

VectorStar™ MS464xB Series

Microwave Vector Network Analyzer

MS4642B VNA, 10 MHz to 20 GHz, K Connectors

MS4644B VNA, 10 MHz to 40 GHz, K Connectors

MS4645B VNA, 10 MHz to 50 GHz, V Connectors (No longer available)

MS4647B VNA, 10 MHz to 70 GHz, V Connectors



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Chapter 1 — Overview

1-1 Introduction

This manual provides a reference for the VectorStar Series VNA User Interface (UI) menus and dialog boxes. In addition, this manual provides the context-sensitive portion of the instrument Help system.

The full documentation set for the VectorStar is listed in [“Related Documentation” on page 1-2](#).

1-2 Documentation Conventions

Instrument Identification

Throughout this manual, the following term definitions are used:

- VectorStar VNA refers to any VectorStar VNA instrument or system.
- VNA refers to any VectorStar standalone VNA instrument.
- MS4640B or MS464xB may refer to any MS4642B, MS4644B, MS4645B, or MS4647B VNA.

When required to identify a specific VNA model, the specific model number is used, such as MS4647B.

Note

Many of the images in this document are used as typical representations of the user interface. Your instrument and instrument displays may vary slightly from these images.

Hard Keys or Front Panel Keys

Front panel hard keys are denoted with a bold Sans Serif font such as “Press the front panel **Frequency** key.”

User Interface, Menus, and Soft Buttons

The MS464xB Series VNA user interface consists of menus, button lists, sub-menus, toolbars, and dialog boxes. All of these elements are denoted with a regular Sans Serif font, such as the CALIBRATION menu or the AutoCal button.

User Interface Navigation

- **Previous**

The prior object such as a menu or dialog box that was used to navigate to the current object is always identified with a “Previous” cross reference line. In some cases, multiple menus can link to the same sub-menu/dialog.

- **Navigation**

Elements in navigation shortcuts or paths (identified as “Navigation”) are separated with the pipe symbol (“|”). Menu and dialog box names are distinctive font in CAPITALS. Button names are in Title Case. For example, the path to the AUTOCAL menu is:

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT

User Input

User input such as entering values or other information is denoted in a mono-spaced font such as:

This font denotes a string of user input.

1-3 Related Documentation

The latest product information and documentation can be found on the VectorStar product web page:

<https://www.anritsu.com/en-us/test-measurement/products/ms4640b-series>

On this web page, you can select various tabs for more information about your instrument. Included is a “Library” tab which contains links to all the latest technical documentation related to this instrument.

Product Information, Compliance, and Safety

Refer to the VectorStar Product Information, Compliance, and Safety (PICS) – 10100-00063 for applicable product information, compliance statements, and safety information, including links to applicable product web pages.

1-4 Contacting Anritsu

To contact Anritsu, please visit:

<https://www.anritsu.com/en-US/contact-us>

From here, you can select the latest sales, service and support contact information in your country or region, provide online feedback, complete a “Talk to Anritsu” form to get your questions answered, or obtain other services offered by Anritsu.

Chapter 2 — Main Menu

2-1 Chapter Overview

This user interface (UI) reference chapter provides summary operational information about the UI and a detailed overview of the primary controls on the top-of-screen **Menu Bar** and **Icon Bar**, and the right-side application **Main Menu**. The **MAIN Menu** is available for VectorStar VNAs. The **Menu Bar** provides a drop-down menu interface to major instrument functions. The **Icon Bar** provides single-click access to many instrument functions and is user-configurable to meet individual needs.

Note

VNA commands should be issued either using the front panel GUI or remotely, not intermixed. Dialog values may not be updated if remote commands are sent while dialog boxes are open.

2-2 MAIN Menu

The **MAIN Menu** (or **MAIN**) provides arrow buttons that link to lower-level submenus. The bulleted navigation paths presented in the sections below use the following conventions:

- Buttons are in initial capitals, such as **Channel** for the Channel button. For brevity, buttons are not named.
- Menus, toolbars, and dialog box names are in all capitals, such as **FREQUENCY** for the Frequency menu.
 - For brevity, menus are not labeled with the word “menu.”
 - Dialog boxes are labeled with the words “dialog box” such as the **SAVE FILE** dialog box.
 - Toolbars are labeled such as the **START FREQUENCY** field toolbar.

MAIN Menu

Navigation paths to all menus, toolbars, and dialog boxes start with the MAIN menu

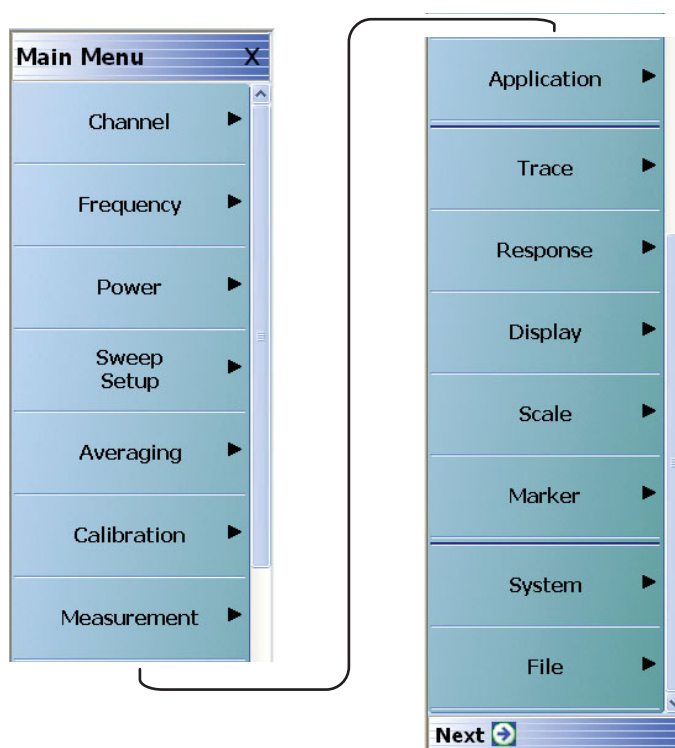


Figure 2-1. MAIN MENU

Channel

Select displays the CHANNEL menu.

- [“Channel Menus” on page 3-1](#)

Frequency

Select displays the FREQUENCY menu. The name, appearance, and available buttons on the FREQUENCY menu varies depending on the sweep type set and if CW frequency is selected.

- [“Frequency Menus” on page 4-1](#)

Power

Select displays the POWER menu, which varies depending on 2-Port or 4-Port Mode, and the installed options.

- [“Power Menus – 2-Port VNAs” on page 5-1](#)
- [“Power Menus – 4-Port VNAs” on page 6-1](#)

Sweep Setup

Select displays the SWEEP SETUP menu.

- [“Sweep Menus” on page 7-1](#)

Averaging

Select displays the AVERAGING menu.

- [“Averaging Menus” on page 8-1](#)

Calibration

Select displays the CALIBRATION menu.

- [“Calibration Menus – 2-Port VNAs” on page 9-1](#)
- [“Calibration Menus – 4-Port VNAs” on page 10-1](#)

Measurement

Select displays the MEASUREMENT menu.

- [“Measurement Menus” on page 11-1](#)

Application

Select displays the APPLICATION menu.

- [“Application Menus – Overview” on page 12-1](#)
- [“Multiple Source” on page 13-1](#)
- [“Broadband/mmWave” on page 14-1](#)
- [“Noise Figure \(Option 41\)” on page 15-1](#)
- [“Differential Noise Figure \(Option 48\)” on page 16-1](#)
- [“Mixer Setup” on page 17-1](#)
- [“NxN” on page 18-1](#)
- [“PulseView™” on page 19-1](#)
- [“DifferentialView™ \(True Mode Stimulus\)” on page 20-1](#)
- [“Spectrum Analysis” on page 23-1](#)

Trace

Select displays the TRACE menu.

- [“Trace Menus” on page 24-1](#)

Response

Select displays the RESPONSE menu.

- [“Response Menus – 2-Port VNAs” on page 25-1](#)
- [“Response Menus – 4-Port VNAs” on page 26-1](#)

Display

Select displays the DISPLAY menu.

- [“Display Menus” on page 27-1](#)

Scale

Select displays the SCALE menu which allows the user to change the scaling and other attributes of a trace display.

- [“Scale Menus” on page 28-1](#)

The available SCALE menu buttons change based on the settings on the TRACE FORMAT menu.

- [“Trace Menus” on page 24-1](#)

Marker

Select displays the MARKER [1] menu.

- [“Marker Menus” on page 29-1](#)

System

Select displays the SYSTEM menu.

- [“System Menus” on page 30-1](#)

File

Select displays the FILE menu.

- [“File Management Menus” on page 31-1](#)

2-3 Context (Right-Click) Menus

The ShockLine Series VNA provides three context menus, which can be accessed by right-clicking in the designated areas:

- [Main Display Area, Menu Bar, and Icon Toolbar](#)
- [Right-Side Menu](#)
- [Right-Side Menu Scroll Bar](#)

Main Display Area, Menu Bar, and Icon Toolbar

- Context menu displays the Active Channel Number and Active Trace Number.
- The active channel's Hold state is indicated by a check mark in the context menu.
- Right-clicking to activate the context menu will not change the active channel.

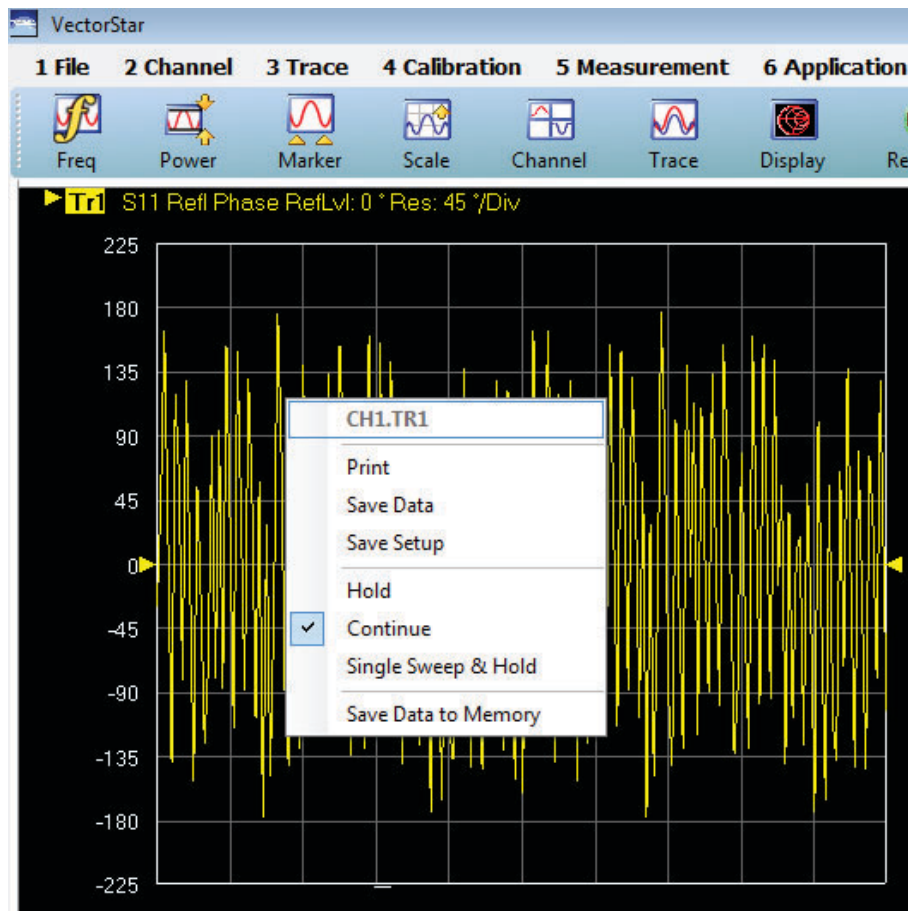


Figure 2-2. Main Display Area Context Menu

Right-Side Menu

- Context menu allows definition of up to five custom icon functions using the Right-side Menu context menu. The actual icon symbols are predefined.
 - Click Set as Icon X to display the Custom Icon dialog.

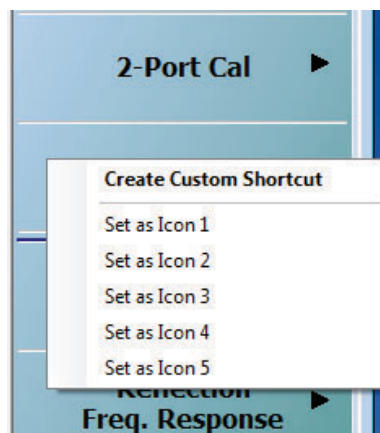


Figure 2-3. Right-side Menu Context Menu—Initial State

- Enter a Display Name of between 1 and 15 characters and click Save.

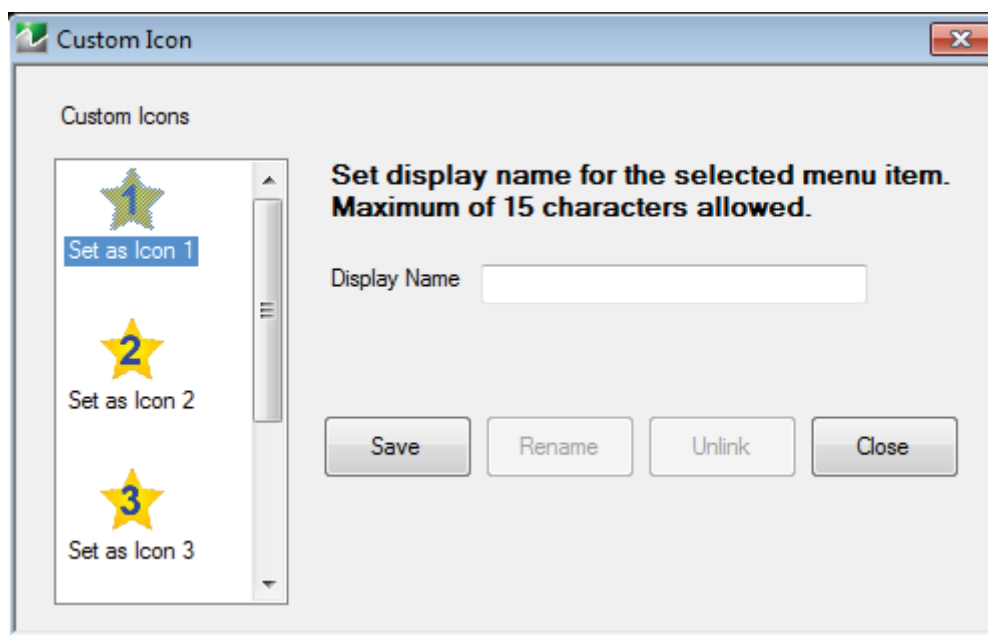


Figure 2-4. Custom Icon Dialog Box—Initial State

- The custom icon will be added to the Icon Bar. The name of the selected custom icon will be changed in both the Right-side Menu context menu and the Custom Icon dialog box. To move the icon in the Icon Bar, use Customize Toolbar.
 - If the Icon Bar is full, use Utilities | Customize Toolbar to adjust the number of icons in the Icon Bar. The Customize Toolbar feature is described in the *VectorStar MS464xB Series Microwave Vector Network Analyzer Operation Manual* (10410-00317).

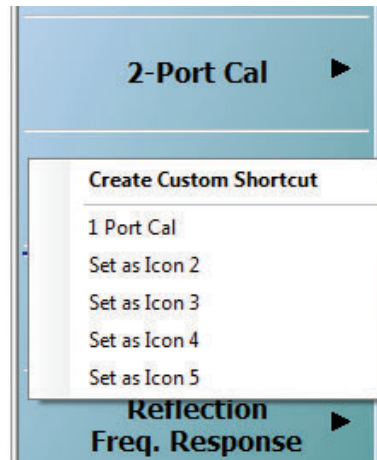


Figure 2-5. Custom Icon Dialog Box and Icon Bar—1-Port Cal Icon Added

- d. To redefine a custom icon, right-click the desired menu button and select the appropriate icon entry in the **Right-side Menu** context menu. Enter new name, if desired, and click **Save**.
- e. To deactivate a custom icon, right-click in the **Right-side Menu** context menu and select the appropriate icon entry in the **Right-side Menu** context menu. In the **Customize Icon** dialog, click **Unlink**. The custom icon will be removed from the **Icon Bar**. The name of the selected custom icon will be changed to **Set as Icon X** in both the **Right-side Menu** context menu and the **Custom Icon** dialog box.

Right-Side Menu Scroll Bar

- Available when right-side menu has extended content with a scroll-bar. Right-click in scroll bar.

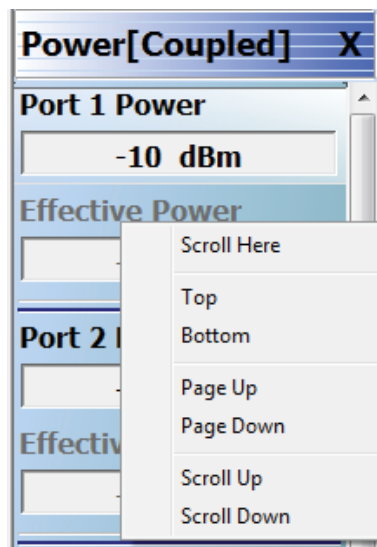


Figure 2-6. Right-Side Menu Scroll Bar Context Menu

Chapter 3 — Channel Menus

3-1 Chapter Overview

This chapter provides information for setting the number of channels and how they are displayed on the instrument. If the instrument is in 25,000 point mode, up to 16 channels can be configured, each with up to 16 traces per channel. If the instrument is in 100,000 point mode, only one channel with up to 16 traces can be displayed.

3-2 Overview of Channel Menus

There are two channel menus:

- [“CHANNEL Menu” on page 3-2](#)
- [“CHAN. LAYOUT Menu” on page 3-6](#)

3-3 Channel Menus

The CHANNEL menu and the CHAN. LAYOUT menus are related in that the setting on one menu affects the setting on the other menu.

CHANNEL Menu

Previous

- “MAIN Menu” on page 2-2

Navigation

- MAIN | Channel | CHANNEL

Channel

X

Chan. Max

Chan. Next

Chan. Previous

Channel Detach

of Channels

2

Chan. Layout

Channel Sweep Config.

Channel Menu in 100k Mode

Channel

X

Chan. Max

Chan. Next

Chan. Previous

Channel Detach

of Channels

1

Chan. Layout

Channel Sweep Config.

Chan. Max

When multiple channels are displayed, use the Channel Maximum button to maximize the active channel to fill the display area. Clicking a second time returns to the prior multi-channel view.

Chan. Next

When multiple channels are displayed, the Channel Next button activates the next higher channel number. When the highest channel number is reached, the next click activates channel 1 (one).

Chan. Previous

When multiple channels are displayed, the Channel Previous button activates the next lower channel number. When channel 1 (one) is reached, the next click activates the highest channel number.

Channel Detach

Clicking on the Channel Detach menu item will display a separate detached window from the active channel that is currently selected in the main application. The maximum number of possible detached windows is 16. The main application and corresponding detached windows are shown in [Figure 3-2 on page 3-3](#) through [Figure 3-6 on page 3-5](#).

of Channels

Select displays the Number of Channels field toolbar. The toolbar allows the user to set the number of displayed channels in discrete values of 1 (one), 2, 3, 4, 6, 8, 9, 10, 12, or 16 channels. If other channel settings are applied (5, 7, 11, 13, or 14), the instrument applies the next permitted channel setting. The Channel Layout (described below) is automatically set to the number of selected channels. If the instrument is in 100,000 point mode, only 1 (one) channel is available.

of Channels : 16

^

v

Enter

X

Chan. Layout

The Channel Layout button displays the CHAN. LAYOUT menu which defines how multiple channels are displayed on the screen.

- “CHAN. LAYOUT Menu” on page 3-6

Channel Sweep Config.

The Channel Sweep Config button displays the CH.SWEEP CONFIG menu which allows the user to configure the sweep settings for each channel.

- “CHANNEL SWEEP CONFIG Menu” on page 3-9

Figure 3-1. CHANNEL Menu

Examples of Detached Channels

Below are a number of examples of detached channels:

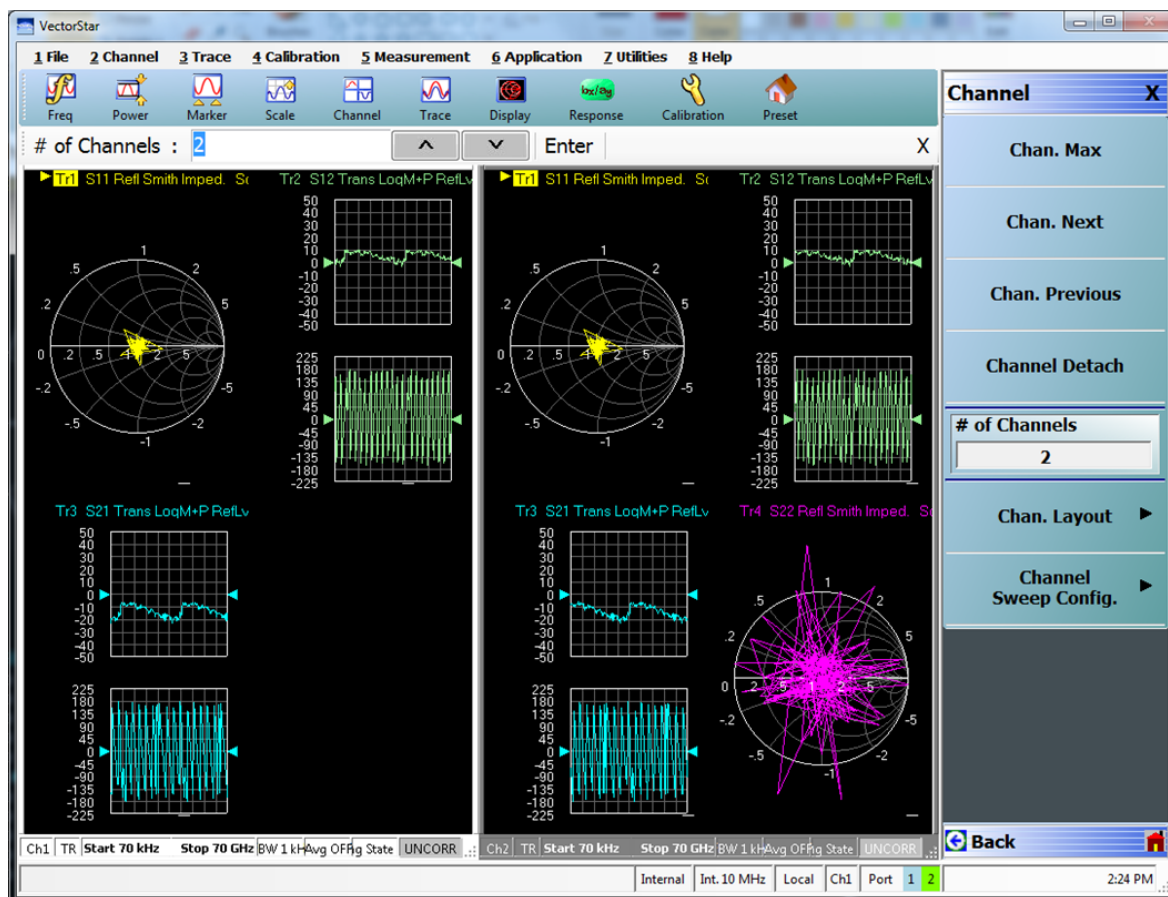


Figure 3-2. Channel Menu – Full Screen View Showing Channel Detach Button

Features

- The user can create multiple detached windows which can be used to display a particular Trace/Channel in a separate window.
- The user can monitor different channels in different detached windows. The diagrams in [Figure 3-2](#) and [Figure 3-3 on page 3-4](#) show the above two channels displayed in two different detached windows.
- Changes made in Ch1 and Ch2 from the main application will affect the respective Detached Windows.

100k Mode

- In 100k mode the user can create a maximum number of 16 detached windows for a single channel.
- The user can monitor the different traces in different detached windows.
- In Channel menu, when in 100k mode, only the menu item Channel Detach will be enabled.

Notes

- The message: "Maximum number of supported detach windows is 16." is displayed when user tries to detach a window when 16 detached windows are already running.
- In the case of an "Out of Memory" scenario, an error message is displayed to the user: "Unable to add additional windows due to memory limits."

Channel 1 Detached

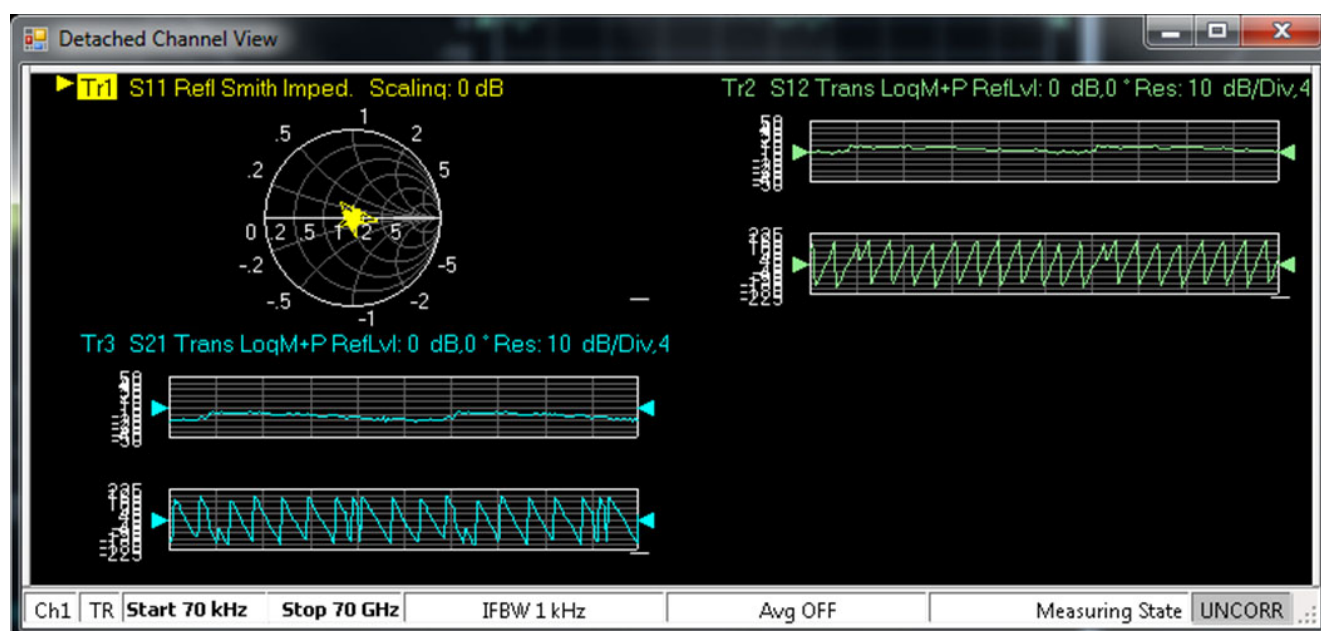


Figure 3-3. Detached Channel View – Channel 1 in Detached Window 1

Channel 2 Detached

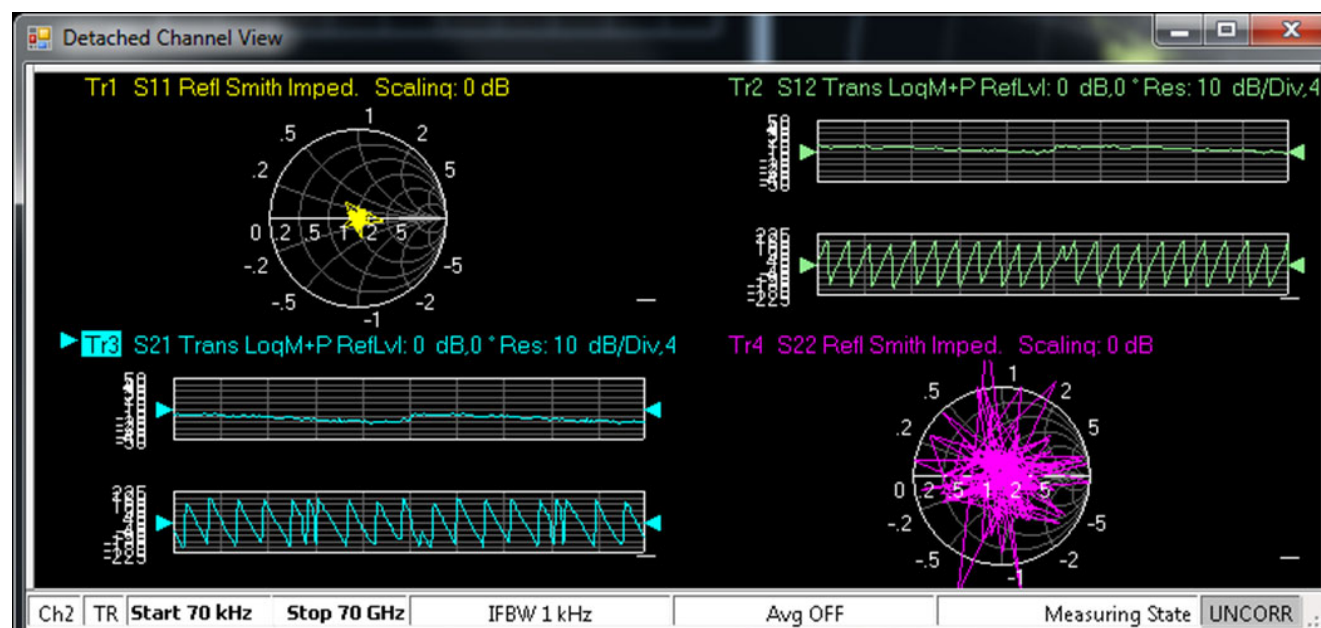


Figure 3-4. Detached Channel View – Channel 2 in Detached Window 2

Monitoring Individual Traces

The user can monitor different Traces in different Detached Windows. [Figure 3-5](#) and [Figure 3-6](#) shows two different traces in two different detached windows.

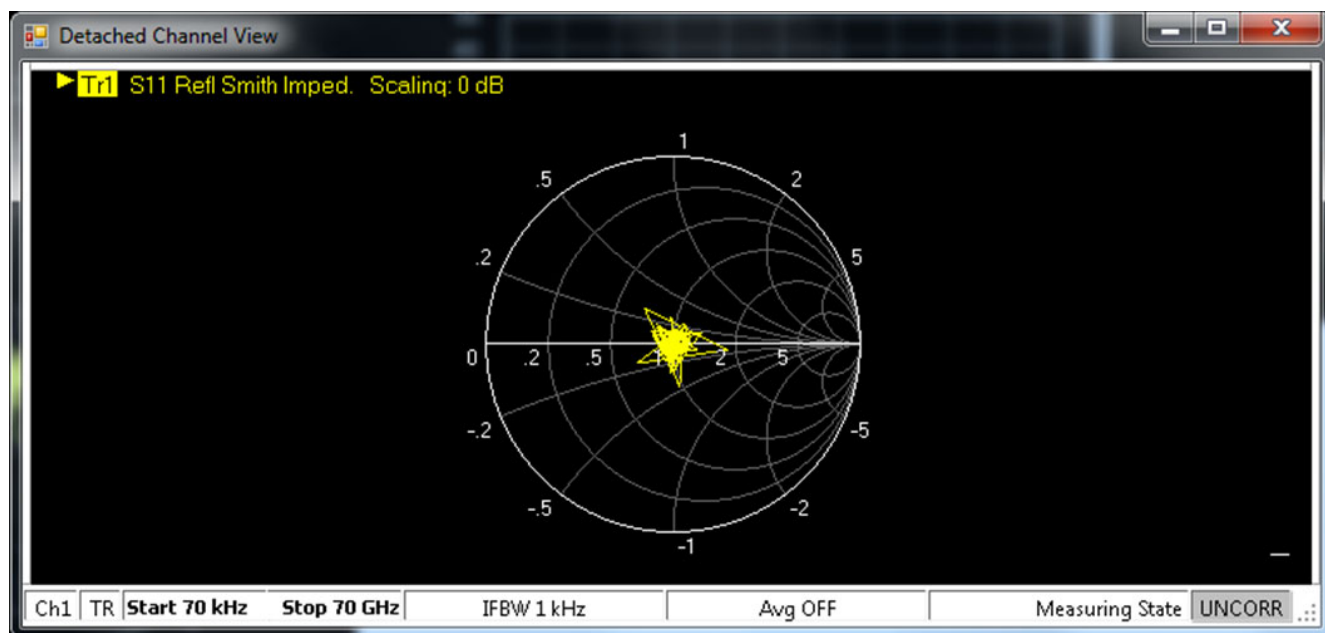


Figure 3-5. Detached Channel View – Trace 1 of Channel 1 in Detached Window 1

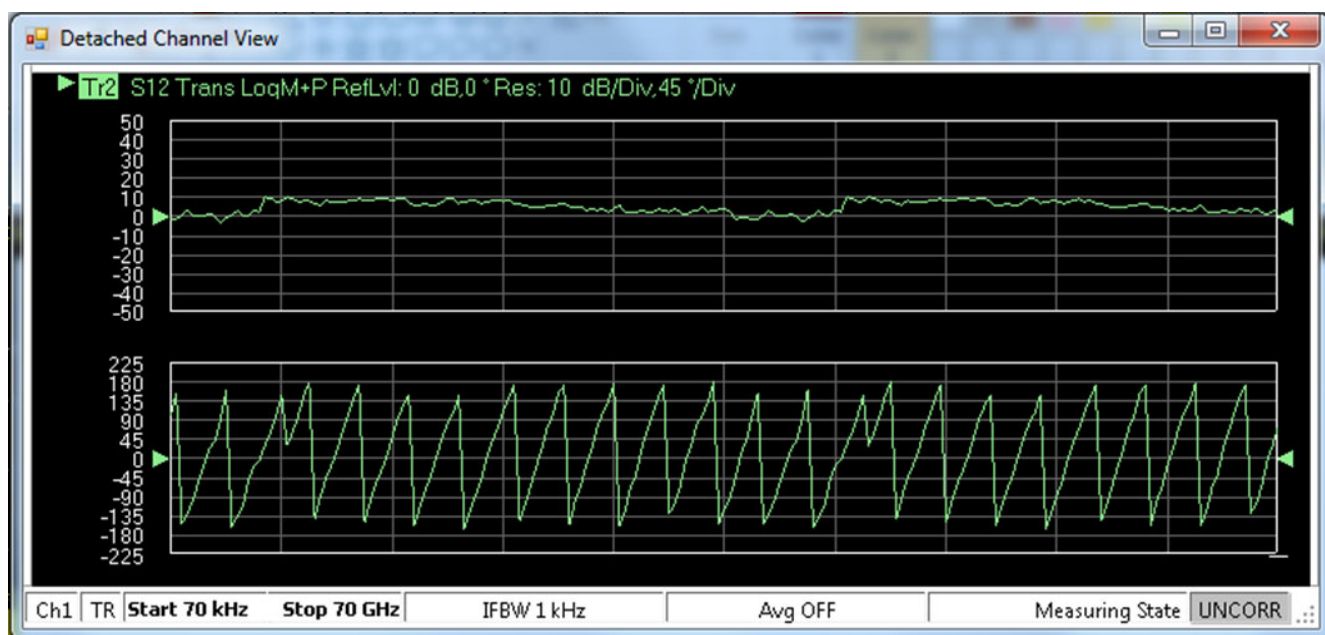


Figure 3-6. Detached Channel View – Trace 2 of Channel 1 in Detached Window 2

CHAN. LAYOUT Menu

The CHANNEL LAYOUT menu allows the user to select from 22 available channel views. The channel view buttons are not labeled, but instead provide a representative icon of each view configuration. For example, the Single Channel View button provides a channel view where one channel is displayed in one display area. Once the desired view is selected, click the Back button at the bottom of the CHAN. LAYOUT menu to return to the CHANNEL menu. Note that CHAN. LAYOUT menu setting and the # of Channels setting on the CHANNEL menu are linked. Changing the number of channels selects an appropriate channel layout. Changing the channel layout where the number of displayed channels changes, changes the number of channels set on the CHANNEL menu.

Previous

- [“CHANNEL Menu” on page 3-2.](#)

Navigation

- MAIN | Channel | CHANNEL | Chan. Layout | CHAN. LAYOUT.

Note

The **Chan. Layout** buttons do not have labels, but do have tool tips that appear if the mouse pointer is hovered over the button. The selected channel layout view is indicated by the button selected icon. For VNA programmatic control, note also that each channel layout is described by the appropriate SCPI parameter. For example, to program a three across channel layout, use the R1C3 parameter.

The long CHAN LAYOUT menu is immediately below. The names of the different channel layout displays are shown in the [Table 3-1, “Channel Layout Options” on page 3-7](#) below.

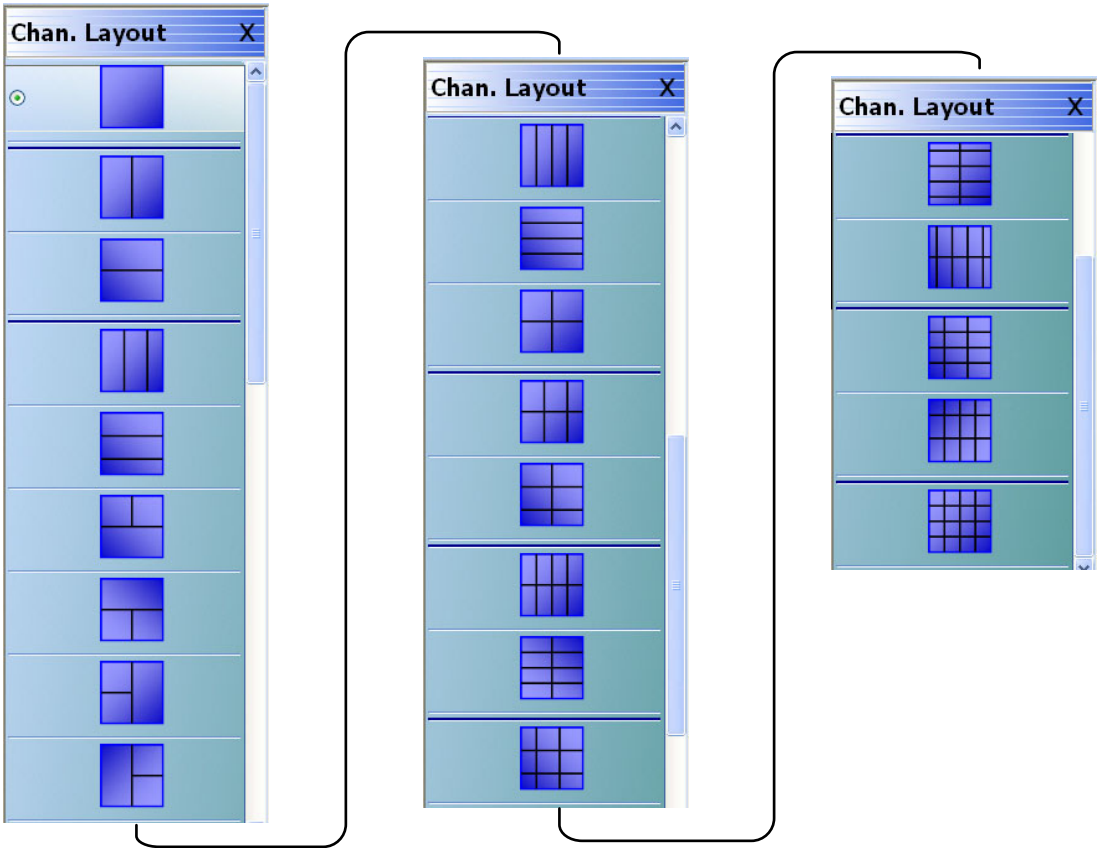


Figure 3-7. CHAN. LAYOUT (CHANNEL LAYOUT) Menu

The table below describes each Channel Layout option.

Table 3-1. Channel Layout Options (1 of 2)

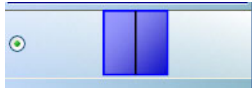
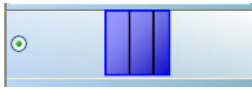
Graphic	Description
	Single Channel View Click Back to return to the CHANNEL menu. R1C1 for SCPI programs.
	Two Channel View – 2 Across x 1 Down Click Back to return to the CHANNEL menu. R1C2 for SCPI programs.
	Two Channel View – 1 Across x 2 Down Click Back to return to the CHANNEL menu. R2C1 for SCPI programs.
	Three Channel View – 3 Across Click Back to return to the CHANNEL menu. R1C3 for SCPI programs.
	Three Channel View – 3 Down Click Back to return to the CHANNEL menu. R3C1 for SCPI programs.
	Three Channel View – 2 on Top x 1 on Bottom Click Back to return to the CHANNEL menu. R2C2C1 for SCPI programs.
	Three Channel View – 1 on Top x 2 on Bottom Click Back to return to the CHANNEL menu. R2C1C2 for SCPI programs.
	Three Channel View – 2 on Left x 1 on Right Click Back to return to the CHANNEL menu. C2R2R1 for SCPI programs.
	Three Channel View – 1 on Left x 2 on Right Click Back to return to the CHANNEL menu. C2R1R2 for SCPI programs.
	Four Channel View – 4 Across Click Back to return to the CHANNEL menu. R1C4 for SCPI programs.
	Four Channel View – 4 Down Click Back to return to the CHANNEL menu. R4C1 for SCPI programs.

Table 3-1. Channel Layout Options (2 of 2)

Graphic	Description
	Four Channel View – 2 Across x 2 Down Click Back to return to the CHANNEL menu. R2C2 for SCPI programs.
	Six Channel View – 3 Across x 2 Down Click Back to return to the CHANNEL menu. R2C3 for SCPI programs.
	Six Channel View – 2 Across x 3 Down Click Back to return to the CHANNEL menu. R3C2 for SCPI programs.
	Eight Channel View – 4 Across x 2 Down Click Back to return to the CHANNEL menu. R2C4 for SCPI programs.
	Eight Channel View – 2 Across x 4 Down Click Back to return to the CHANNEL menu. R4C2 for SCPI programs.
	Nine Channel View – 3 Across x 3 Down Click Back to return to the CHANNEL menu. R3C3 for SCPI programs.
	Ten Channel View – 5 Across x 2 Down Click Back to return to the CHANNEL menu. R5C2 for SCPI programs.
	Ten Channel View – 2 Across x 5 Down Click Back to return to the CHANNEL menu. R2C5 for SCPI programs.
	Twelve Channel View – 3 Across x 4 Down Click Back to return to the CHANNEL menu. R4C3 for SCPI programs.
	Twelve Channel View – 4 Across x 3 Down Click Back to return to the CHANNEL menu. R3C4 for SCPI programs.
	Sixteen Channel View – 4 Across x 4 Down Click Back to return to the CHANNEL menu. R4C4 for SCPI programs.

CHANNEL SWEEP CONFIG Menu

The CHANNEL SWEEP CONFIG menu allows the user to configure the sweep settings for each channel.

Previous

- “CHANNEL Menu” on page 3-2.

Navigation

- MAIN | Channel | CHANNEL | Channel Sweep Config | CH. SWEEP CONFIG



Figure 3-8. Channel Sweep Configuration Menu and Dialog (1 of 2)

1. Channel Sweep Config Menu – Sweep only active channel toggled to ON – In this mode:

- Only the active channel will be sweeping and all the other channels will be put on HOLD.
- If the user changes the active channel, the new channel that has become active will sweep and all other channels will be put on HOLD.
- User will not be able to start sweep (via remote) for any of the inactive channels.
- User will be able to perform “All channel” operations such as “Hold all channels”, “Continue all channels”, “Restart all channels” and “Single Sweep & Hold all channels”.
- In this mode, the Channel Sweep Config. button is disabled.

2. Channel Sweep Config Menu – Sweep only active channel toggled to OFF – In this mode:

- The Channel Sweep Config. button is active. Clicking on this button opens the Channel Sweep Configuration dialog.

3. Channel Sweep Configuration dialog allowing user selected channels set to either Measure or Hold.**4. Channel Sweep Configuration** dialog showing channels set to Measure all.**5. Channel Sweep Configuration** dialog showing channels set to Hold all.

Figure 3-8. Channel Sweep Configuration Menu and Dialog (2 of 2)

Chapter 4 — Frequency Menus

4-1 Chapter Overview

This chapter provides information for configuring and displaying the frequency menus and their variants. The menus and associated field toolbars allow the user set various frequency start, stop, span, point, and CW mode parameters. The settings on the Frequency menu apply to the currently active channel. Settings on the SWEEP TYPES and other menus affect the frequency menu appearance, button availability, and available controls.

4-2 Overview of Frequency Menus

There are six FREQUENCY menu variants:

- [“FREQUENCY Freq.-Based Linear Sweep Menu” on page 4-4](#)
- [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
- [“FREQUENCY Freq.-Based Segmented Sweep Menu” on page 4-8](#)
- [“FREQUENCY Index-Based Segmented Sweep Menu” on page 4-9](#)
 - Note that this frequency menu has been renamed from its functional name of the “FREQUENCY Index-Based Segmented Sweep Menu” on page 4-9
- [“FREQUENCY Power Sweep CW-Based Menu” on page 4-10](#)
- [“FREQUENCY Power Sweep Swept Freq Menu” on page 4-11](#)

4-3 Frequency Menus

The frequency menus and associated field toolbars allow the user set various frequency start, stop, span, point, and CW mode parameters. The settings on the Frequency menu apply to the currently active channel.

There is a single menu for frequency that appears in several variants depending on the setting on the SWEEP TYPES menu.

FREQUENCY Menu Changes

The buttons present, button availability, and the menu name of the FREQUENCY menu change depending on the setting of the SWEEP TYPES menu. Detailed descriptions of each menu and the contained buttons are in the sections below. The different frequency menus are described below.

FREQUENCY Menu with Frequency-Based Sweep (Linear)

If Sweep Types is set to Frequency-Based Sweep (Linear), the full nine (9) button FREQUENCY menu (described in the sections below) is available.

- Available buttons are Start, Stop, Center, Span, # of Points, Step Size (read-only display), CW Mode, CW Frequency, and Src1-Src2 Phase.
- The availability of these buttons depends on whether CW Mode is on or off.
- [“FREQUENCY Freq.-Based Linear Sweep Menu” on page 4-4](#)

SWEEP Menu Information:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu with Frequency-Based Sweep (Log)

If Sweep Types is set to Frequency-Based Sweep (Linear), the full nine (9) button FREQUENCY menu (described in the sections below) is available.

- Available buttons are Start, Stop, Center, Span, # of Points, Step Size (read-only display), CW Mode, CW Frequency, and Src1-Src2 Phase.
- The availability of these buttons depends on whether CW Mode is on or off.
- [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
- SWEEP Menu Information:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu with Segmented Sweep (Frequency-Based)

If the SWEEP TYPE is set to Segmented Sweep (Frequency-Based), the FREQUENCY menu changes to six (6) button menu with three active buttons and three read-only displays.

- The three (3) active buttons are Start Range, Stop Range, and Maximize Range
- The three read-only buttons are Display Start, Display Stop, and DataPoints.
- [“FREQUENCY Freq.-Based Segmented Sweep Menu” on page 4-8](#)
- SWEEP Menu Information:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu – INDEX. SEG. SWP Menu with Segmented Sweep (Index-Based)

When the SWEEP TYPE is set to Segmented Sweep (Index-Based), the FREQUENCY menu name changes to INDEX. SEG. SWP and the menu changes to a six (6) button menu with three active buttons and three read-only displays.

- The three (3) active buttons are Start Index, Stop Index, and Maximize Range
- The three read-only buttons are Display Start Index, Display Stop Index, and DataPoints.
- Both links go to the same location.
- [“FREQUENCY Index-Based Segmented Sweep Menu” on page 4-9](#)
- [“FREQUENCY Index-Based Segmented Sweep Menu” on page 4-9](#)
- SWEEP Menu Information:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu with Power Sweep (CW Frequency)

When the SWEEP TYPE is set to Power Sweep (CW) Sweep, the FREQUENCY menu has only two buttons consisting of a read-only display button for CW Mode, and a CW Frequency field button.

- [“FREQUENCY Power Sweep CW-Based Menu” on page 4-10](#)
- SWEEP Menu Information:
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Menu with Power Sweep (Swept Frequency)

When the SWEEP TYPE is set to Power Sweep (Swept Frequency), the FREQUENCY menu changes to an eight (8) button menu with seven (7) active buttons and one read-only display.

- The three (3) buttons of Start Index, Stop Index, and Maximize Range are available.
- The three (3) read-only buttons of Display Start Index, Display Stop Index, and Data Points are displayed.
- The availability of these buttons depends on whether CW Mode is on or off.
- [“FREQUENCY Power Sweep Swept Freq Menu” on page 4-11](#)

SWEEP Menu Information:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

FREQUENCY Freq.-Based Linear Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- If the SWEEP TYPE is set to Frequency Sweep (Linear), the FREQUENCY menu changes to a nine (9) button menu with seven (7) active buttons and typically two read-only displays.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Frequency | FREQUENCY-

Frequency

Start

10.000000 MHz

Stop

70.000000000 GHz

Center

35.005000000 GHz

Span

69.990000000 GHz

of Points

51

StepSize

1.399800000 GHz

CW Mode

OFF

CW Frequency

10.000000 MHz

Src1-Src2 Phase

0 °

Start (Frequency)

Displays the Start (Frequency) field toolbar and allows the user to enter a starting frequency on a per-channel basis.

Start : 70.000 kHz ^ v GHz MHz kHz Hz X

Stop (Frequency)

Displays the Stop (Frequency) field toolbar and allows the user to enter a stop frequency on a per-channel basis.

Stop : 10.000000000 GHz ^ v GHz MHz kHz Hz X

Center (Frequency)

The Center (Frequency) button displays the Center (Frequency) field toolbar and allows the user to enter a center frequency on a per-channel basis.

Center : 5.000035000 GHz ^ v GHz MHz kHz Hz X

Span (Frequency)

The Span (Frequency) button displays the Span (Frequency) field toolbar and allows the user to enter a span frequency on a per channel basis.

Span : 9.999930000 GHz ^ v GHz MHz kHz Hz X

of Points

The Number of Points button displays the # of Points field toolbar and allows the user to enter the number of points for the frequency span, allowing separate parameter point settings for CW Mode ON and CW Mode OFF.

of Points : 201 ^ v Enter X

Figure 4-1. FREQUENCY Freq.-Based Linear Sweep Menu (1 of 2)

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	<div><div>Step Size (Frequency)</div><div>A read-only field displays the calculated frequency step-size based on the requested frequency span and the number of points selected in the buttons above. If the CW Mode (below) is set to ON, the read-only field displays 0 (zero) Hz.</div><div>CW Mode (Off/On)</div><div>The Continuous Wave (CW) toggle button, on a per-channel basis, toggles the CW function off and on. The default setting is off. If CW Mode is ON, the Step Size (Frequency) display (described above) is set to 0 (zero) Hz and the # of Points setting changes to what has been set for the CW Mode.</div><div>CW Frequency</div><div>The CW Frequency button displays the CW Frequency field toolbar and allows the user to set the required CW frequency. Input the required frequency value and select GHz, MHz, kHz, or Hz. If a calibration is active, the VNA will choose the closest CW frequency point from the active calibration points. If the requested CW frequency is a calibrated point, the VNA will assign the entered value. Note that the CW Frequency must fall within the range set by the Start/Stop buttons above.</div><div><div>CW Frequency : 70.000 kHz<div><div>^</div><div>v</div></div><div>GHzMHzkHzHz</div></div></div><div><div>Src1-Src2 Phase</div><div>The Src1-Src2 Phase button is available when both internal sources are set to Active. Select displays the Src1-Src2 Phase field toolbar and allows the user to set the required phase relationship between the two internal sources.</div><div><div>Src1-Src2 Phase : 0.00 °<div><div>^</div><div>v</div></div><div>°</div></div></div></div></div>
--	---

Figure 4-1. FREQUENCY Freq.-Based Linear Sweep Menu (2 of 2)

FREQUENCY Freq.-Based Log Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)

Previous

- [“MAIN Menu” on page 2-2](#)
- Consult the section above for menu identification and prerequisites.

Prerequisites

- If the SWEEP TYPE is set to Frequency Sweep (Log), the FREQUENCY menu changes to a nine (9) button menu with seven (7) active buttons and typically two read-only displays.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Frequency | FREQUENCY

Frequency

Start

70.000 kHz

Stop

70.000000000 GHz

Center

35.000035000 GHz

Span

69.999930000 GHz

of Points

196

StepSize

N/A in Log Sweep

CW Mode

OFF

CW Frequency

70.000 kHz

Src1-Src2 Phase

0 °

Start (Frequency)

Displays the Start (Frequency) field toolbar and allows the user to enter a starting frequency on a per-channel basis.

Start : 70.000 kHz ^ v GHz MHz kHz Hz X

Stop (Frequency)

Displays the Stop (Frequency) field toolbar and allows the user to enter a stop frequency on a per-channel basis.

Stop : 10.000000000 GHz ^ v GHz MHz kHz Hz X

Center (Frequency)

The Center (Frequency) button displays the Center (Frequency) field toolbar and allows the user to enter a center frequency on a per-channel basis.

Center : 5.000035000 GHz ^ v GHz MHz kHz Hz X

Span (Frequency)

The Span (Frequency) button displays the Span (Frequency) field toolbar and allows the user to enter a span frequency on a per channel basis.

Span : 9.999930000 GHz ^ v GHz MHz kHz Hz X

Figure 4-2. FREQUENCY Freq.-Based Log Sweep Menu (1 of 2)

	<div><div># of Points (Number)</div><div>The Number of Points button displays the # of Points field toolbar and allows the user to enter the number of points for the frequency span.</div><div>This button allows separate parameter point settings for CW Mode ON and CW Mode OFF.</div><div><div># of Points : 201</div><div>^</div><div>v</div><div>Enter</div><div>X</div></div><div><div>Step Size (Frequency)</div><div>If the SWEEP TYPES menu is set to Freq Sweep (Log), the Step Size display defaults to N/A in Log Sweep.</div><div><div>• “SWEEP TYPES Menu” on page 7-4</div><div>• MAIN Sweep Setup SWEEP SETUP Sweep Types SWEEP TYPES</div></div><div><div>CW Mode (Off/On)</div><div>The Continuous Wave (CW) toggle button, on a per-channel basis, toggles the CW function off and on. The default setting is off.</div><div>If CW Mode is ON, the Step Size (Frequency) display (described above) is set to 0 (zero) Hz and the # of Points setting changes to what has been set for the CW Mode.</div><div><div>CW Frequency</div><div>The CW Frequency button displays the CW Frequency field toolbar and allows the user to set the required CW frequency. Input the required frequency value and select GHz, MHz, kHz, or Hz. Note that the CW Frequency must fall within the range set by the Start/Stop buttons above.</div><div><div>CW Frequency : 70.000 kHz</div><div>^</div><div>v</div><div>GHz</div><div>MHz</div><div>kHz</div><div>Hz</div><div></div></div><div><div>Src1-Src2 Phase</div><div>The Src1-Src2 Phase button is available when both internal sources are set to Active. Select displays the Src1-Src2 Phase field toolbar and allows the user to set the required phase relationship between the two internal sources.</div><div><div>Src1-Src2 Phase : 0.00 °</div><div>^</div><div>v</div><div>°</div><div>X</div></div></div></div></div></div></div>
--	---

Figure 4-2. FREQUENCY Freq.-Based Log Sweep Menu (2 of 2)

FREQUENCY Freq.-Based Segmented Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- If the SWEEP TYPE is set to Segmented Sweep (Frequency-Based), the FREQUENCY menu changes to six (6) button menu with three active buttons and three read-only displays.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Frequency | FREQUENCY

Frequency

Start Range

2.857192857 GHz

Stop Range

10.000000000 GHz

Maximize Range

Display Start

2.857192857 GHz

Display Stop

10.000000000 GHz

DataPoints

11

Start Range (Frequency)

Select displays the Start Range (Frequency) toolbar with frequency values and units of GHz, MHz, kHz, and Hz.

Start Range : 2.857192857 GHz ^ v GHz MHz kHz Hz X

Stop Range (Frequency)

Select displays the Stop Range (Frequency) toolbar with frequency values and units of GHz, MHz, kHz, and Hz.

Stop Range : 10.000000000 GHz ^ v GHz MHz kHz Hz X

Maximize Range (Frequency)

Select maximizes the start and stop value to the maximum of the instrument. Note that when clicked, any previously entered Start and Stop value are overwritten and cannot be recovered unless a preset save was done.

Display Start (Frequency)

A read-only display of the Start Range frequency.

Display Stop (Frequency)

A read-only display of the Stop Range frequency.

DataPoints (Number)

A read-only display of the calculated number of data points in the set frequency range.

Figure 4-3. FREQUENCY Freq.-Based Segmented Sweep Menu

FREQUENCY Index-Based Segmented Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- When the SWEEP TYPE is set to Segmented Sweep (Index-Based), the FREQUENCY menu name changes to INDEX. SEG. SWP and the menu changes to a six (6) button menu with three active buttons and three read-only displays.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Frequency | FREQUENCY

	<p>Start (Index Number) Select displays the Start (Index Number) toolbar allowing the selection of a starting index number for the sweep.</p> <p>Start Index : 0</p> <p>Stop Index (Number) Select displays the Stop (Index Number) toolbar allowing the selection of an ending index number for the sweep.</p> <p>Stop Index : 14</p> <p>Maximize Range (Index Number) Select maximizes the start and stop value to the maximum of the instrument. Note that when clicked, any previously entered Start and Stop value are overwritten and cannot be recovered unless a preset save was done.</p> <p>Display Start (Index Number) A read-only display of the Start Index number.</p> <p>Display Stop (Index Number) A read-only display of the Stop Index number.</p> <p>DataPoints (Number) A read-only display of the calculated number of data points in the swept frequency range.</p>
--	---

Figure 4-4. INDEX. SEG. SWP (FREQUENCY) Index-Based Segmented Sweep Menu

FREQUENCY Power Sweep CW-Based Menu

Full Name

Frequency Power Sweep CW-Based

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- When the SWEEP TYPE is set to Power Sweep (CW Frequency), the FREQUENCY menu changes to a two (2) button menu with one active button and one read-only display.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Frequency | FREQUENCY

Frequency

CW Mode

ON

CW Frequency

70.000 kHz

CW Mode (Off/On)

The CW Mode toggle button is set to a read-only value of ON for a per-channel basis.

CW Frequency

The CW Frequency button displays the CW Frequency field toolbar and allows the user to set the required CW frequency. Input the required frequency value and select GHz, MHz, kHz, or Hz. Note that the CW Frequency must fall within the range set by the Start/Stop buttons above.

CW Frequency : 70.000 kHz

^

v

GHz

MHz

kHz

Hz

Figure 4-5. FREQUENCY Power Sweep CW Freq. Menu

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FREQUENCY Power Sweep Swept Freq Menu

Menu Identification and Variants

- The appearance and button availability of the FREQUENCY menu depends on settings on the SWEEP TYPE menu.
- [“FREQUENCY Menu Changes” on page 4-1](#)
- Consult the section above for menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- If the SWEEP TYPE is set to Power Sweep (Swept Frequency), Frequency Sweep (Linear), the FREQUENCY menu changes to an eight (8) button menu with seven (7) active buttons and one read-only display.
- Power sweep (swept frequency) is a limited multi-dimensional sweep mode that allows the evaluation of gain compression across swept frequency.

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Frequency | FREQUENCY

Frequency X

Start
1.000000000 GHz

Stop
45.000000000 GHz

Center
23.000000000 GHz

Span
44.000000000 GHz

of Points
401

StepSize
110.000000 MHz

CW Mode
OFF

CW Frequency
45.000000000 GHz

Start (Frequency)

Displays the Start (Frequency) field toolbar and allows the user to enter a starting frequency on a per-channel basis.

Start : 70.000 kHz ^ v GHz MHz kHz Hz X

Stop (Frequency)

Displays the Stop (Frequency) field toolbar and allows the user to enter a stop frequency on a per-channel basis.

Stop : 10.000000000 GHz ^ v GHz MHz kHz Hz X

Center (Frequency)

The Center (Frequency) button displays the Center (Frequency) field toolbar and allows the user to enter a center frequency on a per-channel basis.

Center : 5.000035000 GHz ^ v GHz MHz kHz Hz X

Figure 4-6. FREQUENCY Power Sweep Swept Frequency Menu (1 of 2)

Span (Frequency)

The Span (Frequency) button displays the Span (Frequency) field toolbar and allows the user to enter a span frequency on a per channel basis.

Span (Frequency) Field Toolbar

Span : 9.999930000 GHz

^

v

GHz

MHz

kHz

Hz

X

of Points (Number)

The Number (#) of Points button displays the # of Points field toolbar and allows the user to enter the number of points for the frequency span. When the sweep is set to Power Sweep (Swept Frequency) on the SWEEP TYPES menu, the number of points is limited to no more than 401, subject to the CW Mode setting below.

• “SWEEP TYPES Menu” on page 7-4

• MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

The # of Points setting depends on the CW Mode:

• If CW Mode is OFF, the range for the number of points is from 2 to 401.

• If CW Mode is ON, the number of points is 1 (one).

of Points : 201

^

v

Enter

X

Step Size (Frequency)

Read-only display. If CW Mode is ON, the step size is set to 0 (zero) Hz.

CW Mode (Off/On)

The Continuous Wave (CW) toggle button, on a per-channel basis, toggles the CW function off and on. The default setting is off.

If CW Mode is ON:

• The Step Size (Frequency) display (described above) is set to 0 (zero) Hz

• The # of Points setting is set to 1 (one) point.

CW Frequency

The CW Frequency button displays the CW Frequency field toolbar and allows the user to set the required CW frequency. Input the required frequency value and select GHz, MHz, kHz, or Hz. Note that the CW Frequency must fall within the range set by the Start/Stop buttons above.

CW Frequency : 70.000 kHz

^

v

GHz

MHz

kHz

Hz

Figure 4-6. FREQUENCY Power Sweep Swept Frequency Menu (2 of 2)

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Chapter 5 — Power Menus – 2-Port VNAs

5-1 Chapter Overview

This chapter provides information on port power control and configuration and, if equipped, attenuator configurations for the VNA in 2-Port Mode. The **POWER** menus and associated field toolbars allow the user to set various power mode parameters. The settings on the **POWER** menus apply to the currently active channel. The power menus, their link structure, appearance, and related dialog boxes vary depending on the setting of the **SWEEP TYPE** menu as either: Frequency-Based Sweep (Linear or Log), Segmented-Based Sweep (Frequency- or Index-Based), or Power-Based Sweep (CW Frequency or Swept Frequency).

Note	For 4-Port Mode POWER menus, see Chapter 6, “Power Menus – 4-Port VNAs” .
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5-2 Overview of Power Menus

The power menu sets and detailed descriptions of each menu, sub-menu and dialog boxes follow:

- “Power Menu Sets” on page 5-6
 - “Power Menus for Frequency-Based Sweeps – 2-Port VNAs” on page 5-6
 - “Power Menus for Frequency-Based Sweeps – 2-Port VNAs (Option 32)” on page 5-8
 - “Power Menus for Segment-Based Sweeps – 2-Port VNAs” on page 5-10
 - “Power Menus for Power-Based Sweeps – 2-Port VNAs” on page 5-12
 - “Power Menus for Power-Based Sweeps – 2-Port VNAs (Option 32)” on page 5-14
- “Power Menu Variants – 2-Port VNAs” on page 5-16
 - “POWER Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-16
 - “POWER Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-18
 - “POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20
 - “POWER Menu – Power-Based Sweeps – 2-Port VNAs” on page 5-22
 - “POWER Menu – Power-Based Sweep – 2-Port VNAs (Option 32)” on page 5-24
- “Attenuators Menu Variants – 2-Port VNAs” on page 5-26
 - “ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-26
 - “ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-27
 - “ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-28
 - “ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs (Option 32)” on page 5-29
 - “ATTENUATORS Menu – Power-Based Sweep Menu – 2-Port VNAs” on page 5-30
 - “ATTENUATORS Menu – Power-Based Sweep – 2-Port VNAs (Option 32)” on page 5-31
- “Power Setup Menu Variants – 2-Port VNAs” on page 5-32
 - “POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-32
 - “POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-34
 - “POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-36
 - “POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs (Option 32)” on page 5-37
 - “POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs” on page 5-39
 - “POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs (Option 32)” on page 5-42
 - “LEVELING MODE Menu – 2-Port VNAs” on page 5-44

- “Power Cal Menu Variants – 2-Port VNAs” on page 5-45
 - “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-45
 - “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs with Option 32” on page 5-47
 - “POWER CAL Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-45
 - “POWER CAL Menu – Segment-Based Sweep – 2-Port VNAs with Option 32” on page 5-47
 - “POWER CAL Menu – Power-Based Sweep – 2-Port VNAs” on page 5-49
 - “POWER CAL Menu – Power-Based Sweep – 2-Port VNAs with Option 32” on page 5-51
 - “POWER CALIBRATION (PORT 1/PORT 2) Dialog Box” on page 5-53
 - “OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box” on page 5-59
 - “OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 5-59
 - “SAVE AS (FREQ SWEEP POWER CAL FPC FILE) Dialog Box” on page 5-60
 - “SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 5-60
 - “NW EXTRACTION Menu” on page 5-61
- “External Source Power Menu – 2-Port VNAs” on page 5-62
 - “EXT. SRC POWER Menu – 2-Port VNAs” on page 5-62
- “Receiver Setup and Calibration Menus – 2-Port VNAs” on page 5-63
 - “RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63
 - “RECEIVER CAL Menu – 2-Port VNAs” on page 5-64
 - “SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box – 2-Port VNAs” on page 5-65
 - “RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box – 2-Port VNAs” on page 5-66
 - “VIEW RECEIVER CAL Dialog Box – 2-Port VNAs” on page 5-68
 - “RCVR UTILITIES Menu – 2-Port VNAs” on page 5-67

5-3 Factors Governing Structure/Availability of Power Menus

As mentioned before, the POWER menu and its related sub-menus vary in menu appearance, menu links, button presence, and button type (read/write vs. read-only) depending on a number of factors including:

- Type of sweep set
- Instrument model number
- Installed options
- Application receiver configuration mode
- Frequency range configured

Sweep Types

The instrument sweep type setting changes the POWER Menu Set depending on if the Sweep Type is set to

- Frequency-Based (Linear)
- Frequency-Based (Log)
- Segmented Sweep (either Frequency-Based or Index-Based)
- Power Sweep (either CW Freq or Swept Freq)

VNA Model, Option, and Mode

For MS4642B, MS4644B, and MS4645B VNAs, the POWER menu variants depend on the sweep type selected above and whether Multiple Source and mmWave are selected.

For MS4647B VNAs without Option 8x, the POWER menu variants depend on the sweep type set above, and whether Multiple Source and BB/mmWave are selected.

For MS4647B VNAs, additional menu changes depend on the frequency range covered, the Receiver Configuration Mode if set to Modular Broadband or Modular Broadband with Multiple Source:

- Modular Broadband requires a MS4647B with Option 8x and an attached 3739x Test Set. Menus change depending the sweep type set above and the frequency range set, particularly depending on below, across, and above 54 GHz.
- Modular Broadband (MS4647B with Option 8x and Option 6x providing attenuators) with Multiple Source can be configured. If at least one band is configured with a frequency greater than 54 GHz, an additional button is present.

Attenuator Menu Button Availability

The available buttons in the ATTENUATORS menu depend on which attenuator option has been installed in the instrument and the sweep type setting.

- Option 61 Installed – Port 1 Source Attenuator and Port 2 Test Attenuator
 - If Option 61 (Port 1 Source Attenuator and Port 2 Test Attenuator) is installed, only the first and fourth buttons are active. The other buttons are unavailable.
- Option 62 Installed – Port 1 and Port 2 Source Attenuators, Port 1 and Port 2 Test Attenuators:
 - If Option 62 (Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuators) is installed, all buttons are available.
- No Attenuator Options Installed
 - If neither attenuator option is installed, the Attenuators button (on the POWER or POWER SETUP menu) and the ATTENUATORS menu are unavailable. Contact Anritsu Customer Service for more information.

5-4 Maximum and Minimum Power Settings

For all configurations, the maximum power setting is +15 dBm (+20 dBm for systems with Option 31). For all configurations below 54 GHz, the minimum power setting is –30 dBm and for above 54 GHz, the minimum power setting is –80 dBm. These minimum power settings can be further lowered by application of internal attenuator, linear power calibration effects, and/or the connected presence of OEM mmWave modules.

- The power settings are set by the appropriate Start, Stop, and/or Single Power buttons and their related field toolbars.
- Below 54 GHz, the user-defined start, stop, and/or single power settings are then modified by the effects of any applied attenuators (if equipped), and the relevant Linear Power Calibration and displayed as the appropriate read-only Effective Power button.
- Above 54 GHz, the user-defined start, stop, and/or single power settings are then modified by the effects of the relevant Linear Power Calibration (noting that internal attenuator effects are not applied above 54 GHz) and displayed as the appropriate read-only Effective Power button.
- Depending on the instrument model and equipped test sets where the frequency range is less than 54 GHz, greater than 54 GHz, or across 54 GHz, some of the following read-only Effective Power buttons appear:
 - Effective Start Power
 - Effective Start Power < 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective Start Power button present.
 - Effective Start Power > 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective Start Power button present.
 - Effective End Power
 - Effective Stop Power < 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective End Power button present.
 - Effective Stop Power > 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective End Power button present.
 - Effective Single Power
 - Effective Single Power < 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective Single Power button present.
 - Effective Single Power > 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective Single Power button present.
- For VNAs where frequencies either cross 54 GHz (MS4647B VNA) or use frequencies above 54 GHz (MS464xB VNA with Option 8x and E-Band or W-Band modules), additional buttons of Effective Start Power > 54 GHz, Effective Stop Power > 54 GHz, and Effective Single Power > 54 GHz are present.
- Where compatible with the various options above, the 4-Port VNA power maximum and power minimum are the same as for the 2-Port VNA less the loss of the Test Set and cables.

A summary of the power settings is in [Table 5-1, "Summary of Maximum and Minimum Power Levels"](#) below.

Table 5-1. Summary of Maximum and Minimum Power Levels

VNA, Power Level, and Frequency Range	Power Sweep Type	Power Setting Max/Min ^a	Factors Affecting Effective Power	Resultant Effective Power
Any MS464xB VNA Maximum Power Above, Below, or Across 54 GHz	Any	+15 dBm maximum (+20 dBm for systems with Option 31)	Option 6x Attenuators ^b Linear Power Calibration	Effects at left can lower effective maximum power.
Any MS464xB VNA Minimum Power for Less Than 54 GHz	Power Sweep CW Single Power Mode Power Sweep; Swept Frequency Power Sweep; Swept Frequency Single Power	–30 dBm minimum	Option 6x Attenuators Linear Power Calibration	Effects at left can lower effective minimum power to less than -30 dBm.
MS4647B VNAs with BB/mmWave Option 80/81^c Minimum Power for Less Than 54 GHz to Greater Than 54 GHz	Power Sweep Swept Frequency Power Sweep; Swept Frequency Single Power	–80 dBm minimum	Below 54 GHz: Option 6x Attenuators Linear Power Calibration Above 54 GHz: Attenuators have no effect above 54 GHz. Linear Power Calibration	The default minimum power for frequencies less than 54 GHz is –30 dBm and for frequencies greater than 54 GHz is –80 dBm. The effects at left are applied to these default values can lower the effective minimum power below the default value in each frequency range.
MS464xB VNAs with mmWave Option 82/83 and OML/VDI mmWave Modules^d	Any	–100 dBm minimum	VNA Attenuators have no effect on OML/VDI modules at any frequency. Linear Power Calibration	The default minimum power for any frequency is always –100 dBm. The effects at left are applied to these default values can lower the effective minimum power below the default value in each frequency range.

a. The default power setting applies to the user configurable Start, Stop, and Single Power buttons and their variants.

b. The Active Measurement Suite – Option 61 provides two attenuators; one if the Source 1 Path, and one in the Receive 2 Path. Option 62 provides four attenuators; One in each Source Path and one in each Receive Path.

c. Broadband/mmWave System – ME7838 Series system with MS4647B VNA, Option 8x, 3739x Test Set, and Broadband Modules.

d. mmWave System – Any MS464xB VNA, with Option 8x, 3739x Test Set, and OML or VDI mmWave Modules.

5-5 Power Menu Sets

POWER menu feature availability and functions are dependent on the selected sweep mode. Below are overviews of the different POWER menus and their sub-menus based on sweep mode.

Power Menus for Frequency-Based Sweeps – 2-Port VNAs

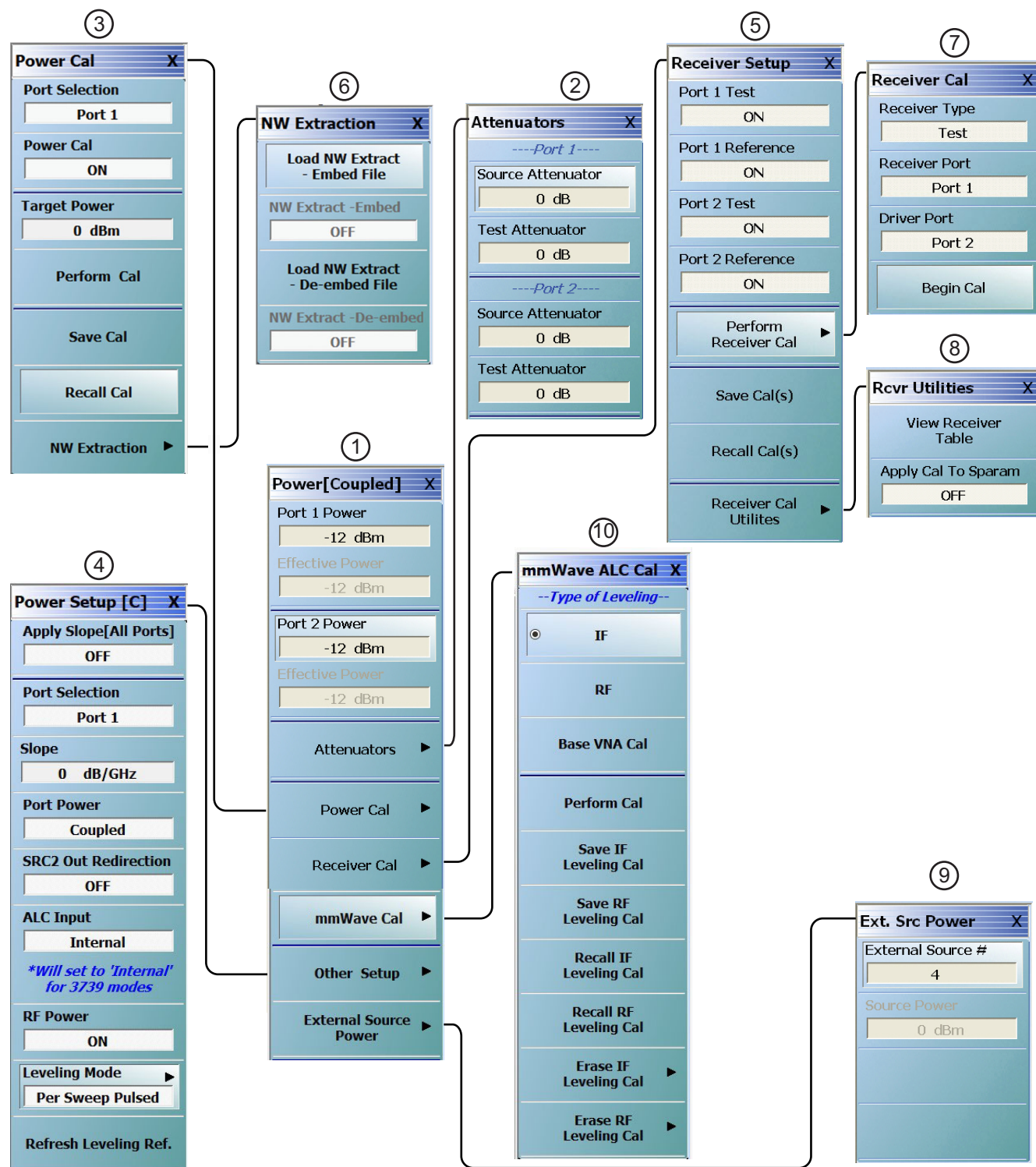


Figure 5-1. Power Menu Set – Frequency-Based Sweep (Linear or Log) (1 of 2)

<p>This power menu set, including menu appearance and menu links, is available if Sweep Type is set to Frequency-Based (Linear) or Frequency-Based (Log), (When Modular BB is enabled on the APPLICATION menu on MS4647B only when equipped with Options 007, 070, and 08x, some power menus have either relabeled buttons or additional buttons.) The button changes are related to power levels above and below 54 GHz.</p> <ol style="list-style-type: none"> 1. “POWER Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-16 2. “ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-26 3. “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-45 	<ol style="list-style-type: none"> 4. “POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-32. Leveling Mode is visible only if the application is set to PulseView. Refresh Leveling Reference is only visible in Per Sweep Pulsed and Per Point Pulsed leveling modes. 5. “RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63 6. “NW EXTRACTION Menu” on page 5-61 7. “RECEIVER CAL Menu – 2-Port VNAs” on page 5-64 8. “RCVR UTILITIES Menu – 2-Port VNAs” on page 5-67 9. “EXT. SRC POWER Menu – 2-Port VNAs” on page 5-62 10. “mmWAVE ALC CAL Menu” on page 14-14. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.
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Figure 5-1. Power Menu Set – Frequency-Based Sweep (Linear or Log) (2 of 2)

Power Menus for Frequency-Based Sweeps – 2-Port VNAs (Option 32)

Prerequisites:

- Option 32 installed

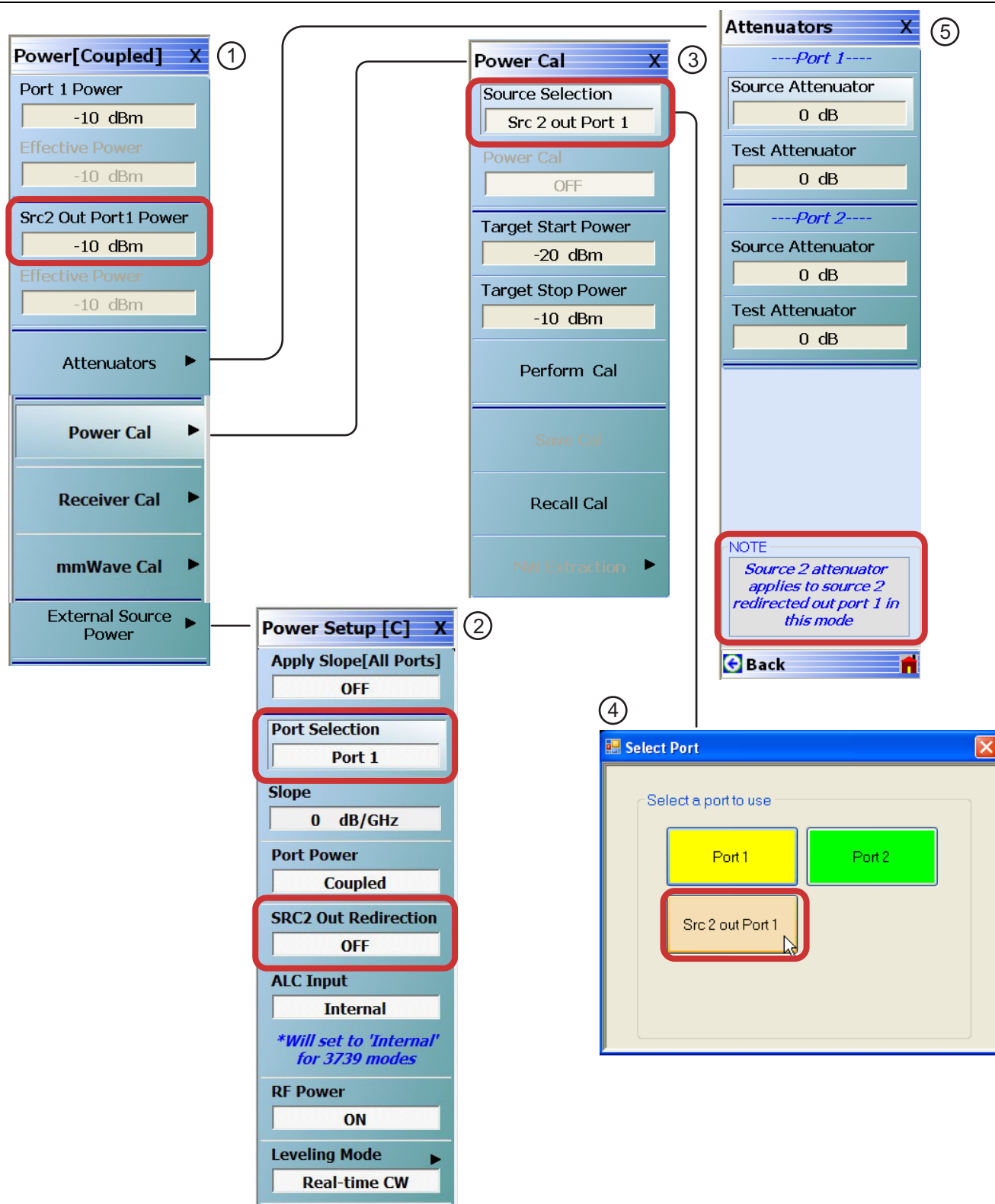
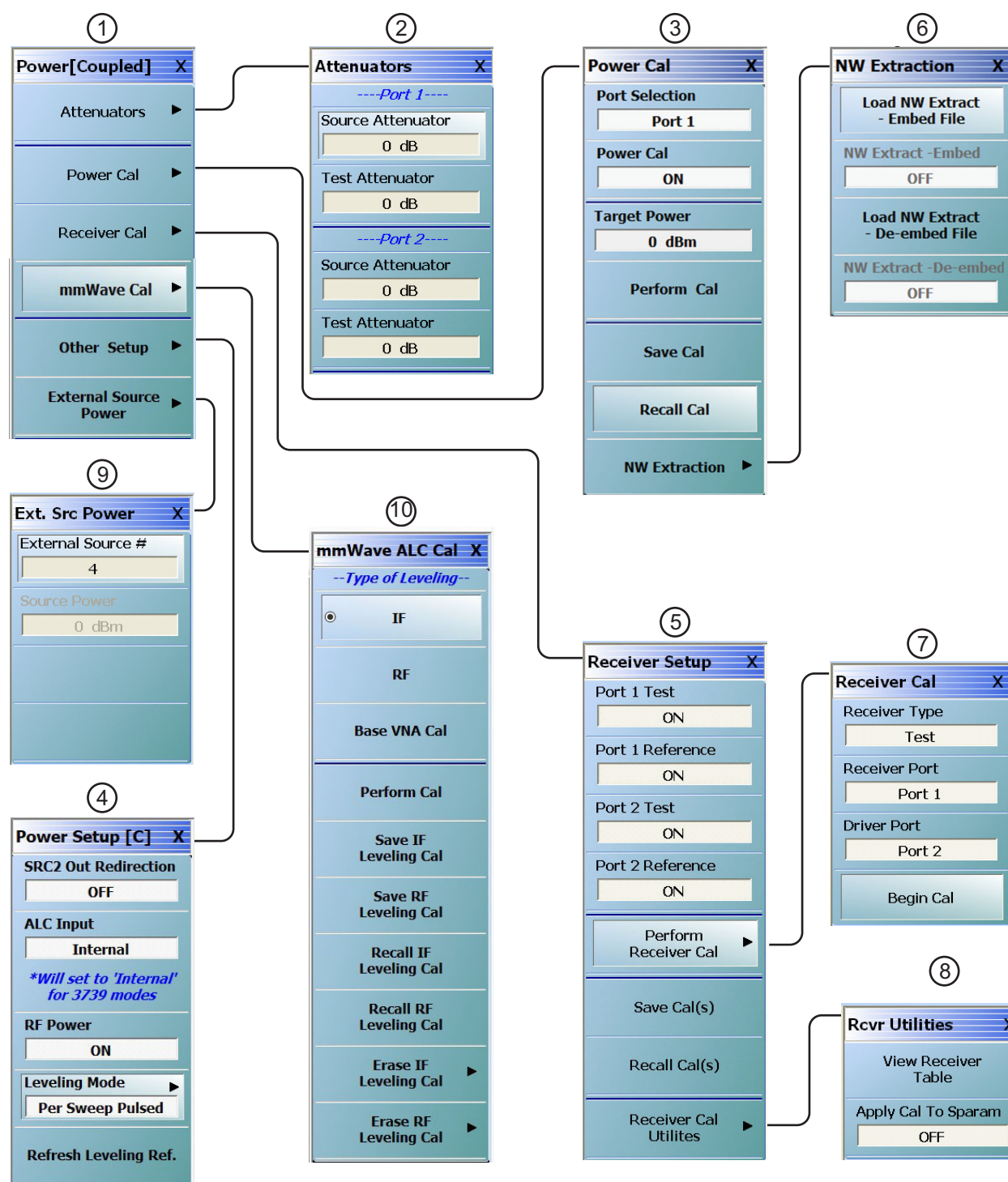


Figure 5-2. Power Menu Set – Frequency-Based Sweep with Option 32 (1 of 2)

<p>With Option 32 installed, the Source 2 power can be redirected out of port 1.</p> <p>When SRC2 Out Redirection is ON, all other menus remain the same, except for those that are shown above.</p> <p>When SRC2 Out Redirection is OFF, Port selection reverts to a toggle between a choice of either Port 1 or Port 2.</p> <p>1. “POWER Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-18</p>	<p>2. “POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-34 Leveling Mode is visible only if the application is set to PulseView. Refresh Leveling Reference is only visible in Per Sweep Pulsed and Per Point Pulsed leveling modes.</p> <p>3. “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs with Option 32” on page 5-47</p> <p>4. PORT SELECTION Dialog</p> <p>5. “ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-27</p>
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Figure 5-2. Power Menu Set – Frequency-Based Sweep with Option 32 (2 of 2)

Power Menus for Segment-Based Sweeps – 2-Port VNAs



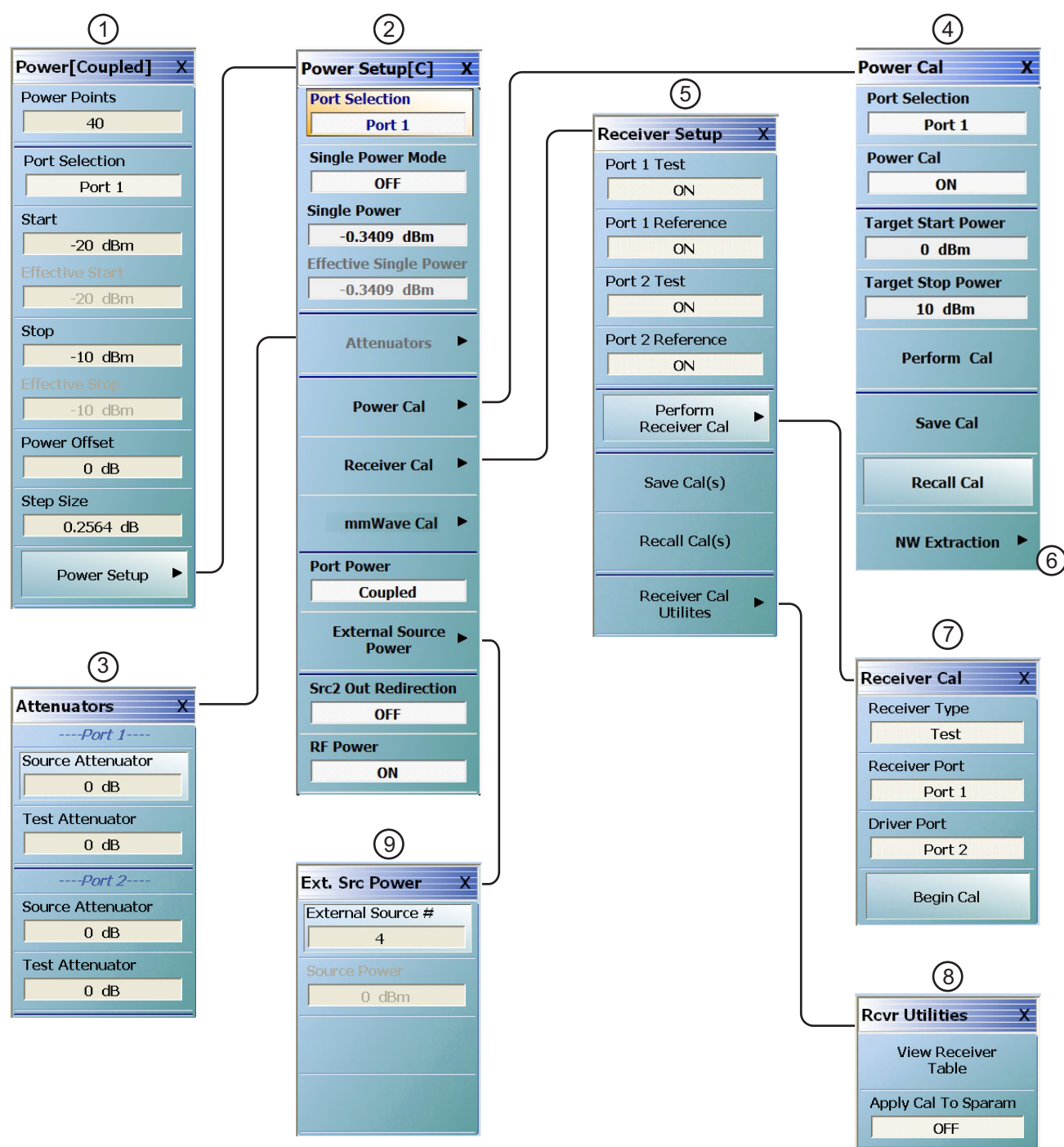
This power menu set is available if Sweep Type is set to Segmented Sweep (Frequency-Based) or Segmented Sweep (Index-Based). When Modular BB is enabled on the APPLICATION menu, some power menus have relabeled buttons and/or additional buttons. The power settings for segmented sweeps (frequency-based or index-based) are in the segmented-sweep input tables.

Figure 5-3. Power Menu Set – Segmented Sweeps (Frequency- or Index-Based) (1 of 2)

<ol style="list-style-type: none"> 1. “POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20. 2. “ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-28. 3. “POWER CAL Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-45. 4. “POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-32. Leveling Mode is visible only if the application is set to PulseView. Refresh Leveling Reference is only visible in Per Sweep Pulsed and Per Point Pulsed leveling modes. 	<ol style="list-style-type: none"> 5. “RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63 6. “NW EXTRACTION Menu” on page 5-61 7. “RECEIVER CAL Menu – 2-Port VNAs” on page 5-64 8. “RCVR UTILITIES Menu – 2-Port VNAs” on page 5-67 9. “EXT. SRC POWER Menu – 2-Port VNAs” on page 5-62 10. “mmWAVE ALC CAL Menu” on page 14-14. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.
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Figure 5-3. Power Menu Set – Segmented Sweeps (Frequency- or Index-Based) (2 of 2)

Power Menus for Power-Based Sweeps – 2-Port VNAs



This power menu set is available if Sweep Type is set to Power Sweep (CW Freq) or Power Sweep (Swept Freq). When Modular BB is enabled on the APPLICATION menu, some power menus have relabeled buttons and/or additional buttons. The power settings for power sweeps (frequency-based or index-based) are in the input tables. The button changes are related to power levels above and below 54 GHz.

Figure 5-4. Power Menu Set – Power Sweeps (CW or Swept Frequency) (1 of 2)

1. "POWER Menu – Power-Based Sweeps – 2-Port VNAs" on page 5-22	5. "RECEIVER SETUP Menu – 2-Port VNAs" on page 5-63.
2. "POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs" on page 5-39.	6. Opens the "NW EXTRACTION Menu" on page 5-61
3. "ATTENUATORS Menu – Power-Based Sweep Menu – 2-Port VNAs" on page 5-30.	7. "RECEIVER CAL Menu – 2-Port VNAs" on page 5-64.
4. "POWER CAL Menu – Power-Based Sweep – 2-Port VNAs" on page 5-49.	8. "RCVR UTILITIES Menu – 2-Port VNAs" on page 5-67.
	9. "EXT. SRC POWER Menu – 2-Port VNAs" on page 5-62.

Figure 5-4. Power Menu Set – Power Sweeps (CW or Swept Frequency) (2 of 2)

Power Menus for Power-Based Sweeps – 2-Port VNAs (Option 32)

Prerequisites:

- Option 32 installed

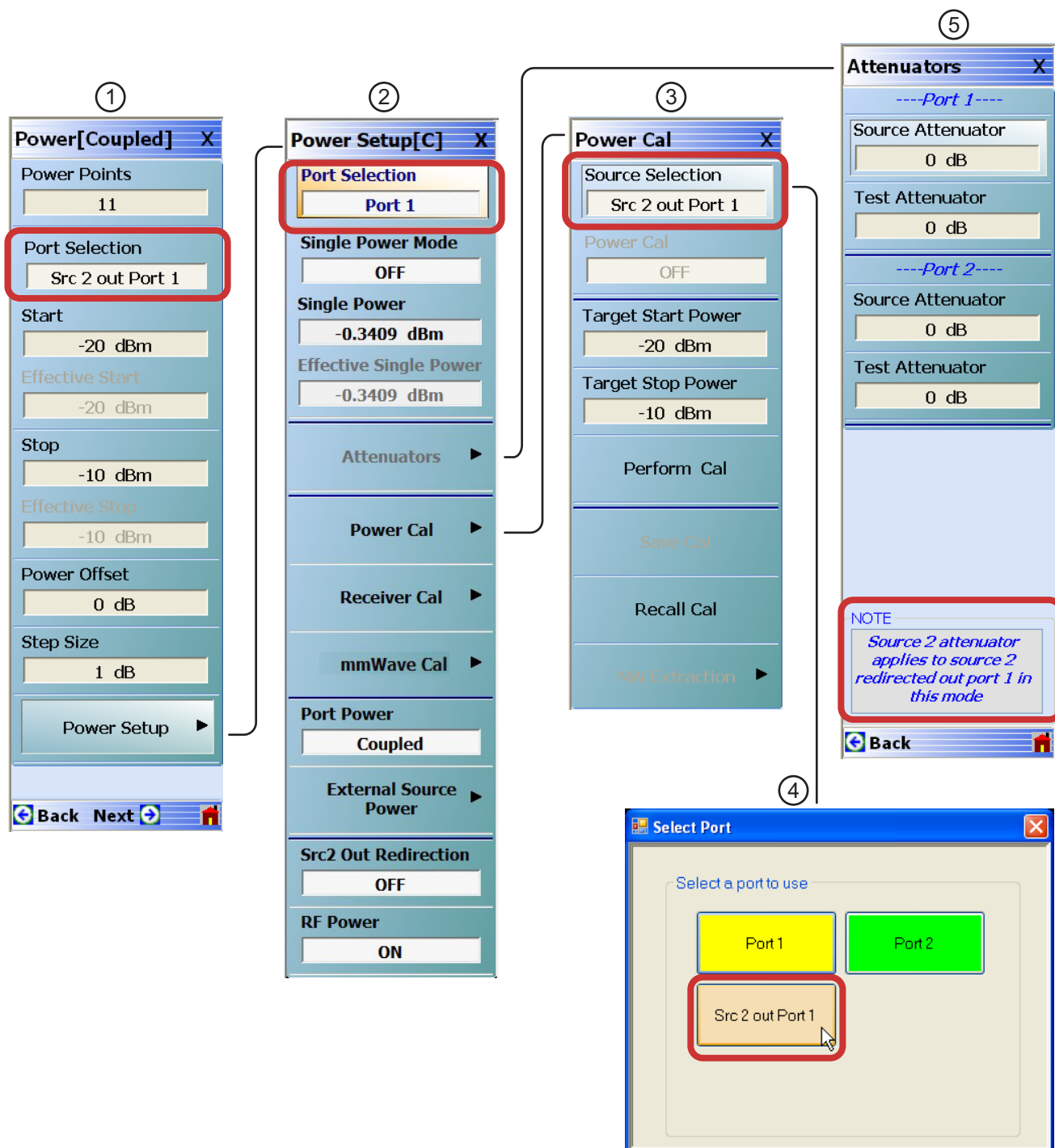


Figure 5-5. Power Menu Set – Power-Based Sweep with Option 32 (1 of 2)

<p>With Option 32 installed, the Source 2 power can be redirected out of port 1.</p> <p>When SRC2 Out Redirection is ON, all other menus remain the same except for those that are shown above.</p> <p>When SRC2 Out Redirection is OFF, Port selection reverts to a toggle between a choice of either Port 1 or Port 2.</p>	<ol style="list-style-type: none">1. “POWER Menu – Power-Based Sweep – 2-Port VNAs (Option 32)” on page 5-242. “POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs (Option 32)” on page 5-423. “POWER CAL Menu – Power-Based Sweep – 2-Port VNAs with Option 32” on page 5-514. Port Selection dialog box5. “ATTENUATORS Menu – Power-Based Sweep – 2-Port VNAs (Option 32)” on page 5-31
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Figure 5-5. Power Menu Set – Power-Based Sweep with Option 32 (2 of 2)

5-6 Power Menu Variants – 2-Port VNAs

POWER Menu – Frequency-Based Sweep – 2-Port VNAs

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[Coupled] X

Port 1 Power

-20 dBm

Effective Power

-20 dBm

Port 2 Power

-20 dBm

Effective Power

-20 dBm

Attenuators ▶

Power Cal ▶

Receiver Cal ▶

mmWave Cal ▶

Other Setup ▶

External Source Power ▶

Port 1 Power

Select displays the Port 1 Power field toolbar and allows setting the port 1 power level in dBm. If Port Power is set to coupled, changes to the Port 1 Power level affect the Port 2 Power level.

Port 1 Power : -5.0000 dBm ^ v dBm X

Effective (Port 1) Power (dBm)

Read-only display. Shows the effective Port 1 power after any applied attenuator.

Effective Pwr (>54G) (dBm)

This read-only button is only present if the instrument is an MS4647B VNA with Option 8x and, on the APPLICATION menu, the Modular BB is selected. The additional button is shown below.

Port 1 Power

-10 dBm

Effective Power

-10 dBm

Effective Pwr (>54G)

-10 dBm

Port 2 Power

Select displays the Port 2 Power field toolbar and allows setting the port 2 power level in dBm. If Port Power is set to coupled, changes to the Port 2 Power level affect the Port 1 Power level.

Port 2 Power : -10.0000 dBm ^ v dBm X

Effective (Port 2) Power (dBm)

Read-only display. Shows the effective Port 1 power after any applied attenuator.

Effective Pwr (>54G) (dBm)

This read-only button is only present if the instrument is an MS4647B VNA with Option 8x and, on the APPLICATION menu, the Modular BB is selected. See example above.

Figure 5-6. POWER [COUPLED] Menu – Frequency-Based Sweeps – 2-Port VNAs (1 of 2)

5-16

PN: 10410-00319 Rev: AE

MS4640B Series VNA UIRM

	<p>Attenuators</p> <p>Button Not Present</p> <p>If the Attenuators button is not present, the SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.</p> <p>Button Not Available</p> <p>If the Attenuators button is present but unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.</p> <p>Button Available</p> <p>If the Attenuators button is available, one of the attenuator options has been installed:</p> <ul style="list-style-type: none"> • Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator. • Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator. <p>Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.</p> <ul style="list-style-type: none"> • “ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-26 <p>Power Cal</p> <p>Select displays the POWER CAL menu.</p> <ul style="list-style-type: none"> • “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-45 <p>Receiver Cal</p> <p>Select displays the RECEIVER SETUP menu.</p> <ul style="list-style-type: none"> • “RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63 <p>mmWave Cal</p> <p>Select displays the mmWAVE ALC CALC menu. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.</p> <ul style="list-style-type: none"> • “mmWAVE ALC CAL Menu” on page 14-14 <p>Other Setup (Power)</p> <p>Select displays the POWER SETUP [1], POWER SETUP [2], or the POWER SETUP [C] menu. The name of the POWER SETUP menu depends on the settings of the Power Selection button and the Port Power button.</p> <ul style="list-style-type: none"> • “POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-32 <p>External Source Power</p> <p>Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.</p> <ul style="list-style-type: none"> • “EXT. SRC POWER Menu – 2-Port VNAs” on page 5-62
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Figure 5-6. POWER [COUPLED] Menu – Frequency-Based Sweeps – 2-Port VNAs (2 of 2)

POWER Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)

Previous

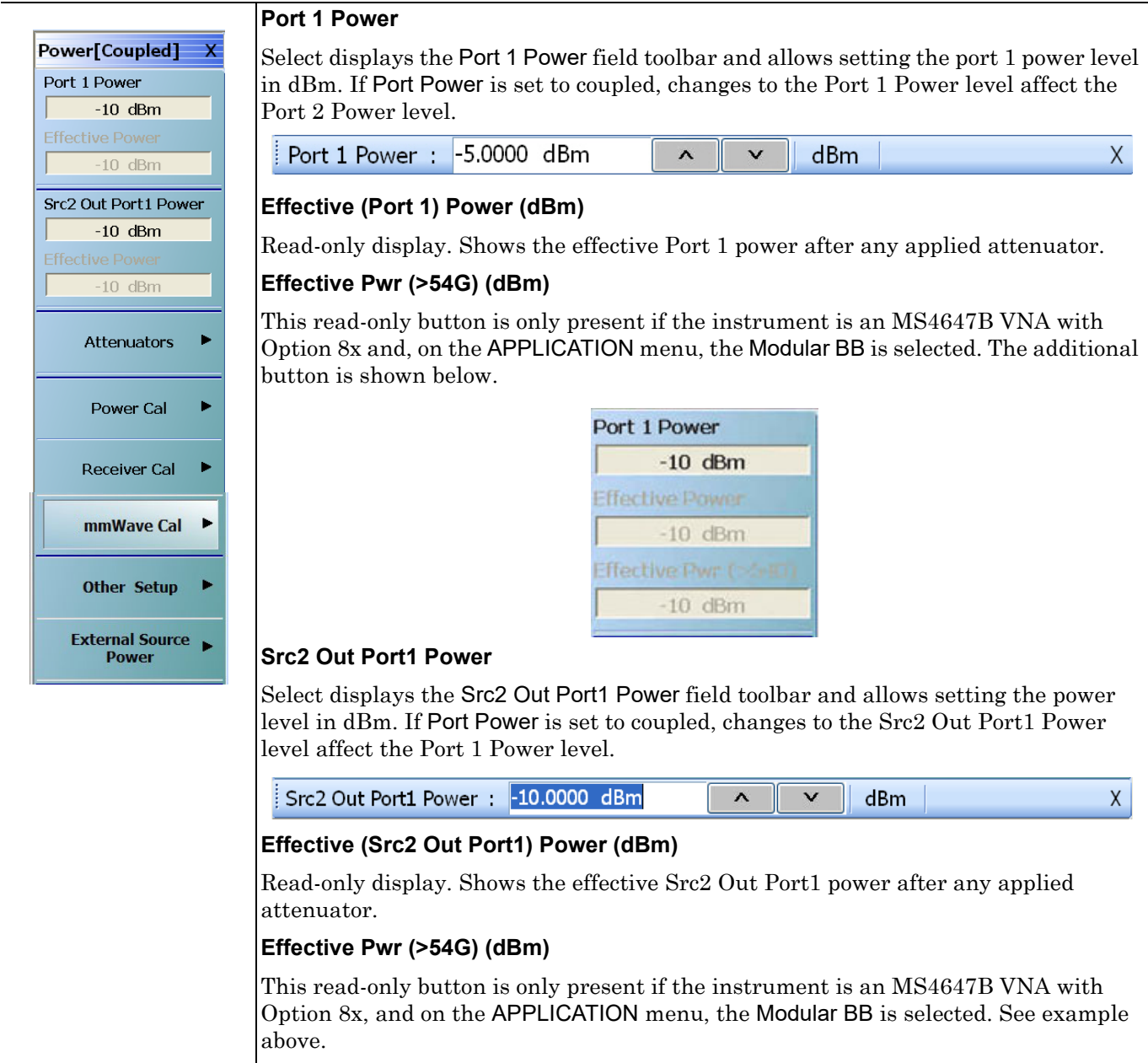
- [“MAIN Menu” on page 2-2](#)

Prerequisites:

- Option 32 installed
- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER



	<p>Attenuators</p> <p>Button Not Present</p> <p>If the Attenuators button is not present, the Sweep Type is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.</p> <p>Button Not Available</p> <p>If the Attenuators button is present but unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.</p> <p>Button Available</p> <p>If the Attenuators button is available, one of the attenuator options has been installed:</p> <ul style="list-style-type: none"> • Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator. • Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator. <p>Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.</p> <ul style="list-style-type: none"> • “ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-27 <p>Power Cal</p> <p>Select displays the POWER CAL menu.</p> <ul style="list-style-type: none"> • “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs with Option 32” on page 5-47 <p>mmWave Cal</p> <p>Select displays the mmWAVE ALC CALC menu. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.</p> <ul style="list-style-type: none"> • “mmWAVE ALC CAL Menu” on page 14-14 <p>Receiver Cal</p> <p>Select displays the RECEIVER SETUP menu.</p> <ul style="list-style-type: none"> • “RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63 <p>Other Setup (Power)</p> <p>Select displays the POWER SETUP [1], POWER SETUP [2], or the POWER SETUP [C] menu. The name of the POWER SETUP menu depends on the settings of the Power Selection button and the Port Power button.</p> <ul style="list-style-type: none"> • “POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-34 <p>External Source Power</p> <p>Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.</p> <ul style="list-style-type: none"> • “EXT. SRC POWER Menu – 2-Port VNAs” on page 5-62
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Figure 5-7. POWER [COUPLED] Menu – Frequency-Based Sweeps – 2-Port VNAs with Option 32 (2 of 2)

POWER Menu – Segment-Based Sweeps – 2-Port VNAs

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[Coupled] X

Attenuators ▶

Power Cal ▶

Receiver Cal ▶

mmWave Cal ▶

Other Setup ▶

External Source Power ▶

Segmented Sweep Power Control Functions

Controls for power configuration is moved to the frequency- or index-based segmented sweep setup functions on the SWEEP SETUP menu. There, the following parameters for each created segment can be defined:

- Basic controls add, delete, clear, save, and recall segments
- Configuration controls for graph mode and ON/OFF display of IFBW, power, and averaging
- Individual segment controls for:
 - Segment ON/OFF
 - Segment definition as either Start and Stop, Start and Step-Size, or CW
 - Number of points per segment
 - Calculated Step Size
 - IF Bandwidth (IFBW)
 - Port 1 Source Power
 - Port 2 Source Power
 - Averaging number of points
- Navigation:
 - MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg. Sweep Setup | FREQ BASE SETUP
 - [“FREQ BASE SETUP Menu” on page 7-6](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Index-Based Seg. Sweep Setup | INDEX BASE SETUP
 - [“INDEX BASE SETUP Menu” on page 7-12](#)

Figure 5-8. POWER [COUPLED] Menu – Segment-Based Sweep – 2-Port VNAs (1 of 2)

	<p>Attenuators</p> <p>Button Not Available</p> <p>If the Attenuators button is present but unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.</p> <p>Button Available</p> <p>If the Attenuators button is available, one of the attenuator options has been installed:</p> <ul style="list-style-type: none"> • Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator. • Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator. <p>Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.</p> <ul style="list-style-type: none"> • “ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-28 <p>Power Cal</p> <p>Select displays the POWER CAL menu.</p> <ul style="list-style-type: none"> • “POWER CAL Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-45 <p>mmWave Cal</p> <p>Select displays the mmWAVE ALC CALC menu. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.</p> <ul style="list-style-type: none"> • “mmWAVE ALC CAL Menu” on page 14-14 <p>Receiver Cal</p> <p>Select displays the RECEIVER SETUP menu.</p> <ul style="list-style-type: none"> • “RECEIVER CAL Menu – 2-Port VNAs” on page 5-64 <p>Other Setup (Power)</p> <ul style="list-style-type: none"> • The POWER SETUP menu is <i>not</i> available if sweep is set to a frequency-based or index-based segment sweep. Instead, power configuration is on a per-segment basis and is configured at the FREQ BASE SETUP or the INDEX BASE SETUP menus. “POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-36. • The POWER SETUP menu <i>is</i> available (via Other Setup) when Option 32 is installed. See “POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs (Option 32)” on page 5-37. <p>External Source Power</p> <p>Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.</p> <ul style="list-style-type: none"> • “EXT. SRC POWER Menu – 2-Port VNAs” on page 5-62
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Figure 5-8. POWER [COUPLED] Menu – Segment-Based Sweep – 2-Port VNAs (2 of 2)

POWER Menu – Power-Based Sweeps – 2-Port VNAs

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[Coupled] X

Power Points
40

Port Selection
Port 1

Start
-20 dBm

Effective Start
-20 dBm

Stop
-10 dBm

Effective Stop
-10 dBm

Power Offset
0 dB

Step Size
0.2564 dB

Power Setup ▶

Power Points

Select displays the Power Points field toolbar and allows selection of the total number of power points in the sweep.

Power Points : 60 ^ v Enter X

Port Selection

The Port Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1 or Port 2. The selected port is shown in the button display field.

Start (Power) (dBm)

For the displayed port above, select displays the Start (dBm) field toolbar where the start power level is set.

Start : -20.0000 dBm ^ v dBm X

Effective Start (Power) (dBm)

A read only display that shows the effective start power after the application of any attenuator effects.

Eff. Start (>54G) (dBm)

Effective Start Power >54 GHz Port 1. This read-only button is only present if the instrument is an MS4647B VNA with Option 8x and, on the APPLICATION menu, the Modular BB is selected. The additional button is shown below.

Start
-20 dBm

Effective Start
-20 dBm

Eff. Start (>54G)
-20 dBm

Figure 5-9. POWER [COUPLED] Menu – Power-Based Sweep – 2-Port VNAs (1 of 2)

Stop (Power) (dBm)

For the displayed port, select displays the Stop (dBm) field toolbar where the stop power level is set.

Effective Stop (Power) (dBm)

A read only display that shows the effective stop power after the application of any attenuator effects.

Eff. Stop (>54G) (dBm)

Effective Stop Power >54 GHz Port 1. This read-only button is only present if the instrument is an MS4647B VNA with Option 8x and, on the APPLICATION menu, the Modular BB is selected. See example above.

Power Offset (dB)

Select displays the Power Offset (dB) field toolbar where offsets can be applied.

Step Size (dB)

The button display field calculates the step size based on the start value, stop value, and the number of power points set in the field toolbars above or allows input of a required step size value. If a new value is input, the number of power points changes as required.

Power Setup

Select displays the POWER SETUP menu which contains the controls for Attenuators, Power Cal, Receiver Cal, and External Source Power. For a frequency-based sweep, these controls are located on the POWER menu.

- MAIN | Power | POWER | Other Setup | POWER SETUP

[“POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs” on page 5-39](#)

Figure 5-9. POWER [COUPLED] Menu – Power-Based Sweep – 2-Port VNAs (2 of 2)

POWER Menu – Power-Based Sweep – 2-Port VNAs (Option 32)

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- Option 32 installed.
- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[**Coupled**] X

Power Points
11

Port Selection
Src 2 out Port 1

Start
-20 dBm

Effective Start
-20 dBm

Stop
-10 dBm

Effective Stop
-10 dBm

Power Offset
0 dB

Step Size
1 dB

Power Setup ▶

Power Points

Select displays the Power Points field toolbar and allows selection of the total number of power points in the sweep.

Power Points : 60 ^ v Enter X

Port Selection (With Option 32)

The selected port is shown in the button display field.

With Src2 Out Redirection ON, Select toggles between Port 1, or Src2 Out Port1. (Redirection ON/OFF is toggled from the Power Setup menu)

With Src2 Out Redirection OFF, Select toggles between Port 1, or Port 2.

Start (Power) (dBm)

For the displayed port above, select displays the Start (dBm) field toolbar where the start power level is set.

Start : -20.0000 dBm ^ v dBm X

Effective Start (Power) (dBm)

A read only display that shows the effective start power after the application of any attenuator effects.

Eff. Start (>54G) (dBm)

Effective Start Power >54 GHz Port 1. This read-only button is only present if the instrument is an MS4647B VNA with Option 8x and, on the APPLICATION menu, the Modular BB is selected. The additional button is shown below.

Start
-20 dBm

Effective Start
-20 dBm

Eff. Start (>54G)
-20 dBm

Figure 5-10. POWER [COUPLED] Menu – Power-Based Sweep – 2-Port VNAs with Option 32 (1 of 2)

Stop (Power) (dBm)

For the displayed port, select displays the Stop (dBm) field toolbar where the stop power level is set.

Effective Stop (Power) (dBm)

A read only display that shows the effective stop power after the application of any attenuator effects.

Eff. Stop (>54G) (dBm)

Effective Stop Power >54 GHz Port 1. This read-only button is only present if the instrument is an MS4647B VNA with Option 8x and, on the APPLICATION menu, the Modular BB is selected. See example above.

Power Offset (dB)

Select displays the Power Offset (dB) field toolbar where offsets can be applied.

Step Size (dB)

The button display field calculates the step size based on the start value, stop value, and the number of power points set in the field toolbars above or allows input of a required step size value. If a new value is input, the number of power points changes as required.

Power Setup

Select displays the POWER SETUP menu which contains the controls for Attenuators, Power Cal, Receiver Cal, External Source Power, and Src 2 Out Redirection (ON/OFF).

- MAIN | Power | POWER | Power Setup | POWER SETUP
- [“POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs \(Option 32\)” on page 5-42](#)

Figure 5-10. POWER [COUPLED] Menu – Power-Based Sweep – 2-Port VNAs with Option 32 (2 of 2)

5-7 Attenuators Menu Variants – 2-Port VNAs

ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs

Previous

- [“POWER Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-16](#)

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Type:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Attenuators | ATTENUATORS

Attenuators

---Port 1---

Source Attenuator

0 dB

Test Attenuator

0 dB

---Port 2---

Source Attenuator

0 dB

Test Attenuator

0 dB

Source Attenuator (Port 1) (dB)

Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 1) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Port 2) (dB)

Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 2) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 2 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 5-11. ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs

ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)

Previous

- [“POWER Menu – Frequency-Based Sweep – 2-Port VNAs \(Option 32\)” on page 5-18](#)

Prerequisites:

- Option 32 installed
- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Attenuators | ATTENUATORS

	<p>Source Attenuator (Port 1) (dB)</p> <p>Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.</p> <p>Source Attenuator : 10.0000 dB ^ v dB X</p> <p>Test Attenuator (Port 1) (dB)</p> <p>Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.</p> <p>Test Attenuator : 20.0000 dB ^ v dB X</p> <p>Source Attenuator (Port 2) (dB)</p> <p>Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in 10 dB increments.</p> <p>Source Attenuator : 10.0000 dB ^ v dB X</p> <p>Test Attenuator (Port 2) (dB)</p> <p>Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 2 attenuation in 10 dB increments.</p> <p>Test Attenuator : 20.0000 dB ^ v dB X</p> <p>Note: “Source 2 attenuator applies to source 2 redirected out port 1 in this mode.” This note appears when Option 32 is installed and SRC2 Out Redirection is toggled ON (via the Power Other Setup menu).</p>
--	--

Figure 5-12. ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs with Option 32

ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs

Previous

- [“POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20](#)

Prerequisites:

- Sweep Type = Segment-Based Sweep (Frequency or Index). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Attenuators | ATTENUATORS

Attenuators X

---Port 1---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Port 2---

Source Attenuator
0 dB

Test Attenuator
0 dB

Source Attenuator (Port 1) (dB)

Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 1) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Port 2) (dB)

Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 2) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 2 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 5-13. ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs

ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs (Option 32)

Previous

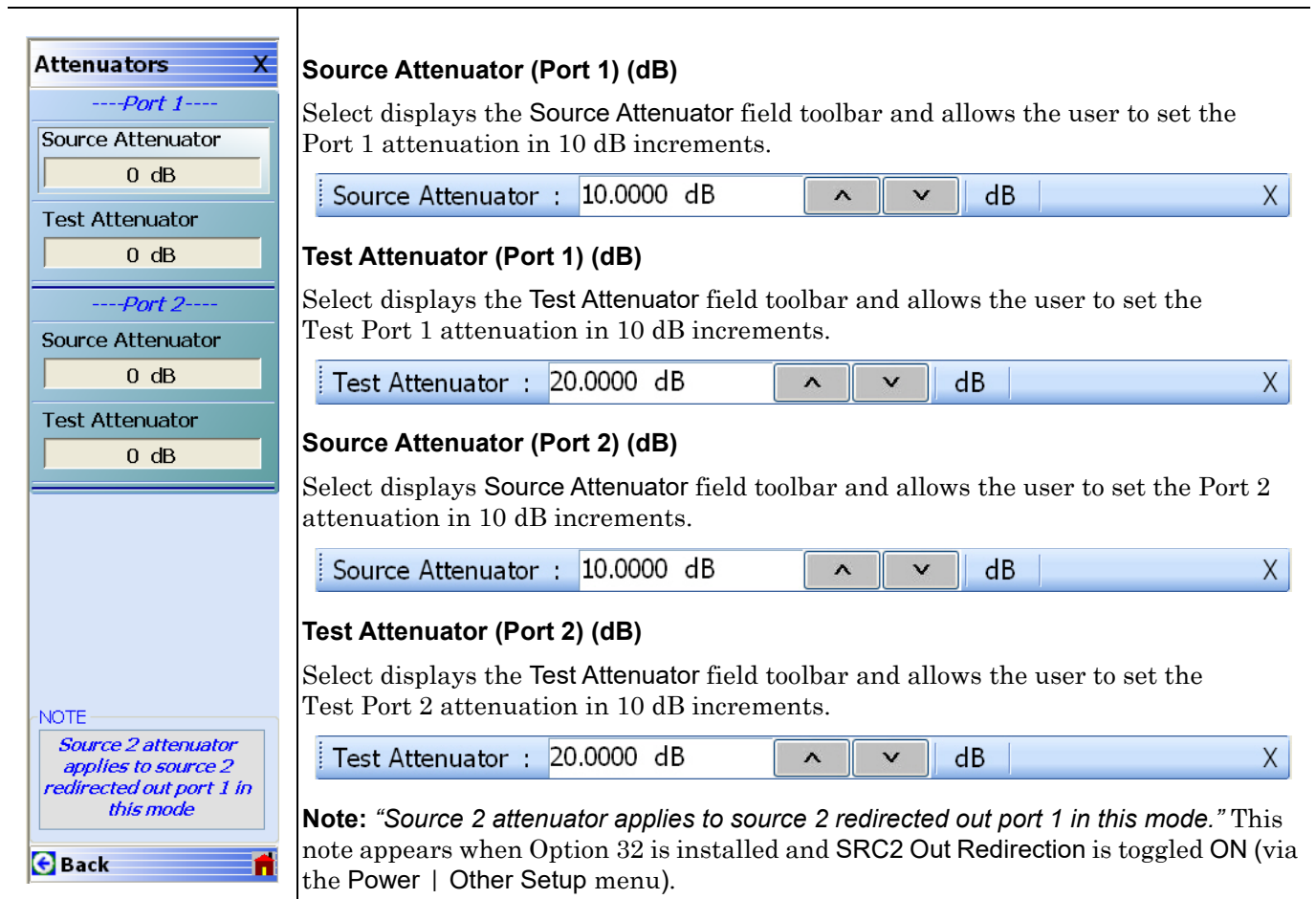
- “POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20

Prerequisites

- Option 32 installed
- Sweep Type = Segment-Based Sweep (Frequency or Index). See “Sweep Setup and Sweep Type Menus” on page 7-2. Navigation to Sweep Type:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES | Segmented Sweep (Freq-Based) or Segmented Sweep (Index-Based)

Navigation

- MAIN | Power | POWER | Attenuators | ATTENUATORS



Attenuators X

---Port 1---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Port 2---

Source Attenuator
0 dB

Test Attenuator
0 dB

NOTE
Source 2 attenuator applies to source 2 redirected out port 1 in this mode

Back

Source Attenuator (Port 1) (dB)
Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 1) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Port 2) (dB)
Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 2) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 2 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Note: “Source 2 attenuator applies to source 2 redirected out port 1 in this mode.” This note appears when Option 32 is installed and SRC2 Out Redirection is toggled ON (via the Power | Other Setup menu).

Figure 5-14. ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs

ATTENUATORS Menu – Power-Based Sweep Menu – 2-Port VNAs

Previous

- [“POWER Menu – Power-Based Sweeps – 2-Port VNAs” on page 5-22](#)

Prerequisites

- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Attenuators | ATTENUATORS

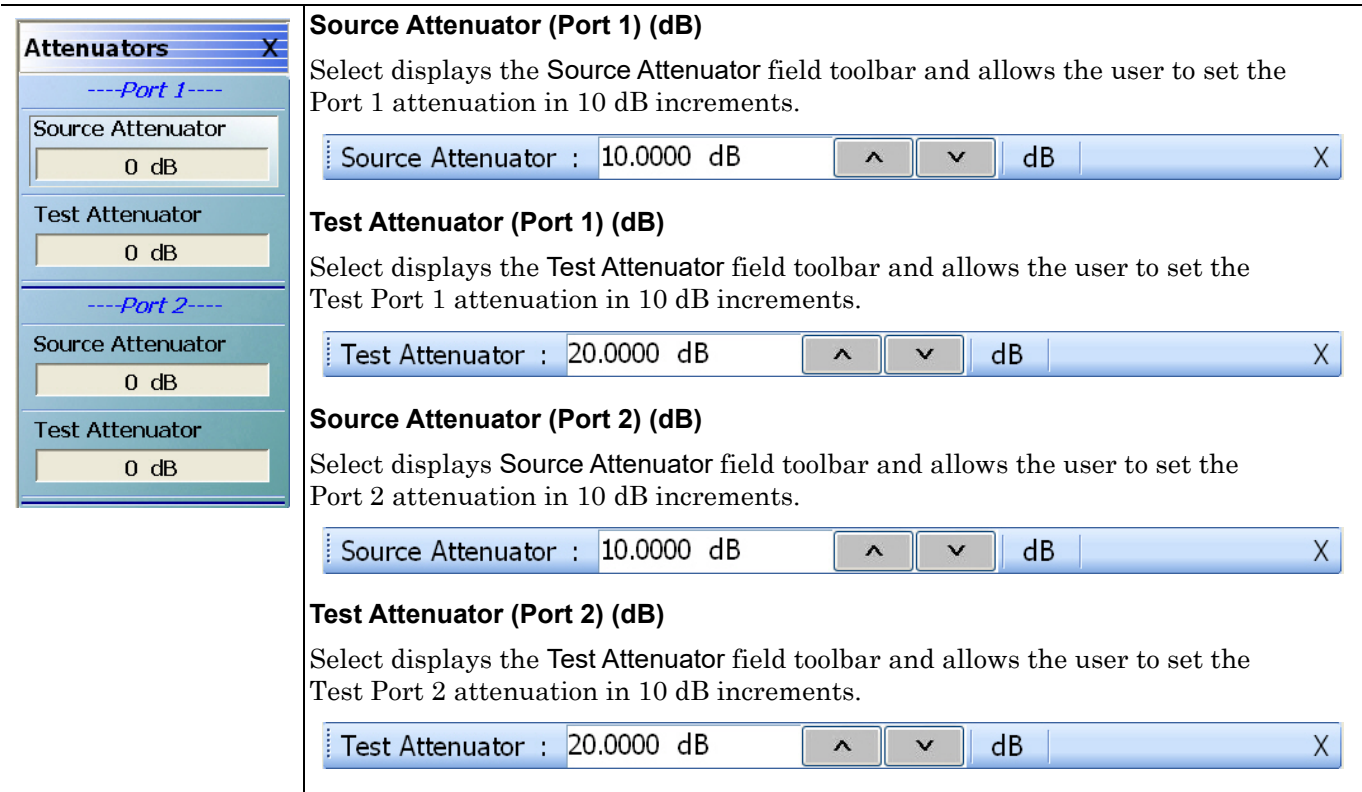


Figure 5-15. ATTENUATORS Menu – Power-Based Sweep – 2-Port VNAs

ATTENUATORS Menu – Power-Based Sweep – 2-Port VNAs (Option 32)

Previous

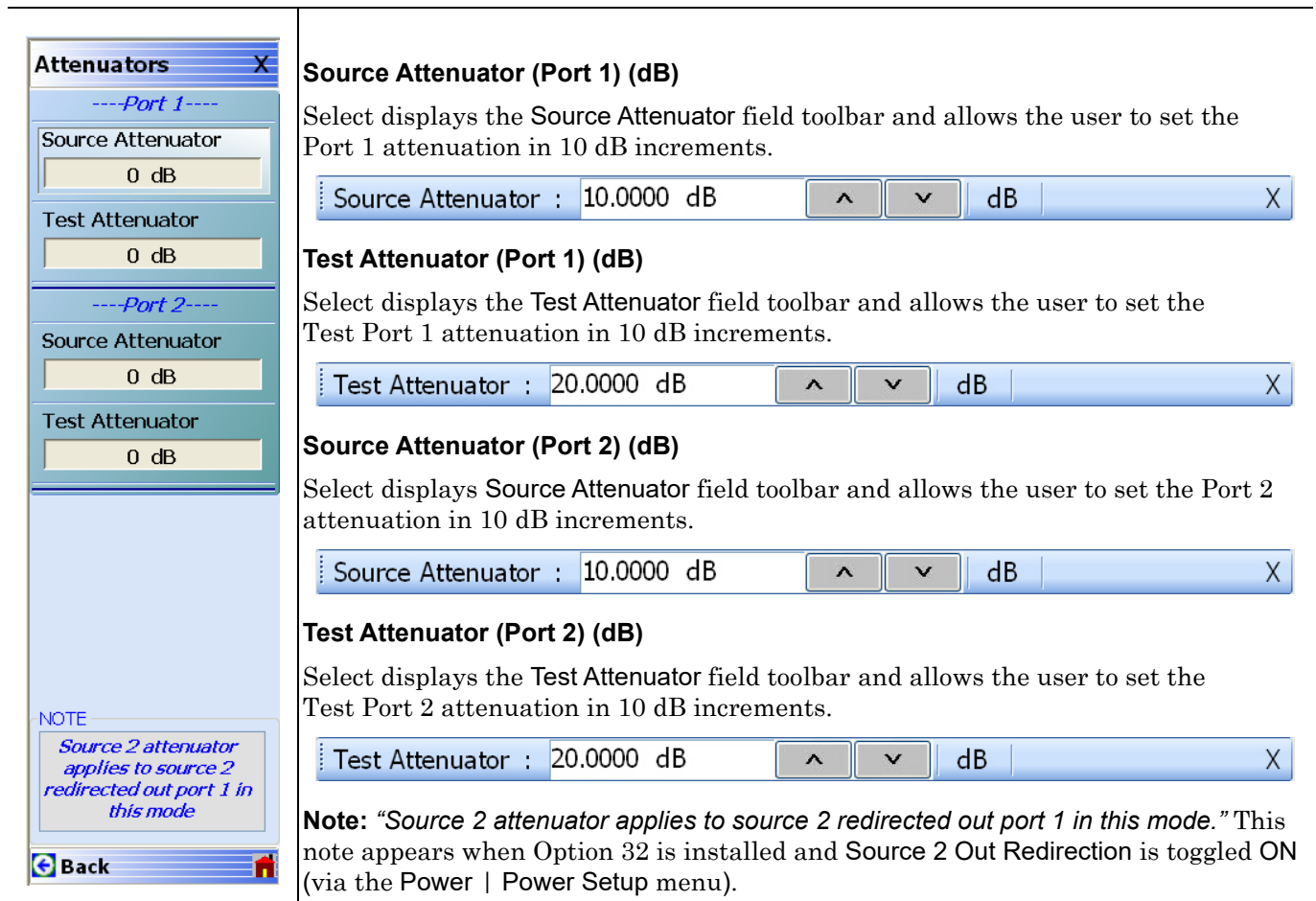
- “POWER Menu – Power-Based Sweep – 2-Port VNAs (Option 32)” on page 5-24

Prerequisites

- Option 32 installed
- Sweep Type = Power -Based Sweep (CW Frequency or Swept Frequency). See “Sweep Setup and Sweep Type Menus” on page 7-2. Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES | Power Sweep (CW Freq) or Power Sweep (Swept Freq)

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Attenuators | ATTENUATORS



Attenuators X

---Port 1---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Port 2---

Source Attenuator
0 dB

Test Attenuator
0 dB

NOTE
Source 2 attenuator applies to source 2 redirected out port 1 in this mode

Back

Source Attenuator (Port 1) (dB)
Select displays the Source Attenuator field toolbar and allows the user to set the Port 1 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 1) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Port 2) (dB)
Select displays Source Attenuator field toolbar and allows the user to set the Port 2 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Port 2) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 2 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Note: “Source 2 attenuator applies to source 2 redirected out port 1 in this mode.” This note appears when Option 32 is installed and Source 2 Out Redirection is toggled ON (via the Power | Power Setup menu).

Figure 5-16. ATTENUATORS Menu – Power-Based Sweep – 2-Port VNAs with Option 32

5-8 Power Setup Menu Variants – 2-Port VNAs

POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs

Previous

- “POWER Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-16

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log). See “Sweep Setup and Sweep Type Menus” on page 7-2.

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

Apply Slope [All Ports] (ON/OFF)

Select toggles the Apply Slope value set below between Off and On.

Port Selection (Port 1/Port 2) Select toggles the setup between Port 1 and Port 2.

- If Port Power is set to Not Coupled, when Port 1 is selected, the menu name changes to POWER SETUP [1].
- If Port Power is set to Not Coupled, when Port 2 is selected, the menu name changes to POWER SETUP [2].
- If Port Power is set to Coupled, the menu name changes to POWER SETUP [C]

Slope (dB/GHz)

Select displays the Slope field toolbar – select the power slope in dB/GHz.

Port Power (Coupled/Not Coupled)

The Port Power button toggles whether the power adjustments to Ports 1 and 2 move together or are independent.

If Not Coupled is selected:

- The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2 also changing the POWER SETUP menu name between POWER SETUP [1] and POWER SETUP [2].
- The POWER menu name also changes between POWER [1] and POWER [2].

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1 and Port 2.
- The POWER SETUP menu name changes to POWER SETUP [C].
- The POWER menu name changes to POWER [C].
- Coupling does not affect attenuator settings.

ALC Input

Visible only if Option 53 installed (or 8x installed, but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs.

Figure 5-17. POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs Without Option 32 (1 of 2)

	<p>RF Power</p> <p>Select toggles the RF Power Off and On. In the Off state, the internal source(s) is (are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.</p> <p>Leveling Mode (Application PulseView)</p> <p>Visible only if the application is set to PulseView and allows the user to more precisely control power based on the signal envelope. Displays the LEVELING MODE menu.</p> <ul style="list-style-type: none"> • “LEVELING MODE Menu – 2-Port VNAs” on page 5-44 <p>Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog Power tab.</p> <ul style="list-style-type: none"> • “Pulse Power Calibration Setup” on page 19-29 <p>Refresh Leveling Ref. (Reference) (Application PulseView)</p> <p>Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.</p> <p>Refresh Leveling Ref. (Reference) (Application PulseView)</p> <p>Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.</p>
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Figure 5-17. POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs Without Option 32 (2 of 2)

POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)

Previous

- [“POWER Menu – Frequency-Based Sweep – 2-Port VNAs \(Option 32\)” on page 5-18](#)

Prerequisites

- Option 32 installed
- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

	<p>Apply Slope [All Ports] (ON/OFF) Select toggles the Apply Slope value set below between off and on.</p> <p>Port Selection (Port 1/Src 2 out Port 1) Select toggles the setup between Port 1 and Src 2 out Port 1.</p> <p>Slope (dB/GHz) Select displays the Slope field toolbar and allows the user to select the power slope in dB/GHz.</p> <p>Slope [dB/GHz] : 0.00 ^ v Enter X</p> <p>Port Power (Coupled/Not Coupled) The Port Power button toggles whether the power adjustments to Ports 1 and 2 move together or are independent.</p> <p>If Not Coupled is selected:</p> <ul style="list-style-type: none"> • The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus. • The Port Selection button (described above) toggles between Port 1 and Port 2 also changing the POWER menu and POWER SETUP menu name between POWER SETUP [1] and POWER SETUP [2]. <p>If Coupled is selected:</p> <ul style="list-style-type: none"> • An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus. • The Port Selection button (described above) toggles between Port 1 and Port 2. • The POWER menu and POWER SETUP menu name changes to POWER SETUP [C]. • Coupling does not affect attenuator settings. <p>SRC2 Out Redirection Select toggles between ON or OFF to direct Source 2 power out of Port 1.</p> <p>ALC Input Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs. Button is disabled when SRC2 Out Redirection is ON.</p>
--	--

Figure 5-18. POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs with Option 32 (1 of 2)

	<div><div>RF Power</div><div>Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.</div><div>Leveling Mode (Application PulseView)</div><div>Visible only if the application is set to PulseView and allows the user to more precisely control power based on the signal envelope. Displays the LEVELING MODE menu.</div><div><ul style="list-style-type: none">“LEVELING MODE Menu – 2-Port VNAs” on page 5-44</div><div>Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog Power tab.</div><div><ul style="list-style-type: none">“Pulse Power Calibration Setup” on page 19-29</div><div>Refresh Leveling Ref. (Reference) (Application PulseView)</div><div>Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.</div></div>
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Figure 5-18. POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs with Option 32 (2 of 2)

POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs

The POWER SETUP menu is substantially different when in one of the segmented sweep modes (as opposed to linear frequency sweep). Most of the power configuration (in a segmented sweep mode) is configured on a per-segment basis and is configured at the FREQ BASE SETUP or the INDEX BASE SETUP menus accessible via the SWEEP SETUP menu.

Previous

- [“POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20](#)

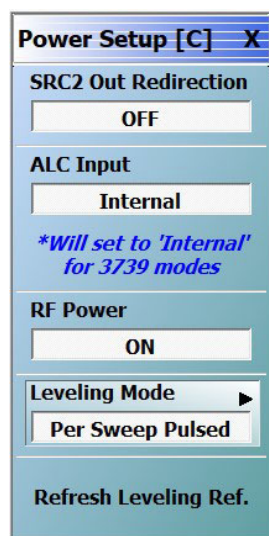
Prerequisites

- Sweep = Frequency-Based Segment Sweep or Index-Based Segment Sweep – See [“Sweep Setup and Sweep Type Menus” on page 7-2](#).
- Navigation to Sweep Types:

MAIN | Sweep Setup | SWEEP SETUP | Sweep Types

Navigation to Power Configuration for Segment-based Sweep

- MAIN | Sweep Setup | SWEEP SETUP | Freq-based Seg. Sweep Setup | FREQ BASE SETUP
- MAIN | Sweep Setup | SWEEP SETUP | Index-based Seg. Sweep Setup | INDEX BASE SETUP



SRC2 Out Redirection

When Option 32 is installed, Power Setup menu (click Other Setup button) is present so Source 2 power can be redirected out of Port 1.

ALC Input

Visible only if Option 53 installed (or 8x installed, but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs. Button is disabled when SRC2 Out Redirection is ON.

RF Power

Select toggles the RF Power Off and On. In the Off state, the internal source(s) is (are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.

Leveling Mode (Application | PulseView)

Visible only if the application is set to PulseView. Allows the user to more precisely control power based on the signal envelope. Displays the LEVELING MODE menu.

- [“LEVELING MODE Menu – 2-Port VNAs” on page 5-44](#)

Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog | Power tab.

- [“Pulse Power Calibration Setup” on page 19-29](#)

Refresh Leveling Ref. (Reference) (Application | PulseView)

Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.

Figure 5-19. POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs

POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs (Option 32)

When Option 32 is installed, and a segment-based sweep is selected, a POWER SETUP menu is made available. This menu consists of a button to toggle Src2 Out Redirection ON or OFF.

Previous

- [“POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20](#)

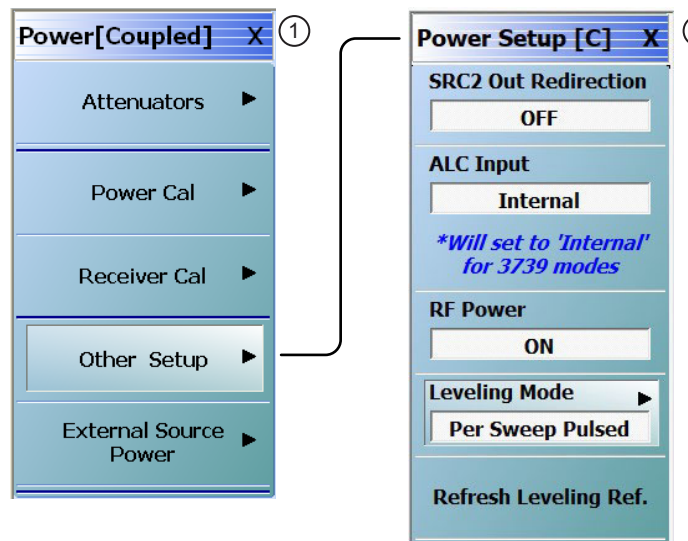
Prerequisites

- Option 32 installed
- Sweep = Frequency-Based Segment Sweep or Index-Based Segment Sweep – See [“Sweep Setup and Sweep Type Menus” on page 7-2](#).
- Navigation to Sweep Types:

MAIN | Sweep Setup | SWEEP SETUP | Sweep Types

Navigation to Power Setup Menu (Option 32)

- MAIN | Power | POWER | Other Setup | POWER SETUP



When Option 32 is installed, POWER SETUP menu (click Other Setup button) is present so Source 2 power can be redirected out of Port 1. All other menus remain the same.

1. POWER Menu – Segment-Based Sweep – 2-Port VNAs with Option 32
2. POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs with Option 32 and PulseView.

SRC2 Out Redirection

When Option 32 is installed, POWER SETUP menu (click Other Setup button) is present so Source 2 power can be redirected out of Port 1.

ALC Input

Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs. Button is disabled when SRC2 Out Redirection is ON.

RF Power

Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.

Figure 5-20. Power Setup Menu – Segment-Based Sweep with Option 32 (1 of 2)

Leveling Mode (Application | PulseView)

Visible only if the application is set to PulseView. Allows the user to more precisely control power based on the signal envelope. Displays the LEVELING MODE menu.

- [“LEVELING MODE Menu – 2-Port VNAs” on page 5-44](#)

Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog | Power tab.

- [“Pulse Power Calibration Setup” on page 19-29](#)

Refresh Leveling Ref. (Reference) (Application | PulseView)

Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.

Figure 5-20. Power Setup Menu – Segment-Based Sweep with Option 32 (2 of 2)

POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs

Previous

- [“POWER Menu – Power-Based Sweeps – 2-Port VNAs” on page 5-22](#)

Prerequisites

- Sweep = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types: MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP

Power Setup[C] X

Port Selection

Port 1

Single Power Mode

OFF

Single Power

-20 dBm

Effective Single Power

-20 dBm

Attenuators ▶

Power Cal ▶

Receiver Cal ▶

(cont.)

Port Selection (Port 1/Port 2)

Select displays the SELECT PORT dialog box allowing selection of Port 1 or Port 2.

The menu name suffix changes depending on the state of the Port Power (Couple/Not Coupled) button, and if Not Coupled, on the currently selected port.

Single Power Mode (ON/OFF)

Select toggles single power mode ON and OFF.

Single Power (dBm)

Select displays the Single Power (dBm) field toolbar and allows the user to select the single power level.

Single Power : -20.0000 dBm ^ v dBm X

Effective Single Power (dBm)

The read-only button name depends on the receiver configuration selection made on the APPLICATION menu. If Single, Multiple Source, or BB/mm Wave is selected, the button name is Effective Single Power and displays the value of the effective single power level in dBm after the effects of any attenuators.

Eff. Single Pwr (>54G) (dBm)

Effective Single Power >54 GHz. The button name depends on the receiver configuration selection made on the APPLICATION menu where Modular BB must be selected. In addition, the instrument must be an MS4647B with Option 8x installed. An example of the button name change is shown below.

Port Selection

Port 1

Single Power Mode

OFF

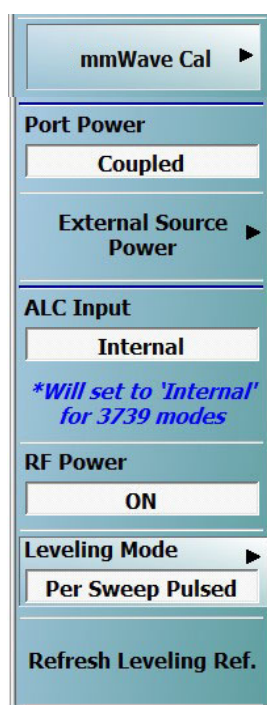
Single Power

-20 dBm

Eff. Single Pwr (>54G)

-20 dBm

Figure 5-21. POWER SETUP Menu – Power-Based Sweep – 2-Port VNAs (1 of 3)



Attenuators

The Attenuators button presence depends on instrument installed options:

- Button Not Available
 - If the Attenuators button is present but unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.
- Button Available
 - If the Attenuators button is available, one of the attenuator options has been installed.
 - Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
 - Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-26](#)
- [“ATTENUATORS Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-28](#)
- [“ATTENUATORS Menu – Power-Based Sweep Menu – 2-Port VNAs” on page 5-30](#)

Power Cal

Select displays the POWER CAL menu.

- [“POWER CAL Menu – Power-Based Sweep – 2-Port VNAs” on page 5-49](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu – 2-Port VNAs” on page 5-64](#)

mmWave Cal

Select displays the mmWAVE ALC CALC menu. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.

- [“mmWAVE ALC CAL Menu” on page 14-14](#)

Figure 5-21. POWER SETUP Menu – Power-Based Sweep – 2-Port VNAs (2 of 3)

	<p>Port Power (Coupled/Not Coupled)</p> <p>The Port Power button toggles whether the power adjustments to Ports 1 and 2 move together or are independent.</p> <p>If Not Coupled is selected:</p> <ul style="list-style-type: none"> • The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus. • The Port Selection button (described above) toggles between Port 1 and Port 2 also changing the POWER SETUP menu name between POWER SETUP [1] and POWER SETUP [2]. • The POWER menu name also changes between POWER [1] and POWER [2]. <p>If Coupled is selected:</p> <ul style="list-style-type: none"> • An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus. • The Port Selection button (described above) toggles between Port 1 and Port 2. • The POWER SETUP menu name changes to POWER SETUP [C]. • The POWER menu name changes to POWER [C]. • Coupling does not affect attenuator settings. <p>External Source Power</p> <p>Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.</p> <ul style="list-style-type: none"> • “EXT. SRC POWER Menu – 2-Port VNAs” on page 5-62 <p>ALC Input</p> <p>Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs.</p> <p>RF Power</p> <p>Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.</p> <p>Leveling Mode (Application PulseView)</p> <p>Visible only if the application is set to PulseView. Allows the user to more precisely control power based on the signal envelope. Displays the LEVELING MODE menu.</p> <ul style="list-style-type: none"> • “LEVELING MODE Menu – 2-Port VNAs” on page 5-44 <p>Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog Power tab.</p> <ul style="list-style-type: none"> • “Pulse Power Calibration Setup” on page 19-29 <p>Refresh Leveling Ref. (Reference) (Application PulseView)</p> <p>Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.</p>
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Figure 5-21. POWER SETUP Menu – Power-Based Sweep – 2-Port VNAs (3 of 3)

POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs (Option 32)

Previous

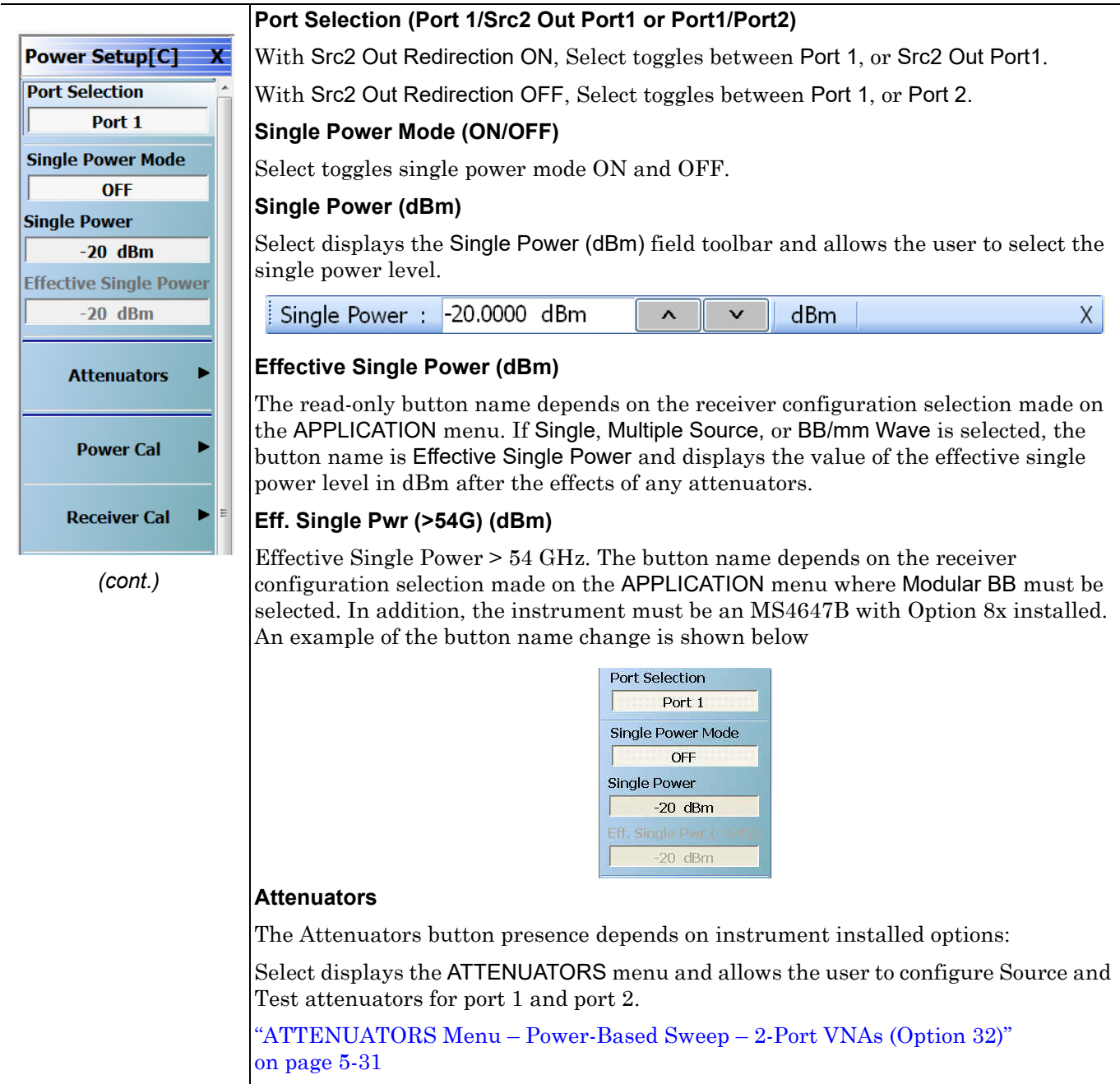
- [“POWER Menu – Power-Based Sweep – 2-Port VNAs \(Option 32\)” on page 5-24](#)

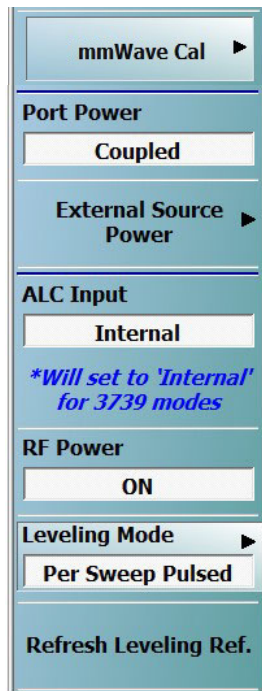
Prerequisites

- Option 32 installed
- Sweep = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types: MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP



**Power Cal**

Select displays the POWER CAL menu.

- [“POWER CAL Menu – Power-Based Sweep – 2-Port VNAs with Option 32” on page 5-51](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu – 2-Port VNAs” on page 5-64](#)

Port Power (Coupled/Not Coupled)

The Port Power button toggles whether the power adjustments to Ports 1 and 2 move together or are independent.

If Not Coupled is selected:

- The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus.

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- Coupling does not affect attenuator settings.

External Source Power

Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.

- [“EXT. SRC POWER Menu – 2-Port VNAs” on page 5-62](#)

SRC2 Out Redirection

Select toggles between ON or OFF to direct Source 2 power out of Port 1.

ALC Input

Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs. Button is disabled when SRC2 Out Redirection is ON.

RF Power

Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.

Leveling Mode (Application | PulseView)

Visible only if the application is set to PulseView. Allows the user to more precisely control power based on the signal envelope. Displays the LEVELING MODE menu.

- [“LEVELING MODE Menu – 2-Port VNAs” on page 5-44](#)

Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog | Power tab.

- [“Pulse Power Calibration Setup” on page 19-29](#)

Refresh Leveling Ref. (Reference) (Application | PulseView)

Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.

Figure 5-22. POWER SETUP Menu – Power-Based Sweep – 2-Port VNAs with Option 32 (2 of 2)

LEVELING MODE Menu – 2-Port VNAs

Previous

- [“POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-32](#)
- [“POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs \(Option 32\)” on page 5-34](#)
- [“POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-36](#)
- [“POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs \(Option 32\)” on page 5-37](#)
- [“POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs” on page 5-39](#)
- [“POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs \(Option 32\)” on page 5-42](#)

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP | Leveling Mode | LEVELING MODE

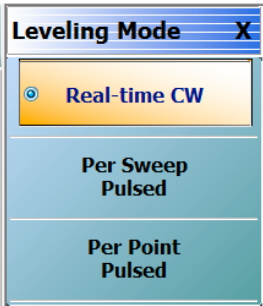
	<p>Leveling Mode (Application PulseView)</p> <p>Visible only if the application is set to PulseView. Allows the user to more precisely control power based on the signal envelope. Allows selection of:</p> <ul style="list-style-type: none">• Real Time CW leveling mode – Level adjustments occur based upon detection of the CW non-pulsed signal. This will result in a leveling of average power, but occurs on a continuous (sub-microsecond) basis and has no impact on sweep time.• Per Sweep leveling mode – Level adjustments occur on a per sweep basis targeting the specific portion of the pulse described by the reference measurement width and delay. The leveling adjustments only occur at the end of the sweep, so fast drift (by a preamplifier for example) will not be corrected. This approach has minimal impact on sweep time.• Per Point leveling mode – Level adjustments occur on a per point basis targeting the specific portion of the pulse described by the reference measurement width and delay. The leveling adjustment is made at every point before the main measurement is made, so even fast drifts will be corrected. This approach has more impact on sweep time, but the power level at a specific point in the pulse is more precisely controlled. <p>Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog Power tab.</p> <ul style="list-style-type: none">• “Pulse Power Calibration Setup” on page 19-29
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Figure 5-23. LEVELING MODE Menu

<p>Note</p>	<p>If the application is set to PulseView and the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed, the Refresh Leveling Ref. button will become available, which will allow the user to refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.</p>
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5-9 Power Cal Menu Variants – 2-Port VNAs

POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs

POWER CAL Menu – Segment-Based Sweep – 2-Port VNAs

Note The menus are identical for frequency-based sweep and segment-based sweep.

Previous

- “POWER Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-16
- “POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20

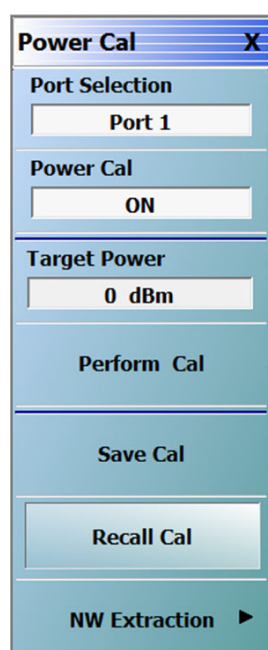
Prerequisites

- Sweep = Frequency and Segment-Based Sweep – See “Sweep Setup and Sweep Type Menus” on page 7-2. Navigation to Sweep Type:

MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL



POWER CAL Menu (Non-Power Sweep Modes)

Available if a non-power sweep mode of Frequency-Based Sweep or Index-Based Sweep is selected.

Port Selection (Port 1/Port 2)

The Port Selection button toggles the port selection between Port 1 and Port 2.

Port Selection (Port 1/Port 2/Aux Module)

Availability requires Option 31 dual source and one of Options 084, 085, 088, or 089 installed.

Selecting button opens Select Port dialog and allows selection between Port 1, Port 2, or Aux Module. This feature is active only when either:

- The receiver is configured for 3739 test set use, and IMDView (Option 044) is active in a millimeter waveband, or:
- The receiver is configured for Multiple Source control using the 3739 test set, and both sources (Option 031) are active

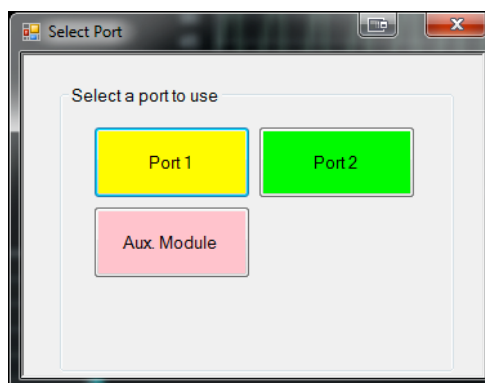


Figure 5-24. POWER CAL Menu – Non-Power Sweep Modes (1 of 2)

Power Cal (Off/On)

If a successful power calibration has not been completed, the button is unavailable. If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.

Target Power (dBm)

Select displays the Target Power field toolbar and allows the user to enter power levels in dBm.

Target Power : 1.0000 dBm

^

v

dBm

X

Perform Cal

Starts the power calibration routine and displays the POWER CALIBRATION dialog box. When the calibration is successfully completed, the Save Cal button (below) and the Power Cal (Off/On) button (above) are available.

• “POWER CALIBRATION (PORT 1/PORT 2) Dialog Box” on page 5-53

Save Cal

If a successful power calibration has not been completed, the button is unavailable. The Save Cal button is available after a successful power calibration (above). If the sweep mode is set to a frequency sweep, select displays the SAVE AS (FREQUENCY SWEEP POWER CAL.FPC FILE) dialog box.

• “SAVE AS (FREQ SWEEP POWER CAL FPC FILE) Dialog Box” on page 5-60

Recall Cal

The Recall Calibration (Recall Cal) button allows a prior saved calibration to be recalled. As above, if the sweep mode is set to a frequency sweep, select displays the OPEN (FREQUENCY SWEEP POWER CAL.FPC FILE) dialog box.

• “OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box” on page 5-59

When a Power Cal is successfully recalled on any port of the channel, the indicator ‘PwrCal’ is shown on the Channel Status bar.

Ch1 | TR | RF Start 4 GHz | Stop 8 GHz | IFBW 1 kHz | Avg OFF |

PwrCal

 | Measuring State | UNCORR

Port 1 Power Cal Recalled.

Internal

Int. 10 MHz

Local

Ch1

Port

1

2

NW Extraction

This button is only available if there is an existing power calibration. This menu enables one to load files separately for embedding and de-embedding, where an existing power calibration is modified by the S-parameters in a .s2p file to reflect a network that was added after the power calibration (embedding) or removed after calibration (de-embedding).

• “NW EXTRACTION Menu” on page 5-61

Figure 5-24. POWER CAL Menu – Non-Power Sweep Modes (2 of 2)

5-46

PN: 10410-00319 Rev: AE

MS4640B Series VNA UIRM

POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs with Option 32**POWER CAL Menu – Segment-Based Sweep – 2-Port VNAs with Option 32**

Note The menus are identical for frequency-based sweep and segment-based sweep.

Previous

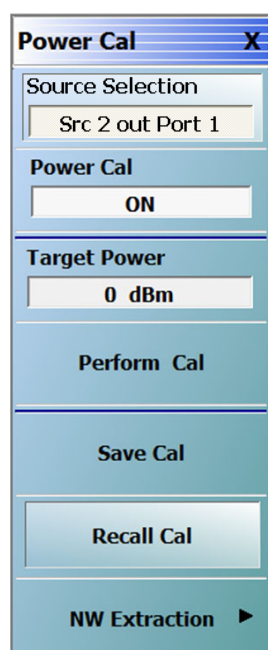
- “POWER Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-18
- “POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20

Prerequisites

- Option 32 installed
- Sweep = Frequency and Segment-Based Sweep – See “Sweep Setup and Sweep Type Menus” on page 7-2. Navigation to Sweep Type:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL

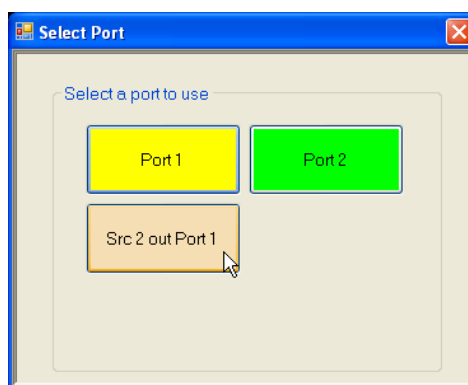
**POWER CAL Menu (Non-Power Sweep Modes)**

Available if a non-power sweep mode of Frequency-Based Sweep or Index-Based Sweep is selected.

Port/Source Selection (Port 1/Port2 or Port 1/Port2/Src 2 out Port 1)

With Src2 Out Redirection OFF, button is named Port Selection. Select toggles between Port 1, or Port 2.

With Src2 Out Redirection ON, button is named Source Selection. Select opens a dialog to select Port 1, Port 2 or Src 2 out Port 1.

**Power Cal (Off/On)**

If a successful power calibration has not been completed, the button is unavailable. If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.

Target Power (dBm)

Select displays the Target Power field toolbar and allows the user to enter power levels in dBm.



Figure 5-25. POWER CAL Menu – Non-Power Sweep Modes (1 of 2)

Save Cal

If a successful power calibration has not been completed, the button is unavailable. The Save Cal button is available after a successful power calibration (above). If the sweep mode is set to a frequency sweep, select displays the SAVE AS (FREQUENCY SWEEP POWER CAL.FPC FILE) dialog box.

- [“SAVE AS \(FREQ SWEEP POWER CAL FPC FILE\) Dialog Box” on page 5-60](#)

Recall Cal

The Recall Calibration (Recall Cal) button allows a prior saved calibration to be recalled. As above, if the sweep mode is set to a power sweep, select displays the OPEN (POWER SWEEP POWER CAL.PPC FILE) dialog box.

- [“OPEN \(POWER SWEEP POWER CAL PPC FILE\) Dialog Box” on page 5-59](#)

When a Power Cal is successfully recalled on any port of the channel, the indicator ‘PwrCal’ is shown on the Channel Status bar.



NW Extraction

This button is only available if there is an existing power calibration. This menu enables one to load files separately for embedding and de-embedding, where an existing power calibration is modified by the S-parameters in a .s2p file to reflect a network that was added after the power calibration (embedding) or removed after calibration (de-embedding).

- [“NW EXTRACTION Menu” on page 5-61](#)

Figure 5-25. POWER CAL Menu – Non-Power Sweep Modes (2 of 2)

POWER CAL Menu – Power-Based Sweep – 2-Port VNAs

Previous

- [“POWER Menu – Power-Based Sweeps – 2-Port VNAs” on page 5-22](#)

Prerequisites

- Sweep = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL

Power Cal X

Port Selection
Port 1

Power Cal
ON

Target Start Power
0 dBm

Target Stop Power
10 dBm

Perform Cal

Save Cal

Recall Cal

NW Extraction ▶

POWER CAL Menu (Power Sweep Modes)

Available if Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is selected.

Port Selection (Port 1/Port 2)

The Port Selection button toggles the port selection between Port 1 and Port 2.

Power Cal (Off/On)

If a successful power calibration has not been completed, the button is unavailable.

If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.

Target Start Power (dBm)

Select displays the Target Start Power field toolbar and allows the user to enter power levels in dBm.

Target Start Power : -30.0000 dBm ^ v dBm X

Target Stop Power (dBm)

Select displays the Target Start Power field toolbar and allows the user to enter power levels in dBm.

Target Stop Power : -20.0000 dBm ^ v dBm X

Perform Cal

Starts the power calibration routine and displays the POWER CALIBRATION dialog box. When the calibration is successfully completed, the Save Cal button (below) and the Power Cal (Off/On) button (above) are available.

- [“POWER CALIBRATION \(PORT 1/PORT 2\) Dialog Box” on page 5-53](#)

Save Cal

If a successful power calibration has not been completed, the button is unavailable.

The Save Cal button is available after a successful power calibration (above).

If the sweep mode is set to a power sweep, select displays the SAVE AS (POWER SWEEP POWER CAL.PPC FILE) dialog box.

- [“SAVE AS \(POWER SWEEP POWER CAL PPC FILE\) Dialog Box” on page 5-60](#)

Figure 5-26. POWER CAL Menu – Power Sweep Modes (1 of 2)

Ch1

TR

RF Start 4 GHz

Stop 8 GHz

IFBW 1 kHz

Avg OFF

PwrCal

Measuring State

UNCORR

Port 1 Power Cal Recalled.

Internal

Int. 10 MHz

Local

Ch1

Port

1

2

Recall Cal

The Recall Calibration (Recall Cal) button allows a prior saved calibration to be recalled.

As above, if the sweep mode is set to a frequency sweep, select displays the OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box. The dialog box is similar to the dialog box below:

• “OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 5-59

When a Power Cal is successfully recalled on any port of the channel, the indicator ‘PwrCal’ is shown on the Channel Status bar.

NW Extraction

This button is only available if there is an existing power calibration. This menu enables one to load files separately for embedding and de-embedding, where an existing power calibration is modified by the S-parameters in a .s2p file to reflect a network that was added after the power calibration (embedding) or removed after calibration (de-embedding).

• “NW EXTRACTION Menu” on page 5-61

Figure 5-26. POWER CAL Menu – Power Sweep Modes (2 of 2)

POWER CAL Menu – Power-Based Sweep – 2-Port VNAs with Option 32

Previous

- [“POWER Menu – Power-Based Sweeps – 2-Port VNAs” on page 5-22](#)

Prerequisites

- Option 32 installed
- Sweep = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL

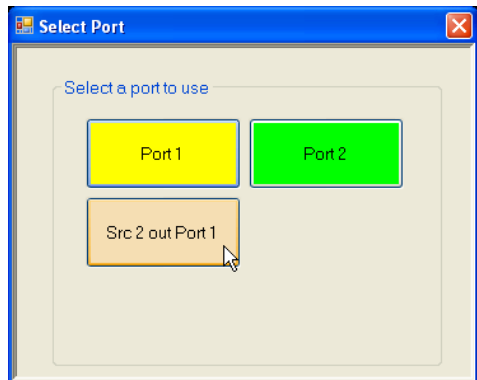
	<h3>POWER CAL Menu (Power Sweep Modes)</h3> <p>Available if Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is selected.</p> <h4>Port/Source Selection (Port 1/Port2 or Port 1/Port2/Src 2 out Port 1)</h4> <p>With Src2 Out Redirection OFF, button is named Port Selection. Select toggles between Port 1, or Port 2.</p> <p>With Src2 Out Redirection ON, button is named Source Selection. Select opens a dialog to select Port 1, Port 2 or Src 2 out Port 1.</p> <div>  </div> <h4>Power Cal (Off/On)</h4> <p>If a successful power calibration has not been completed, the button is unavailable.</p> <p>If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.</p> <h4>Target Start Power (dBm)</h4> <p>Select displays the Target Start Power field toolbar and allows the user to enter power levels in dBm.</p> <div>  </div>
--	--

Figure 5-27. POWER CAL Menu – Power Sweep Modes (with Option 32) (1 of 2)

POWER CALIBRATION (PORT 1/PORT 2) Dialog Box

Previous

- “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-45

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Perform Cal | POWER CALIBRATION (PORT 1/PORT 2) Dialog Box

Note

The examples shown below have the Sweep Setup set to Frequency Sweep. When Sweep Setup is set to Power Sweep, the dialog states: “Power calibration in power sweep adjusts the source output power for the frequency specified across the power sweep range to provide a linear power level at the calibration plane.”

Power Calibration Dialog – USB Power Sensor *Not* Detected and Broadband Disabled

When Broadband receiver mode is disabled and a USB power sensor is not detected, the dialog instructions appear as shown in [Figure 5-28](#).

Power Calibration (Port 1)

Power calibration in frequency sweep adjusts the source power to provide a constant level at the test port.

Instructions:

1. Preset, Zero, Calibrate the power meter.
2. If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA. If using an USB power meter, connect it to a USB port of the VNA. In either case, connect the RF port of the sensor to the desired DUT reference plane connected to port 1.
3. Select <Start Cal> to perform the calibration.

☐ Use USB Erickson PM5 power sensor **PM5 drivers must be loaded on the VNA to use the meter for power calibrations. This is typically done by executing the 'setup.exe' file supplied with the meter.*

☐ Use USB power sensor Model and serial number ▼

**If sweeping over a range exceeding that of the USB sensor, one or more GPIB sensors will be expected by the calibration and will be used for those higher frequencies.*

0 %

Start Cal Abort Cal Close

Figure 5-28. POWER CALIBRATION (PORT 1/PORT 2) Dialog Box – USB Sensor Not Detected – Broadband Disabled

Instructions

For best results: Set the source power, port attenuator, and power target so that the test port level is correct at the desired port.

1. Preset, Zero, and Calibrate the power meter.
2. If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA. If using a USB power meter, connect it to a USB port on the VNA. In either case, connect the RF port of the sensor to the desired DUT reference plane connected to Port 1.
3. Select Start Cal to perform the calibration.
4. Click Close to return. Click Abort Cal to end calibration session.

Power Calibration – Pulse Mode and Broadband Disabled

In pulse modes (Options 35 and 42 required), a power calibration selection is available to calibrate based only on energy in specific time intervals (e.g., in the middle of the on-state of the pulse). The timing parameters are set in the PulseView Configuration section and their use requires a pulsed power meter. The Calibrate Pulsed Power check box is available in the POWER CALIBRATION dialog box, as shown in [Figure 5-29](#).

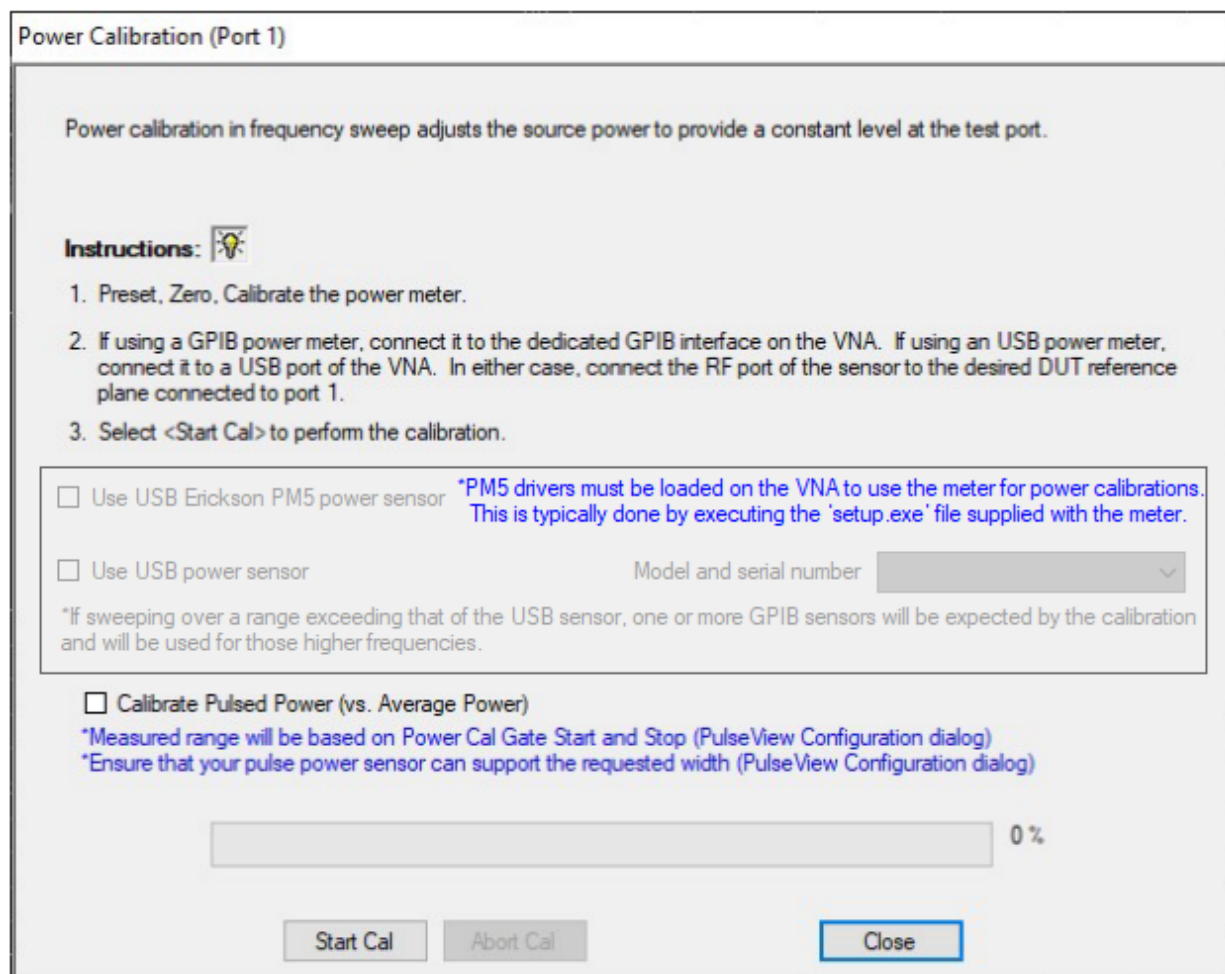


Figure 5-29. POWER CALIBRATION (PORT 1/PORT 2) Dialog Box – Calibrate Pulsed Power – 3739 Mode Disabled

Power Calibration Dialog – USB Power Sensor Detected and 3739 Mode Disabled

When 3739 Broadband receiver mode is disabled and a USB power sensor is detected, the dialog instructions appear as shown in [Figure 5-30](#).

Note

The MA24500A series USB PowerMaster is supported only on VectorStar systems equipped with Windows 7 or Windows 10 IoT Operating System and requires a dual USB Type A male to single USB Type A female cable to supply needed current draw.

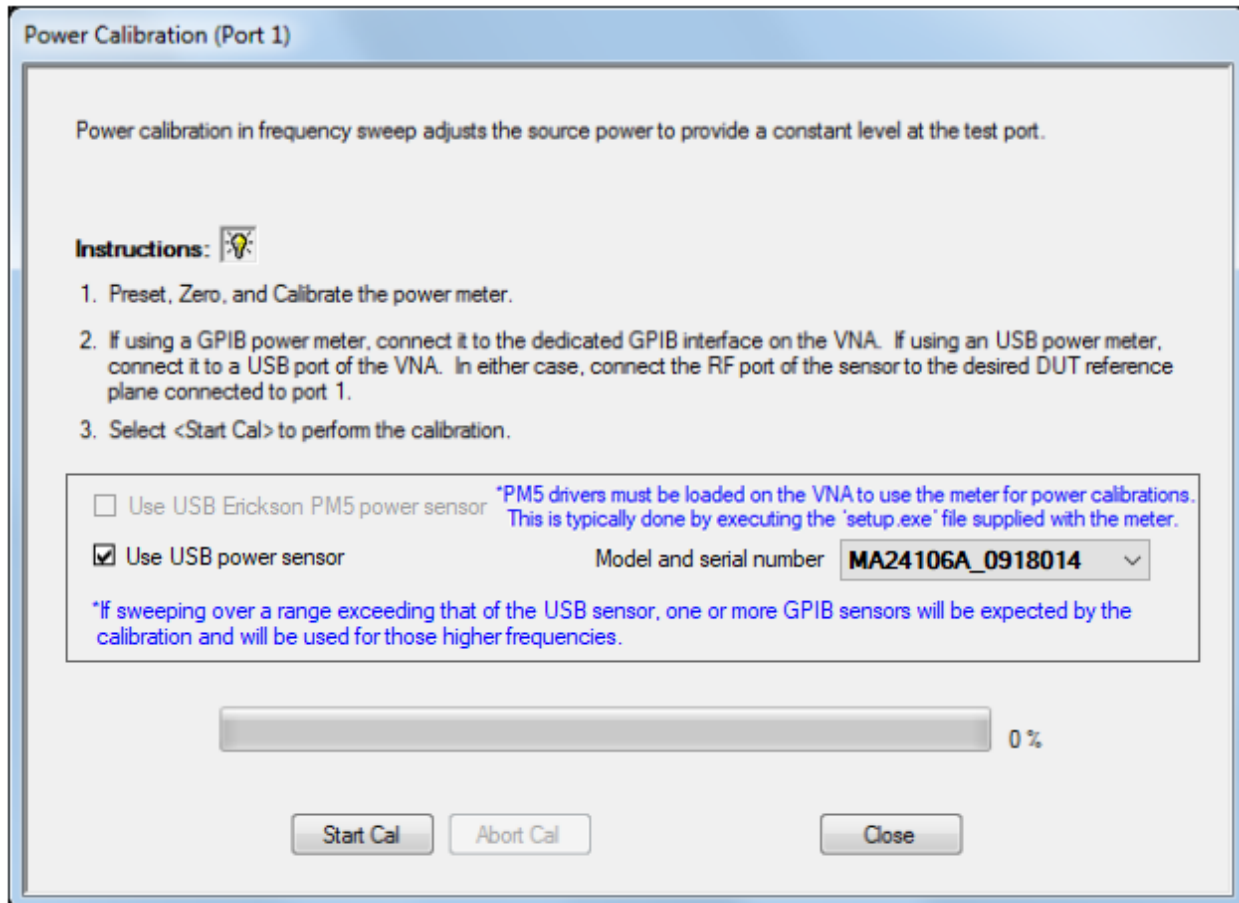


Figure 5-30. POWER CALIBRATION (PORT 1/PORT 2) Dialog Box – USB Sensor Detected – 3739 Mode Disabled

Instructions

Clicking on the ‘lamp’ icon opens the following notice: *“For Best Results: Set the source power, port attenuator, and power target so that the test port level is correct at the desired port.”*

1. Preset, Zero, and Calibrate the power meter.
2. If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA. If using a USB power meter, connect it to a USB port on the VNA. In either case, connect the RF port of the sensor to the desired DUT reference plane connected to Port 1.
3. Select **Start Cal** to perform the calibration.
4. Click **Close** to return. Click **Abort Cal** to end calibration session.

Power Calibration Dialog – USB Power Sensor Detected and Any 3739 Mode Enabled

When any 3739 receiver mode is enabled and a USB power sensor is detected, the dialog instructions appear as shown in Figure 5-31.

When in 3739 broadband mode, checking the “Use Fundamental Power Correction” box improves overall power accuracy by characterizing the harmonic content during the power calibration.

Note

The MA24500A series USB PowerMaster is supported only on VectorStar systems equipped with Windows 7 or Windows 10 IoT Operating System and requires a dual USB Type A male to single USB Type A female cable to supply needed current draw.

These sensors cannot be used to perform fundamental power correction.

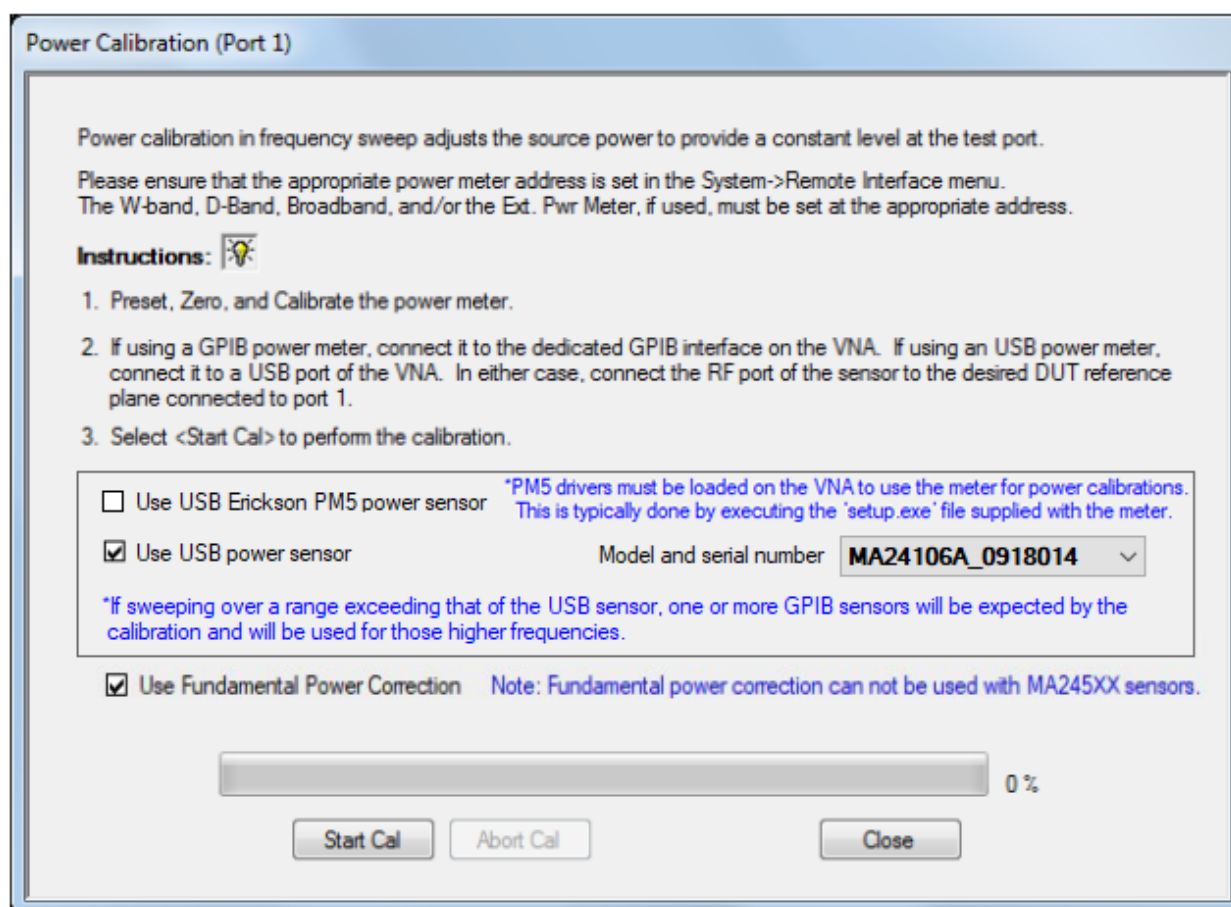


Figure 5-31. POWER CALIBRATION (PORT 1/PORT 2) Dialog Box – USB Sensor Detected – 3739 Mode Enabled

Instructions

Clicking on the 'lamp' icon opens the following notice: *“For Best Results: Set the source power, port attenuator, and power target so that the test port level is correct at the desired port.”*

1. Preset, Zero, and Calibrate the power meter.
2. Connect the RF port of the sensor to the desired DUT reference plane connected to Port 1.
 - If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA.
 - If using a USB Erickson PM5 power sensor, this option is only available Flatness and Linear power cal dialogs, when the application is in any of HB1, HB2, or HB3 modes, and the frequency range includes 70 GHz or above.
 - If using a USB power meter, connect it to a USB port on the VNA.
3. Select **Start Cal** to perform the calibration.
4. Click **Close** to return. Click **Abort Cal** to end calibration session.

Power Calibration Dialog – USB Power Sensor *Not* Detected and any 3739 Mode Enabled

When Broadband receiver mode is enabled (3739 Test set enabled in Application | Receiver Config.), and a USB sensor is *not* detected, the dialog instructions appear as shown in [Figure 5-32](#). The USB power sensor selection is disabled because no USB sensor was detected.

Note that when in 3739 broadband mode, checking the “Use Fundamental Power Correction” box improves overall power accuracy by characterizing the harmonic content during the power calibration.

Note	The MA24500A series USB PowerMaster is supported only on VectorStar systems equipped with Windows 7 or Windows 10 IoT Operating System and requires a dual USB Type A male to single USB Type A female cable to supply needed current draw.
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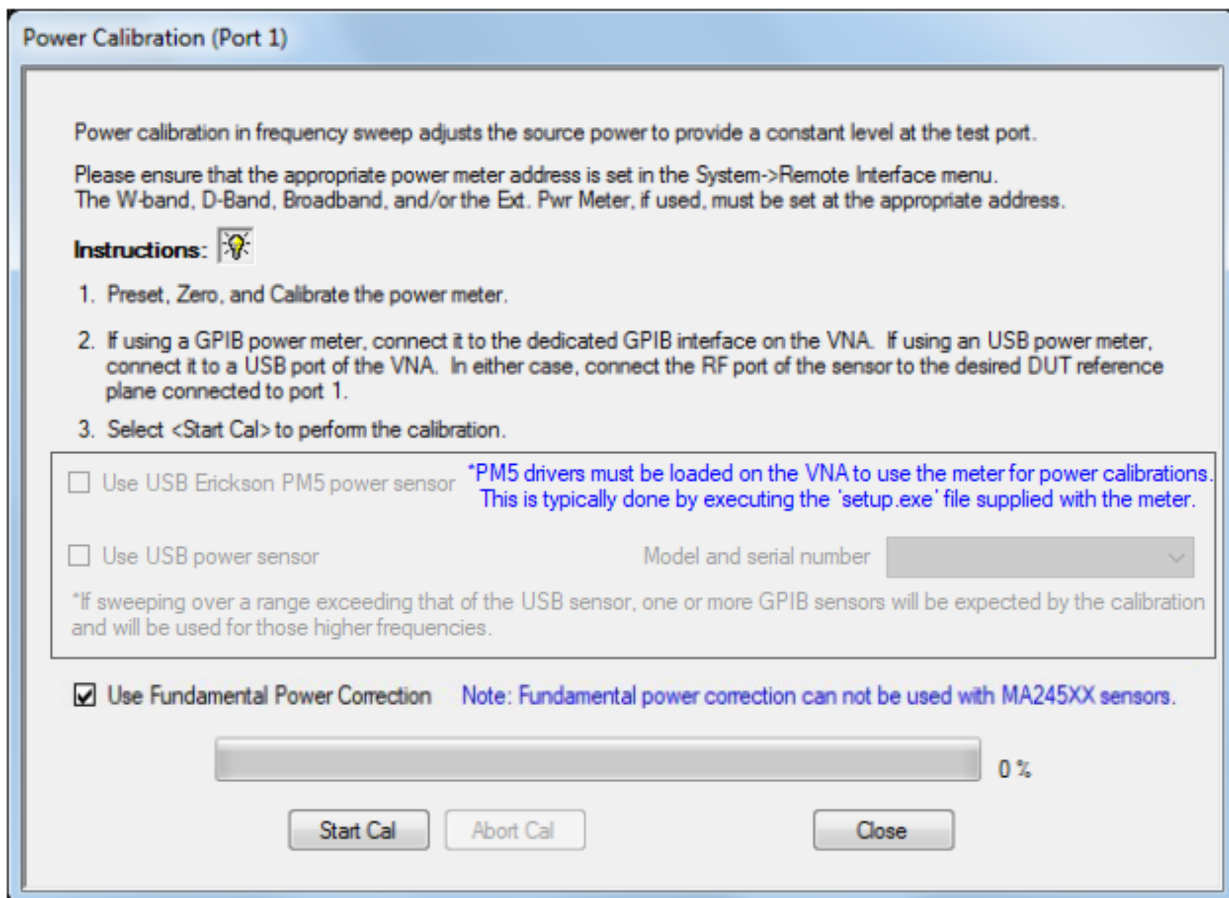


Figure 5-32. POWER CALIBRATION (PORT 1/PORT 2) Dialog Box – USB Sensor NOT Detected – 3739 Mode Enabled

Instructions

Clicking on the ‘lamp’ icon opens the following notice: *“For Best Results: Set the source power, port attenuator, and power target so that the test port level is correct at the desired port.”*

1. Preset, Zero, and Calibrate the power meter.
2. If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA. If using a USB power meter, connect it to a USB port on the VNA. In either case, connect the RF port of the sensor to the desired DUT reference plane connected to Port 1.
3. Select Start Cal to perform the calibration.
4. Click Close to return. Click Abort Cal to end calibration session.

OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box

Overview

Allows the user to find, open, and recall a frequency sweep power calibration (FPC file). If a frequency sweep is set, recalling a prior calibration displays the Open (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box. See left image in [Figure 5-33](#).

Previous

- “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-45.

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Recall Cal | OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box

OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box

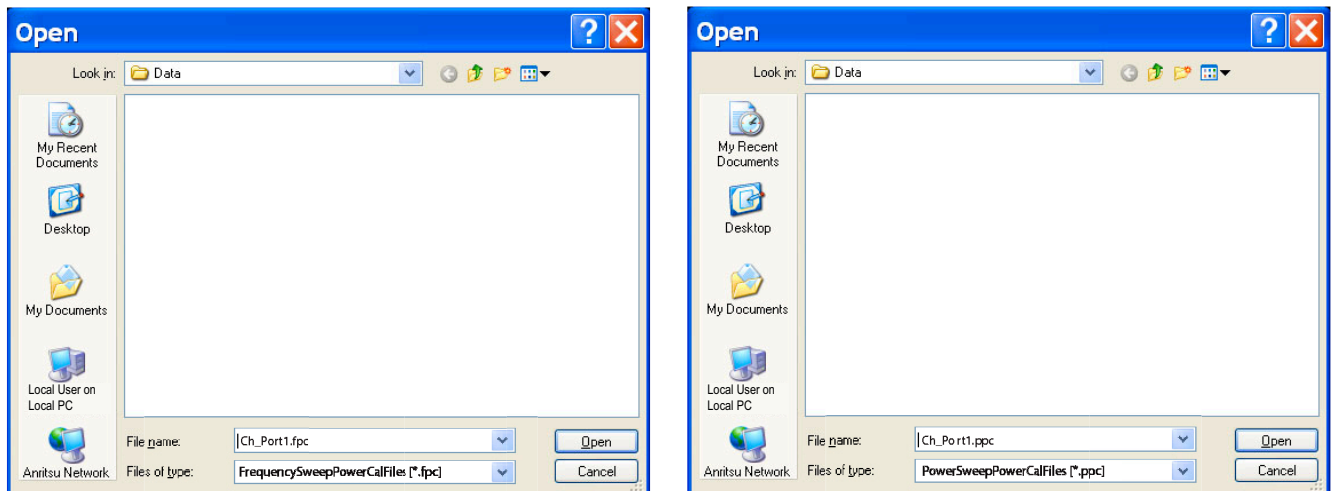
Allows the user to find, open, and recall a power sweep power calibration (PPC file). If a power sweep is set, recalling a prior calibration from the Power Cal menu displays the Open (POWER SWEEP POWER CAL PPC FILE) dialog box. See right image in [Figure 5-33](#).

Previous

- “POWER CAL Menu – Power-Based Sweep – 2-Port VNAs” on page 5-49

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL | Recall Cal | RECALL CAL (POWER SWEEP POWER CAL PPC FILE) Dialog Box



At left, Open Frequency Sweep Power Cal FPC File

At right, Open Power Sweep Power Cal (PPC) File

Figure 5-33. OPEN FPC or PPC File Dialog Boxes

SAVE AS (FREQ SWEEP POWER CAL FPC FILE) Dialog Box

Allows the user to save a frequency sweep power calibration (FPC file). If a frequency sweep is set, clicking Save Cal displays the Save As (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box. See left image in [Figure 5-34](#).

Full Name

SAVE AS (FREQUENCY SWEEP POWER CALIBRATION FPC FILE)

Previous

- [“POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-45](#)

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Save Cal | SAVE AS (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box

SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box

Allows the user to save a power sweep power calibration (PPC file). If a power sweep is set, clicking Save Cal displays the Save As (POWER SWEEP POWER CAL PPC FILE) dialog box. See right image in [Figure 5-34](#).

Previous

- [“POWER CAL Menu – Power-Based Sweep – 2-Port VNAs” on page 5-49](#)

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL | Save Cal | SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box

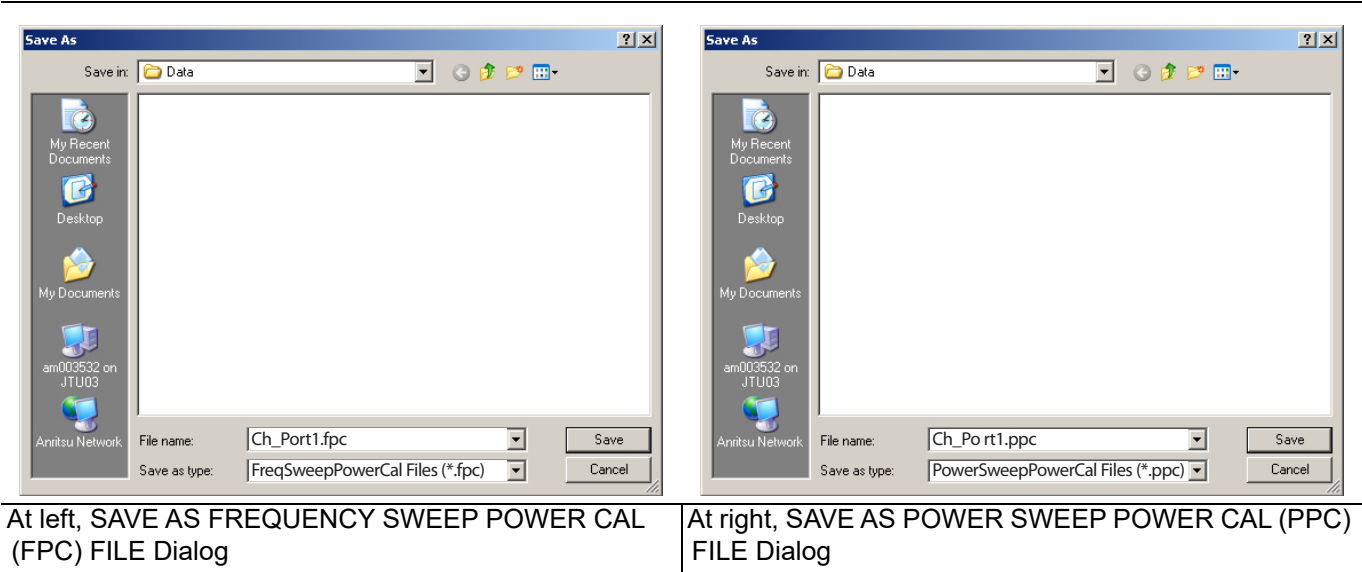


Figure 5-34. SAVE AS FPC or PPC File Dialog Boxes

NW EXTRACTION Menu

Full Name

NW Extraction

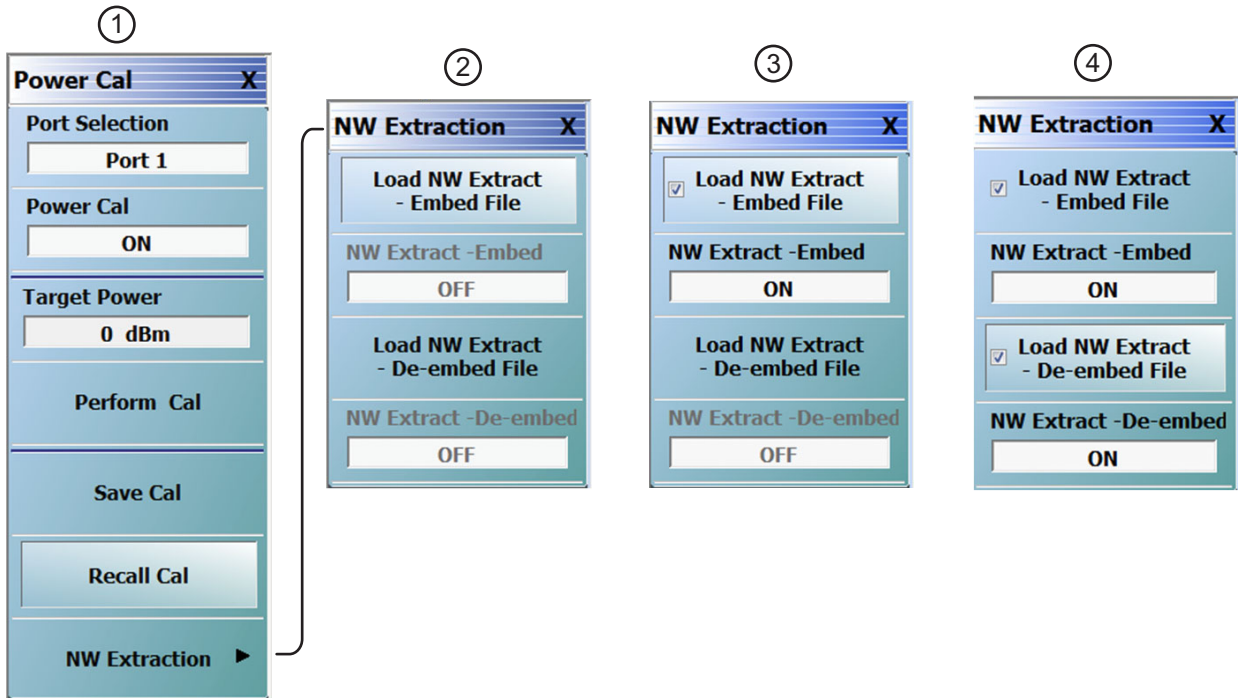
Previous

- “POWER CAL Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-45

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | NW Extraction

An additional function available with power calibrations is embedding or de-embedding, where an existing power calibration is modified by the S-parameters in a .s2p file to reflect a network that was added after the power calibration (embedding) or removed after calibration (de-embedding). These functions are placed on the NW Extraction submenu (short for network extraction) shown in Figure 5-35. This refers to the calibration options submenu where the .s2p file is often generated.



This menu enables the user to load files separately for embedding and de-embedding.

1. Power Cal menu

2. Selection opens NW Extraction menu.
Click “Load NW Extract – **Embed File**” to select s2p file for embedding. Once a valid .s2p file is selected, a check mark will be displayed in the “Load NW Extract – **Embed File**” menu item.

Click “Load NW Extract – **De-embed File**” to select s2p file for de-embedding. Once a valid .s2p file is selected, a check mark will be displayed in the “Load NW Extract-**De-embed File**” menu item.

3. Loaded s2p file – Embed is ON

4. Loaded s2p file – De-embed is ON

NOTE: The updated cal file values (after embedding/ de-embedding) are applied to the system only if the “Power Cal” status is ON. If the “Power Cal” status is OFF, then the updated cal file values are applied to the system when it is turned ON.

The user is also allowed to turn ON/OFF the “NW Extract – Embed / De-embed” ON/OFF toggle buttons to remove the embedding / de-embedding effects from the existing power calibration (the effect of .s2p file data is removed from the power cal file values).

Figure 5-35. Power Menu Set – Frequency-Based Sweep (Linear or Log)

5-10 External Source Power Menu – 2-Port VNAs

EXT. SRC POWER Menu – 2-Port VNAs

Full Name

External Source Power

Previous for Frequency- and Segmented-Based Sweeps

- [“POWER SETUP Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-32](#)
- [“POWER SETUP Menu – Segment-Based Sweep – 2-Port VNAs” on page 5-36](#)

Navigation for Frequency- and Segmented-Based Sweeps

- MAIN | Power | POWER | External Source Power | EXT SRC POWER

Previous for Power-Based Sweeps

- [“POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs” on page 5-39](#)

Navigation for Power-Based Sweeps

- MAIN | Power | POWER | Power Setup | POWER SETUP | External Source Power | EXT SRC POWER

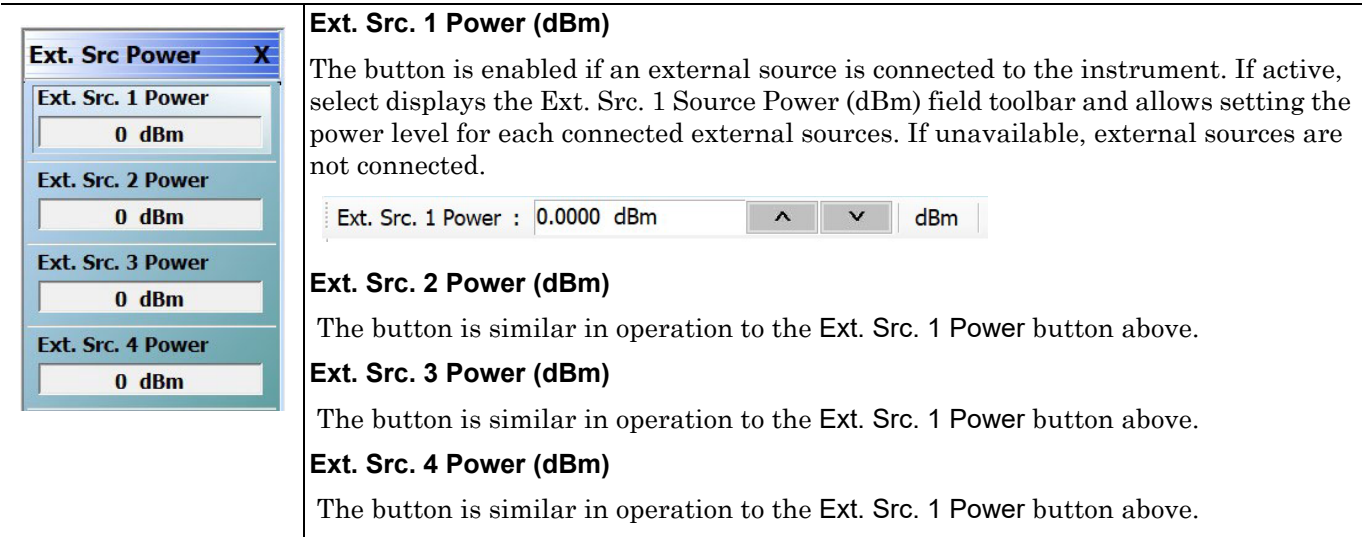


Figure 5-36. EXT SRC POWER (EXTERNAL SOURCE POWER) Menu

5-11 Receiver Setup and Calibration Menus – 2-Port VNAs

The receiver setup and calibration menus are available for all sweep types.

RECEIVER SETUP Menu – 2-Port VNAs

Previous

- [“POWER Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-16](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP

Menu Button Availability

- The top four (4) buttons are unavailable until a successful receiver calibration has been performed on the Receiver Cal menu. After a successful calibration, the buttons are available (shown below).

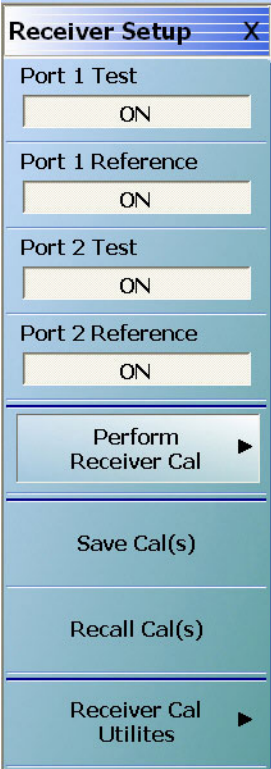
	<p>Port 1 Test (Off/On) Select toggles the receiver Port 1 Test Off and On.</p> <p>Port 1 Reference (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 1 Reference between off and on.</p> <p>Port 2 Test (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Port 2 Test between off and on.</p> <p>Port 2 Reference (Off/On) This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 2 Reference between off and on.</p> <p>Perform Receiver Cal Select displays the RECEIVER CAL menu.</p> <ul style="list-style-type: none">• “RECEIVER CAL Menu – 2-Port VNAs” on page 5-64 <p>Save Cal(s) Select displays the SAVE RCVR CAL dialog box.</p> <ul style="list-style-type: none">• “SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box – 2-Port VNAs” on page 5-65 <p>Recall Cal(s) Select displays the RECALL RCVR CAL dialog box.</p> <ul style="list-style-type: none">• “RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box – 2-Port VNAs” on page 5-66 <p>Receiver Cal Utilities Select displays the RCVR UTILITIES menu.</p> <ul style="list-style-type: none">• “RCVR UTILITIES Menu – 2-Port VNAs” on page 5-67
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Figure 5-37. RECEIVER SETUP Menu

RECEIVER CAL Menu – 2-Port VNAs

Previous

- [“RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63](#)
- [“POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs” on page 5-39](#)

Navigation for Frequency- and Segmented-Based Sweeps

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Perform Receiver Cal | RECEIVER CAL

Navigation for Power-Based Sweeps

- MAIN | Power | POWER | Power Setup | POWER SETUP | Receiver Cal | RECEIVER SETUP | Perform Receiver Cal | RECEIVER CAL

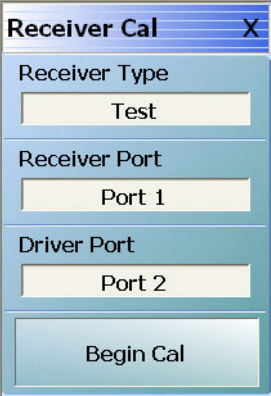
	<p>RECEIVER CAL Menu Message</p> <p>The menu displays a message: “Connect a through line between test ports.”</p> <p>Receiver Type (Test/Reference)</p> <p>After a successful receiver calibration, select toggles Receiver Type between Test (default) and Reference. Reference is used for additional test loop calibration.</p> <p>Receiver Port (Port 1/Port 2)</p> <p>The Receiver Port toggle button switches the receiver port between Port 1 and Port 2.</p> <p>Driver Port (Port 1/Port 2)</p> <p>The Driver Port toggle button switches the driving port between Port 1 and Port 2.</p> <p>Begin Cal</p> <p>The Begin Calibration button starts the receiver calibration. During the calibration process, the button dims and is unavailable. When the calibration is complete, the button returns to normal.</p> <p>At the end of successful calibration, the buttons on the RECEIVER SETUP menu are enabled.</p> <ul style="list-style-type: none">• “RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63
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Figure 5-38. RECEIVER CAL (RECEIVER CALIBRATION) Menu

SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box – 2-Port VNAs

Previous

- [“RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Save Cal(s) | SAVE RCVR CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

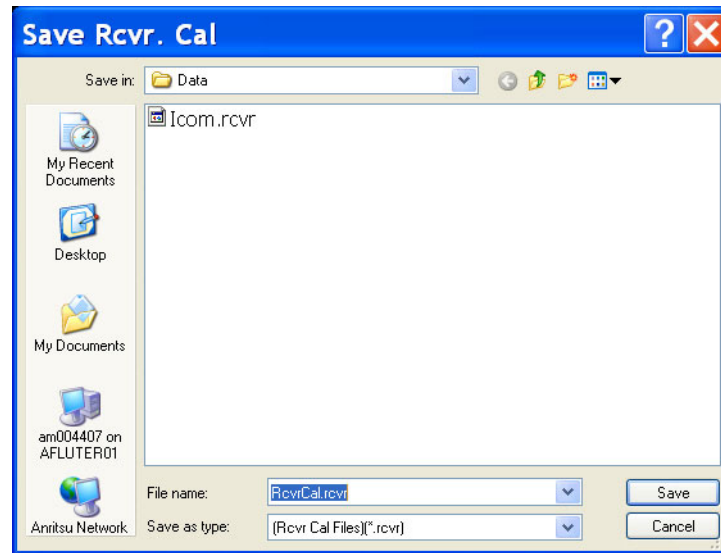


Figure 5-39. SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

Overview

Use the dialog box to navigate to the desired location, enter a unique RCVR file name, and click **Save** to save. Click **Cancel** to exit the dialog box. Allows the user to save a receiver calibration (.rcvr) file.

Instructions

1. Navigate to the required location.
2. Click **Save**.
3. Click **Close** to return or **Cancel** to end recall session.

RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box – 2-Port VNAs**Previous**

- [“RECEIVER SETUP Menu – 2-Port VNAs” on page 5-63](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Recall Cal(s) | RECALL RCVR CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

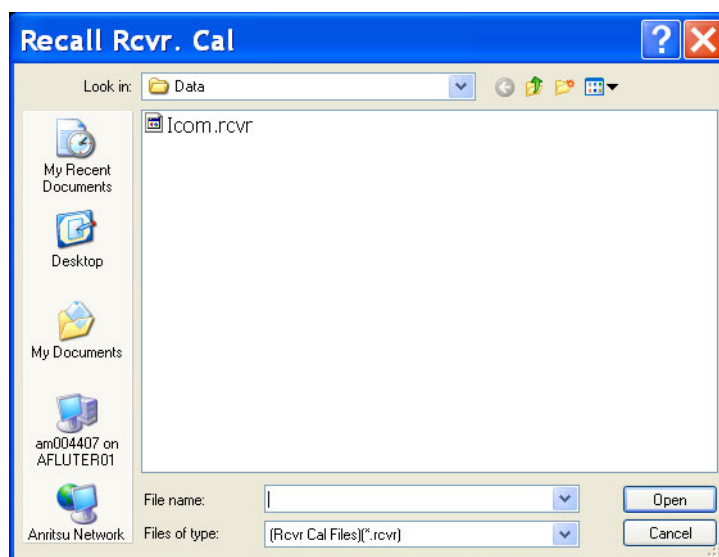


Figure 5-40. RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

Instructions

Use the Open dialog box to navigate to required directory and select the required RCVR file. Click Open to recall the RCVR file. Click Cancel to exit the dialog box.

RCVR UTILITIES Menu – 2-Port VNAs

Previous

- [“RECEIVER CAL Menu – 2-Port VNAs” on page 5-64](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Receiver Cal Utilities | RCVR UTILITIES

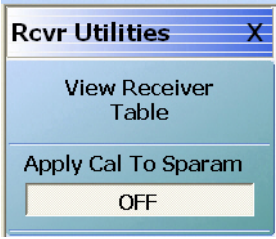
	<p>View Rcvr Table</p> <p>The View Receiver Table button displays the VIEW RCVR CAL dialog box.</p> <ul style="list-style-type: none">• “VIEW RECEIVER CAL Dialog Box – 2-Port VNAs” on page 5-68 <p>Apply Cal. to Sparam (Off/On)</p> <p>Toggles the application of S-Parameters to the calibration off and on.</p>
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Figure 5-41. RCVR UTILITIES (RECEIVER UTILITIES) Menu

VIEW RECEIVER CAL Dialog Box – 2-Port VNAs

Previous

- “RCVR UTILITIES Menu – 2-Port VNAs” on page 5-67

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Receiver Cal Utilities | RCVR UTILITIES | View Receiver Table | VIEW RECEIVER CAL Dialog Box

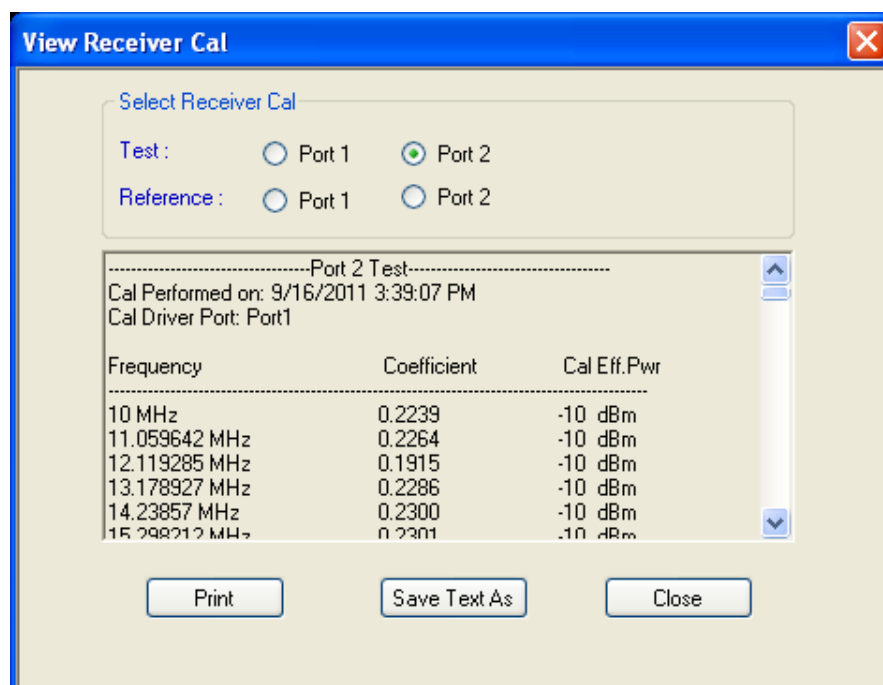


Figure 5-42. VIEW RCVR CAL (VIEW RECEIVER CALIBRATION) Dialog Box

Instructions

Use the View Rcvr Cal dialog box to view the applicable Receiver Calibration report. Radio buttons allow selection of following types of calibration data:

- Port 1 Test
- Port 1 Reference
- Port 2 Test
- Port 2 Reference

Click **Print** to print; **Save Text As** to save results as an ASCII TXT file to the desired directory or USB memory device; or click **Close** to close the dialog box.

Information Fields

The information fields provided are:

- Calibration date and time
- Port number
- Frequency
- Power in dB
- Cal.Eff.Pwr (Calculated Effective Power) in dBm

Chapter 6 — Power Menus – 4-Port VNAs

6-1 Chapter Overview

This chapter provides information on port power control and configuration and, if equipped, attenuator configurations for the VNA in 4-Port Mode. The power menus and associated field toolbars allow the user to set various power mode parameters which apply to the currently active channel. The power menus, their link structure, appearance, and related dialog boxes vary depending on the setting of the SWEEP TYPE menu as either a Frequency-Based Sweep (Linear or Log), a Segment-Based Sweep (Frequency- or Index-Based), or a Power Sweep (CW Frequency or Swept Frequency).

Note	For 2-Port Mode POWER menus, see Chapter 5, “Power Menus – 2-Port VNAs” .
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6-2 Overview of Power Menus

The following 4-Port VNA power menus and dialog boxes are available. Note that several menus have variants depending on the sweep type setting:

- “Power Menu Sets” on page 6-6
 - “Power Menus for Frequency-Based Sweep – 4-Port VNAs” on page 6-6
 - “Power Menus for Frequency-Based Sweep – 4-Port VNAs (Option 32)” on page 6-8
 - “Power Menus for Segment-Based Sweep – 4-Port VNAs” on page 6-10
 - “Power Menus for Power-Based Sweep – 4-Port VNAs” on page 6-12
 - “Power Menus for Power-Based Sweep – 4-Port VNAs (Option 32)” on page 6-14
- “Power Menu Variants – 4-Port VNAs” on page 6-16
 - “POWER Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-16
 - “POWER Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-18
 - “POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20
 - “POWER Menu – Power-Based Sweep – 4-Port VNAs” on page 6-22
 - “POWER Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-24
- “Attenuators Menu Variants – 4-Port VNAs” on page 6-26
 - “ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-26
 - “ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-27
 - “ATTENUATORS Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-28
 - “ATTENUATORS Menu – Segment-Based Sweep – 4-Port VNAs with Option 32” on page 6-29
 - “ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs” on page 6-30
 - “ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-31
- “Power Setup Menu Variants – 4-Port VNAs” on page 6-32
 - “POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-32
 - “POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-34
 - “POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-36
 - “POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs with Option 32” on page 6-37
 - “POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs” on page 6-39
 - “POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs with Option 32” on page 6-42

- “LEVELING MODE Menu – 4-Port VNAs” on page 6-45
- “Power Cal Menu Variants – 4-Port VNAs” on page 6-46
 - “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-46
 - “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-48
 - “POWER CAL Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-46
 - “POWER CAL Menu – Segment-Based Sweep – 4-Port VNAs with Option 32” on page 6-48
 - “POWER CAL Menu – Power-Based Sweep – 4-Port VNAs” on page 6-50
 - “POWER CAL Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-52
 - “POWER CALIBRATION (PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box” on page 6-54
 - “OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box” on page 6-59
 - “OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 6-59
 - “SAVE AS (FREQ SWEEP POWER CAL FPC FILE) Dialog Box” on page 6-60
 - “SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 6-60
- “External Source Power Menu – 4-Port VNAs” on page 6-63
 - “EXT. SRC POWER Menu – 4-Port VNA” on page 6-63
- “Receiver Setup and Calibration Menus – 4-Port VNAs” on page 6-64
 - “RECEIVER SETUP Menu – 4-Port VNAs” on page 6-64
 - “RECEIVER CAL Menu – 4-Port VNAs” on page 6-66
 - “SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box” on page 6-67
 - “RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box” on page 6-68
 - “RCVR UTILITIES Menu – 4-Port VNAs” on page 6-69
 - “VIEW RCVR CAL Dialog Box” on page 6-70

6-3 Factors Governing Structure/Availability of Power Menus

As mentioned before, the POWER menu and its related sub-menus vary in menu appearance, menu links, button presence, and button type (read/write vs. read-only) depending on a number of factors including:

- Type of sweep set
- Instrument model number
- Installed options
- Application receiver configuration mode
- Frequency range configured

Sweep Types

The instrument sweep type setting changes the POWER Menu Set depending on if the Sweep Type is set to

- Frequency-Based (Linear)
- Frequency-Based (Log)
- Segmented Sweep (either Frequency-Based or Index-Based)
- Power Sweep (either CW Freq or Swept Freq)

VNA Model, Option, and Mode

For MS4642B, MS4644B, and MS4645B VNAs, the POWER menu variants depend on the sweep type selected above and whether Multiple Source and mmWave are selected.

For MS4647B VNAs without Option 8x, the POWER menu variants depend on the sweep type set above, and whether Multiple Source and BB/mmWave are selected.

For MS4647B VNAs, additional menu changes depend on the frequency range covered, the Receiver Configuration Mode if set to Modular Broadband or Modular Broadband with Multiple Source:

- Modular Broadband requires a MS4647B with Option 8x and an attached 3739x Test Set. Menus change depending the sweep type set above and the frequency range set, particularly depending on below, across, and above 54 GHz.
- Modular Broadband (a MS4647B with Option 8x and Option 6x providing attenuators) with Multiple Source can be configured. If at least one band is configured with a frequency greater than 54 GHz, an additional button is present.

Attenuator Menu Button Availability

The available buttons in the ATTENUATORS menu depend on which attenuator option has been installed in the instrument and the sweep type setting.

- Option 61 Installed – Port 1 Source Attenuator and Port 2 Test Attenuator
 - If Option 61 (Port 1 Source Attenuator and Port 2 Test Attenuator) is installed, only the first and fourth buttons are active. The other buttons are unavailable.
- Option 62 Installed – Port 1 and Port 2 Source Attenuators, Port 1 and Port 2 Test Attenuators:
 - If Option 62 (Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuators) is installed, all buttons are available.
- No Attenuator Options Installed
 - If neither attenuator option is installed, the Attenuators button (on the POWER or POWER SETUP menu) and the ATTENUATORS menu are unavailable. Contact Anritsu Customer Service for more information.

6-4 Maximum and Minimum Power Settings

For all configurations, the maximum power setting is +15 dBm (+20 dBm for systems with Option 31). For all configurations below 54 GHz, the minimum power setting is –30 dBm and for above 54 GHz, the minimum power setting is –80 dBm. These minimum power settings can be further lowered by application of internal attenuators, linear power calibration effects, and/or the connected presence of OEM mmWave modules.

- The power settings are set by the appropriate Start, Stop, and/or Single Power buttons and their related field toolbars.
- Below 54 GHz, the user defined start, stop, and/or single power settings are then modified by the effects of any applied attenuators (if equipped), and the relevant Linear Power Calibration and displayed as the appropriate read-only Effective Power button.
- Above 54 GHz, the user defined start, stop, and/or single power settings are then modified by the effects of the relevant Linear Power Calibration (noting that internal attenuator effects are not applied above 54 GHz) and displayed as the appropriate read-only Effective Power button.
- Depending the VNA model and the equipped test set, where the frequency range as less than 54 GHz, greater than 54 GHz, or across 54 GHz, some of the following read-only Effective Power buttons appear:
 - Effective Start Power
 - Effective Start Power < 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective Start Power button present.
 - Effective Start Power > 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective Start Power button present.
 - Effective End Power
 - Effective Stop Power < 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective End Power button present.
 - Effective Stop Power > 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective End Power button present.
 - Effective Single Power
 - Effective Single Power < 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective Single Power button present.
 - Effective Single Power > 54 GHz – Button is only available when 3743 Modules are in use. If not present, only the Effective Single Power button present.
- For VNAs where frequencies either cross 54 GHz (MS4647B VNA) or use frequencies above 54 GHz (MS464xB VNA with Option 8x and E-Band or W-Band modules), additional buttons of Effective Start Power > 54 GHz, Effective Stop Power > 54 GHz, and Effective Single Power > 54 GHz are present.
- Where compatible with the various options above, the 4-Port VNA power maximum and power minimum are the same as for the 2-Port VNA less the loss of the Test Set and cables.

A summary of the power settings is in [Table 6-1, "Summary of Maximum and Minimum Power Levels"](#) below.

Table 6-1. Summary of Maximum and Minimum Power Levels

VNA, Power Level, and Frequency Range	Power Sweep Type	Power Setting Max/Min ^a	Factors Affecting Effective Power	Resultant Effective Power
Any MS464xB VNA Maximum Power Above, Below, or Across 54 GHz	Any	+15 dBm maximum (+20 dBm for systems with Option 31)	Option 6x Attenuators ^b Linear Power Calibration	Effects at left can lower effective maximum power.
Any MS464xB VNA Minimum Power for Less Than 54 GHz	Power Sweep CW Single Power Mode Power Sweep; Swept Frequency Power Sweep; Swept Frequency Single Power	-30 dBm minimum	Option 6x Attenuators Linear Power Calibration	Effects at left can lower effective minimum power to less than -30 dBm.
MS4647B VNAs with BB/mmWave Option 80/81^c Minimum Power for Less Than 54 GHz to Greater Than 54 GHz	Power Sweep: Swept Frequency Power Sweep: Swept Frequency Single Power	-80 dBm minimum	Below 54 GHz: Option 6x Attenuators Linear Power Calibration	The default minimum power for frequencies less than 54 GHz is -30 dBm and for frequencies greater than 54 GHz is -80 dBm. The effects at left are applied to these default values can lower the effective minimum power below the default value in each frequency range.
			Above 54 GHz: Attenuators have no effect above 54 GHz. Linear Power Calibration	
MS464xB VNAs with mmWave Option 82/83 and OML/VDI mmWave Modules^d	Any	-100 dBm minimum	VNA Attenuators have no effect on OML/VDI modules at any frequency. Linear Power Calibration	The default minimum power for any frequency is always -100 dBm. The effects at left are applied to these default values can lower the effective minimum power below the default value in each frequency range.

a. The default power setting applies to the user configurable Start, Stop, and Single Power buttons and their variants.

b. The Active Measurement Suite – Option 61 provides two attenuators; one if the Source 1 Path, and one in the Receive 2 Path. Option 62 provides four attenuators; One in each Source Path and one in each Receive Path.

c. Broadband/mmWave System – ME7838 Series system with MS4647B VNA, Option 8x, 3739x Test Set, and Broadband Modules.

d. mmWave System – Any MS464xB VNA, with Option 8x, 3739x Test Set, and OML or VDI mmWave Modules.

6-5 Power Menu Sets

Power Menus for Frequency-Based Sweep – 4-Port VNAs

The power menu set for frequency-based sweep is shown in the figure below.

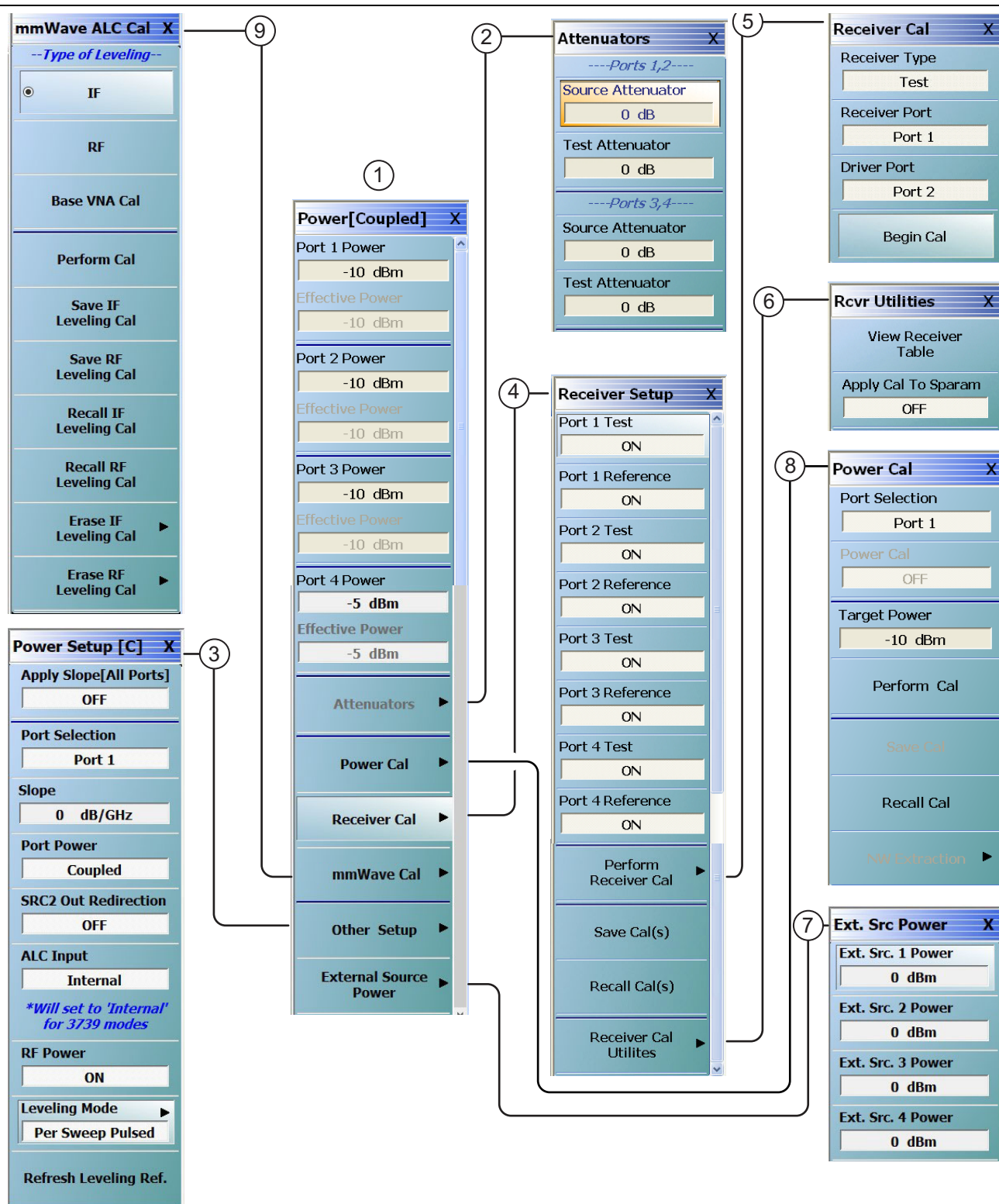


Figure 6-1. Power Menu Set – Frequency-Based Sweep (Linear or Log) (1 of 2)

<p>This power menu set, including menu appearance and menu links, is available if Sweep Type is set to Frequency-Based (Linear) or Frequency-Based (Log). When Modular BB is enabled on the APPLICATION menu on MS4647B only when equipped with Options 007, 070, and 08x, some power menus have either relabeled buttons or additional buttons. The button changes are related to power levels above and below 54 GHz.</p> <ol style="list-style-type: none"> 1. “POWER Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-16. 2. “ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-26. 3. “POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-32. Leveling Mode is visible only if the application is set to PulseView. Refresh Leveling Reference is only visible in Per Sweep Pulsed and Per Point Pulsed leveling modes. 	<ol style="list-style-type: none"> 4. “RECEIVER SETUP Menu – 4-Port VNAs” on page 6-64. 5. “RECEIVER CAL Menu – 4-Port VNAs” on page 6-66. 6. “RCVR UTILITIES Menu – 4-Port VNAs” on page 6-69. 7. “EXT. SRC POWER Menu – 4-Port VNA” on page 6-63. 8. “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-46 9. “mmWAVE ALC CAL Menu” on page 14-14. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.
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Figure 6-1. Power Menu Set – Frequency-Based Sweep (Linear or Log) (2 of 2)

Power Menus for Frequency-Based Sweep – 4-Port VNAs (Option 32)

The power menu set for frequency-based sweep with Option 32 installed is shown in the figure below.

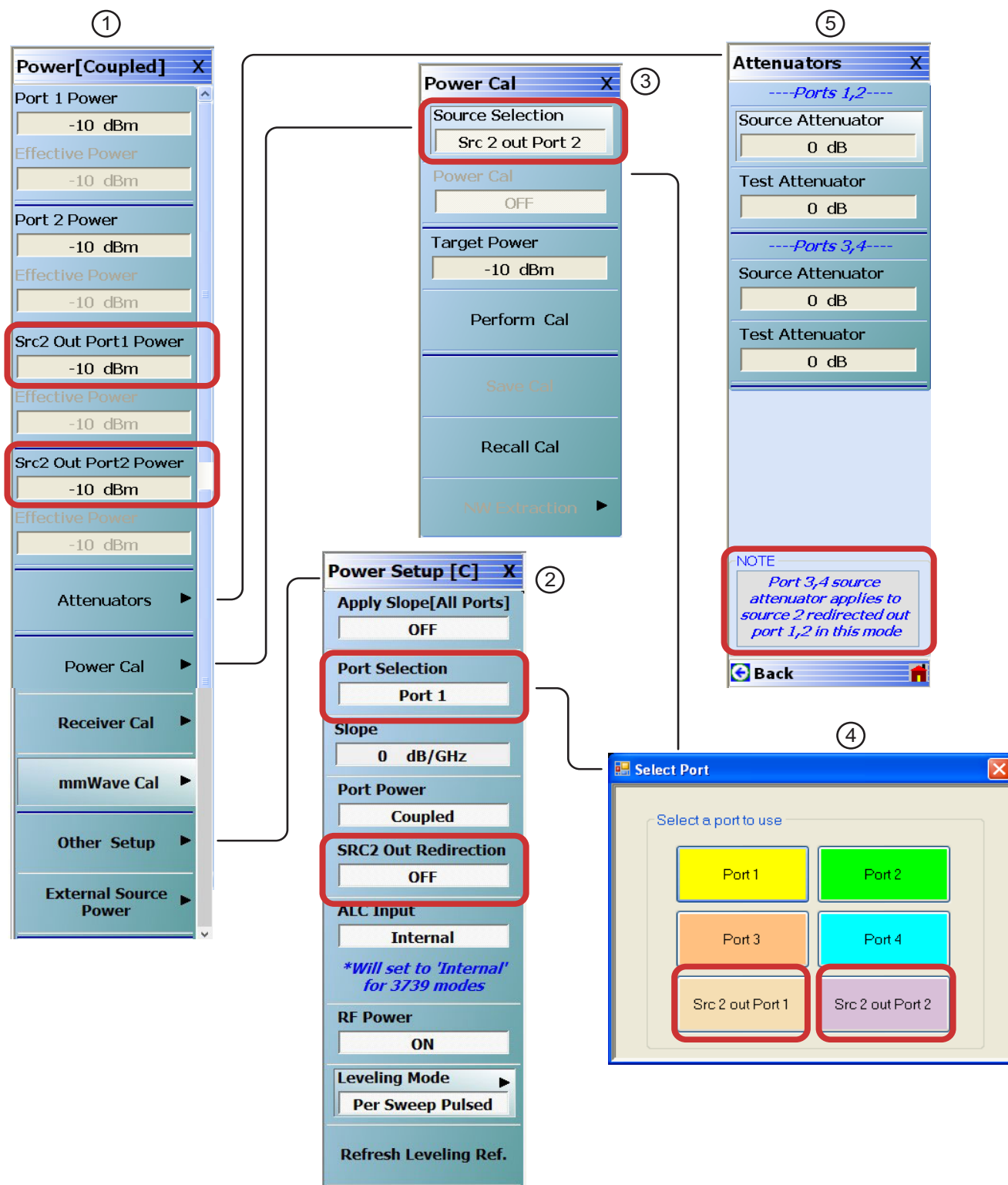


Figure 6-2. Power Menu Set – Frequency-Based Sweep with Option 32 (1 of 2)

<p>With Option 32 installed, the Source 2 power can be redirected out of Port 1 or Port 2.</p> <p>When SRC2 Out Redirection is ON, all other menus remain the same except for those that are shown above.</p> <p>When SRC2 Out Redirection is OFF, Port selection reverts to a toggle between a choice of Port 1, Port 2, Port 3, or Port 4.</p> <p>1. “POWER Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-18.</p>	<p>2. “POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-34. Leveling Mode is visible only if the application is set to PulseView. Refresh Leveling Reference is only visible in Per Sweep Pulsed and Per Point Pulsed leveling modes.</p> <p>3. “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-48</p> <p>4. SELECT PORT Dialog Box</p> <p>5. “ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-27</p>
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Figure 6-2. Power Menu Set – Frequency-Based Sweep with Option 32 (2 of 2)

Power Menus for Segment-Based Sweep – 4-Port VNAs

The POWER menu set for segment-based sweep is shown in the figure below.

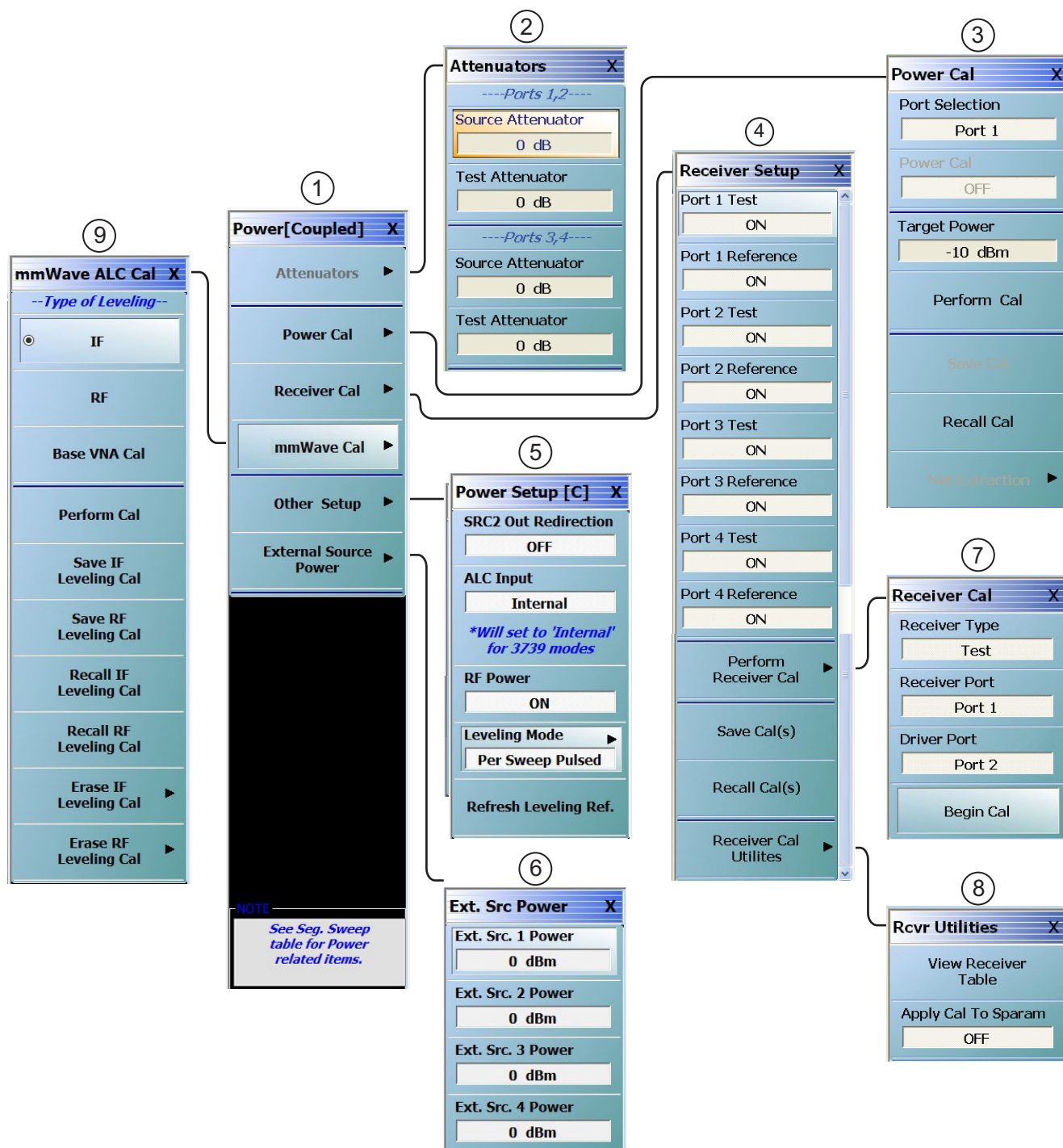


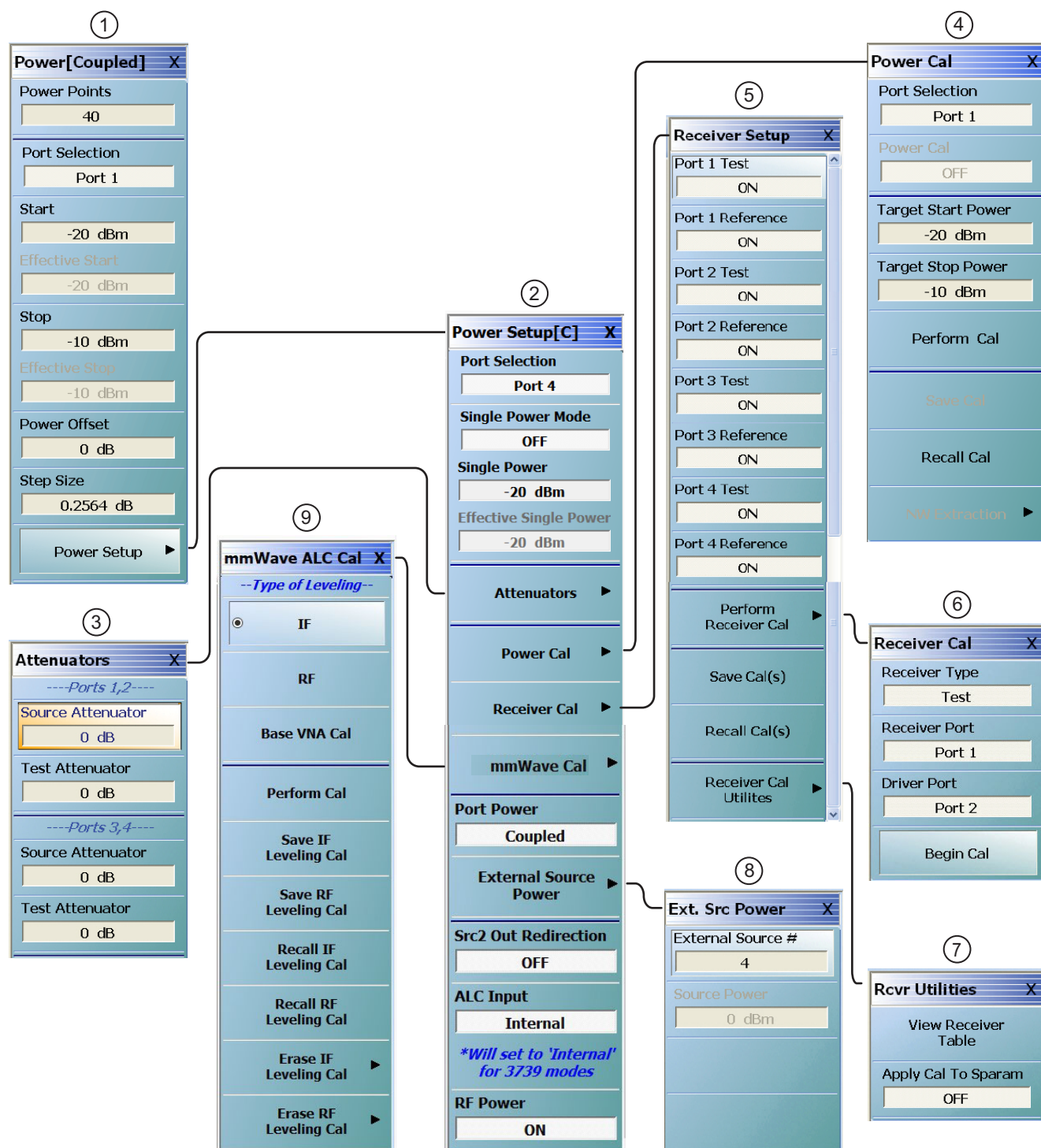
Figure 6-3. Power Menu Set – Segmented Sweeps (Frequency or Index-Based) (1 of 2)

<p>This POWER menu set is available if Sweep Type is set to Segmented Sweep (Frequency-Based) or Segmented Sweep (Index-Based). When Modular BB is enabled on the APPLICATION menu, some power menus have relabeled buttons and/or additional buttons. The power settings for segmented sweeps (frequency-based or index-based) are in the segmented-sweep input tables.</p>	<ol style="list-style-type: none"> 4. “RECEIVER SETUP Menu – 4-Port VNAs” on page 6-64 5. “POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-36. Leveling Mode is visible only if the application is set to PulseView. Refresh Leveling Reference is only visible in Per Sweep Pulsed and Per Point Pulsed leveling modes. 6. “EXT. SRC POWER Menu – 4-Port VNA” on page 6-63 7. “RECEIVER CAL Menu – 4-Port VNAs” on page 6-66 8. “RCVR UTILITIES Menu – 4-Port VNAs” on page 6-69 9. “mmWAVE ALC CAL Menu” on page 14-14. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.
<ol style="list-style-type: none"> 1. “POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20 2. “ATTENUATORS Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-28 3. “POWER CAL Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-46 	

Figure 6-3. Power Menu Set – Segmented Sweeps (Frequency or Index-Based) (2 of 2)

Power Menus for Power-Based Sweep – 4-Port VNAs

The power menu set for power-based sweep is shown in the [Figure 6-4](#).



This power menu set is available if Sweep Type is set to Power Sweep (CW Freq) or Power Sweep (Swept Freq). When Modular BB is enabled on the APPLICATION menu, some power menus have relabeled buttons and/or additional buttons.

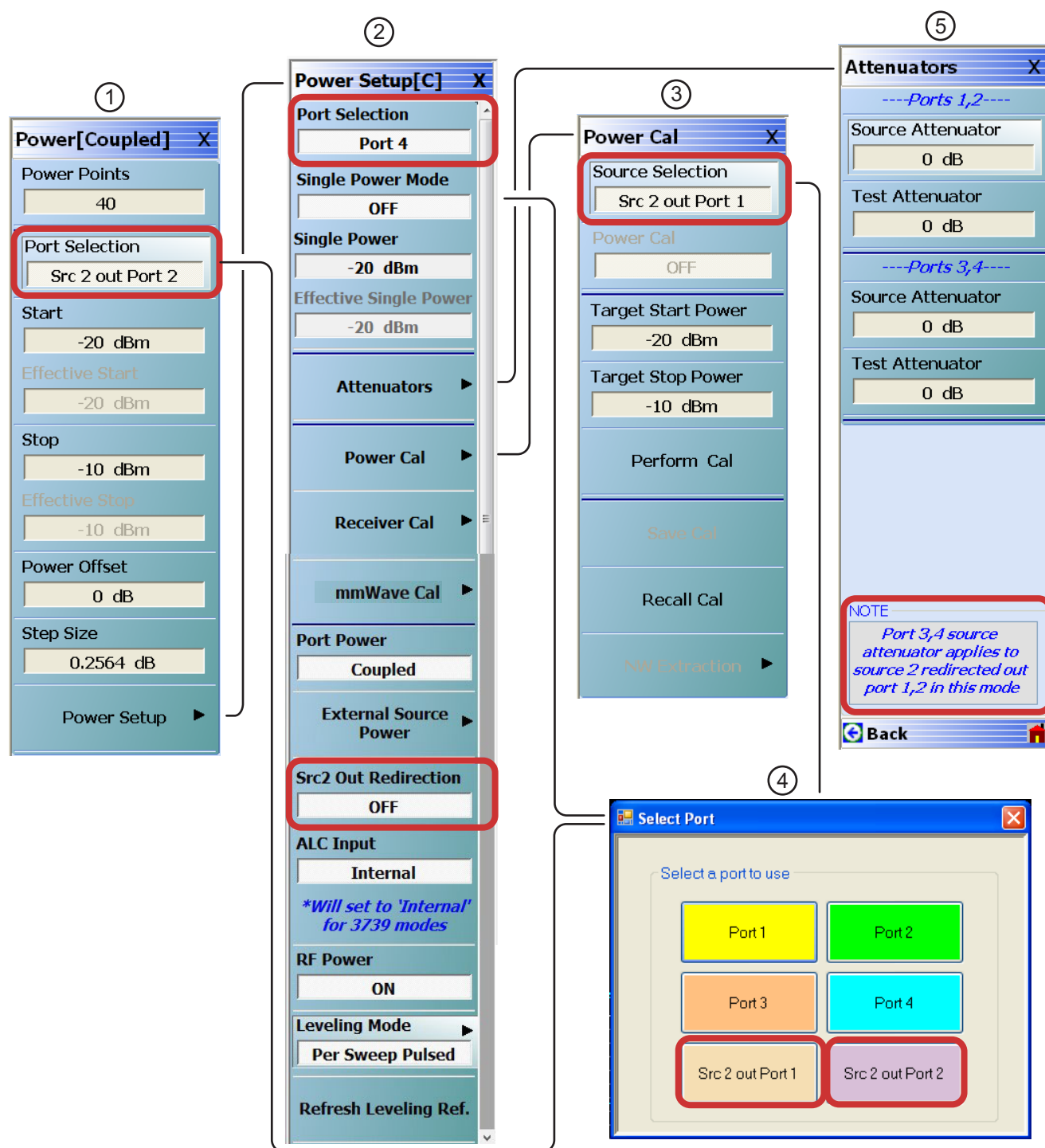
Figure 6-4. Power Menu Set – Power-Based Sweep (CW or Swept Frequency) (1 of 2)

1. "POWER Menu – Power-Based Sweep – 4-Port VNAs" on page 6-22	4. "POWER CAL Menu – Power-Based Sweep – 4-Port VNAs" on page 6-50
2. "POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs" on page 6-39. Leveling Mode is visible only if the application is set to PulseView. Refresh Leveling Reference is only visible in Per Sweep Pulsed and Per Point Pulsed leveling modes.	5. "RECEIVER SETUP Menu – 4-Port VNAs" on page 6-64
3. "ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs" on page 6-30	6. "RECEIVER CAL Menu – 4-Port VNAs" on page 6-66
	7. "RCVR UTILITIES Menu – 4-Port VNAs" on page 6-69
	8. "EXT. SRC POWER Menu – 4-Port VNA" on page 6-63
	9. "mmWAVE ALC CAL Menu" on page 14-14. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.

Figure 6-4. Power Menu Set – Power-Based Sweep (CW or Swept Frequency) (2 of 2)

Power Menus for Power-Based Sweep – 4-Port VNAs (Option 32)

The power menu set for power-based sweep with Option 32 installed is shown in the figure below.



With Option 32 installed, the Source 2 power can be redirected out of Port 1 or Port 2.

When SRC2 Out Redirection is ON, all other menus remain the same except for those that are shown above.

When SRC2 Out Redirection is OFF, Port selection reverts to a toggle between a choice of Port 1, Port 2, Port 3, or Port 4.

Figure 6-5. Power Menu Set – Power-Based Sweep with Option 32 (1 of 2)

1. “POWER Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-24	3. “POWER CAL Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-52
2. “POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs with Option 32” on page 6-42. Leveling Mode is visible only if the application is set to PulseView. Refresh Leveling Reference is only visible in Per Sweep Pulsed and Per Point Pulsed leveling modes.	4. SELECT PORT Dialog Box
	5. . “ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-31

Figure 6-5. Power Menu Set – Power-Based Sweep with Option 32 (2 of 2)

6-6 Power Menu Variants – 4-Port VNAs

POWER Menu – Frequency-Based Sweep – 4-Port VNAs

Previous

- “MAIN Menu” on page 2-2

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log). See “Sweep Setup and Sweep Type Menus” on page 7-2. Navigation to Sweep Types: MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[Coupled] X

Port 1 Power

-10 dBm

Effective Power

-10 dBm

Port 2 Power

-10 dBm

Effective Power

-10 dBm

Port 3 Power

-10 dBm

Effective Power

-10 dBm

Port 4 Power

-5 dBm

Effective Power

-5 dBm

Attenuators ▶

Power Cal ▶

Receiver Cal ▶

mmWave Cal ▶

Other Setup ▶

External Source Power ▶

Port 1 Power

Select displays the Port 1 Power field toolbar and allows setting the port 1 power level in dBm. If Port Power is set to coupled, changes to the Port 1 Power level affect all other port power levels.

Port 1 Power : -5.0000 dBm ^ v dBm X

Effective (Port 1) Power (dBm)

Read-only display. Shows the effective Port 1 power after any applied attenuator.

Port 2 Power

Select displays the Port 2 Power field toolbar and allows setting the port 2 power level in dBm. If Port Power is set to coupled, changes to the Port 2 Power level affect all other port power levels.

Port 2 Power : -10.0000 dBm ^ v dBm X

Effective (Port 2) Power (dBm)

Read-only display. Shows the effective Port 2 power after any applied attenuator.

Port 3 Power

Select displays the Port 3 Power field toolbar and allows setting the port 3 power level in dBm. If Port Power is set to coupled, changes to the Port 3 Power level affect all other port power levels. The toolbar is similar in appearance to the Port 2 Power (dBm) toolbar above.

Effective (Port 3) Power (dBm)

Read-only display. Shows the effective Port 3 power after any applied attenuator.

Port 4 Power

Select displays the Port 4 Power field toolbar and allows setting the port 4 power level in dBm. If Port Power is set to coupled, changes to the Port 4 Power level affect all other port power levels. The toolbar is similar in appearance to the Port 2 Power (dBm) toolbar above.

Effective (Port 4) Power (dBm)

Read-only display. Shows the effective Port 4 power after any applied attenuator.

Figure 6-6. POWER [COUPLED] Menu – Frequency-Based Sweep – 4-Port VNAs (1 of 2)

6-16

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	<p>Attenuators</p> <p>Button Not Present</p> <p>If the Attenuators button is not present, the Sweep Type is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.</p> <p>Button Not Available</p> <p>If the Attenuators button is unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.</p> <p>Button Available</p> <p>If the Attenuators button is available, one of the attenuator options has been installed:</p> <ul style="list-style-type: none"> • Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator. • Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator. • In 4-Port Mode, the two attenuators control Port 1-2 and Ports 3-4. <p>Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.</p> <ul style="list-style-type: none"> • “ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-26 <p>Power Cal</p> <p>Select displays the POWER CAL menu.</p> <ul style="list-style-type: none"> • “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-46 <p>Receiver Cal</p> <p>Select displays the RECEIVER SETUP menu.</p> <ul style="list-style-type: none"> • “RECEIVER CAL Menu – 4-Port VNAs” on page 6-66 <p>mmWave Cal</p> <p>Select displays the mmWAVE ALC CAL menu. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.</p> <ul style="list-style-type: none"> • “mmWAVE ALC CAL Menu” on page 14-14 <p>Other Setup (Power)</p> <p>Select displays the POWER SETUP [1], POWER SETUP [2], or the POWER SETUP [C] menu. The name of the POWER SETUP menu depends on the settings of the Power Selection button and the Port Power button.</p> <ul style="list-style-type: none"> • “POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-32 <p>External Source Power</p> <p>Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.</p> <ul style="list-style-type: none"> • “EXT. SRC POWER Menu – 4-Port VNA” on page 6-63
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Figure 6-6. POWER [COUPLED] Menu – Frequency-Based Sweep – 4-Port VNAs (2 of 2)

POWER Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- Option 32 installed
- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types: MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[Coupled] X

Port 1 Power

-10 dBm

Effective Power

-10 dBm

Port 2 Power

-10 dBm

Effective Power

-10 dBm

Src2 Out Port1 Power

-10 dBm

Effective Power

-10 dBm

Src2 Out Port2 Power

-10 dBm

Effective Power

-10 dBm

Attenuators ▶

Power Cal ▶

Receiver Cal ▶

mmWave Cal ▶

Other Setup ▶

External Source Power ▶

Port 1 Power

Select displays the Port 1 Power field toolbar and allows setting the port 1 power level in dBm. If Port Power is set to coupled, changes to the Port 1 Power level affect all other port power levels.

Port 1 Power : -5.0000 dBm ^ v dBm X

Effective (Port 1) Power (dBm)

Read-only display. Shows the effective Port 1 power after any applied attenuator.

Port 2 Power

Select displays the Port 2 Power field toolbar and allows setting the port 2 power level in dBm. If Port Power is set to coupled, changes to the Port 2 Power level affect all other port power levels.

Port 2 Power : -10.0000 dBm ^ v dBm X

Effective (Port 2) Power (dBm)

Read-only display. Shows the effective Port 2 power after any applied attenuator.

Src2 Out Port1 Power

Select displays the Src2 Out Port1 Power field toolbar and allows setting the power level in dBm. If Port Power is set to coupled, changes to the Src2 Out Port1 Power level affect the Port 1 Power level

Src2 Out Port1 Power : -10.0000 dBm ^ v dBm X

Effective (Src2 Out Port1) Power (dBm)

Read-only display. Shows the effective Src2 Out Port1 power after any applied attenuator.

Src2 Out Port2 Power

Select displays the Src2 Out Port2 Power field toolbar and allows setting the power level in dBm. If Port Power is set to coupled, changes to the Src2 Out Port2 Power affect the Port 2 Power level.

Src2 Out Port1 Power : -10.0000 dBm ^ v dBm X

Effective (Src2 Out Port2) Power (dBm)

Read-only display. Shows the effective Src2 Out Port2 power after any applied attenuator.

Figure 6-7. POWER [COUPLED] Menu – Frequency-Based Sweep – 4-Port VNAs (1 of 2)

6-18

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	<p>Attenuators</p> <p>Button Not Present</p> <p>If the Attenuators button is not present, the SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.</p> <p>Button Not Available</p> <p>If the Attenuators button is unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.</p> <p>Button Available</p> <p>If the Attenuators button is available, one of the attenuator options has been installed:</p> <ul style="list-style-type: none"> • Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator. • Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator. • In 4-Port Mode, the two attenuators control Port 1-2 and Ports 3-4. <p>Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.</p> <ul style="list-style-type: none"> • “ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-27 <p>Power Cal</p> <p>Select displays the POWER CAL menu.</p> <ul style="list-style-type: none"> • “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-48 <p>Receiver Cal</p> <p>Select displays the RECEIVER SETUP menu.</p> <ul style="list-style-type: none"> • “RECEIVER CAL Menu – 4-Port VNAs” on page 6-66 <p>mmWave Cal</p> <p>Select displays the mmWAVE ALC CAL menu. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.</p> <ul style="list-style-type: none"> • “mmWAVE ALC CAL Menu” on page 14-14 <p>Other Setup (Power)</p> <p>Select displays the POWER SETUP [1], POWER SETUP [2], or the POWER SETUP [C] menu. The name of the POWER SETUP menu depends on the settings of the Power Selection button and the Port Power button.</p> <ul style="list-style-type: none"> • “POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-34 <p>External Source Power</p> <p>Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.</p> <ul style="list-style-type: none"> • “EXT. SRC POWER Menu – 4-Port VNA” on page 6-63
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Figure 6-7. POWER [COUPLED] Menu – Frequency-Based Sweep – 4-Port VNAs (2 of 2)

POWER Menu – Segment-Based Sweep – 4-Port VNAs

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- Sweep Type = Frequency-Based Segmented Sweep or Index-Based Segmented Sweep – See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu: MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[Coupled] X

Attenuators ▶

Power Cal ▶

Receiver Cal ▶

mmWave Cal ▶

Other Setup ▶

External Source Power ▶

NOTE

See Seg. Sweep table for Power related items.

Attenuators Button

Button Not Present

If the Attenuators button is not present, the SWEEP TYPE is set to Power-Based Sweep (CW or Swept Frequency). The button is available on the POWER SETUP menu described in the section below. The operation on the POWER SETUP menu is the same as described here.

Button Not Available

If the Attenuators button is unavailable, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.

Button Available

If the Attenuators button is available, one of the attenuator options has been installed:

- Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
- Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.
- In 4-Port Mode, the two attenuators control Port 1-2 and Ports 3-4.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-28](#)

Power Cal

Select displays the POWER CAL menu.

- [“POWER CAL Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-46](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu – 4-Port VNAs” on page 6-66](#)

Figure 6-8. POWER [COUPLED] Menu – Segment-Based Sweep – 4-Port VNAs (1 of 2)

	<p>mmWave Cal</p> <p>Select displays the mmWAVE ALC CAL menu. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.</p> <ul style="list-style-type: none">• “mmWAVE ALC CAL Menu” on page 14-14 <p>Other Setup (Power)</p> <ul style="list-style-type: none">• The POWER SETUP menu is <i>not</i> available if sweep is set to a frequency-based or index-based segment sweep. Instead, power configuration is on a per-segment basis and is configured at the FREQ BASE SETUP or the INDEX BASE SETUP menus. “POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-36.• The POWER SETUP menu <i>is</i> available (via Other Setup) when Option 32 is installed. See “POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs with Option 32” on page 6-37. <p>External Source Power</p> <p>Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.</p> <ul style="list-style-type: none">• “EXT. SRC POWER Menu – 4-Port VNA” on page 6-63
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Figure 6-8. POWER [COUPLED] Menu – Segment-Based Sweep – 4-Port VNAs (2 of 2)

POWER Menu – Power-Based Sweep – 4-Port VNAs

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[**Coupled**] X

Power Points
40

Port Selection
Port 1

Start
-20 dBm

Effective Start
-20 dBm

Stop
-10 dBm

Effective Stop
-10 dBm

Power Offset
0 dB

Step Size
0.2564 dB

Power Setup ▶

Power Points
Select displays the Power Points field toolbar and allows selection of the total number of power points in the sweep.

Power Points : 60 ^ v Enter X

Port Selection
The Port Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1, Port 2, Port 3, or Port 4. The selected port is shown in the button display field.

Select Port X

Select a port to use

Port 1

Port 2

Port 3

Port 4

Start (Power) (dBm)
Select displays the Start (dBm) field toolbar where the start power level is set.

Start : -20.0000 dBm ^ v dBm X

Effective Start (Power) (dBm)
A read only display that shows the effective start power after the application of any attenuator effects.

Stop (Power) (dBm)
Select displays the Stop (dBm) field toolbar where the stop power level is set.

Stop : -10.0000 dBm ^ v dBm X

Figure 6-9. POWER [COUPLED] Menu – Power-Based Sweep – 4-Port VNAs (1 of 2)

	<div><div>Effective Stop (Power) (dBm)</div><div>A read only display that shows the effective stop power after the application of any attenuator effects.</div><div>Power Offset (dB)</div><div>Select displays the Power Offset (dB) field toolbar where offsets can be applied.</div><div><div>Power Offset : -10.0000 dB</div><div><div>^</div><div>v</div></div><div>dB</div><div>X</div></div><div>Step Size (dB)</div><div>The button display field calculates the step size (in dB) based on the start value, stop value, and the number of power points set in the field toolbars above or allows input of a required step size value. If a new value is input, the number of power points changes as required.</div><div><div>Step Size : 0.2041 dB</div><div><div>^</div><div>v</div></div><div>dB</div><div>X</div></div><div>Power Setup</div><div>Select displays the POWER SETUP menu which contains the controls for Attenuators, Receiver Cal, and External Source Power. For a frequency-based sweep, these controls are located on the POWER menu.</div><div><ul style="list-style-type: none">MAIN Power POWER Other Setup POWER SETUP“POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs” on page 6-39</div></div>
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Figure 6-9. POWER [COUPLED] Menu – Power-Based Sweep – 4-Port VNAs (2 of 2)

POWER Menu – Power-Based Sweep – 4-Port VNAs with Option 32

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- Option 32 installed
- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Power[**Coupled**] X

Power Points

40

Port Selection

Src 2 out Port 2

Start

-20 dBm

Effective Start

-20 dBm

Stop

-10 dBm

Effective Stop

-10 dBm

Power Offset

0 dB

Step Size

0.2564 dB

Power Setup ▶

Power Points

Select displays the Power Points field toolbar and allows selection of the total number of power points in the sweep.

Power Points : 60 ^ v Enter X

Port Selection

The Port Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2. The selected port is shown in the button display field.

Select Port

Select a port to use

Port 1

Port 2

Port 3

Port 4

Src 2 out Port 1

Src 2 out Port 2

Start (Power) (dBm)

Select displays the Start (dBm) field toolbar where the start power level is set.

Start : -20.0000 dBm ^ v dBm X

Effective Start (Power) (dBm)

A read only display that shows the effective start power after the application of any attenuator effects.

Stop (Power) (dBm)

Select displays the Stop (dBm) field toolbar where the stop power level is set.

Stop : -10.0000 dBm ^ v dBm X

Figure 6-10. POWER [COUPLED] Menu – Power-Based Sweep – 4-Port VNAs (1 of 2)

6-24

PN: 10410-00319 Rev: AE

MS4640B Series VNA UIRM

	<div><div>Effective Stop (Power) (dBm)</div><div>A read only display that shows the effective stop power after the application of any attenuator effects.</div><div>Power Offset (dB)</div><div>Select displays the Power Offset (dB) field toolbar where offsets can be applied.</div><div><div>Power Offset : -10.0000 dB</div><div><div>^</div><div>v</div></div><div>dB</div><div>X</div></div><div>Step Size (dB)</div><div>The button display field calculates the step size (in dB) based on the start value, stop value, and the number of power points set in the field toolbars above or allows input of a required step size value. If a new value is input, the number of power points changes as required.</div><div><div>Step Size : 0.2041 dB</div><div><div>^</div><div>v</div></div><div>dB</div><div>X</div></div><div>Power Setup</div><div>Select displays the POWER SETUP menu which contains the controls for Attenuators, Receiver Cal, and External Source Power. For a frequency-based sweep, these controls are located on the POWER menu.</div><div><ul style="list-style-type: none">MAIN Power POWER Other Setup POWER SETUP“POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs with Option 32” on page 6-42</div></div>
--	---

Figure 6-10. POWER [COUPLED] Menu – Power-Based Sweep – 4-Port VNAs (2 of 2)

6-7 Attenuators Menu Variants – 4-Port VNAs

ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs

Previous

- [“POWER Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-16](#)

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

Attenuators

Ports 1,2

Source Attenuator

0 dB

Test Attenuator

0 dB

Ports 3,4

Source Attenuator

0 dB

Test Attenuator

0 dB

Source Attenuator (Ports 1,2) (dB)

Select displays the Source Attenuator field toolbar and allows the user to set the Port 1,2 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 1,2) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1,2 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Ports 3,4) (dB)

Select displays Source Attenuator field toolbar and allows the user to set the Port 3,4 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 3,4) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 3,4 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 6-11. ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs

6-26

PN: 10410-00319 Rev: AE

MS4640B Series VNA UIRM

ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32

Previous

- [“POWER Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-18](#)

Prerequisites

- Option 32 installed
- Sweep Type = Frequency-Based Sweep (Linear or Log). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

<p>Attenuators X</p> <p>---Ports 1,2---</p> <p>Source Attenuator 0 dB</p> <p>Test Attenuator 0 dB</p> <p>---Ports 3,4---</p> <p>Source Attenuator 0 dB</p> <p>Test Attenuator 0 dB</p> <p>NOTE Port 3,4 source attenuator applies to source 2 redirected out port 1,2 in this mode</p>	<p>Source Attenuator (Ports 1,2) (dB) Select displays the Source Attenuator field toolbar and allows the user to set the Port 1,2 attenuation in 10 dB increments.</p> <p>Source Attenuator : 10.0000 dB ^ v dB X</p> <p>Test Attenuator (Ports 1,2) (dB) Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1,2 attenuation in 10 dB increments.</p> <p>Test Attenuator : 20.0000 dB ^ v dB X</p> <p>Source Attenuator (Ports 3,4) (dB) Select displays Source Attenuator field toolbar and allows the user to set the Port 3,4 attenuation in 10 dB increments.</p> <p>Source Attenuator : 10.0000 dB ^ v dB X</p> <p>Test Attenuator (Ports 3,4) (dB) Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 3,4 attenuation in 10 dB increments.</p> <p>Test Attenuator : 20.0000 dB ^ v dB X</p> <p>Note: “Port 3,4 source attenuator applies to source 2 redirected out port 1,2 in this mode.” This note appears when Option 32 is installed and SRC2 Out Redirection is toggled ON (via the Power Other Setup menu).</p>
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Figure 6-12. ATTENUATORS Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32

ATTENUATORS Menu – Segment-Based Sweep – 4-Port VNAs

Previous

- [“POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20](#)

Prerequisites

- Sweep Type = Segment-Based Sweep (Frequency or Index). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

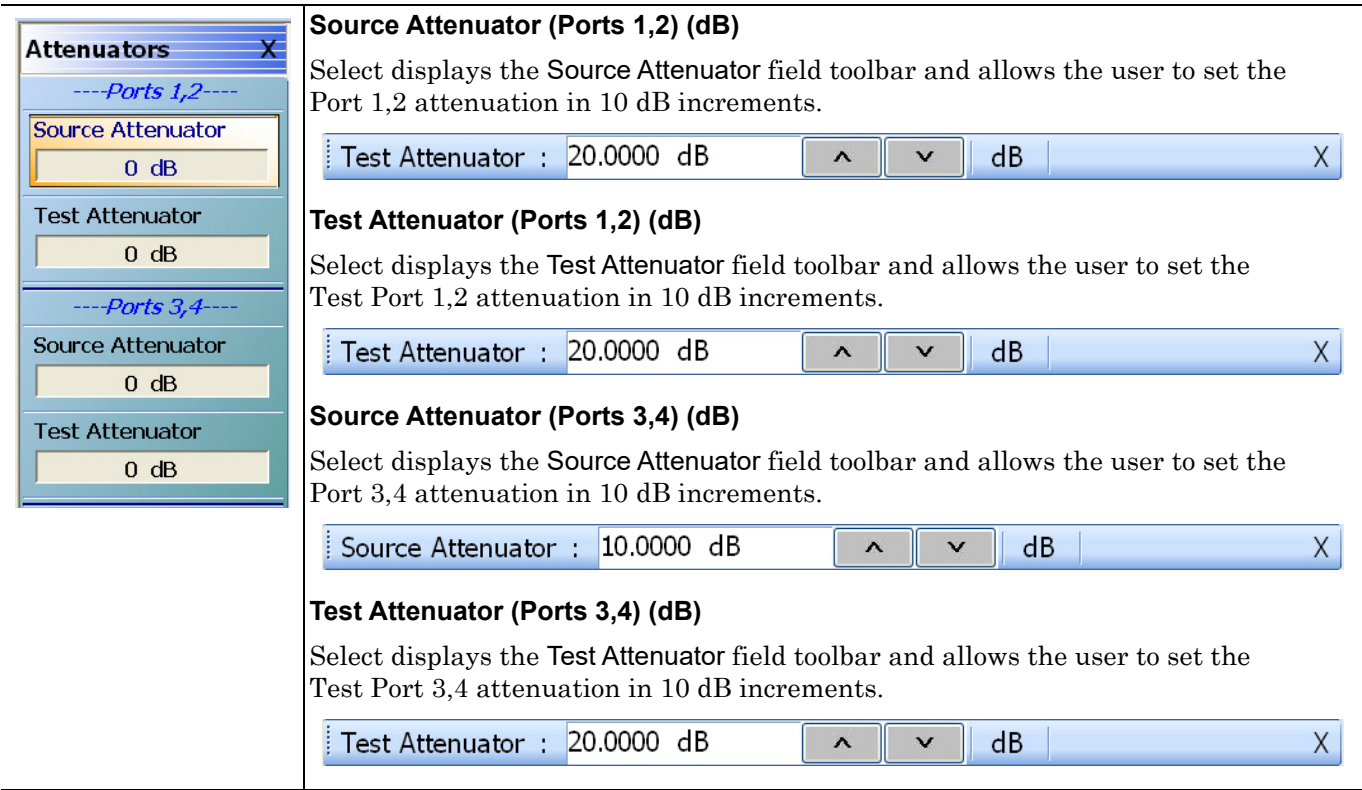


Figure 6-13. ATTENUATORS Menu – Segment-Based Sweep – 4-Port VNAs

ATTENUATORS Menu – Segment-Based Sweep – 4-Port VNAs with Option 32

Previous

- [“POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20](#)

Prerequisites

- Option 32 installed
- Sweep Type = Segment-Based Sweep (Frequency or Index). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER

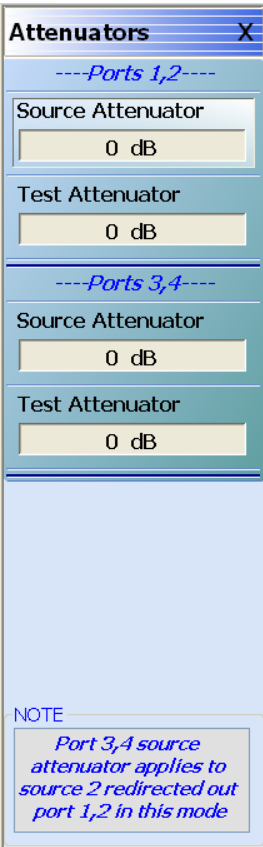
	<p>Source Attenuator (Ports 1,2) (dB) Select displays the Source Attenuator field toolbar and allows the user to set the Port 1,2 attenuation in 10 dB increments.</p> <p>Test Attenuator : 20.0000 dB ^ v dB X</p> <p>Test Attenuator (Ports 1,2) (dB) Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1,2 attenuation in 10 dB increments.</p> <p>Test Attenuator : 20.0000 dB ^ v dB X</p> <p>Source Attenuator (Ports 3,4) (dB) Select displays the Source Attenuator field toolbar and allows the user to set the Port 3,4 attenuation in 10 dB increments.</p> <p>Source Attenuator : 10.0000 dB ^ v dB X</p> <p>Test Attenuator (Ports 3,4) (dB) Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 3,4 attenuation in 10 dB increments.</p> <p>Test Attenuator : 20.0000 dB ^ v dB X</p> <p>Note: “Port 3,4 source attenuator applies to source 2 redirected out port 1,2 in this mode.” This note appears when Option 32 is installed and SRC2 Out Redirection is toggled ON (via the Power Other Setup menu).</p>
--	---

Figure 6-14. ATTENUATORS Menu – Segment-Based Sweep – 4-Port VNAs

ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs

Previous

- [“POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs” on page 6-39](#)

Prerequisites

- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP

Attenuators

Ports 1,2

Source Attenuator

0 dB

Test Attenuator

0 dB

Ports 3,4

Source Attenuator

0 dB

Test Attenuator

0 dB

Source Attenuator (Ports 1,2) (dB)

Select displays the Source Attenuator field toolbar and allows the user to set the Port 1,2 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 1,2) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1,2 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Ports 3,4) (dB)

Select displays Source Attenuator field toolbar and allows the user to set the Port 3,4 attenuation in 10 dB increments.

Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 3,4) (dB)

Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 3,4 attenuation in 10 dB increments.

Test Attenuator : 20.0000 dB ^ v dB X

Figure 6-15. ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs

ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs with Option 32

Previous

- [“POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs with Option 32” on page 6-42](#)

Prerequisites

- Option 32 installed
- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP

Attenuators X

---Ports 1,2---

Source Attenuator
0 dB

Test Attenuator
0 dB

---Ports 3,4---

Source Attenuator
0 dB

Test Attenuator
0 dB

NOTE
Port 3,4 source attenuator applies to source 2 redirected out port 1,2 in this mode

Source Attenuator (Ports 1,2) (dB)
Select displays the Source Attenuator field toolbar and allows the user to set the Port 1,2 attenuation in 10 dB increments.
Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 1,2) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 1,2 attenuation in 10 dB increments.
Test Attenuator : 20.0000 dB ^ v dB X

Source Attenuator (Ports 3,4) (dB)
Select displays Source Attenuator field toolbar and allows the user to set the Port 3,4 attenuation in 10 dB increments.
Source Attenuator : 10.0000 dB ^ v dB X

Test Attenuator (Ports 3,4) (dB)
Select displays the Test Attenuator field toolbar and allows the user to set the Test Port 3,4 attenuation in 10 dB increments.
Test Attenuator : 20.0000 dB ^ v dB X

Note: “Port 3,4 source attenuator applies to source 2 redirected out port 1,2 in this mode.” This note appears when Option 32 is installed and SRC2 Out Redirection is toggled ON (via the Power | Power Setup menu).

Figure 6-16. ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs with Option 32

6-8 Power Setup Menu Variants – 4-Port VNAs

POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs

Previous

- “POWER Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-16

Prerequisites

- Sweep Type = Frequency-Based Sweep (Linear or Log). See “Sweep Setup and Sweep Type Menus”.

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

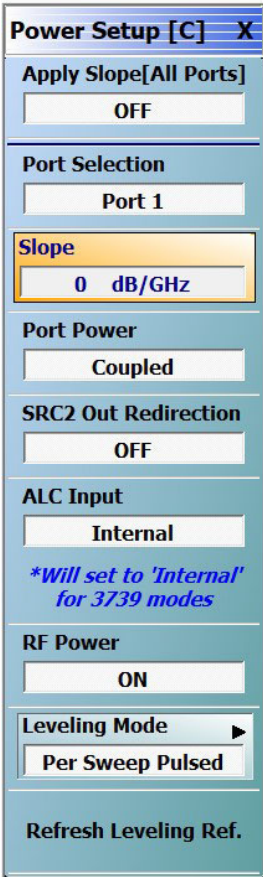
	<p>Menu Name Change</p> <p>If Port Power is set to Not Coupled, when Port 1 is selected, the menu name changes to POWER SETUP [1]. Similar menu name changes occur for the remaining Port selections.</p> <p>If Port Power is set to Coupled, the menu name changed to POWER SETUP [C]</p> <p>Port Selection (Port 1/Port 2/Port 3/Port 4)</p> <p>Select displays the SELECT PORT dialog box allowing touch screen selection of Port 1, Port 2, Port 3, or Port 4.</p> <p>Apply Slope [All Ports]</p> <p>Select toggles the Apply Slope value set below between off and on.</p> <p>Slope (dB/GHz)</p> <p>Select displays the Single Power field toolbar and allows the user to select the single power level in dBm.</p> <div><div>Slope [dB/GHz] : 0.00</div><div><div>^</div><div>v</div><div>Enter</div><div>X</div></div></div> <p>Port Power (Coupled/Not Coupled)</p> <p>The Port Power button toggles whether the power adjustments to Ports 1, 2, 3, and 4 move together or are independent.</p> <p>If Not Coupled is selected:</p> <ul style="list-style-type: none">• The power level of the ports can be adjusted separately on the POWER and POWER SETUP menus.• The Port Selection button (described above) toggles between Port 1 through Port 4, also changing the POWER SETUP menu name between POWER SETUP [1], POWER SETUP [2], POWER SETUP [3], or POWER SETUP [4]. <p>If Coupled is selected:</p> <ul style="list-style-type: none">• An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.• The Port Selection button (described above) toggles between Port 1 and Port 2.• The POWER SETUP menu name changes to POWER SETUP [C].• The POWER menu name changes to POWER [C].• Coupling does not affect attenuator settings.
---	--

Figure 6-17. POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs (1 of 2)

	<p>SRC2 Out Redirection</p> <p>Visible only if Option 32 is installed. Select toggles between ON or OFF to direct Source 2 power out of Port 1.</p> <p>ALC Input</p> <p>Visible only if Option 53 is installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs.</p> <p>RF Power</p> <p>Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.</p> <p>Leveling Mode (Application PulseView)</p> <p>Visible only if the application is set to PulseView. Allows the user to more precisely control power based on the signal envelope. Displays the LEVELING MODE menu.</p> <ul style="list-style-type: none"> • “LEVELING MODE Menu – 4-Port VNAs” on page 6-45 <p>Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog Power tab.</p> <ul style="list-style-type: none"> • “Pulse Power Calibration Setup” on page 19-29 <p>Refresh Leveling Ref. (Reference) (Application PulseView)</p> <p>Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.</p>
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Figure 6-17. POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs (2 of 2)

POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32

Previous

- “POWER Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-18

Prerequisites

- Option 32 installed
- Sweep Type = Frequency-Based Sweep (Linear or Log). See “Sweep Setup and Sweep Type Menus” on page 7-2. Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP

Power Setup [C] X

Apply Slope[All Ports]
OFF

Port Selection
Port 1

Slope
0 dB/GHz

Port Power
Coupled

SRC2 Out Redirection
OFF

ALC Input
Internal
**Will set to 'Internal' for 3739 modes*

RF Power
ON

Leveling Mode
Per Sweep Pulsed

Refresh Leveling Ref.

Menu Name Change

If Port Power is set to Not Coupled, when Port 1 is selected, the menu name changes to POWER SETUP [1]. Similar menu name changes occur for the remaining Port selections.

If Port Power is set to Coupled, the menu name changed to POWER SETUP [C]

Apply Slope [All Ports]

Select toggles the Apply Slope value set below between off and on.

Port Selection

The Port Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2. The selected port is shown in the button display field.

Select Port

Select a port to use

Port 1

Port 2

Port 3

Port 4

Src 2 out Port 1

Src 2 out Port 2

Slope (dB/GHz)

Select displays the Single Power field toolbar and allows the user to select the single power level in dBm.

Slope [dB/GHz] : 0.00 ^ v Enter X

Figure 6-18. POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32 (1 of 2)

Port Power (Coupled/Not Coupled)

The Port Power button toggles whether the power adjustments to Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2 move together or are independent.

If Not Coupled is selected:

- The power level of the ports can be adjusted separately on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2, also changing the POWER SETUP menu name between POWER SETUP [1], POWER SETUP [2], POWER SETUP [3], or POWER SETUP [4].

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- The Port Selection button (described above) toggles between Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2.
- The POWER SETUP menu name changes to POWER SETUP [C].
- The POWER menu name changes to POWER [C].

Coupling does not affect attenuator settings.

SRC2 Out Redirection (Option 32)

Select toggles between ON or OFF to direct Source 2 power out of Port 1 or Port 2, depending on port selection.

ALC Input

Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs. Button is disabled when SRC2 Out Redirection is ON.

RF Power

Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.

Leveling Mode (Application | PulseView)

Visible only if the application is set to PulseView and allows the user to more precisely control power based on the signal envelope.

- [“LEVELING MODE Menu – 2-Port VNAs” on page 5-44](#)

Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog | Power tab.

- [“Pulse Power Calibration Setup” on page 19-29](#)

Refresh Leveling Ref. (Reference) (Application | PulseView)

Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.

Figure 6-18. POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32 (2 of 2)

POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs

The POWER SETUP menu is *not* available if sweep is set to a frequency-based or index-based segment sweep. Instead, power configuration is on a per-segment basis and is configured at the FREQ BASE SETUP or the INDEX BASE SETUP menus (accessible via the Sweep Setup menu)

NoteWhen Option 32 (Source Redirect) is installed, the POWER SETUP menu is made available for toggling this option. See the following section for details.

Previous

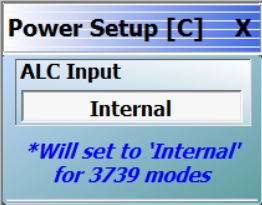
- [“POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20](#)

Prerequisites

- Sweep Type = Frequency-Based Sweep or Index-Based Sweep – See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation to Power Configuration for Segment-based Sweep

- MAIN | Sweep Setup | Sweep Setup | Freq-based Seg. Sweep Setup | FREQ BASE SETUP
- MAIN | Sweep Setup | Sweep Setup | Index-based Seg. Sweep Setup | INDEX BASE SETUP



ALC Input

Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs.

Figure 6-19. POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs

POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs with Option 32

A POWER SETUP menu is available when Option 32 is installed. This menu consists of a single button to toggle Src2 Out Redirection ON or OFF. Power configuration for segment based sweep is still performed as described in the previous section via the FREQ BASE SETUP or the INDEX BASE SETUP menus (accessible via the Sweep Setup menu).

Previous

- [“POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20](#)

Prerequisites

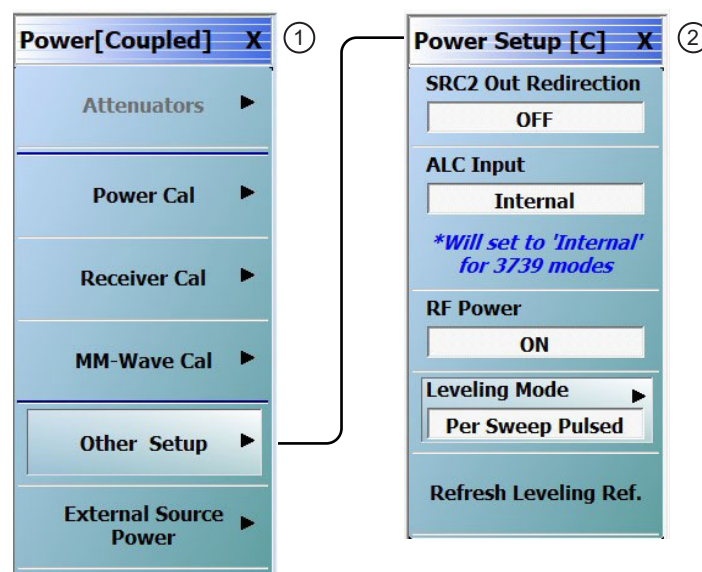
- Sweep Type = Frequency-Based Sweep or Index-Based Sweep – See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to Sweep Types menu:
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation to Power Setup Menu (Option 32)

- MAIN | Power | POWER | Other Setup | POWER SETUP

Navigation to Power Configuration for Segment-based Sweep

- MAIN | Sweep Setup | Sweep Setup | Freq-based Seg. Sweep Setup | FREQ BASE SETUP
- MAIN | Sweep Setup | Sweep Setup | Index-based Seg. Sweep Setup | INDEX BASE SETUP



When Option 32 is installed, POWER SETUP menu (click Other Setup button on POWER menu) is active, so Source 2 power can be redirected out of Port 1 or Port 2. All other sub-menus remain the same.

1. Power Menu – Segment-Based Sweep – 4-Port VNAs with Option 32
2. Power Setup Menu – Segment-Based Sweep – 4-Port VNAs with Option 32

SRC2 Out Redirection (Option 32)

Select toggles between ON or OFF to direct Source 2 power out of Port 1 or Port 2.

ALC Input

Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs. Button is disabled when SRC2 Out Redirection is ON.

Figure 6-20. Power Setup Menu – Segment-Based Sweep with Option 32 (1 of 2)

RF Power

Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.

Leveling Mode (Application | PulseView)

Visible only if the application is set to PulseView and allows the user to more precisely control power based on the signal envelope.

- [“LEVELING MODE Menu – 2-Port VNAs” on page 5-44](#)

Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog | Power tab.

- [“Pulse Power Calibration Setup” on page 19-29](#)

Refresh Leveling Ref. (Reference) (Application | PulseView)

Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.

Figure 6-20. Power Setup Menu – Segment-Based Sweep with Option 32 (2 of 2)

POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs

Previous

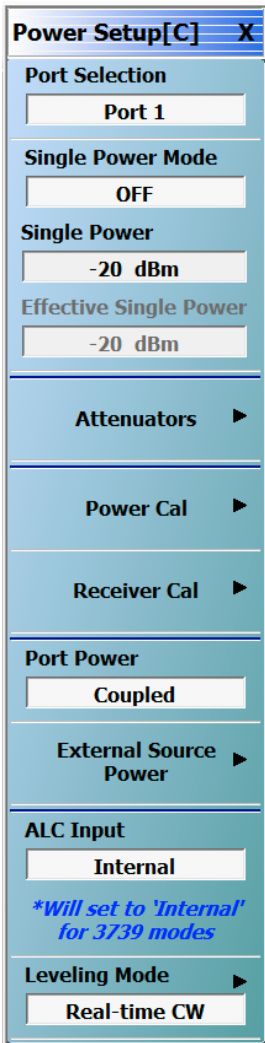
- [“POWER Menu – Power-Based Sweep – 4-Port VNAs” on page 6-22](#)

Prerequisites

- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See [“Sweep Setup and Sweep Type Menus” on page 7-2](#). Navigation to SWEEP TYPES menu: MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

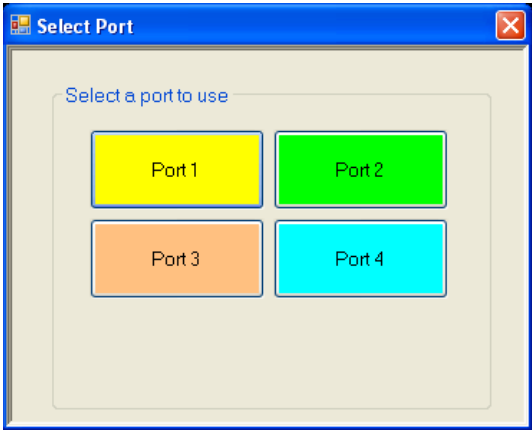
- MAIN | Power | POWER | Power Setup | POWER SETUP



(cont.)

Port Selection (Port 1/Port 2/Port 3/Port 4)

Select displays the SELECT PORT dialog box allowing touch screen selection of Port 1, Port 2, Port 3, or Port 4.



The menu name suffix changes depending on the state of the Port Power (Coupled/Not Coupled) button, and if Not Coupled, on the currently selected port.

Single Power Mode (ON/OFF)

Select toggles single power mode ON and OFF.

Single Power (dBm)

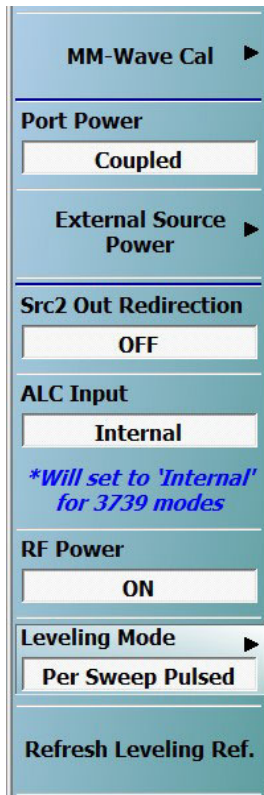
Select displays the Single Power (dBm) field toolbar and allows the user to select the single power level.



Effective Single Power (dBm)

A read-only display of the effective single power level after the effects of any attenuators.

Figure 6-21. POWER SETUP Menu – Power-Based Sweep – 4-Port VNAs (1 of 3)



Attenuators

If the Attenuators button is available, one of the attenuator options has been installed:

- Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
- Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.
- In 4-Port Mode, the two attenuators control Port 1-2 and Ports 3-4.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs” on page 6-30](#)

If the Attenuators button does not appear in this menu, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.

Power Cal

Select displays the POWER CAL menu.

- [“POWER CAL Menu – Power-Based Sweep – 4-Port VNAs” on page 6-50](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu – 4-Port VNAs” on page 6-66](#)

Port Power (Coupled/Not Coupled)

The Port Power button toggles whether the power adjustments to Port 1, Port 2, Port 3, and Port 4 move together or are independent.

If Not Coupled is selected:

- The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus.
- The Port Selection button toggles between Port 1 through Port 4, also changing the POWER SETUP menu name between POWER SETUP [1], POWER SETUP [2], POWER SETUP [3], or POWER SETUP [4].

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- The Port Selection button toggles between Port 1, Port 2, Port 3, and Port 4.
- The POWER SETUP menu name changes to POWER SETUP [C].
- The POWER menu name changes to POWER [C].
- Coupling does not affect attenuator settings.

External Source Power

Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.

- [“EXT. SRC POWER Menu – 4-Port VNA” on page 6-63](#)

ALC Input

Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs.

Figure 6-21. POWER SETUP Menu – Power-Based Sweep – 4-Port VNAs (2 of 3)

	<p>RF Power</p> <p>Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.</p> <p>Leveling Mode (Application PulseView)</p> <p>Visible only if the application is set to PulseView and allows the user to more precisely control power based on the signal envelope.</p> <ul style="list-style-type: none">• “LEVELING MODE Menu – 2-Port VNAs” on page 5-44 <p>Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog Power tab.</p> <ul style="list-style-type: none">• “Pulse Power Calibration Setup” on page 19-29 <p>Refresh Leveling Ref. (Reference) (Application PulseView)</p> <p>Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.</p>
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Figure 6-21. POWER SETUP Menu – Power-Based Sweep – 4-Port VNAs (3 of 3)

POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs with Option 32

Previous

- “POWER Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-24

Prerequisites

- Option 32 installed, Src2 Out Redirection ON
- Sweep Type = Power-Based Sweep (CW Frequency or Swept Frequency). See “Sweep Setup and Sweep Type Menus” on page 7-2. Navigation to SWEEP TYPES menu: MAIN | Sweep Setup | SWEEP SETUP | Sweep Type | SWEEP TYPES

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP

Power Setup[C] X

Port Selection

Port 1

Single Power Mode

OFF

Single Power

-20 dBm

Effective Single Power

-20 dBm

Attenuators

Power Cal

Receiver Cal

Port Selection

The Port Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2. The selected port is shown in the button display field.

Select Port

Select a port to use

Port 1

Port 2

Port 3

Port 4

Src 2 out Port 1

Src 2 out Port 2

The menu name suffix changes depending on the state of the Port Power (Coupled/Not Coupled) button, and if Not Coupled, on the currently selected port.

Single Power Mode (ON/OFF)

Select toggles single power mode ON and OFF.

Single Power (dBm)

Select displays the Single Power (dBm) field toolbar and allows the user to select the single power level.

Single Power : -20.0000 dBm

^

v

dBm

X

Effective Single Power (dBm)

A read only display of the effective single power level after the effects of any attenuators.

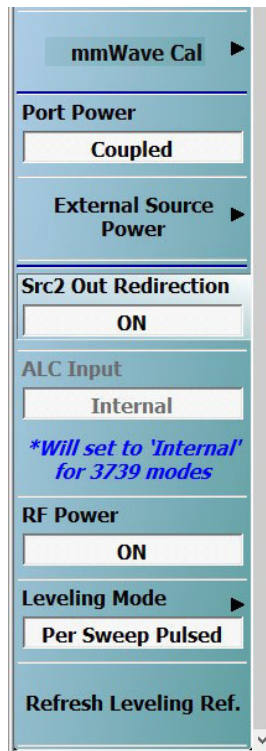
(cont.)

Figure 6-22. POWER SETUP Menu – Power-Based Sweep – 4-Port VNAs with Option 32 (1 of 3)

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Attenuators

If the Attenuators button is available, one of the attenuator options has been installed:

- Option 61: Includes Port 1 Source Attenuator and Port 2 Test Attenuator.
- Option 62: Includes Port 1 Source Attenuator, Port 2 Source Attenuator, Port 1 Test Attenuator, and Port 2 Test Attenuator.
- In 4-Port Mode, the two attenuators control Port 1-2 and Ports 3-4.

Select displays the ATTENUATORS menu and allows the user to configure Source and Test attenuators for port 1 and port 2.

- [“ATTENUATORS Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-31](#)

If the Attenuators button does not appear in this menu, the attenuator options have not been installed in your instrument. Contact Anritsu Customer Service for more information.

Power Cal

Select displays the POWER CAL menu.

- [“POWER CAL Menu – Power-Based Sweep – 4-Port VNAs with Option 32” on page 6-52](#)

Receiver Cal

Select displays the RECEIVER SETUP menu.

- [“RECEIVER CAL Menu – 4-Port VNAs” on page 6-66](#)

mmWave Cal

Select displays the mmWAVE ALC CAL menu. The mmWave CAL button is visible only in 3739 or Multiple Source modes when mmWave control is enabled.

- [“mmWAVE ALC CAL Menu” on page 14-14](#)

Port Power (Coupled/Not Coupled)

The Port Power button toggles whether the power adjustments to Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2 move together or are independent.

If Not Coupled is selected:

- The power level of the two port pairs can be adjusted separately on the POWER and POWER SETUP menus.
- The Port Selection button toggles between Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2, also changing the POWER SETUP menu name between POWER SETUP [1], POWER SETUP [2], POWER SETUP [3], or POWER SETUP [4].

If Coupled is selected:

- An adjustment to one port is also applied to the other port on the POWER and POWER SETUP menus.
- The Port Selection button toggles between Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2.
- The POWER SETUP menu name changes to POWER SETUP [C].
- The POWER menu name changes to POWER [C].
- Coupling does not affect attenuator settings.

External Source Power

Select displays the EXT SRC POWER (EXTERNAL SOURCE POWER) menu.

- [“EXT. SRC POWER Menu – 4-Port VNA” on page 6-63](#)

Figure 6-22. POWER SETUP Menu – Power-Based Sweep – 4-Port VNAs with Option 32 (2 of 3)

	<div><div>SRC2 Out Redirection (Option 32)</div><div>Select toggles between ON or OFF to direct Source 2 power out of Port 1 or Port 2.</div><div>ALC Input</div><div>Visible only if Option 53 installed (or 8x installed but instrument not operating in 3739 broadband mode). Select toggles the value between Internal and External leveling detector inputs. Button is disabled when SRC2 Out Redirection is ON.</div><div>RF Power</div><div>Select toggles the RF Power Off and On. In the Off state, the internal source(s) is(are) disabled, as might be useful when using the VNA solely as a receiver, and is similar to the 'Inactive' state discussed in the Multiple Source Control section.</div><div>Leveling Mode (Application PulseView)</div><div>Visible only if the application is set to PulseView and allows the user to more precisely control power based on the signal envelope.</div><div><ul style="list-style-type: none">• “LEVELING MODE Menu – 2-Port VNAs” on page 5-44</div><div>Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog Power tab.</div><div><ul style="list-style-type: none">• “Pulse Power Calibration Setup” on page 19-29</div><div>Refresh Leveling Ref. (Reference) (Application PulseView)</div><div>Visible only if the application is set to PulseView and if the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed. Selection will refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.</div></div>
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Figure 6-22. POWER SETUP Menu – Power-Based Sweep – 4-Port VNAs with Option 32 (3 of 3)

LEVELING MODE Menu – 4-Port VNAs

Previous

- [“POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-32](#)
- [“POWER SETUP Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-34](#)
- [“POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-36](#)
- [“POWER SETUP Menu – Segment-Based Sweep – 4-Port VNAs with Option 32” on page 6-37](#)
- [“POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs” on page 6-39](#)
- [“POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs with Option 32” on page 6-42](#)

Navigation

- MAIN | Power | POWER | Other Setup | POWER SETUP | Leveling Mode | LEVELING MODE

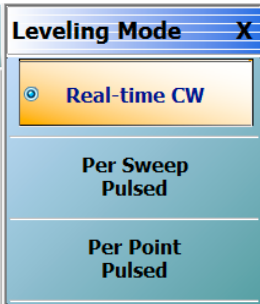
	<h4>Leveling Mode (Application PulseView)</h4> <p>Visible only if the application is set to PulseView and allows the user to more precisely control power based on the signal envelope. Allows selection of:</p> <ul style="list-style-type: none"> • Real Time CW leveling mode – Level adjustments occur based upon detection of the CW non-pulsed signal. This will result in a leveling of average power, but occurs on a continuous (sub-microsecond) basis and has no impact on sweep time. • Per Sweep leveling mode – Level adjustments occur on a per sweep basis targeting the specific portion of the pulse described by the reference measurement width and delay. The leveling adjustments only occur at the end of the sweep, so fast drift (by a pre-amplifier for example) will not be corrected. This approach has minimal impact on sweep time. • Per Point leveling mode – Level adjustments occur on a per point basis targeting the specific portion of the pulse described by the reference measurement width and delay. The leveling adjustment is made at every point before the main measurement is made, so even fast drifts will be corrected. This approach has more impact on sweep time, but the power level at a specific point in the pulse is more precisely controlled. <p>Leveling Mode can be set in the LEVELING MODE menu, or in the PULSEVIEW CONFIGURATION dialog Power tab.</p> <ul style="list-style-type: none"> • “Pulse Power Calibration Setup” on page 19-29
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Figure 6-23. LEVELING MODE Menu

Note

If the application is set to PulseView and the Leveling Mode is set to Per Sweep Pulsed or Per Point Pulsed, the Refresh Leveling Ref. button will become available, which will allow the user to refresh the pulsed leveling reference target values. This action is recommended after recalling a pulsed leveling setup with a user power calibration or a pulsed user power calibration file, particularly if the proper measurement hardware connections were not in place at time of recall.

6-9 Power Cal Menu Variants – 4-Port VNAs

Note The menus are identical for frequency-based sweep and segment-based sweep.

POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs

POWER CAL Menu – Segment-Based Sweep – 4-Port VNAs

Previous

- “POWER Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-16
- “POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL

Power Cal X

Port Selection

Port 1

Power Cal

ON

Target Power

0 dBm

Perform Cal

Save Cal

Recall Cal

NW Extraction ▶

POWER CAL Menu (Non-Power Sweep Modes)

Available if a non-power sweep mode of Frequency-Based Sweep or Index-Based Sweep is selected.

Port Selection (Port 1/Port 2/Port 3/Port 4)

Select displays the SELECT PORT dialog box allowing touch screen selection of Port 1, Port 2, Port 3, or Port 4.

Select Port

Select a port to use

Port 1

Port 2

Port 3

Port 4

Power Cal (Off/On)

If a successful power calibration has not been completed, the button is unavailable. If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.

Target Power (dBm)

Select displays the Target Power field toolbar and allows the user to enter power levels in dBm.

Target Power : 1.0000 dBm ^ v dBm X

Figure 6-24. POWER CAL Menu – Non-Power Sweep Modes (1 of 2)

	<div><div>Perform Cal</div><div>Starts the power calibration routine and displays the POWER CALIBRATION dialog box. When the calibration is successfully completed, the Save Cal button (below) and the Power Cal (Off/On) button (above) are available.</div><div><ul style="list-style-type: none">“POWER CALIBRATION (PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box” on page 6-54</div><div>Save Cal</div><div>If a successful power calibration has not been completed, the button is unavailable. The Save Cal button is available after a successful power calibration (above). If the sweep mode is set to a frequency sweep, select displays the SAVE AS (FREQUENCY SWEEP POWER CAL.fpc FILE) dialog box.</div><div><ul style="list-style-type: none">“SAVE AS (FREQ SWEEP POWER CAL FPC FILE) Dialog Box” on page 6-60</div><div>Recall Cal</div><div>The Recall Calibration (Recall Cal) button allows a prior saved calibration to be recalled. As above, if the sweep mode is set to a frequency sweep, select displays the OPEN (FREQUENCY SWEEP POWER CAL.fpc FILE) dialog box. If the sweep mode is set to a power sweep, select displays the OPEN (POWER SWEEP POWER CAL.ppc FILE) dialog box.</div><div><ul style="list-style-type: none">“OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box” on page 6-59</div><div>When a Power Cal is successfully recalled on any port of the channel, the indicator ‘PwrCal’ is shown on the Channel Status bar.</div><div><div><div>Ch1</div><div>TR</div><div>RF Start 4 GHz</div><div>Stop 8 GHz</div><div>IFBW 1 kHz</div><div>Avg OFF</div><div>PwrCal</div><div>Measuring State</div><div>UNCORR</div></div><div><div><div>Port 1 Power Cal Recalled.</div><div>Internal</div><div>Int. 10 MHz</div><div>Local</div><div>Ch1</div><div>Port</div><div>1</div><div>2</div></div></div></div></div> <div><div>NW Extraction</div><div>This menu enables one to load files separately for embedding and de-embedding, where an existing power calibration is modified by the S-parameters in a .s2p file to reflect a network that was added after the power calibration (embedding) or removed after calibration (de-embedding).</div><div><ul style="list-style-type: none">“NW EXTRACTION Menu” on page 6-61</div></div>
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Figure 6-24. POWER CAL Menu – Non-Power Sweep Modes (2 of 2)

POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32

POWER CAL Menu – Segment-Based Sweep – 4-Port VNAs with Option 32

Note The menus are identical for frequency-based sweep and segment-based sweep.

Previous

- “POWER Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-18
- “POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20

Prerequisites

- Option 32 installed

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL

Power Cal

Source Selection

Src 2 out Port 2

Power Cal

ON

Target Power

0 dBm

Perform Cal

Save Cal

Recall Cal

NW Extraction

POWER CAL Menu (Non-Power Sweep Modes)

Available if a non-power sweep mode of Frequency-Based Sweep or Index-Based Sweep is selected.

Source Selection (Port 1/Port 2/Port 3/Port 4/Src 2 out Port 1/Src 2 out Port 2)

With Source2 Out Redirection ON, “Port Selection” is renamed “Source Selection”. The Source Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2. The selected port is shown in the button display field.

Select Port

Select a port to use

Port 1

Port 2

Port 3

Port 4

Src 2 out Port 1

Src 2 out Port 2

Power Cal (Off/On)

If a successful power calibration has not been completed, the button is unavailable. If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.

Target Power (dBm)

Select displays the Target Power field toolbar and allows the user to enter power levels in dBm.

Target Power : 1.0000 dBm ^ v dBm X

Figure 6-25. POWER CAL Menu – Non-Power Sweep Modes with Option 32 (1 of 2)

POWER CAL Menu – Power-Based Sweep – 4-Port VNAs

Previous

- “POWER Menu – Power-Based Sweep – 4-Port VNAs” on page 6-22

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL

Power Cal

Port Selection

Port 1

Power Cal

ON

Target Start Power

0 dBm

Target Stop Power

10 dBm

Perform Cal

Save Cal

Recall Cal

NW Extraction

POWER CAL Menu (Power Sweep Modes)

Available if Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is selected.

Port Selection (Port 1/Port 2/Port3/Port4)

The Port Selection button toggles the port selection between Port 1, Port 2, Port 3, and Port 4.

Select Port

Select a port to use

Port 1

Port 2

Port 3

Port 4

Power Cal (Off/On)

If a successful power calibration has not been completed, the button is unavailable.

If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.

Target Start Power (dBm)

Select displays the Target Start Power field toolbar and allows the user to enter power levels in dBm.

Target Start Power : -30.0000 dBm

^

v

dBm

X

Target Stop Power (dBm)

Select displays the Target Start Power field toolbar and allows the user to enter power levels in dBm.

Target Stop Power : -20.0000 dBm

^

v

dBm

X

Figure 6-26. POWER CAL Menu – Power Sweep Modes (1 of 2)

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	<div><div>Perform Cal</div><div>Starts the power calibration routine and displays the POWER CALIBRATION dialog box. When the calibration is successfully completed, the Save Cal button (below) and the Power Cal (Off/On) button (above) are available.</div><div><ul style="list-style-type: none">“POWER CALIBRATION (PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box” on page 6-54</div><div>Save Cal</div><div>If a successful power calibration has not been completed, the button is unavailable. The Save Cal button is available after a successful power calibration (above). If the sweep mode is set to a power sweep, select displays the SAVE AS (POWER SWEEP POWER CAL.PPC FILE) dialog box.</div><div><ul style="list-style-type: none">“SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 6-60</div><div>Recall Cal</div><div>The Recall Calibration (Recall Cal) button allows a prior saved calibration to be recalled.</div><div>As above, if the sweep mode is set to a frequency sweep, select displays the OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box. The dialog box is similar to the dialog box below:</div><div><ul style="list-style-type: none">“OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 6-59</div><div>When a Power Cal is successfully recalled on any port of the channel, the indicator ‘PwrCal’ is shown on the Channel Status bar.</div><div><div><div>Ch1 TR RF Start 4 GHz Stop 8 GHz IFBW 1 kHz Avg OFF PwrCal Measuring State UNCORR</div><div>Port 1 Power Cal Recalled. Internal Int. 10 MHz Local Ch1 Port 1 2</div></div></div><div>NW Extraction</div><div>This menu enables one to load files separately for embedding and de-embedding, where an existing power calibration is modified by the S-parameters in a .s2p file to reflect a network that was added after the power calibration (embedding) or removed after calibration (de-embedding).</div><div><ul style="list-style-type: none">“NW EXTRACTION Menu” on page 6-61</div></div>
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Figure 6-26. POWER CAL Menu – Power Sweep Modes (2 of 2)

POWER CAL Menu – Power-Based Sweep – 4-Port VNAs with Option 32

Previous

- “POWER Menu – Power-Based Sweep – 4-Port VNAs” on page 6-22

Prerequisites

- Option 32 installed, Source2 Out Redirection is ON (Power Setup Menu)

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL

Power Cal

Source Selection

Src 2 out Port 2

Power Cal

ON

Target Start Power

0 dBm

Target Stop Power

10 dBm

Perform Cal

Save Cal

Recall Cal

NW Extraction

POWER CAL Menu (Power Sweep Modes)

Available if Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is selected.

Source Selection (Port 1/Port 2/Port 3/Port 4/Src 2 out Port 1/Src 2 out Port 2)

With Source2 Out Redirection ON, “Port Selection” is renamed “Source Selection”. The Source Selection button displays the SELECT PORT dialog box which allows touch screen selection of Port 1, Port 2, Port 3, Port 4, Src 2 out Port 1, or Src 2 out Port 2. The selected port is shown in the button display field.

Select Port

Select a port to use

Port 1

Port 2

Port 3

Port 4

Src 2 out Port 1

Src 2 out Port 2

Power Cal (Off/On)

If a successful power calibration has not been completed, the button is unavailable. If a prior successful power calibration has been completed, the toggle button is available and allows the user to toggle the power calibration off and on.

Target Start Power (dBm)

Select displays the Target Start Power field toolbar and allows the user to enter power levels in dBm.

Target Stop Power (dBm)

Select displays the Target Start Power field toolbar and allows the user to enter power levels in dBm.

Figure 6-27. POWER CAL Menu – Power Sweep Modes with Option 32 (1 of 2)

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	<div><div>Perform Cal</div><div>Starts the power calibration routine and displays the POWER CALIBRATION dialog box. When the calibration is successfully completed, the Save Cal button (below) and the Power Cal (Off/On) button (above) are available.</div><div><ul style="list-style-type: none">• “POWER CALIBRATION (PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box” on page 6-54</div><div>Save Cal</div><div>If a successful power calibration has not been completed, the button is unavailable. The Save Cal button is available after a successful power calibration (above). If the sweep mode is set to a power sweep, select displays the SAVE AS (POWER SWEEP POWER CAL.lpc FILE) dialog box.</div><div><ul style="list-style-type: none">• “SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 6-60</div><div>Recall Cal</div><div>The Recall Calibration (Recall Cal) button allows a prior saved calibration to be recalled. As above, if the sweep mode is set to a frequency sweep, select displays the OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box. The dialog box is similar to the dialog box below:</div><div><ul style="list-style-type: none">• “OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box” on page 6-59</div><div>When a Power Cal is successfully recalled on any port of the channel, the indicator ‘PwrCal’ is shown on the Channel Status bar.</div><div></div><div>NW Extraction</div><div>This menu enables one to load files separately for embedding and de-embedding, where an existing power calibration is modified by the S-parameters in a .s2p file to reflect a network that was added after the power calibration (embedding) or removed after calibration (de-embedding).</div><div><ul style="list-style-type: none">• “NW EXTRACTION Menu” on page 6-61</div></div>
--	--

Figure 6-27. POWER CAL Menu – Power Sweep Modes with Option 32 (2 of 2)

POWER CALIBRATION (PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box

Previous

- “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-46

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Perform Cal | POWER CALIBRATION (PORT 1/PORT 2/PORT 3/PORT 4)Dialog Box

Note

The examples shown below have the Sweep Setup set to Frequency Sweep. When Sweep Setup is set to Power Sweep, the dialog states: “Power calibration in power sweep adjusts the source output power for the frequency specified across the power sweep range to provide a linear power level at the calibration plane.”

Power Calibration Dialog – USB Power Sensor *Not* Detected and Broadband Disabled

When Broadband receiver mode is disabled and a USB power sensor is not detected, the dialog instructions appear as shown in [Figure 6-28](#).

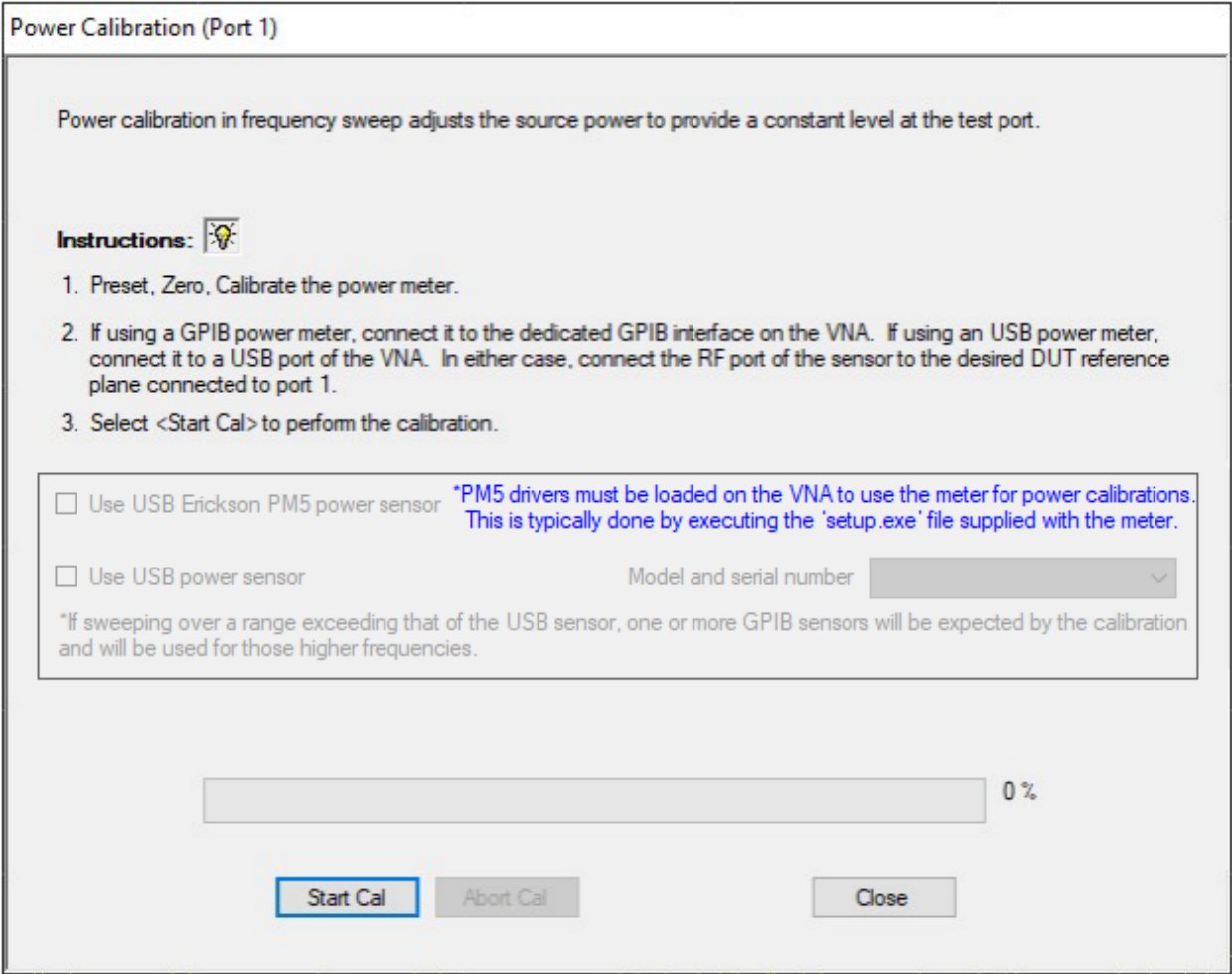


Figure 6-28. POWER CAL (PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box – USB Sensor Not Detected and Broadband Disabled

Instructions

For best results: Set the source power, port attenuator, and power target so that the test port level is correct at the desired port.

1. Preset, Zero, and Calibrate the power meter.
2. If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA. If using a USB power meter, connect it to a USB port on the VNA. In either case, connect the RF port of the sensor to the desired DUT reference plane connected to Port 1.
3. Select Start Cal to perform the calibration.
4. Click Close to return. Click Abort Cal to end calibration session.

Power Calibration Dialog – USB Power Sensor Detected and Broadband Disabled

When Broadband receiver mode is disabled and a USB power sensor is detected, the dialog instructions appear as shown in [Figure 6-29](#).

Note The MA24500A series USB PowerMaster is supported only on VectorStar systems equipped with Windows 7 or Windows 10 IoT Operating System and requires a dual USB Type A male to single USB Type A female cable to supply needed current draw.

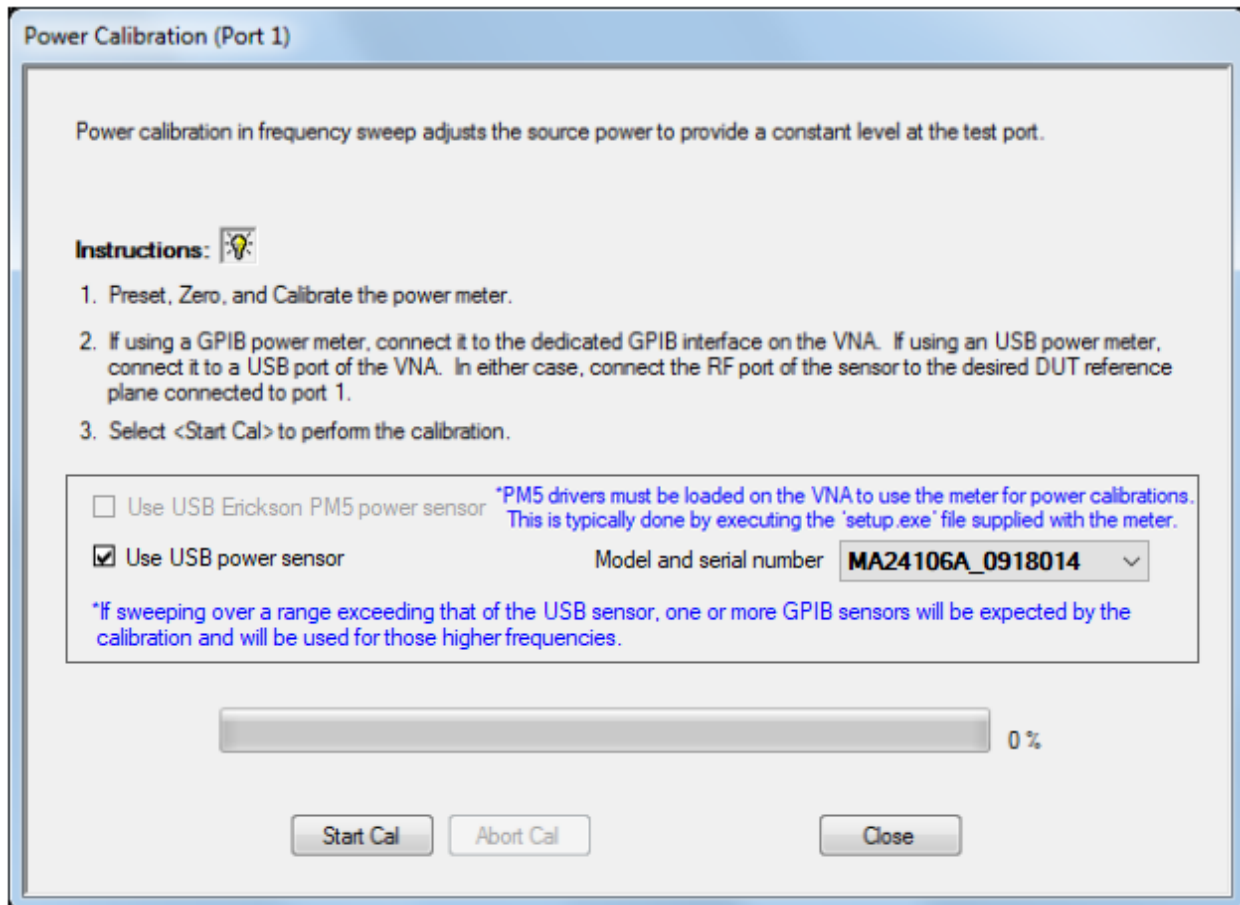


Figure 6-29. POWER CALIBRATION(PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box – With USB Sensor – Broadband Disabled

Instructions

Clicking on the 'lamp' icon opens the following notice: *“For Best Results: Set the source power, port attenuator, and power target so that the test port level is correct at the desired port.”*

1. Preset, Zero, and Calibrate the power meter.
2. If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA. If using a USB power meter, connect it to a USB port on the VNA. In either case, connect the RF port of the sensor to the desired DUT reference plane connected to Port 1.
3. Select Start Cal to perform the calibration.
4. Click Close to return. Click Abort Cal to end calibration session.

Power Calibration Dialog – USB Power Sensor Detected and Broadband Enabled

When Broadband receiver mode is enabled and a USB power sensor is detected, the dialog instructions appear as shown in [Figure 6-30](#).

Note that when in 3739 broadband mode, checking the “Use Fundamental Power Correction” box improves overall power accuracy by characterizing the harmonic content during the power calibration.

Note

The MA24500A series USB PowerMaster is supported only on VectorStar systems equipped with Windows 7 or Windows 10 IoT Operating System and requires a dual USB Type A male to single USB Type A female cable to supply needed current draw. These sensors cannot be used to perform fundamental power correction.

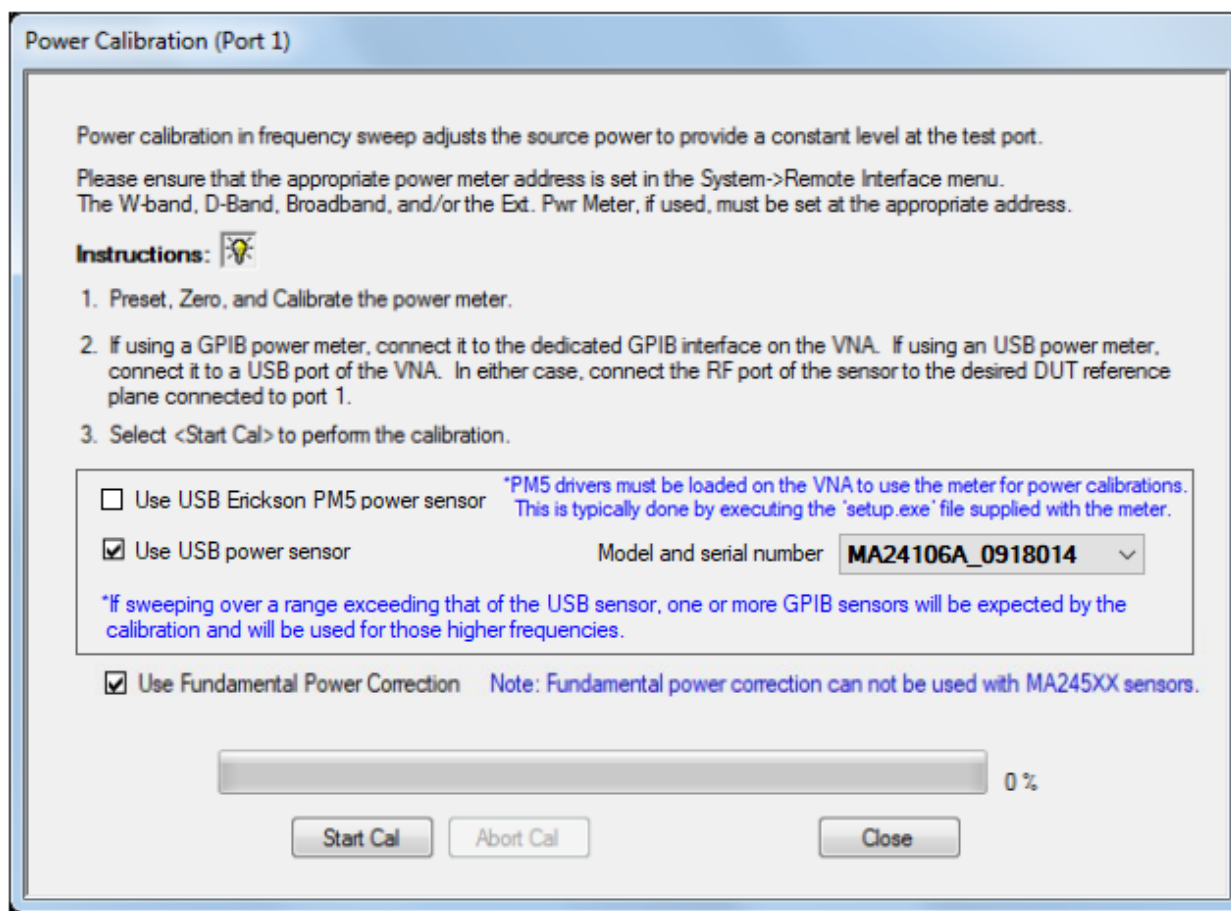


Figure 6-30. POWER CALIBRATION (PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box – Broadband Enabled – Using USB Sensor

Instructions

Clicking on the 'lamp' icon opens the following notice: *“For Best Results: Set the source power, port attenuator, and power target so that the test port level is correct at the desired port.”*

1. Preset, Zero, and Calibrate the power meter.
2. If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA. If using a USB power meter, connect it to a USB port on the VNA. In either case, connect the RF port of the sensor to the desired DUT reference plane connected to Port 1.
3. Select Start Cal to perform the calibration.
4. Click Close to return. Click Abort Cal to end calibration session.

Power Calibration Dialog – USB Power Sensor *Not* Detected and Broadband Enabled

When Broadband receiver mode is enabled and a USB sensor is *not* detected, the dialog instructions appear as shown in [Figure 6-31](#). Note that the USB power sensor selection is disabled because no USB sensor was detected.

Note that when in 3739 broadband mode, checking the “Use Fundamental Power Correction” box improves overall power accuracy by characterizing the harmonic content during the power calibration.

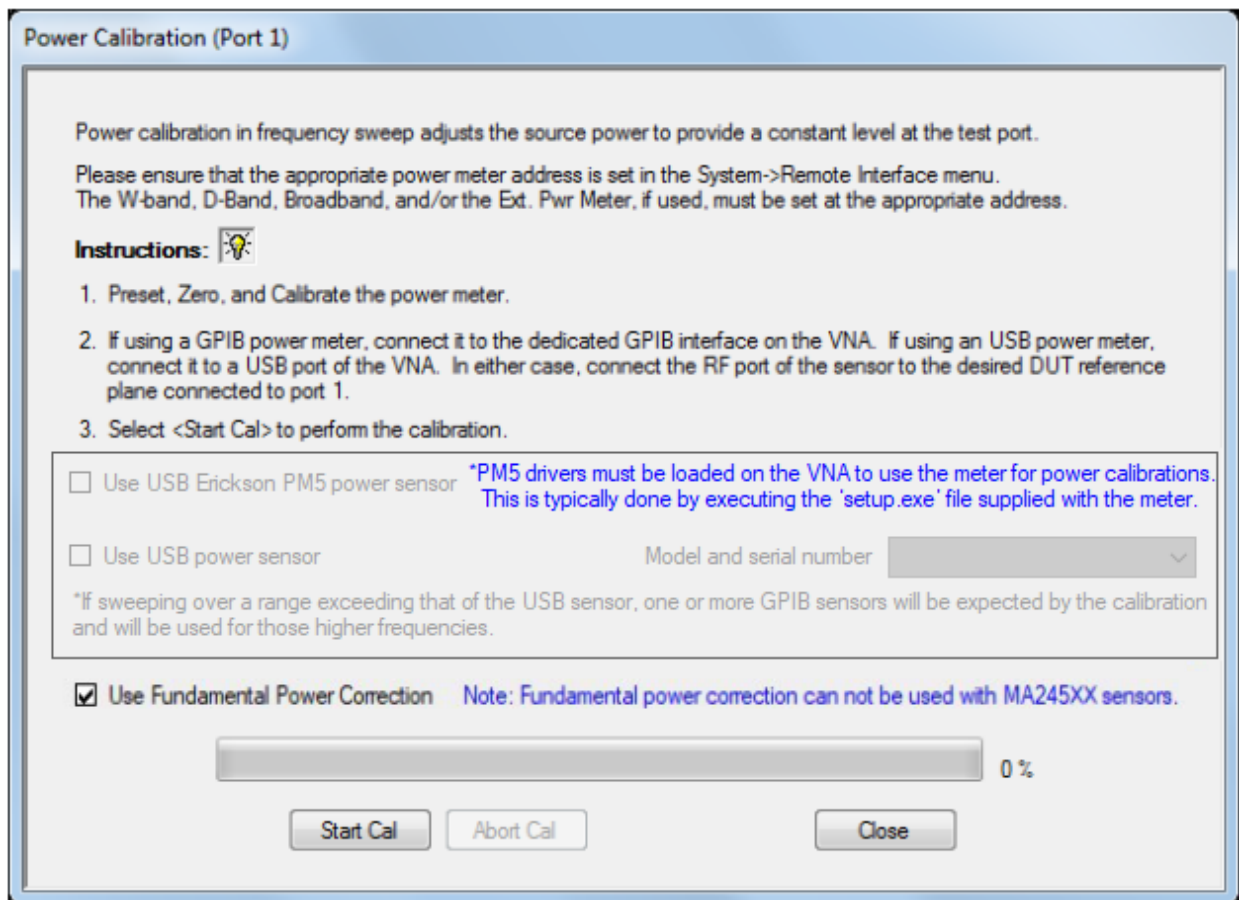


Figure 6-31. POWER CALIBRATION (PORT 1/PORT 2/PORT 3/PORT 4) Dialog Box – Broadband Enabled – No USB Sensor

Instructions

Clicking on the 'lamp' icon opens the following notice: *“For Best Results: Set the source power, port attenuator, and power target so that the test port level is correct at the desired port.”*

1. Preset, Zero, and Calibrate the power meter.
2. If using a GPIB power meter, connect it to the dedicated GPIB interface on the VNA. If using a USB power meter, connect it to a USB port on the VNA. In either case, connect the RF port of the sensor to the desired DUT reference plane connected to Port 1.
3. Select **Start Cal** to perform the calibration.
4. Click **Close** to return. Click **Abort Cal** to end calibration session.

OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box

Overview

Allows the user to find, open, and recall a frequency sweep power calibration (FPC file). If a frequency sweep is set, recalling a prior calibration displays the Open (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box. See left image in [Figure 6-32](#).

Previous

- “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-46.

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Recall Cal | OPEN (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box

OPEN (POWER SWEEP POWER CAL PPC FILE) Dialog Box

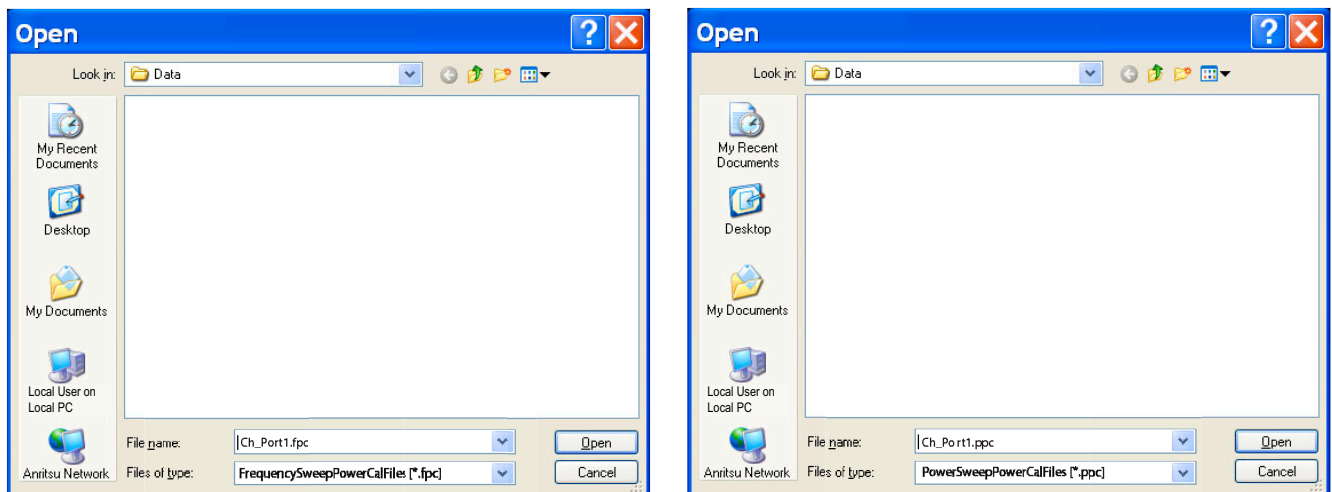
Allows the user to find, open, and recall a power sweep power calibration (PPC file). If a power sweep is set, recalling a prior calibration from the POWER CAL menu displays the OPEN (POWER SWEEP POWER CAL PPC FILE) dialog box. See right image in [Figure 6-32](#).

Previous

- “POWER CAL Menu – Power-Based Sweep – 4-Port VNAs” on page 6-50

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL | Recall Cal | RECALL CAL (POWER SWEEP POWER CAL PPC FILE) Dialog Box



At left, Open Frequency Sweep Power Cal FPC File

At right, Open Power Sweep Power Cal (PPC) File

Figure 6-32. OPEN FPC or PPC File Dialog Boxes

SAVE AS (FREQ SWEEP POWER CAL FPC FILE) Dialog Box

Allows the user to save a frequency sweep power calibration (FPC file). If a frequency sweep is set, clicking Save Cal displays the Save As (FREQUENCY SWEEP POWER CAL FPC FILE) dialog box. See left image in [Figure 6-33](#).

Full Name

Save As (Frequency Sweep Power Calibration FPC File)

Previous

- [“POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-46](#)

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | Save Cal | SAVE AS (FREQUENCY SWEEP POWER CAL FPC FILE) Dialog Box

SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box

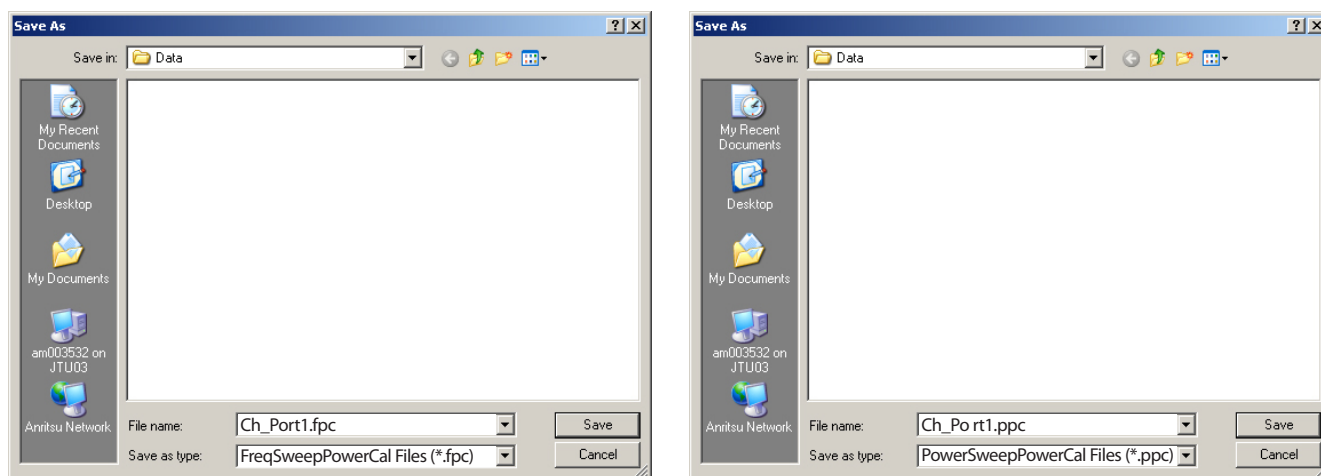
Allows the user to save a power sweep power calibration (PPC file). If a power sweep is set, clicking Save Cal displays the Save As (POWER SWEEP POWER CAL PPC FILE) dialog box. See right image in [Figure 6-33](#).

Previous

- [“POWER CAL Menu – Power-Based Sweep – 4-Port VNAs” on page 6-50](#)

Navigation

- MAIN | Power | POWER | Power Setup | POWER SETUP | Power Cal | POWER CAL | Save Cal | SAVE AS (POWER SWEEP POWER CAL PPC FILE) Dialog Box



At left, Save as Frequency Sweep Power Cal FPC File

At right, Save As Power Sweep Power Cal (PPC) File

Figure 6-33. SAVE AS FPC or PPC File Dialog Boxes

NW EXTRACTION Menu

Full Name

NW Extraction Menu

Previous

- “POWER CAL Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-46
- “POWER CAL Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-46
- “POWER CAL Menu – Power-Based Sweep – 4-Port VNAs” on page 6-50

Navigation

- MAIN | Power | POWER | Power Cal | POWER CAL | NW Extraction

An additional function available with power calibrations is embedding or de-embedding, where an existing power calibration is modified by the S-parameters in a .s2p file to reflect a network that was added after the power calibration (embedding) or removed after calibration (de-embedding). These functions are placed on the NW Extraction submenu (short for network extraction) shown in [Figure 6-34](#). This refers to the calibration options submenu where the .s2p file is often generated.

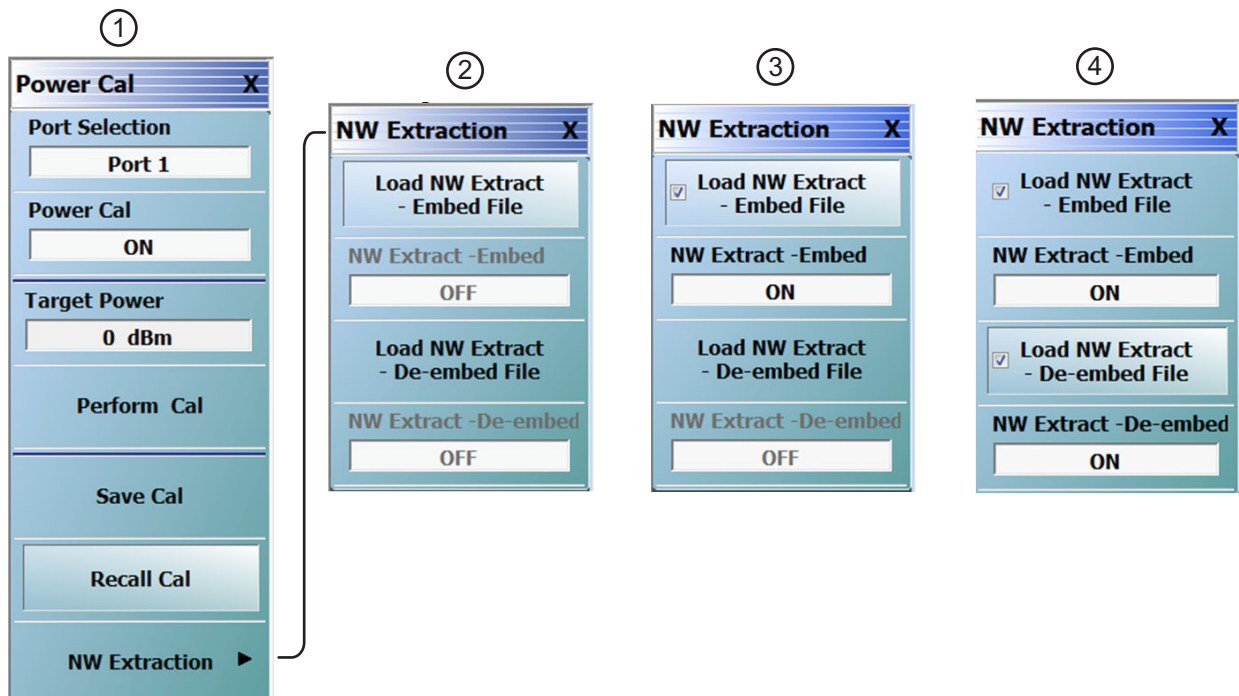


Figure 6-34. Power Menu Set – Frequency-Based Sweep (Linear or Log) (1 of 2)

<p>This menu enables the user to load files separately for embedding and de-embedding.</p> <p>1. POWER CAL menu</p> <p>2. Selection opens NW EXTRACTION menu.</p> <p>Click “Load NW Extract – Embed File” to select s2p file for embedding. Once a valid .s2p file is selected, a check mark will be displayed in the “Load NW Extract – Embed File” menu item.</p> <p>Click “Load NW Extract – De-embed File” to select s2p file for de-embedding. Once a valid .s2p file is selected, a check mark will be displayed in the “Load NW Extract-De-embed File” menu item.</p>	<p>3. Loaded s2p file – Embed is ON</p> <p>4. Loaded s2p file – De-embed is ON</p> <p>NOTE: The updated cal file values (after embedding/ de-embedding) are applied to the system only if the “Power Cal” status is ON. If the “Power Cal” status is OFF, then the updated cal file values are applied to the system when it is turned ON.</p> <p>The user is also allowed to turn ON/OFF the “NW Extract – Embed / De-embed” ON/OFF toggle buttons to remove the embedding / de-embedding effects from the existing power calibration (the effect of .s2p file data is removed from the power cal file values).</p>
--	--

Figure 6-34. Power Menu Set – Frequency-Based Sweep (Linear or Log) (2 of 2)

6-10 External Source Power Menu – 4-Port VNAs

EXT. SRC POWER Menu – 4-Port VNA

Full Name

External Source Power

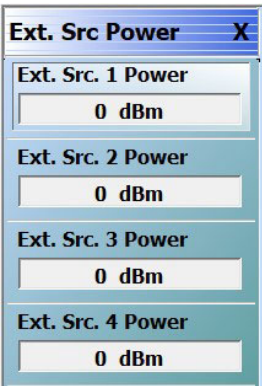
Previous

The EXT. SRC POWER menu is available for all sweep types.

- [“POWER Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-16](#)
- [“POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20](#)
- [“POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs” on page 6-39](#)

Navigation

- MAIN | Power | POWER | External Source Power | EXT SRC POWER.



Ext. Src. 1 Power (dBm)

The button is enabled if an external source is connected to the instrument. If active, select displays the Ext. Src. 1 Source Power (dBm) field toolbar and allows setting the power level for each connected external sources. If unavailable, external sources are not connected.



Ext. Src. 2 Power (dBm)

The button is similar in operation to the Ext. Src. 1 Power button above.

Ext. Src. 3 Power (dBm)

The button is similar in operation to the Ext. Src. 1 Power button above.

Ext. Src. 4 Power (dBm)

The button is similar in operation to the Ext. Src. 1 Power button above.

Figure 6-35. EXT SRC POWER (EXTERNAL SOURCE POWER) Menu – 4-Port VNAs

6-11 Receiver Setup and Calibration Menus – 4-Port VNAs

The receiver setup and calibration menus are available for all sweep types.

RECEIVER SETUP Menu – 4-Port VNAs

Sweep Types

- The RECEIVER SETUP menu is available for all sweep types.

Previous

- [“POWER Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-16.](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP

Menu Button Availability

- The top four (4) buttons (Port 1 Test and Reference, Port 2 Test and Reference) are unavailable until a successful receiver calibration has been performed on the RECEIVER CAL menu. After a successful calibration, the buttons are available (shown below).

<div><div>Receiver Setup</div><div><div>Port 1 Test</div><div>ON</div></div><div><div>Port 1 Reference</div><div>ON</div></div><div><div>Port 2 Test</div><div>ON</div></div><div><div>Port 2 Reference</div><div>ON</div></div><div><div>Port 3 Test</div><div>ON</div></div><div><div>Port 3 Reference</div><div>ON</div></div><div><div>Port 4 Test</div><div>ON</div></div><div><div>Port 4 Reference</div><div>ON</div></div><div><div>Perform Receiver Cal</div></div><div><div>Save Cal(s)</div></div><div><div>Recall Cal(s)</div></div><div><div>Receiver Cal Utilities</div></div></div>	<div><div>Port 1 Test (Off/On)</div><div>This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Port 1 Test Off and On.</div></div> <div><div>Port 1 Reference (Off/On)</div><div>This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 1 Reference between off and on.</div></div> <div><div>Port 2 Test (Off/On)</div><div>This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Port 2 Test between off and on.</div></div> <div><div>Port 2 Reference (Off/On)</div><div>This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 2 Reference between off and on.</div></div> <div><div>Port 3 Test (Off/On)</div><div>This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Port 3 Test Off and On.</div></div> <div><div>Port 3 Reference (Off/On)</div><div>This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 3 Reference between off and on.</div></div> <div><div>Port 4 Test (Off/On)</div><div>This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Port 4 Test between off and on.</div></div> <div><div>Port 4 Reference (Off/On)</div><div>This button is unavailable until a Perform Receiver Calibration has been completed. Once enabled, select toggles the Receiver Setup Port 4 Reference between off and on.</div></div>
--	---

Figure 6-36. RECEIVER SETUP Menu – 4-Port VNAs (1 of 2)

	<div><div>Perform Receiver Cal</div><div>Select displays the RECEIVER CAL menu.</div><div><ul style="list-style-type: none">• “RECEIVER CAL Menu – 4-Port VNAs” on page 6-66</div><div>Save Cal(s)</div><div>Select displays the SAVE RCVR CAL dialog box.</div><div><ul style="list-style-type: none">• “SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box” on page 6-67</div><div>Recall Cal(s)</div><div>Select displays the RECALL RCVR CAL dialog box.</div><div><ul style="list-style-type: none">• “RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box” on page 6-68</div><div>Receiver Cal Utilities</div><div>Select displays the RCVR UTILITIES menu.</div><div><ul style="list-style-type: none">• “RCVR UTILITIES Menu – 4-Port VNAs” on page 6-69</div></div>
--	---

Figure 6-36. RECEIVER SETUP Menu – 4-Port VNAs (2 of 2)

RECEIVER CAL Menu – 4-Port VNAs

Full Name

Receiver Calibration

Sweep Types

- The RECEIVER CAL menu is available for all sweep types.

Previous

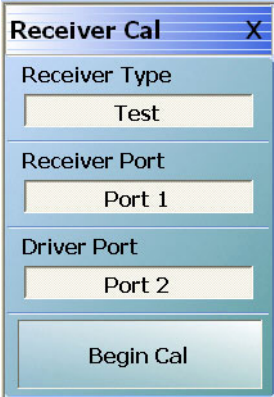
- [“RECEIVER SETUP Menu – 4-Port VNAs” on page 6-64](#)
- [“POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs” on page 6-39](#)

Navigation for Frequency- and Segmented-Based Sweeps

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Perform Receiver Cal | RECEIVER CAL

Navigation for Power-Based Sweeps

- MAIN | Power | POWER | Power Setup | POWER SETUP | Receiver Cal | RECEIVER SETUP | Perform Receiver Cal | RECEIVER CAL



RECEIVER CAL Menu Message

The menu displays a message: “Connect a through line between test ports.”

Receiver Type (Test/Reference)

After a successful receiver calibration, select toggles Receiver Type between Test (default) and Reference. Reference is used for additional test loop calibration.

Receiver Port (Port 1/Port 2/Port 3/Port 4)

The Receiver Port button displays the SELECT PORT touch screen dialog box and allows the user to select Port 1, Port 2, Port 3, or Port 4.

Driver Port (Port 1/Port 2/Port 3/Port 4)

The Driver Port button displays the SELECT PORT touch screen dialog box and allows the user to select Port 1, Port 2, Port 3, or Port 4.

Begin Cal

The Begin Calibration button starts the receiver calibration. During the calibration process, the button dims and is unavailable. When the calibration is complete, the button returns to normal.

At the end of successful calibration, the buttons on the RECEIVER SETUP menu are enabled.

- [“RECEIVER SETUP Menu – 4-Port VNAs” on page 6-64](#)

Figure 6-37. RECEIVER CAL (RECEIVER CALIBRATION) Menu – 4-Port VNAs

SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

Full Name

Save Receiver Calibration .rcvr File

Previous

- [“RECEIVER SETUP Menu – 4-Port VNAs” on page 6-64](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Save Cal(s) | SAVE RCVR CAL (RECEIVER CALIBRATION .rcvr FILE) Dialog Box

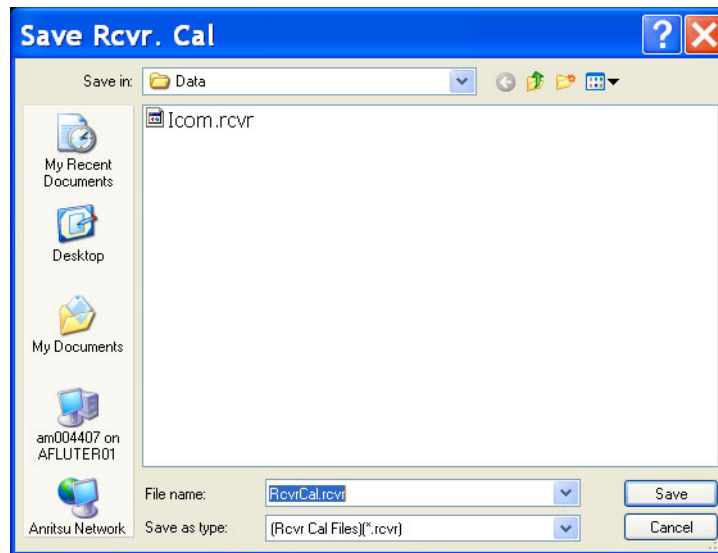


Figure 6-38. SAVE RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box – 4-Port VNAs

Overview

Use the dialog box to navigate to the desired location, enter a unique RCVR file name, and click **Save** to save. Click **Cancel** to exit the dialog box. Allows the user to save a receiver calibration (.rcvr) file.

Instructions

1. Navigate to the required location.
2. Click **Save**.
3. Click **Close** to return or **Cancel** to end recall session.

RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box

Full Name

Recall Receiver Calibration .rcvr File

Previous

- [“RECEIVER SETUP Menu – 4-Port VNAs” on page 6-64](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Recall Cal(s) | RECALL RCVR CAL Dialog Box

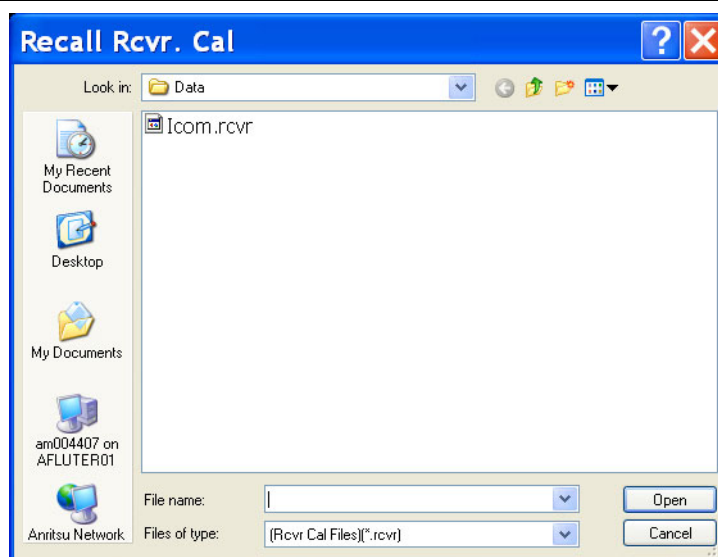


Figure 6-39. RECALL RCVR. CAL (RECEIVER CALIBRATION RCVR FILE) Dialog Box – 4-Port VNAs

Instructions

Use the Open dialog box to navigate to required directory and select the required RCVR file. Click Open to recall the RCVR file. Click Cancel to exit the dialog box.

RCVR UTILITIES Menu – 4-Port VNAs

Full Name

Receiver Utilities

Previous

- [“RECEIVER CAL Menu – 4-Port VNAs” on page 6-66](#)

Prerequisites

- The RCVR UTILITIES menu is available for all sweep types.

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Receiver Cal Utilities | RCVR UTILITIES

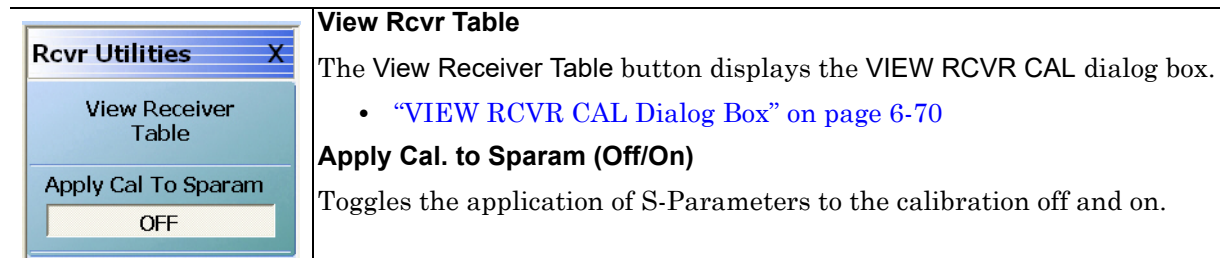


Figure 6-40. RCVR UTILITIES (RECEIVER UTILITIES) Menu – 4-Port VNAs

VIEW RCVR CAL Dialog Box

Full Name

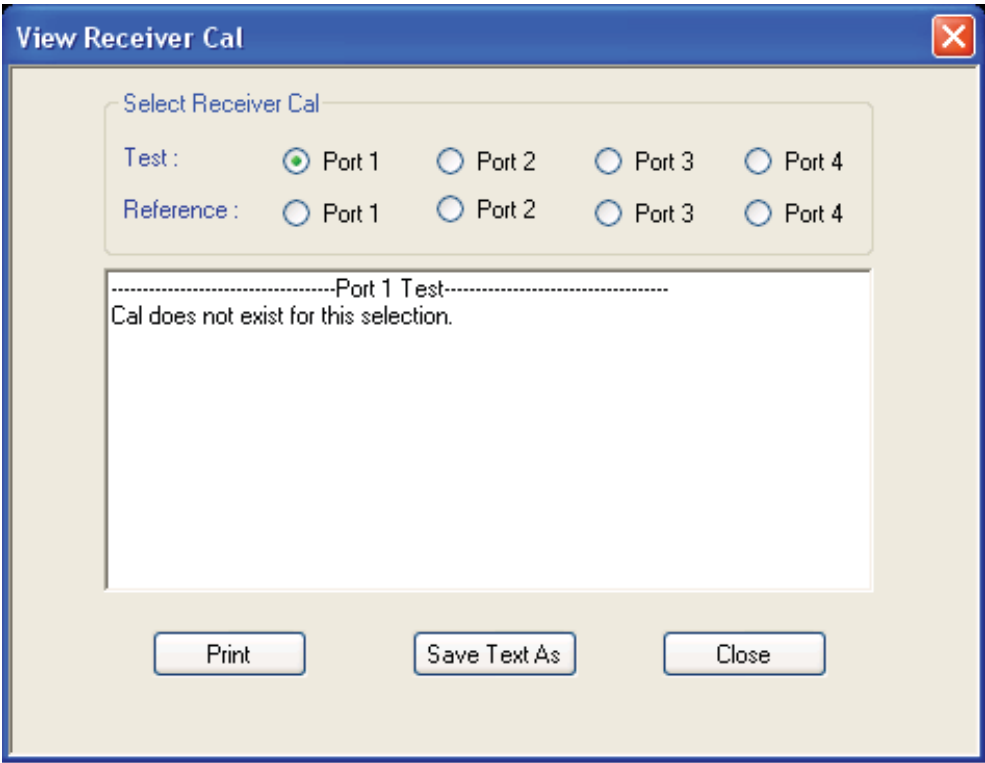
View Receiver Calibration

Previous

- [“RCVR UTILITIES Menu – 4-Port VNAs” on page 6-69](#)

Navigation

- MAIN | Power | POWER | Receiver Cal | RECEIVER SETUP | Receiver Cal Utilities | RCVR UTILITIES | View Receiver Table | VIEW RECEIVER CAL Dialog Box



Receiver Cal Test	Receiver Cal Reference
<ul style="list-style-type: none">• Port 1 Test• Port 2 Test• Port 3 Test• Port 4 Test	<ul style="list-style-type: none">• Port 1 Reference• Port 2 Reference• Port 3 Reference• Port 4 Reference

Figure 6-41. VIEW RECEIVER CAL Dialog Box – 4-Port VNAs

Instructions

Use the VIEW RECEIVER CAL dialog box to view the applicable Receiver Calibration report. Radio buttons allow selection of following types of calibration data. Only one (1) report can be viewed at a time.

- Port 1 Test and Port 1 Reference
- Port 2 Test and Port 2 Reference
- Port 3 Test and Port 3 Reference
- Port 4 Test and Port 4 Reference

Click Print to print; Save Text As to save results as an ASCII TXT file to the desired directory or USB memory device; or click Close to close the dialog box.

Information Fields

The information fields provided are:

- Calibration date and time
- Port number
- Frequency
- Power in dB
- Cal.Eff.Pwr (Calculated Effective Power) in dBm

Chapter 7 — Sweep Menus

7-1 Chapter Overview

This chapter provides information for controlling the instrument sweep types and their associated parameters. There are six (6) basic sweep types available: Frequency-based linear sweep, Frequency-based log sweep, Segmented frequency-based sweep, Segmented index-based sweep, Power sweep CW frequency, and Power sweep swept frequency. Configuration tableaus are provided for each segmented sweep allowing a specific set of frequencies or power levels to be assigned to an instrument setup. All sweep configurations can be saved or recalled individually and/or assigned to a user-defined preset setup configuration that can be recalled at any time. The sweep menus also configure the hold and trigger conditions available to each sweep type.

7-2 Overview of Sweep Menus

There are 17 sweep control menus and dialog boxes:

- “SWEEP SETUP Menu” on page 7-2
- “SWEEP TYPES Menu” on page 7-4
- “FREQ BASE SETUP Menu” on page 7-6
 - “SEGMENTED SWEEP DEFINITION Table” on page 7-8
 - “SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box” on page 7-10
 - “RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box” on page 7-11
 - “SEGMENTED SWEEP DEFINITION Table” on page 7-8
- “INDEX BASE SETUP Menu” on page 7-12
- “HOLD FUNCTIONS Menu” on page 7-14
- “HOLD CONDITIONS Frequency-Based Sweep Menu” on page 7-17
- “HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18
- “TRIGGER Menu” on page 7-19
- “TRIGGER SOURCE Source Menu” on page 7-21
- “MANUAL TRIGGER Menu” on page 7-22
- “EXT. TRIGGER Menu” on page 7-23
- “GPIB TRIGGER Menu” on page 7-25
 - “IF CALIBRATION Dialog Box” on page 7-26

7-3 Sweep Setup and Sweep Type Menus

SWEEP SETUP Menu

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP

	<p>Sweep Types</p> <p>Select displays the SWEEP TYPES menu for selection frequency sweep options. The display field in the Sweep Types button displays the instrument sweep setting for the active channel. The possible field display values and their meanings are:</p> <ul style="list-style-type: none">• Freq Sweep (Linear) – Frequency-Based Sweep – Linear• Freq Sweep (Log) – Frequency-Based Sweep – Log• Segmented (Freq) – Frequency-Based Segmented Sweep• Segmented (Index) – Index-Based Segmented Sweep• Power (CW Freq) – Power Sweep CW-Frequency• Power (Swept Freq) – Power Sweep Swept-Frequency• “SWEEP TYPES Menu” on page 7-4 <p>Freq-Based Seg Sweep Setup</p> <p>The Frequency-Based Segmented Sweep Setup button displays the FREQ BASE SETUP menu and opens the FREQ DEF for F1 & F2 tableau area below the main display area.</p> <ul style="list-style-type: none">• “FREQ BASE SETUP Menu” on page 7-6 <p>Index-Based Seg Sweep Setup</p> <p>The Index-Based Segmented Sweep Setup button displays the INDEX BASE SETUP menu and opens the FREQ DEF for F1 & F2 table area below the main display area.</p> <ul style="list-style-type: none">• “INDEX BASE SETUP Menu” on page 7-12 <p>Hold Functions</p> <p>Select displays the HOLD FUNCTIONS menu.</p> <ul style="list-style-type: none">• “HOLD FUNCTIONS Menu” on page 7-14 <p>Trigger</p> <p>Select displays the TRIGGER menu.</p> <ul style="list-style-type: none">• “TRIGGER Menu” on page 7-19
---	---

Figure 7-1. SWEEP SETUP Menu (1 of 2)

	<div><div>Enable Sweep Time (On/Off)</div><div>The toggle button enables or disables the sweep time configuration capability. If OFF, the Sweep Time Setup button below is unavailable. If ON, the Sweep Time Setup button is available.</div><div>This button is disabled when IMDView is ON.</div><div>Sweep Time Setup</div><div>Select displays the SWP TIME SETUP menu where sweep time functions of mode, time, display, and delay are configured.</div><div>This button is disabled when IMDView is ON.</div><div><ul style="list-style-type: none">• “SWP TIME SETUP” on page 7-27</div><div>RF Retrace (On/Off)</div><div>Select toggles the RF retrace function on and off.</div></div>
--	--

Figure 7-1. SWEEP SETUP Menu (2 of 2)

SWEEP TYPES Menu

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- [MAIN](#) | [Sweep Setup](#) | [SWEEP SETUP](#) | [Sweep Types](#) | [SWEEP TYPES](#)

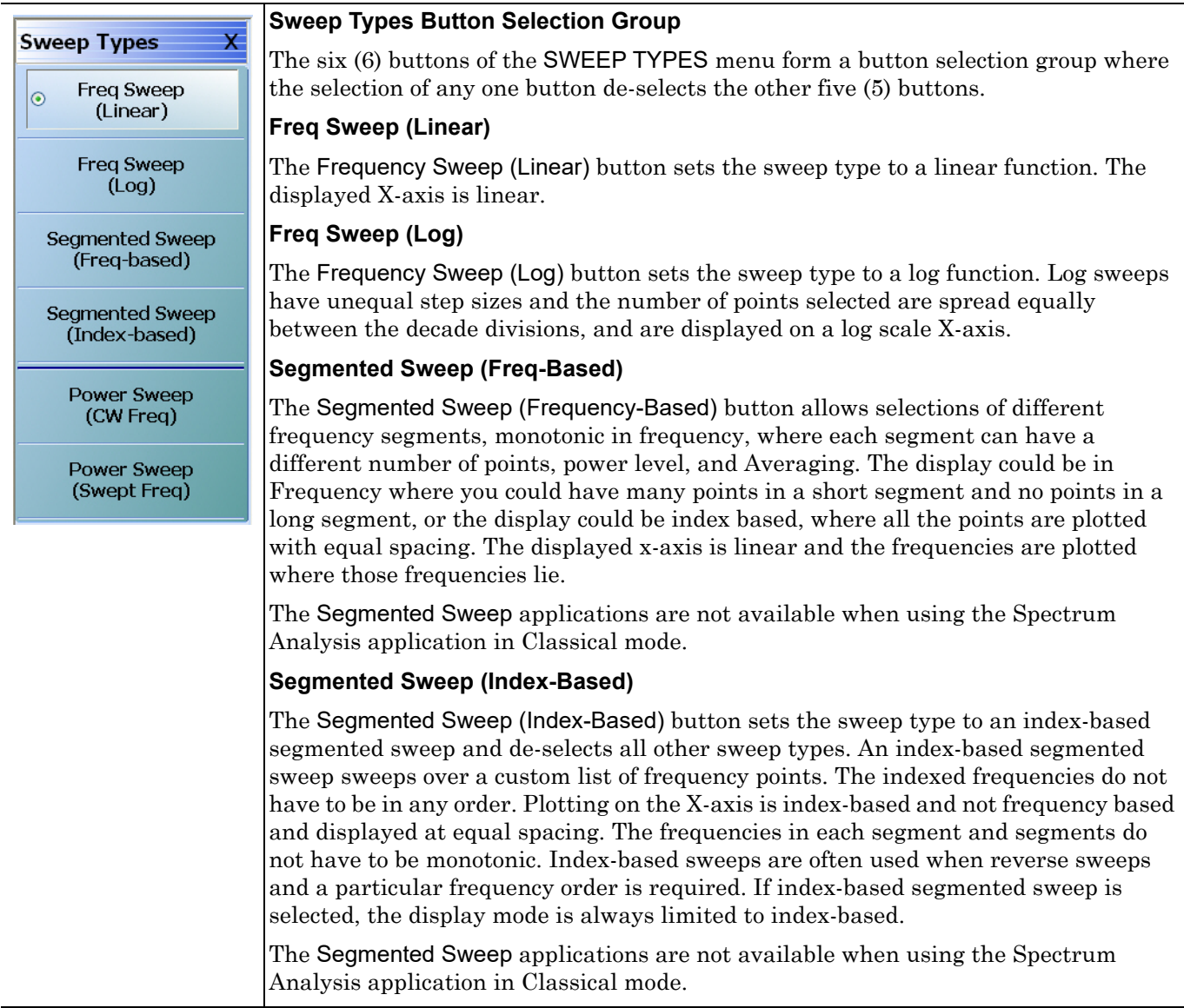


Figure 7-2. SWEEP TYPES Menu (1 of 2)

Power Sweep (CW Freq)

The Power Sweep (CW) application is not available when using the Spectrum Analysis application.

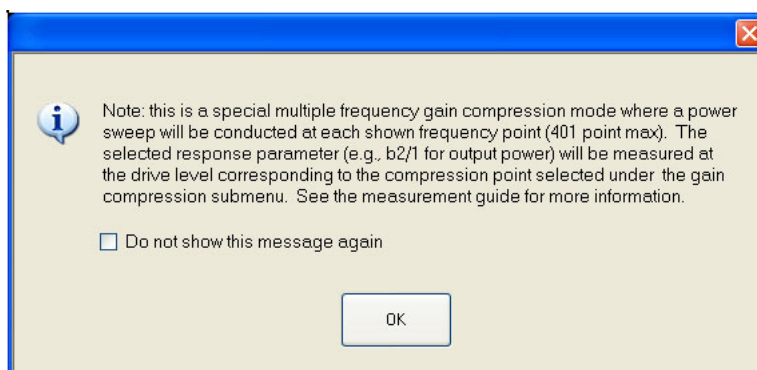
The Power Sweep (CW Freq) button selects the power sweep mode and de-selects all other sweep types. In this mode, a CW Frequency is set on the FREQUENCY menu and power is swept linearly on the X-axis, based on the number of points.

- [“FREQUENCY Power Sweep CW-Based Menu” on page 4-10](#)
- MAIN | Frequency | FREQUENCY

Power Sweep (Swept Freq)

The Power Sweep (Swept) application is not available when using the Spectrum Analysis application.

The Power Sweep (Swept Freq) button sets the sweep to power sweep (swept frequencies) and de-selects all other sweep types. If selected, a notification dialog box appears.



Click OK to clear the dialog box. Select the Do Not Show Again check box and then click OK to prevent the dialog box from appearing again.

- [“FREQUENCY Power Sweep Swept Freq Menu” on page 4-11](#)
- MAIN | Frequency | FREQUENCY

Figure 7-2. SWEEP TYPES Menu (2 of 2)

7-4 Segmented Frequency-Based Sweep Setup

FREQ BASE SETUP Menu

Full Name

Frequency-based Segmented Sweep Setup

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP

Freq Base Setup X

Graph Mode

Freq Base

Display IFBW

ON

Display Power

ON

Display Averaging

ON

Add

Delete

Clear All Segments

Save Table to File

Recall Table from File

Segmented Frequency Table Display

When the FREQ BASE SETUP menu appears, the SEGMENTED SWEEP DEFINITION TABLE display dialog appears at the bottom of the main display area. The table display, described below, allows the configuration of frequency segments for sweep management.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Graph Mode (Freq Base/Index Base)

The Graph Mode toggle button toggles the graph mode between Freq Base and Index Base. When Freq Base is selected, the display status bar shows Freq Base.

Display IFBW (Off/On)

Select toggles the IFBW column off and on. If on, the IFBW field is added to the Freq Def. for F1 & F2 table header in the SEGMENTED SWEEP DEFINITION table below.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Display Power (Off/On)

Select toggles the Power column display off and on. If on, the P1 Src. Pwr (Src. Atten - 0 dB) and P2 Src. Pwr (Src. Atten - 0 dB) columns are added to the Freq Def. for F1 & F2 table header in the SEGMENTED SWEEP DEFINITION table below.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Display Averaging (Off/On)

Select toggles the Averaging column display off and on. If on, the Averaging field is added to the Freq Def. for F1 & F2 table header in the SEGMENTED SWEEP DEFINITION table below.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Add (Freq-Based Segment)

The Add button adds a row for a new segment to the Freq Def. for F1 & F2 table information below the currently selected segment.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Delete (Freq-Based Segment)

The Delete button deletes the currently selected row/segment from the Freq Def. for F1 & F2 table information.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Figure 7-3. FREQ BASE SETUP (FREQUENCY-BASED SEGMENTED SWEEP SETUP) Menu (1 of 2)

	<div><div>Clear All Segments (Freq-Based Segment)</div><div>The Clear All Segments clears all rows except for Row 1 from the Freq Def. for F1 & F2 table information.<ul style="list-style-type: none">• “SEGMENTED SWEEP DEFINITION Table” on page 7-8</div><div><div>Save Table to File (Freq-Based Segment)</div><div>The Save Table to File button saves the table data to a Segment Sweep .sgs file. Select displays the Save Segmented Sweep Table (SGS File) dialog box.<ul style="list-style-type: none">• “SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box” on page 7-10</div><div><div>Recall Table from File (Freq-Based Segment)</div><div>The Recall Table from File button recalls table data from a Segment Sweep .sgs file. Select displays the Recall Segmented Sweep Table (Sweep SGS File) dialog box.<ul style="list-style-type: none">• “RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box” on page 7-11</div></div></div></div>
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Figure 7-3. FREQ BASE SETUP (FREQUENCY-BASED SEGMENTED SWEEP SETUP) Menu (2 of 2)

SEGMENTED SWEEP DEFINITION Table

Previous

- [“FREQ BASE SETUP Menu” on page 7-6](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP

Overview

The Freq Def. for F1 and F2 (Segmented Sweep Definition) table information appears below the display area. The number of rows and columns displayed depend on the button settings in the Freq Base Setup menu. The default settings display the following column fields: IFBW, P1 source power, P2 source power, and Per Point Averaging.

Default Appearance

This is table display with all fields showing.

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	P1 Src Pwr (Src Atten = 0 dB)	P2 Src Pwr (Src Atten = 0 dB)	P3 Src Pwr (Src Atten = 0 dB)	P4 Src Pwr (Src Atten = 0 dB)	Per Point Averaging
▶ 1	☒	Start & Stop	70 kHz	10 GHz	2	9.99993 GHz	100 kHz	-10	-10	-10	-10	1

Freq Def. for F1 & F2 Column, Sweep Segment Options Drop-down Menu

The Freq Def. for F1 & F2 drop-down menu allows each segment to be set as either a Stop & Start, Start & Step Size, or CW (F2 not used).

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	P1 Src Pwr (Src Atten = 0 dB)	P2 Src Pwr (Src Atten = 0 dB)	P3 Src Pwr (Src Atten = 0 dB)	P4 Src Pwr (Src Atten = 0 dB)	Per Point Averaging
↵ 1	☒	Start & Stop	70 kHz	70.001 kHz	2	1 Hz	100 kHz	-10	-10	-10	-10	1
		Start & Stop										
		Start & Step Size										
		CW (F2 not used)										

Display IFBW Column, Toggle Off/On

The Display IFBW button on the Freq Base Setup menu causes the IFBW column to disappear and appear.

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	P1 Src Pwr (Src Atten = 0 dB)	P2 Src Pwr (Src Atten = 0 dB)	P3 Src Pwr (Src Atten = 0 dB)	P4 Src Pwr (Src Atten = 0 dB)	Per Point Averaging
▶ 1	☒	CW (F2 not used)	70 kHz		1	0 kHz		-10	-10	-10	-10	1

Display Power Column, Toggle Off/On

The Display Power button on the Freq Base Setup menu causes the Power columns to disappear and appear.

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	Per Point Averaging
▶ 1	☒	CW (F2 not used)	70 kHz		1	0 kHz	100 kHz	1

Display Averaging, Toggle Off/On

The Display Averaging button on the Freq Base Setup menu causes the Per Point Averaging column to disappear and appear.

	Seg. On	Freq Def. for F1 & F2	F1	F2	# of Pts	Step/Stop Freq	IFBW	P1 Src Pwr (Src Atten = 0 dB)	P2 Src Pwr (Src Atten = 0 dB)	P3 Src Pwr (Src Atten = 0 dB)	P4 Src Pwr (Src Atten = 0 dB)
▶ 1	☒	Start & Stop	70 kHz	10 GHz	15	714.2807142857...	100 kHz	-10	-10	-10	-10

Adding Rows

Selecting the **Add** button on the **Freq Base Setup** menu adds a row to the tableau so that another frequency segment can be added.

	Seg On	Freq Def. for F1 & F2	F1	F2	Num Pts	Step/ Stop Freq
▶ 1	☒	Start & Stop	70 kHz	10 GHz	15	714280714.2...
2	☒	Start & Stop	10.000000000...	10.000000000...	2	1

To add additional rows, repeat selecting the **Add** button. Note that the currently selected and editable row is indicated by the left arrow, as shown in **Row 3** below.

	Seg On	Freq Def. for F1 & F2	F1	F2	Num Pts	Step/ Stop Freq
1	☒	Start & Stop	70 kHz	10 GHz	15	714280714.2...
2	☒	Start & StepSize	10.000000000...	1	2	10.000000000...
▶ 3	☒	CW (F2 not used)	100000000003		1	0

Deleting Rows

Select a row to delete it. A selected row is indicated by the right-facing arrow icon as shown for **Row 2** below:

	Seg On	Freq Def. for F1 & F2	F1	F2	Num Pts	Step/ Stop Freq
1	☒	Start & Stop	70 kHz	10 GHz	15	714280714.2...
▶ 2	☒	Start & StepSize	10.000000000...	1	2	10.000000000...
3	☒	CW (F2 not used)	100000000003		1	0

Click the **Delete** button on the **Freq Base Setup** menu to delete the row:

	Seg On	Freq Def. for F1 & F2	F1	F2	Num Pts	Step/ Stop Freq
▶ 1	☒	Start & Stop	70 kHz	10 GHz	15	714280714.2...
2	☒	CW (F2 not used)	100000000003		1	0

Click the **Clear All Seg.** button on the **Freq Base Setup** menu to clear all rows.

SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box

Previous

- [“FREQ BASE SETUP Menu” on page 7-6](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP | Save Table to File | SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box

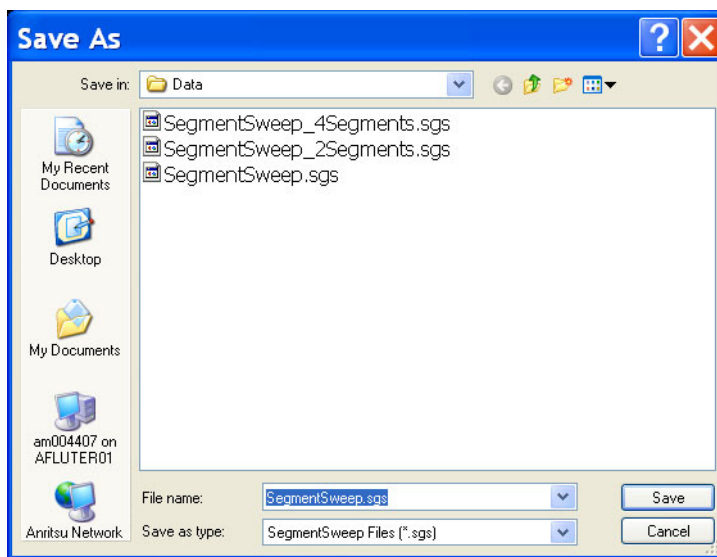


Figure 7-4. SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box

Instructions

Navigate to required location, enter unique file name, and click **Save**. Click **Cancel** to return to the Freq Base Setup menu.

RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box

Previous

- [“FREQ BASE SETUP Menu” on page 7-6](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Freq-Based Seg Sweep Setup | FREQ BASE SETUP | Save Table to File | RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box

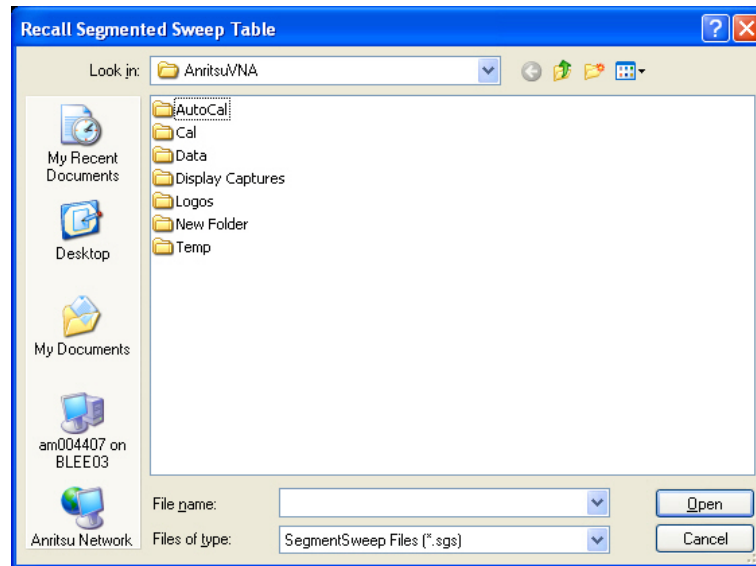


Figure 7-5. RECALL (SEGMENTED SWEEP TABLE SGS FILE) Dialog Box

Instructions

Navigate to required location, select the required SGS file, and click Open. Click Cancel to return to the Freq Base Setup menu.

7-5 Segmented Index-Based Sweep Setup

INDEX BASE SETUP Menu

Full Name

Indexed-based Sweep Setup

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Index-Based Seg Sweep Setup | INDEX BASE SETUP

Index Base Setup X

Display IFBW

OFF

Display Power

OFF

Display Averaging

ON

Add

Delete

Clear All Seg.

Save Table to File

Recall Table from File

Segmented Frequency Table Display

When the Index Base Setup menu appears, the Segmented Frequency Table Display tableau dialog appears at the bottom of the main display area. The tableau display allows the configuration of frequency segments for sweep management.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Display IFBW (Off/On)

In the tableau display, select toggles the IFBW column display off and on. If on, the IFBW column field is added to the Freq Def. for F1 & F2 table header.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Display Power (Off/On)

In the tableau display, select toggles the P1 Src. Pwr (Src. Atten = XX dB) and P2 Src. Pwr (Src. Atten = XX dB) column fields off and on.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Display Averaging (Off/On)

In the tableau display, select toggles the Averaging column display off and on. If on, an Averaging column field is added to the Freq Def. for F1 & F2 table header.

- [“SEGMENTED SWEEP DEFINITION Table” on page 7-8](#)

Figure 7-6. INDEX BASE SETUP (INDEX-BASED SEGMENTED SWEEP SETUP) Menu (1 of 2)

	<p>Add (Index-Based Segment)</p> <p>In the tableau area, select adds a row to the Freq Def. for F1 & F2 table information.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Delete (Index-Based Segment)</p> <p>In the tableau area, select a row so the Right Arrow icon appears. Click Delete to remove the row from the Freq Def. for F1 & F2 table information.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Clear All Seg. (Index-Based Segment)</p> <p>In the tableau area, select the Clear All Segments button to clear all rows except for Row 1 from the Freq Def. for F1 & F2 table information.</p> <ul style="list-style-type: none"> • “SEGMENTED SWEEP DEFINITION Table” on page 7-8 <p>Save Table to File (Index-Based Segment)</p> <p>Select displays the Save Segmented Sweep Table (SGS File) dialog box to save the segment table data as a Segment Sweep SGS file.</p> <ul style="list-style-type: none"> • “SAVE AS (SEGMENT SWEEP TABLE SGS FILE) Dialog Box” on page 7-10 <p>Recall Table from File (Index-Based Segment)</p> <p>Select displays the Recall Segmented Sweep Table (SGS) dialog box to recall table data from a previously stored Segment Sweep SGS file.</p> <ul style="list-style-type: none"> • “RECALL SEGMENTED SWEEP TABLE SGS FILE Dialog Box” on page 7-11
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Figure 7-6. INDEX BASE SETUP (INDEX-BASED SEGMENTED SWEEP SETUP) Menu (2 of 2)

7-6 Sweep Hold and Trigger Functions

HOLD FUNCTIONS Menu

Previous

- [SWEEP SETUP Menu](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Hold Functions | HOLD FUNCTIONS

Hold Functions X

Hold

Continue

Single Sweep & Hold

Restart Sweep

Hold All Channels

Continuous All Channels

Single Sweep & Hold All Channels

Restart All Channels

Hold Conditions ▶

HOLD FUNCTIONS Menu – Per-Channel Button Selection Group

The top four (4) buttons of the HOLD FUNCTIONS menu provide hold control for the active trace.

The Hold, Continue, Single Sweep & Hold, and Restart Sweep buttons form a four (4) button selection group where the selection of any one button de-selects the other three (3) buttons on a per channel basis.

Hold

For the active channel, the Hold button pauses the display and stops the channel signal processing. Also, if the Hold All Channels button (described below) is selected, this Hold button is selected.

Continue

For the active channel, the Continue button starts signal processing and resumes the active channel display. Also, if the Continuous All Channels button (described below) is selected, this Continue button is selected.

Single Sweep & Hold

For the active channel, the Single Sweep & Hold button performs a single sweep signal processing, and then holds the display, stops signal processing, and returns the button selection to the Hold button.

Restart Sweep

For the active channel only, the Restart Sweep button restarts signal processing, resumes the active channel display, and then selects the Continue button. To restart sweeps on all channels, use the Restart All Channels button described below.

Figure 7-7. HOLD FUNCTIONS Menu (1 of 2)

	<p>HOLD FUNCTIONS Menu – Per-System Button Selection Group</p> <p>The second set of four (4) buttons of the HOLD FUNCTIONS menu provide hold control for instrument on a per-system basis.</p> <p>The Hold All Channels, Continuous All Channels, Single Sweep & Hold All Channels, and Restart All Channels buttons form a four (4) button selection group where the selection of any one button de-selects the other three (3) buttons on a per-system basis.</p> <p>Hold All Channels</p> <p>For all channels, the Hold All Channels button stops signal processing, holds the display, and then selects the Hold button (above).</p> <p>Continuous All Channels</p> <p>For all channels, the Continuous All Channels button starts signal processing, resumes the display on all channels, and then selects the Continue button (above).</p> <p>Single Sweep & Hold All Channels</p> <p>For all channels, the Single Sweep & Hold All Channels button performs a single sweep signal processing, and then stops signal processing, holds the display, momentarily selects the Single Sweep & Hold button, and then selects the Hold button (above).</p> <p>Restart All Channels</p> <p>For all channels, the Restart All Channels button restarts signal processing, resumes the active channel display, and then selects the Continue button. To restart only the active channel, use the Restart Sweep button described above.</p> <p>Hold Conditions</p> <p>Select displays the HOLD CONDITIONS menu where toggle settings for Bias Tee, RF, and DUT Protection are available.</p> <ul style="list-style-type: none">• “HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18
--	---

Figure 7-7. HOLD FUNCTIONS Menu (2 of 2)

HOLD CONDITIONS Menu Variants

The HOLD CONDITIONS menu appearance varies as a 3- or 4-button version depending on the sweep type settings. The prerequisites for each variant is described below with a link to a full description of each menu.

HOLD CONDITIONS Frequency-Based Sweep Menu

If the HOLD CONDITIONS menu has three (3) buttons of Bias Tee, RF, and DUT Protection, Sweep Type is set to one of the following:

- Freq Sweep (Linear)
- Freq Sweep (Log)
- Segmented Sweep (Freq-based)
- Segmented Sweep (Index-based)

Menu Description

- [“HOLD CONDITIONS Frequency-Based Sweep Menu” on page 7-17](#)

Prerequisites

- The sweep type is set on the SWEEP TYPES menu:
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

HOLD CONDITIONS Power-Based Sweep Menu

If the HOLD CONDITIONS menu has four (4) buttons of Bias Tee, RF, DUT Protection, and Hold Power, Sweep Type is set to one of the following:

- Power Sweep (CW Freq)
- Power Sweep (Swept Freq)

Menu Description:

- [“HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18](#)

Prerequisites

- The sweep type is set on the SWEEP TYPES menu:
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Related Menus

Use the links and navigation below to change the prerequisites for the HOLD CONDITIONS menus.

SWEEP SETUP Menu

- [“SWEEP SETUP Menu” on page 7-2](#)
- MAIN | Sweep Setup | SWEEP SETUP

SWEEP TYPES Menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

DISPLAY Menu

- [“Display Menus” on page 27-1](#)
- MAIN | Display | DISPLAY

HOLD CONDITIONS Frequency-Based Sweep Menu

Menu Identification and Variants

- The appearance and button availability of the HOLD CONDITIONS menu depends on settings on the SWEEP TYPE menu.
- Consult the section above for menu identification and prerequisites.
- [“HOLD CONDITIONS Menu Variants” on page 7-16](#)

Previous

- [HOLD FUNCTIONS Menu](#)

Prerequisites

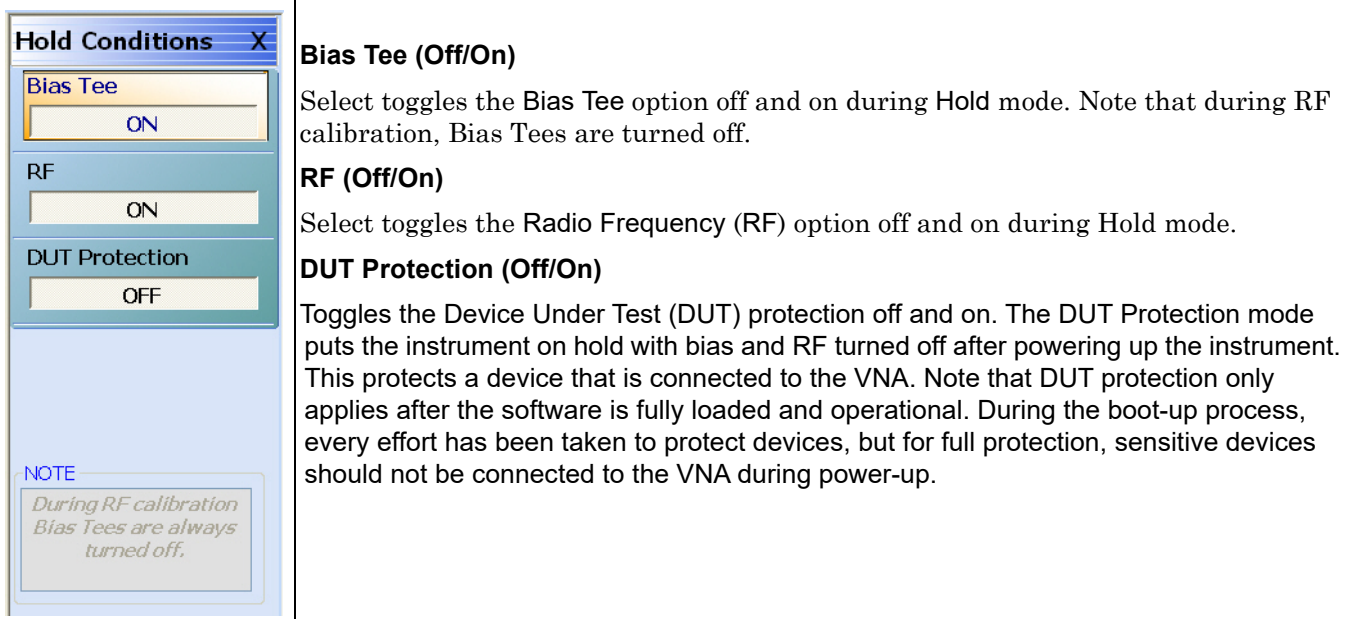
- The number of buttons on the HOLD CONDITIONS menu depends on the Sweep Type.
- If the HOLD CONDITIONS menu (described in the immediately below) has three (3) buttons, Sweep Type is set to one of the following:
 - Freq Sweep (Linear)
 - Freq Sweep (Log)
 - Segmented Sweep (Freq-based)
 - Segmented Sweep (Index-based)
- If the HOLD CONDITIONS menu has four (4) buttons, Sweep Type is set to:
 - Power Sweep (CW Freq)
 - Power Sweep (Swept Freq)
 - [“HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18](#)

SWEEP TYPES menu

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Hold Functions | HOLD FUNCTIONS | Hold Conditions | HOLD CONDITIONS Freq-Based Sweep



Bias Tee (Off/On)

Select toggles the Bias Tee option off and on during Hold mode. Note that during RF calibration, Bias Tees are turned off.

RF (Off/On)

Select toggles the Radio Frequency (RF) option off and on during Hold mode.

DUT Protection (Off/On)

Toggles the Device Under Test (DUT) protection off and on. The DUT Protection mode puts the instrument on hold with bias and RF turned off after powering up the instrument. This protects a device that is connected to the VNA. Note that DUT protection only applies after the software is fully loaded and operational. During the boot-up process, every effort has been taken to protect devices, but for full protection, sensitive devices should not be connected to the VNA during power-up.

Figure 7-8. HOLD CONDITIONS Frequency-Based Sweep Menu

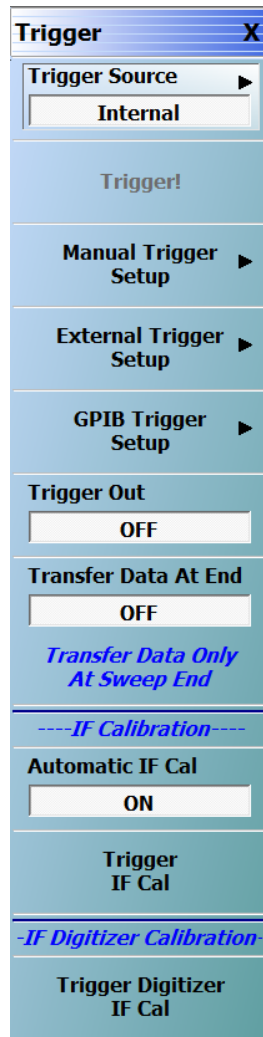
TRIGGER Menu

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER



TRIGGER Menu Button Availability

The availability of the Trigger! button depends on the setting of Trigger Source. If Trigger Source is set to Internal, External, or GPIB, the button is unavailable.

Trigger Source

Select displays the Trigger Source menu which allows trigger source choices of Internal, Manual, External, or GPIB. The configuration and settings for each trigger source type are defined by the buttons below.

- [“TRIGGER SOURCE Source Menu” on page 7-21](#)

Trigger!

The Trigger button manually triggers the measurement. Trigger Source (above) must be set to manual.

Manual Trigger Setup

Select displays the MANUAL TRIGGER menu and sets what measurement will be made when the trigger is manually selected. Measurement options can be based per-point, per-sweep (or per-port), per-channel, or for all channels.

- [“MANUAL TRIGGER Menu” on page 7-22](#)

External Trigger Setup

External trigger mode allows a rear panel input to start a measurement based per-point, per-sweep (or per-port), per-channel, or for all channels with configuration options between the external triggering device and the instrument. Select displays the EXT TRIGGER menu.

- [“EXT. TRIGGER Menu” on page 7-23](#)

GPIB Trigger Setup

The GPIB trigger mode allows a GPIB trigger command to start a measurement based per-point, per-sweep (or per-port), per-channel, or for all channels. Select displays the GPIB TRIGGER menu.

- [“GPIB TRIGGER Menu” on page 7-25](#)

Trigger Out (Off/On)

Select toggles the Trigger Out mode off and on.

Note: Trigger Out functionality is enabled or disabled under the conditions and application usage indicated in [Table 7-1 on page 7-20](#).

This toggle allows the user to have Trigger Out functionality for internal and manual trigger modes (in external triggering, the handshake control enables this trigger out feature). For example, if the user toggles Trigger Out to On while in internal triggering mode, the VectorStar will control measurement timing with its internal trigger and the trigger out BNC connector will become active. A positive going pulse will appear at this connector at the time of the measurement (with some finite latency) at each point.

Figure 7-10. TRIGGER Menu (1 of 2)

	Transfer Data At End (Off/On)
	Select toggles feature On/Off. When toggled ON, the transfer of data is prohibited until end of sweep to minimize point to point triggering time. This feature is useful for optimizing speed in a rapid triggering environment.
	Automatic IF Cal (Off/On)
	Select toggles the Automatic Intermediate Frequency Calibration (Automatic IF Cal) calibration mode off and on.
	Trigger IF Cal
	The Trigger IF Cal button starts the IF calibration and displays the IF CALIBRATION dialog box with a completion progress bar.
	“IF CALIBRATION Dialog Box” on page 7-26

Figure 7-10. TRIGGER Menu (2 of 2)

Table 7-1. Trigger Out Blocking

Trigger Src	Internal				Manual				GPIB				External			
Manual Trig Setup/ Applic.	All Ch	One Ch	One Swp	One Pt	All Ch	One Ch	One Swp	One Pt	All Ch	One Ch	One Swp	One Pt	All Ch	One Ch	One Swp	One Pt
PIP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CPIP (Time)	Y	Y	Y	Y	Y	Y	Y	Z	Y	Y	Y	Z	Y	Y	Y	Y
CPIP (Sync)	X	X	X	X	X	X	X	Z	X	X	X	Z	X	X	X	X
Prof																
CProf (Time)	Y	Y	Y	Y	Y	Y	Y	Z	Y	Y	Y	Z	Y	Y	Y	Y
CProf (Sync)	X	X	X	X	X	X	X	Z	X	X	X	Z	X	X	X	X
P2P																
TMS																
IMD																
TR	Y	Y	Y	Y									Y	Y	Y	Y
NF	Y	Y	Y	Y									Y	Y	Y	Y

Legend:

Z = Trigger Out is ON and disabled, Trigger Per Point is disabled

Y = Trigger Out is enabled, Trigger Per Point is enabled

Blank = Trigger Out is OFF and disabled, Trigger Per Point is enabled

X = Trigger Out is ON and disabled, Trigger Per Point is enabled

TRIGGER SOURCE Source Menu

Previous

- [“TRIGGER Menu” on page 7-19](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | Trigger Source | TRIGGER SOURCE

Trigger Source X

Internal

☒ Manual

External

GPIB

TRIGGER SOURCE Menu Auto-Return Button Selection Group

In the TRIGGER SOURCE menu, the Automatic Internal, Manual Internal, External, and GPIB buttons are members of a four (4) button selection group. Selection of any one button de-selects the other three buttons and automatically returns to the TRIGGER menu.

Internal (Trigger Source)

Select sets triggering to be automatically created within the instrument. Internal triggering mode is an automatically triggered point-by-point measurement that is controlled by the instrument internal software.

Manual (Trigger Source)

Select sets triggering to be manually triggered by the user. The default setting is on a per-channel basis. The maximum setting is for all channels.

External (Trigger Source)

Select sets triggering to be created externally by another instrument and sensed through an external port/connector.

GPIB (Trigger Source)

Select sets triggering to be through an external General Purpose Interface Bus (GPIB) device and communicated to the instrument via a GPIB network.

Figure 7-11. TRIGGER SOURCE Menu

MANUAL TRIGGER Menu

Manual trigger mode is triggered by the user from the TRIGGER menu to start a measurement based per-point, per-sweep (or port), per-channel, or for all channels.

Previous

- [“TRIGGER Menu” on page 7-19](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | Manual Trigger Setup | MANUAL TRIGGER

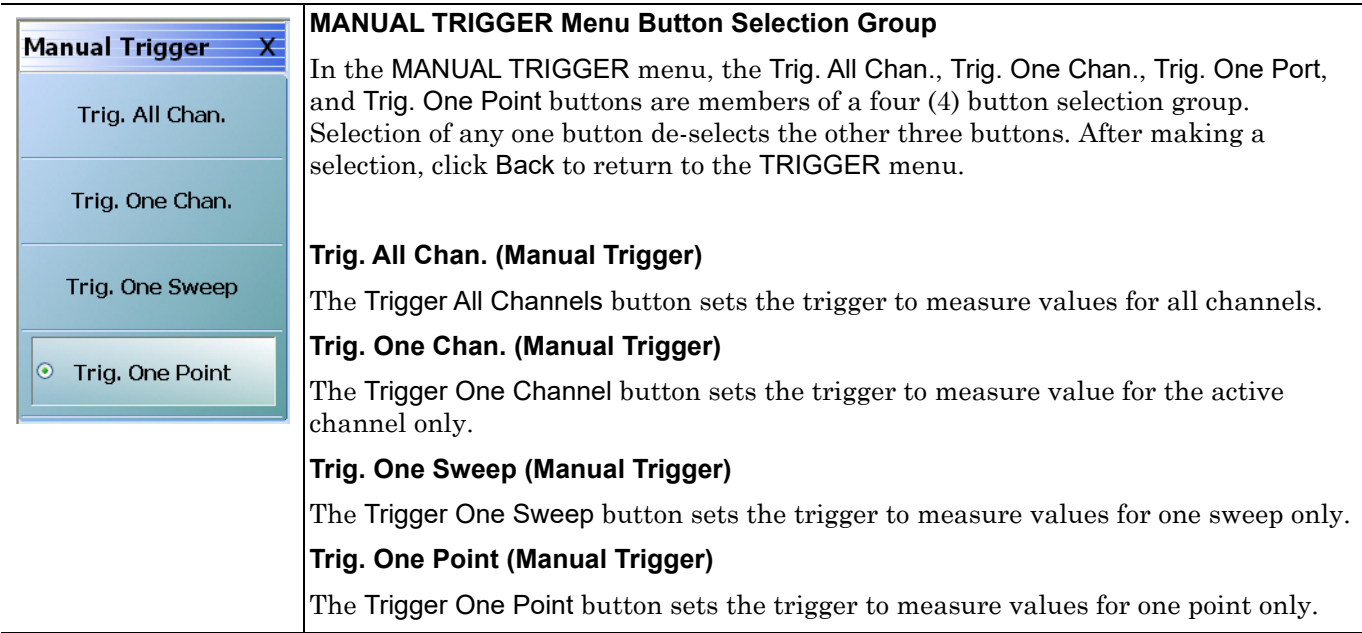


Figure 7-12. MANUAL TRIGGER Menu

EXT. TRIGGER Menu

External trigger mode allows a rear panel input to start a measurement based per-point, per-sweep (or per-port), per-channel, or for all channels. The EXT. TRIGGER menu configuration options allow for selection of either a positive or negative signal edge, a trigger delay, and signal handshaking between the external triggering device and the instrument.

Full Name

External Trigger

Previous

- “TRIGGER Menu” on page 7-19

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | External Trigger Setup | EXT. TRIGGER

Ext. Trigger X

Trig. All Chan.

☒ Trig. One Chan.

Trig. One Sweep

Trig. One Point

Trigger Delay

0 s

Trigger On

Positive Edge

Trigger Handshake

OFF

EXT. TRIGGER Menu Button Selection Group

In the Ext. Trigger menu, the Trig. All Chan., Trig. One Chan., Trig. One Port, and Trig. One Point buttons are members of a four (4) button selection group where selection of any one button de-selects the other three.

Trig. All Chan. (External Trigger)

The Trigger All Channels button sets the external trigger to measure values for all channels.

Trig. One Chan. (External Trigger)

The Trigger One Channel button sets the external trigger to measure values for one channel only.

Trig. One Sweep (External Trigger)

The Trigger One Sweep button sets the external trigger to measure values for one sweep only.

Trig. One Point (External Trigger)

The Trigger One Point sets the external trigger to measure values for one point only.

Trigger Delay (Time) (External Trigger)

Trigger delay sets the time interval between when the instrument received the trigger signal and when the triggered measurement starts.

Select displays the Trigger Delay field toolbar and allows the user to enter a trigger delay time in units of seconds (s), milliseconds (ms), microseconds (us), or nanoseconds (ns).

Trigger Delay : 0.0000 s ^ v s ms us ns X

Figure 7-13. EXT. TRIGGER (EXTERNAL TRIGGER) Menu (1 of 2)

	<div><div>Trigger On (Positive Edge/Negative Edge) (External Trigger)</div><div>Select toggles the triggering point to be on either the positive edge or negative edge of the triggering signal. The default value is positive edge.</div><div>Trigger Handshake (Off/On) (External Trigger)</div><div>If triggering handshaking is on, the instrument provides a Ready for Trigger and an Output Trigger signal from the rear panel.</div><div><ul style="list-style-type: none">The instrument sends a Ready for Trigger signal to specify if the instrument is ready or not to receive a triggering signal.The instrument sends an Output Trigger signal when the triggered measurement is complete.</div><div>Select toggles whether the trigger handshake is off or on. The default value is OFF.</div></div>
--	---

Figure 7-13. EXT. TRIGGER (EXTERNAL TRIGGER) Menu (2 of 2)

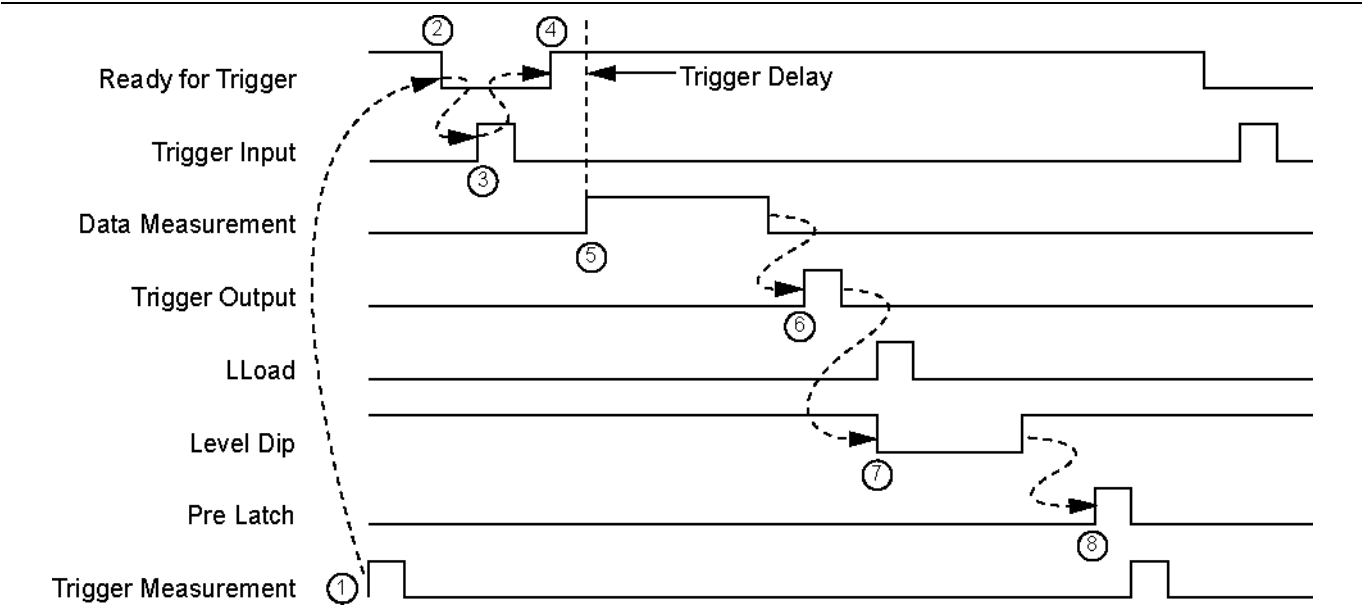


Figure 7-14. External Trigger Timing Diagram

GPIB TRIGGER Menu

Previous

- “TRIGGER Menu” on page 7-19

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | GPIB Trigger Setup | GPIB TRIGGER

GPIB Trigger
X

☒ Trig. All Chan.

☐ Trig. One Chan.

☐ Trig. One Sweep

☐ Trig. One Point

GPIB TRIGGER Menu Button Group

The four (4) buttons below are members of a button selection group where the selection of any one button de-selects the other three buttons:

- Trig. All Chan.
- Trig. One Chan.
- Trig. One Port
- Trig. One Point

Trig. All Chan. (GPIB Trigger)

The Trig. All Chan. button triggers a measurement for all channels.

Trig. One Chan. (GPIB Trigger)

The Trig. One Chan. button triggers a measurement for the active channel only.

Trig. One Sweep (GPIB Trigger)

The Trig. One Sweep button triggers a measurement for one sweep only.

Trig. One Point (GPIB Trigger)

The Trig. One Point button triggers a measurement for one point only.

Figure 7-15. GPIB TRIGGER Menu

IF CALIBRATION Dialog Box

Previous

- [“TRIGGER Menu” on page 7-19](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Trigger | TRIGGER | Trigger IF Cal | IF CALIBRATION Dialog Box

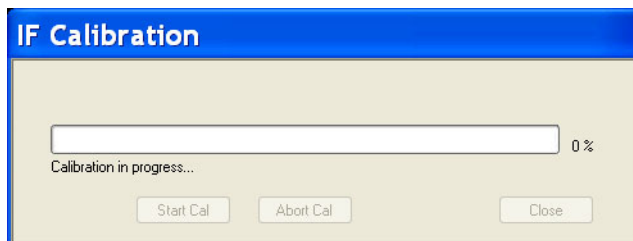


Figure 7-16. IF CALIBRATION Dialog Box

Instructions

Click Start Cal button to start; Abort Cal to end; Close to exit the dialog box.

SWP TIME SETUP

Full Name

Sweep Time Setup

Previous

- [“SWEEP SETUP Menu” on page 7-2](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Sweep Time Setup | SWP TIME SETUP

Swp Time Setup X

Sweep Time Mode

Manual

Sweep Time

0 s

Display Sweep Time

OFF

Sweep Delay Type

BeginningSwp

Sweep Delay

11 ms

Sweep Time Mode (Auto/Manual)

If toggled to Manual, the Sweep Time button is available. If toggled to Auto, the button is unavailable.

Sweep Time

The Sweep Time Mode must be set to Manual for the Sweep Time button to be available. Select displays the Sweep Time field toolbar. Note that the sweep delay time set here is also set on the SWEEP DELAY menu.

Sweep Time : 0.0000 s

^

v

s

ms

us

ns

ps

Display Sweep Time (On/Off)

Select toggles the display of the sweep time ON and OFF.

Sweep Delay Type

Select displays the SWEEP DELAY menu where the delay can be set as OFF, or as begin sweep, phase locked, or load pulse. In addition, the sweep delay time value can be set.

- [“SWEEP DELAY Menu” on page 7-28](#)

Sweep Delay (Time)

Select displays the Sweep Delay field toolbar where the delay can be set as s, ms, us, or ns.

Sweep Delay : 12.0000 us

^

v

s

ms

us

ns

X

Figure 7-17. SWP TIME SETUP (SWEEP TIME SETUP) Menu

MS4640B Series VNA UIRM

PN: 10410-00319 Rev: AE

7-27

SWEEP DELAY Menu

Previous

- [“SWP TIME SETUP” on page 7-27](#)

Navigation

- MAIN | Sweep Setup | SWEEP SETUP | Sweep Time Setup | SWP TIME SETUP | Sweep Delay Type | SWEEP DELAY

Sweep Delay X

Off

BeginSwp

Phase Locked

Load Pulse

Sweep Delay

11 ms

Auto-Return Button Group

The top four (4) buttons on the SWEEP DELAY menu form an auto-return button selection group. Selecting the either the Off, Begin Swp, Phase Locked, or Load Pulse button de-selects the other three (3) buttons and auto-returns to the SWP TIME SETUP menu.

The fifth button, Sweep Delay, displays the Sweep Delay field toolbar allowing input of sweep delays in units of seconds (s), milliseconds (ms), microseconds (us), and nanoseconds (ns).

Off

Select turns the sweep delay off and auto-returns to the SWP TIME SETUP menu. The sweep delay status of OFF is displayed in the Sweep Delay Type button.

Begin Swp

Select sets the sweep delay to Beginning Sweep and auto-returns to the SWP TIME SETUP menu. At the beginning of each sweep, the first point is phase locked, and then the user-defined delay time period occurs. After the delay time, the sweep is completed. On the SWP TIME SETUP menu, the Sweep Delay Type is shown as BeginningSwp.

Phase Locked

Select sets the sweep delay to Phase Locked and auto-returns to the SWP TIME SETUP menu. The sweep starts, the hardware phase locks at each frequency, and the user-defined delay time period occurs. The sweep continues until the sweep is completed. On the SWP TIME SETUP menu, the Sweep Delay Type is shown as PhaseLocked.

Load Pulse

Select sets the sweep to Load Pulse and auto-returns to the SWP TIME SETUP menu. The sweep starts, and while sweeping, the VNA digital signal processor sends a command to load the programming for the next frequency. At this point, the user-defined delay time period occurs. The sweep-load-delay cycle repeats for every point in the sweep.

Sweep Delay

Select displays the Sweep Delay field toolbar where the time delay can be set as s, ms, us, or ns. Note that the sweep delay time set here can also be set on the SWEEP DELAY menu.

Sweep Delay : 12.0000 us

^

v

s

ms

us

ns

X

After setting the sweep delay time, select the Back button to return to the SWP TIME SETUP menu.

Figure 7-18. SWEEP DELAY Menu

Chapter 8 — Averaging Menus

8-1 Chapter Overview

This chapter provides information for the AVERAGING menu and its functions. The menu controls the on/off status of averaging, the averaging factor, and whether the averaging type is per point or per sweep. Functions are also provided for IFBW and trace smoothing.

8-2 Overview of the Averaging Menu

There is one averaging menu:

- [“AVERAGING Menu” on page 8-2](#)

8-3 Averaging Menu Functions

AVERAGING Menu

Menu Variants

- Two variants of AVERAGING menus are available, determined by whether the sweep type is frequency- or power-based, or is segment-based.
- If a frequency/power-based sweep is used, the menu has seven (7) buttons.
- If a segment-based sweep is used, the menu has five (5) buttons. For segment-based sweeps, Averaging, IFBW, and Power settings are made on a per-segment basis on the segment-based setup tableaus at the bottom of the screen. (See [Section 7-4 “Segmented Frequency-Based Sweep Setup”](#) and [Section 7-5 “Segmented Index-Based Sweep Setup”](#).)

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation: MAIN | Averaging | AVERAGING

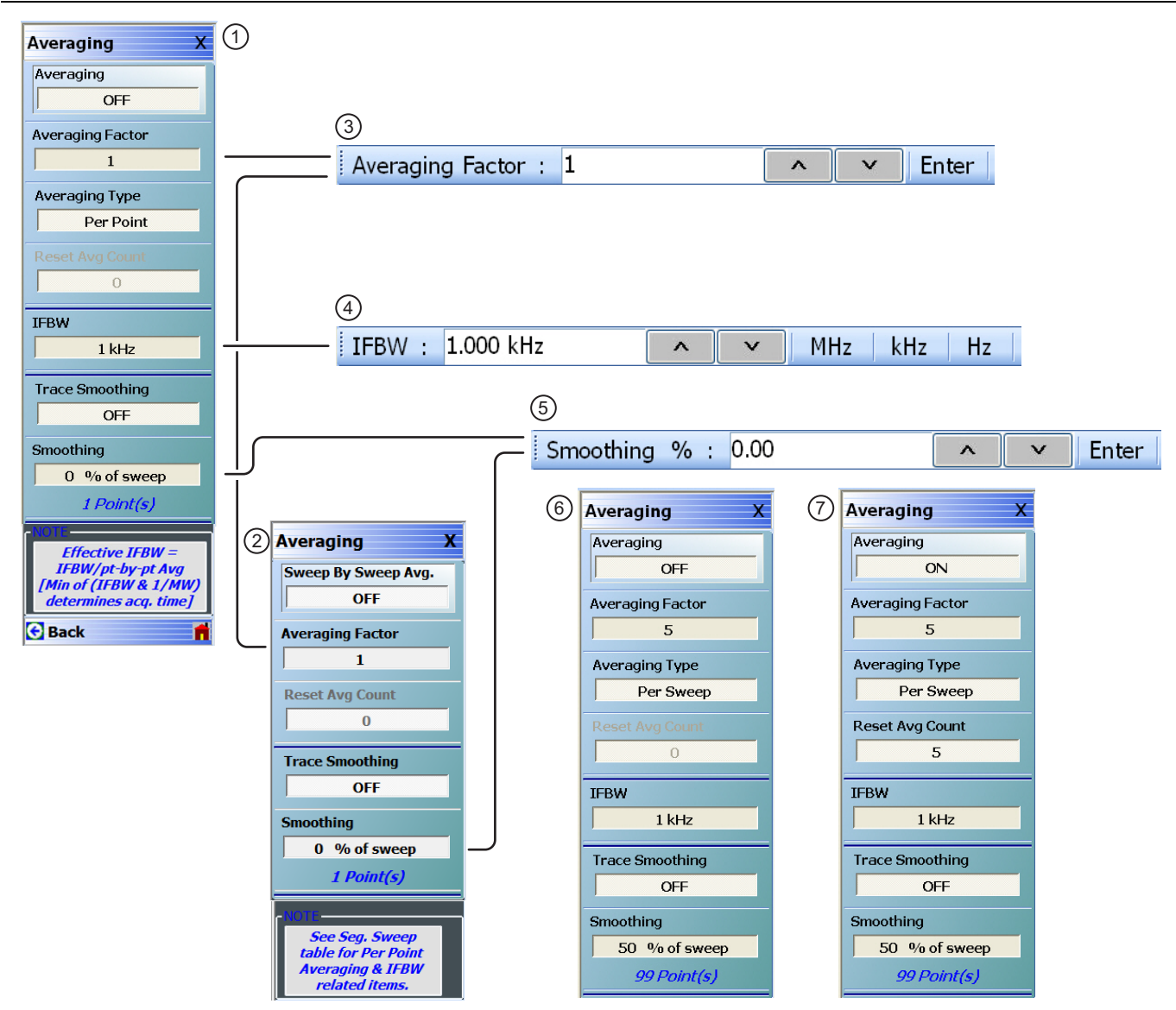


Figure 8-1. AVERAGING Menu (1 of 2)

1. AVERAGING Menu – Frequency-Based and Power-Based Sweeps	6. AVERAGING Menu – Example of frequency-/power-based sweeps menu with parameters set and Averaging OFF.
2. AVERAGING Menu – Segmented-Based Sweeps (See Section 7-4 and Section 7-5 for more information.)	7. AVERAGING Menu – Example of frequency-/power-based sweeps menu with parameters set and results shown with Averaging ON. When set to ON, the Reset Avg Count and a similar display in the channel status bar count up to the Averaging Factor value setting.
3. Averaging Factor Field Toolbar	
4. IFBW Frequency Field Toolbar	
5. Smoothing % (Smoothing Percentage) Field Toolbar	

Figure 8-1. AVERAGING Menu (2 of 2)**Averaging (Off/On)**

Button present for frequency-based and power-based sweeps. Select toggles trace averaging off and on.

Sweep By Sweep Averaging

Sweep-by-sweep averaging aggregates data on a sweep basis, hence represents averaging with a longer sampling time between data elements. In the case of segmented sweep, the sweep-by-sweep averaging is global for all segments (unlike point-by-point averaging which can be assigned per segment).

Sweep By Sweep Avg. (Off/On)

Button present for segmented-based sweeps. When toggled ON, the status bar displays Averaging status:



When Sweep By Sweep Avg. is toggled OFF, the status bar displays Averaging status as NA. If sweep by sweep The status bar will continue to say Avg N/A since point by point averaging could be set per segment:

**Averaging Factor**

Button only present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select displays the Averaging Factor field toolbar.

Averaging Type (Per Point/Per Sweep)

Button only present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select toggles between averaging per point and averaging per sweep.

Reset Average Count

Button present for frequency-based, power-based, and segment-based sweeps. Read only display field. Counts up to the Averaging Factory value as the averaging session proceeds. Select resets the averaging count to 0 (zero), and the averaging session starts anew.

IFBW

Button only present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select displays the IFBW field toolbar for setting the Intermediate Frequency Bandwidth frequency. The toolbar allows discrete values of:

- 1 Hz, 2 Hz, 3 Hz, 5 Hz, 7 Hz
- 10 Hz, 20 Hz, 30 Hz, 50 Hz, 70 Hz
- 100 Hz, 200 Hz, 300 Hz, 500 Hz, 700 Hz
- 1 kHz, 2 kHz, 3 kHz, 5 kHz, 7 kHz
- 10 kHz, 20 kHz, 30 kHz, 50 kHz, 70 kHz
- 100 kHz, 200 kHz, 300 kHz, 500 kHz, 700 kHz
- 1 MHz

Units of MHz, kHz, or Hz can be selected.

Trace Smoothing (Off/On)

On a per-trace basis, toggles trace smoothing OFF and ON.

Smoothing

On a per-trace basis, select displays the Smoothing % field toolbar. The toolbar allows the user to set the percentage of trace smoothing in use. A display below the button field shows the number of points that are smoothed.

Chapter 9 — Calibration Menus – 2-Port VNAs

9-1 Introduction

This chapter provides information for calibrating the 2-port versions of the VectorStar MS464xB Series VNAs. This calibration chapter is organized in the sequence of the menus and dialog boxes that control the various types of calibrations. Due to the numerous permutations of instrument calibration ports, AutoCal™, manual calibration, calibration methods, line types, and connectors, only a small subset of calibrations are shown.

The CALIBRATION menu is not available when using the Spectrum Analysis application.

9-2 Chapter Overview

These links connect to the calibration menus organized by function and type of calibration:

Calibration Menu, Sub-Menus and Dialog Boxes

- [“Menu Set Overview – 2-Port VNA Calibration” on page 9-5](#)
- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)
 - [“CALIBRATION Menu – 2-Port VNAs – with IMDView Active” on page 9-9](#)
 - [“CALIBRATION Menu – Noise Figure” on page 9-10](#)
 - [“CALIBRATE Menu – 2-Port VNAs” on page 9-12](#)
 - [“AutoCal Menus and Dialog Boxes” on page 9-2](#)
 - [“Manual Calibration Menus and Dialog Boxes” on page 9-2](#)
 - [“THRU UPDATE Menu – 2-Port VNAs” on page 9-14](#)
 - [“CAL KIT/AUTOCAL Menu – 2-Port VNAs” on page 9-19](#)
 - [“INSTALL \(AUTOCAL CHARAC./CAL KIT\) Dialog Box – 2-Port VNAs” on page 9-20](#)
 - [“SAVE \(AUTOCAL CHARAC./CAL KIT\) Dialog Box – 2-Port VNAs” on page 9-22](#)
 - [“CAL KIT INFO Dialog Box – 2-Port VNAs” on page 9-24](#)
 - [“RESTORE DEFAULT COEF. Dialog Box – 2-Port VNAs” on page 9-28](#)
 - [“CAL OPTIONS Menu – 2-Port VNAs” on page 9-15](#)
 - [“FLEXIBLE CAL SETUP Dialog Box – 2-Port VNAs” on page 9-17](#)
 - [“DEEMBED. TOOLS Menu – 2-Port VNAs” on page 9-30](#)
 - [“NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(Option 21\)” on page 9-32](#)
 - [“NETWORK EXTRACTION Dialog Box – Type A” on page 9-35](#)
 - [“NETWORK EXTRACTION Dialog Box – Type B \(No Option 21\)” on page 9-37](#)
 - [“NETWORK EXTRACTION Dialog Box – Type B – Flex Standards \(Option 21\)” on page 9-39](#)
 - [“NETWORK EXTRACTION Dialog Box – Type C” on page 9-45](#)
 - [“NETWORK EXTRACTION Dialog Box – Type D \(No Option 21\)” on page 9-47](#)
 - [“NETWORK EXTRACTION Dialog Box – Type D – Multi-Standards \(Option 21\)” on page 9-49](#)
 - [“NETWORK EXTRACTION Dialog Box – Type D – Phase-Localized \(Option 21\)” on page 9-52](#)

- [“NETWORK EXTRACTION Dialog Box – Sequential Extraction \(Peeling\) \(Option 21\)” on page 9-54](#)
- [“PERFORM MANUAL ADAPTER REMOVAL Dialog Box – 2-Port VNAs” on page 9-56](#)
- [“ALTERNATIVE CALS Menu – 2-Port VNAs” on page 9-57](#)
 - [“HYBRID CAL Menu – 2-Port VNAs” on page 9-58](#)
 - [“HYBRID ENHANCED MATCH CAL SETUP Dialog Box – 2-Port VNAs” on page 9-60](#)
 - [“CAL MERGE Dialog Box – 2-Port VNAs” on page 9-62](#)

AutoCal Menus and Dialog Boxes

AutoCal Setup Menu – 2-Port VNAs

The main AutoCal setup menu is:

- [“AUTOCAL PORT Menu – 2-Port VNAs” on page 9-64](#)

AutoCal 2-Port Calibration – 2-Port VNAs

The following describes the settings for a 2-port AutoCal calibration followed by an example procedure for an AutoCal 2-Port Calibration.

- [“AUTOCAL SETUP Menu – 2-Port Cal – 2-Port VNAs” on page 9-65](#)
 - [“MODIFY 2-PORT AUTOCAL SETUP Dialog Box” on page 9-66](#)
- AutoCal 1-Port Calibration Example – 2-Port VNAs
 - [“AutoCal 1-Port Cal Setup – 2-Port VNAs” on page 9-71](#)

AutoCal 1-Port Calibration – 2-Port VNAs

This set of menus and dialogs control the settings for a 1-port AutoCal calibration. These are followed by an example procedure for an AutoCal 1-Port Calibration.

- [“AUTOCAL SETUP Menu – 1-Port Cal – 2-Port VNAs” on page 9-71](#)
 - [“MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs” on page 9-72](#)

Manual Calibration Menus and Dialog Boxes

Manual Calibration Configuration – 2-Port VNAs

Once a calibration type is selected above in the MANUAL CALIBRATION menus, the following menus are used to set up the calibration method and line type. The settings in these menus define which dialog boxes will be available and the procedural menus that will appear for the specified calibration parameters:

- [“MANUAL CAL Menu – 2-Port VNAs” on page 9-76](#)
- [“CAL SETUP Menu” on page 9-77](#)
- [“CAL METHOD Menu” on page 9-79](#)
- [“LINE TYPE Menu” on page 9-81](#)

Manual 2-Port Calibration – 2-Port VNAs

This section provides information on 2-port manual calibration types on 2-port VNAs. A few of the possible configuration dialog boxes are shown. All of the controls and functions for the dialog boxes are listed in the summary table below that follows the dialog box examples. This section concludes with an example manual 2-port calibration procedure.

- [“TWO PORT CAL Menu – 2-Port VNAs” on page 9-82](#)
 - [“TWO PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 9-85](#)
 - [“TWO PORT CAL SETUP \(SSLT, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-89](#)
 - [“TWO PORT CAL SETUP \(SSST, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-93](#)

- “TWO PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-96
- “TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box – 2-Port VNAs” on page 9-99
- “TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box – 2-Port VNAs” on page 9-102
- “TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box – 2-Port VNAs” on page 9-106
- “TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box – 2-Port VNAs” on page 9-109
- Summary Table:
 - “2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs” on page 9-112

Manual 1-Port Calibration – 2-Port VNAs

- “ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123
 - “ONE-PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box – 2-Port VNAs” on page 9-126
 - “ONE-PORT CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs” on page 9-129
 - “ONE-PORT CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNAs” on page 9-132
 - “ONE PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-134
 - “ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 9-136
- Summary Table:
 - “1-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs” on page 9-139

Manual Transmission Frequency Response Calibration – 2-Port VNAs

- “TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145
 - “TRANS. FREQ. RESP. CAL. SETUP (SOLT/R – Coaxial) Dialog Box” on page 9-147
 - “TRANS. FREQ. RESP. CAL. SETUP (SOLT/R – Coaxial) Dialog Box” on page 9-147
 - “Manual Calibration – Trans. Freq. Resp. Cal. Setup Dialog Box Contents – 2-Port VNAs” on page 9-149
- Manual Trans. Freq. Resp. Calibration Example – 2-Port VNAs
 - “Manual Cal – Trans. Freq. Resp. Cal – 2-Port VNAs” on page 9-145

Manual Reflection Frequency Response Calibration – 2-Port VNAs

- “REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151
 - “REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-153
 - “REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-153
 - “Manual Calibration – Reflection Frequency Response Cal Setup – 2-Port VNAs” on page 9-157
- Manual Refl. Freq. Resp. Calibration Example
 - “Manual Cal – Refl. Freq. Resp. Cal – 2-Port VNAs” on page 9-151

Manual Receiver Cal/Normalization Calibration – 2-Port VNAs

- “RCVRCAL-NORM.CAL Menu – 2-Port VNAs” on page 9-161
 - “RCVRCAL/NORMALIZATION CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-164

Manual Enhanced-Match Calibration – 2-Port VNAs

- “ENHANCED-MATCH Menu – 2-Port VNAs” on page 9-162
 - “ENHANCED-MATCH CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-165
 - “ENHANCED-MATCH CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs” on page 9-168
 - “ENHANCED-MATCH CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNA” on page 9-171

Calibration Sub-Menus

- “REFL. DEVICE(S) Menu – 2-Port VNAs” on page 9-177

- “LINES/MATCHES DEVICE(S) Menu – 2-Port VNAs” on page 9-179
- “SLIDING LOADS Menu – 2-Port VNA” on page 9-181
- “THRU/RECIP Menu – 2-Port VNAs” on page 9-183
- “ISOLATION(S) Menu – 2-Port VNA” on page 9-184

General Purpose Manual Calibration Dialog Boxes

These dialog boxes are representative of those that can be linked-to from multiple locations. Not all possible dialog boxes are shown:

- “AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185
- “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187
- “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188
- “STANDARD INFO (Broadband Cal) 0.8 mm (M) Connector Dialog Box” on page 9-189
- “THRU INFO Dialog Box – 2-Port VNAs” on page 9-190
- “USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM 2-Port VNAs” on page 9-194
- “USER DEFINED MATCH DEVICES Dialog Box – mTRL 2-Port VNAs” on page 9-196
- “USER DEFINED MATCH Dialog Box – mSSS” on page 9-198
- “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199
- “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200
- “USER-DEFINED STANDARD (Broadband Cal) Dialog Box” on page 9-203
- “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
- “USER DEFINED WAVEGUIDE SHORT Dialog Box – 2-Port VNAs” on page 9-206
- “USER DEFINED WAVEGUIDE SHORT Dialog Box – 2-Port VNAs” on page 9-206

9-3 Menu Set Overview – 2-Port VNA Calibration

The menus shown below provide the primary control for all 2-Port VNA calibration functions.

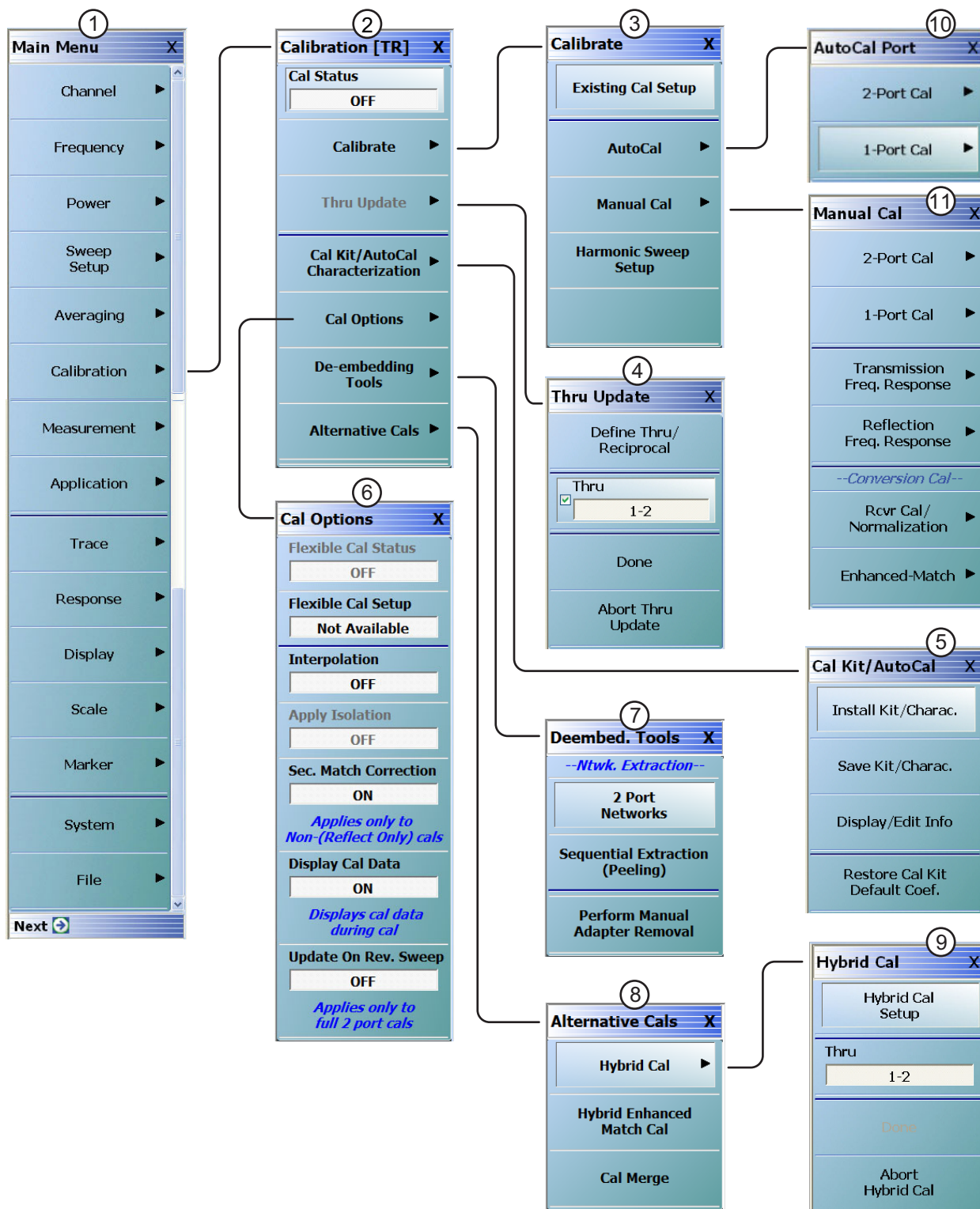


Figure 9-1. Calibration Menu [TR] Set Overview (1 of 2)

-
1. “MAIN Menu”
 2. “CALIBRATION [TR] Menu – 2 Port VNAs”
 3. “CALIBRATE Menu – 2-Port VNAs”
 4. “THRU UPDATE Menu – 2-Port VNAs”
 5. “CAL KIT/AUTOCAL Menu – 2-Port VNAs” Characterization File Management Menu
 6. “CAL OPTIONS Menu – 2-Port VNAs”
 7. “DEEMBDED. TOOLS Menu – 2-Port VNAs” Menu (shown with Option 21 – Universal Fixture Extraction, which includes Sequential Extraction)
 8. “ALTERNATIVE CALS Menu – 2-Port VNAs”
 9. “HYBRID CAL Menu – 2-Port VNAs”
 10. “AUTOCAL PORT Menu – 2-Port VNAs”
 11. “MANUAL CAL Menu – 2-Port VNAs”
-

Figure 9-1. Calibration Menu [TR] Set Overview (2 of 2)

9-4 Primary Cal Menu, Sub-Menus and Dialog Boxes – 2-Port VNAs

CALIBRATION [TR] Menu – 2 Port VNAs

Use the Calibration menu to setup calibration options, configure AutoCal and cal kit characterization files, and to configure and run calibration routines.

The CALIBRATION menu is not available when using the Spectrum Analysis application.

Full Name

Calibration [Transmission-Reflection]

The name of the CALIBRATION menu is appended with [TR] for transmission/reflection operational mode. The instrument operation mode is set on the Application Menu. See [Chapter 12 — Application Menus – Overview](#).

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Calibration | CALIBRATION

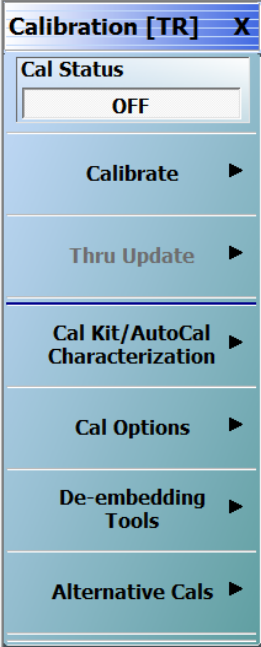
	<p>Cal Status (Off/On)</p> <p>The Cal Status toggle button displays the calibration status based on the last calibration run.</p> <p>If not calibrated, Cal Status cannot be changed from OFF and a calibration run must be successfully completed before the status can be changed.</p> <p>If calibrated, Cal Status status can be toggled between OFF and ON. If ON, the Channel Status bar at the bottom of the display area shows a status of CORR in green.</p> <p>Calibrate</p> <p>Use the Calibrate button to start the AutoCal or manual calibration process. Options on sub-menus allow for selection of automatic or manual calibration, calibration type, calibration method, line type and other calibration parameters. Select displays the CALIBRATE menu.</p> <ul style="list-style-type: none">• “CALIBRATE Menu – 2-Port VNAs” on page 9-12 <p>Thru Update</p> <p>Thru update is a calibration refreshing technique where the user connects a thru line and quickly refreshes the transmission tracking and load match terms without the time and complexity of a full calibration run. The thru update is essentially a one-step refresh calibration for Full 2 Port and 1 Path-2 Port calibrations.</p> <p>Select displays the THRU UPDATE menu. If the Thru Update button is not available, a Full 2-Port or 1 Path-2 Port calibration is not active.</p> <ul style="list-style-type: none">• “THRU UPDATE Menu – 2-Port VNAs” on page 9-14 <p>Cal Kit/AutoCal Characterization</p> <p>Use this menu to save, load, and recall characterization files for AutoCal and manual calibration kits. Select displays the CAL KIT/AUTOCAL menu.</p> <ul style="list-style-type: none">• “CAL KIT/AUTOCAL Menu – 2-Port VNAs” on page 9-19.
--	---

Figure 9-2. CALIBRATION Menu – 2-Port VNAs (1 of 2)

	<div><div>Cal Options</div><div>Select displays the CAL OPTIONS menu.<ul style="list-style-type: none">“CAL OPTIONS Menu – 2-Port VNAs” on page 9-15</div><div>De-embedding Tools</div><div>Select displays the DEEMBDED. TOOLS menu.<ul style="list-style-type: none">“DEEMBDED. TOOLS Menu – 2-Port VNAs” on page 9-30</div><div>Alternative Cals</div><div>Select Displays the ALTERNATIVE CALS menu.<ul style="list-style-type: none">“ALTERNATIVE CALS Menu – 2-Port VNAs” on page 9-57</div></div>
--	--

Figure 9-2. CALIBRATION Menu – 2-Port VNAs (2 of 2)

CALIBRATION Menu – 2-Port VNAs – with IMDView Active

When IMDView is active (Chapter 21, “IMDView™”), selecting Calibration from Main Menu opens a modified Calibration [IMD] menu. Use the Calibration menu to select the driver port, perform normalization calibrations, and to turn normalization calibration on or off. Normalization calibrations are used to compute input-referred versions of IMD parameters tone power and intercept point and for tone gain computations.

Previous

- “MAIN Menu” on page 2-2

Prerequisites

- Option 44 installed on the VNA, and Application Menu Transmission/Reflection mode activated, and IMDView is ON.

Navigation

- MAIN | Calibration | CALIBRATION [IMD]

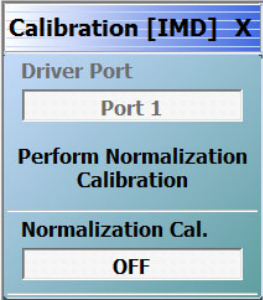
	<p>Driver Port</p> <p>Displays driver port number (Port 1 or Port 2).</p> <p>Perform Normalization Calibration</p> <p>Select initiates normalization calibration for IMDView measurements.</p> <p>Normalization Cal.</p> <p>Select toggles normalization calibration ON or OFF.</p> <p>ON Applies the normalization calibration to the measurement.</p>
---	--

Figure 9-3. CALIBRATION Menu – 2-Port VNAs with IMDView Active

CALIBRATION Menu – Noise Figure

When Noise Figure is active (see [Chapter 15](#) or [Chapter 16](#)), selecting Calibration from Main Menu opens a modified Calibration [Noise Figure] menu. Use the Calibration menu to perform noise calibrations, which remove the noise added by the composite receiver chain(s).

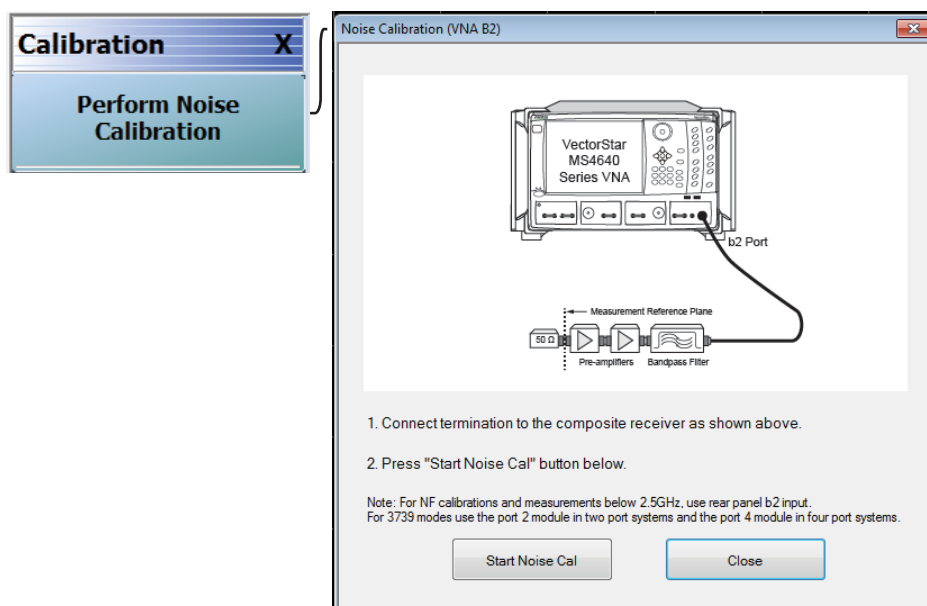


Figure 9-4. CALIBRATION Menu – Noise Figure – Option 41

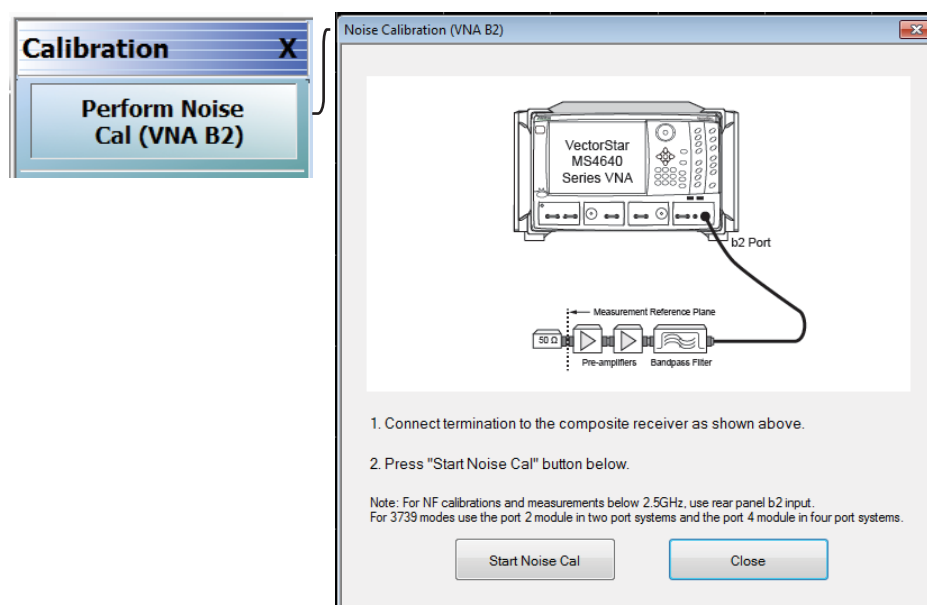


Figure 9-5. CALIBRATION Menu – Noise Figure – Option 48 with 2-Port DUT Configuration

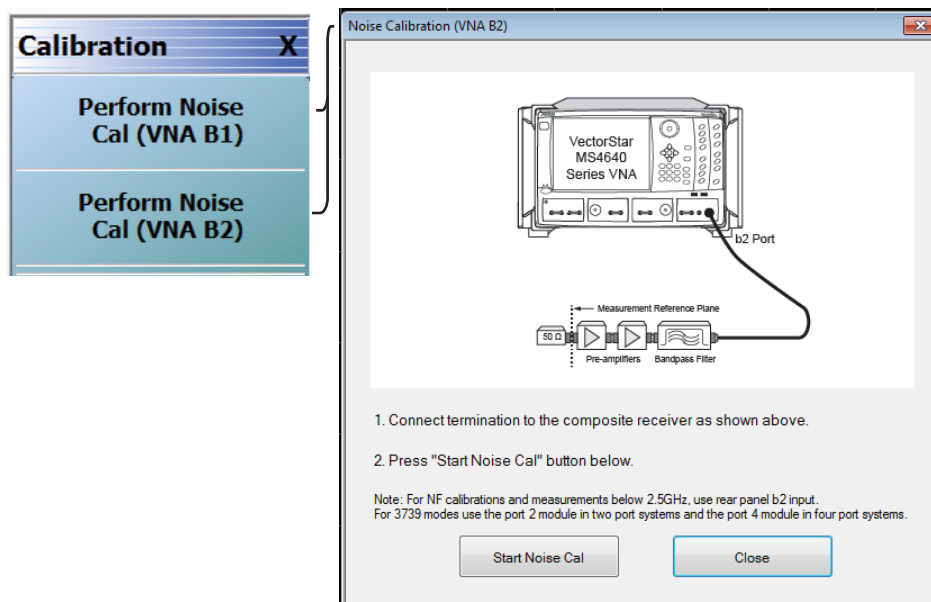


Figure 9-6. CALIBRATION Menu – Noise Figure – Option 48 with 4-Port DUT Configuration

CALIBRATE Menu – 2-Port VNAs

Use the CALIBRATE menu to start the AutoCal or manual calibration process. Sub-menus within each category allow selection of calibration parameters, calibration types, calibration methods, line types, and test port connectors.

Previous

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE

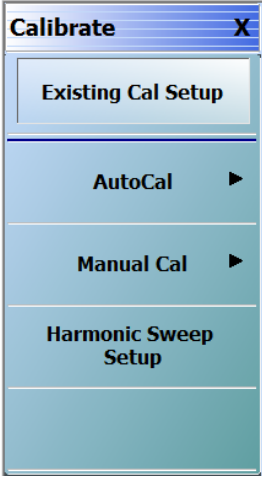
	<p>Existing Cal Setup</p> <p>Displays a dialog showing setups that were used during the current calibrations.</p> <p>AutoCal</p> <p>Select displays the AutoCal menu.</p> <ul style="list-style-type: none">• “AUTOCAL PORT Menu – 2-Port VNAs” on page 9-64 <p>Manual Cal</p> <p>Select displays the Manual Calibration menu.</p> <ul style="list-style-type: none">• “MANUAL CAL Menu – 2-Port VNAs” on page 9-76 <p>Harmonic Sweep Setup</p> <p>Select displays the Harmonic Sweep dialog box. This selection is available only when Frequency Sweep (Linear) mode is selected from the SWEEP TYPES Menu.</p> <ul style="list-style-type: none">• See Figure 9-8, “HARMONIC SWEEP Setup Dialog Box”
---	--

Figure 9-7. CALIBRATE Menu – 2-Port VNAs

HARMONIC SWEEP SETUP Dialog Box – 2-Port VNAs

When in Frequency Sweep (Linear) mode, selecting Harmonic Sweep Setup from the Calibrate menu opens the dialog below. This is available only with the VNA in Frequency Sweep (Linear) mode.

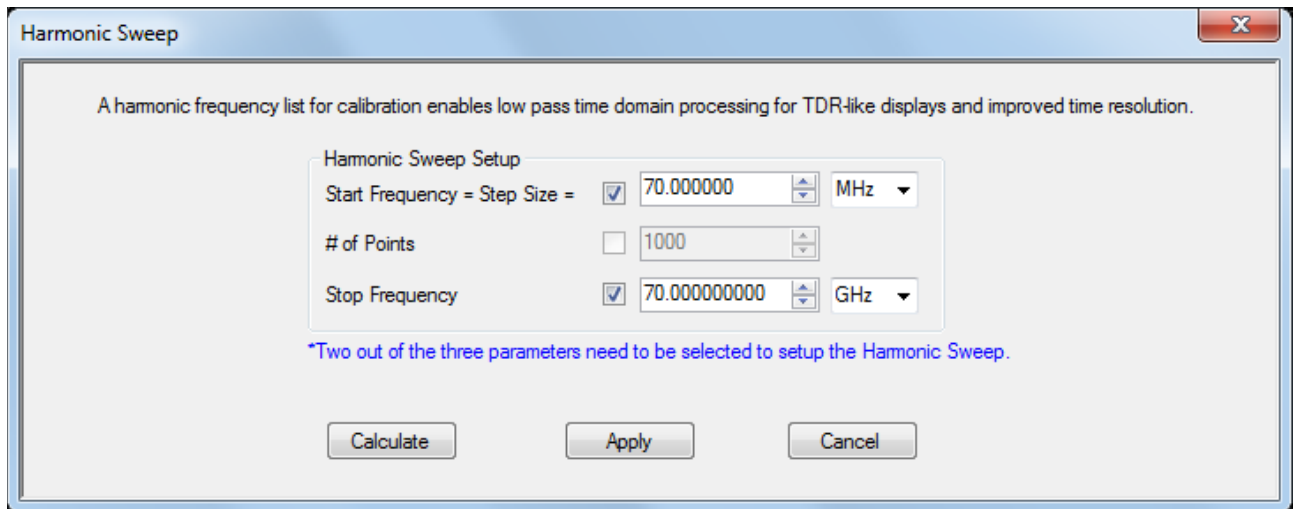
By using Harmonic Sweep, a harmonic frequency list for calibration enables low pass time domain processing for TDR (Time Domain Reflectometer)-like displays and improved time resolution.

Previous

- [“CALIBRATE Menu – 2-Port VNAs”](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Harmonic Sweep Setup | HARMONIC SWEEP



Two of the three parameters (Start Frequency or Number of Points or Stop Frequency) must be selected in order to set the harmonic sweep. The value of the third parameter is adjusted according to the other two.

Even with one free parameter, the entered numbers may not be consistent with a harmonic sweep. Pressing the Calculate button will coerce values to make a valid harmonic sweep and allow the user to fine tune values before leaving the dialog.

Figure 9-8. HARMONIC SWEEP Setup Dialog Box

THRU UPDATE Menu – 2-Port VNAs

The THRU UPDATE menu is a completion button menu. When the through update calibration procedure is complete, the button is annotated with a completion checkmark as shown in the figure below.

Previous

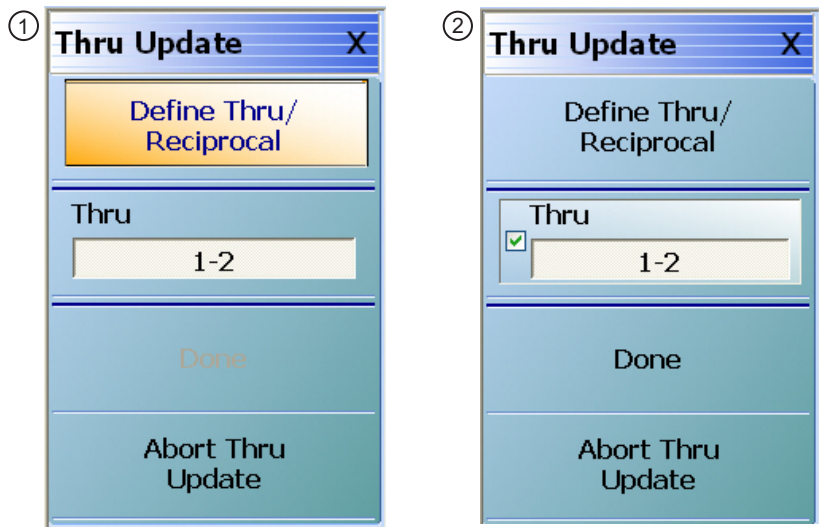
- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Prerequisites

- The Thru Update button on the CALIBRATION menu is not available unless a Full 2-Port or Transmission Freq. Response, or a 1 Path-2 Port calibration (AutoCal or manual) has been successfully completed.

Navigation

- MAIN | Calibration | CALIBRATION | Thru Update | THRU UPDATE



1. Starting THRU UPDATE calibration menu for 2-Port VNA system on left. The Done button is unavailable.	2. At right, the completed THRU UPDATE calibration menu for 2-Port VNA system on right with completion checkmark and Done button available.
---	---

Figure 9-9. THRU UPDATE Calibration Menu – 2-Port VNAs

Define Thru/Reciprocal

Displays the THRU INFO dialog box where the through parameters can be changed.

- [“THRU INFO Dialog Box – 2-Port VNAs” on page 9-190](#)

Done

When all calibrations are successfully completed, the Done button is available. Select returns to the CALIBRATION menu and the Cal Status button is set to ON.

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Abort Thru Update

Abort Thru Update stops the current calibration procedure and returns to the CALIBRATION menu.

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

CAL OPTIONS Menu – 2-Port VNAs

The CAL OPTIONS menu and related sub-menus provide access to advanced calibration options.

Previous

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS

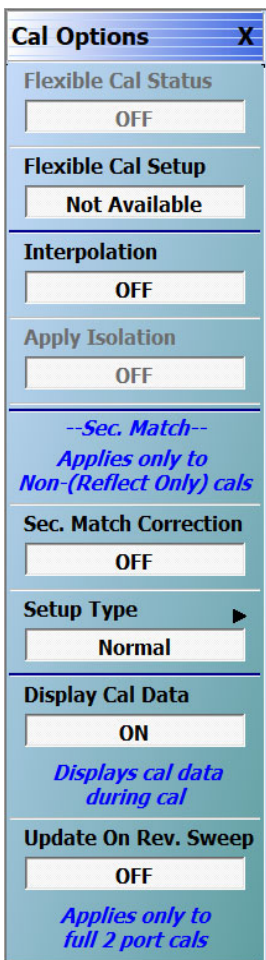
	<p>Flexible Cal Status (Off/On)</p> <p>Read only display button. Flexible calibration is the ability to select a sub-set of a currently active calibration status. For example, if a Full 2 Port calibration has been completed, flexible calibration allows the calibration to be reduced to a Transmission Frequency Response calibration. Select toggles flexible calibration off and on.</p> <p>Flexible Cal Setup</p> <p>Use Flexible Cal Setup to change the parameters above. Select displays the FLEXIBLE CAL SETUP dialog box. See “FLEXIBLE CAL SETUP Dialog Box – 2-Port VNAs” on page 9-17</p> <p>Interpolation (Off/On)</p> <p>Interpolation allows additional interpolated measurement points between calibrated measurement points. This is useful if the user wants to zoom into a specific area without having to recalibrate the instrument. The interpolated points must lie within the calibration frequency points. Select toggles interpolation OFF and ON with a default state of OFF.</p> <p>Apply Isolation (Off/On)</p> <p>If this button is unavailable, isolation calibration was not performed. The isolation calibration procedure is started by a button on the calibration type menu.</p> <ul style="list-style-type: none"> • “Manual 2-Port Cal Setup – 2-Port VNAs” on page 9-82 • “Manual 1-Port Cal Setup – 2-Port VNAs” on page 9-123 <p>If this button is available, isolation calibration was performed, and select toggles isolation calibration OFF and ON.</p> <p>Sec. Match Correction (Off/On)</p> <p>Secondary Match Correction provides a calibration enhancement that reduces high-spatial-frequency ripple by removing the effects of the multiple reflection paths within a DUT. Default value is OFF. This feature only applies for full-term calibrations, 1p2p and TFR. This function has no effect when an appropriate calibration is not applied, when the frequency range is too small (~< 2GHz), the step size is too large (~>1 GHz) or for certain very irregular segmented sweep setups. See the Measurement Guide for more details.</p> <p>Setup Type</p> <p>Select displays the SMC Setup Type menu.</p> <ul style="list-style-type: none"> • “SMC Setup Type Menu” on page 9-16. <p>Display Cal Data (On/Off)</p> <p>When turned on, the Display Cal Data function enables the use of a previous calibration to provide a real-time quasi-corrected view of the current standard being measured. Select toggles Display Cal Data OFF and ON. The default state is ON.</p>
--	--

Figure 9-10. CAL OPTIONS (CALIBRATION OPTIONS) Menu (1 of 2)

	<p>Update On Rev. Sweep (On/Off)</p> <p>When turned on, updates display data only on the reverse sweep. When turned off, updates display data on every sweep. This feature is only available on 2 port systems and is only used when a full 2-port RF cal is applied. Select toggles Update On Rev. Sweep ON and OFF. The default state is OFF.</p>
--	--

Figure 9-10. CAL OPTIONS (CALIBRATION OPTIONS) Menu (2 of 2)

SMC Setup Type Menu

The gate parameters, principally the factor K is a multiplier applied to resolution to get gate width and the length scales to the test set mismatch centers are fairly long. Commonly used when a DUT is directly connected to the instrument test port and operating at mm-wave frequencies. But when the mm-wave module test ports are essentially the reference planes, then the length scales are much shorter and the current gate widths may make SMC less effective. The SMC Setup Type menu provides a switch (Normal, Direct Test Port connection, or Electrically Long setup), that can be set to adjust for the search range.

Previous

- [“CAL OPTIONS Menu – 2-Port VNAs” on page 9-15](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | SMC Setup Type

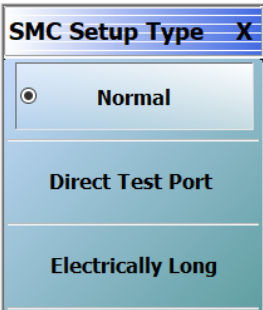
	<p>Normal</p> <p>The normal search range with the K factor of 140.</p> <p>Direct test Port</p> <p>The search range with the K factor of 30. Commonly used when a DUT is directly connected to the instrument test port and operating at mm-wave frequencies.</p> <p>Electrically Long</p> <p>The search range with the K factor of 140 but changes the search range to (0, 1.5 alias free range). Most commonly used with fiber optic setups (e.g., EO and OE measurements) or extremely long RF cables.</p>
---	---

Figure 9-11. SMC Setup Type Menu

FLEXIBLE CAL SETUP Dialog Box – 2-Port VNAs

Use the Flexible Cal Setup dialog box to define a calibration sub-set of the currently active calibration.

Previous

- [“CAL OPTIONS Menu – 2-Port VNAs” on page 9-15](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Flexible Cal Setup | FLEXIBLE CAL SETUP Dialog Box

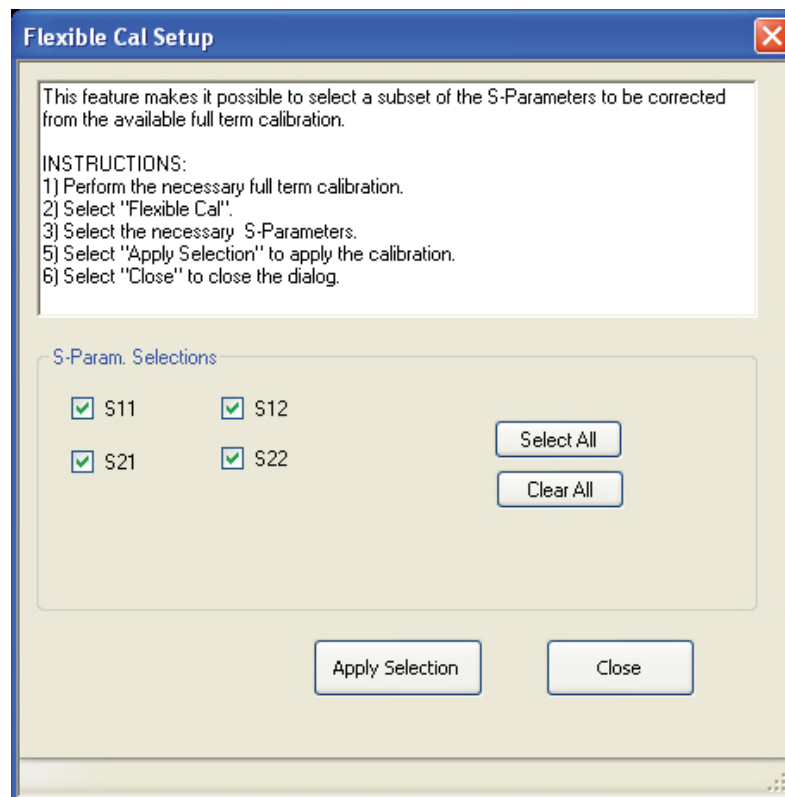


Figure 9-12. FLEXIBLE CAL SETUP (FLEXIBLE CALIBRATION SETUP) Dialog Box – 2-Port VNAs

Instructions

The flexible calibration setup feature makes it possible to select a subset of the S-Parameters to be corrected from the available full-term calibration.

Procedure

1. Perform the necessary full-term calibration.
2. On the CAL OPTIONS menu, select Flexible Cal Setup.
 - MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Flexible Cal Setup
 - The FLEXIBLE CAL SETUP dialog box appears.
3. Select the necessary S-Parameters in any combination as long as one S-Parameter is selected:
 - S11
 - S12
 - S21
 - S22

4. Select the Apply Selection button to apply the calibration.
5. Select Close to close the dialog box and return to the CAL OPTIONS menu.
 - [“FLEXIBLE CAL SETUP Dialog Box – 2-Port VNAs” on page 9-17](#)
6. If Full Term Cal (By Port) is selected above, the area label is Port Selections (Full Term) with available options of:
 - Port 1 and/or
 - Port 2
7. If Reflection Only (By Port) is selected above, the area label is Port Selections (Reflection Only) with the available options of:
 - Port 1 and/or
 - Port 2
8. If Customize Cal (By S-Param) is selected, the S-Param Selections area appears with S-Parameter selection check boxes. Select any combination of:
 - S11
 - S21
 - S12
 - S22
9. Select Apply Selection to apply the selections.
10. Select Close to close the dialog without saving the selections.

CAL KIT/AUTOCAL Menu – 2-Port VNAs

Use the CAL KIT/AUTOCAL menu to install, save, and restore calibration kit characterization files between an external memory device, the instrument firmware, and a hard drive on the instrument or on a network.

Previous

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL

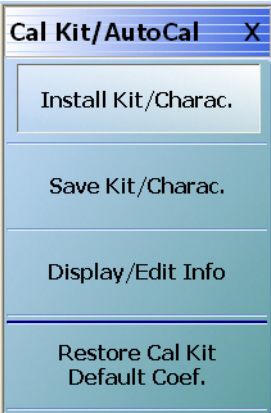
	<p>Install Kit/Charac.</p> <p>Select loads the Calibration Kit file or AutoCal Characterization file from the hard drive or external memory device into the VNA firmware through the INSTALL (AutoCal Characterization/Cal Kit File) dialog box.</p> <ul style="list-style-type: none">• “INSTALL (AUTOCAL CHARAC./CAL KIT) Dialog Box – 2-Port VNAs” on page 9-20 <p>Save Kit/Charac.</p> <p>Select saves the Cal Kit or AutoCal Characterization file from the firmware to the location of choice (typically the instrument hard drive) for later use through the SAVE (AutoCal Characterization/Cal Kit) File dialog box.</p> <ul style="list-style-type: none">• “SAVE (AUTOCAL CHARAC./CAL KIT) Dialog Box – 2-Port VNAs” on page 9-22 <p>Display/Edit Info</p> <p>Select displays the CAL KIT INFO dialog box which shows parametric information about the calibration kit and allows user edits of the values.</p> <ul style="list-style-type: none">• “CAL KIT INFO Dialog Box – 2-Port VNAs” on page 9-24 <p>Restore Cal Kit Default Coef.</p> <p>Select displays the RESTORE DEFAULT COEF dialog box.</p> <ul style="list-style-type: none">• “RESTORE DEFAULT COEF. Dialog Box – 2-Port VNAs” on page 9-28
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Figure 9-13. CAL KIT/AUTOCAL Menu – 2-Port VNAs

INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box – 2-Port VNAs

Use the INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) dialog box to install the calibration kit coefficients file or AutoCal Characterization files in the instrument firmware for subsequent use. A recommended best practice is to keep the cal kit serial number as part of the file name.

Previous

- “CAL KIT/AUTOCAL Menu – 2-Port VNAs” on page 9-19

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Install Kit/Charac. | INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box

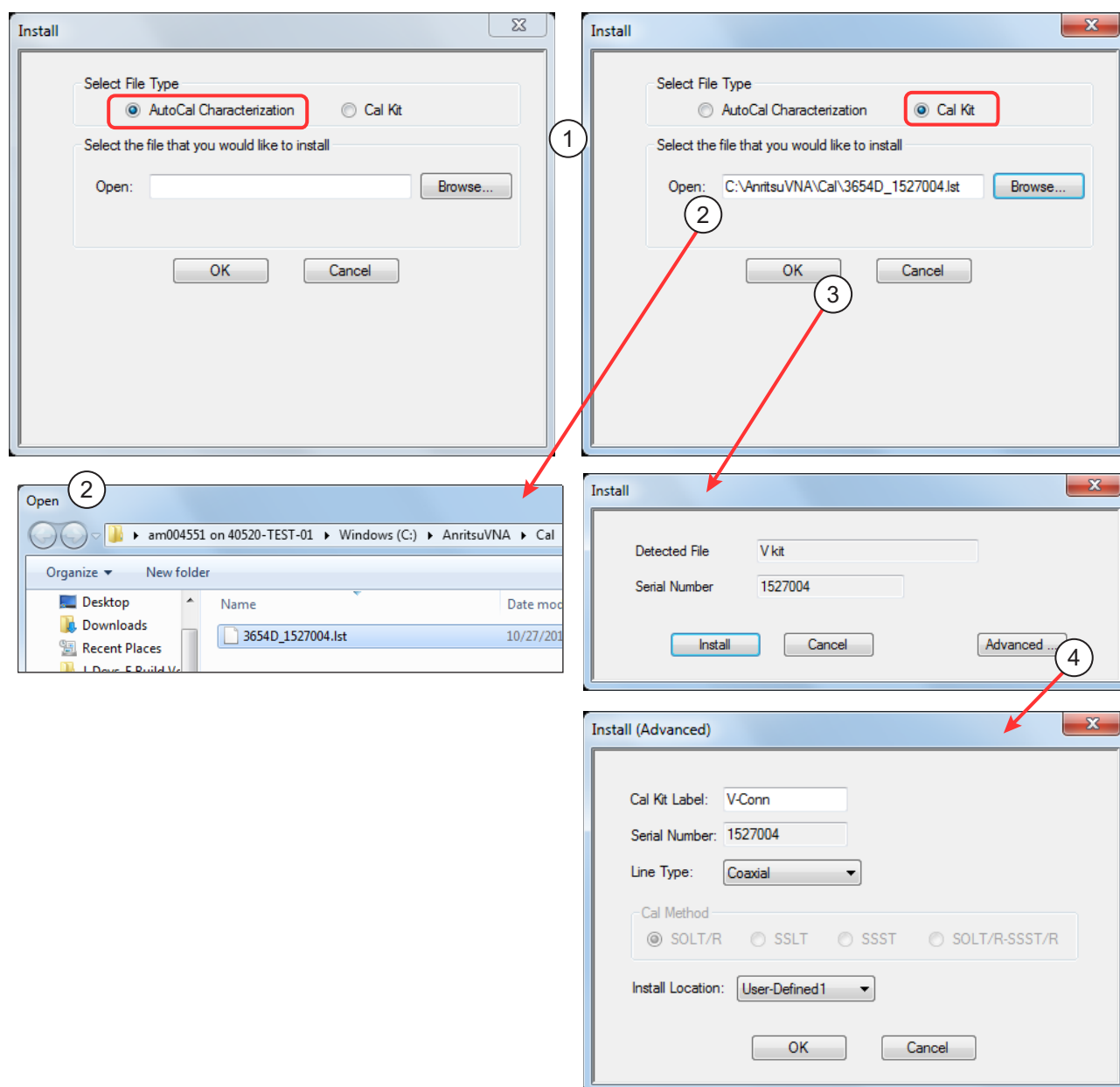


Figure 9-14. INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box

Instructions

1. In the Select File Type area, select either the AutoCal Characterization or the Cal Kit radio button.
2. In the Open field, either enter the file name or click **Browse** to navigate manually.
 - If AutoCal Characterization was selected, the file type will be an AutoCal Characterization ACD file.
 - If Cal Kit was selected, the file type choices will be:
 - Cal Kit Coefficient (CCF file)
 - S1P/S2P Files (LST file)
 - LRL/LRM Cal Kit Files (LCF file)
 - Lightning Files
 - Click **Open** to load the file or **Cancel** to return to the menu.
3. Clicking **OK** to accept opens the **Install** window. Click the **Install** button to load the file.
4. Clicking the **Advanced** button opens the **Install (Advanced)** dialog where the user can change the Cal Kit Label, Line Type, or the Install Location to install the LST CalKit to a User Defined install location.

SAVE (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box – 2-Port VNAs

Use the SAVE (AUTOCAL CHARACTERIZATION/CAL KIT) dialog to save a Calibration Kit Coefficients file or an AutoCal Characterization file from the VNA firmware to external location such as the instrument hard drive, a network drive, or an external memory device. This is useful for storing in the instrument hard drive multiple files from available cal kits or AutoCal modules.

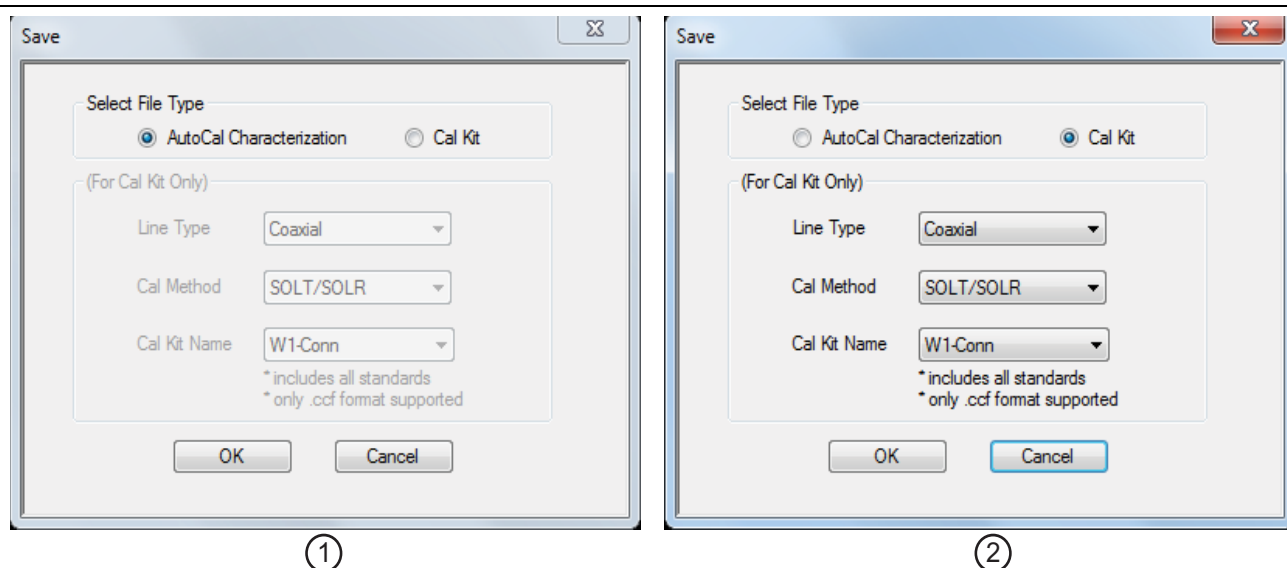
An alternate method is to a Windows program such as File Manager to copy the file from the supplied USB memory device onto the hard drive. In that case, we recommend using the default locations mentioned later in this paragraph.

Previous

- [“CAL KIT/AUTOCAL Menu – 2-Port VNAs” on page 9-19](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Save Kit/Charac | SAVE (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box



1. AutoCal Characterization radio button selected at left.
2. Cal Kit radio button selected at right.

Figure 9-15. SAVE (AUTOCAL CHARACTERIZATION/CAL KIT FILE Dialog Box

Save Dialog Button and Field Availability

The available buttons and fields on the dialog depend on the radio button selection in the Select File Type area.

- If AutoCal Characterization is selected, no other buttons/fields are available and instructions are immediately below.
- If Cal Kit is selected, the For Cal Kit Only area becomes available with fields for Line Type, Cal Method, and Cal Kit Name. Instructions are in the next sub-section following.

Instructions for AutoCal Characterization File Type

1. Click OK to save the AutoCal Characterization file.
 - Click Cancel to stop the save.
2. The SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) dialog box appears.
3. Navigate to the required storage location:
 - C:\AnritsuVNA\AutoCal is recommended.
4. Click Save. The system auto-returns to the Cal Kit/AutoCal menu.

Instructions for Cal Kit File Types

If Cal Kit is selected, the fields of Line Type, Cal Method, and Cal Kit Name are available (shown at right in [“SAVE \(AUTOCAL CHARACTERIZATION/CAL KIT FILE Dialog Box” on page 9-22](#) above) with the values in drop-down menus.

1. In the Line Type field, select a type value:
 - Coaxial
 - Non-Dispersive
 - Waveguide
2. In the Cal Method field, select a method value:
 - SOLT/SOLR
 - SSLT
 - SSST
 - SOLT/R-SSST/R (Broadband)
3. In the Cal Kit Name field, select a calibration kit characterization file:
 - 0.8 mm Conn
 - W1-Conn
 - V-Conn
 - K-Conn
 - GPC-3.5
 - 2.4 mm (M)
 - 2.4 mm (F)
 - 2.4 mm V(M)
 - 2.4 mm V(F)
 - SMA
 - N-Conn
 - N-Conn (75)
 - GPC-7
 - 7/16
 - TNC (Kit from Maury Microwave)
 - User-Defined 1 through to User-Defined 32
4. Click OK to save the calibration kit characterization file.
 - Click Cancel to stop the save.
5. The SAVE AS (CAL KIT COEFFICIENT CCF FILE) dialog box appears.
6. Navigate to the required storage location:
 - C:\AnritsuVNA\Data is recommended.
7. Click Save. The system auto-returns to the CAL KIT/AUTOCAL menu.
 - Click Cancel to abort the save and return to the CAL KIT/AUTOCAL menu.

CAL KIT INFO Dialog Box – 2-Port VNAs

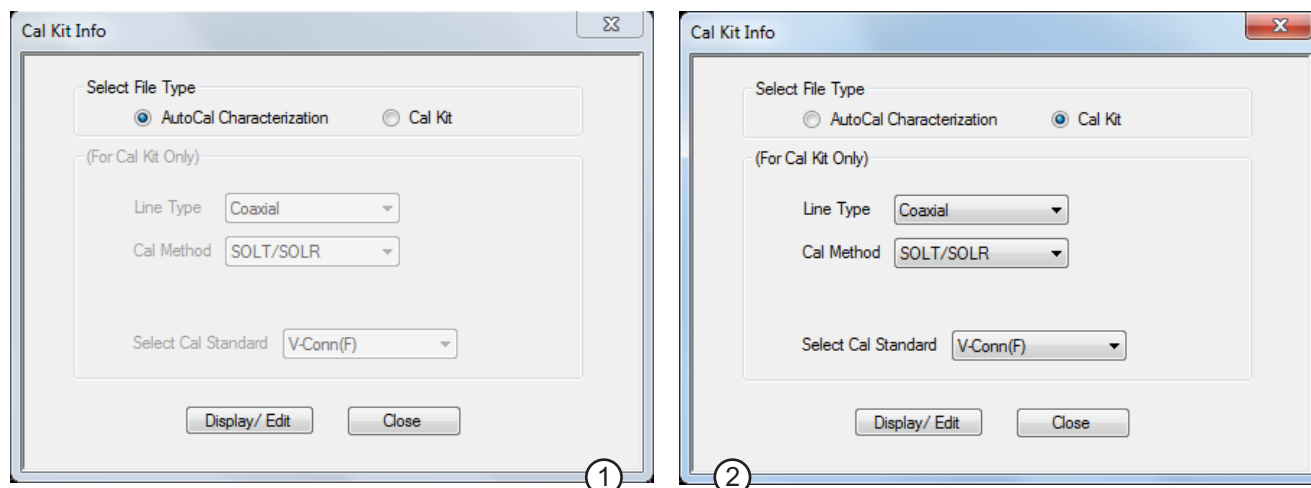
Use the CAL KIT INFO dialog box to review the available instrument calibration kit information.

Previous

- [“CAL KIT/AUTOCAL Menu – 2-Port VNAs” on page 9-19](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Display/Edit Info | CAL KIT INFO Dialog Box



1. Controls for AutoCal Characterization files at left.

2. Controls for Cal Kit files at right.

Note that when a User-Defined cal standard is selected, clicking the Display/Edit button opens the dialog shown in [Figure 9-18 on page 9-27](#). There, the user can either Define Circuit Model (default) or select, load, and view an S1P file. S1P characterization files come with the 3652A-3 and 3652A-4 K-connector cal kits, and the 3654D-3, and 3654D-4 V-connector cal kits.

Figure 9-16. CAL KIT INFO Dialog Box

Button and Field Availability

The available buttons and fields on the dialog depend on the radio button selection in the Select File Type area.

- If AutoCal Characterization is selected, no other buttons/fields are available.
- If Cal Kit is selected, the For Cal Kit Only area becomes available with fields for Line Type, Cal Method, and Select Cal Standard.

Instructions

1. Select AutoCal Characterization or Cal Kit as required.
2. If Cal Kit was selected above, in the For Cal Kit Only area, select a Line Type value:
 - Coaxial
 - Non-Dispersive
 - Waveguide
3. Select a Cal Method value:
 - SOLT/SOLR
 - SSLT
 - SSST
 - SOLT/R-SSST/R (for broadband)

4. Select a Cal Standard value:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

5. Click Display/Edit.

- The STANDARD INFO read-only dialog box appears as shown in [Figure 9-17 on page 9-26](#).
- Note that the dialog box title and content fields are dependent on the selections made in the steps above for Cal Method, Line Type, and Connector Type.
- For example, if:
 - Calibration type is set to Full 2 Port (12 Term Cal)
 - Calibration method is set to SOLT/SOLR
 - Line type is set to Coaxial
 - Connector type is set to V-Conn (M).
- The read-only dialog box is titled:
 - STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn (M)) (shown below).

6. Click OK to close the read-only dialog box.

Note

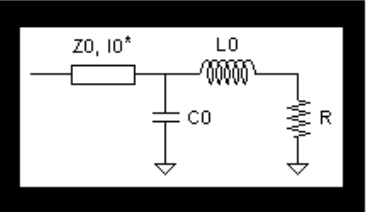
If an LST file has been loaded for either V or K connector, an interactive STANDARD INFO dialog will appear as shown in [Figure 9-18 on page 9-27](#). There, the S1P file can be viewed for each component.

Standard Info (SOLT/R)

Standard Label: V-Conn(M)

Serial Number: XXXXXX

Broadband Load



I0*: air equivalent length polynomial coef0

Sliding Load BreakPoint Freq (in GHz): 4

BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	I0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

BB Load 2 (SN XXXXXX)

R (Ω)	Z0 (Ω)	I0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	0	0	0	5.1	0	0

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	-200	5	0	4.75	0	0

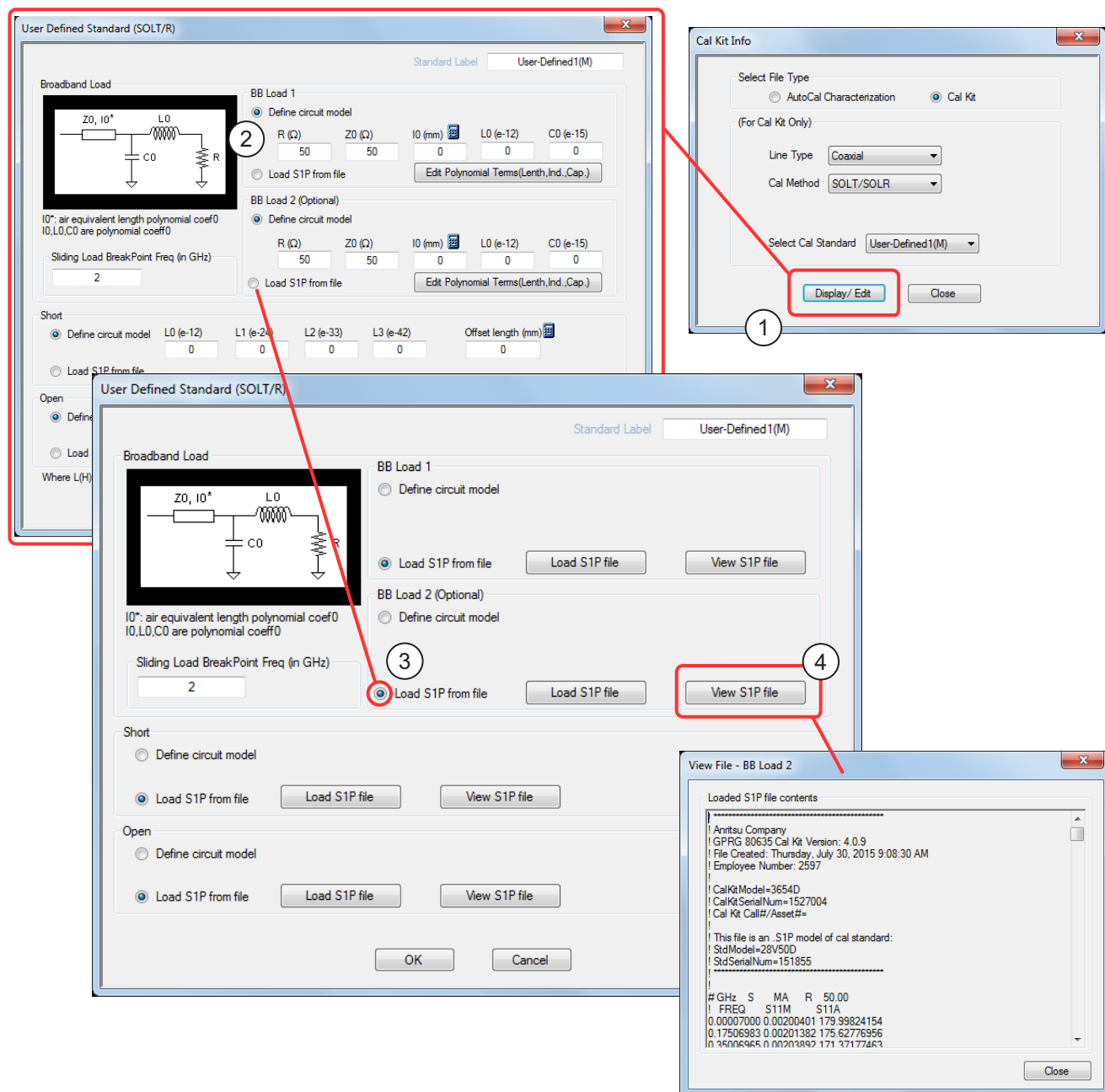
Where $L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3$ and $C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3$

OK

Figure 9-17. STANDARD INFO (SOLT/R) Standard Label (V-Conn (M)) Dialog Box

- If a User Defined Cal Standard is selected, the dialog appears as shown in [Figure 9-18 on page 9-27](#) where the user can define standards or load a .s1p file and view the file contents.

The user can view the contents of s1p files loaded in the different models by using the View S1P File button from all the USER DEFINED dialogs which are displayed for any Cal Setup (1-Port Cal, 2-Port Cal, 3-Port Cal and 4-Port Cal).



1. From the Cal Kit Info dialog, the user may choose a User Defined value as a Cal Standard. On clicking the Display/Edit button, the dialog above is displayed.
2. Here, the user can either Define Circuit Model (default) or:
3. Select the Load S1P From File radio button to load the file.
4. Once the file is loaded, the user can view the .s1p file contents of the corresponding model(s).

Figure 9-18. USER DEFINED Standard (SOLT/R) Dialog Box with S1P file Loaded and File View

Note The S1P files loaded are saved as part of saving .cha setup (similar to cal kit saving).

RESTORE DEFAULT COEF. Dialog Box – 2-Port VNAs

Use the RESTORE DEFAULT COEF. dialog box to restore firmware-stored Cal Kit Coefficients fields back to their default coefficients. For best performance, either install the cal kit coefficients file supplied with your cal kit, or enter your user-defined coefficients before starting this procedure. The restore function is not available to AutoCal kits as they do not have restorable characterization data.

Previous

- [“CAL KIT/AUTOCAL Menu – 2-Port VNAs” on page 9-19](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Restore Cal Kit Default Coef. | RESTORE DEFAULT COEF. Dialog Box

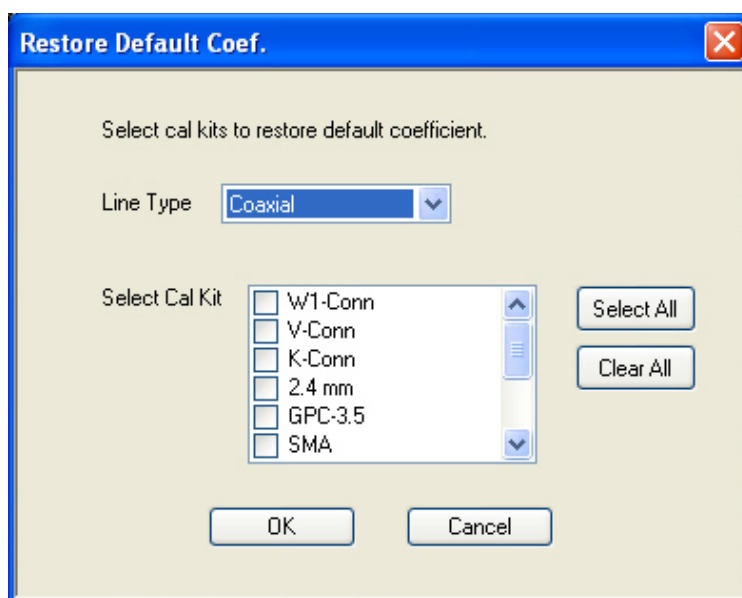


Figure 9-19. RESTORE DEFAULT COEF. (RESTORE DEFAULT COEFFICIENTS) Dialog Box

Instructions Restore Default Calibration Coefficients

Use this dialog to restore factory coefficients to available calibration kits.

1. Select the Line Type as required.
2. Select the Calibration Kits as required to be restored.
3. Click OK.

Available Selections

The table below shows the available calibration kits in the Select Cal Kit field of the dialog box. The available kits depend on the input combination selected for Line Type Media and Cal Method

Table 9-1. Calibration Kit Availability in the RESTORE DEFAULT COEF. Dialog Box

LINE TYPE Media Setting	CAL METHOD Setting	Available Calibration Kits
Coaxial	SOLT/SOLR	0.8 mm-Conn, W1-Conn, V-Conn, K-Conn, 2.4 mm, 2.4 mm V, GPC-3.5, SMA, N-Conn, N-Conn (75), GPC-7, 7/16, TNC
	SSLT	0.8 mm-Conn, W1-Conn
	SSST	0.8 mm-Conn, W1-Conn
	SOLT/R-SSST/R (for Broadband)	0.8 mm-Conn W1-Conn
Non-Dispersive	SOLT/SOLR	0.8 mm-Conn, W1-Conn, V-Conn, K-Conn, 2.4 mm, GPC-3.5, SMA, N-Conn, N-Conn (75), GPC-7, 7/16, TNC
	SSLT	0.8 mm-Conn, W1-Conn
	SSST	0.8 mm-Conn, W1-Conn
Microstrip	SOLT/SOLR	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
	SSLT	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
	SSST	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
Waveguide	SOLT/SOLR	No selections available
	SSLT	WR10, WR12, WR15
	SSST	No selections available

DEEMBED. TOOLS Menu – 2-Port VNAs

Use the DEEMBED. TOOLS menu to for network extraction and adapter removal.

Previous

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools| DEEMBED. TOOLS

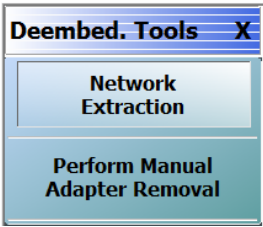
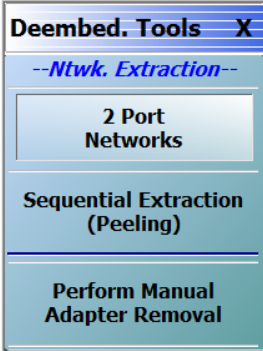
	<p>Deembed. Tools Menu (without Option 21)</p> <p>Shown at the left is the Deembed. Tools menu when Option 21 is not installed.</p> <p>Network Extraction</p> <p>Use network extraction to generate an S-Parameter (.s2p) file for a set of networks. The file can be embedded or de-embedded as required. Select displays the NETWORK EXTRACTION dialog box.</p> <ul style="list-style-type: none">• “NETWORK EXTRACTION Main Dialog – 2-Port VNAs (No Option 21)” on page 9-31 <p>Perform Manual Adapter Removal</p> <p>Adapter removal permits accurate measurement of non-insertable devices using an adapter of known electrical length and two full 12-term calibrations. Manual adapter removal extracts the behavior of the adapter from the setup after a successful calibration. Select displays the MANUAL ADAPTER REMOVAL dialog box.</p> <p>“PERFORM MANUAL ADAPTER REMOVAL Dialog Box – 2-Port VNAs” on page 9-56</p>
	<p>Deembed. Tools Menu (with Option 21)</p> <p>Shown at the left is the Deembed. Tools menu when Option 21 is installed.</p> <p><i>Ntwk. Extraction</i></p> <p>2 Port Networks</p> <p>Use network extraction to generate an S-Parameter (.s2p) file for a set of networks. The file can be embedded or de-embedded as required. Select displays the NETWORK EXTRACTION dialog box.</p> <ul style="list-style-type: none">• “NETWORK EXTRACTION Main Dialog – 2-Port VNAs (Option 21)” on page 9-32 <p>Sequential Extraction (Peeling) – Visible only with Option 21 Installed</p> <p>Sequential Extraction will construct a .s2p or .s4p file based on a localization of the selected parameter to isolate a given defect. This process can be used to sequentially de-embed and identify additional defects.</p> <ul style="list-style-type: none">• “NETWORK EXTRACTION Dialog Box – Sequential Extraction (Peeling) (Option 21)” on page 9-54 <p>Perform Manual Adapter Removal</p> <p>Adapter removal permits accurate measurement of non-insertable devices using an adapter of known electrical length and two full 12-term calibrations. Manual adapter removal extracts the behavior of the adapter from the setup after a successful calibration. Select displays the MANUAL ADAPTER REMOVAL dialog box.</p> <ul style="list-style-type: none">• “PERFORM MANUAL ADAPTER REMOVAL Dialog Box – 2-Port VNAs” on page 9-56

Figure 9-20. DEEMBED. TOOLS Menu – 2-Port VNAs

NETWORK EXTRACTION Main Dialog – 2-Port VNAs (No Option 21)

The network extraction features provide a method of generating an S-Parameter (.s2p) file for a set of networks. The.s2p file can then be embedded or de-embedded into the error coefficient of the VNA as required. Four extractable network configurations are provided.

Full Name

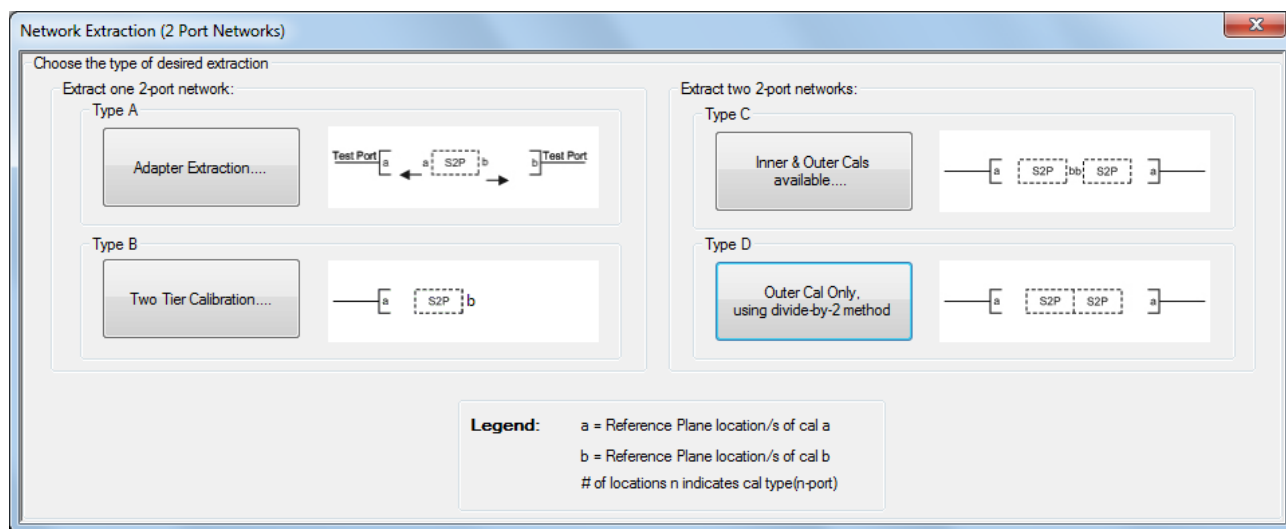
Network Extraction (2-Port Networks)

Previous

- [“DEEMBED. TOOLS Menu – 2-Port VNAs”](#) on page 9-30

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED.TOOLS | *Ntwk. Extraction* 2-Port Networks | NETWORK EXTRACTION (2-PORT NETWORKS) Dialog Box



NETWORK EXTRACTION Dialog Box – Choose the type of desired extraction from the four (4) buttons:

1. Type A – Extract one 2-Port Network – Adapter Extraction
2. Type B – Extract one 2-Port Network – Two Tier Calibration
3. Type C – Extract two 2-Port Networks – Inner and Outer Cals Available
4. Type D – Extract two 2-Port Networks – Outer Cal Only using divided-by-2 method

Figure 9-21. NETWORK EXTRACTION Dialog Box

NETWORK EXTRACTION Main Dialog – 2-Port VNAs (Option 21)

The network extraction features provide a method of generating an S-Parameter (.s2p) file for a set of networks. The .s2p file can then be embedded or de-embedded into the error coefficient of the VNA as required. Six extractable network configurations are provided. From the **Deembed. Menu, 2 Port Networks**, open the corresponding Network Extraction Dialogs. Each of these are explained with more detail in [Table 9-2 on page 9-33](#).

Full Name

Network Extraction (2-Port Networks)

Previous

- “[DEEMBED. TOOLS Menu – 2-Port VNAs](#)” on page 9-30

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED.TOOLS | *Ntwk. Extraction* 2-Port Networks | NETWORK EXTRACTION (2-PORT NETWORKS) Dialog Box

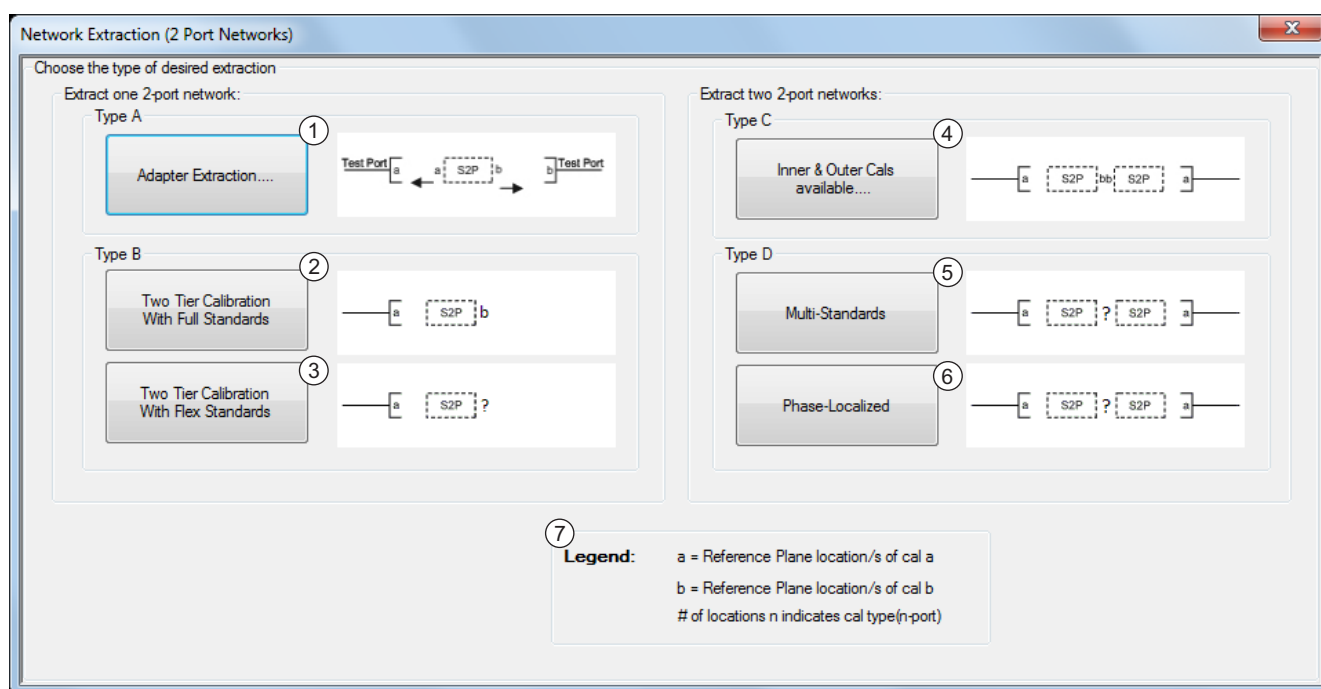


Figure 9-22. NETWORK EXTRACTION Dialog Box (1 of 2)

NETWORK EXTRACTION Dialog Box – Choose the type of desired extraction from the six (6) buttons:

1. Type A – Extract one 2-Port Network – Adapter Extraction
2. Type B – Extract one 2-Port Network – Two Tier Calibration With Full Standards
3. Type B – Extract one 2-Port Network – Two Tier Calibration With Flex Standards (**Available only with Option 21 Universal Fixture Extraction installed**)
4. Type C – Extract two 2-Port Networks – Inner and Outer Cals Available
5. Type D – Extract two 2-Port Networks – Multi-Standard (**Available only with Option 21 Universal Fixture Extraction installed**)
6. Type D – Extract two 2-Port Networks – Phase-Localized (**Available only with Option 21 Universal Fixture Extraction installed**)
7. Legend for Dialog Box Figures:
 - a – Location of one or more Reference Planes for Cal A
 - b – Location of one or more Reference Planes for Cal B
 - # – Locations “n” indicated Cal Type for n-Port

Figure 9-22. NETWORK EXTRACTION Dialog Box (2 of 2)

Instructions

The network extraction feature provides the method for generating the S-Parameter for a given set of networks. This generated.s2p file can then be embedded or de-embedded into the error coefficient for the VNA at a later stage. The dialog box provides four extraction choices accessible via large buttons. Each choice provides a separate configuration dialog box as described in the sections below.

Table 9-2. Network Extraction Type Definitions

Network Extraction Type	Extract These Networks	Extraction Method	Cross Reference to Dialog Box Description
Type A	One 2-Port Network	Adapter Extraction	“NETWORK EXTRACTION Dialog Box – Type A” on page 9-35
Type B	One 2-Port Network	Two Tier Calibration with Full Standards	“NETWORK EXTRACTION Dialog Box – Type B (No Option 21)” on page 9-37
		Two Tier Calibration with Flexible Standards (Available only with Option 21) ^a	“NETWORK EXTRACTION Dialog Box – Type B – Flex Standards (Option 21)” on page 9-39
Type C	Two 2-Port Networks	Inner and Outer Cals Available	“NETWORK EXTRACTION Dialog Box – Type C” on page 9-45
Type D	Two 2-Port Networks	Outer Cal only using Divide-by-Two Method	“NETWORK EXTRACTION Dialog Box – Type D (No Option 21)” on page 9-47
		Outer Cal only using Divide-by-Two Method (Multi-Standards) (Available only with Option 21) ^a	“NETWORK EXTRACTION Dialog Box – Type D – Multi-Standards (Option 21)” on page 9-49
		Phase Localized (Available only with Option 21) ^a	“NETWORK EXTRACTION Dialog Box – Type D – Phase-Localized (Option 21)” on page 9-52
Sequential Extraction	–	Sequential Extraction (Peeling) (Available only with Option 21) ^a	“NETWORK EXTRACTION Dialog Box – Sequential Extraction (Peeling) (Option 21)” on page 9-54

- a. For more information on Type B, Type D, and Sequential Extraction with Option 21 installed, refer to the Measurement Guide (10410-00218).

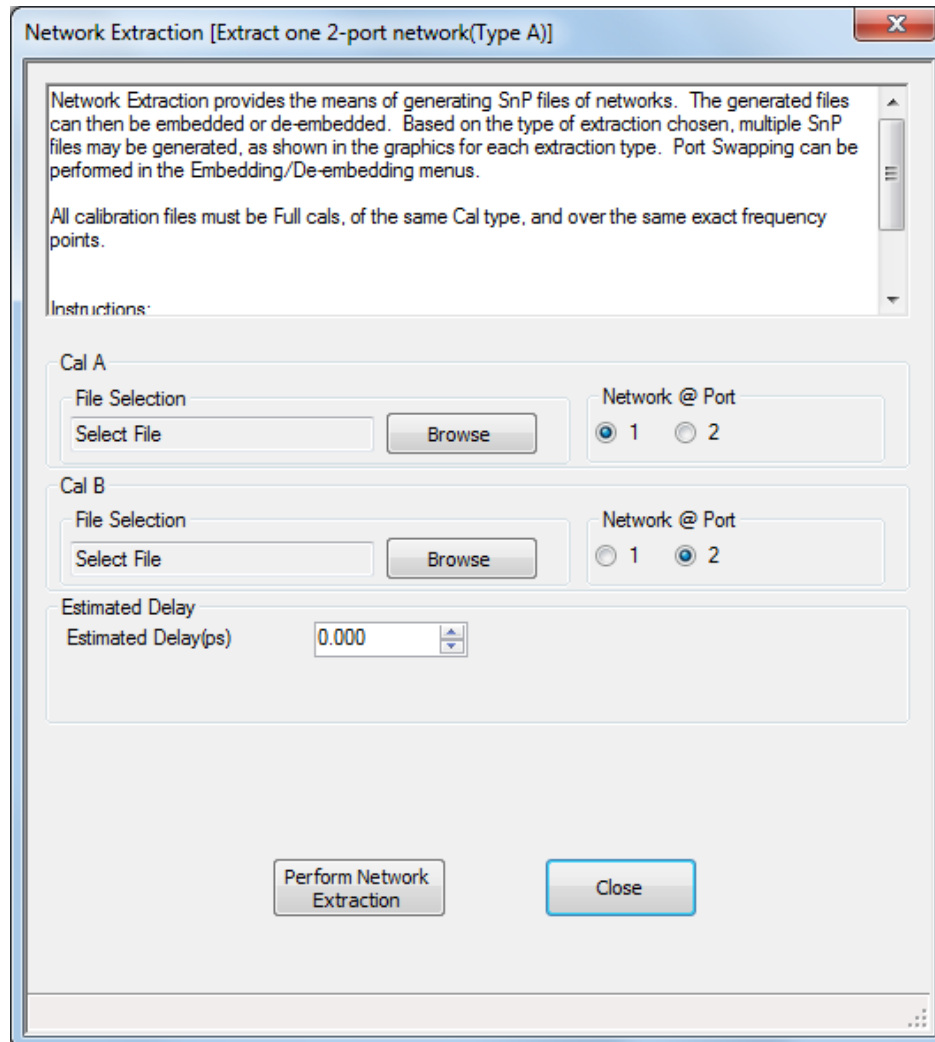
NETWORK EXTRACTION Dialog Box – Type A

Previous

- “[NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(No Option 21\)](#)” on page 9-31
- “[NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(Option 21\)](#)” on page 9-32

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | Network Extraction – 2-Port Networks | NETWORK EXTRACTION (2-PORT NETWORKS) Dialog Box | Type A – Adapter Extraction | NETWORK EXTRACTION [EXTRACT ONE 2-PORT NETWORK (TYPE A)]



Use Type A Network Extraction to extract one (1) 2-Port network using adapter extraction.

Figure 9-23. NETWORK EXTRACTION Dialog Box – Type A – Adapter Extraction

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

All calibration files must be full cals, of the same Cal type, and over the same exact frequency points.

Instructions

1. Use the **Browse** button to define the Cal A file path. Repeat to define the Cal B file path.
2. If necessary, enter the **Estimated Delay** in ps.
3. Select **Perform Network Extraction** to perform the extraction.
4. If the extraction is successful, follow the prompt to save the generated SnP files/s.
5. After the extraction, the focus auto-returns to the [“DEEMBDED. TOOLS Menu – 2-Port VNAs”](#).
6. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network Configuration** panel to recall the .SnP files and configure the network.

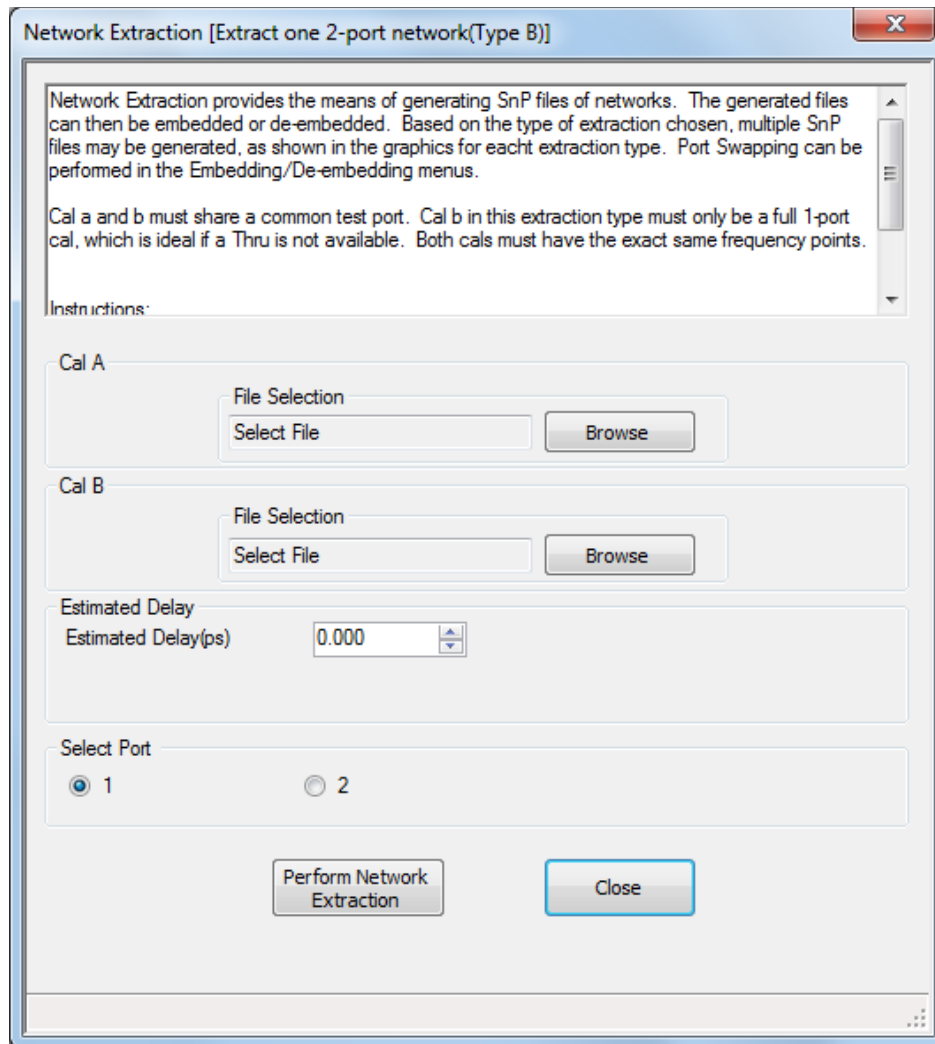
NETWORK EXTRACTION Dialog Box – Type B (No Option 21)

Previous

- “NETWORK EXTRACTION Main Dialog – 2-Port VNAs (No Option 21)” on page 9-31
- “NETWORK EXTRACTION Main Dialog – 2-Port VNAs (Option 21)” on page 9-32

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | Network Extraction – 2-Port Networks | NETWORK EXTRACTION (2-PORT NETWORKS) Dialog Box | Extract One 2-Port Network – Type B – Two Tier Calibration With Full Standards (Type B)] | Network Extraction [Extract One 2-Port Network (Type B)]



Use Type B Network Extraction to extract one (1) 2-Port network using available two tier calibration.

Figure 9-24. NETWORK EXTRACTION Dialog Box – Type B – Two Tier Calibration – With Full Standards

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

Cal A and Cal B must share a common test port. Cal B in this extraction type must only be a full 1-port cal, which is ideal if a Thru is not available. Both cals must have the exact same frequency points.

Instructions

1. Use the **Browse** button to select the appropriate cal file(s).
2. If necessary, enter the **Estimated Delay** in ps.
3. Select **Perform Network Extraction** to perform the extraction.
4. If the extraction is successful, follow the prompt to save the generated SnP file(s).
5. After the extraction, the focus auto-returns to the [“DEEMBDED. TOOLS Menu – 2-Port VNAs”](#).
6. After the .s2p files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .s2p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type B – Flex Standards (Option 21)

Previous

- [“NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(Option 21\)” on page 9-32](#)

Prerequisites

- Option 21 Universal Fixture Extraction installed
- A calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* – 2 Port Networks | NETWORK EXTRACTION dialog box | Extract One 2-Port Network – Type B – Two Tier Calibration With Flex Standards | [Extract one 2-Port Network (Type B – Flex Standards)]

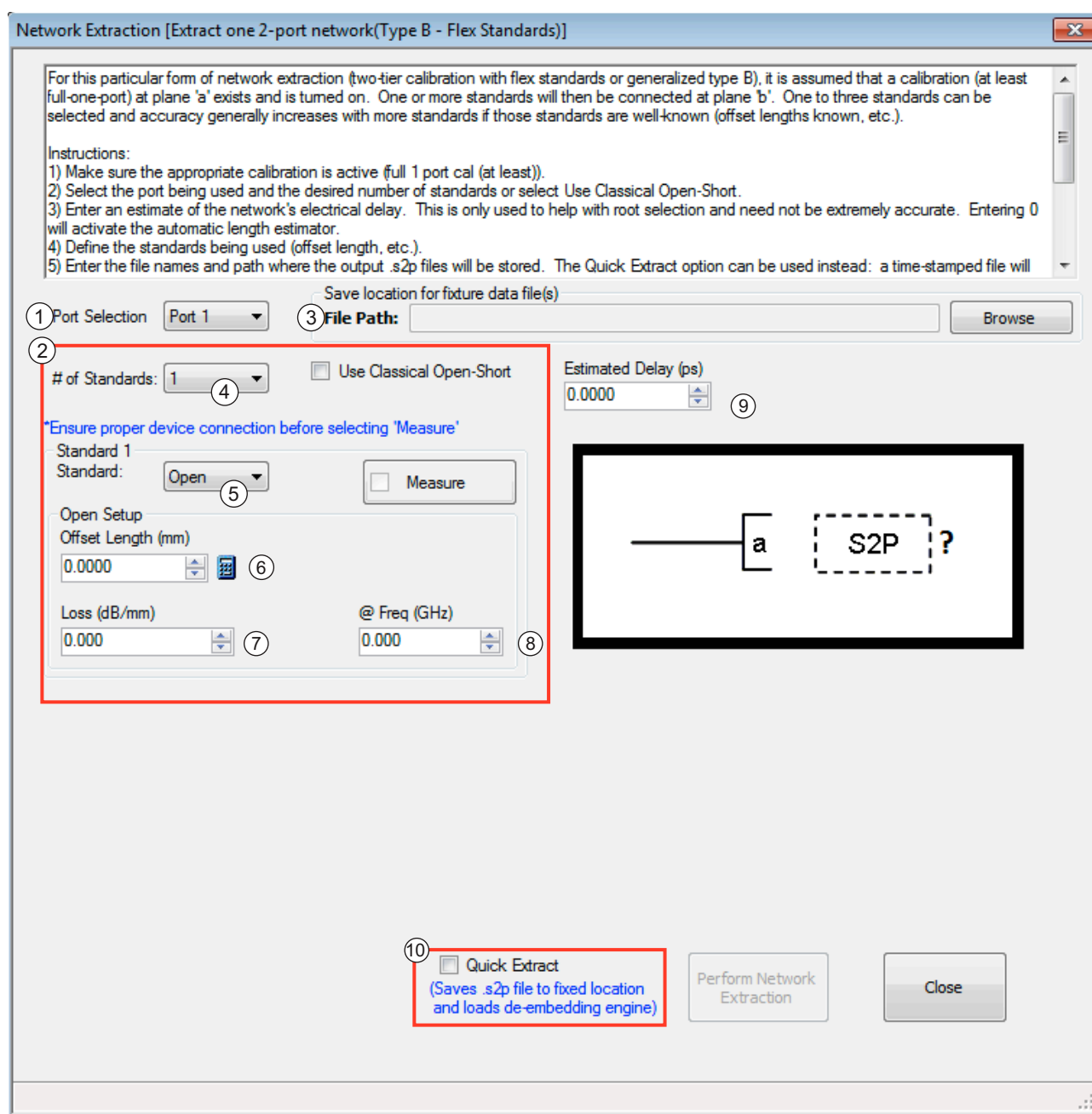
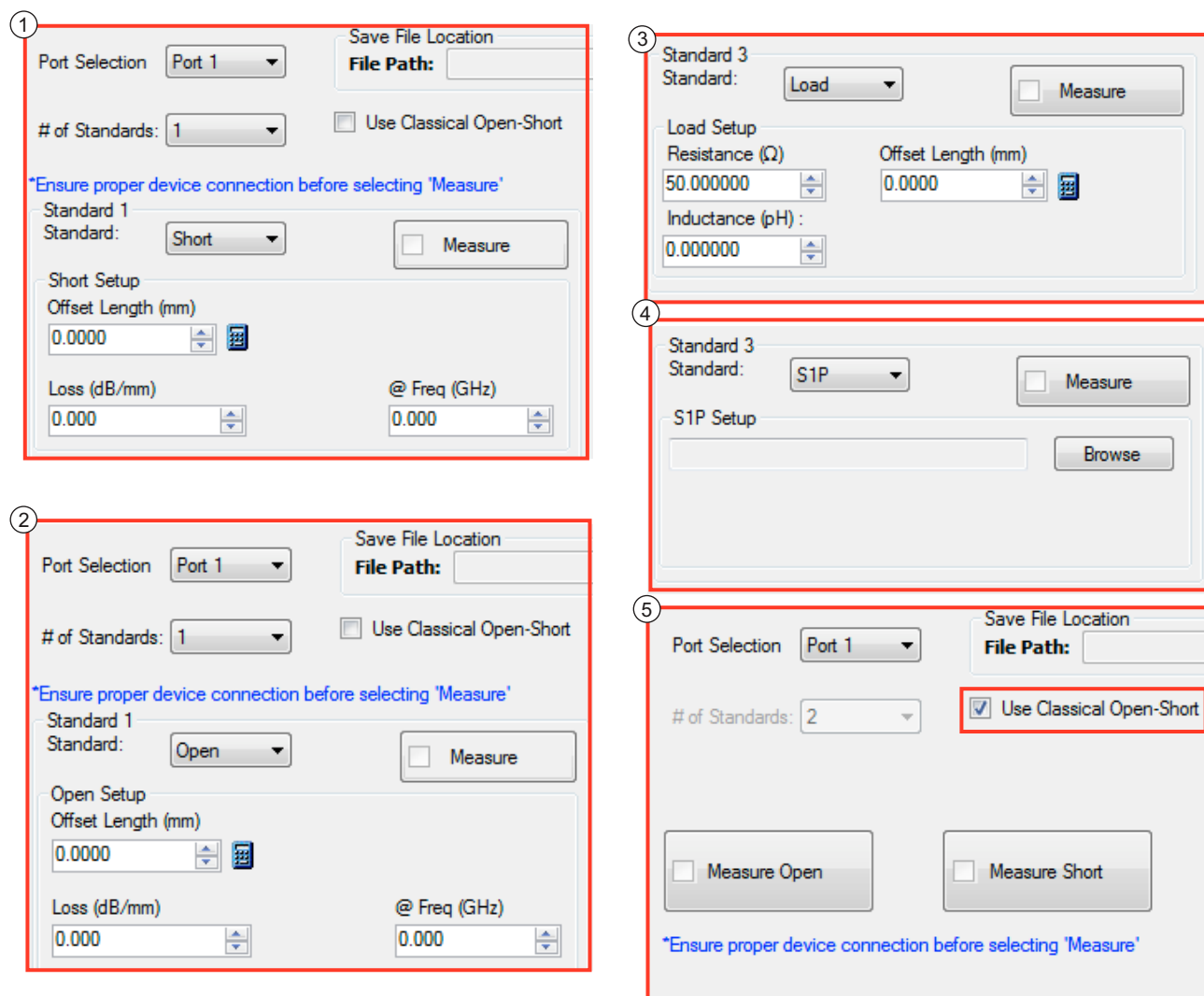


Figure 9-25. NETWORK EXTRACTION Dialog Box – Type B – Two Tier Calibration With Flex Standards (1 of 2)

Default view shown above.

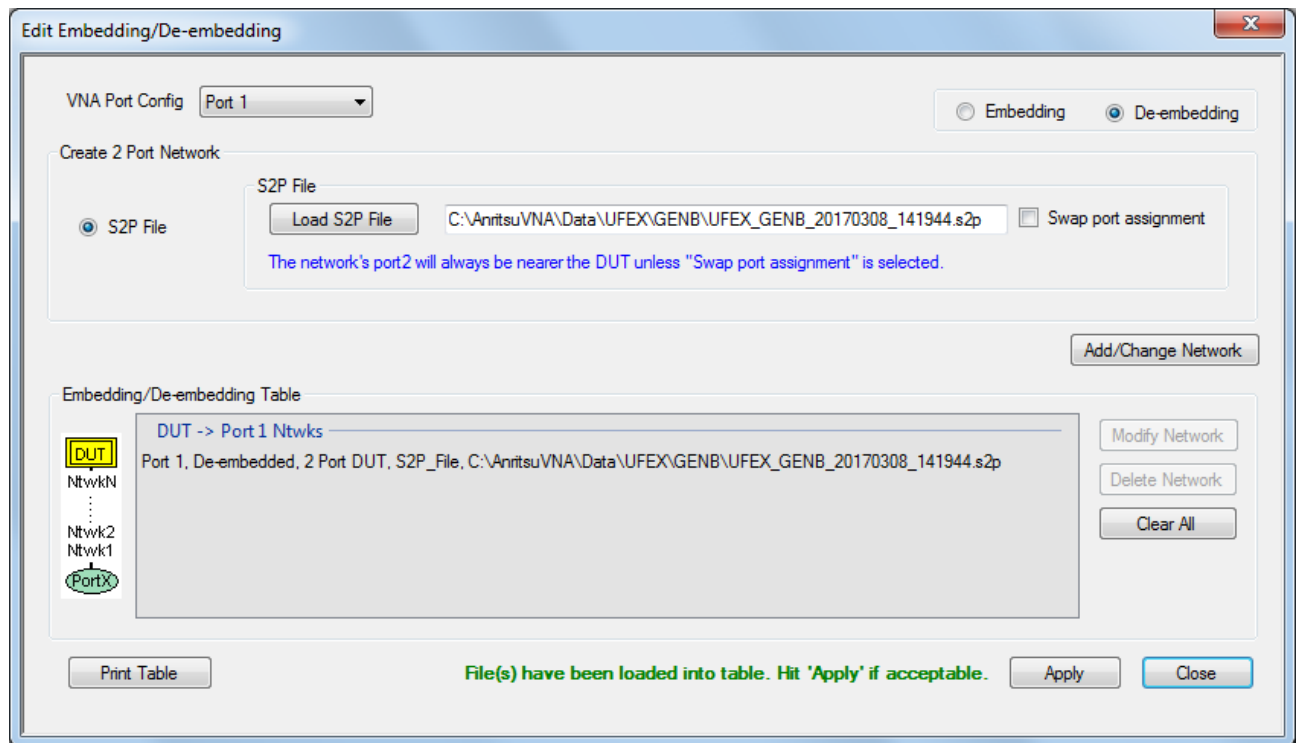
1. **Port Selection:** Two ports available (with 2-Port VectorStar)
2. See [Figure 9-26](#) for available extraction options based on the **Number of Standards** selected, or whether **Use Classical Open Short** box is checked.
3. **File Path:** Location for saving file
4. **# of Standards:** Three standards available; corresponding setup fields appear for up to three standards.
5. **Standard (1, 2, 3) Standard:** Selections for up to four standard types; **Short, Open, Load, or S1P file** (Provides File Browse navigation for .s1p files).
6. **Short or Open or Setup:** Setup field for Offset Length (mm)
When Load is Selected: Load Setup has setup fields for Resistance, Inductance, and Offset Length (mm)
7. **Loss:** The loss per unit offset length of this standard, expressed in dB/mm at the reference frequency (fref) specified in the next entry. The loss (at other frequencies) scales as $\sqrt{f/f_{ref}}$ in dB terms. If fref=0, the loss is assumed to be independent of frequency.
8. **@ Frequency:** The reference frequency ((fref) in GHz) for the loss described above.
9. **Estimated Delay (ps):** An estimate of the network's electrical delay is entered. This is only used to help with root selection and need not be extremely accurate. Entering 0 will activate the automatic length estimator.
10. Checking **Quick Extract** saves .s2p file to a fixed location and loads deembedding dialog ([Figure 9-27](#)).

Figure 9-25. NETWORK EXTRACTION Dialog Box – Type B – Two Tier Calibration With Flex Standards (2 of 2)



1. Selecting **Short** from the dropdown opens the setup options as shown.
2. Selecting **Open** from the dropdown opens the setup options as shown.
3. Selecting **Load** from the dropdown opens the setup options as shown.
4. Selecting **S1P** from the dropdown opens the setup options as shown.
5. Checking the **Use Classical Open-Short** box opens the setup options as shown. This selection sets up a special case of the 2-standards scenario where a zero offset open and short are used and the fixture arm is assumed to be electrically short. When selected, dialog options adjust as shown.

Figure 9-26. Type B – Two Tier Calibration With Flex Standards Extraction Setup Options



If the option **Quick Extract** is selected, and after **Perform Network Extraction** is executed, the above dialog appears with a pre-loaded Networks table using newly created .SnP files.

Figure 9-27. Quick Extract – Edit Embedding/De-embedding Dialog

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

For this particular form of network extraction (two-tier calibration with flex standards or generalized type B), it is assumed that a calibration (at least full-one-port) at plane 'a' exists and is turned on. One or more standards will then be connected at plane 'b'. One to three standards can be selected and accuracy generally increases with more standards if those standards are well-known (offset lengths known, etc.).

Procedure (Use Classical Open-Short *Is Not* Selected)

1. Make sure the appropriate calibration is active (full 1 port cal (at least)).
2. Select the port being used and the desired number of standards.
3. Enter an estimate of the network's electrical delay. This is only used to help with root selection and need not be extremely accurate. Entering 0 will activate the automatic length estimator.
4. Define the standards being used (offset length, etc.). Note if two standards are of the same type, they should have different parameters.
5. Enter the file names and path where the output .s2p files will be stored. The **Quick Extract** option can be used instead: a time-stamped file will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files. Remember to keep track of available disk space.
6. Connect each standard sequentially and click the appropriate **Measure** button when ready. When the sweep is complete, a check will appear in the box and the button will turn green.
7. When all desired standards have been measured, click on **Perform Network Extraction**. If successful, a confirmation dialog will appear.
8. After the extraction, the focus auto-returns to the **“DEEMBED. TOOLS Menu – 2-Port VNAs”**.

9. If Quick Extract was not selected, after the .s2p files have been saved, go to Measurement | Edit Embed/De-embed | Edit Network configuration panel to recall the .s2p files and configure the network.

Procedure (Use Classical Open-Short *Is* Selected)

1. Select the port being used.
2. Enter an estimate of the network's electrical delay. This is only used to help with root selection and need not be extremely accurate. Entering 0 will activate the automatic delay estimator.
3. Enter the file names where the output .s2p files will be stored. The Quick Extract option can be used instead: the file will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files.
4. Connect each standard sequentially and click the appropriate Measure button when ready. When the sweep is complete, a check will appear in the box and the button will turn green.
5. When all desired standards have been measured, click on Perform Network Extraction.
6. After the extraction, the focus auto-returns to the “[DEEMBDED. TOOLS Menu – 2-Port VNAs](#)”.
7. If Quick Extract was not selected, after the .s2p files have been saved, go to Measurement | Edit Embed/De-embed | Edit Network configuration panel to recall the .s2p files and configure the network.

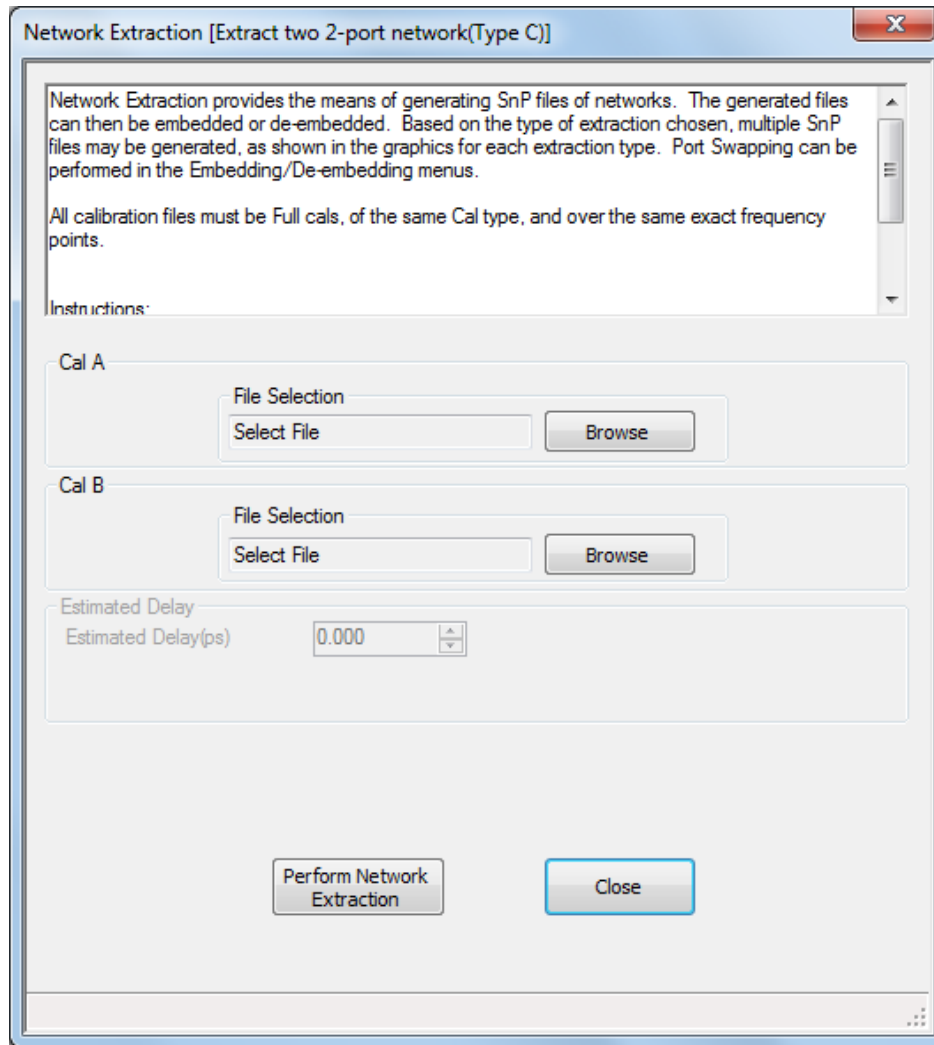
NETWORK EXTRACTION Dialog Box – Type C

Previous

- “[NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(No Option 21\)](#)” on page 9-31
- “[NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(Option 21\)](#)” on page 9-32

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | *Ntwk. Extraction* – 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract Two 2-Port Networks | Extract Two 2-Port Networks – Type C – Inner and Outer Cals Available | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE C)] dialog box



Use Type C Network Extraction to extract two (2) 2-Port networks using available Inner and Outer calibrations.

Figure 9-28. NETWORK EXTRACTION Dialog Box – Type C – Inner and Outer Cals

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

All calibration files must be Full cals, of the same Cal type, and over the same exact frequency points.

Instructions:

1. Use the **Browse** button to define the appropriate cal file(s) path. Note that CalB is the inner file and CalA is the outer file.
2. Select **Perform Network Extraction** to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP files(s).
4. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 2-Port VNAs”](#).
5. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .SnP files and configure the network.

NETWORK EXTRACTION Dialog Box – Type D (No Option 21)

Previous

- “[NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(No Option 21\)](#)” on page 9-31

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* – 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract Two 2-Port Networks | Extract Two 2-Port Networks – Type D – Outer Cal Only, using divide-by-2 method | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE D)] dialog box

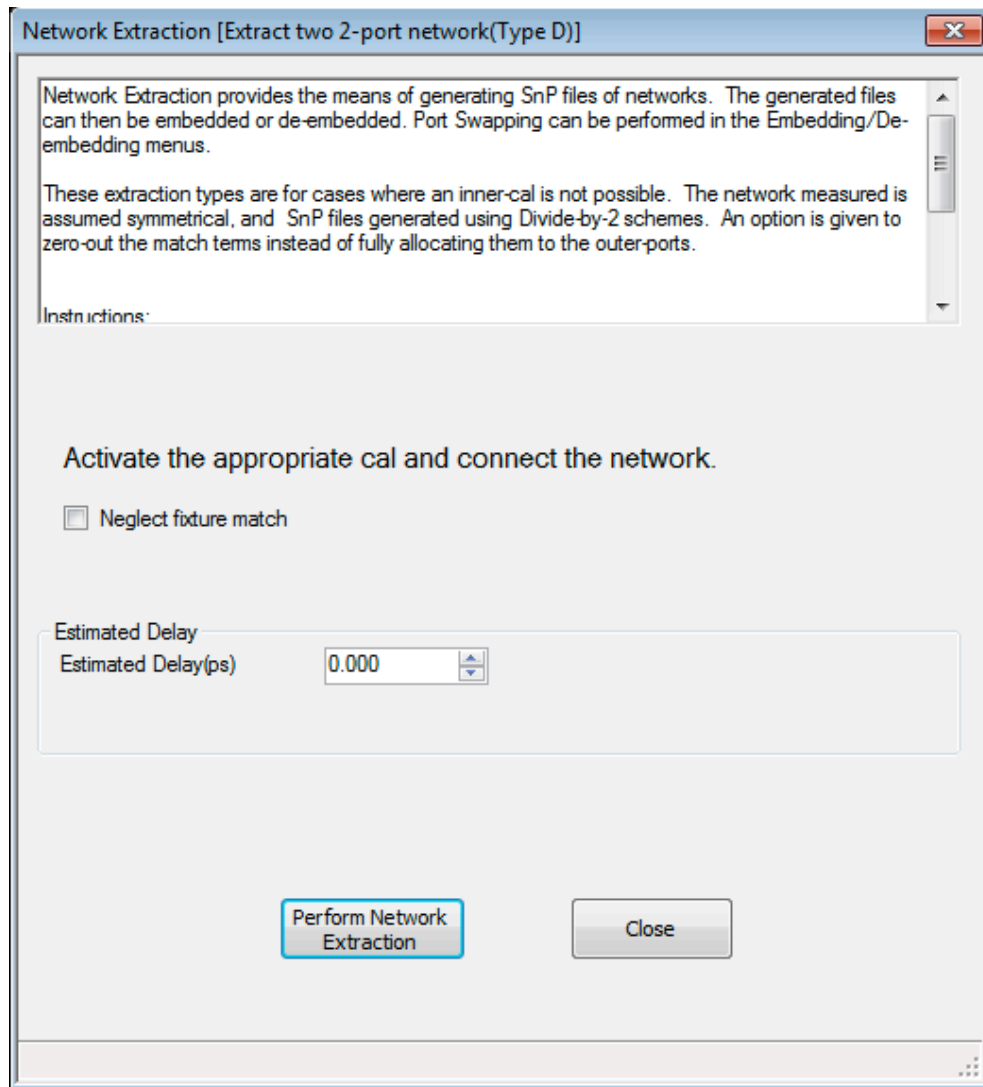


Figure 9-29. NETWORK EXTRACTION Dialog Box – Type D (Without Option 21)

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to neglect fixture match terms instead of fully allocating them to the outer-ports.

Procedure

1. Make sure the appropriate calibration is active.
2. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Connect the network and select **Perform Network Extraction**.
4. If the extraction is successful, follow the prompt to save the generated SnP files/s.
5. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .SnP files and configure the network.z

NETWORK EXTRACTION Dialog Box – Type D – Multi-Standards (Option 21)

Full Name

Network Extraction – Type D – Multi-Standards

Previous

- “[NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(Option 21\)](#)” on page 9-32

Prerequisites

- Option 21 Universal Fixture Extraction installed
- A calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | *Ntwk. Extraction* – 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract Two 2-Port Networks – Type D – Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE D-MULTI-STANDARDS)] Dialog Box

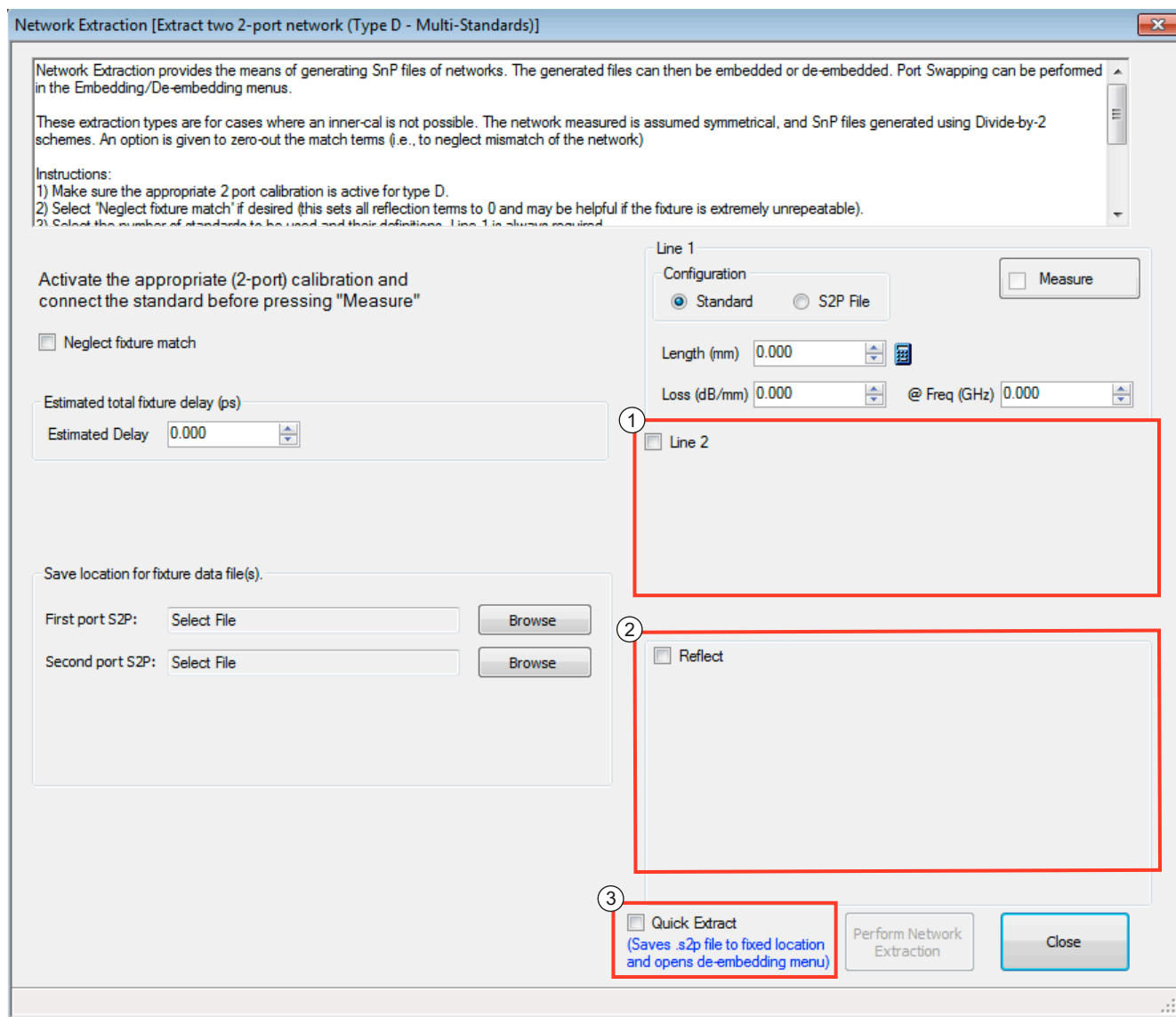
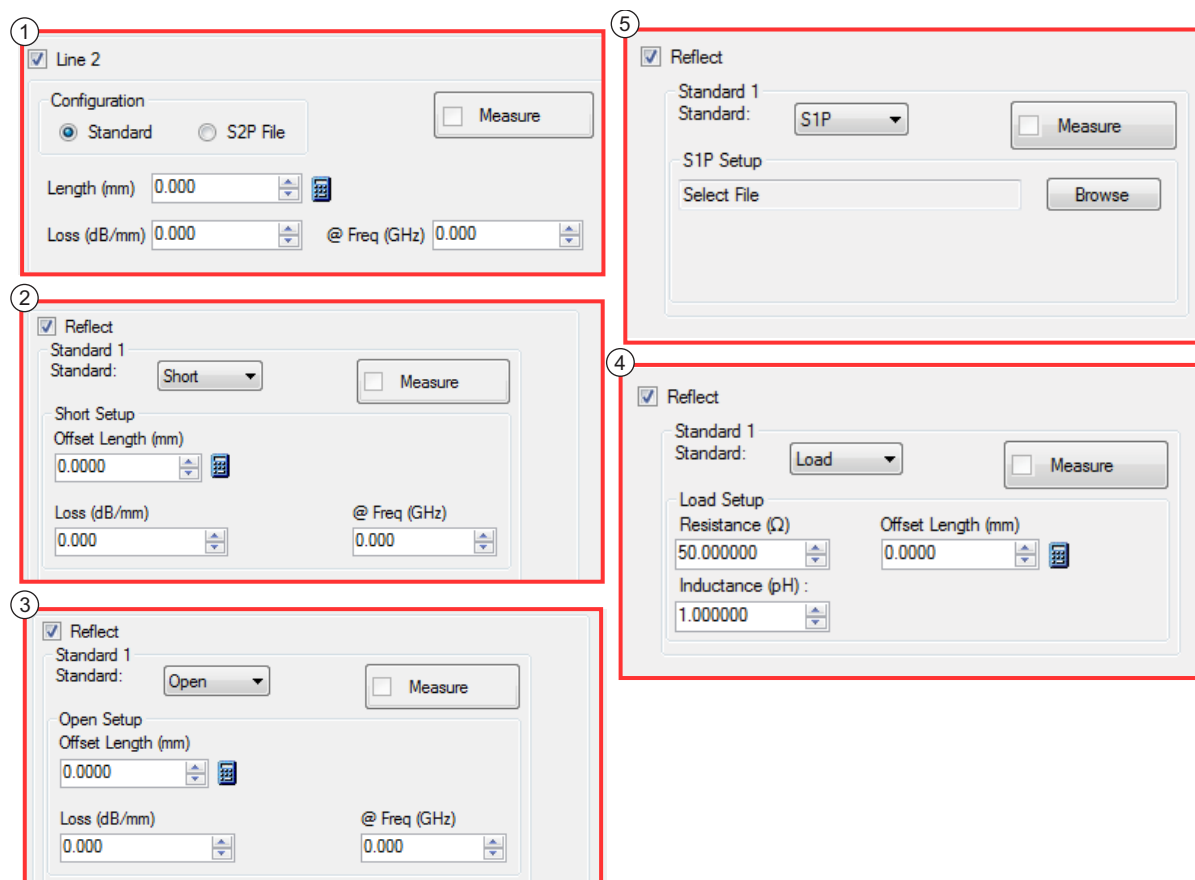


Figure 9-30. NETWORK EXTRACTION Dialog Box – Type D – Multi-Standards

1. Checking **Line 2 Length** box opens entry window as shown in [Figure 9-31](#).
2. Checking **Reflect** box opens various options related to Reflect as shown in [Figure 9-31](#)
3. Checking **Quick Extract** saves .s2p file to a fixed location and loads deembedding dialog ([Figure 9-27](#)).

Figure 9-30. NETWORK EXTRACTION Dialog Box – Type D – Multi-Standards



1. Checking **Line 2 Length** box opens a dialog to adjust length and frequency-dependent line loss.
2. Checking **Reflect** box and selecting **Short** from the dropdown opens the dialog as shown.
3. Checking **Reflect** box and selecting **Open** from the dropdown opens the dialog as shown.
4. Checking **Reflect** box and selecting **Load** from the dropdown opens the dialog as shown.
5. Checking **Reflect** box and selecting **S1P** from the dropdown opens the dialog as shown.

Figure 9-31. TYPE D – Multi Standards Dialog – Extraction Selections

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

Application

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to neglect fixture match terms (i.e., to neglect mismatch of the network).

Instructions

1. Make sure the appropriate 2-port calibration is active for Type D.
2. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Select the number of standards to be used and their definitions. Line 1 is always required.
4. Connect each standard (or standards in the case of **Reflect**; all ports must have the Reflect connected simultaneously) before pressing **Measure**.
5. Enter the file names and path where the output .s2p files will be stored. The **Quick Extract** option can be used instead: time stamped files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files. Remember to keep track of available disk space.
6. When all fields have been entered and all standards measurements have been completed (all of the check boxes marked and the buttons turn green), press **Perform Network Extraction**. If successful, a confirmation dialog will appear.
7. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 2-Port VNAs”](#).
8. If Quick Extract was not selected, after the .s2p files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .s2p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type D – Phase-Localized (Option 21)

Previous

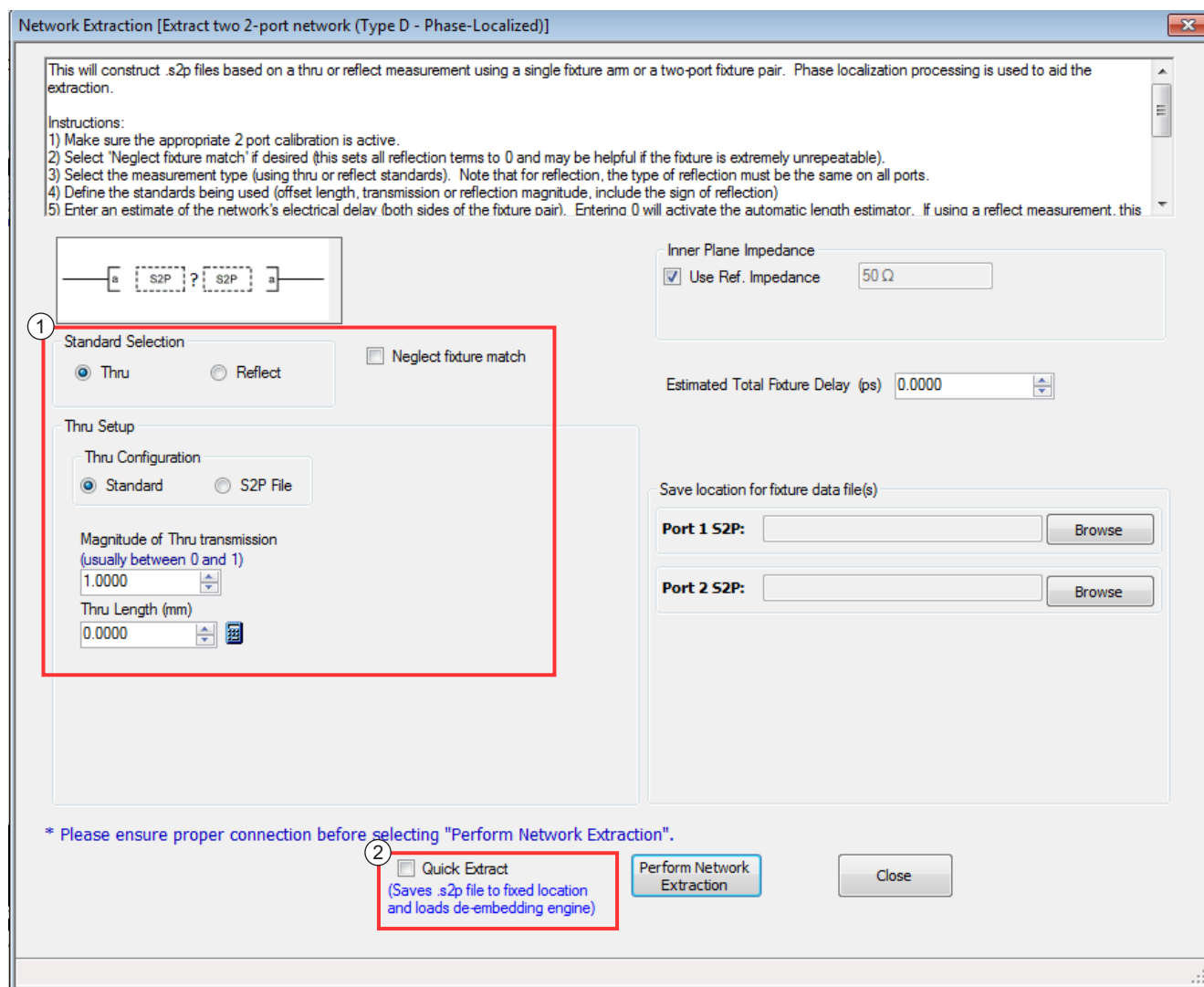
- “[NETWORK EXTRACTION Main Dialog – 2-Port VNAs \(Option 21\)](#)” on page 9-32

Prerequisites

- Option 21 Universal Fixture Extraction installed
- A calibration needs to exist and be active.

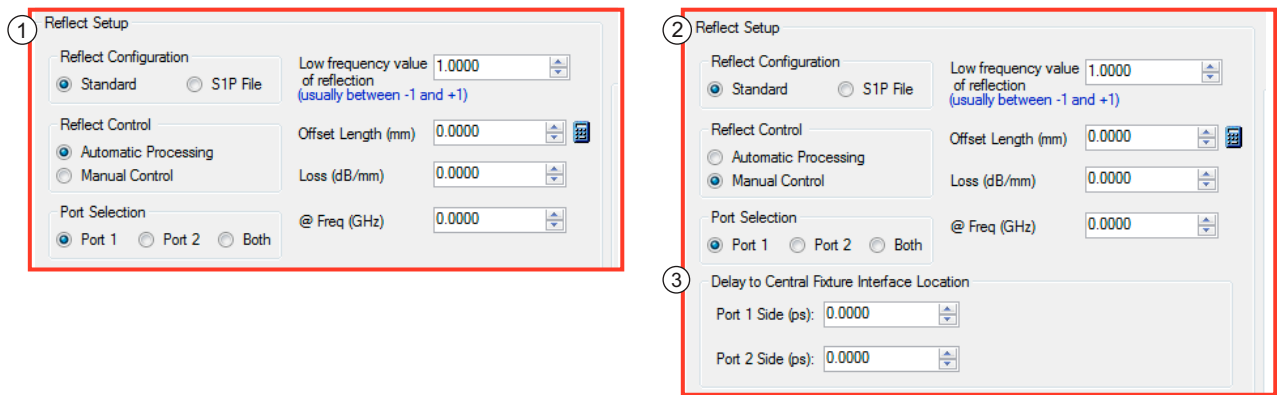
Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMB. TOOLS – *Ntwk. Extraction* | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract Two 2-Port Networks | Phase-Localized | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS – (Type D – PHASE-LOCALIZED)] Dialog Box



1. Default dialog settings shown with **Thru** selected. For **Reflect** variants of this dialog, see [Figure 9-33](#) on page 9-53.
2. Checking **Quick Extract** saves .s2p file to a fixed location and loads deembedding dialog ([Figure 9-27](#)).

Figure 9-32. NETWORK EXTRACTION Dialog – Type D – Phase-Localized with Thru Standard Selected



1. Checking **Reflect** and selecting **Automatic Processing** opens the dialog as shown.
2. Checking **Reflect** and selecting **Manual Control** opens the dialog as shown.
3. Note that when Manual Control is selected, the Delay to Central Fixture Interface Location is enabled.

Figure 9-33. TYPE D – Phase-Localized Dialog – Reflect Extraction Setup Variations

Description

This will construct .s2p files based on a thru or reflect measurement using a single fixture arm or a two-port fixture pair. Phase localization processing is used to aid the extraction.

To do this phase localization, the frequency list must be relatively uniform (no CW or log sweep and segmented sweep step sizes should not deviate more than 3% from the mean) and the range should be large enough that the total fixture length (ns) $> 5/(\text{frequency range (GHz)})$. The frequency step should be small enough that the total fixture length (ns) $< 0.3/(\text{Frequency step (GHz)})$.

Instructions:

1. Make sure the appropriate 2-port calibration is active for Type D (or 1-port for reflect-based version on a single port).
2. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Select the measurement type (using thru or reflect standards). Note that for **Reflection**, the type of reflection must be the same on all ports.
4. Define the standards being used (offset length, transmission or reflection magnitude, include the sign of reflection)
5. Enter an estimate of the network's electrical delay (both sides of the fixture pair). Entering 0 will activate the automatic length estimator. If using a **Reflect** measurement, this can be further refined selecting **Manual Control** where the fixture halves can be treated as asymmetric and only one side can be done if desired.
6. Enter the file names where the output .s2p files will be stored. The **Quick Extract** option can be used instead: time stamped files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files. Remember to keep track of available disk space.
7. When all fields have been entered and proper connection of the standard or standards have been made, click on **Perform Network Extraction**. If successful, files will automatically be saved and a confirmation dialog will appear.
8. After the extraction, the focus auto-returns to the **“DEEMBED. TOOLS Menu – 2-Port VNAs”**.
9. If **Quick Extract** was not selected, after the .s2p files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .s2p files and configure the network.

NETWORK EXTRACTION Dialog Box – Sequential Extraction (Peeling) (Option 21)

Sequential Extraction will construct a .s2p or .s4p file based on a localization of the selected parameter to isolate a given defect. This process can be used to sequentially de-embed and identify additional defects.

Full Name

Sequential Extraction (Peeling)

Previous

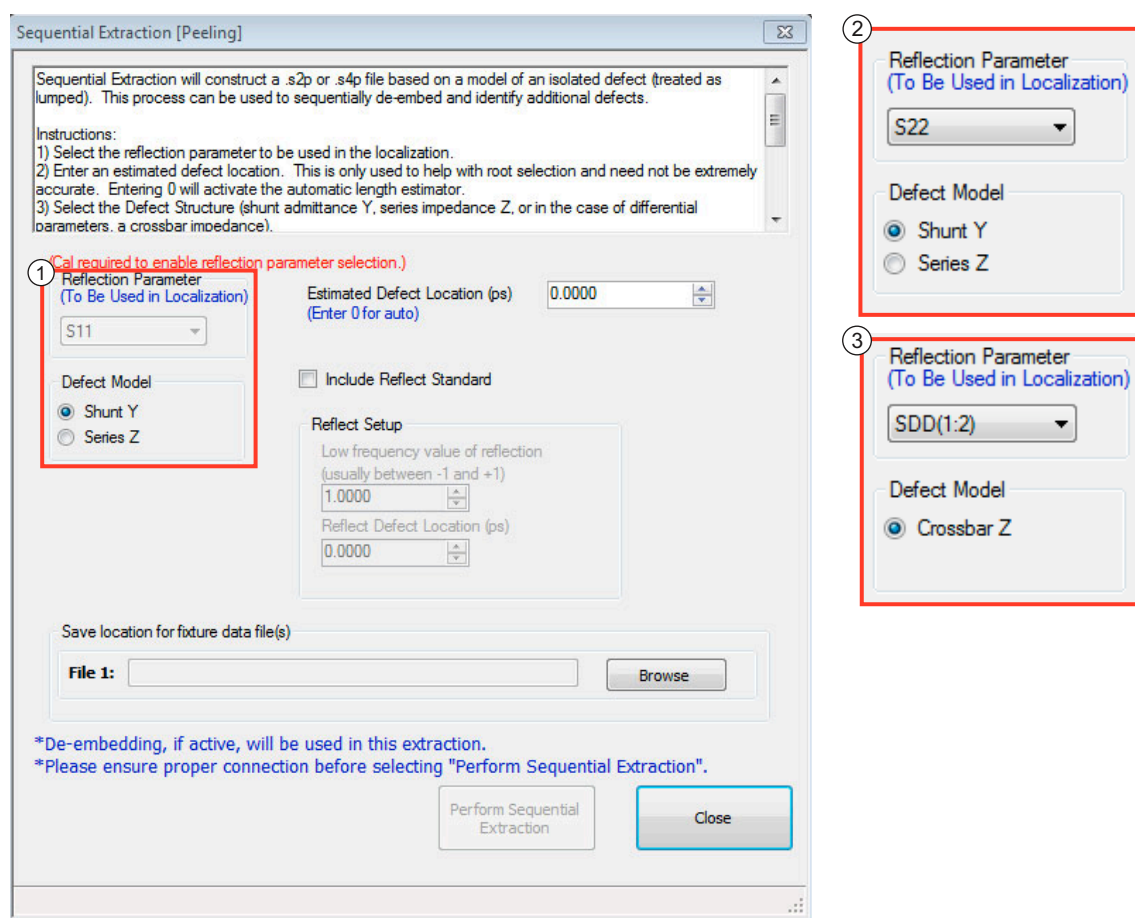
- “DEEMBED. TOOLS Menu – 2-Port VNAs” on page 9-30

Prerequisites

- Option 21 Universal Fixture Extraction installed

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | Sequential Extraction (Peeling) | SEQUENTIAL EXTRACTION (PEELING) Dialog Box



1. Reflection parameter selected is S11
2. Reflection parameter selected is S22
3. Reflection parameter selected is SDD(1:2), Mixed Mode Selection Defect Model is Crossbar Z, file type would be .s4p

Figure 9-34. NETWORK EXTRACTION – SEQUENTIAL EXTRACTION (PEELING) Dialog Box

Description

Sequential Extraction will construct a .s2p or .s4p file based on a model of an isolated defect (treated as lumped). This process can be used to sequentially de-embed and identify additional defects.

Notes

- The Reflection Parameter selection is dynamic and will be based on active cal settings. **Note:** *If no active cal is in place or cal is off, the Reflection Parameter drop down list will be disabled with a note indicating a calibration requirement.*
- If the Reflection Parameter is switched between standard and mixed, the file name will be cleared. The Browse button on file name will bring up appropriate filter (.s2p or .s4p) based on current selected reflect parameter.
- When Perform Sequential Extraction is selected, measurement will be taken and the processing of the mixed mode will occur internally.

Instructions

1. Select the Reflection Parameter to be used in the localization. **Note:** *If no active cal is in place or cal is off, the Reflection Parameter drop down list will be disabled with a note indicating requirement.*
2. Enter an estimated defect location. This is only used to help with root selection and need not be extremely accurate. Entering 0 will activate the automatic length estimator.
3. Select the Defect Model (shunt admittance Y, series impedance Z, or in the case of differential parameters, a crossbar impedance).
4. Select Include Reflect Standard to include the reflect standard to help compensate for loss between the reference plane and the defect of interest. The location of the reflect standard should be entered (enter 0 for auto estimation; the largest response will be assumed to be the reflect standard and, if auto length is also used for the defect, the next larger and closer-in response will be assumed to be the defect). The reflection coefficient of the standard must be entered and is assumed to be real. Uncheck Include Reflect Standard to omit this correction.
5. When all fields have been entered and proper connection has been made, click on Perform Sequential Extraction.
6. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 2-Port VNAs”](#).

PERFORM MANUAL ADAPTER REMOVAL Dialog Box – 2-Port VNAs

Use manual adapter removal to extract the electrical behavior of an adapter after a successful calibration procedure. This is especially useful when the DUT configuration is not entirely compatible with common calibration procedures such as having different connectors at each end.

Previous

- [“CAL OPTIONS Menu – 2-Port VNAs” on page 9-15](#) or [“DEEMBED. TOOLS Menu – 2-Port VNAs” on page 9-30](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | Perform Manual Adapter Removal | MANUAL ADAPTER REMOVAL Dialog Box

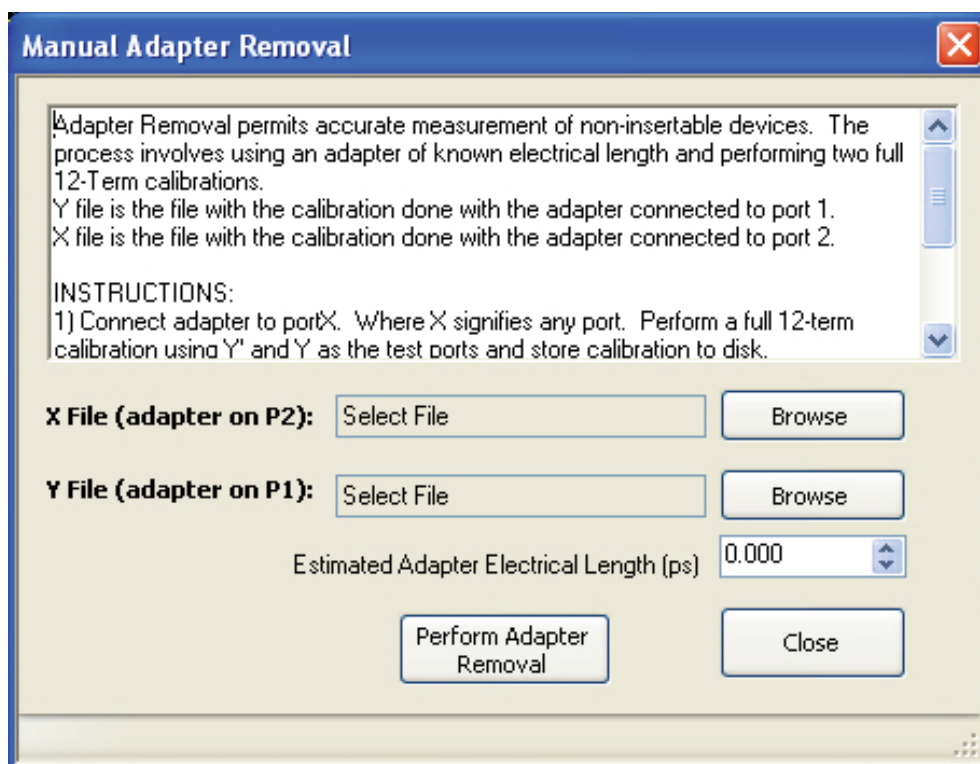


Figure 9-35. MANUAL ADAPTER REMOVAL Dialog Box

Instructions

Adapter removal permits accurate measurement of non-insertable devices. The process involves using an adapter of known electrical length and performing two full 12-term calibrations. In the procedure below, the Y file is the file with the calibration when the adapter connected to port 1 and the X file is the file with the calibration when the adapter connected to port 2.

Procedure

1. Connect the adapter to port X, where X signifies any port. Perform a full 12-term (Full 2 Port) calibration using Y' and Y as the test ports and store the calibration to disk.
2. Connect the adapter to port Y, where Y signifies any port that is not X. Perform a full 12-term calibration using X and X' as the test ports and store calibration to disk.
3. Call up the X and Y files.
4. Input the estimated adapter electrical length.
5. Select Perform Adapter Removal to remove adapter.

ALTERNATIVE CALS Menu – 2-Port VNAs

Use the ALTERNATIVE CALS menu to hybridize and merge calibrations.

Previous

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals| ALTERNATIVE CALS

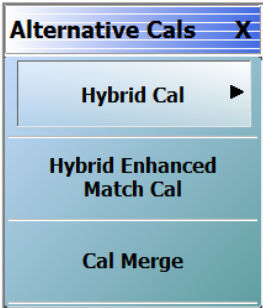
	<p>Hybrid Cal</p> <p>Hybrid calibrations take two 1-port calibrations and hybridize them into a 2-port calibration, which allows a mixed-media calibration for a device that may have coaxial and waveguide connections. Select displays the HYBRID CAL menu where the hybrid calibration is configured.</p> <ul style="list-style-type: none">• “HYBRID CAL Menu – 2-Port VNAs” on page 9-58 <p>Hybrid Enhanced Match Cal</p> <p>Available only on 2-port instruments with Option 7, Receiver Offset (disabled when Option 7 is not installed and when a 4-port test set is connected). Allows a version of hybrid calibrations (mentioned above) for frequency converting devices (mixers) to take two enhanced match calibrations and hybridize them into a new enhanced match calibration with the input media of the first calibration and the output media of the second calibration. This allows a mixed-media calibration for a device that may have coaxial and waveguide connections. Select displays the ENHANCED MATCH CAL SETUP dialog where the hybrid calibration is configured.</p> <ul style="list-style-type: none">• “HYBRID ENHANCED MATCH CAL SETUP Dialog Box – 2-Port VNAs” on page 9-60 <p>Cal Merge</p> <p>Cal Merge allows merging two calibration files into a single file where the calibrations can use different methods at different frequencies. The calibrations must be of the same calibration type. Select displays the CAL MERGE dialog box.</p> <ul style="list-style-type: none">• “CAL MERGE Dialog Box – 2-Port VNAs” on page 9-62
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Figure 9-36. ALTERNATIVE CALS MENU – 2-Port VNAs

HYBRID CAL Menu – 2-Port VNAs

Previous

- [“ALTERNATIVE CALS Menu – 2-Port VNAs” on page 9-57](#)

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals| ALTERNATIVE CALS | Hybrid Cal | HYBRID CAL

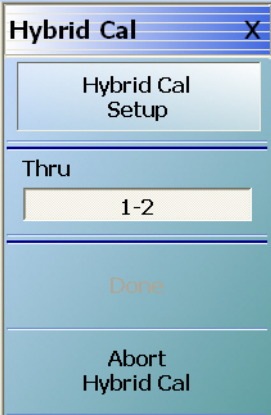
	<p>Hybrid Cal Setup</p> <p>Hybrid calibrations take two 1-port calibrations and hybridizes them into a 2-port calibration which allows a mixed-media calibration for a device that may have coaxial and waveguide connections. It also allows 2-port calibrations where the two 1-port calibrations are not restricted to be the same type. Select displays the HYBRID CAL SETUP dialog box where the hybrid calibration is configured.</p> <ul style="list-style-type: none">• “HYBRID CAL SETUP Dialog Box – 2-Port VNAs” on page 9-59 <p>Thru</p> <p>After the hybridized calibration has been configured in the HYBRID CAL SETUP dialog box, make sure all through connections are complete. When ready to proceed, select the Thru button to start the hybridization. The display dims for a few seconds, and then reappears with a completion check box.</p> <p>Done</p> <p>If the Done button is unavailable, the hybrid calibration has not been successfully completed. After a successful completion, the Done button is available. Select returns to the CALIBRATION menu where the Cal Status button is set to ON.</p> <ul style="list-style-type: none">• “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7 <p>Abort Hybrid Cal Setup</p> <p>Selecting the Abort button stops the hybrid calibration and returns to the CALIBRATION menu.</p> <ul style="list-style-type: none">• “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7
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Figure 9-37. HYBRID CAL Menu-2 port

HYBRID CAL SETUP Dialog Box – 2-Port VNAs

Previous

- [“HYBRID CAL Menu – 2-Port VNAs” on page 9-58](#)

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals | ALTERNATIVE CALS | Hybrid Cal | HYBRID CAL | Hybrid Cal Setup | HYBRID CAL SETUP Dialog Box

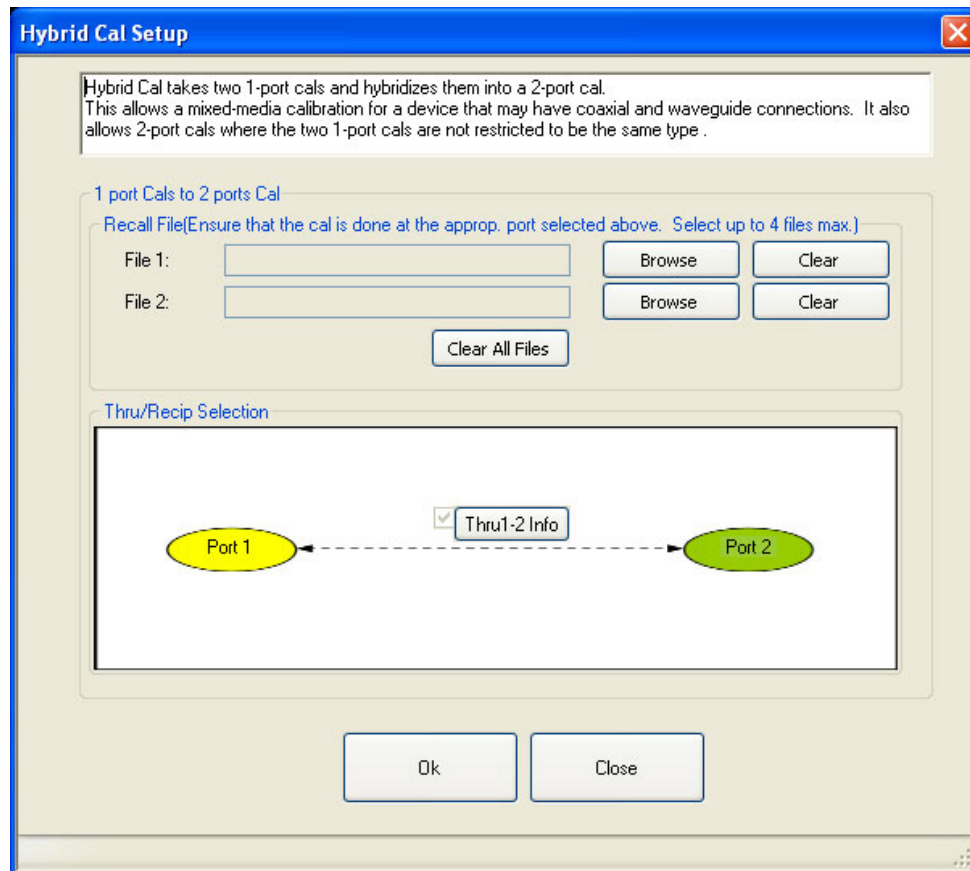


Figure 9-38. HYBRID CAL SETUP Dialog Box – 2-Port VNAs

Instructions

A hybrid calibration takes two 1-port calibrations and hybridizes them into a 2-port calibration. This allows a mixed-media calibration for a device that may have both coaxial and waveguide connections. It also allows 2-port calibrations where the two 1-port calibrations are not restricted to the same line type.

Hybridizing Two 1-Port Cals into a 2-Port Cal

In the File 1 field, select the Browse button to navigate to the appropriate Channel Setup and Calibration (CHX) file for the first calibration.

Repeat for the File 2 field.

Thru/Recip Selection

The figure shows the relationship between the two ports and the Thru 1-2 Info button is automatically selected.

OK

When both files have been identified, select OK to return to the HYBRID CAL menu.

HYBRID ENHANCED MATCH CAL SETUP Dialog Box – 2-Port VNAs

Previous

- “HYBRID CAL Menu – 2-Port VNAs” on page 9-58

Prerequisites

- Option 7, Receiver Offset
- 2-Port VNA (disabled when a 4-port test set is connected).

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals | ALTERNATIVE CALS | Hybrid Enhanced Match Cal | HYBRID ENHANCED MATCH CAL Dialog Box

Hybrid Enhanced Match Cal Setup

Hybrid Enhanced match Cal takes two enhanced match cal with same or mixed media and hybridizes them into a single enhanced match cal. This allows a mixed-media calibration for a device that may have coaxial and waveguide connections.

Note: The input frequency range of the hybrid calibration will be the input frequency range of File1 and the output frequency range of the hybrid calibration will be the output frequency range of File2, where File1 is the media or connector of the DUT input and File2 is the media or connector of the DUT output. File1 and File2 should have the same mixer setup.

Select Calibration files

Recall File (File1 represents the media/connector of DUT input and File2 represents the media/connector of DUT output)

File1 [DUT Input]: C:\Anritsu\VNA\HybridCal\cal1_wr10.chx Browse Clear

File2 [DUT Output]: C:\Anritsu\VNA\HybridCal\cal2_1mm_osl.ch Browse Clear

Clear All Files

Description of output adapter

☒ Trans. Line

Transmission Line

Impedance (Ohm)	Length (mm)	Loss (dB/mm)	@ Frequency (GHz)
50.000	0.0000	0.0000	0.0000

Dielectric: Air(1.000649)

☒ S2P File

S2P File (Note: S2P file should at least cover the input frequency range.)

C:\Anritsu\VNA\HybridCal\5_8_12_66G_100 Load S2P File ☐ Swap port assignment

The network's port2 will always be nearer the DUT unless "Swap port assignment" is selected.

Perform Cal Cancel

Figure 9-39. HYBRID CAL SETUP Dialog Box – 2-Port VNAs

Instructions

Available only on 2-port instruments with Option 7, Receiver Offset (disabled when Option 7 is not installed and when a 4-port test set is connected). Allows a version of hybrid calibrations for frequency converting devices (mixers) to take two enhanced match calibrations and hybridize them into a new enhanced match calibration with the input media of the first calibration and the output media of the second calibration. This allows a mixed-media calibration for a device that may have coaxial and waveguide connections.

Hybridizing Two 1-Port Cals into a 2-Port Cal

In the File 1 [DUT Input] field, select the Browse button to navigate to the appropriate Channel Setup and Calibration (CHX) file for the first calibration.

Repeat for the File 2 [DUT Output] field.

Description of output adapter Section

Select the output adapter of Trans. Line or S2P File:

- **Trans. Line:** Enter the transmission line parameters.
- **S2P File:** Select the Load S2P File button to navigate to and load the appropriate S2P file. Select Swap port assignment if required.

Note The Trans. Line and S2P File setup areas are mutually exclusive.
--

Perform Cal

When the setup above is complete, select **Perform Cal** to initiate the calibration.

CAL MERGE Dialog Box – 2-Port VNAs

Calibration merge allows merging two calibration files into a single file where the prior calibrations can use different methods (such as SOLT and SSLT) at different frequencies. The calibrations must be the same calibration type (such as Full 1 Port) and be available on the instrument hard drive. Calibration merge has other requirements (described below) as to the number of points, start and stop frequencies, and front panel settings.

Previous

- [“ALTERNATIVE CALS Menu – 2-Port VNAs” on page 9-57](#)

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals | ALTERNATIVE CALS | Cal Merge | CAL MERGE Dialog Box

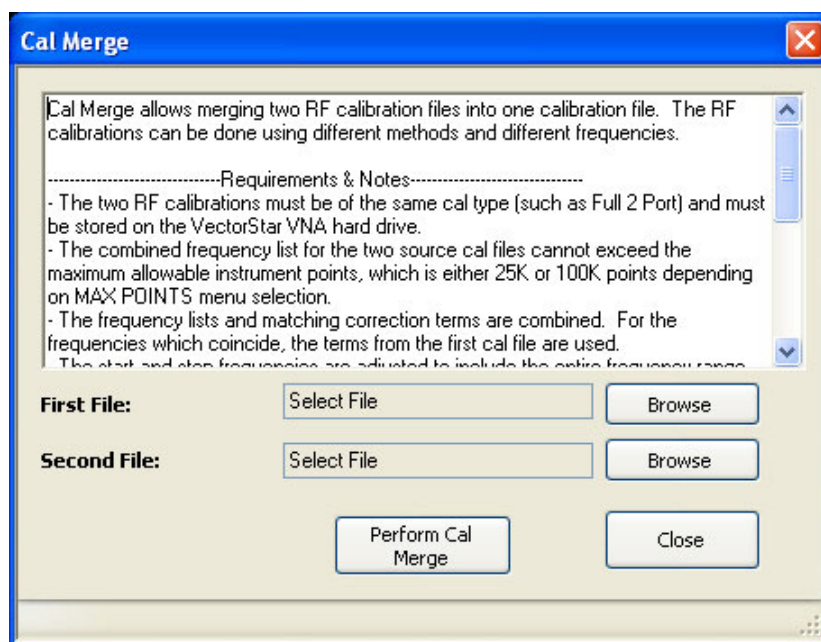


Figure 9-40. CAL MERGE Dialog Box

Instructions

Calibration merge (cal merge) allows the merging of two RF calibration files into a single file. The RF calibrations can use different methods and different frequencies.

Requirements and Notes

- The two RF calibrations must be of the same cal type (such as Full 2 Port) and must be stored on the VectorStar VNA hard drive.
- The combined frequency list for the two source cal files cannot exceed the maximum allowable instrument points, which is either 25,000 or 100,000 points depending on MAX POINTS menu selection.
- The frequency lists and matching correction terms are combined. For the frequencies which coincide, the terms from the first cal file are used.
- The start and stop frequencies are adjusted to include the entire frequency range provided by the two cal files.
- The first cal file provides all other front panel setup configuration information.
- Since Cal Merge can result in a non-discrete step size, the cal merge file sweep type is set to a frequency-based segmented sweep.

Procedure

1. In the dialog box, select **Browse** to select the appropriate cal files (e.g. calfile1.chx and calfile2.chx).
2. Click the **First File** or **Second File Browse** button to display an **OPEN (Setup.cal File)** dialog box.
3. Select **Perform Cal Merge** to perform the merge of the frequency lists and matching correction terms.
4. If required, enter the **Cutoff Frequency** in kHz.
5. Click **Perform Cal Merge** to merge the calibration files.
6. If the selected files are incorrect, a warning message is displayed.
7. Best practices recommend saving the resultant Cal Merge file, but a save is not required.
8. Click **Close** to exit the dialog box.

9-5 AutoCal Port Setup – 2-Port VNAs

AUTOCAL PORT Menu – 2-Port VNAs

Use the AUTOCAL PORT menu to define whether the AutoCal procedure will be for two-ports or only for one-port.

Previous

- [“CALIBRATE Menu – 2-Port VNAs” on page 9-12](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT

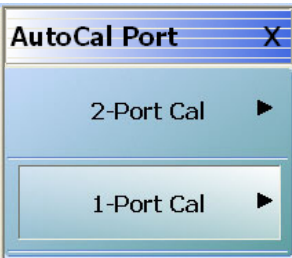
	<p>2-Port Cal (2-Port VNAs)</p> <p>Sets the AutoCal calibration function for 2-Port VNAs to a 2-port method and displays the AUTOCAL PROCEDURE (2-PORT CAL) menu.</p> <ul style="list-style-type: none">• “AUTOCAL SETUP Menu – 2-Port Cal – 2-Port VNAs” on page 9-65 <p>1-Port Cal (2-Port VNAs)</p> <p>Sets the AutoCal calibration function for 2-Port VNAs to a 1-port method and displays the AUTOCAL SETUP (1-PORT CAL) menu.</p> <ul style="list-style-type: none">• “AUTOCAL SETUP Menu – 1-Port Cal – 2-Port VNAs” on page 9-71
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Figure 9-41. AUTOCAL PORT Menu – 2-Port VNAs

9-6 AutoCal 2-Port Cal Setup – 2-Port VNAs

AUTOCAL SETUP Menu – 2-Port Cal – 2-Port VNAs

Instrument Mode

- 2-Port VNA Mode

Previous

- [“AUTOCAL PORT Menu – 2-Port VNAs” on page 9-64](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 2-Port Cal | AUTOCAL SETUP

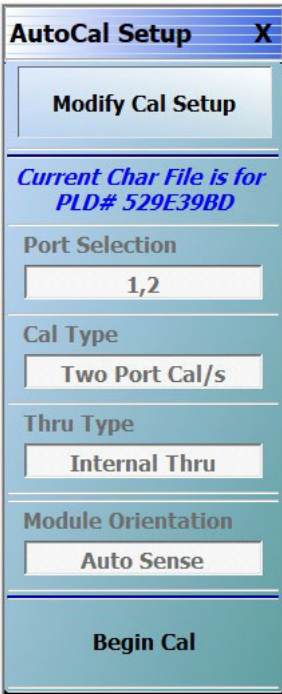
	<h4>Modify Cal Setup</h4> <p>Select displays the MODIFY 2-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for Auto Sense Module Orientation, Select Cal Type, Through Setup, Adapter Removal Port, and links to the THRU INFO and AIR EQUIVALENT LENGTH CONVERSION dialog boxes.</p> <ul style="list-style-type: none"> • “MODIFY 2-PORT AUTOCAL SETUP Dialog Box” on page 9-66 • “AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185 <h4>Port Selection (Read Only)</h4> <p>Displays the Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <h4>Cal Type (Read Only)</h4> <p>Displays the Cal Type selected for the AutoCal procedure. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <h4>Thru Type (Read Only)</h4> <p>Displays the Thru Type selected for the AutoCal procedure as Internal Thru, Internal Reciprocal, True Thru, or True Reciprocal. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <h4>Module Orientation (Read Only)</h4> <p>Displays the left/right VNA Port orientation and assignment for the AutoCal procedure. Options are either:</p> <ul style="list-style-type: none"> • Left=P1, Right=P2 • Left=P2, Right=P1 <p>The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <h4>Begin Cal (AutoCal 2-Port Cal) (2-Port VNAs)</h4> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu where the Cal Status button is enabled and set to ON.</p> <p>“CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7</p>
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Figure 9-42. AUTOCAL 2-PORT CAL SETUP Menu – 2-Port VNAs

MODIFY 2-PORT AUTOCAL SETUP Dialog Box

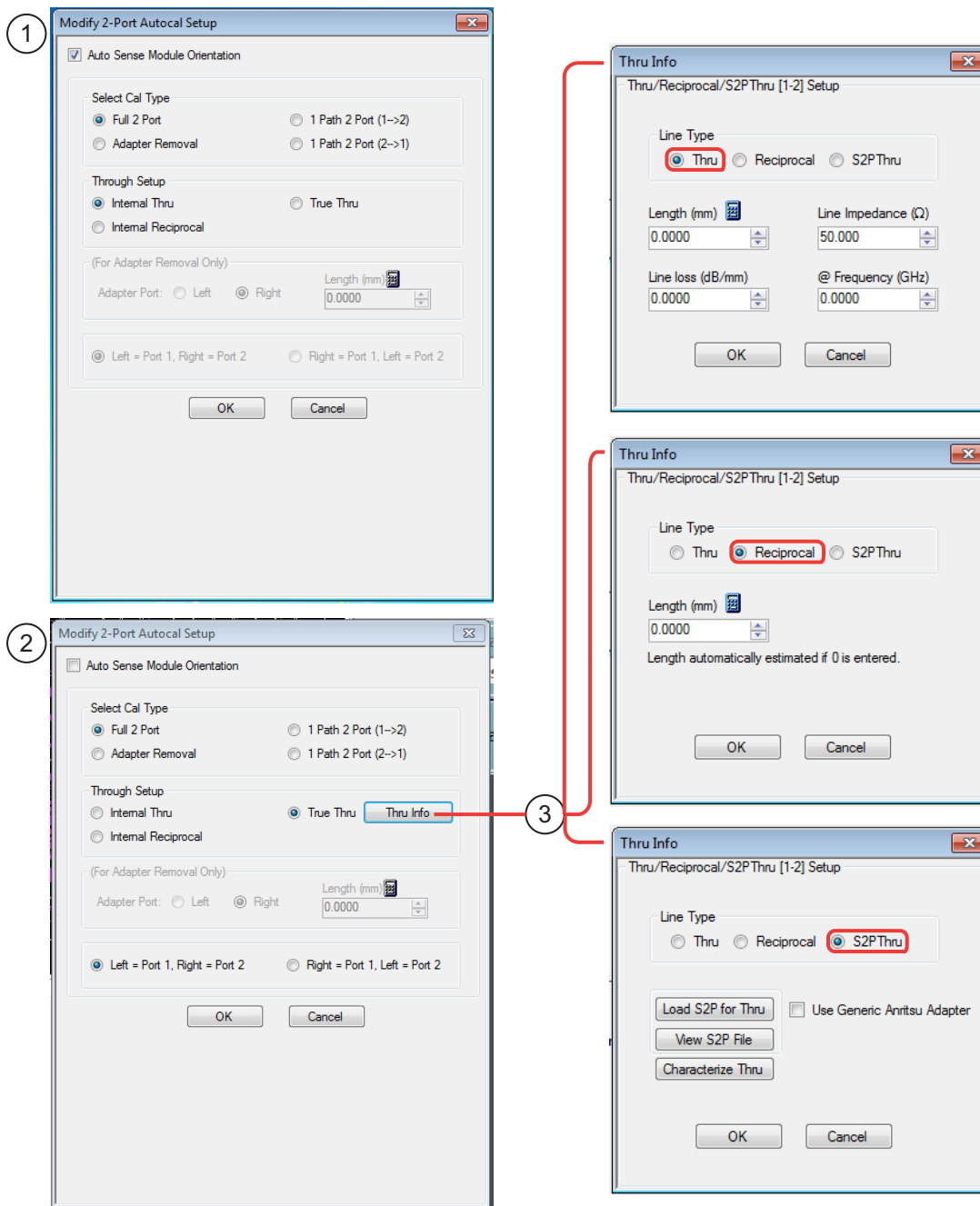
Use the MODIFY 2-PORT AUTOCAL SETUP dialog box to change the calibration parameters prior to an AutoCal calibration procedure. Options include the calibration and thru types to be used. If required, an adapter removal calibration can be configured. For production installations, the left/right port sense can be automatically or manually configured.

Previous

- [“AUTOCAL SETUP Menu – 2-Port Cal – 2-Port VNAs” on page 9-65](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 2-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY AUTOCAL SETUP Dialog Box

**Thru Info Dialog Notes:**

Thru selected allows user entries for length, line impedance, line loss, and frequency.

Reciprocal selected allows user entry for length.

S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 9-43. MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs) (1 of 2)

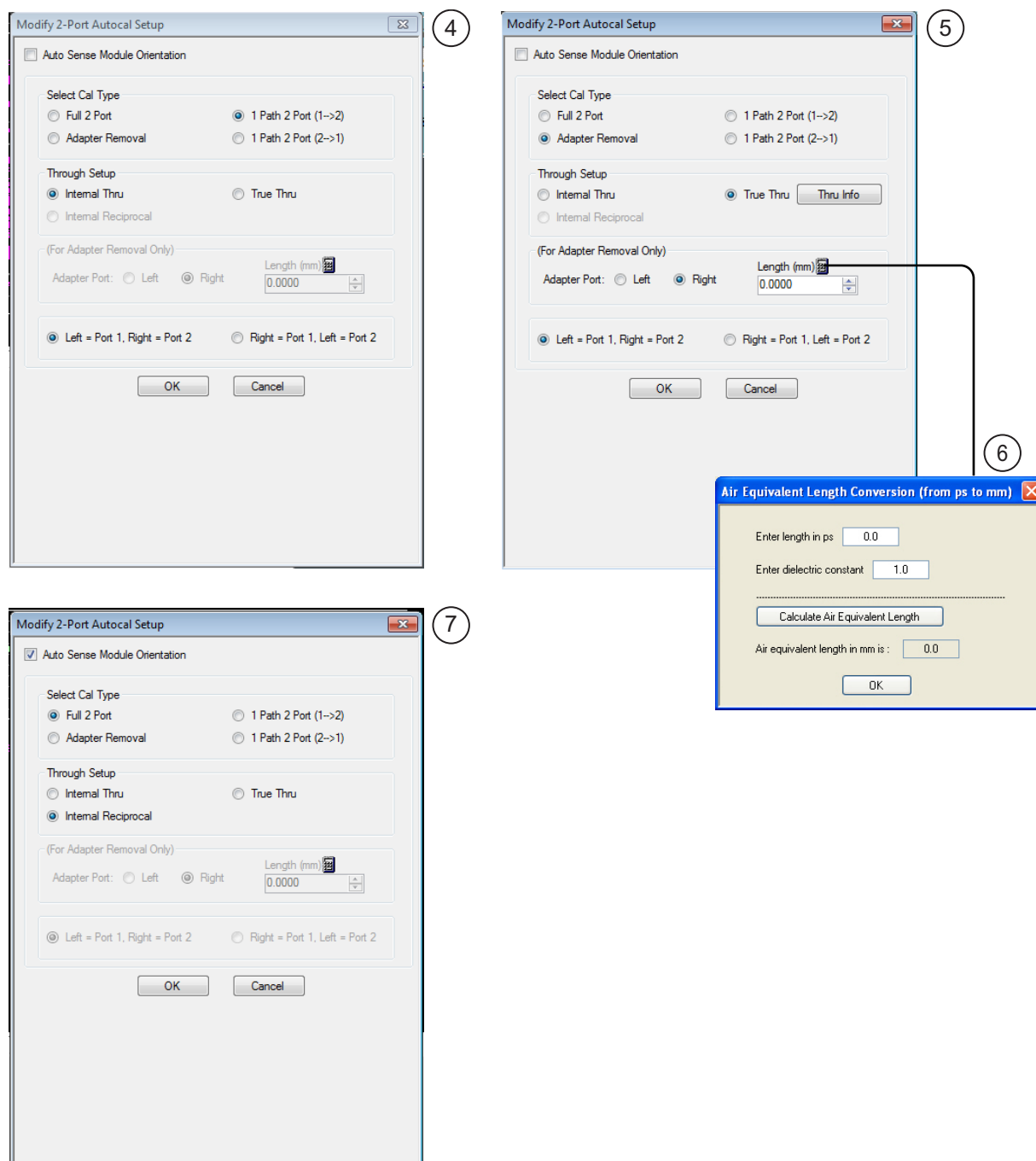


Figure 9-43. MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs) (2 of 2)

Auto Sense Module Orientation Check Box

See **Callout #1** and **Callout #2** in “MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs)” on page 9-67.

- If selected, the AutoCal Module determines the Port Left/Right assignments.
- If not selected, the Left/Right manual assignment area at the bottom of the dialog box is available. The user can select a radio button for either:
 - Left = Port 1, Right = Port 2
 - Right = Port 1, Left = Port 2.

Select Cal Type Area

Select one of the following using the provided radio buttons:

- Full 2 Port
 - When selected, the Thru Select area becomes available.
 - When selected, the For Adapter Removal Only area is unavailable.
 - See **Callout #2** in [Figure 9-43](#).
- Adapter Removal
 - When selected, the Thru Select area becomes available and, if True Thru is selected, the Thru Info button appears.
 - Select the Thru Info button to display the THRU INFO dialog box. See **Callout #3**.
 - When selected, the For Adapter Removal Only area becomes available.
 - Select the Calculator icon to display the AIR EQUIVALENT LENGTH CONVERSION dialog box. Use the calculator to convert length in ps to air equivalent length in mm.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
 - See **Callout #5**, and **Callout #6** in [Figure 9-43](#).
- 1 Path 2 Port (1→2)
 - When selected, the Thru Select area becomes available.
 - When selected, the For Adapter Removal Only area is unavailable.
 - See **Callout #4** in [Figure 9-43](#).
- 1 Path 2 Port (2→1)
 - When selected, the Thru Select area becomes available.
 - When selected, the For Adapter Removal Only area is unavailable.

Through Setup Area

This area is available for all AutoCal Types. The button selection options are:

- Internal Thru
 - If selected, the AutoCal module uses internal circuitry to determine the through values.
 - The Thru Info button is unavailable.
 - See **Callout #4** in [Figure 9-43](#).
- Internal Reciprocal
 - With this choice, the internal transmissive path within the AutoCal module is employed, but it is treated as a reciprocal (i.e., the S-parameters from the characterization file are not used).
 - See **Callout #7** in [Figure 9-43](#).
- True Thru
 - If selected, the AutoCal module will prompt the user to remove the module and connect the ports with a through line.
 - If selected, the Thru Info button becomes available. When clicked, the THRU INFO dialog box appears and allows input of values for Thru Length, Thru Line Impedance, Thru Line Loss, and Thru Frequency Setting.
 - In the Thru Line Length field, enter the line length in mm. For example, enter a value of 30 mm.
 - In the Line Impedance field, enter the impedance in ohms. For example, use the default value of 50 ohms.
 - In the Line Loss field, enter the loss as dB per mm. For example, enter a value of 0.1 dB/mm.
 - In the @ Frequency field, enter the working frequency in GHz. For example, enter a value of 45 GHz.

- When all entries are complete, click OK to return to the Modify 2-Port AutoCal Setup dialog box.
- See **Callout #3** in [Figure 9-43 on page 9-67](#).
 - [“THRU INFO Dialog Box – 2-Port VNAs” on page 9-190](#)

For Adapter Removal Only Area

This area is only available if Adapter Removal button was selected in the Select Cal Type area above. The adapter removal controls are:

Adapter Port Select Radio Buttons

- Left
- Right.

Adapter Length (mm) Field

Available as either a direct entry field or using the dialog box below to calculate the parameters.

- To use the calculator dialog, click the Calculator icon.
- The AIR EQUIVALENT LENGTH CONVERSION dialog box appears. Entries can be typed in or incremented by clicking the field up/down arrows, or by pressing the keyboard up/down arrow keys.
 - Enter the adapter length in ps. For example, enter a length of 100 ps.
 - Enter the adapter dielectric constant. For example, enter a dielectric constant for polyethylene of 2.26.
 - Click the Calculate Air Equivalent Length button.
 - The air equivalent length in mm is: 9.9778515... or 9.9779.
 - Click OK and the result appears in the For Adapter Removal Only Length field.
 - See **Callout #7** in [Figure 9-43 on page 9-67](#).
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)

Manual Port Orientation Area

This area is only available if the Auto Sense Module Orientation check box at the top of the dialog box is deselected.

- If the Auto Sense check box is selected, the Left/Right buttons at the bottom of the dialog box are unavailable. The instrument identifies the left/right ports, and directs the user to the appropriate port.
 - See **Callout #1** in [Figure 9-43 on page 9-67](#).
- If the Auto Sense check box is deselected, the Left/Right buttons at the bottom of the dialog box are available. The user defines which port is “Left” and which port is “Right”. This is especially useful if the instrument is oriented differently from the work environment. Options are:
 - Left = Port 1, Right = Port 2
 - Right = Port 1, Left = Port 2
 - See **Callout #2** in [Figure 9-43 on page 9-67](#).

Completing AutoCal Setup

When all AutoCal Setup functions are completed, click OK to return to the AutoCal menu. Click Cancel to make no changes and close the dialog box.

- [“AUTOCAL SETUP Menu – 2-Port Cal – 2-Port VNAs” on page 9-65](#)

9-7 AutoCal 1-Port Cal Setup – 2-Port VNAs

AUTOCAL SETUP Menu – 1-Port Cal – 2-Port VNAs

Previous

- [“AUTOCAL PORT Menu – 2-Port VNAs” on page 9-64](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 1-Port Cal | AUTOCAL SETUP

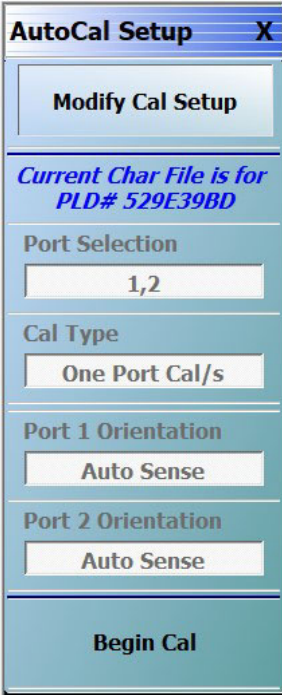
	<p>Modify Cal Setup</p> <p>Select displays the MODIFY 1-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for 1-Port Calibration Ports and Port Left/Right Identification.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs” on page 9-72 <p>Port Selection (Read Only)</p> <p>Displays the Port or Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 1-PORT AUTOCAL SETUP dialog box.</p> <p>Cal Type (Read Only)</p> <p>Displays the Cal Type selected for the AutoCal procedure. The setting is defined in the AUTOCAL PORTS menu.</p> <p>Port 1 Orientation (Read Only)</p> <p>This read-only button only appears if Port 1 was selected in the MODIFY 1-PORT AUTOCAL SETUP dialog box. If available, shows the left/right assignment for Port 1.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs” on page 9-72 <p>Port 2 Orientation (Read Only)</p> <p>This read-only button only appears if Port 2 was selected in the MODIFY 1-PORT AUTOCAL SETUP dialog box. If available, shows the left/right assignment for Port 2.</p> <ul style="list-style-type: none"> • “MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs” on page 9-72 <p>Begin Cal (AutoCal 1-Port Cal)</p> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu when the Cal Status button is enabled and set to ON.</p> <ul style="list-style-type: none"> • “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7
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Figure 9-44. AUTOCAL SETUP Menu – One-Port Calibration – 2-Port VNAs

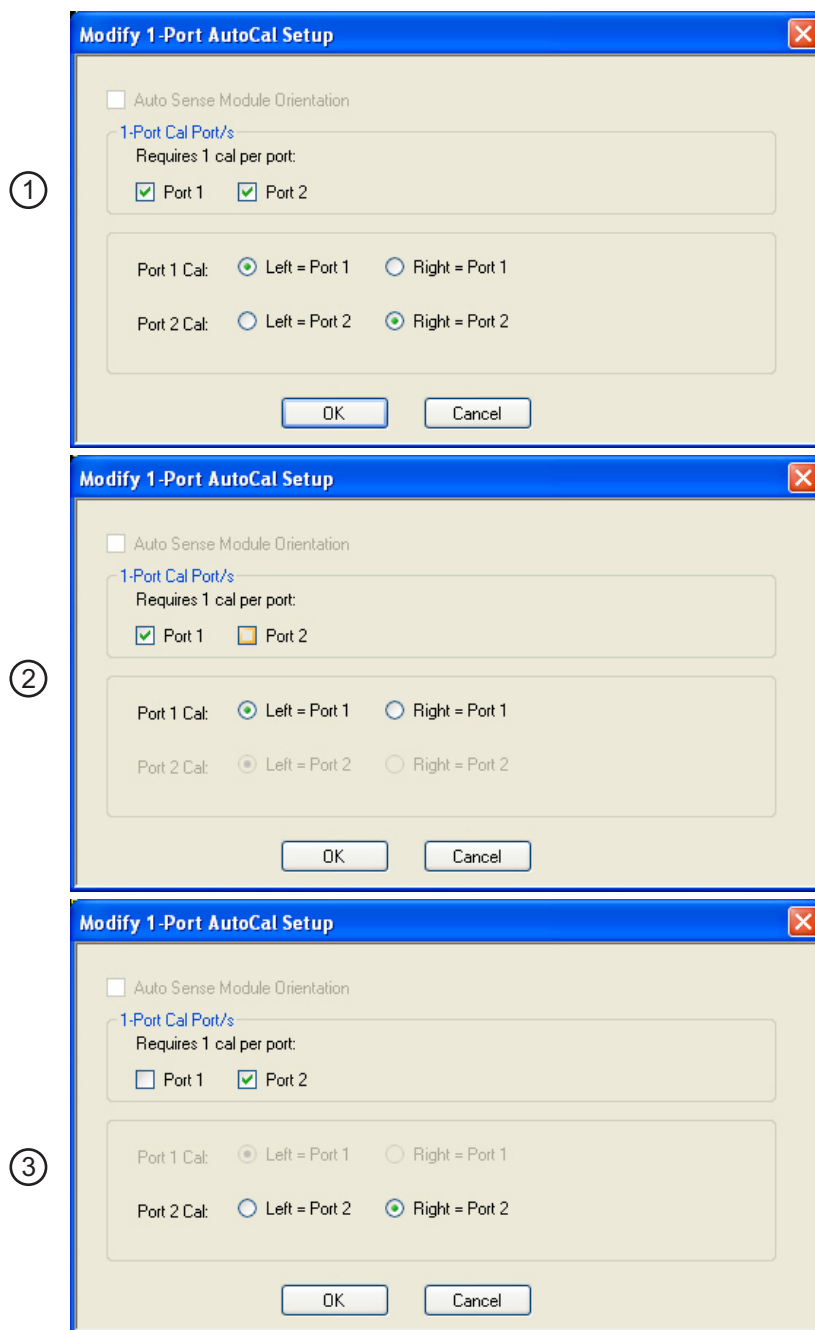
MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs

Previous

- “AUTOCAL SETUP Menu – 1-Port Cal – 2-Port VNAs” on page 9-71

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 1-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY 1-PORT AUTOCAL SETUP Dialog Box



1. AutoSense not available. Port 1 and Port 2 selected for calibration. Port 1 = Left and Port 2 = Right.
2. Only Port 1 selected for calibration. Port 1 = Left.
3. Only Port 2 selected for calibration. Port 2 = Right.

Figure 9-45. MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 2-Port VNAs

Auto Sense Cal Port(s)

The Auto Sense selection check box is not available in AutoCal 1-Port.

1-Port Cal Port(s)

Select either one or both of the available ports.

- Port 1 Only
 - See **Callout #2** in [Figure 9-45 on page 9-72](#).
 - If selected, the Port 1 Cal Left/Right area is available.
- Port 1 and Port 2
 - See **Callout #1** in [Figure 9-45 on page 9-72](#).
 - If selected, the Port 1 Cal Left/Right area is available.
- Port 2 Only
 - See **Callout #3** in [Figure 9-45 on page 9-72](#)
 - If selected, the Port 2 Cal Left/Right area is available.

Port 1 Cal Left/Right Radio Buttons

Port 1 above must be selected to make the radio buttons available. If available, allows the following port left/right options:

- Left = Port 1
- Right = Port 1
- See **Callout #1** in [Figure 9-45 on page 9-72](#).

Port 2 Cal Left/Right Radio Buttons

Port 2 above must be selected to make the radio buttons available. If available, allows the following port left/right options:

- Left = Port 2
- Right = Port 2
- See **Callout #3** in [Figure 9-45 on page 9-72](#).

9-8 Manual Calibration Menus and Dialog Boxes

Once a manual calibration type such as 1-Port Cal has been selected, the main setup menu (which is named for the cal type such as ONE PORT CAL) appears. The **Modify Cal Setup** button provides access to the CAL SETUP, CAL METHOD, and LINE TYPE configuration menus with further access to the appropriate calibration parameter configuration dialog box. The manual calibration setup and procedure menus – TWO PORT CAL, ONE PORT CAL, TRANS. RESPONSE, and REFL. RESPONSE and their supporting dialog boxes – change depending on the configuration made during the in the calibration setup. [Figure 9-46](#) summarizes the configuration menus and dialogs,

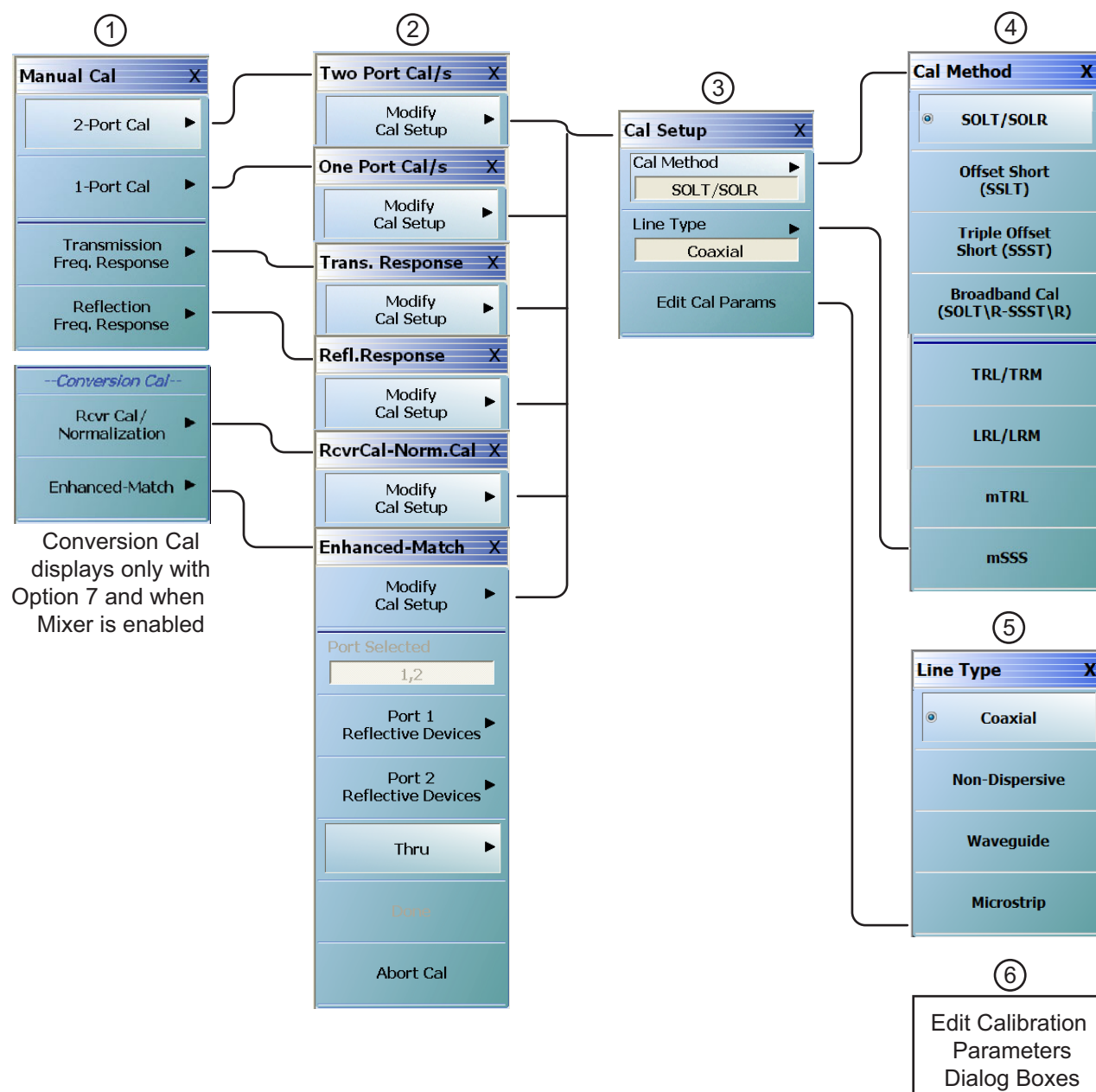


Figure 9-46. Manual Calibration Setup Menus – 2-Port VNAs

1. MANUAL CAL port selection menu (Conversion Cal area displays only when Option 7, Receiver Offset, is installed and when a Mixer measurement is active).
2. Calibration setup menus with titles of TWO PORT CAL, ONE PORT CAL, TRANS. RESPONSE, or REFL. RESPONSE.
3. CAL SETUP selection menu.
4. CAL METHOD selection menu. (Broadband Cal available only in Broadband configuration with Option 8x and 3739 Test Set.)
5. LINE TYPE selection menu.
6. Edit Cal Params button accesses calibration configuration dialog boxes. Dialog box titles vary depending on the calibration type, method, and line type selected.

Figure 9-46. Manual Calibration Setup Menus – 2-Port VNAs

Manual Calibration Types

- 2-Port Calibration
- 1-Port Calibration
- Transmission Frequency Response Calibration
- Reflection Frequency Response Calibration
- Conversion Calibration – Receiver Calibration/Normalization (Mixer measurements only)
- Conversion Calibration – Enhanced Match (Mixer measurements only)

Manual Calibration Methods

- SOLT/SOLR – Short-Open-Load-Thru / Short-Open-Load-Return
- SSLT – Offset Short or Short-Short-Load-Thru
- SSST – Triple Offset Short or Short-Short-Short-Thru
- Broadband Cal, Merged (SOLT/SOLR-SSST/SSSR)
- TRL/TRM – Through-Reflect-Line / Through-Reflect-Match
- LRL/LRM – Line-Reflect-Line / Line-Reflect-Match
- mTRL – Multiline Thru-Reflect-Line
- mSSS – Multiple Offset Short

Calibration Line Types

- Coaxial
- Non-Dispersive – Essentially the same as coaxial
- Waveguide
- Microstrip

Manual Calibration Dialog Box Settings

All permissible combinations of the calibration parameters above can be further modified through a series of dialog boxes that control DUT connectors, load types such as broadband or sliding loads, port selection, through types, reference plane location, number of bands, and similar settings. Many of these dialog boxes are shown in this document and all are summarized in tables.

MANUAL CAL Menu – 2-Port VNAs

Previous

- [“CALIBRATE Menu – 2-Port VNAs” on page 9-12](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL

<div><div>Manual Cal</div><div><div>2-Port Cal</div><div>1-Port Cal</div><div>Transmission Freq. Response</div><div>Reflection Freq. Response</div><div>--Conversion Cal--</div><div>Rcvr Cal/Normalization</div><div>Enhanced-Match</div></div></div>	<div><div>2-Port Cal</div><div>Select displays the Two Port Cal menu where the calibration step-by-step procedure is carried out. Also called 12 Term Calibration. This is the most complete calibration, and fully corrects the four S-parameters (S11, S12, S21, and S22) parameters for both instrument ports.<ul style="list-style-type: none">• “TWO PORT CAL Menu – 2-Port VNAs” on page 9-82</div><div><div>1-Port Cal</div><div>Select displays the One Port Cal menu. A single reflection parameter, configured in the Edit Cal Params CAL SETUP dialog, is fully corrected (S11 or S22). Both ports can be covered but only reflection measurements are corrected. During the calibration configuration, you can select either Port 1 or Port 2.<ul style="list-style-type: none">• “ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123</div><div><div>Transmission Freq. Response</div><div>Selecting the Transmission Frequency Response button displays the Trans Freq menu. During the calibration configuration in the Edit Cal Params CAL SETUP dialog, select forward or reverse or both directions.<ul style="list-style-type: none">• “TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145</div><div><div>Reflection Freq. Response</div><div>Select displays the Refl. Response menu.<ul style="list-style-type: none">• “REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151</div><div><div>Rcvr Cal/Normalization</div><div>Present only when Option 7, Receiver Offset, is installed and with a Mixer measurement setup (refer to “MIXER Menu” on page 12-20 and Chapter 17 for information on setting up a Mixer measurement). Select displays the RcvrCal-Norm.Cal menu.<ul style="list-style-type: none">• “RCVRCAL-NORM.CAL Menu – 2-Port VNAs” on page 9-161</div><div><div>Enhanced-Match</div><div>Present only when Option 7, Receiver Offset, is installed and with a Mixer measurement setup (refer to “MIXER Menu” on page 12-20 and Chapter 17 for information on setting up a Mixer measurement). Select displays the Enhanced-Match menu.<ul style="list-style-type: none">• “ENHANCED-MATCH Menu – 2-Port VNAs” on page 9-162</div></div></div></div></div></div></div>
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Figure 9-47. MANUAL CAL (MANUAL CALIBRATION) Menu – 2-Port VNAs

CAL SETUP Menu

Use the CAL SETUP menu to set the calibration method (such as SOLT/R or SSLT), the calibration line type (such as coaxial or microwave), and more detailed parameters for ports and connectors through the Edit Cal Parameters button and the linked CAL SETUP dialogs.

Previous

- The CAL SETUP menu can be accessed from multiple menus depending on the manual calibration type selected on the MANUAL CAL menu.
 - [“TWO PORT CAL Menu – 2-Port VNAs” on page 9-82](#)
 - [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)
 - [“TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145](#)
 - [“REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151](#)
 - [“RCVRCAL-NORM.CAL Menu – 2-Port VNAs” on page 9-161](#)
 - [“ENHANCED-MATCH Menu – 2-Port VNAs” on page 9-162](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP
- The navigation path above assumes that Two Port Cal manual calibration type was selected on the MANUAL CAL menu.

	<p>Cal Method</p> <p>The field displays the currently selected calibration method such as SOLT/SOLR, SSLT, SSST, TRL/TRM, LRL/LRM, mTRL, or mSSS. Select displays the CAL METHOD menu where a calibration method is selected. Once a selection is made on the CAL METHOD menu, the system auto-returns to this CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL METHOD Menu” on page 9-79 <p>Line Type</p> <p>The field displays the currently selected line type such as Coaxial or Microstrip. Select displays the LINE TYPE menu where a line type is selected. Once a selection is made on the LINE TYPE menu, the system auto-returns to this CAL SETUP menu.</p> <ul style="list-style-type: none"> • “LINE TYPE Menu” on page 9-81 <p>Edit Cal Params</p> <p>Select displays the appropriate calibration setup dialog box. The exact name of the dialog box varies depending on the calibration type, calibration method, and line type selected.</p> <ul style="list-style-type: none"> • Dialog box name format: [Cal Type] [Cal Method] Cal Setup [Line Type] • For example, if Full 2 Port, SOLT/SOLR, and Coaxial were selected, the dialog box name is: <ul style="list-style-type: none"> • Full Two Port Cal Setup (SOLT/R, Coaxial)
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Figure 9-48. CAL SETUP (CALIBRATION SETUP) Menu – 2-Port VNAs (1 of 2)

	<p>Edit Cal Params (continued)</p> <p>Click links below for examples of 2-Port CAL SETUP dialog boxes using Coaxial line type.</p> <ul style="list-style-type: none"> • “TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-85 • “TWO PORT CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs” on page 9-89 • “TWO PORT CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNAs” on page 9-93 • “TWO PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-96 • “TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box – 2-Port VNAs” on page 9-99 • “TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box – 2-Port VNAs” on page 9-102 • “TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box – 2-Port VNAs” on page 9-106 • “TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box – 2-Port VNAs” on page 9-109 • A summary table lists dialog box contents for all other combinations of method and line type in “2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs” on page 9-112 <p>Click links below for examples of 1-Port CAL SETUP dialog boxes using Coaxial line type.</p> <ul style="list-style-type: none"> • “ONE-PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box – 2-Port VNAs” on page 9-126 • “ONE-PORT CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs” on page 9-129 • “ONE-PORT CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNAs” on page 9-132 • “ONE PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-134 • “ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 9-136 • A summary table lists dialog box contents for all other combinations of method and line type in “1-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs” on page 9-139
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Figure 9-48. CAL SETUP (CALIBRATION SETUP) Menu – 2-Port VNAs (2 of 2)

CAL METHOD Menu

Use the CAL METHOD menu to select whether the method of SOLT/SOLR, SSLT, SSST, Broadband Cal (SOLT/R-SSST/R), TRL/TRM, LRL/LRM, mTRL, or mSSS will be used during the calibration.

Previous

- [“CAL SETUP Menu” on page 9-77](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method | CAL METHOD
- The navigation path above assumes that Two Port Cal calibration type was selected on the Manual Cal menu.

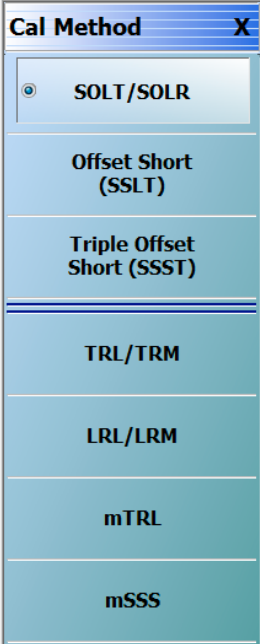
	<p>Auto-Return Button Selection Group:</p> <p>The buttons of the CAL METHOD menu form an auto-return button selection group. Selecting any one button marks the selection with the select icon, de-selects the other buttons, and auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-77 <p>SOLT/SOLR</p> <p>Selecting the SOLT/SOLR button sets the calibration method to Short-Open-Load-Thru (or Short-Open-Load-Reciprocal) and then auto-returns to the CAL SETUP menu.</p> <p>Offset Short (SSLT)</p> <p>Selecting the Offset Short (SSLT) button sets the calibration method to Short-Short-Load-Thru and then auto-returns to the CAL SETUP menu.</p> <p>Triple Offset Short (SSST)</p> <p>Selecting the Triple Offset Short (SSST) button sets the calibration method to Short-Short-Short-Thru and then auto-returns to the CAL SETUP menu.</p> <p>Broadband Cal (SOLT/R-SSST/R) – Appears only with VNA in Broadband Mode</p> <p>Selecting the Broadband Cal (SOLT/R-SSST/R) button sets the calibration method to Broadband Cal (SOLT/R-SSST/R) and then auto-returns to the CAL SETUP menu.</p> <p>TRL/TRM</p> <p>Selecting the TRL/TRM button sets the calibration method to Through-Reflect-Line or Through-Reflect-Match and then auto-returns to the CAL SETUP menu.</p> <p>LRL/LRM</p> <p>Selecting the LRL/LRM button sets the calibration method to Line-Reflect-Line or Line-Reflect-Match and then auto-returns to the CAL SETUP menu.</p> <p>mTRL</p> <p>Selecting the mTRL button sets the calibration method to multiline TRL (Thru-Reflect-Line) and then auto-returns to the CAL SETUP menu.</p> <p>mSSS</p> <p>Selecting the mSSS button sets the calibration method to multiple offset short and then auto-returns to the CAL SETUP menu.</p>
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Figure 9-49. CAL METHOD Menu – 2-Port VNAs (1 of 2)

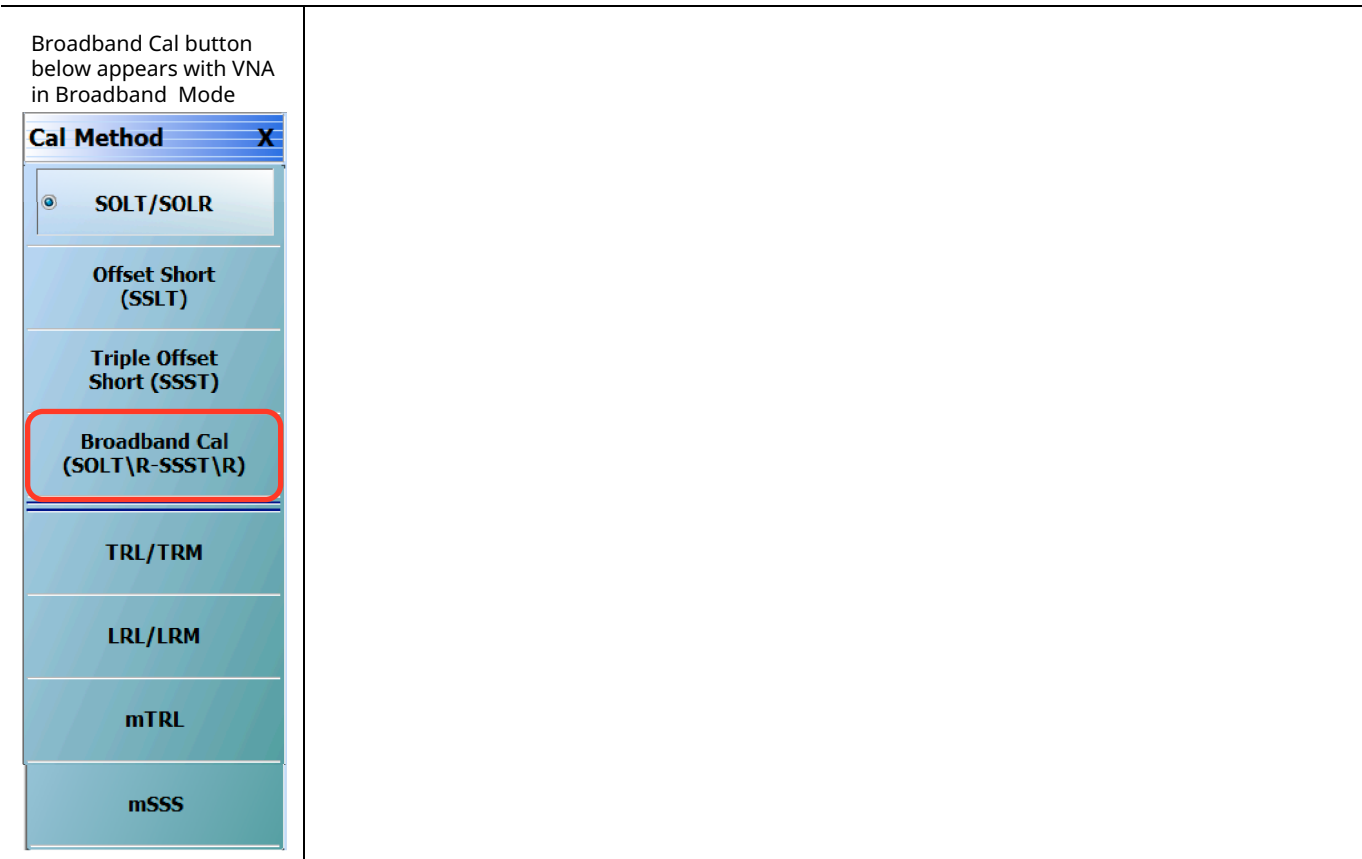


Figure 9-49. CAL METHOD Menu – 2-Port VNAs (2 of 2)

LINE TYPE Menu

Use the LINE TYPE menu to select from coaxial, non-dispersive, waveguide, or microstrip line types.

Non-dispersive is for line types such as coplanar waveguide, stripline, or twin-lead and is treated the same as coaxial line.

Previous

- [“CAL SETUP Menu” on page 9-77.](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Line Type | LINE TYPE



Auto-Return Button Selection Group

The four (4) buttons of the LINE TYPE menu form an auto-return button selection group. Selecting any one button marks the selection with the select icon, de-selects the other three (3) buttons, and auto-returns to the CAL SETUP menu.

Coaxial (Line Type)

Select sets the line type to coaxial, marks the button with the select icon, de-selects the Non-Dispersive, Waveguide, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.

- [“CAL SETUP Menu” on page 9-77](#)

Non-Dispersive (Line Type)

Non-dispersive line types, such as Coplanar Waveguide, Stripline, or twin-lead, are used on transmissions. The system treats non-dispersive lines the same as coaxial line types.

Select sets the line type to non-dispersive, marks the button with the select icon, de-selects the Coaxial, Waveguide, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.

- [“CAL SETUP Menu” on page 9-77](#)

Waveguide (Line Type)

Waveguide is transmission media such as rectangular or circular waveguide.

Select sets the line type to waveguide, marks the button with the select icon, de-selects the Coaxial, Non-Dispersive, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.

- [“CAL SETUP Menu” on page 9-77](#)

Microstrip (Line Type)

Microstrip line is typically used in on-wafer media.

Select sets the line type to microstrip, marks the button with the select icon, de-selects the Coaxial, Non-Dispersive, and Waveguide buttons, and then auto-returns to the CAL SETUP menu.

- [“CAL SETUP Menu” on page 9-77](#)

Figure 9-50. LINE TYPE Menu – 2-Port VNAs

9-9 Manual 2-Port Cal Setup – 2-Port VNAs

TWO PORT CAL Menu – 2-Port VNAs

Button Availability

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TWO PORT CAL SETUP dialog box.
- A representative menu is shown below.
- The example procedures at the end of this chapter show examples of various TWO PORT CAL menus.

Previous

- [“MANUAL CAL Menu – 2-Port VNAs” on page 9-76](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL

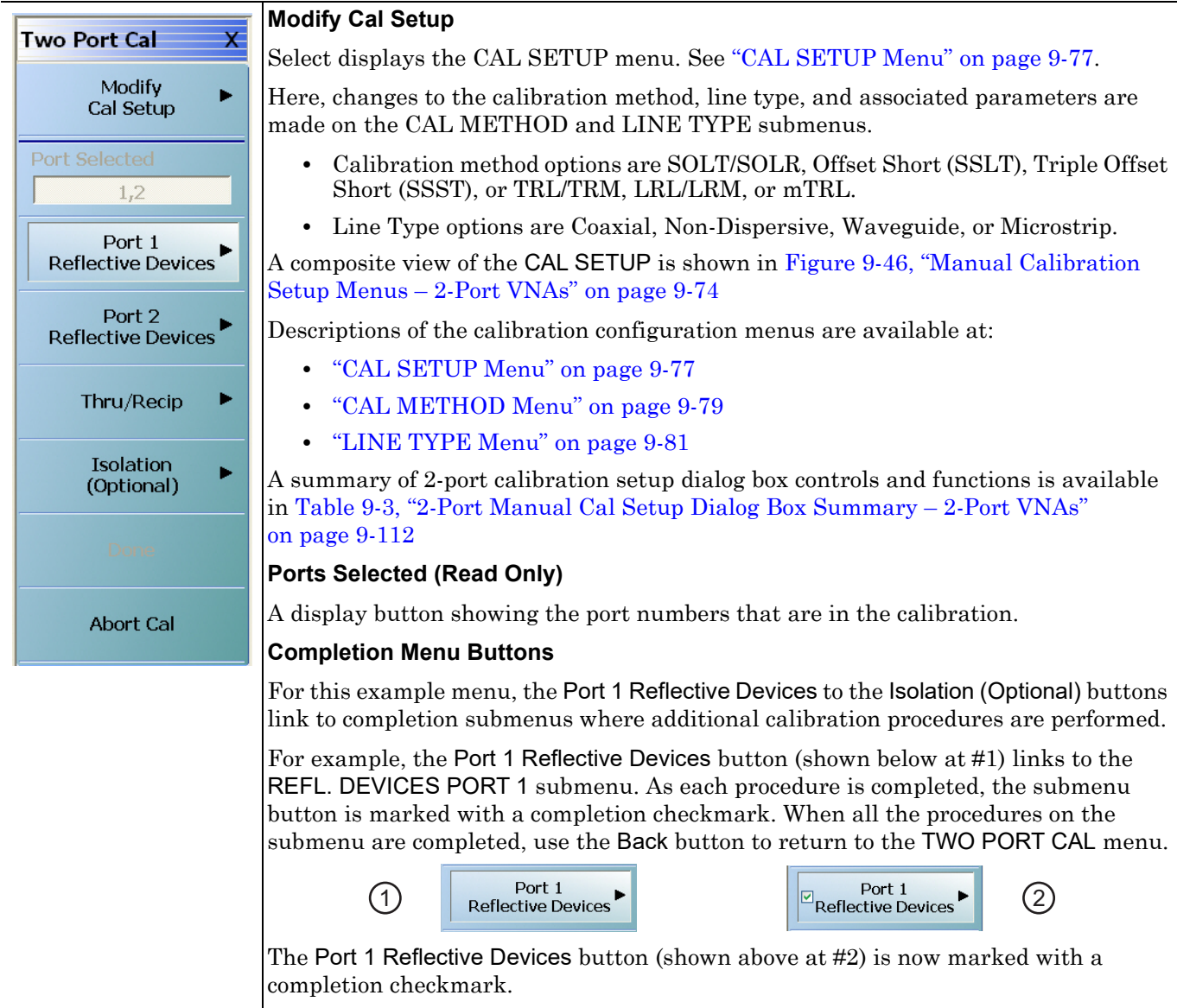
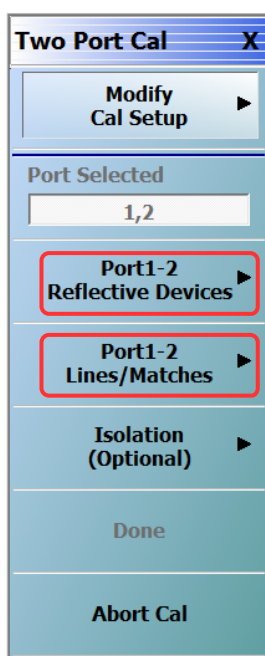


Figure 9-51. TWO PORT CAL MENU – 2-Port VNAs – Typical Example (1 of 2)



Port 1 Reflective Devices

When selected, provides the REFL. DEVICES PORT 1 menu. Each button represents a completion task. When ready for the task, click the button, and the instrument performs the calibration. When the calibration task is successfully completed, the button is marked with a completion checkmark. When all tasks are completed on the menu, return to the TWO PORT CAL menu.

Port 2 Reflective Devices

When selected, displays the REFL. DEVICES PORT 2 menu. When all tasks are completed, return to the TWO PORT CAL menu.

Port 1-2 Reflective Devices (See figure at left)

When Cal Method selected is TRL/TRM, LRL/LRM, or mTRL, the Port 1 Reflective Devices button label changes to Port 1-2 Reflective Devices. Selecting opens the “[LINES/MATCHES DEVICE\(S\) Menu – 2-Port VNAs](#)” on page 9-179. It offers selections in accordance with the settings made in the 2 Port Cal Setup Dialog.

Port 1-2 Lines/Matches (See figure at left)

When Cal Method selected is TRL/TRM, LRL/LRM, or mTRL, the Port 1 Reflective Devices button label changes to Port 1-2 Lines/Matches. Selecting opens the “[LINES/MATCHES DEVICE\(S\) Menu – 2-Port VNAs](#)” on page 9-179. It offers selections in accordance with the settings made in the 2 Port Cal Setup Dialog. This offers selections of up to five bands and ten devices.

Thru/Recip

When selected, displays the THRU/RECIP menu. When all tasks are completed, return to the TWO PORT CAL menu.

Isolation (Optional)

When selected, displays the ISOLATION menu. When all tasks are completed, return to the TWO PORT CAL menu.

Done

This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.

- “[CALIBRATION \[TR\] Menu – 2 Port VNAs](#)” on page 9-7

Abort Cal

Select aborts the current calibration and returns to the CALIBRATION menu.

- “[CALIBRATION \[TR\] Menu – 2 Port VNAs](#)” on page 9-7

Figure 9-51. TWO PORT CAL MENU – 2-Port VNAs – Typical Example (2 of 2)

Manual 2-Port Cal Setup Dialog Boxes – 2-Port VNAs

From the TWO PORT CAL menu, Modify Cal Setup button links to the CAL SETUP menu, where the Edit Cal Params button displays the appropriate configuration dialog box with that vary depending on the settings made in the MANUAL CAL, CAL SETUP, CAL METHOD, and LINE TYPE menus. Sample dialog boxes are described in the sections below for:

- [“TWO PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 9-85](#)
- [“TWO PORT CAL SETUP \(SSLT, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-89](#)
- [“TWO PORT CAL SETUP \(SSST, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-93](#)
- [“TWO PORT CAL SETUP \(Broadband Cal, Merged SOLT/R-SSST/R\) Dialog Box – 2-Port VNAs” on page 9-96](#)
- [“TWO PORT CAL SETUP \(TRL/TRM, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-99](#)
- [“TWO PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-102](#)
- [“TWO PORT CAL SETUP \(mTRL, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-106](#)
- [“TWO PORT CAL SETUP \(mSSS, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-109](#)

For all other calibration combinations, see the summary table of all dialog boxes and their controls:

- [“2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs” on page 9-112.](#)

TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu” on page 9-77

Prerequisites

- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (SOLT/R, Coaxial Dialog Box)

1. Through selected allows user entries for length, line impedance, line loss, and frequency.
Reciprocal selected allows user entry for length.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 9-52. Edit Cal Params – TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reference Impedance

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- Full 2 Port
- 1 Path 2 Port (1 → 2)
- 1 Path 2 Port (2 → 1)

Load Type Area

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu and on the PORT 2 REFLECTIVE DEVICES menu.

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Select BB Load for Test Port 1 Area

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2 Area

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Through/Reciprocal/S2P Thru Area

Located on the right side of the dialog box, these controls allow characterization of the Through/Reciprocal/S2P Thru line settings.

- **Select Line.** Allows options of:
 - Through
 - Reciprocal
 - S2P Thru
- **Through Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
 - Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
 - Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
 - @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.
- **Reciprocal Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)

- **S2P Thru Selected**

- Load S2P for Thru
 - Opens navigation window to load S2P file.
- View S2P File
 - Opens window to view contents of S2P file.
- Characterize Thru
 - Allows a thru characterization and generation of a .s2p file.
- Use Generic Anritsu Adapter (check box)
 - Checking this box will automatically load a default .s2p file for a generic Anritsu adapter. Note that selecting the checkbox disables the Load S2P for Thru and Characterize Thru buttons. (Supports V and K type connectors only.)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs

Previous

- “CAL SETUP Menu” on page 9-77

Prerequisites

- Cal Method = SSLT
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (SSLT, Coaxial) Dialog Box

1. Through selected allows user entries for length, line impedance, line loss, and frequency.
Reciprocal selected allows user entry for length.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 9-53. TWO PORT CAL SETUP (SSLT, Coaxial) Dialog Box

Reference Impedance

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- Full 2 Port
- 1 Path 2 Port (1 → 2)
- 1 Path 2 Port (2 → 1)

Load Type Area

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu and on the PORT 2 REFLECTIVE DEVICES menu.

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Select BB Load for Test Port 1 Area

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2 Area

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Through/Reciprocal/S2P Thru Area

Located on the right side of the dialog box, these controls allow characterization of the Through/Reciprocal/S2P Thru line settings.

- **Select Line.** Allows options of:
 - Through
 - Reciprocal
 - S2P Thru
- **Through Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
 - Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
 - Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
 - @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.
- **Reciprocal Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- **S2P Thru Selected**
 - Load S2P for Thru
 - Opens navigation window to load S2P file.
 - View S2P File
 - Opens window to view contents of S2P file.
 - Characterize Thru
 - Allows a thru characterization and generation of a .s2p file.

Test Port 2 Connector Area – Standard Info Button

Select displays the STANDARD INFO (SOLT/R) K-Conn (M) dialog box shown below. In the example below, K-Conn (M) was selected for a Test Port 1 DUT Connector.

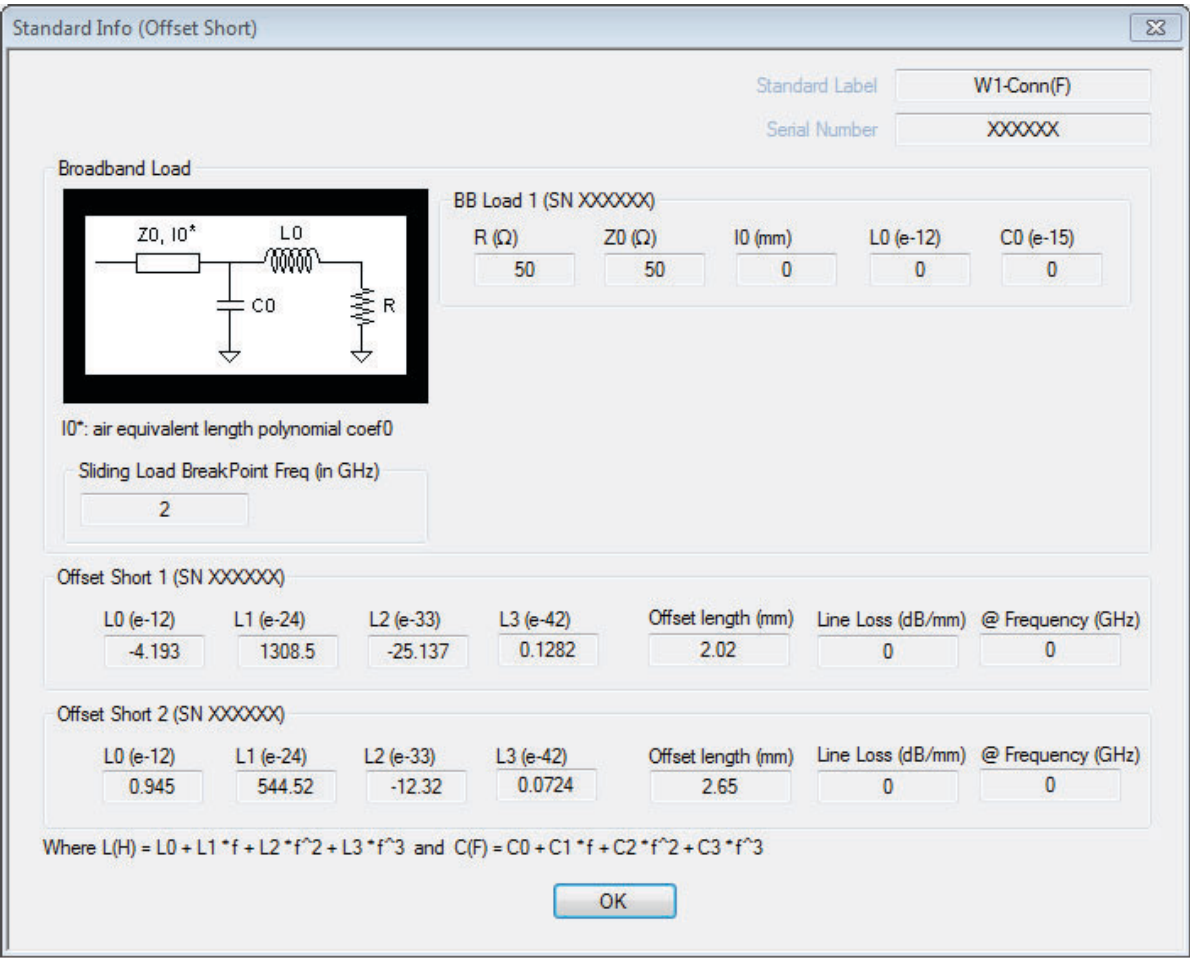


Figure 9-54. Test Port 2 Connector STANDARD INFO Dialog Box for SOLT/R and K-Conn (M)

The STANDARD INFO dialog shows the applicable calibration parameters for Test Port 2.

TWO PORT CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNAs

Previous

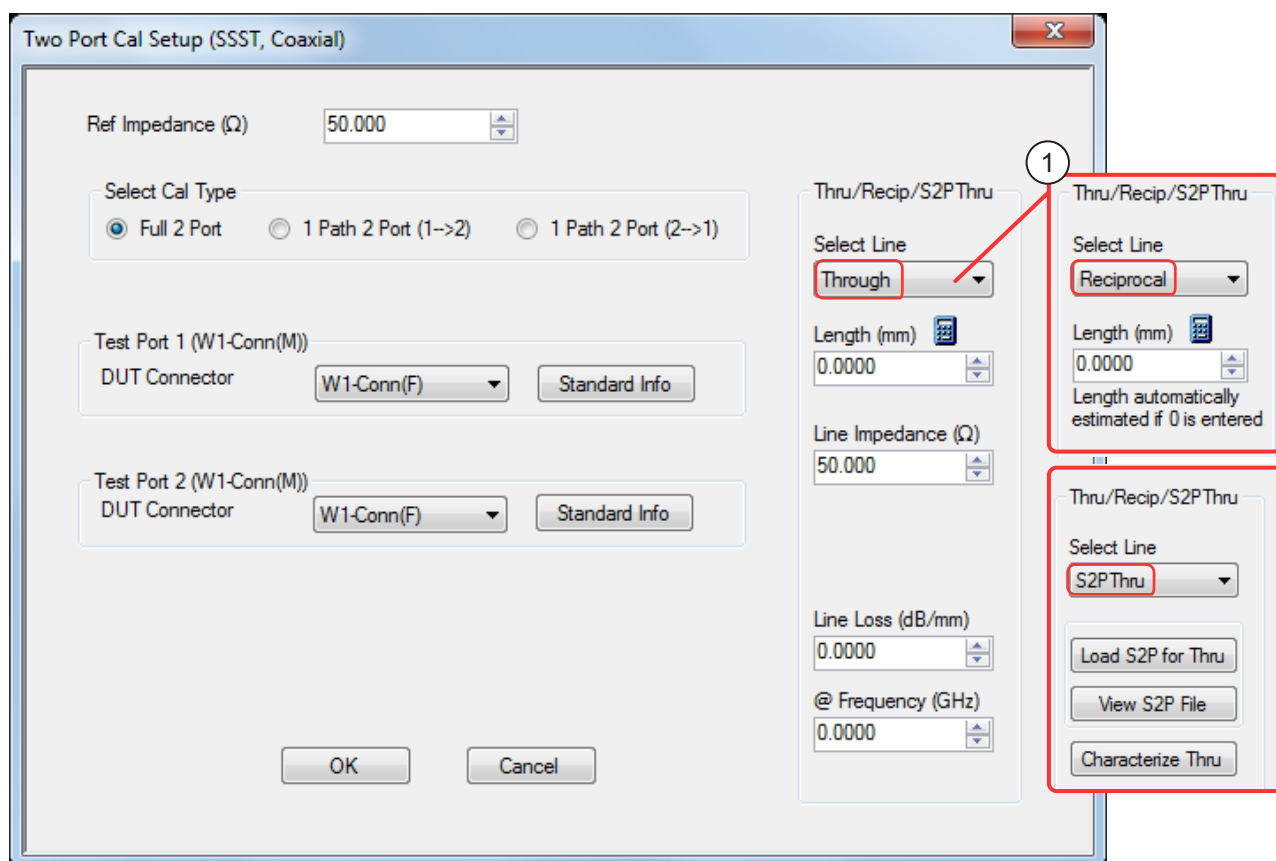
- “CAL SETUP Menu” on page 9-77

Prerequisites

- Cal Method = SSST
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (SSST, Coaxial) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
Reciprocal selected allows user entry for length.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 9-55. Edit Cal Params – TWO PORT CAL SETUP (SSST, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- Full 2 Port
- 1 Path 2 Port (1 → 2)
- 1 Path 2 Port (2 → 1)

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Through/Reciprocal/S2P Thru Area

Located on the right side of the dialog box, these controls allow characterization of the Through/Reciprocal/S2P Thru line settings.

- **Select Line.** Allows options of:
 - Through
 - Reciprocal
 - S2P Thru
- **Through Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
 - Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
 - Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
 - @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

- **Reciprocal Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- **S2P Thru Selected**
 - Load S2P for Thru
 - Opens navigation window to load S2P file.
 - View S2P File
 - Opens window to view contents of S2P file.
 - Characterize Thru
 - Allows a thru characterization and generation of a .s2p file.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs

Previous

- “CAL SETUP Menu” on page 9-77

Prerequisites

- VNA Mode = 2-Port Mode
- Cal Method = Broadband Cal (SOLT/R-SSST/R) – Appears only with VNA in Broadband Mode (3739)
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box

1. Through selected allows user entries for length, line impedance, line loss, and frequency.
Reciprocal selected allows user entry for length.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 9-56. TWO PORT CAL SETUP Broadband Cal, Merged (SOLT/R-SSST/R) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- Full 2 Port
- 1 Path 2 Port (1 → 2)
- 1 Path 2 Port (2 → 1)

Test Port 1 DUT Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- W1-Conn (M)
- W1-Conn (F)
- 0.8 mm (M)
- 0.8 mm (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

- Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal.
 - [“STANDARD INFO \(Broadband Cal\) 0.8 mm \(M\) Connector Dialog Box” on page 9-189](#)

The following link shows a typical User-Defined Standard information dialog box for broadband cal.

- [“THRU INFO Dialog Box – 2-Port VNAs” on page 9-190](#)

Test Port 2 DUT Connector

- Identical function as with the Test Port 1 DUT Connector Area above. DUT Connector Type is selected from a drop-down menu list.

Test Port 2 Connector Standard Info Button

- Identical function as with the Test Port 1 DUT Connector Standard Info button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

Breakpoint Frequency

- 67 GHz is recommended for the 3656 (1 mm) calibration kit.
- 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
- In this combined calibration, the breakpoint frequency defines the frequency above which the SSS algorithm will be used (and SOL will be used for the frequencies at or below the breakpoint). Default values are based on Anritsu calibration kits and are optimal for those components.

Through/Reciprocal/S2P Thru Area

Located on the right side of the dialog box, these controls allow characterization of the Through/Reciprocal/S2P Thru line settings.

- **Select Line.** Allows options of:
 - Through
 - Reciprocal
 - S2P Thru

- **Through Selected**

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs”](#) on page 9-185
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

- **Reciprocal Selected**

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs”](#) on page 9-185

- **S2P Thru Selected**

- Load S2P for Thru
 - Opens navigation window to load S2P file.
- View S2P File
 - Opens window to view contents of S2P file.
- Characterize Thru
 - Allows a thru characterization and generation of a .s2p file.

TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box – 2-Port VNAs

Previous

- [“CAL SETUP Menu” on page 9-77](#)

Prerequisites

- Cal Method = TRL/TRM
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (TRL/TRM) | Line Type (Coaxial) | Edit Cal Param | TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

Two Port Cal Setup (TRL/TRM, Coaxial)

Ref Impedance (Ω) 50.000 Dielectric 1.000649

Line Length Representation

☒ Effective Length ☐ Delay ☐ Physical Length

Band Definition

Number of Bands: 1

In addition to the thru line, the other calibration devices are:

Band #	Cal Device	Device Eff. Length (mm) / Match	Reflection Type	Breakpoint (GHz)	Breakpoint Calculation
1	Line	5	Short-like		

Reflection Component (Note: Reflection offset length is referenced from the Ends of first line)

☐ Enforce Passivity Open-like Offset Length (mm) 0.0000 Short-like Offset Length (mm) 0.0000

Last Loaded Kit Name

Save Kit Load Kit

Restore Defaults OK Cancel

Figure 9-57. TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Band Definition

Select one to five bands from the drop-down menu.

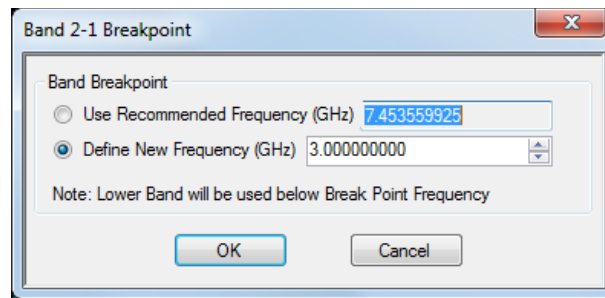
- Number of Bands = 1. Only the Band 1 Definition and editable parameters appear.
- Number of Bands = 2. The Band 2 Definition and editable parameters appear.
- Number of Bands = 3. The Band 3 Definition and editable parameters appear.
- Number of Bands = 4. The Band 4 Definition and editable parameters appear.
- Number of Bands = 5. The Band 5 Definition and editable parameters appear.

Band Parameter Definitions

- **Band #**
- **Cal Device**
 - Band choice is
 - Line
 - Match
- **Device Effective Length (mm) / Match**
 - Line: Enter device effective length for each band
 - Match: [“USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM” on page 9-192](#)
- **Reflection Type**
 - Enter a reflection type for each band.
 - Short-like
 - Open-like
- **Breakpoint (GHz)**
 - Enter a breakpoint frequency for Band 2–5. (The entries are active for bands 2–5.)

- **Breakpoint Calculation**

- Select to calculate a breakpoint frequency for band 2-5:

**Reflection Component**

- **Enforce Passivity** – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- **Enter Open-like and/or Short-like offset length**

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- **Last Loaded Kit Name** – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- **Save Kit** – Saves the present cal setup.
- **Load Kit** – Loads a previously saved cal setup.
- **Restore Defaults** – Loads the instrument default values for the Cal Setup.

OK/Cancel

OK and Cancel returns user to the CAL SETUP menu.

TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box – 2-Port VNAs

When LRL/LRM Cal Method is selected, the Edit Cal Parameters LRL/LRM dialog provides for up to five bands and 10 devices.

Previous

- [“CAL SETUP Menu” on page 9-77](#)

Prerequisites

- Cal Method = LRL/LRM
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box

Two Port Cal Setup (LRL/LRM, Coaxial)

Ref Impedance (Ω) Dielectric

Reference Plane Location
☒ Ends of Line 1 ☐ Middle of Line 1

Line Length Representation
☒ Eff. Length ☐ Delay ☐ Phy. Length

Band Definition
 Number of Bands:

Band # (Device #)	Cal Device X	Device X Length (mm)	Cal Device Y	Device Y Length (mm)/ Match	Loss (dB/mm)	@Frequency (GHz)	Reflection Type	Breakpoint (GHz)	Breakpoint Calculation
1 (X=1, Y=2)	Line	3	Line	5.8	3.1	2.3	Short-like		
2 (X=3, Y=4)	Bnd1 Cal Dev X	3	Line	2.1	4	3	Short-like	3	Band 2-1
3 (X=5, Y=6)	Bnd1 Cal Dev X	3	Match	Match Info	2	3.5	Short-like	4	Band 3-2
4 (X=7, Y=8)	Bnd1 Cal Dev Y	5.8	Line	2	4.2	2	Open-like	5	Band 4-3
5 (X=9, Y=10)	Bnd1 Cal Dev X	3	Match	Match Info	2	2.8	Both	6	Band 5-4

Reflection Component (Note: Reflection offset length is referenced from the Ends of first line)
☐ Enforce Passivity Open-like Offset Length (mm) Short-like Offset Length (mm)

Last Loaded Kit Name

Figure 9-58. Edit Cal Params – TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Band Definition

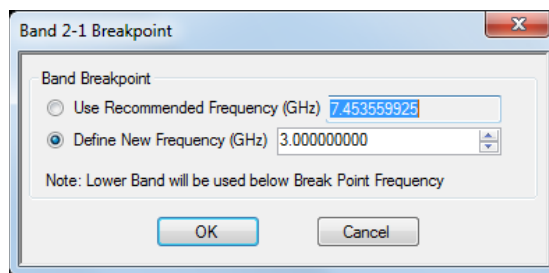
Select one to five bands from the drop-down menu.

- Number of Bands = 1. Only the Band 1 Definition and editable parameters appear.
- Number of Bands = 2. The Band 2 Definition and editable parameters appear.
- Number of Bands = 3. The Band 3 Definition and editable parameters appear.
- Number of Bands = 4. The Band 4 Definition and editable parameters appear.
- Number of Bands = 5. The Band 5 Definition and editable parameters appear.

Band Parameter Definitions

- **Band # (Device #)**
 - Band 1 defines Devices as X = 1 and Y = 2)
 - Band 2 defines Devices as X = 3 and Y = 4)
 - Band 3 defines Devices as X = 5 and Y = 6)
 - Band 4 defines Devices as X = 7 and Y = 8)
 - Band 5 defines Devices as X = 9 and Y = 10)
- **Cal Device X**
 - Band 1 choice is:
 - Line
 - Band 2 choices are:
 - New Line
 - Bnd1 Cal Dev X
 - Band1 Cal Dev Y
 - Band 3 choices are:
 - New Line
 - Bnd1 Cal Dev X
 - Band1 Cal Dev Y
 - Bnd2 Cal Dev X
 - Band2 Cal Dev Y
 - Band 4 choices are:
 - New Line
 - Bnd1 Cal Dev X, Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X, Bnd2 Cal Dev Y
 - Bnd3 Cal Dev X, Bnd3 Cal Dev Y

- Band 5 choices are:
 - New Line
 - Bnd1 Cal Dev X, Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X, Bnd2 Cal Dev Y
 - Bnd3 Cal Dev X, Bnd3 Cal Dev Y
 - Bnd4 Cal Dev X, Bnd4 Cal Dev Y
- **Device X Length (mm)**
 - Enter device length for each band.
- **Cal Device Y**
 - Select Line or Match for each band.
- **Device Y Length (mm)/Match**
 - Enter device length for each band if Device Y is Line.
 - Select Match Info if Device Y is Match. Opens “[USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM 2-Port VNAs](#)” on page 9-194
- **Loss (dB/mm)**
 - Enter loss for each band.
- **@Frequency (GHz)**
 - Enter frequency for line loss for each band.
- **Reflection Type**
 - Enter a reflection type for each band.
 - Short-like
 - Open-like
 - Both (available only if Cal Device Y= Match)
- **Breakpoint (GHz)**
 - Enter a breakpoint frequency for each band. (This area only active for bands 2 through 5.)
- **Breakpoint Calculation**
 - Select to Calculate a breakpoint frequency for each band:



Reflection Component

- **Enforce Passivity** – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- Enter Open-like and/or Short-like offset length.

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- Last Loaded Kit Name – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- Save Kit saves the present cal setup.
- Load Kit – Click opens window to navigate to a desired existing LRL/LRM cal kit file (.lcf).
- Restore Defaults loads the instrument default values for the Cal Setup.

OK/Cancel: Returns user to the CAL SETUP menu.

USER DEFINED MATCH DEVICES Dialog Box

The USER DEFINED MATCH DEVICES dialog box only appears if Device 2 or Device 4 is set to Match and the user clicks the Match Info button.

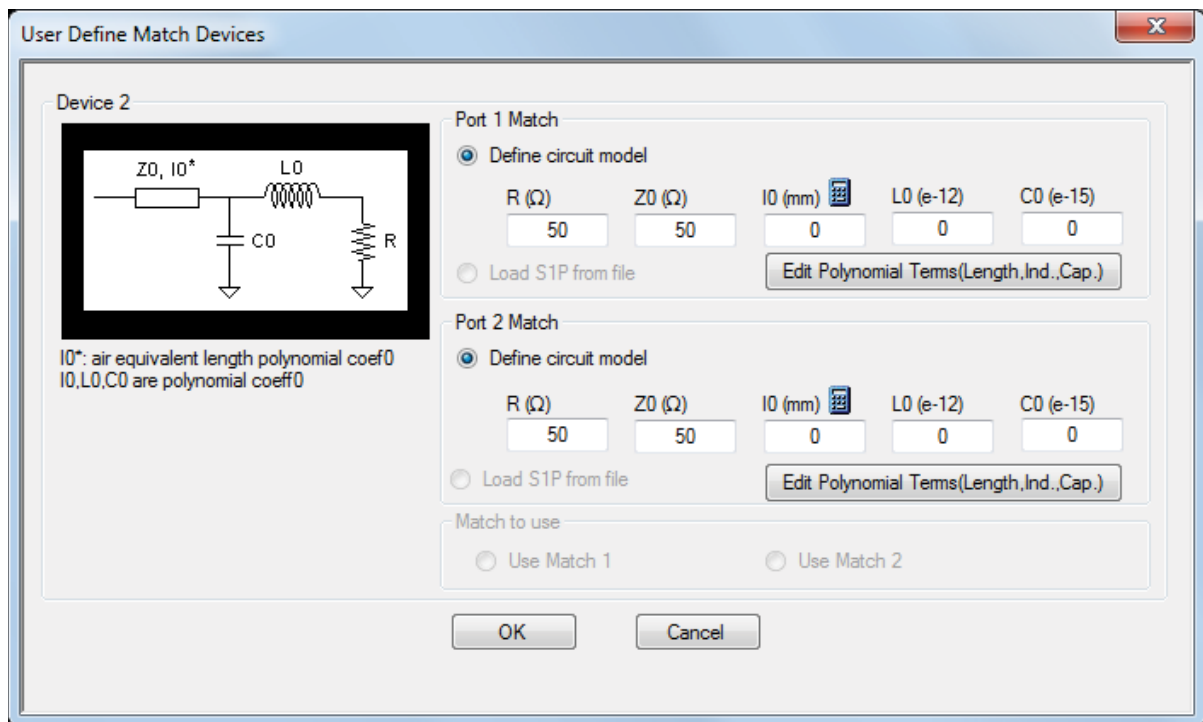


Figure 9-59. USER DEFINED MATCH DEVICES Dialog Box

TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box – 2-Port VNAs

When mTRL Cal Method is selected, the Edit Cal Parameters button opens the Two Port Cal Setup (mTRL, Coaxial) dialog that provides from two to ten lines.

Previous

- [“CAL SETUP Menu” on page 9-77](#)

Prerequisites

- Cal Method = mTRL
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (mTRL, Coaxial) Dialog Box

Two Port Cal Setup (mTRL, Coaxial)

Ref Impedance (Ω) Dielectric

Reference Plane Location
☒ Ends of Line 1 ☐ Middle of Line 1

Line Length Representation
☒ Eff. Length ☐ Delay ☐ Phy. Length

Line Definition
 Number of Lines:

Line #	Eff. Length (mm)	Loss (dB/mm)	@Frequency (GHz)
1	1	0	0
2	2	0	0
3	3	0	0
4	4	0	0
5	5	0	0
6	6	0	0
7	7	0	0
8	8	0	0
9	9	0	0
10	10	0	0

Reflection Component (Note: Reflection offset length is always referenced from the Ends of Line 1)

Reflection Type ☐ Enforce Passivity Open-like Offset Length (mm) Short-like Offset Length (mm)

☐ Use Match ☐ Optimal Length Super-Weighting

Last Loaded Kit Name

Figure 9-60. Edit Cal Params – TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Line Definition

Select two to ten line from the drop-down menu.

- Number of Lines = 2. The Lines 1 and 2 editable parameters appear.
- Number of Lines = 3. The Lines 1 through 3 editable parameters appear.
- Number of Lines = 4. The Lines 1 through 4 editable parameters appear.
- ...
- Number of Lines = 10. The Lines 1 through 10 editable parameters appear.

Line Parameter Definitions

- **Line #**
- **Effective Length (mm) (If Effective Length is selected)**
 - Enter effective length for each line.
- **Delay (ps) (If Delay is selected)**
 - Enter delay for each line.
- **Physical Length (mm) (If Physical Length is selected)**
 - Enter physical length for each line.
- **Loss (dB/mm)**
 - Enter loss for each line.
- **@Frequency (GHz)**
 - Enter frequency for line loss for each line.

Reflection Component

- Select Reflection Type
- Enforce Passivity – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- Enter Open-like and/or Short-like offset length.

Use Match

- If selected, will display the Match Info button to open the [USER DEFINED MATCH DEVICES Dialog Box – mTRL 2-Port VNAs](#). Also, if selected, enables the use of the match standard during calibration whenever line length deltas are below the phase threshold entered in the MATCH INFO dialog.

Optimal Length Super-Weighting

- Enables the use of an enhanced weighting scheme during the calibration to further emphasize line pairs that have optimal line length deltas. The use of this feature further de-emphasizes non-optimal pairs and reduces the impact of repeatability differences.

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- Last Loaded Kit Name – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- Save Kit saves the present cal setup.
- Load Kit – Click opens window to navigate to a desired existing mTRL cal kit file (.mlcf).
- Restore Defaults loads the instrument default values for the Cal Setup.

OK/Cancel: Returns user to the CAL SETUP menu.

TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box – 2-Port VNAs

Previous

- “CAL SETUP Menu” on page 9-77
- “Manual 2-Port Cal Setup – 2-Port VNAs” on page 9-82

Prerequisites

- Cal Method = mSSS
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (mSSS, Coaxial)

Two Port Cal Setup (mSSS, Coaxial)

Ref Impedance (Ω) 50.000

Select Cal Type

☒ Full 2 Port

☐ 1 Path 2 Port (1→2)

☐ 1 Path 2 Port (2→1)

Thru/Recip/S2PThru

Select Line Through

Length (mm) 0.0000

Line Loss (dB/mm) 0.0000

Line Impedance (Ω) 50.000

@ Frequency (GHz) 0.0000

Port 1 Port 2

Short Definition Port 1

Number of Shorts: 3

Short #	Offset Length (mm)	Cal Kit Sel	Kit Info (Sx is short selected)	Loss (dB/mm)	@Frequency (GHz)
1	0	Other	N/A	0	0
2	1	Other	N/A	0	0
3	2	Other	N/A	0	0

☐ Use Match ☐ Optimal Offset Length Super-Weighting

OK Cancel

Figure 9-61. TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- Full 2 Port
- 1 Path 2 Port (1 → 2)
- 1 Path 2 Port (2 → 1)

Through/Reciprocal/S2P Thru Setup

- **Through Selected**

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

- **Reciprocal Selected**

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)

- **S2P Thru Selected**

- Load S2P for Thru
 - Opens navigation window to load S2P file.
- View S2P File
 - Opens window to view contents of S2P file.
- Characterize Thru
 - Allows a thru characterization and generation of an .s2p file.
- Use Generic Anritsu Adapter (check box)
 - Checking this box will automatically load a default .s2p file for a generic Anritsu adapter. Note that selecting the checkbox disables the Load S2P for Thru and Characterize Thru buttons.

Port 1 Tab – Short Definition**Number of Shorts**

Select number of shorts from 3-10.

Offset Length (mm)

Editable if the Cal Kit Sel selected is “Other”; otherwise it will reflect the offset length of the selected short in the cal kit standard (Kit Info column).

Cal Kit Selection

Select the **DUT Connector Type** from a drop-down menu list with options of:

- Other
- 0.8 mm-Conn (M)

- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Kit Info Button

Select displays the STANDARD INFO or USER DEFINED STANDARD dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The examples show typical standard information dialog boxes.

- [“STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188](#)
 - Since the STANDARD INFO (mSSS) dialog derives from the SSS calibration kit definition, three shorts are available and the one to be used for the current line in the mSSS table is defined by the Select Short to use field. All of the shorts in the kit can be employed in the mSSS calibration, but each must be assigned to a separate line in the table.
- [“USER DEFINED MATCH Dialog Box – mSSS” on page 9-198](#)

Loss (dB/mm)

This field (in conjunction with the @Frequency field and the offset length) is used to compute the loss in the short and hence the magnitude of its reflection coefficient. This is mainly relevant for very large offset lengths (> 10 mm) at microwave frequencies or somewhat shorter lengths at millimeter wave frequencies.

@Frequency (GHz)

This field (in conjunction with the loss in dB/mm and the offset length) is used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency. If a non-zero value is entered here, it is treated as the reference frequency f_{ref} at which the loss (dB/mm) was defined and the loss at all other frequencies is scaled by $\sqrt{f/f_{ref}}$. If 0 is entered here, the loss is assumed to be constant with frequency.

Use Match Checkbox

When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation (value defined within the USER DEFINED MATCH dialog: Electrical line length delta for match use, expressed in degrees). The decision to use the match data is made on a frequency-by-frequency basis. See the *MS464XB Calibration and Measurement Guide* for more information. This helps increase bandwidth of the calibration, particularly at lower frequencies, if a match standard is available.

Match Info Button

Opens the USER DEFINED MATCH dialog.

- [“USER DEFINED MATCH Dialog Box – mSSS” on page 9-198](#)

Optimal Offset Length Super-Weighting Checkbox

When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration. More details can be found in the *MS464XB Calibration and Measurement Guide*. Using this feature can increase the available bandwidth of the calibration, but does reduce immunity to repeatability variances in the setup, so it is not advised in more repeatability challenged scenarios (e.g., fixtures where the short standards are attached by spring force alone).

Port 2 – Short Definition

Identical functions as with the Port 1 Tab above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 2-Port Calibration Setup Dialog Boxes

The table below summarizes the available fields in all 2-port calibration setup dialog boxes. If the dialog box is described above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All dialog boxes are named “Two Port Cal Setup (Cal Method, Line Type)”

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (1 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Coaxial	<p>See full description above at “TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-85</p> <p>Reference Impedance (Ohms)</p> <p>Select Cal Type: Full 2 Port, 1 Path 2 Prt (1→2), 1 Path 2 Port (2→1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>1. Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 <p>Test Port Select BB Load: Load 1, Load 2</p> <p>Through/Reciprocal/S2P Thru Select Line: Through, Reciprocal, S2P Thru</p> <p>Through/Reciprocal Length (mm): Input field</p> <p>Through/Reciprocal Line Impedance (Ohms): Input field</p> <p>Through/Reciprocal Line Loss (dB/mm): Input field</p> <p>Through/Reciprocal @ Frequency (GHz): Input field</p>
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls and functions as SOLT/R Coax above with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (2 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199 <p>Test Port DUT Connector Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200
SSLT Coaxial	<p>See full description above at “TWO PORT CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs” on page 9-89</p> <p>Reference Impedance (Ohms)</p> <p>Select Cal Type: Full 2 Port, 1 Path 2 Port (1→2), 1 Path 2 Port (2→1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <p>Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188</p> <p>Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200</p> <p>Test Port Select BB Load: Load 1, Load 2</p> <p>Through/Reciprocal/S2P Thru Select Line: Through, Reciprocal, S2P Thru area</p> <p>Through selected allows user entries for length, line impedance, line loss, and frequency.</p> <p>Reciprocal selected allows user entry for length.</p> <p>S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).</p>
SSLT Non-Dispersive	<p>Same controls and functions as SSLT Coaxial above.</p>
SSLT Waveguide	<p>Same controls and functions as SSLT Coaxial above with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (3 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
SSLT Microstrip	<p>Same controls and functions as SSLT Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199 <p>Test Port DUT Connector Type: User-Defined 1 to User-Defined 32</p> <p>Test Port DUT Connector Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200
SSST Coaxial	<p>See full description above at “TWO PORT CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNAs” on page 9-93.</p> <p>Reference Impedance (Ohms)</p> <p>Select Cal Type: Full 2 Port, 1 Path 2 Prt (1→2), 1 Path 2 Port (2→1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200 <p>Through/Reciprocal/S2P Thru Select Line: Through, Reciprocal, S2P Thru area</p> <p>Through selected allows user entries for length, line impedance, line loss, and frequency.</p> <p>Reciprocal selected allows user entry for length.</p> <p>S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files)</p>
SSST Non-Dispersive	<p>Same controls and functions as SSST Coaxial above.</p>
SSST Waveguide	<p>Same controls and functions as SSLT Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (4 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
SSST Microstrip	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199 <p>Test Port DUT Connector Type: User-Defined 1 to User-Defined 32</p> <p>Test Port DUT Connector Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (5 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
Broadband (SOLT/SOLR- SSST/SSSR) Coaxial	See full description at “TWO PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-96
	Reference Impedance (Ohms)
	Select Cal Type: Full 2 Port, 1 Path 2 Prt (1→2), 1 Path 2 Port (2→1)
	Test Port 1 Connector Type Area
	Select the DUT Connector Type from a drop-down menu list with options of: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)
	Test Port 1 Connector Standard Info Button Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal. “STANDARD INFO (Broadband Cal) 0.8 mm (M) Connector Dialog Box” on page 9-189
	The following link shows a typical User-defined Standard information dialog box for broadband cal. “THRU INFO Dialog Box – 2-Port VNAs” on page 9-190
	Test Port 2 Connector Type Area: Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.
	Test Port 2 Connector Standard Info Button: Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.
	Breakpoint Frequency 67 GHz is recommended for the 3656 (1 mm) calibration kit. 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
	Through/Reciprocal/S2P Thru Setup Area: Through selected allows user entries for length, line impedance, line loss, and frequency. Reciprocal selected allows user entry for length. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files). OK / Cancel: OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (6 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
TRL/TRM Coaxial	<p>See full description above display logic and controls at “TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box – 2-Port VNAs” on page 9-99.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric: Enter a value if different than the default.</p> <p>Line Length Representation: Effective Length, Delay, Physical Length</p> <p>Number of Bands: 1 through 5</p> <p>Band 1-5 Type: Line, Match; Device Effective Length (mm)/Match; If Device 1 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. “USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM” on page 9-192</p> <p>Reflection Type: Open-Like Short-Like.</p> <p>Cal A Band Breakpoint: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz).</p> <p>Reflection Component: Enforce Passivity</p> <p>Reflection Component: Open-like Length (mm), Short-like Offset Length (mm)</p> <p>Last Loaded Kit Name – TRL/TRM Cal Kit file name last loaded</p> <p>Save Kit: Provides the ability to save calibration kit data. Click opens a SAVE CAL KIT window to save current settings to an LRL/LRM-TRL/TRM cal kit file (.lcf) in a desired location.</p> <p>Load Kit: Provides the ability to recall calibration kit data. Click opens window to navigate to a desired existing LRL/LRM-TRL/TRM cal kit file (.lcf).</p>
TRL/TRM Non-Dispersive	Same controls and functions as TRL/TRM Coaxial above.
TRL/TRM Waveguide	<p>Same controls and functions as TRL/TRM Coaxial above with the following changes:</p> <p>Cutoff frequency (GHz): The TE₁₀ mode cutoff frequency for the waveguide in use.</p>
TRL/TRM Microstrip	<p>Same controls and functions as TRL/TRM Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (7 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Coaxial	<p>See full description above display logic and controls at “TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box – 2-Port VNAs” on page 9-102.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric: Enter a value if different than the default.</p> <p>Reference Plane Location: Ends of Line 1 or Middle of Line 1</p> <p>Line Length Representation: Effective Length, Delay, Physical Length</p> <p>Number of Bands: 1 through 5</p> <p>Band# (Device#): Up to 10 devices</p> <p>Band 1 Device 1: Type defaults to Line, Line Length (mm) or Delay (ps), Line Loss (dB/mm), @ Frequency (GHz)</p> <p>Band 1 Device 2 Type: Line or Match</p> <ul style="list-style-type: none"> • If Device 2 = Match, Match Info button appears. Select displays USER DEFINED MATCH DEVICES dialog box for selected calibration method and kit. • Typical “USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM 2-Port VNAs” on page 9-194 <p>Band 1 Device 2 Type of Reflection: Use Short-like component, Use Open-like component, Use both</p> <ul style="list-style-type: none"> • If Use Short-like component selected: Reflection Component = Short-like Offset Length (mm) • If Use Open-like component selected: Reflection Component = Open-like Offset Length (mm) • If Use both selected: Reflection Component = Short-like Offset Length (mm) and Open-like Offset Length (mm) <p>If Number of Bands = 2, Band 2 Device 3 and Band 2 Device 4 areas appear:</p> <p>Band 2 Device 3: Use device 1, Use new line</p> <ul style="list-style-type: none"> • If Use new line selected: Line Length (mm) or Delay (ps), Line Loss (dB/mm), and @ Frequency (GHz) fields appear <p>Band 2 Device 4: Line or Match</p> <ul style="list-style-type: none"> • If Line selected: Line Length (mm) field appears. • If Match selected: Match Info button appears. Select displays USER DEFINED MATCH DEVICES dialog box for selected calibration method and kit. • Typical “USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM 2-Port VNAs” on page 9-194 <p>Band 2 Device 4 Type of Reflection: Use Short-like component, Use Open-like component</p> <p>Band Break Point: Calculate Recommended Value, Use Recommended Frequency (GHz) or Define New Frequency (GHz).</p> <p>Reflection Component: Enforce Passivity</p> <p>Reflection Component: Open-like Length (mm) and/or Short-like Offset Length (mm)</p> <p>Last Loaded Kit Name: Provides the name of the LRL/LRM Cal Kit file that was last loaded.</p> <p>Save Kit: Provides the ability to save calibration kit data. Click opens a SAVE CAL KIT window to save current settings to an LRL/LRM cal kit file (.lcf) in a desired location.</p> <p>Load Kit: Provides the ability to recall calibration kit data. Click opens window to navigate to a desired existing LRL/LRM cal kit file (.lcf).</p>

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (8 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Non-Dispersive	Same controls and functions as LRL/LRM Coaxial above.
LRL/LRM Waveguide	Same controls and functions as LRL/LRM Coaxial above with the following changes: Cutoff frequency (GHz): The TE ₁₀ mode cutoff frequency for the waveguide in use.
LRL/LRM Microstrip	Same controls and functions as LRL/LRM Coaxial above with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32 Microstrip Info button: Displays a dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199
mTRL Coaxial	See full description above display logic and controls at “TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box – 2-Port VNAs” on page 9-106. Reference Impedance (Ohms) Dielectric: Enter a value if different than the default. Reference Plane Location: Ends of Line 1 or Middle of Line 1 Line Length Representation: Effective Length, Delay, Physical Length Number of Lines: 2 through 10 Line#: Up to 10 devices Line 1: Effective Length defaults to 1, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 3.3356 ps • If Use Physical Length selected: Physical Length defaults to 0.9997 mm Line 2: Effective Length defaults to 2, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 6.6713 ps • If Use Physical Length selected: Physical Length defaults to 1.9994 mm Line 3: Effective Length defaults to 3, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 10.0069 ps • If Use Physical Length selected: Physical Length defaults to 2.9990 mm Line 4: Effective Length defaults to 4, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 13.3426 ps • If Use Physical Length selected: Physical Length defaults to 3.9987 mm Line 5: Effective Length defaults to 5, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 16.6782 ps • If Use Physical Length selected: Physical Length defaults to 4.9984 mm Line 6: Effective Length defaults to 6, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 20.0138 ps • If Use Physical Length selected: Physical Length defaults to 5.9981 mm Line 7: Effective Length defaults to 7, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 23.3495 ps • If Use Physical Length selected: Physical Length defaults to 6.9977 mm

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (9 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
mTRL Coaxial (continued)	<p>Line 8: Effective Length defaults to 8, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 26.6851 ps • If Use Physical Length selected: Physical Length defaults to 7.9974 mm <p>Line 9: Effective Length defaults to 9, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 30.0208 ps • If Use Physical Length selected: Physical Length defaults to 8.9971 mm <p>Line 10: Effective Length defaults to 10, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 33.3564 ps • If Use Physical Length selected: Physical Length defaults to 9.9968 mm <p>Reflection Component: Reflection Type</p> <p>Reflection Component: Enforce Passivity</p> <p>Reflection Component: Open-like Length (mm) and/or Short-like Offset Length (mm)</p> <p>Use Match: If selected, will display the Match Info button to open the USER DEFINED MATCH DEVICES dialog box. Also, if selected, enables the use of the match standard during calibration whenever line length deltas are below the phase threshold entered in the MATCH INFO dialog.</p> <ul style="list-style-type: none"> • “USER DEFINED MATCH DEVICES Dialog Box – mTRL 2-Port VNAs” on page 9-196 <p>Optimal Length Super-Weighting: Enables the use of an enhanced weighting scheme during the calibration to further emphasize line pairs that have optimal line length deltas. The use of this feature further de-emphasizes non-optimal pairs and reduces the impact of repeatability differences.</p> <p>Last Loaded Kit Name: Provides the name of the mTRL Cal Kit file that was last loaded.</p> <p>Save Kit: Provides the ability to save calibration kit data. Click opens a Save Cal Kit window to save current settings to an mTRL cal kit file (.mlcf) in a desired location.</p> <p>Load Kit: Provides the ability to recall calibration kit data. Click opens window to navigate to a desired existing mTRL cal kit file (.mlcf).</p>
mTRL Non-Dispersive	Same controls and functions as mTRL Coaxial above.
mTRL Waveguide	<p>Same controls and functions as mTRL Coaxial above with the following changes:</p> <p>Cutoff frequency (GHz): The TE₁₀ mode cutoff frequency for the waveguide in use.</p>
mTRL Microstrip	<p>Same controls and functions as mTRL Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (10 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
mSSS Coaxial	<p>See full description at “TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box – 2-Port VNAs” on page 9-109</p> <p>Reference Impedance (Ohms)</p> <p>Cal Type: Select from Full 2 Port, 1 Path 2 Port (1->2), 1 Path 2 Port (2 ->1).</p> <p>Through/Reciprocal/S2P Thru Setup</p> <p>Through selected allows user entries for length, line impedance, line loss, and frequency.</p> <p>Reciprocal selected allows user entry for length.</p> <p>S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).</p> <p>Test Ports: Port 1, Port 2</p> <p>Number of Shorts: 3-10</p> <p>Offset Length: Cal Kit Sel selected is “Other”, otherwise reflects the offset length of the selected short in the cal kit standard (Kit Info column)</p> <p>Cal Kit Selection: Other, 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Kit Info Standard Info Button: Displays the STANDARD INFORMATION (mSSS) or USER DEFINED STANDARD (mSSS) dialog box for the selected short.</p> <ul style="list-style-type: none"> • “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 <ul style="list-style-type: none"> • The short to be used for the current line in the mSSS table is defined by the Select Short to use field. • “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200 <p>Loss (dB/mm): Used to compute the loss in the short and hence the magnitude of its reflection coefficient.</p> <p>@Frequency: Used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency.</p> <p>Use Match: When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation.</p> <p>Optimal Offset Length Super-Weighting: When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration.</p> <p>Test Port 1 and Test Port 2 controls are the same.</p>
mSSS Non-Dispersive	Same controls as mSSS Coaxial above.
mSSS Waveguide	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Cutoff Frequency: The cutoff frequency for the TE₁₀ mode in the waveguide size being used for this calibration (all shorts are assumed to have the same aperture dimensions and hence the same cutoff frequency).</p> <p>Dielectric: The dielectric constant of any filling material in the waveguide interface being used for the calibration (assumed 100% fill; default value is 1).</p>

Table 9-3. 2-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (11 of 11)

Cal Method Line Type	Dialog Box Controls and Functions
mSSS Microstrip	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187

9-10 Manual 1-Port Cal Setup – 2-Port VNAs

Note The appearance and button availability of the calibration menus depends on the settings established in the CAL SETUP, CAL METHOD, LINE TYPE menus and in the associated dialog boxes that appear from the Edit Cal Params button.

ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs

Previous

- [“MANUAL CAL Menu – 2-Port VNAs” on page 9-76](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL/S menu

	<p>Modify Cal Setup</p> <p>Select displays the CAL SETUP menu where changes to the calibration method, line type, and associated parameters are made on the CAL METHOD and LINE TYPE submenus.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-77. • “CAL METHOD Menu” on page 9-79. <ul style="list-style-type: none"> • Calibration method options are SOLT/SOLR, Offset Short (SSLT), Triple Offset Short (SSST), Broadband Cal (SOLT/R-SSST/R), or mSSS. • “LINE TYPE Menu” on page 9-81. <ul style="list-style-type: none"> • Line Type options are Coaxial, Non-Dispersive, Waveguide, or Microstrip. <p>A composite view of the CAL SETUP menu set and is available in:</p> <ul style="list-style-type: none"> • Figure 9-46 on page 9-74 <p>Ports Selected (Read Only)</p> <p>A display button showing the port numbers that are in the calibration.</p> <p>Completion Menu Buttons</p> <p>For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.</p> <p>For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the FOUR PORT CAL menu.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>①</p> </div> <div style="text-align: center;"> <p>②</p> </div> </div> <p>The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.</p>
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Figure 9-62. ONE PORT CAL MENU – 2-Port VNAs – Typical Example (1 of 2)

	<div><div>Port 1 Reflective Devices</div><div>When selected, provides the PORT 1 REFLECTIVE DEVICES menu. Each button represents a completion task. When ready for the task, click the button, and the instrument performs the calibration. When the calibration task is successfully completed, the button is marked with a completion checkmark. When all tasks are completed on the menu, return to the ONE PORT CAL menu.</div><div>Thru/Recip</div><div>When selected, displays the THRU/RECIP menu. When all tasks are complete, return to the ONE PORT CAL menu.</div><div>Isolation (Optional)</div><div>When selected, displays the ISOLATION menu. When all tasks are completed, return to the ONE PORT CAL menu.</div><div>Done</div><div>This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.<ul style="list-style-type: none">• “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7</div><div>Abort Cal</div><div>Select aborts the current calibration and returns to the CALIBRATION menu.<ul style="list-style-type: none">• “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7</div></div>
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Figure 9-62. ONE PORT CAL MENU – 2-Port VNAs – Typical Example (2 of 2)

Modify One-Port Cal Setup Dialog Boxes

The Edit Cal Params dialog boxes are populated with controls and fields that vary depending on the settings made in the MANUAL CAL, CAL SETUP, CAL METHOD, and LINE TYPE menus. Dialog box examples are:

- [“ONE-PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-126](#)
- [“ONE-PORT CAL SETUP \(SSLT, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-129](#)
- [“ONE-PORT CAL SETUP \(SSST, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-132](#)
- [“ONE PORT CAL SETUP \(Broadband Cal, Merged SOLT/R-SSST/R\) Dialog Box – 2-Port VNAs” on page 9-134](#)
- [“ONE PORT CAL SETUP \(mSSS, Coaxial\) Dialog Box” on page 9-136](#)

For all other combinations of calibration methods and line types, see the summary in [Table 9-4 on page 9-139](#) for a listing of dialog box controls and functions.

Note

Note that the TRL/TRM, LRL/LRM, and mTRL calibration methods are not available for One-Port Calibrations.

ONE-PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box – 2-Port VNAs

Prerequisites

- Calibration Method = SOLT/SOLR
- Line Type = Coaxial

Previous

- [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE-PORT CAL(S) | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE-PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

One Port Cal Setup (SOLT/R, Coaxial)

Ref Impedance (Ω) 50.000

☒ Test Port 1 (V-Conn(F))

DUT Connector V-Conn(M) Standard Info

Select BB Load: ☒ Load 1 ☐ Load 2

Select Load Type: ☐ Broadband Load ☒ Sliding Load

* Still requires broadband loads below sliding load breakpoint frequency.

☒ Test Port 2 (V-Conn(F))

DUT Connector V-Conn(M) Standard Info

Select BB Load: ☒ Load 1 ☐ Load 2

Select Load Type: ☒ Broadband Load ☐ Sliding Load

* At least one port must be selected.

OK Cancel

Figure 9-63. ONE-PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box – 2-Port VNAs

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port 1

At least one test port (Test Port 1 or Test Port 2) must be selected. Both test ports may be selected.

Use the check box to select Test Port 1. If the check box is not selected, all Test Port 1 fields and controls are unavailable. If selected, the following controls are available:

DUT Connector Type Field

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 1

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Select Load Type for Test Port 1

Select the load type for Test Port 1:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu.

Test Port 2 Area

Use the check box to select Test Port 2. If the check box is not selected, all Test Port 2 fields and controls are unavailable. If selected, the following controls are available:

DUT Connector Type Field:

Select the DUT Connector Type from a drop-down menu list with the same options as in Test Port 1 above.

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Select Load Type for Test Port 2

Select the load type for Test Port 2:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 2 REFLECTIVE DEVICES menu.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE-PORT CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs

Prerequisites

- Calibration Method = SSLT
- Line Type = Coaxial

Previous

- [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE-PORT CAL SETUP (SSLT, Coaxial) Dialog Box

One Port Cal Setup (SSLT, Coaxial)

Ref Impedance (Ω) 50.000

☒ Test Port 1 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Select BB Load: ☒ Load 1 ☐ Load 2

Select Load Type: ☒ Broadband Load ☐ Sliding Load

☒ Test Port 2 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Select BB Load: ☒ Load 1 ☐ Load 2

Select Load Type: ☒ Broadband Load ☐ Sliding Load

* At least one port must be selected.

OK Cancel

Figure 9-64. ONE-PORT CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port 1

At least one test port (Test Port 1 or Test Port 2) must be selected. Both test ports may be selected.

Use the check box to select Test Port 1. If the check box is not selected, all Test Port 1 fields and controls are unavailable. If selected, the following controls are available:

Test Port 1 DUT Connector Type Field

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the selected connector and Cal Method selected.

Select BB Load for Test Port 1

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Select Load Type for Test Port 1

Select the load type for Test Port 1:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu.

Test Port 2 Area

Use the check box to select Test Port 2. If the check box is not selected, all Test Port 2 fields and controls are unavailable. If selected, the following controls are available:

Test Port 2 DUT Connector Type Field:

Select the DUT Connector Type from a drop-down menu list with the same options as in Test Port 1 above.

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Select Load Type for Test Port 2

Select the load type for Test Port 2:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 2 REFLECTIVE DEVICES menu.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Test Port 1 Connector Area – Standard Info Button

Select displays the STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn M) Dialog Box shown below. Note that the name of this dialog changes depending on the selected Cal Method and DUT Connector. In the example below, V-Conn (M) was selected for a Test Port 1 DUT Connector.

Note

The name of this dialog and the information presented is dependent on the user selections for **Calibration Type, Calibration Method, and Test Port Connectors**.

Standard Info (SOLT/R)

Standard Label: V-Conn(M)

Serial Number: XXXXXX

Broadband Load

Diagram: A circuit diagram showing a broadband load model. It consists of a series combination of a resistor Z_0 and an inductor L_0 , followed by a shunt combination of a capacitor C_0 and a resistor R . The diagram is enclosed in a black box.

BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	L0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

BB Load 2 (SN XXXXXX)

R (Ω)	Z0 (Ω)	L0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

Sliding Load BreakPoint Freq (in GHz): 4

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	0	0	0	5.1	0	0

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	-200	5	0	4.75	0	0

Where $L(H) = L_0 + L_1 * f + L_2 * f^2 + L_3 * f^3$ and $C(F) = C_0 + C_1 * f + C_2 * f^2 + C_3 * f^3$

OK

Figure 9-65. Test Port 1 Connector Standard Info Dialog Box for SOLT/R V-Conn (M)

The STANDARD INFO dialog shows the applicable calibration parameters for Test Port 1.

ONE-PORT CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNAs

Previous

- [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)

Prerequisites

- Calibration Method = SSST
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE-PORT CAL(S) | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE-PORT CAL SETUP (SSST, Coaxial) Dialog Box

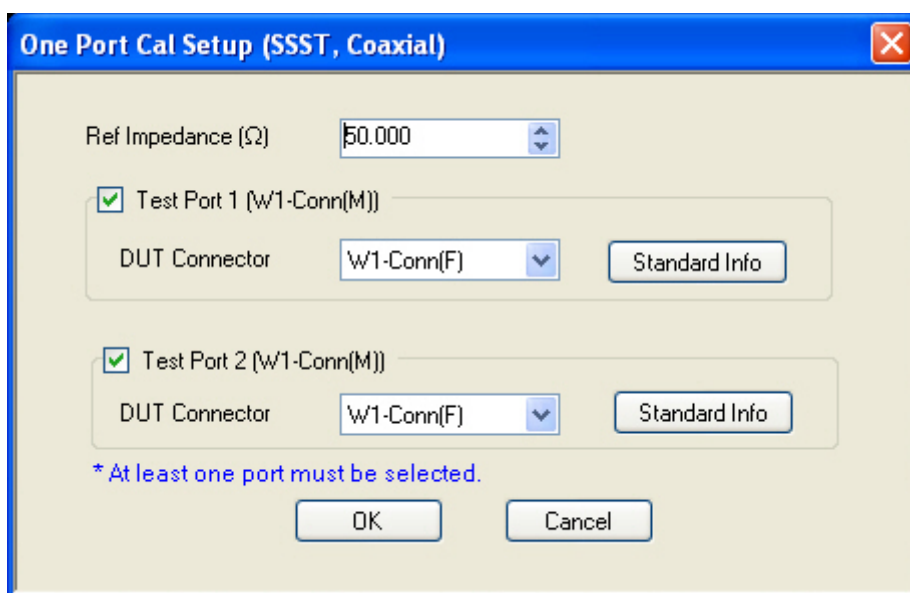


Figure 9-66. ONE-PORT CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNAs

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port 1

At least one test port (Test Port 1 or Test Port 2) must be selected. Both test ports may be selected.

Use the check box to select Test Port 1. If the check box is not selected, all Test Port 1 fields and controls are unavailable. If selected, the following controls are available:

Test Port 1 DUT Connector Type

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm (M)
- 0.8 mm (F)
- W1-Conn (M)
- W1-Conn (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Area

Use the check box to select Test Port 2. If the check box is not selected, all Test Port 2 fields and controls are unavailable. If selected, the following controls are available:

Test Port 2 DUT Connector Type Field:

Select the DUT Connector Type from a drop-down menu list with the same options as in Test Port 1 above.

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs

Previous

- “CAL SETUP Menu” on page 9-77

Prerequisites

- VNA Mode = 2-Port Mode
- Cal Method = Broadband Cal (SOLT/R-SSST/R) – Appears only with VNA in Broadband Mode (3739)
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box

One Port Cal Setup (Broadband Cal, Merged SOLT-SSST/SOLR-SSSR)

Ref Impedance (Ω) 50.000

☒ Test Port 1 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Breakpoint Frequency (GHz) 67.000000000 Note: 67 GHz recommended for 374xx
80 GHz recommended for MA25300A

☒ Test Port 2 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Breakpoint Frequency (GHz) 67.000000000 Note: 67 GHz recommended for 374xx
80 GHz recommended for MA25300A

* At least one port must be selected.

OK Cancel

Figure 9-67. TWO PORT CAL SETUP Broadband Cal, Merged (SOLT/R-SSST/R) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port 1 DUT Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- W1-Conn (M)
- W1-Conn (F)
- 0.8 mm (M)
- 0.8 mm (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

- Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal.
 - [“STANDARD INFO \(Broadband Cal\) 0.8 mm \(M\) Connector Dialog Box” on page 9-189](#)
- The following link shows a typical User-Defined Standard information dialog box for broadband cal.
 - [“USER-DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 9-203](#)

Test Port 1 Breakpoint Frequency

- 67 GHz is recommended for the 3656 (1 mm) calibration kit.
- 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
- In this combined calibration, the breakpoint frequency defines the frequency above which the SSS algorithm will be used (and SOL will be used for the frequencies at or below the breakpoint). Default values are based on Anritsu calibration kits and are optimal for those components.

Test Port 2 DUT Connector

- Identical function as with the Test Port 1 DUT Connector Area above. DUT Connector Type is selected from a drop-down menu list.

Test Port 2 Connector Standard Info Button

- Identical function as with the Test Port 1 DUT Connector Standard Info button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

Test Port 2 Breakpoint Frequency

- Identical function as with the Test Port 1 Breakpoint Frequency.

OK / Cancel:

Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu” on page 9-77
- “Manual 1-Port Cal Setup – 2-Port VNAs” on page 9-123

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (mSSS, Coaxial)

One Port Cal Setup (mSSS, Coaxial)

Ref Impedance (Ω)

50.000

Select Port(s) To Calibrate

☒ Port 1

☒ Port 2

* At least one port must be selected.

Port 1Port 2

Short Definition Port 1

Number of Shorts: 3

Short #	Offset Length (mm)	Cal Kit Sel	Kit Info (Sx is short selected)	Loss (dB/mm)	@Frequency (GHz)
1	0	Other	N/A	0	0
2	1	Other	N/A	0	0
3	2	Other	N/A	0	0

☒ Use Match

Match Info

☐ Optimal Offset Length Super-Weighting

OK

Cancel

Figure 9-68. ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Port(s) to Calibrate

Select any test port(s) from Port 1 and Port 2. At least one test port must be selected.

Port 1 Tab – Short Definition**Number of Shorts**

Select number of shorts from 3-10.

Offset Length (mm)

Editable if the Cal Kit Sel selected is “Other”; otherwise it will reflect the offset length of the selected short in the cal kit standard (Kit Info column).

Cal Kit Selection

Select the **DUT Connector Type** from a drop-down menu list with options of:

- Other
- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Kit Info Button

Select displays the STANDARD INFO or USER DEFINED STANDARD dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The examples show typical standard information dialog boxes.

- [“STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188](#)
 - Since the STANDARD INFO (mSSS) dialog derives from the SSS calibration kit definition, three shorts are available and the one to be used for the current line in the mSSS table is defined by the Select Short to use field. All of the shorts in the kit can be employed in the mSSS calibration, but each must be assigned to a separate line in the table.
- [“USER DEFINED MATCH Dialog Box – mSSS” on page 9-198](#)

Loss (dB/mm)

This field (in conjunction with the @Frequency field and the offset length) is used to compute the loss in the short and hence the magnitude of its reflection coefficient. This is mainly relevant for very large offset lengths (> 10 mm) at microwave frequencies or somewhat shorter lengths at millimeter wave frequencies.

@Frequency (GHz)

This field (in conjunction with the loss in dB/mm and the offset length) is used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency. If a non-zero value is entered here, it is treated as the reference frequency f_{ref} at which the loss (dB/mm) was defined and the loss at all other frequencies is scaled by $\sqrt{f/f_{ref}}$. If 0 is entered here, the loss is assumed to be constant with frequency.

Use Match Checkbox

When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation (value defined within the USER DEFINED MATCH dialog: Electrical line length delta for match use, expressed in degrees). The decision to use the match data is made on a frequency-by-frequency basis. See the *MS464XB Calibration and Measurement Guide* for more information. This helps increase bandwidth of the calibration, particularly at lower frequencies, if a match standard is available.

Match Info Button

Opens the USER DEFINED MATCH dialog.

- [“USER DEFINED MATCH Dialog Box – mSSS” on page 9-198](#)

Optimal Offset Length Super-Weighting Checkbox

When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration. More details can be found in the *MS464XB Calibration and Measurement Guide*. Using this feature can increase the available bandwidth of the calibration, but does reduce immunity to repeatability variances in the setup, so it is not advised in more repeatability challenged scenarios (e.g., fixtures where the short standards are attached by spring force alone).

Port 2 – Short Definition

Identical functions as with the Port 1 tab above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 1-Port Calibration Setup Dialog Boxes

The table below summarizes the available fields in other one-port calibration setup dialog boxes. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All dialog boxes are named “One Port Cal Setup (Cal Method, Line Type)”.

Table 9-4. 1-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (1 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See full description above at “ONE-PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box – 2-Port VNAs” on page 9-126.</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200 <p>Test Port BB Load: Load 1, Load 2</p> <p>Test Port Load Type: Broadband Load, Sliding Load</p>
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Reference Impedance (Ohms)</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199 <p>Test Port DUT Connector Type: User-Defined 1 to User-Defined 32</p> <p>Test Port Standard Info button: Displays info dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188

Table 9-4. 1-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (2 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Coaxial	<p>See full description above at “ONE-PORT CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs” on page 9-129.</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200 <p>Test Port BB Load: Load 1, Load 2</p> <p>Test Port Load Type: Broadband Load, Sliding Load</p>
SSLT Non-Dispersive	Same controls and functions as SSLT Coax.
SSLT Waveguide	<p>Same controls and functions as SSLT Coax with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays info dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
SSLT Microstrip	<p>Same controls and functions as SSLT Coax with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays info dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199 <p>Test Port Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200

Table 9-4. 1-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (3 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Coaxial	<p>See the full description above at “ONE-PORT CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNAs” on page 9-132.</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188
SSST Non-Dispersive	<p>Same controls and functions as SSST Coaxial.</p>
SSST Waveguide	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
SSST Microstrip	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199

Table 9-4. 1-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (4 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
Broadband (SOLT/SOLR- SSST/SSSR) Coaxial	<p>See full description at “ONE PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-134</p> <p>Reference Impedance (Ohms)</p> <p>Test Port 1 Connector Type Area</p> <p>Select the DUT Connector Type from a drop-down menu list with options of: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port 1 Connector Standard Info Button</p> <p>Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal. “STANDARD INFO (Broadband Cal) 0.8 mm (M) Connector Dialog Box” on page 9-189</p> <p>The following link shows a typical User-defined Standard information dialog box for broadband cal. “USER-DEFINED STANDARD (Broadband Cal) Dialog Box” on page 9-203</p> <p>Test Port 1 Breakpoint Frequency</p> <p>67 GHz is recommended for the 3656 (1 mm) calibration kit. 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.</p> <p>Test Port 2 Connector Type Area</p> <p>Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.</p> <p>Test Port 2 Connector Standard Info Button:</p> <p>Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.</p> <p>Test Port 2 Breakpoint Frequency</p> <p>Identical function as with the Test Port 1 Breakpoint Frequency.</p> <p>OK / Cancel:</p> <p>Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.</p>
TRL/TRM	The TRL/TRM calibration method is not available for one-port calibrations.
LRL/LRM	The LRL/LRM calibration method is not available for one-port calibrations.
mTRL	The mTRL calibration method is not available for one-port calibrations.

Table 9-4. 1-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (5 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
mSSS Coaxial	<p>See full description at “ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 9-136</p> <p>Reference Impedance (Ohms)</p> <p>Select Ports to Calibrate: Select from Port 1, Port 2. At least one port must be selected.</p> <p>Port 1 Tab</p> <p>Number of Shorts: 3-10</p> <p>Offset Length: Cal Kit Sel selected is “Other”, otherwise reflects the offset length of the selected short in the cal kit standard (Kit Info column)</p> <p>Cal Kit Selection: Other, 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Kit Info Standard Info Button: Displays the STANDARD INFORMATION (mSSS) or USER DEFINED STANDARD (mSSS) dialog box for the selected short.</p> <ul style="list-style-type: none"> • “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 <ul style="list-style-type: none"> • The short to be used for the current line in the mSSS table is defined by the Select Short to use field. • “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200 <p>Loss (dB/mm): Used to compute the loss in the short and hence the magnitude of its reflection coefficient.</p> <p>@Frequency: Used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency.</p> <p>Use Match: When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation.</p> <p>Optimal Offset Length Super-Weighting: When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration.</p> <p>Test Port 1 and Test Port 2 controls are the same.</p>
mSSS Non-Dispersive	<p>Same controls as mSSS Coaxial above.</p>
mSSS Waveguide	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Cutoff Frequency: The cutoff frequency for the TE₁₀ mode in the waveguide size being used for this calibration (all shorts are assumed to have the same aperture dimensions and hence the same cutoff frequency).</p> <p>Dielectric: The dielectric constant of any filling material in the waveguide interface being used for the calibration (assumed 100% fill; default value is 1).</p>

Table 9-4. 1-Port Manual Cal Setup Dialog Box Summary – 2-Port VNAs (6 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
mSSS Microstrip	Same controls as mSSS Coaxial with the following changes: Cal Kit Selection: User-Defined1 through User-Defined32. Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32 Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. <ul style="list-style-type: none">• “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187

9-11 Manual Cal – Trans. Freq. Resp. Cal – 2-Port VNAs

Note

The appearance and button availability of the calibration menus depends on the settings established in the CAL SETUP, CAL METHOD, LINE TYPE menus and in the associated dialog boxes that appear from the Edit Cal Params button.

Full Name

Transmission Frequency Response Calibration

Menu Name

- TRANS. RESPONSE

Button Name

- Transmission Freq. Response

TRANS. RESPONSE Menu – 2-Port VNAs

Full Name

Transmission Frequency Response Calibration Setup

The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box. A representative menu is shown below. There is one example procedure of a Trans. Response calibration in this chapter.

Previous

- [“MANUAL CAL Menu – 2-Port VNAs” on page 9-76](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE

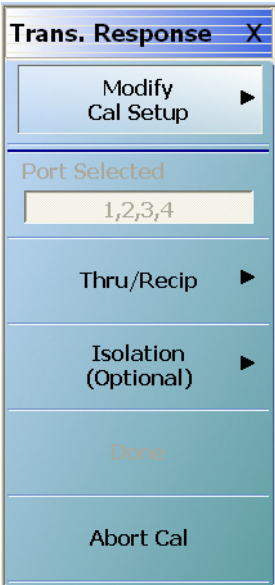
	<p>Modify Cal Setup</p> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-77 <p>Example transmission frequency response calibration dialog boxes are available below:</p> <ul style="list-style-type: none"> • “TRANS. FREQ. RESP. CAL. SETUP (SOLT/R – Coaxial) Dialog Box” on page 9-147 <p>A summary table of all transmission frequency response calibration configuration dialog boxes is available here:</p> <ul style="list-style-type: none"> • Table 9-5, “Manual Calibration – Trans. Freq. Resp. Cal. Setup Dialog Box Contents – 2-Port VNAs” on page 9-149 <p>Port Selected</p> <p>Read-only display of the ports selected for the pending calibration.</p>
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Figure 9-69. TRANS. RESPONSE Menu – Trans. Freq. Resp. Cal. – 2-Port VNAs – Typical example (1 of 2)

Completion Menu Buttons

For this example menu, the Thru/Recip and Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Thru/Recip button (shown below at #1) links to the THRU/RECIP submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the TRANS. RESPONSE menu.



The Thru/Recip button (shown above at #2) is now marked with a completion checkmark.

Thru/Recip

When selected, displays the THRU/RECIP menu. When all tasks are complete, return to the TRANS. RESPONSE menu.

Isolation (Optional)

When selected, displays the ISOLATION menu. When all tasks are completed, return to the TRANS. RESPONSE menu.

Done

This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the **CALIBRATION** menu when the **Cal Status** is set to **ON**.

- “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7

Abort Cal

Select aborts the current calibration and returns to the CALIBRATION menu.

- “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7

Figure 9-69. TRANS. RESPONSE Menu – Trans. Freq. Resp. Cal. – 2-Port VNAs – Typical example (2 of 2)

TRANS. FREQ. RESP. CAL. SETUP (SOLT/R – Coaxial) Dialog Box**Full Name**

Transmission Frequency Response Calibration Setup

Previous

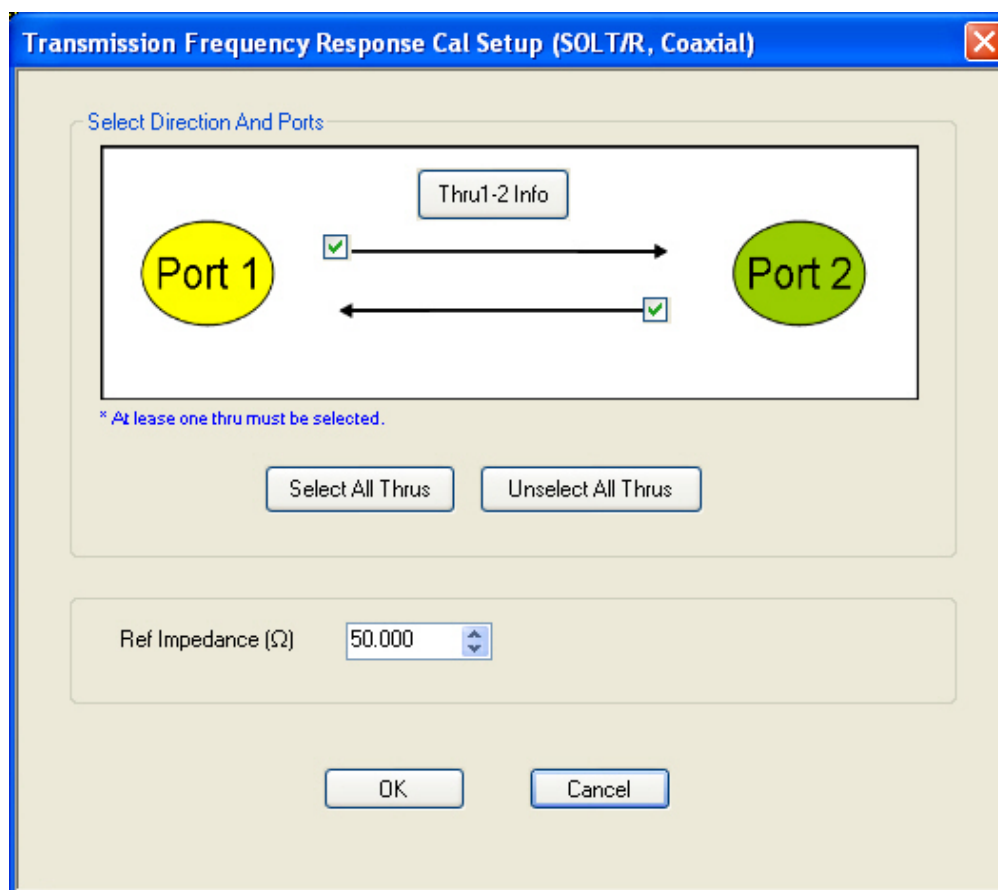
- [“TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145](#)
- [“CAL SETUP Menu” on page 9-77](#)

Prerequisites

- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq Response | TRANS FREQ (TRANSMISSION FREQUENCY RESPONSE) | Modify Cal Setup | CAL SETUP | Edit Cal Params | TRANSMISSION FREQUENCY RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box



TRANSMISSION FREQUENCY RESPONSE CALIBRATION SETUP Dialog Box

Figure 9-70. TRANS. FREQ. RESP. CAL. SETUP (SOLT/R, Coaxial) Dialog Box

Select Direction And Ports

Select any combination of the two available Throughs. At least one thru must be selected. Both the Thru Port 1 to Port 2 and the Thru Port 2 to Port 1 may be selected.

Thru 1-2 Info Button

Select the Thru 1-2 to display the THRU INFO dialog box.

- The THRU INFO dialog box is described above in [“THRU INFO Dialog Box – 2-Port VNAs” on page 9-190](#)

The Calculator icon is available on the THRU INFO dialog box. Select displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.

- The AIR EQUIVALENT LENGTH CONVERSION dialog box is described above in [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#).

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Transmission Frequency Response Calibration Setup Dialog Boxes

The table below summarizes the available fields and controls in other transmission frequency response calibration setup dialog boxes (abbreviated in this section as Trans. Freq. Resp. Cal.). To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button.

Table 9-5. Manual Calibration – Trans. Freq. Resp. Cal. Setup Dialog Box Contents – 2-Port VNAs (1 of 2)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	See full description above at “TRANS. FREQ. RESP. CAL. SETUP (SOLT/R – Coaxial) Dialog Box” on page 9-147. Select Direction and Ports: Port 1, Port 2, Port 1 and Port 2 Reference Impedance (Ohms)
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial.
SOLT/R Waveguide	Same controls and functions as SOLT/R Coaxial with the following changes: Waveguide Kit: User-Defined 1 to User-Defined 32 Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box. • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
SOLT/R Microstrip	Same controls and functions as SOLT/R Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32 Microstrip Info button: Displays info dialog box for selected calibration method and kit. • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199
SSLT Coaxial	Same controls and functions as SOLT/R Coaxial above.
SSLT Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SSLT Waveguide	Same controls and functions as SOLT/R Coaxial with the following changes: Waveguide Kit: User-Defined 1 to User-Defined 32 Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box. • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
SSLT Microstrip	Same controls and functions as SOLT/R Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32 Microstrip Info button: Displays info dialog box for selected calibration method and kit. • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199

Table 9-5. Manual Calibration – Trans. Freq. Resp. Cal. Setup Dialog Box Contents – 2-Port VNAs (2 of 2)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Coaxial	Same controls and functions as SOLT/R Coaxial above.
SSST Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SSST Waveguide	Same controls and functions as SOLT/R Coaxial with the following changes: Waveguide Kit: User-Defined 1 to User-Defined 32 Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box. • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
SSST Microstrip	Same controls and functions as SOLT/R Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32 Microstrip Info button: Displays info dialog box for selected calibration method and kit. • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199
TRL/TRM	The TRL/TRM calibration method is not available for Transmission Frequency Response calibrations.
LRL/LRM	The LRL/LRM calibration method is not available for Transmission Frequency Response calibrations.
mTRL	The mTRL calibration method is not available for Transmission Frequency Response calibrations.
mSSS	The mSSS calibration method is not available for Transmission Frequency Response calibrations.

9-12 Manual Cal – Refl. Freq. Resp. Cal – 2-Port VNAs

Full Name

Manual Calibration – Reflection Frequency Response Calibration – 2-Port VNAs

Note

The appearance and button availability of the calibration menus depends on the settings established in the CAL SETUP, CAL METHOD, LINE TYPE menus and in the associated dialog boxes that appear from the Edit Cal Params button.

Menu Name

- REFL. RESPONSE

Button Name

- Reflection Freq. Response

REFL. RESPONSE Menu – 2-Port VNAs

Full Name

Reflection Response

The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant REFLECTION FREQUENCY RESPONSE CAL SETUP dialog box. A representative menu is shown below. There is one example procedure of a REFL. RESPONSE calibration in this chapter.

Previous

- [“MANUAL CAL Menu – 2-Port VNAs” on page 9-76](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE

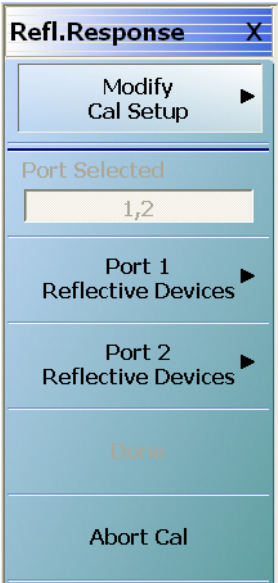
	<h3>Modify Cal Setup</h3> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the REFLECTION FREQ. RESPONSE CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu” on page 9-77 <p>A typical reflection frequency response calibration dialog box is available at:</p> <ul style="list-style-type: none"> • “REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-153 <p>A summary table of all reflection frequency response calibration configuration dialog boxes is available at:</p> <ul style="list-style-type: none"> • Table: “Manual Calibration – Reflection Frequency Response Cal Setup – 2-Port VNAs” on page 9-157 <h3>Port Selected</h3> <p>Read-only display of the ports selected for the pending calibration.</p>
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Figure 9-71. REFL. RESPONSE Menu – Refl. Freq. Resp. Cal. – 2-Port VNAs – Typical example (1 of 2)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices, Port 2 Reflective Devices, Thru/Recip, and Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the REFL. RESPONSE menu.



The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

When selected, the REFL. DEVICES PORT 1 menu appears where each button represents a completion task. When ready for the task, click the button, and the instrument performs the calibration. When the calibration task is successfully completed, the button is marked with a completion checkmark. When all tasks are completed on the menu, return to the REFL. RESPONSE menu.

Port 2 Reflective Devices

When selected, displays the REFL. DEVICES PORT 2 menu where each button represents a completion task. When ready for the task, click the button, and the instrument performs the calibration. When the calibration task is successfully completed, the button is marked with a completion checkmark. When all tasks are completed on the menu, return to the REFL. RESPONSE menu.

Done

This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Abort Cal

Select aborts the current calibration and returns to the CALIBRATION menu.

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Figure 9-71. REFL. RESPONSE Menu – Refl. Freq. Resp. Cal. – 2-Port VNAs – Typical example (2 of 2)

REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box

Previous

- [“REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151](#)
- [“CAL SETUP Menu” on page 9-77](#)

Prerequisites

- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | REFLECTION FREQ REPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reflection Freq. Response Cal Setup (SOLT/R, Coaxial)

Ref Impedance (Ω) 50.000

☒ Test Port 1 (V-Conn(F))

Select Cal Component Open

DUT Connector V-Conn(M) Standard Info

☒ Test Port 2 (V-Conn(F))

Select Cal Component Open

DUT Connector V-Conn(M) Standard Info

OK Cancel

REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP Dialog Box

Figure 9-72. REFL. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection

Select any combination:

- Test Port 1
- Test Port 2
- Test Port 1 and Test Port 2

Test Port 1 Select Cal Component

Select either: Open or Short

Test Port 1 DUT Connector

Select the Test Port 1 Connector type from the pull down menu with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (F) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined 1 (M) through User-Defined 32 (M)
- User-Defined 1 (F) through User-Defined 32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn M) Dialog Box. Note that the name of this dialog changes depending on the selected Cal Method and DUT Connector.

Test Port 2 Select Cal Component

Select either:

- Open
- Short

Test Port 2 DUT Connector

Select the Test Port 2 Connector type from the pull down menu. The options are the same as those for Test Port 1.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn M) Dialog Box. Note that the name of this dialog changes depending on the selected Cal Method and DUT Connector.

REFLECTION FREQ. RESPONSE CAL SETUP (SSLT, Waveguide) Dialog Box

Previous

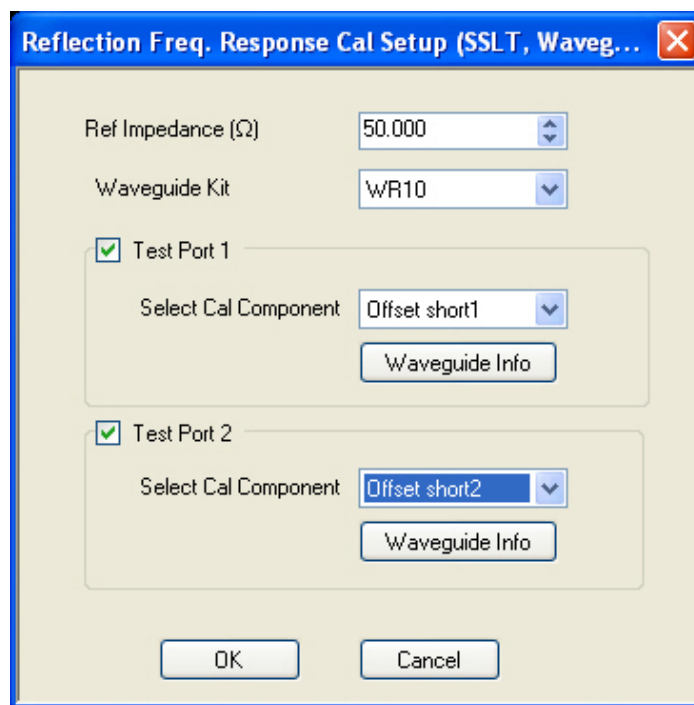
- “CAL SETUP Menu” on page 9-77
- “REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151

Prerequisites

- Cal Method = SSLT
- Line Type = Waveguide

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Waveguide | Edit Cal Params | REFLECTION FREQ REPOSE CAL SETUP (SSLT, Waveguide) Dialog Box



REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP Dialog Box

Figure 9-73. REFL. FREQ. RESP. CAL SETUP (SSLT, Waveguide) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection

Select any combination:

- Test Port 1
- Test Port 2
- Test Port 1 and Test Port 2

Test Port 1 Select Cal Component

Select either:

- Offset Short 1
- Offset Short 2

Test Port 1 DUT Connector Waveguide Info Button

Select displays the WAVEGUIDE KIT or USER DEFINED WAVEGUIDE dialog box for the selected waveguide.

- Typical [“WAVEGUIDE INFO Dialog Box – 2-Port VNAs” on page 9-207](#)
- Typical [“USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204](#)
- Typical [“USER DEFINED WAVEGUIDE SHORT Dialog Box – 2-Port VNAs” on page 9-206](#)

Test Port 2 Select Cal Component

Select either:

- Offset Short 1
- Offset Short 2

Test Port 2 DUT Connector Waveguide Info Button

Select displays the WAVEGUIDE KIT or USER DEFINED WAVEGUIDE dialog box for the selected waveguide as described above.

Refl. Freq. Resp. Calibration Setup Dialog Box Summary

The table below summarizes the available fields and controls in other reflection frequency response calibration setup dialog boxes. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button.

Table 9-6. Manual Calibration – Reflection Frequency Response Cal Setup – 2-Port VNAs (1 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See the full description above “REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-153</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port Cal Component: Open, Short</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 8 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays appropriate information dialog box for selected microstrip kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199

Table 9-6. Manual Calibration – Reflection Frequency Response Cal Setup – 2-Port VNAs (2 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Coaxial	<p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port Cal Component: Offset Short 1, Offset Short 2</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the info dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200
SSLT Non-Dispersive	Same controls and functions as SSLT Coaxial above.
SSLT Waveguide	<p>See the full description above “REFLECTION FREQ. RESPONSE CAL SETUP (SSLT, Waveguide) Dialog Box” on page 9-155</p> <p>Same controls and functions as SSLT Coaxial above with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Display the appropriate information dialog box for the selected waveguide.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204 • Typical “WAVEGUIDE INFO Dialog Box – 2-Port VNAs” on page 9-207
SSLT Microstrip	<p>Same controls and functions as SSLT Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays appropriate information dialog box for the selected microstrip.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199
SSST Coaxial	<p>Reference Impedance (Ohms)</p> <p>Select Test Port: Port 1 and/or Port 2</p> <p>Test Port 1 and Test Port 2 controls are the same. Port must be selected to enable controls.</p> <p>Test Port Cal Component: Offset Short 1, Offset Short 2, Offset Short 2</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the appropriate information dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200
SSST Non-Dispersive	Same controls and functions as SSST Coaxial above.

Table 9-6. Manual Calibration – Reflection Frequency Response Cal Setup – 2-Port VNAs (3 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Waveguide	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Display the appropriate information dialog box for the selected waveguide.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204
SSST Microstrip	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays appropriate information dialog box for the selected microstrip.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199
TRL/TRM	The TRL/TRM calibration method is not available for Reflection Frequency Response calibrations.
LRL/LRM	The LRL/LRM calibration method is not available for Reflection Frequency Response calibrations.
mTRL	The mTRL calibration method is not available for Reflection Frequency Response calibrations.
mSSS	The mSSS calibration method is not available for Reflection Frequency Response calibrations.

9-13 Manual Cal – Conversion Cal – 2-Port VNAs

Note

The appearance and button availability of the calibration menus depends on the settings established in the CAL SETUP, CAL METHOD, LINE TYPE menus and in the associated dialog boxes that appear from the Edit Cal Params button. The Conversion Cal buttons appear when the VNA is configured with Option 7, Receiver Calibration, and is setup for a Mixer measurement.

Full Name

Manual Calibration – Conversion Calibration – 2-Port VNAs

Menu Names

- RcvrCal-Norm.Cal
- Enhanced-Match

Button Names

- RcvrCal/Normalization
- Enhanced-Match

RCVRCAL-NORM.CAL Menu – 2-Port VNAs

Previous

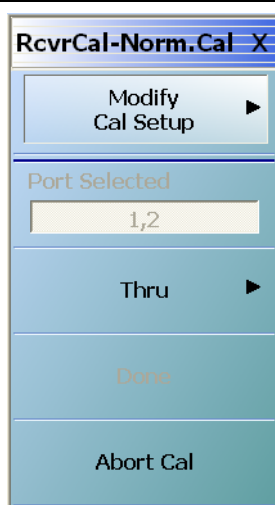
- [“MANUAL CAL Menu – 2-Port VNAs” on page 9-76](#)

Prerequisites

- Option 7, Receiver Offset, installed
- 2-Port VNA (Conversion Cal menus are not available when a 4-port test set is connected).
- Mixer measurement enabled

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Rcvr Cal/Normalization | RCVRCAL-NORM.CAL menu



Modify Cal Setup

Select displays the CAL SETUP menu.

- [“CAL SETUP Menu” on page 9-77](#)

Here, changes to the calibration method, line type, and associated parameters are made on the CAL METHOD and LINE TYPE submenus.

- Calibration method options are SOLT/SOLR, Offset Short (SSLT), or Triple Offset Short (SSST).
- Line Type options are Coaxial, Non-Dispersive, Waveguide, or Microstrip.

A composite view of the CAL SETUP menu set is available in the figure below:

- [Figure 9-46, “Manual Calibration Setup Menus – 2-Port VNAs” on page 9-74](#)

Descriptions of the calibration configuration menus are available at:

- [“CAL SETUP Menu” on page 9-77](#)
- [“CAL METHOD Menu” on page 9-79](#)
- [“LINE TYPE Menu” on page 9-81](#)

An example Rcvr Cal/Normalization Cal Setup dialog box is available in the figure below:

- [Table 9-76, “Edit Cal Params – RCVRCAL/NORMALIZATION CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 9-164](#)

Port Selected

Read-only display of the ports selected for the pending calibration.

Thru

Select displays the THRU/RECIP menu.

- [“THRU/RECIP Menu – 2-Port VNAs” on page 9-183](#)

Done

This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Abort Cal

Select aborts the current calibration and returns to the CALIBRATION menu.

- [“CALIBRATION \[TR\] Menu – 2 Port VNAs” on page 9-7](#)

Figure 9-74. RCVRCAL-NORM.CAL Menu – 2-Port VNAs

ENHANCED-MATCH Menu – 2-Port VNAs

Previous

- [“MANUAL CAL Menu – 2-Port VNAs” on page 9-76](#)

Prerequisite

- Option 7, Receiver Offset, installed
- 2-Port VNA (Conversion Cal menus are not available when a 4-port test set is connected).
- Mixer measurement enabled

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Enhanced-Match | ENHANCED-MATCHED menu

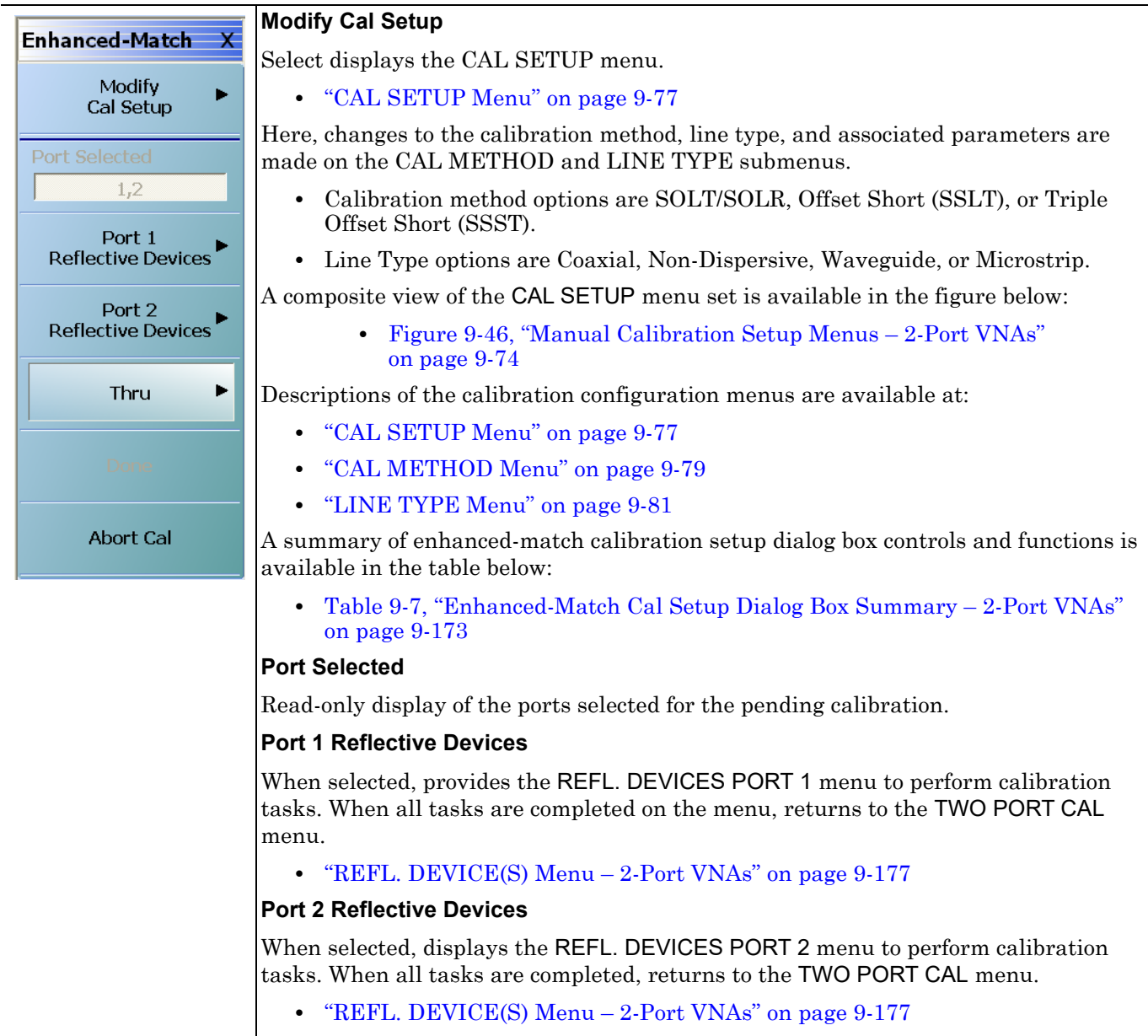


Figure 9-75. ENHANCED-MATCH Menu – 2-Port VNAs (1 of 2)

	<p>Thru</p> <p>Select displays the THRU/RECIP menu.</p> <ul style="list-style-type: none">• “THRU/RECIP Menu – 2-Port VNAs” on page 9-183 <p>Done</p> <p>This button is unavailable until all calibration tasks have been successfully completed. When available, select the button to return to the CALIBRATION menu when the Cal Status is set to ON.</p> <ul style="list-style-type: none">• “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7 <p>Abort Cal</p> <p>Select aborts the current calibration and returns to the CALIBRATION menu.</p> <ul style="list-style-type: none">• “CALIBRATION [TR] Menu – 2 Port VNAs” on page 9-7
--	---

Figure 9-75. ENHANCED-MATCH Menu – 2-Port VNAs (2 of 2)

Manual Conversion Cal Setup Dialog Boxes – 2-Port VNAs

From the two RCVRCAL-NORM.CAL and ENHANCED-MATCH conversion cal menus, the Modify Cal Setup button links to the CAL SETUP menu, where the Edit Cal Params button displays the appropriate configuration dialog box that varies depending on the settings made in the MANUAL CAL, CAL SETUP, CAL METHOD, and LINE TYPE menus. Sample dialog boxes are described in the sections below for:

- [“RCVRCAL/NORMALIZATION CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 9-164](#)
- [“ENHANCED-MATCH CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 9-165](#)
- [“ENHANCED-MATCH CAL SETUP \(SSLT, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-168](#)
- [“ENHANCED-MATCH CAL SETUP \(SSST, Coaxial\) Dialog Box – 2-Port VNA” on page 9-171](#)

For all other calibration combinations, see the summary table of all dialog boxes and their controls:

- Table: [“Enhanced-Match Cal Setup Dialog Box Summary – 2-Port VNAs” on page 9-173.](#)

RCVRCAL/NORMALIZATION CAL SETUP (SOLT/R, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu” on page 9-77

Prerequisites

- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Rcvr Cal/Normalization | RCVRCAL-NORM.CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | RCVRCAL/NORMALIZATION CAL SETUP (SOLT/R, Coaxial) Dialog Box

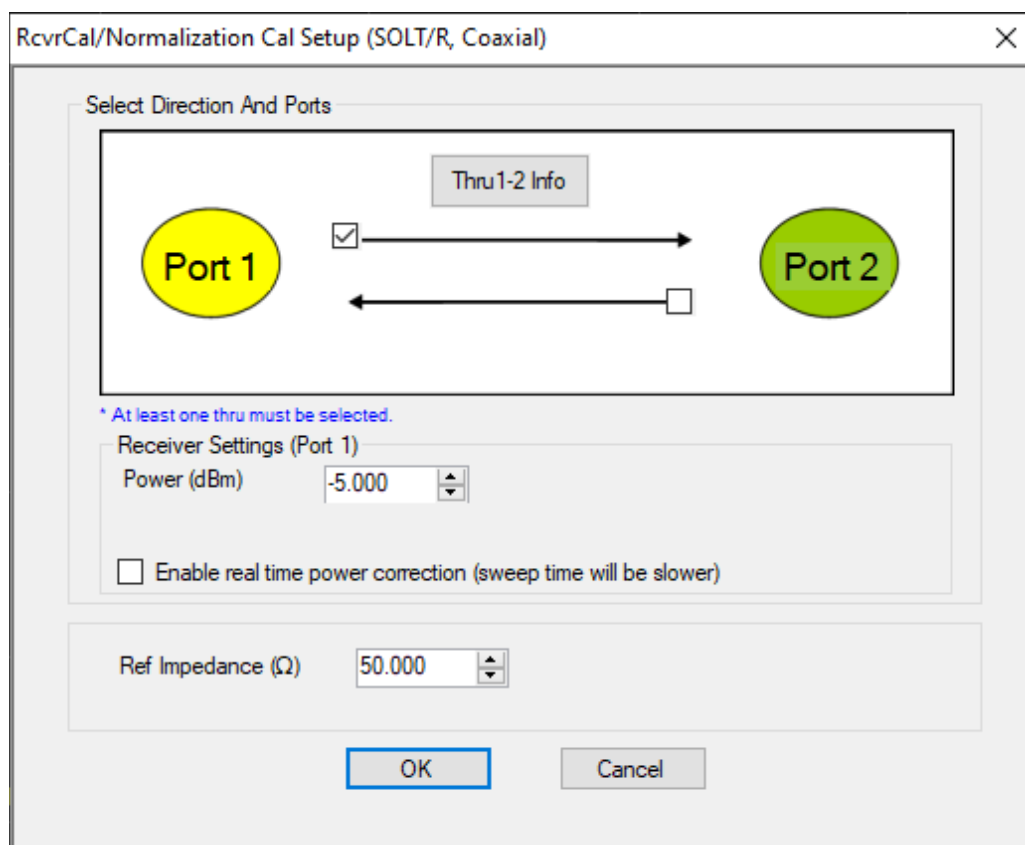


Figure 9-76. Edit Cal Params – RCVRCAL/NORMALIZATION CAL SETUP (SOLT/R, Coaxial) Dialog Box

Each Rcvr Cal/Normalization Cal Setup dialogs are similar to the example above. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All dialog boxes are named “RcvrCal/Normalization Cal Setup (Cal Method, Line Type)”

Select Direction and Ports

Select at least one port and through path direction.

Ref Impedance (Ω)

Input the reference impedance.

- Input field defaults to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

ENHANCED-MATCH CAL SETUP (SOLT/R, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu” on page 9-77

Prerequisites

- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Rcvr Cal/Normalization | RCVRCAL-NORM.CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ENHANCED-MATCH CAL SETUP (SOLT/R, Coaxial) Dialog Box

Enhanced-Match Cal Setup (SOLT/R, Coaxial)

Ref Impedance (Ω) 50.000

☐ True Source Match

Select Cal Type

☒ 1->2 ☐ 2->1

Load Type

☒ Broadband Load ☐ Sliding Load

Test Port 1 (K-Conn(F))

DUT Connector K-Conn(M) Standard Info

Select BB Load: ☒ Load 1 ☐ Load 2

Test Port 2 (K-Conn(F))

DUT Connector K-Conn(M) Standard Info

Select BB Load: ☒ Load 1 ☐ Load 2

Receiver Settings (Port 1)

Power (dBm) 5.000

☐ Enable real time power correction (sweep time will be slower)

Thru/S2P Thru

Select Line Through

Length (mm) 0.0000

Line Impedance (Ω) 50.000

Line Loss (dB/mm) 0.0000

@ Frequency (GHz) 0.0000

OK Cancel

Figure 9-77. Edit Cal Params – ENHANCED-MATCH CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance and select if a True Source Match (True Source Match is decoupled from the reference impedance when a more comprehensive source match model should be used, usually for millimeter wave mixer setups at the expense of longer calibration time).

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from two radio button controlled options:

- (1 → 2)
- (2 → 1)

Load Type Area

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu and on the PORT 2 REFLECTIVE DEVICES menu.

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Select BB Load for Test Port 1 Area

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2 Area

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Through Area

Located on the right side of the dialog box, these controls allow characterization of the through/reciprocal line settings.

- Select Line
 - Through
- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ENHANCED-MATCH CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs**Previous**

- [“CAL SETUP Menu” on page 9-77](#)

Prerequisites

- Cal Method = SSLT
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Rcvr Cal/Normalization | RCVR CAL-NORM.CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ENHANCED-MATCH CAL SETUP (SSLT, Coaxial) Dialog Box

Enhanced-Match Cal Setup (SSLT, Coaxial)

Ref Impedance (Ω)

☐ True Source Match

Select Cal Type
☒ 1-->2 ☐ 2-->1

Load Type
☒ Broadband Load ☐ Sliding Load

Test Port 1 (W1-Conn(M))
 DUT Connector
 Select BB Load: ☒ Load 1

Test Port 2 (W1-Conn(M))
 DUT Connector
 Select BB Load: ☒ Load 1

Receiver Settings (Port 1)
 Power (dBm)

☐ Enable real time power correction (sweep time will be slower)

Thru/S2P Thru
 Select Line
 Length (mm)
 Line Impedance (Ω)
 Line Loss (dB/mm)
 @ Frequency (GHz)

Figure 9-78. ENHANCED-MATCH CAL SETUP (SSLT, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance and select if a True Source Match (True Source Match is decoupled from the reference impedance when a more comprehensive source match model should be used, usually for millimeter wave mixer setups at the expense of longer calibration time).

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- (1 → 2)
- (2 → 1)

Load Type Area

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected:
 - A message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”
 - A Sliding Load button appears on the PORT 1 REFLECTIVE DEVICES menu and on the PORT 2 REFLECTIVE DEVICES menu.

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Select BB Load for Test Port 1 Area

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Select BB Load for Test Port 2 Area

Select BB Load number for Test Port 2:

- Load 1
- Load 2

Through Area

Located on the right side of the dialog box, these controls allow characterization of the through/reciprocal line settings.

- Select Line
 - Through
- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ENHANCED-MATCH CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNA

Previous

- “CAL SETUP Menu” on page 9-77

Prerequisites

- Cal Method = SSST
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Rcvr Cal/Normalization | RCVR CAL-NORM.CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ENHANCED-MATCH CAL SETUP (SSST, Coaxial) Dialog Box

Enhanced-Match Cal Setup (SSST, Coaxial)

Ref Impedance (Ω)

☐ True Source Match

Select Cal Type
☒ 1->2 ☐ 2->1

Test Port 1 (W1-Conn(M))
 DUT Connector

Test Port 2 (W1-Conn(M))
 DUT Connector

Receiver Settings (Port 1)
 Power (dBm)

☐ Enable real time power correction (sweep time will be slower)

Thru/S2P Thru
 Select Line

Length (mm)

Line Impedance (Ω)

Line Loss (dB/mm)

@ Frequency (GHz)

Figure 9-79. ENHANCED-MATCH CAL SETUP (SSST, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance and select if a True Source Match (True Source Match is decoupled from the reference impedance when a more comprehensive source match model should be used, usually for millimeter wave mixer setups at the expense of longer calibration time).

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Cal Type

Select from three radio button controlled options:

- (1 → 2)
- (2 → 1)

Test Port 1 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Test Port 2 Connector Type Area

Select the DUT Connector Type from a drop-down menu list with options the same as the Test Port 1 Connector area above.

Test Port 2 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depends on the connector selected above and on the Cal Method selected.

Through Area

Located on the right side of the dialog box, these controls allow characterization of the through/reciprocal line settings.

- Select Line
 - Through
- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Enhanced-Match Cal Setup Dialog Box Summary

The table below summarizes the available fields in all enhanced-match calibration setup dialog boxes. If the dialog box is described above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All dialog boxes are named “Enhanced-Match Cal Setup (Cal Method, Line Type)”

Table 9-7. Enhanced-Match Cal Setup Dialog Box Summary – 2-Port VNAs (1 of 4)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Coaxial	<p>See full description above at “ENHANCED-MATCH CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 9-165</p> <p>Reference Impedance (Ohms)</p> <p>True Source Match: Toggle (On or Off)</p> <p>Select Cal Type: (1→2), (2→1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 <p>Test Port Select BB Load: Load 1, Load 2</p> <p>Through Select Line: Through</p> <p>Through Length (mm): Input field</p> <p>Through Line Impedance (Ohms): Input field</p> <p>Through Line Loss (dB/mm): Input field</p> <p>Through @ Frequency (GHz): Input field</p>
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coax above.
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls and functions as SOLT/R Coax above with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204

Table 9-7. Enhanced-Match Cal Setup Dialog Box Summary – 2-Port VNAs (2 of 4)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coax above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199 <p>Test Port DUT Connector Standard Info Button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200
SSLT Coaxial	<p>See full description above at “ENHANCED-MATCH CAL SETUP (SSLT, Coaxial) Dialog Box – 2-Port VNAs” on page 9-168</p> <p>Reference Impedance (Ohms)</p> <p>Select Cal Type: (1→2), (2→1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200 <p>Test Port Select BB Load: Load 1, Load 2</p> <p>Through Select Line: Through, Reciprocal</p> <p>Through Length (mm): Input field</p> <p>Through Line Impedance (Ohms): Input field</p> <p>Through Line Loss (dB/mm): Input field</p> <p>Through @ Frequency (GHz): Input field</p>
SSLT Non-Dispersive	<p>Same controls and functions as SSLT Coax above.</p>
SSLT Waveguide	<p>Same controls and functions as SSLT Coax above with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204

Table 9-7. Enhanced-Match Cal Setup Dialog Box Summary – 2-Port VNAs (3 of 4)

Cal Method Line Type	Dialog Box Controls and Functions
SSLT Microstrip	<p>Same controls and functions as SSLT Coax above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187 • Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199 <p>Test Port DUT Connector Type: User-Defined 1 to User-Defined 32</p> <p>Test Port DUT Connector Standard Info Button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200
SSST Coaxial	<p>See full description above at “ENHANCED-MATCH CAL SETUP (SSST, Coaxial) Dialog Box – 2-Port VNA” on page 9-171.</p> <p>Reference Impedance (Ohms)</p> <p>Select Cal Type: (1→2), 1 (2→1)</p> <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Port 1 and Test Port 2 controls are the same.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) through User-Defined 32 (M), User-Defined 1 (F) through User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • Typical “STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188 • Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200 <p>Through Select Line: Through</p> <p>Through Length (mm): Input field</p> <p>Through Line Impedance (Ohms): Input field</p> <p>Through Line Loss (dB/mm): Input field</p> <p>Through @ Frequency (GHz): Input field</p>
SSST Non-Dispersive	<p>Same controls and functions as SSST Coaxial above.</p>
SSST Waveguide	<p>Same controls and functions as SSLT Coax above with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box.</p> <ul style="list-style-type: none"> • Typical “USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204

Table 9-7. Enhanced-Match Cal Setup Dialog Box Summary – 2-Port VNAs (4 of 4)

Cal Method Line Type	Dialog Box Controls and Functions
SSST Microstrip	<p>Same controls and functions as SSST Coax above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays a dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none">• Typical “MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187• Typical “USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199 <p>Test Port DUT Connector Type: User-Defined 1 to User-Defined 32</p> <p>Test Port DUT Connector Standard Info button: Displays USER DEFINED STANDARD dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none">• Typical “USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200

9-14 Typical Calibration Sub-Menus

The menus in this section are example menus for the calibration step procedures. The exact content and presence of each menu is dependent on the settings for each calibration run.

REFL. DEVICE(S) Menu – 2-Port VNAs

This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A SOLT/SOLR calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the REFL. DEVICE(S) menu.

Full Name

Reflective Device(s)

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“TWO PORT CAL Menu – 2-Port VNAs” on page 9-82](#)
 - [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)
 - [“TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145](#)
 - [“REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151](#)
 - [“ENHANCED-MATCH Menu – 2-Port VNAs” on page 9-162](#)
- The REFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-77](#)
 - [“CAL METHOD Menu” on page 9-79](#)
 - [“LINE TYPE Menu” on page 9-81](#)

Similar Menus

- The REFL. DEVICE(S) Port 1 menu is nearly identical to the typical REFL. DEVICE(S) Port 2 menu (not shown).

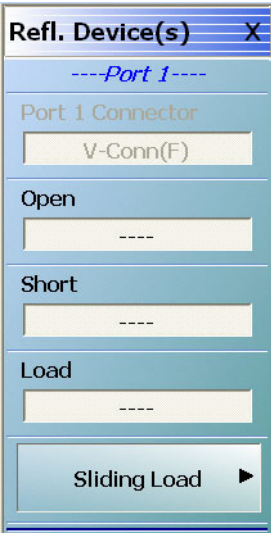
	<p>A typical REFL. DEVICE(S) menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete.</p> <p>Port 1 Connector</p> <p>A read only button showing the configured connector for the indicated port.</p> <p>Open</p> <p>In general, prepare the indicated connections and components and then select the button. Starts the open calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Short</p> <p>Starts the short calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Load</p> <p>Starts the load calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Sliding Load</p> <p>If present, selecting this button displays the SLIDING LOADS menu which is described in the section below.</p> <ul style="list-style-type: none">• “SLIDING LOADS Menu – 2-Port VNA” on page 9-181
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Figure 9-80. REFL. DEVICE(S) (REFLECTIVE DEVICES) Menu – 2-Port VNAs – Typical Example

LINES/MATCHES DEVICE(S) Menu – 2-Port VNAs

Full Name

Lines/Matches Device

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A TRL/TRM, LRL/LRM, or mTRL calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the LINES/MATCHES menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“TWO PORT CAL Menu – 2-Port VNAs” on page 9-82](#)
 - [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)
 - [“TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145](#)
 - [“REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151](#)
 - [“ENHANCED-MATCH Menu – 2-Port VNAs” on page 9-162](#)
- The REFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-77](#)
 - [“CAL METHOD Menu” on page 9-79](#)
 - [“LINE TYPE Menu” on page 9-81](#)

Similar Menus

- The LINES/MATCHES Port 1 menu is nearly identical to typical LINES/MATCHES Port 2, LINES/MATCHES Port 3, and LINES/MATCHES Port 4 menus.

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | [# of Ports] Cal | [NUM OF PORTS] CAL | Port X-Y Lines/Matches |

Typical LINES/MATCHES menu

When Cal Method selected is TRL/TRM, LRL/LRM, or mTRL, this menu offers selections in accordance with the settings made in the 2 Port Cal Setup Dialog.

Each button on the menu is a completion task button and is marked with a checkmark when the calibration task is complete.

Device 1 Line

In general, prepare the indicated connections and components and then select the button. This starts the calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.

Device 2 Line

Select the button as above for the calibration procedure.

Device 3 Line

Select the button as above for the calibration procedure.

Device 4 Match (Port 1)

Select the button as above for the calibration procedure.

Device 4 Match (Port 2)

Select the button as above for the calibration procedure.

Device 5 Line

Select the button as above for the calibration procedure.

Device 6 Match (Port 1)

Select the button as above for the calibration procedure.

Device 6 Match (Port 2)

Select the button as above for the calibration procedure.

Device 7 Line

Select the button as above for the calibration procedure.

Device 8 Match (Port 1)

Select the button as above for the calibration procedure.

Device 8 Match (Port 2)

Select the button as above for the calibration procedure.

Device 9 Line

Select the button as above for the calibration procedure.

Device 10 Match (Port 1)

Select the button as above for the calibration procedure.

Device 10 Match (Port 2)

Select the button as above for the calibration procedure.

Figure 9-81. LINES/MATCHES Menu – 2-Port VNAs – Typical Example

SLIDING LOADS Menu – 2-Port VNA

This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A SOLT/SOLR calibration method
- Sliding loads selected
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the SLIDING LOADS menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“REFL. DEVICE\(S\) Menu – 2-Port VNAs” on page 9-177](#)
 - [“TWO PORT CAL Menu – 2-Port VNAs” on page 9-82](#)
 - [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)
 - [“TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145](#)
 - [“REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151](#)
- The REFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-77](#)
 - [“CAL METHOD Menu” on page 9-79](#)
 - [“LINE TYPE Menu” on page 9-81](#)

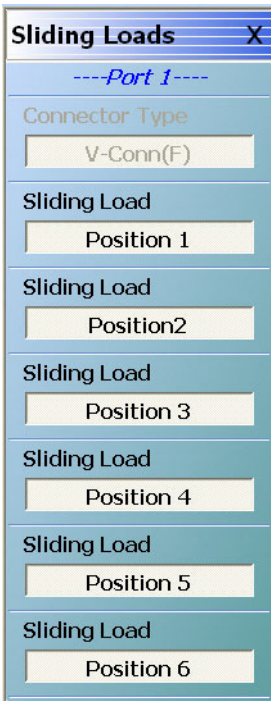
	<p>A typical SLIDING LOADS menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete. The number of buttons appearing on the menu is dependent on the calibration settings.</p> <p>Connector Type</p> <p>A read only button showing the configured connector for the indicated port.</p> <p>Sliding Load (Position 1)</p> <p>In general, prepare the indicated connections and components and then select the button. Starts the sliding load calibration procedure at position 1 for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Sliding Load (Position 2)</p> <p>As above for sliding load calibration procedure at position 2.</p> <p>Sliding Load (Position 3)</p> <p>As above for sliding load calibration procedure at position 3.</p> <p>Sliding Load (Position 4)</p> <p>As above for sliding load calibration procedure at position 4.</p> <p>Sliding Load (Position 5)</p> <p>As above for sliding load calibration procedure at position 5.</p> <p>Sliding Load (Position 6)</p> <p>As above for sliding load calibration procedure at position 6.</p> <p>When all calibration procedures are complete, use the Back button to return to the REFL DEVICE menu.</p> <ul style="list-style-type: none">• “REFL. DEVICE(S) Menu – 2-Port VNAs” on page 9-177
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Figure 9-82. SLIDING LOADS Menu – 2-Port VNAs – Typical Example

THRU/RECIP Menu – 2-Port VNAs

This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A SOLT/SOLR calibration method
- Sliding loads selected
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the THRU/RECIP menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“TWO PORT CAL Menu – 2-Port VNAs” on page 9-82](#)
 - [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)
 - [“TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145](#)
 - [“REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151](#)
- The THRU/RECIP menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-77](#)
 - [“CAL METHOD Menu” on page 9-79](#)
 - [“LINE TYPE Menu” on page 9-81](#)



A typical THRU/RECIP menu.

Each button is a completion task button and marked with a checkmark when the calibration task is complete.

Thru (Port Pair 1-2)

In general, prepare the indicated connections and components and then select the button. Starts the through calibration procedure for the indicated port pair. When the calibration task is completed, the button is marked with a checkmark.

When all calibration procedures are complete, use the **Back** button to return to the REFL DEVICE menu.

- [“REFL. DEVICE\(S\) Menu – 2-Port VNAs” on page 9-177](#)

Figure 9-83. THRU/RECIP Menu – 2-Port VNAs – Typical Example

ISOLATION(S) Menu – 2-Port VNA

This menu example is a representative menu based on the following configuration:

- VNA is in 2-port mode
- A 2-port calibration
- A SOLT/SOLR calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the THRU/RECIP menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“TWO PORT CAL Menu – 2-Port VNAs” on page 9-82](#)
 - [“ONE PORT CAL Menu – SOLT/R – Coaxial – 2-Port VNAs” on page 9-123](#)
 - [“TRANS. RESPONSE Menu – 2-Port VNAs” on page 9-145](#)
 - [“REFL. RESPONSE Menu – 2-Port VNAs” on page 9-151](#)
- The THRU/RECIP menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu” on page 9-77](#)
 - [“CAL METHOD Menu” on page 9-79](#)
 - [“LINE TYPE Menu” on page 9-81](#)

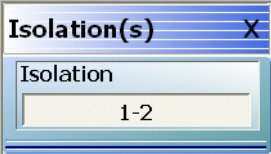
	<p>A typical ISOLATION(S) menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete.</p> <p>Isolation (Port Pair 1-2)</p> <p>In general, prepare the indicated connections and components and then select the button. Starts the optional isolation calibration procedure for the indicated port pair. When the calibration task is completed, the button is marked with a checkmark.</p> <p>When all calibration procedures are complete, use the Back button to return to the REFL DEVICE menu.</p> <ul style="list-style-type: none">• “REFL. DEVICE(S) Menu – 2-Port VNAs” on page 9-177
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Figure 9-84. ISOLATION(S) Menu – 2-Port VNAs – Typical Example

9-15 Manual Calibration General Dialog Boxes – 2-Port VNAs

The dialog boxes displayed below are representative of standard and user-defined dialog boxes associated with the calibration function. Most of these dialog boxes can be called from multiple locations.

- [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- [“MICROSTRIP INFO Dialog Box – 2-Port VNAs” on page 9-187](#)
- [“STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188](#)
- [“THRU INFO Dialog Box – 2-Port VNAs” on page 9-190](#)
- [“USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM 2-Port VNAs” on page 9-194](#)
- [“USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs” on page 9-199](#)
- [“USER DEFINED STANDARD Dialog Box – 2-Port VNAs” on page 9-200](#)
- [“USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204](#)
- [“USER DEFINED WAVEGUIDE SHORT Dialog Box – 2-Port VNAs” on page 9-206](#)
- [“WAVEGUIDE INFO Dialog Box – 2-Port VNAs” on page 9-207](#)

AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs

Use the AIR EQUIVALENT LENGTH CONVERSION dialog box to speed configuration of a thru line by entering its length in picoseconds (ps) and its dielectric constant. The calculator returns the air equivalent length in millimeters (mm).

Previous

- The AIR EQUIVALENT LENGTH dialog box can be accessed from multiple locations.
- [“TWO PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 9-85](#)
- [“TWO PORT CAL SETUP \(SSLT, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-89](#)
- [“TWO PORT CAL SETUP \(SSST, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-93](#)
- [“TWO PORT CAL SETUP \(Broadband Cal, Merged SOLT/R-SSST/R\) Dialog Box – 2-Port VNAs” on page 9-96](#)
- [“TWO PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-102](#)
- [“ONE-PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-126](#)
- [“ONE-PORT CAL SETUP \(SSLT, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-129](#)
- [“ONE-PORT CAL SETUP \(SSST, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-132](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP dialog | Through/Reciprocal Length Calculator Icon | AIR EQUIVALENT LENGTH Dialog Box

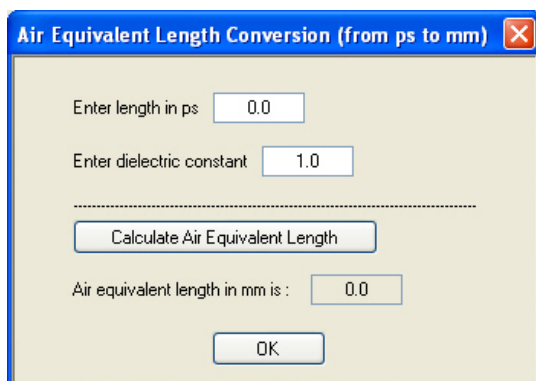


Figure 9-85. AIR EQUIVALENT LENGTH CONVERSION Dialog Box

Using the Calculator

1. Use the Enter length in ps (picoseconds) to input a length.
 - For example, enter a value of 250 ps.
2. Use the Enter constant to change the dielectric constant as required.
 - For example, change the dielectric constant to 1.2.
3. Click the Calculate Air Equivalent Length button.
4. The required value appears in the Air Equivalent Length in mm field.
 - Using the examples above, an air equivalent length of 68.465319... appears in the field.
5. Click OK.
6. The THRU INFO dialog box reappears with the calculated value in the Length (mm) field.
7. Using the examples above, the Length (mm) field displays 68.4653 mm.
 - [“THRU INFO Dialog Box – 2-Port VNAs” on page 9-190](#)
8. Click OK on the THRU INFO dialog box.
9. The MODIFY AUTOCAL SETUP dialog box reappears.
 - [“MODIFY 2-PORT AUTOCAL SETUP Dialog Box” on page 9-66](#)

MICROSTRIP INFO Dialog Box – 2-Port VNAs

This dialog box displays read-only information for a standard microstrip. For the equivalent dialog box for user-defined microstrip, see “[USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs](#)” on page 9-199.

Previous

- The MICROSTRIP INFO dialog box can be accessed from multiple locations.
- “[TWO PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box – 2-Port VNAs](#)” on page 9-102

Prerequisites

- Line Type = Microstrip
- Microstrip Kit = 10 Mil Kit, 15 Mil Kit, or 25 Mil Kit

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, Microstrip) | Microstrip Kit = 10 Mil Kit, 15, Mil Kit, or 25 Mil Kit | Microstrip Info button | MICROSTRIP INFO (*Selected Kit*) Dialog Box

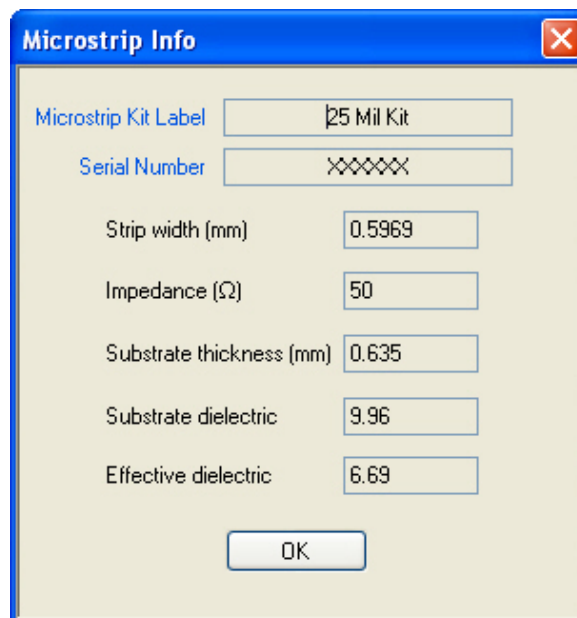


Figure 9-86. MICROSTRIP INFO (10 MIL KIT) Dialog Box

The read-only dialog box provides the calibration parameters for the selected microstrip kit. The displays for 10 Mil, 15 Mil, and 25 Mil Kits are identical.

The calibration parameters listed are:

- Microstrip Kit Label
- Microstrip Kit Serial Number
- Strip width (mm)
- Impedance (Ohms)
- Substrate thickness (mm)
- Substrate dielectric value
- Effective dielectric value

STANDARD INFO Dialog Box – 2-Port VNAs

The exact title and contents of the dialog box depend on the calibration method and connector types selected. This dialog box displays parametric information for a standard connector such as a V-connectors. For the equivalent dialog box for a user-defined connector, see “[USER DEFINED STANDARD Dialog Box – 2-Port VNAs](#)” on page 9-200.

Previous

- The STANDARD INFO dialog box can be accessed from multiple locations.
- “[TWO PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box](#)” on page 9-85

Prerequisites

- Line Type = Coaxial
- DUT Connector Type = V-Conn (M)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, Coaxial) | DUT Connector = V-Conn(M) | Standard Info button | STANDARD INFO (SOLT/R, V-CONN M) Dialog Box

Standard Info (SOLT/R)

Standard LabelV-Conn(M)

Serial NumberXXXXXX

Broadband Load

$Z_0, 10^*$ L_0 C_0 R

10^* : air equivalent length polynomial coef0

Sliding Load BreakPoint Freq (in GHz)

4

BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	I0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

BB Load 2 (SN XXXXXX)

R (Ω)	Z0 (Ω)	I0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	0	0	0	5.1	0	0

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	-200	5	0	4.75	0	0

Where $L(H) = L_0 + L_1 * f + L_2 * f^2 + L_3 * f^3$ and $C(F) = C_0 + C_1 * f + C_2 * f^2 + C_3 * f^3$

OK

Figure 9-87. STANDARD INFO (SOLT/R, V-CONN M) Dialog Box

The read-only dialog box provides the calibration parameters for the selected connector and calibration method.

STANDARD INFO (Broadband Cal) 0.8 mm (M) Connector Dialog Box

Figure 9-88 shows a typical connector standard information dialog box for broadband cal. The contents depend on the calibration line type, and the calibration connectors and genders used. Figure 9-96 on page 9-203 shows standard information for a user-defined connector dialog box.

Previous

- “TWO PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-96
- “ONE PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-134

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = Broadband Cal (SOLT/R-SSST/R) | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box | DUT Connector = 0.8 mm-Conn (M) | Standard Info | STANDARD INFO (Broadband)

Standard Info (Broadband Cal)

Standard Label: 0.8mm-Conn(M)

Serial Number: XXXXXX

Broadband Load

BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	I0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

I0*: air equivalent length polynomial coef0

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
1.418	-116.1	0.3827	0.01922	1.2	0	0

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
11.47	-145.7	4.276	-0.02419	1.2	0	0

Offset Short 1 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-0.03045	-593.6	12.01	-0.05528	1.2	0	0

Offset Short 2 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-0.03214	-462.7	9.442	-0.04441	1.63	0	0

Offset Short 3 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-0.02782	-514.3	10.14	-0.04637	2.06	0	0

Where $L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3$ and $C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3$

OK

Figure 9-88. Standard Info (Broadband Cal) Dialog

THRU INFO Dialog Box – 2-Port VNAs

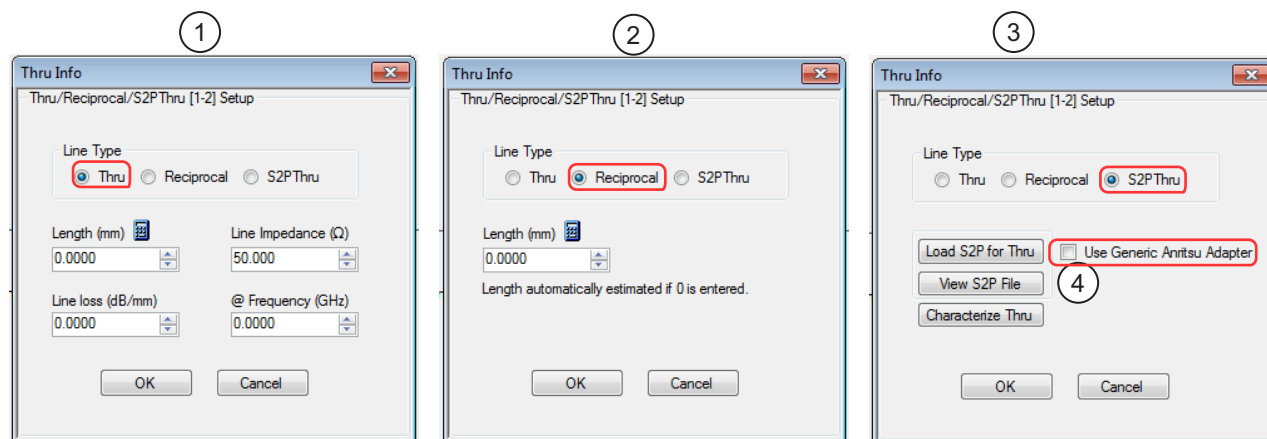
Use the THRU INFO dialog to update the thru information for most calibration types. The dialog includes access to the AIR EQUIVALENT LENGTH CONVERSION dialog box to speed configuration.

Previous

- [“MODIFY 2-PORT AUTOCAL SETUP Dialog Box” on page 9-66](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL
| 2-Port CAL | Modify Cal Setup | MODIFY CAL SETUP Dialog Box | True Thru Setup | Thru Info
| THRU INFO Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
2. Reciprocal selected allows user entry for length.
3. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).
4. Use Generic Anritsu Adapter (check box):

Checking this box will automatically load a default .s2p file for a generic Anritsu adapter.

Note that selecting the checkbox disables the Load S2P for Thru and Characterize Thru buttons. (Supports V and K type connectors only.)

Figure 9-89. THRU INFO Dialog Box – AutoCal Two Port Calibration – 2-Port VNAs

Thru Information Parameters and Calculator

• Thru Selected

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

- **Reciprocal Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- **S2P Thru Selected**
 - Load S2P for Thru
 - Opens navigation window to load .s2p file.
 - View S2P File
 - Opens window to view contents of .s2p file.
 - Characterize Thru
 - Allows a thru characterization and generation of an .s2p file.
 - Use Generic Anritsu Adapter (check box)
 - Checking this box will automatically load a default .s2p file for a generic Anritsu adapter. Note that selecting the checkbox disables the Load S2P for Thru and Characterize Thru buttons.

USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM

Previous

- [“TWO PORT CAL SETUP \(TRL/TRM, Coaxial\) Dialog Box – 2-Port VNAs”](#) on page 9-99

Prerequisites

- Calibration Method = TRL/TRM
- Line Type = Coaxial
- Band 1 Device 2 = Match

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = TRL/TRM | Edit Cal Params | TWO PORT CAL SETUP (TRL/TRM, Coaxial) | Band X = Match | Match Info button | USER DEFINED MATCH DEVICES Dialog Box

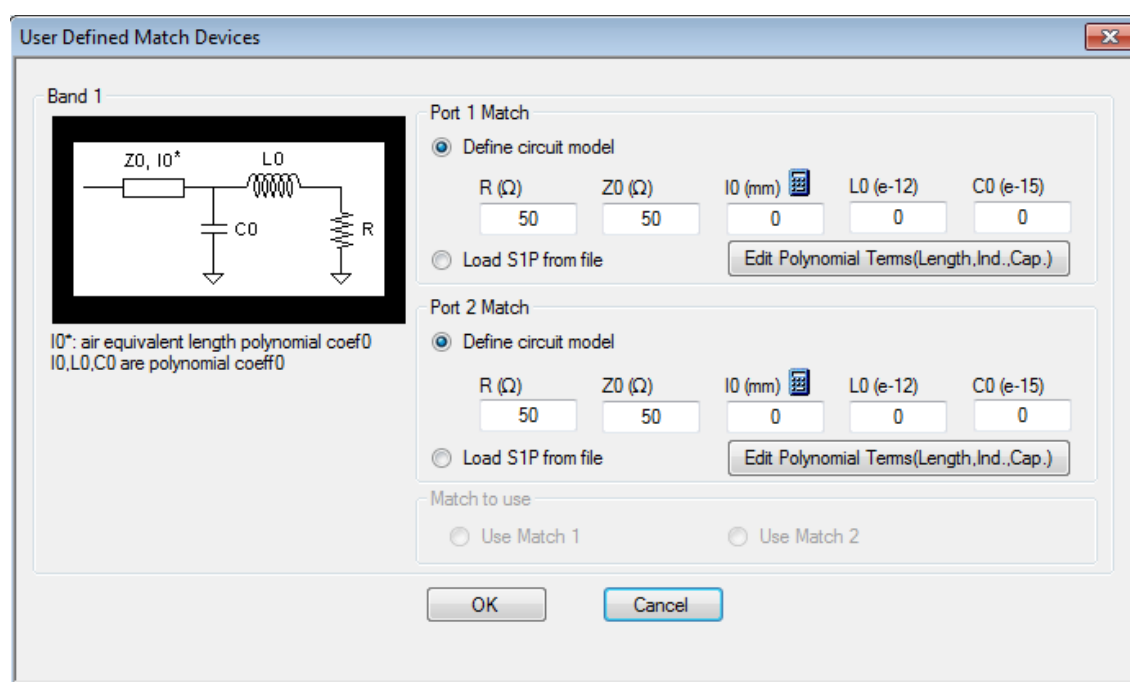


Figure 9-90. Example: USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM

Description

This dialog box allows the definition of a user-provided match device.

Port 1 Match

Define the Port 1 Match device by entering the following parameters:

- R (Ohms)
- Z0 (Ohms)
- l0 (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH CONVERSION dialog box: [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs”](#) on page 9-185
- L0 (e-12)
- C0 (e-15)
- Edit Polynomial Terms (Length, Ind., Cap.) – opens Edit Match Polynomial Terms dialog (see [Figure 9-91](#)).

- Load S1P from file
 - Select disables the DEFINE CIRCUIT MODEL dialog and provides a Load S1P File button for navigating to and loading an S1P file.

Port 2 Match

The Port 2 Match parameters and controls are the same as the Port 1 Match.

Match to Use

Active only when the Reflection Type is designated as Both in the [“TWO PORT CAL SETUP \(TRL/TRM, Coaxial\) Dialog Box – 2-Port VNAs”](#)

USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM 2-Port VNAs

Previous

- [“TWO PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box – 2-Port VNAs”](#) on page 9-102

Prerequisites

- Calibration Method = LRL/LRM
- Line Type = Coaxial
- Band 1 Device 2 = Match

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Edit Cal Params | TWO PORT CAL SETUP (LRL/LRM, Coaxial) | Band 1 Device 2 = Match | Match Info button | USER DEFINED MATCH DEVICES Dialog Box

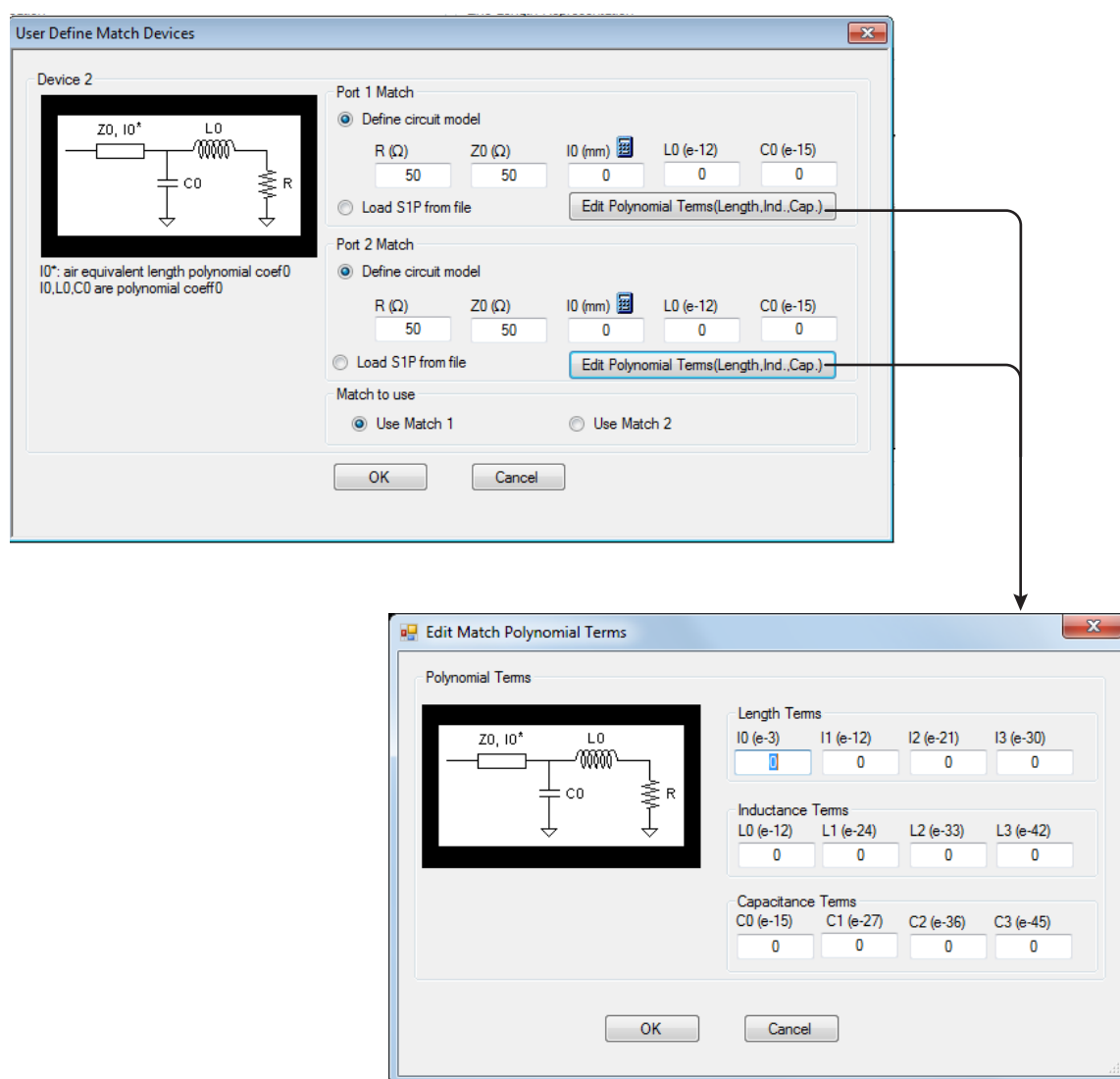


Figure 9-91. USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM 2-Port VNAs

Description

This dialog box allows the definition of a user-provided match device.

Port 1 Match

Define the Port 1 Match device by entering the following parameters:

- R (Ohms)
- Z0 (Ohms)
- l0 (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH CONVERSION dialog box:
[“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- L0 (e-12)
- C0 (e-15)
- Edit Polynomial Terms (Length, Ind., Cap.) – opens Edit Match Polynomial Terms dialog (see [Figure 9-91](#)).
- Load S1P from file
 - Select disables the DEFINE CIRCUIT MODEL dialog and provides a Load S1P File button for navigating to and loading an S1P file.

Port 2 Match

The Port 2 Match parameters and controls are the same as the Port 1 Match.

Match to Use

Active only when the Reflection Type is designated as Both in the [“TWO PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box – 2-Port VNAs”](#)

USER DEFINED MATCH DEVICES Dialog Box – mTRL 2-Port VNAs

Previous

- [“TWO PORT CAL SETUP \(mTRL, Coaxial\) Dialog Box – 2-Port VNAs”](#) on page 9-106

Prerequisites

- Calibration Method = mTRL
- Line Type = Coaxial
- Use Match box selected

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mTRL | Edit Cal Params | TWO PORT CAL SETUP (mTRL, Coaxial) | Use Match | Match Info button | USER DEFINED MATCH DEVICES Dialog Box



Figure 9-92. USER DEFINED MATCH DEVICES Dialog Box – mTRL 2-Port VNAs

Description

This dialog box allows the definition of a user-provided match device.

Port 1 Match

Define the Port 1 Match device by entering the following parameters:

- R (Ohms)
- Z0 (Ohms)
- l0 (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH CONVERSION dialog box:
[“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- L0 (e-12)
- C0 (e-15)
- Edit Polynomial Terms (Length, Ind., Cap.) – opens Edit Match Polynomial Terms dialog (see [Figure 9-92](#)).
- Load S1P from file
 - Select disables the DEFINE CIRCUIT MODEL dialog and provides a Load S1P File button for navigating to and loading an S1P file.

Port 2 Match

The Port 2 Match parameters and controls are the same as the Port 1 Match.

Electrical Line Length Delta for Match Use

If the line length deltas at a given frequency point fall below the entry value, then the match measurement data will be used at that frequency.

USER DEFINED MATCH Dialog Box – mSSS

Previous

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“TWO PORT CAL SETUP \(mSSS, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-109](#)
- [“ONE-PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box – 2-Port VNAs” on page 9-126](#)

Navigation

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mSSS | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP (mSSS, Coaxial) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mSSS | Line Type = Coaxial | Edit Cal Params | ONE PORT CAL SETUP (mSSS, Coaxial) | Match Info | USER DEFINED MATCH Dialog Box

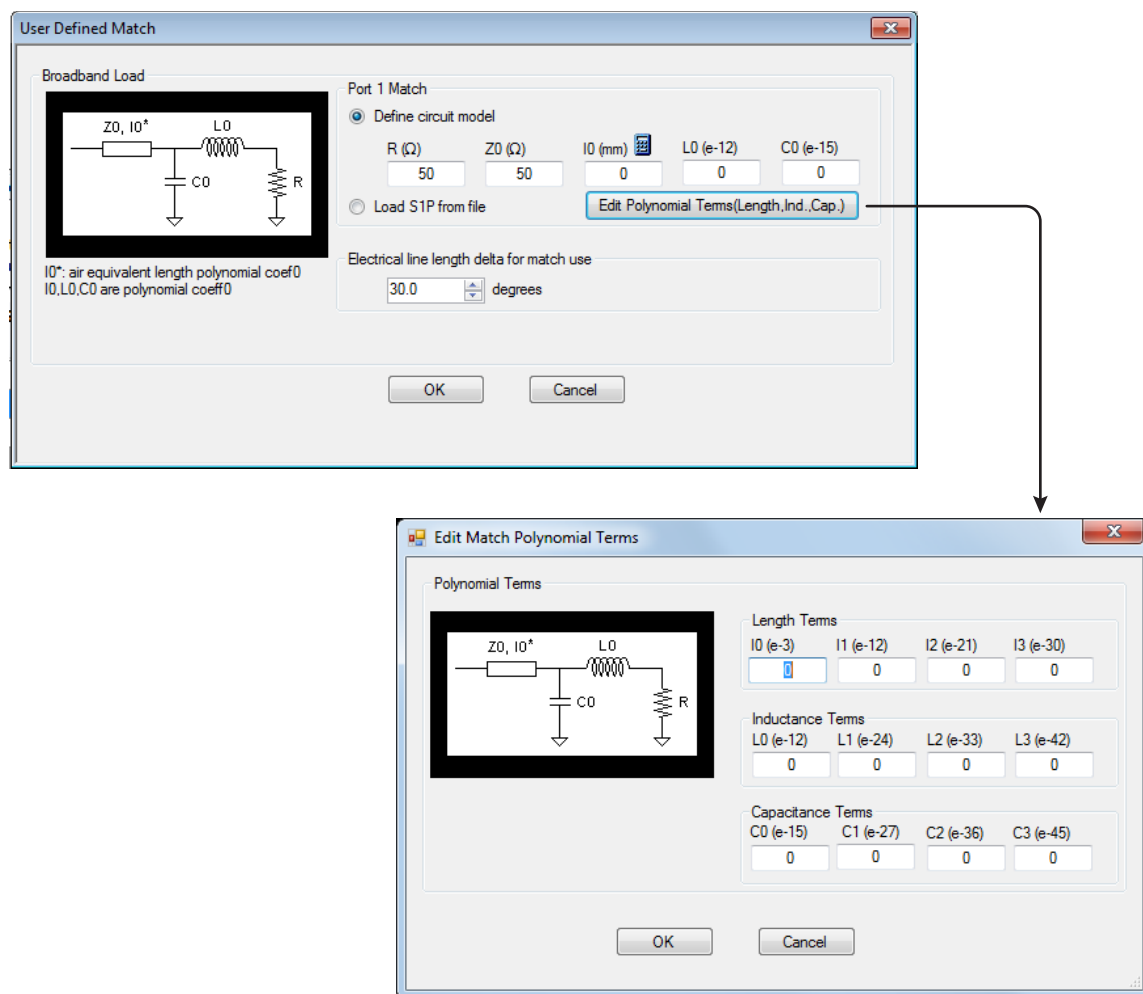


Figure 9-93. Example: USER DEFINED MATCH Dialog Box – mSSS

USER DEFINED MICROSTRIP Dialog Box – 2-Port VNAs

This dialog box displays parametric information for a user-defined microstrip. For the equivalent dialog box for a standard microstrip, see “[MICROSTRIP INFO Dialog Box – 2-Port VNAs](#)” on page 9-187.

Previous

- The USER DEFINED MICROSTRIP dialog box can be accessed from multiple locations.
- TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box

Prerequisites

- Line Type = Microstrip
- Microstrip Kit = User-Defined 1 to User-Defined 32

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Line Type = Microstrip | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, Microstrip) | Microstrip Kit = User-Defined 1 to User-Defined 32 | Microstrip Info button | USER DEFINED MICROSTRIP Dialog Box

Figure 9-94. USER DEFINED MICROSTRIP Dialog Box – User-Defined 1

The dialog box allows the definition of a user-provided microstrip device. The input fields for the calibration parameters are:

- Microstrip Kit Label
- Strip width (mm)
- Impedance (Ohms)
- Substrate thickness (mm)
- Substrate dielectric value
 - If this field is cleared, the Calculate Effective Dielectric button is enabled for the fields below.
- Effective dielectric value
 - Use a recommended value
 - Define a user value

USER DEFINED STANDARD Dialog Box – 2-Port VNAs

The exact title and contents of the dialog box depend on the calibration method and connector types selected. This dialog box displays parametric information for a user-defined connector. For the equivalent dialog box for a standard connector such as a V-connector, see [“STANDARD INFO Dialog Box – 2-Port VNAs” on page 9-188](#)

Previous

- The STANDARD INFO dialog box can be accessed from multiple locations.
- [“TWO PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 9-85](#)

Prerequisites

- Line Type = Coaxial
- DUT Connector Type = User-Defined 1 (M or F) to User-Defined 32 (M or F)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, Coaxial) | DUT Connector = User-Defined 1 (M) | Standard Info button | USER DEFINED STANDARD Dialog Box

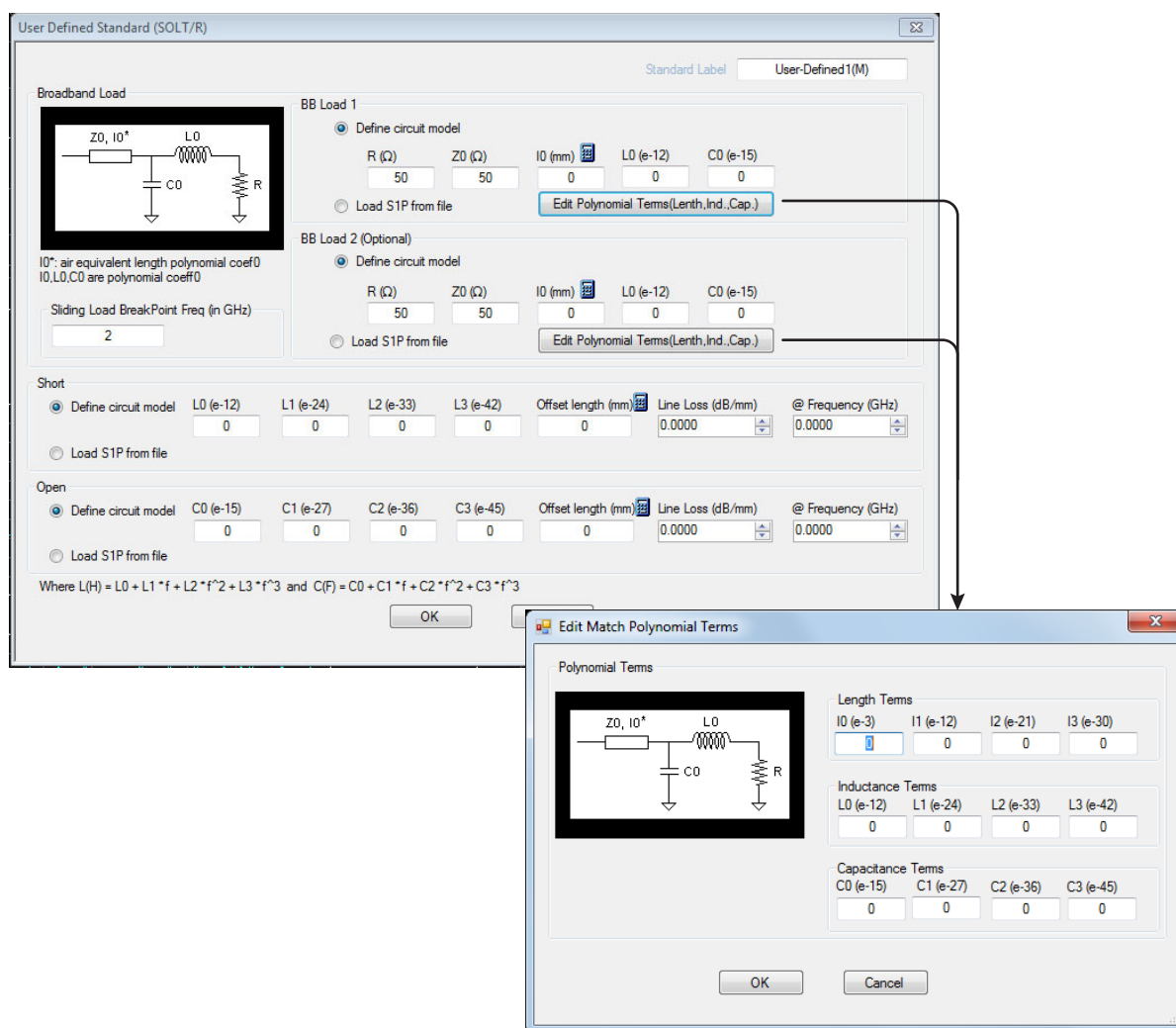


Figure 9-95. USER DEFINED STANDARD Dialog Box

The USER DEFINED STANDARD dialog box allows the input of the calibration parameters for a user-defined device.

Standard Label

Either leave as the pre-defined label or input a new label for the device.

BB Load 1

Define the broadband load 1 circuit model with the following parameters:

- R (Ohms)
- Z0 (Ohms)
- l0 (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- L0 (e-12)
- C0 (e-15)
- Load S1P from file
 - Select disables the DEFINE CIRCUIT MODEL dialog and provides a Load S1P File button for navigating to and loading an S1P file.
- Edit Polynomial Terms (Length, Ind., Cap.)
 - Select opens the Edit Match Polynomial Terms dialog box.

BB Load 2

Define the broadband load 2 circuit model with the same set of parameters as BB Load 1 above.

Sliding Load Break Point Frequency

Enter the Break Point Frequency in GHz.

Short Circuit Model

Define the Short Circuit Model with the following parameters:

- L0 (e-12)
- L1 (e-24)
- L2 (e-33)
- L3 (e-42)
- Offset length (mm) – If required, a link is available to the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)
- Load S1P from file
 - Select disables the DEFINE CIRCUIT MODEL dialog and provides a Load S1P File button for navigating to and loading an S1P file.

Open Circuit Model

Define the Open Circuit Model with the following parameters:

- C0 (e-15)
- C1 (e-27)
- C2 (e-36)
- C3 (e-45)
- Offset length (mm) – If required, a link is available to the AIR EQUIVALENT LENGTH CONVERSION calculator dialog.
- Load S1P from file

- Select disables the DEFINE CIRCUIT MODEL dialog and provides a Load S1P File button for navigating to and loading an S1P file.

USER-DEFINED STANDARD (Broadband Cal) Dialog Box

Figure 9-96 shows a typical connector standard information dialog box for broadband cal with user-defined standard. This dialog allows user input of parameters and names or file names.

Previous

- “TWO PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-96
- “ONE PORT CAL SETUP (Broadband Cal, Merged SOLT/R-SSST/R) Dialog Box – 2-Port VNAs” on page 9-134

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = Broadband Cal (SOLT/R-SSST/R) | Line Type = Coaxial | Edit Cal Params | FULL TWO PORT CAL SETUP BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box | DUT Connector = User-Defined (M) | Standard Info | USER DEFINED STANDARD INFO (Broadband)

User Defined Standard (Broadband Cal)

Standard Label:

Broadband Load

BB Load

☒ Define circuit model

R (Ω) Z0 (Ω) l0 (mm) L0 (e-12) C0 (e-15)

☐ Load S1P from file

l0*: air equivalent length polynomial coef0
l0,L0,C0 are polynomial coeff0

Short

☒ Define circuit model

L0 (e-12) L1 (e-24) L2 (e-33) L3 (e-42) Offset length (mm) Line Loss (dB/mm) @ Frequency (GHz)

☐ Load S1P from file

Open

☒ Define circuit model

C0 (e-15) C1 (e-27) C2 (e-36) C3 (e-45) Offset length (mm) Line Loss (dB/mm) @ Frequency (GHz)

☐ Load S1P from file

Offset Short 1

☒ Define circuit model

L0 (e-12) L1 (e-24) L2 (e-33) L3 (e-42) Offset length (mm) Line Loss (dB/mm) @ Frequency (GHz)

☐ Load S1P from file

Offset Short2

☒ Define circuit model

L0 (e-12) L1 (e-24) L2 (e-33) L3 (e-42) Offset length (mm) Line Loss (dB/mm) @ Frequency (GHz)

☐ Load S1P from file

Offset Short 3

☒ Define circuit model

L0 (e-12) L1 (e-24) L2 (e-33) L3 (e-42) Offset length (mm) Line Loss (dB/mm) @ Frequency (GHz)

☐ Load S1P from file

Where L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3 and C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3

Figure 9-96. Standard Info (Broadband Cal) Dialog for User-Defined Connector

USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs

This dialog box displays parametric information for a user-defined waveguide. For the equivalent dialog box for a standard waveguide kit, see “WAVEGUIDE INFO Dialog Box – 2-Port VNAs” on page 9-207.

Previous

- The USER DEFINED WAVEGUIDE dialog box can be accessed from multiple locations when Line Type is set to Waveguide.
- TWO PORT CAL SETUP (SSLT, Waveguide) Dialog Box

Prerequisites

- Line Type = Waveguide
- DUT Connector Type = User-Defined 1 to User-Defined 32

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Waveguide | Edit Cal Params | TWO PORT CAL SETUP (SSLT, Waveguide) | Waveguide Kit = User-Defined 1 | Waveguide Info button | USER DEFINED WAVEGUIDE Dialog Box

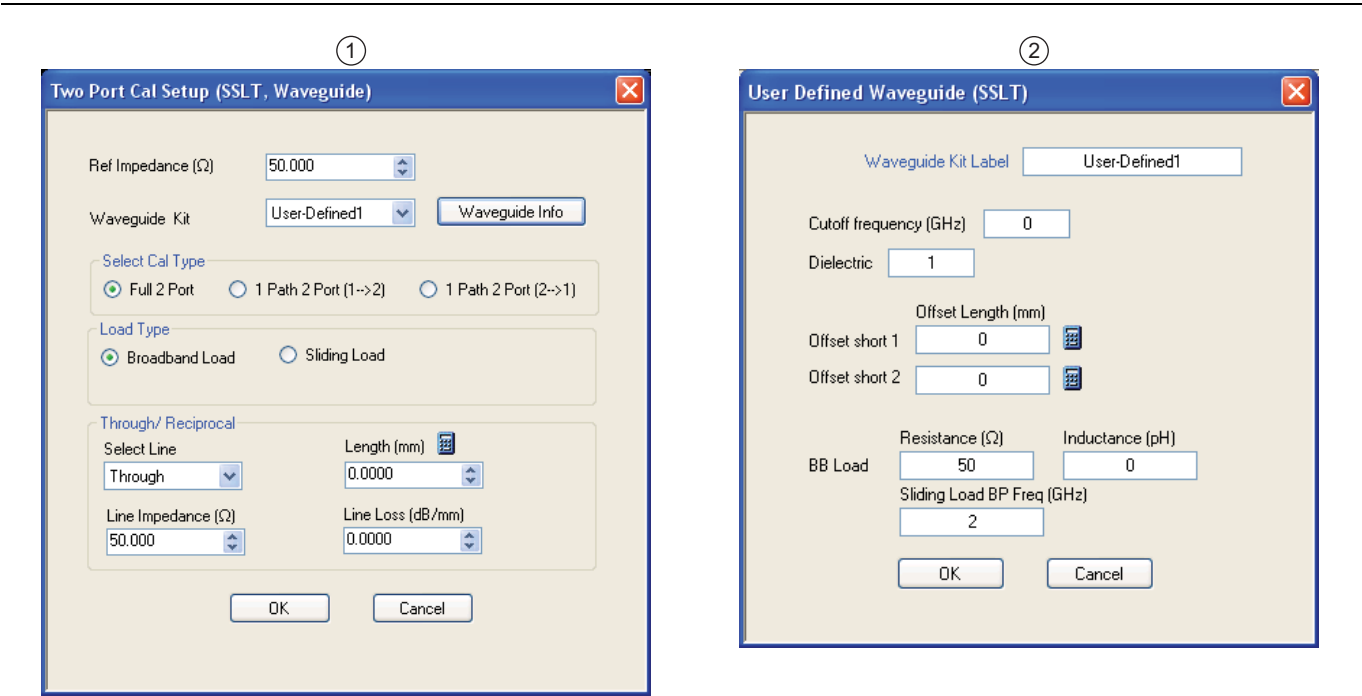


Figure 9-97. USER DEFINED WAVEGUIDE Dialog Box

Description

The USER DEFINED WAVEGUIDE dialog box allows the input of the calibration parameters for a user-defined device.

Standard Label

Either leave as the pre-defined label or input a new label for the device.

Cutoff Frequency and Dielectric

- Cutoff frequency (GHz)
- Dielectric value

Broadband Load Definition

Define the broadband load with the following parameters:

- Resistance (Ohms)
- Inductance (pH)
- Sliding Load Break Point Frequency (GHz)

Short Definition

- Offset length (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)

Open Circuit Model

Define the Open Circuit Model with the following parameters:

- C0 (e-15)
- C1 (e-27)
- C2 (e-36)
- C3 (e-45)
- Offset length (mm)
 - If required, a link is available to the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#)

USER DEFINED WAVEGUIDE SHORT Dialog Box – 2-Port VNAs

This dialog box displays parametric information for a user-defined waveguide short. For the equivalent dialog box for a user-defined waveguide open, see [“USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204](#). For the equivalent dialog box for a standard waveguide kit, see [“WAVEGUIDE INFO Dialog Box – 2-Port VNAs” on page 9-207](#).

Previous

- The USER DEFINED WAVEGUIDE dialog box can be accessed from multiple locations when Line Type = Waveguide.
- [“REFLECTION FREQ. RESPONSE CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 9-153](#)

Prerequisites

- Line Type = Waveguide
- DUT Connector Type = User-Defined 1 to User-Defined 32

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Refl. Freq. Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Waveguide | Edit Cal Params | REFLECTION FREQ. RESPONSE CAL SETUP SOLT/R, Waveguide) | Select Cal Component = Short | Waveguide Info button | USER DEFINED WAVEGUIDE SHORT Dialog Box

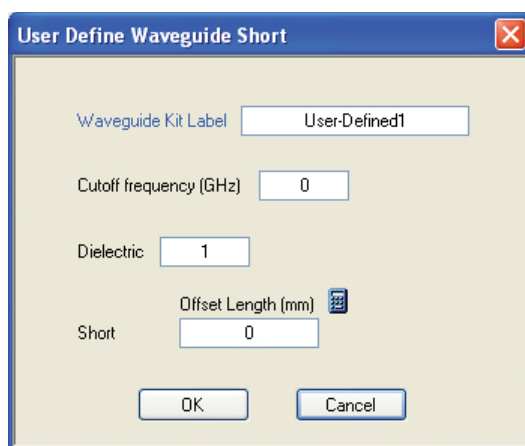


Figure 9-98. USER DEFINED WAVEGUIDE SHORT Dialog Box – 2-Port VNAs

Description

The USER DEFINED WAVEGUIDE SHORT dialog box provides for the following parameter definitions:

Waveguide Kit Label

- Either keep the default User-Defined label or enter a unique name.

Cutoff Frequency (GHz)

- Enter the cutoff frequency in GHz.

Dielectric Value

- Enter a dielectric value.

Short Offset Length (mm)

- Enter a short offset length in mm.
- If needed, select the Calculator icon to link to the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH CONVERSION Dialog Box – 2-Port VNAs” on page 9-185](#).

WAVEGUIDE INFO Dialog Box – 2-Port VNAs

This read-only dialog box displays parametric information for a standard waveguide kit. For the equivalent dialog box for a user-defined waveguide, see [“USER DEFINED WAVEGUIDE Dialog Box – 2-Port VNAs” on page 9-204](#).

Previous

- The WAVEGUIDE INFO dialog box can be accessed from multiple locations when Line Type is set to Waveguide.
- TWO PORT CAL SETUP (SSLT, WAVEGUIDE) Dialog Box

Prerequisites

- Line Type = Waveguide
- DUT Connector Type = User-Defined 1 to User-Defined 32

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Waveguide | Edit Cal Params | TWO PORT CAL SETUP (SSLT, Waveguide) | Waveguide Kit = WR10, WR12, or WR15 | Waveguide Info button | USER DEFINED WAVEGUIDE Dialog Box

Waveguide Info (SSLT)

Waveguide Kit Label: WR10

Serial Number: XXXXXX

Cutoff frequency (GHz): 59.0143

Dielectric: 1

Offset Length (mm): 2.537

Offset short 1: 2.537

Offset short 2: 3.612

BB Load: 50

Resistance (Ω): 50

Inductance (pH): 0

Sliding Load BP Freq (GHz): 2

OK

Figure 9-99. WAVEGUIDE INFO Dialog Box

Description

The read-only WAVEGUIDE INFO dialog box provides the calibration parameters for the WR10, WR12, and WR15 waveguide kits.

Instructions

The provided parameters are:

- Waveguide Kit Label
- Cutoff Frequency (GHz)
- Dielectric value
- and Dielectric
- Cutoff frequency (GHz)
- Dielectric value
- Offset short 1 length (mm)
- Offset short 2 length (mm)
- Broadband Load Resistance (Ohms)
- Broadband Load Resistance Inductance (pH)
- Sliding Load Break Point Frequency (GHz)

Chapter 10 — Calibration Menus – 4-Port VNAs

10-1 Introduction

This chapter provides information for calibrating the 4-port versions of the VectorStar MS464xB Series VNAs. This calibration chapter is organized in the sequence of the menus and dialog boxes that control the various types of calibrations. Due to the numerous permutations of instrument calibration ports, AutoCal, manual calibration, calibration methods, line types, and connectors, only a small subset of calibrations are shown.

The CALIBRATION menu is not available when using the Spectrum Analysis application.

10-2 Chapter Overview

These links connect to the calibration menus organized by function and type of calibration:

Calibration Menu, Sub-Menus and Dialog Boxes

- [“Menu Set Overview – 4-Port VNA Calibration” on page 10-6](#)
- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)
 - [“CALIBRATION \[TR\] Menu – 4-Port VNAs” on page 10-8](#)
 - [“CALIBRATION Menu – Noise Figure” on page 10-9](#)
 - [“CALIBRATE Menu – 4-Port VNAs” on page 10-13](#)
 - [“AutoCal Menus and Dialog Boxes” on page 10-2](#)
 - [“Manual Calibration Menus and Dialog Boxes” on page 10-2](#)
 - [“RESTORE DEFAULT COEF. Dialog Box – 4-Port VNAs” on page 10-26](#)
 - [“CAL KIT/AUTOCAL Menu – 4-Port VNAs” on page 10-17](#)
 - [“INSTALL \(AUTOCAL CHARAC./CAL KIT\) Dialog Box – 4-Port VNAs” on page 10-18](#)
 - [“SAVE \(AUTOCAL CHARAC./CAL KIT\) Dialog Box – 4-Port VNAs” on page 10-20](#)
 - [“CAL KIT INFO Dialog Box – 4-Port VNAs” on page 10-22](#)
 - [“RESTORE DEFAULT COEF. Dialog Box – 4-Port VNAs” on page 10-26](#)
 - [“CAL OPTIONS Menu – 4-Port VNAs” on page 10-28](#)
 - [“FLEXIBLE CAL SETUP Dialog Box – 4-Port VNAs” on page 10-31](#)
 - [“DEEMBED. TOOLS Menu – 4-port VNAs” on page 10-33](#)
 - [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(without Option 21\)” on page 10-34](#)
 - [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(with Option 21\)” on page 10-35](#)
 - [“NETWORK EXTRACTION Dialog Box – Type A” on page 10-38](#)
 - [“NETWORK EXTRACTION Dialog Box – Type B” on page 10-40](#)
 - [“NETWORK EXTRACTION Dialog Box – Type B – With Flex Standards \(Option 21\)” on page 10-42](#)
 - [“NETWORK EXTRACTION Dialog Box – Type C” on page 10-46](#)
 - [“NETWORK EXTRACTION Dialog Box – Type D \(No Option 21\)” on page 10-48](#)
 - [“NETWORK EXTRACTION Dialog Box – Type D – Multi-Standards \(Option 21\)” on page 10-50](#)

- “NETWORK EXTRACTION Dialog Box – Type D – Phase Localized (Option 21)” on page 10-53
- “NETWORK EXTRACTION Dialog Box – Type E” on page 10-56
- “NETWORK EXTRACTION Dialog Box – Type F (No Option 21)” on page 10-58
- “NETWORK EXTRACTION Dialog Box – Type F – Multi-Standards (Option 21)” on page 10-60
- “NETWORK EXTRACTION Dialog Box – Type F – Phase Localized (Option 21)” on page 10-63
- “NETWORK EXTRACTION Dialog Box – Type G (No Option 21)” on page 10-66
- “NETWORK EXTRACTION Dialog Box – Type G – Multi-Standards (Option 21)” on page 10-68
- “NETWORK EXTRACTION Dialog Box – Type G – Phase Localized (Option 21)” on page 10-71
- “NETWORK EXTRACTION Dialog Box – Type G – Phase Localized High Crosstalk (Option 21)” on page 10-74
- “NETWORK EXTRACTION Dialog Box – Sequential Extraction (Peeling) (Option 21)” on page 10-76
- “MANUAL ADAPTER REMOVAL Dialog Box – 4-Port VNAs” on page 10-78
- “ALTERNATIVE CALS Menu – 4-Port VNAs” on page 10-80
 - “HYBRID CAL Menu – 4-Port VNAs” on page 10-81
 - “HYBRID CAL SETUP Dialog Box – 4-Port VNAs” on page 10-82
 - “CAL MERGE Dialog Box – 4-Port VNAs” on page 10-83

AutoCal Menus and Dialog Boxes

AutoCal Setup Menu – 4-Port VNA

The main AutoCal setup menu is:

- “AUTOCAL PORT Menu – 4-Port VNAs” on page 10-85

AutoCal 4-Port Calibration – 4-Port VNA

- “AUTOCAL SETUP Menu – 4-Port Cal – 4-Port VNAs” on page 10-86
 - “MODIFY 4-PORT AUTOCAL SETUP Dialog Box” on page 10-87

AutoCal 2-Port Calibration – 4-Port VNA

- “AUTOCAL SETUP Menu – 2-Port Cal – 4-Port VNAs” on page 10-90
 - “MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-91

AutoCal 1-Port Calibration – 4-Port VNA

- “AUTOCAL SETUP Menu – 1-Port Cal – 4-Port VNAs” on page 10-94
 - “MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-95

Manual Calibration Menus and Dialog Boxes

Manual Calibration Configuration – 4-Port VNA

Once a calibration type is selected in the MANUAL CALIBRATION menus, the following menus are used to set up the calibration method and line type. The settings in these menus define which dialog boxes will be available and the procedural menus that will appear for the specified calibration parameters:

- “MANUAL CAL Menu – 4-Port VNAs” on page 10-99
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101

- [“CAL METHOD Menu – 4-Port VNA” on page 10-104](#)
- [“LINE TYPE Menu – 4-Port VNA” on page 10-106](#)

Manual 4-Port Calibration – 4-Port VNA

- “FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107
 - “FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-111
 - “FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-114
 - “FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-117
 - “FULL FOUR PORT CAL SETUP (SSST, Waveguide) Dialog Box” on page 10-120
 - “FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-122
 - “FULL FOUR PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-125
 - “FULL FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-129
 - “FULL FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-135
 - “FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-140
 - “THRU/RECIP Menu – 4-Port VNAs” on page 10-273
 - Summary Table: Table 10-3, “4-Port Manual Cal Setup Dialog Box Summary” on page 10-143

Manual 3-Port Calibration – 4-Port VNA

- “THREE PORT CAL Menu – 4-Port VNAs” on page 10-153
 - “THREE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-155
 - “THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box” on page 10-158
 - “THREE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-161
 - “THREE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-164
 - “THREE PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-166
 - “THREE PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-170
 - “THREE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-174
 - Summary Table:
 - Table 10-4, “3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-177

Manual 2-Port Calibration – 4-Port VNA

- “TWO PORT CAL Menu – 4-Port VNAs” on page 10-185
 - “TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-187
 - “TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box” on page 10-191
 - “TWO PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-194
 - “TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-198
 - “TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-201
 - “TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-205
 - “TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-208
 - Summary Table:
 - Table 10-5, “2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-213

Manual 1-Port Calibration – 4-Port VNA

- “ONE PORT CAL Menu – 4-Port VNAs” on page 10-223
 - “ONE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-226
 - “ONE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-230
 - “ONE PORT CAL SETUP (SSLT, Waveguide) Dialog Box” on page 10-232
 - “ONE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-234

- “ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-236
- Summary Table:
 - Table 10-6, “1-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-239

Manual Transmission Frequency Response – 4-Port VNA

- “TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245
 - “TRANS. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-247
 - “TRANS. FREQ. RESP. CAL SETUP (SSLT, Waveguide) Dialog Box” on page 10-249
 - “TRANS. FREQ. RESP. CAL SETUP (SSST, Microstrip) Dialog Box” on page 10-251
- Summary Table:
 - Table 10-7, “Trans. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-253

Manual Reflection Frequency Response Calibration – 4-Port VNA

- “REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255
 - “REFL. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-257
 - “REFL. FREQ. RESP. CAL SETUP (SSLT, Microstrip) Dialog Box” on page 10-260
 - “REFL. FREQ. RESP. CAL SETUP (SSST, Waveguide) Dialog Box” on page 10-262
- Summary Table:
 - Table 10-8, “Refl. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-264

Calibration Sub-Menus

- “REFL. DEVICE(S) Menu – 4-Port VNAs” on page 10-267
- “LINES/MATCHES DEVICE(S) Menu – 4-Port VNAs” on page 10-269
- “SLIDING LOADS Menu – 4-Port VNAs” on page 10-271
- “THRU/RECIP Menu – 4-Port VNAs” on page 10-273
- “ISOLATION (OPTIONAL) Menu” on page 10-275

Manual Calibration General Dialog Boxes – 4-Port VNA

These dialog boxes are representative of those that can be linked to from multiple locations. Not all possible dialog boxes are shown:

- “AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278
- “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280
- “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281
- “STANDARD INFO (Broadband Cal) 0.8 mm Connector (M) Dialog Box” on page 10-282
- “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-284
- “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285
- “USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287
- “USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM” on page 10-289
- “USER DEFINED MATCH DEVICES Dialog Box – mTRL” on page 10-292
- “USER DEFINED MATCH Dialog Box – mSSS” on page 10-296
- “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298

10-3 Menu Set Overview – 4-Port VNA Calibration

The menus shown below provide the primary control for all 4-Port VNA calibration functions.

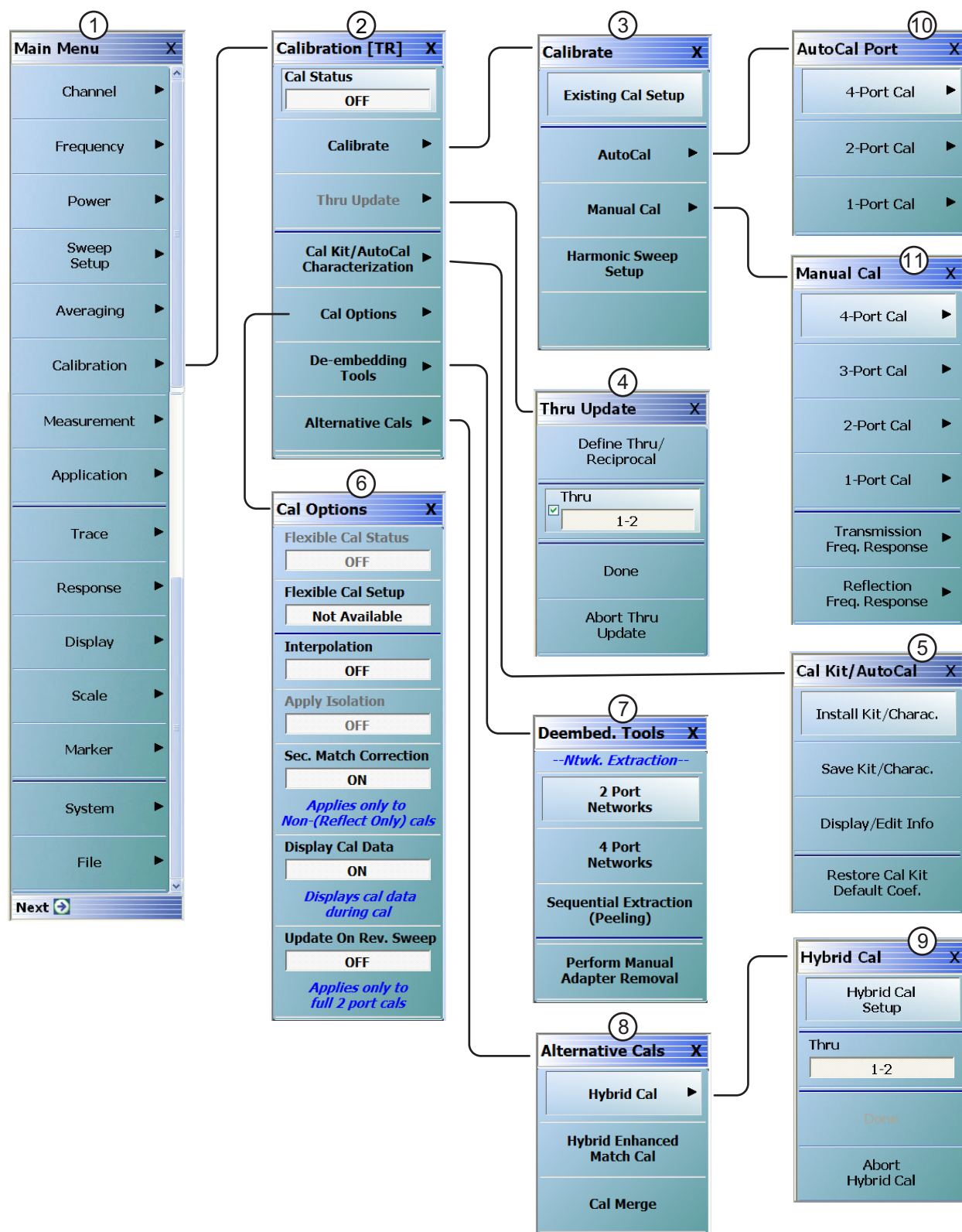


Figure 10-1. Primary Calibration Menus for 4-Port VNAs (1 of 2)

-
1. “MAIN Menu”
 2. “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs”
 3. “CALIBRATE Menu – 4-Port VNAs”
 4. “THRU UPDATE Menu – 4-Port VNAs”
 5. “CAL KIT/AUTOCAL Menu – 4-Port VNAs” Characterization File Management Menu
 6. “CAL OPTIONS Menu – 4-Port VNAs”
 7. “DEEMBED. TOOLS Menu – 4-port VNAs” (This example shown with Option 21 – Universal Fixture Extraction installed, which includes Sequential Extraction)
 8. “ALTERNATIVE CALS Menu – 4-Port VNAs”
 9. “HYBRID CAL Menu – 4-Port VNAs”
 10. “AUTOCAL PORT Menu – 4-Port VNAs”
 11. “MANUAL CAL Menu – 4-Port VNAs”
-

Figure 10-1. Primary Calibration Menus for 4-Port VNAs (2 of 2)

10-4 Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs

CALIBRATION [TR] Menu – 4-Port VNAs

Use the CALIBRATION menu to setup calibration options, configure AutoCal and cal kit characterization files, and to configure and run calibration routines.

The CALIBRATION menu is not available when using the Spectrum Analysis application.

Full Name

Calibration [Transmission-Response]

The name of the Calibration menu is appended with [TR] for transmission/reflection operational mode. The instrument operation mode is set on the Application Menu. See [Chapter 12 — Application Menus – Overview](#).

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- The VNA is in 4-Port mode.
- The VNA is equipped with a Multiport Test Set.

Navigation

- MAIN | Calibration | CALIBRATION

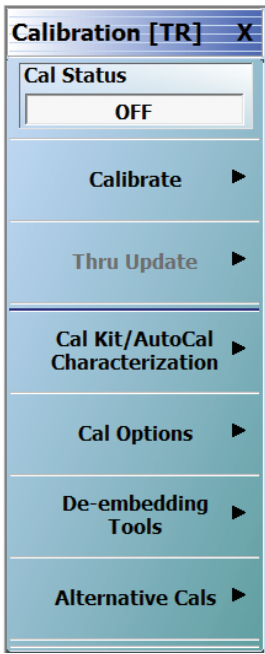
	<p>Cal Status (Off/On)</p> <p>The Cal Status toggle button displays the calibration status based on the last calibration run.</p> <p>If not calibrated, Cal Status cannot be changed from OFF and a calibration run must be successfully completed before the status can be changed.</p> <p>If calibrated, Cal Status status can be toggled between OFF and ON. If ON, the Channel Status bar at the bottom of the display area shows a status of CORR in green.</p> <p>Calibrate</p> <p>Use the Calibrate button to start the AutoCal or manual calibration process. Options on sub-menus allow for selection of automatic or manual calibration, calibration type, calibration method, line type and other calibration parameters. Select displays the CALIBRATE menu.</p> <ul style="list-style-type: none">• “CALIBRATE Menu – 4-Port VNAs” on page 10-13 <p>Thru Update</p> <p>Thru update is a calibration refreshing technique where the user connects a thru line and quickly refreshes the transmission tracking and load match terms without the time and complexity of a full calibration run. The thru update is essentially a one-step refresh calibration for Full 2 Port and 1 Path-2 Port calibrations.</p> <p>Select displays the THRU UPDATE menu. If the Thru Update button is not available, a Full 4-Port, Full 3-Port, Full 2-Port, or 1 Path-2 Port calibration is not active. Complete one of the required calibrations to activate the Thru Update button.</p> <ul style="list-style-type: none">• “THRU UPDATE Menu – 4-Port VNAs” on page 10-15
---	---

Figure 10-2. CALIBRATION Menu – 4-Port VNAs (1 of 2)

Cal Kit/AutoCal Characterization

Use this menu to save, load, and recall characterization files for AutoCal and manual calibration kits. Select displays the CAL KIT/AUTOCAL menu.

- [“CAL KIT/AUTOCAL Menu – 4-Port VNAs” on page 10-17](#)

Cal Options

Select displays the CAL OPTIONS menu.

- [“CAL OPTIONS Menu – 4-Port VNAs” on page 10-28](#)

De-embedding Tools

Select Displays the De-embedding tools menu.

- [“DEEMBED. TOOLS Menu – 4-port VNAs” on page 10-33](#)

Alternative Cals

Select Displays the Alternative Cals menu.

- [“ALTERNATIVE CALS Menu – 4-Port VNAs” on page 10-80](#)

Figure 10-2. CALIBRATION Menu – 4-Port VNAs (2 of 2)

CALIBRATION Menu – Noise Figure

When Noise Figure (Option 41) or Differential Noise Figure (Option 48) is active (see [Chapter 15](#) or [Chapter 16](#)), selecting Calibration from Main Menu opens a modified Calibration [Noise Figure] menu, which varies depending on DUT configuration and Noise Cal Method. Use the Calibration menu to perform noise calibrations, which remove the noise added by the composite receiver chain(s).

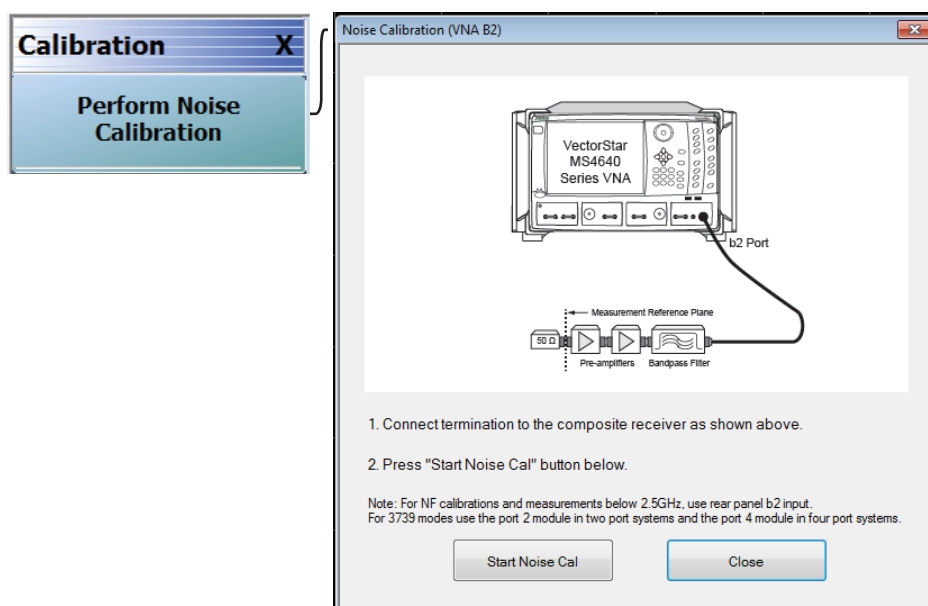


Figure 10-3. CALIBRATION Menu – Noise Figure, Option 41

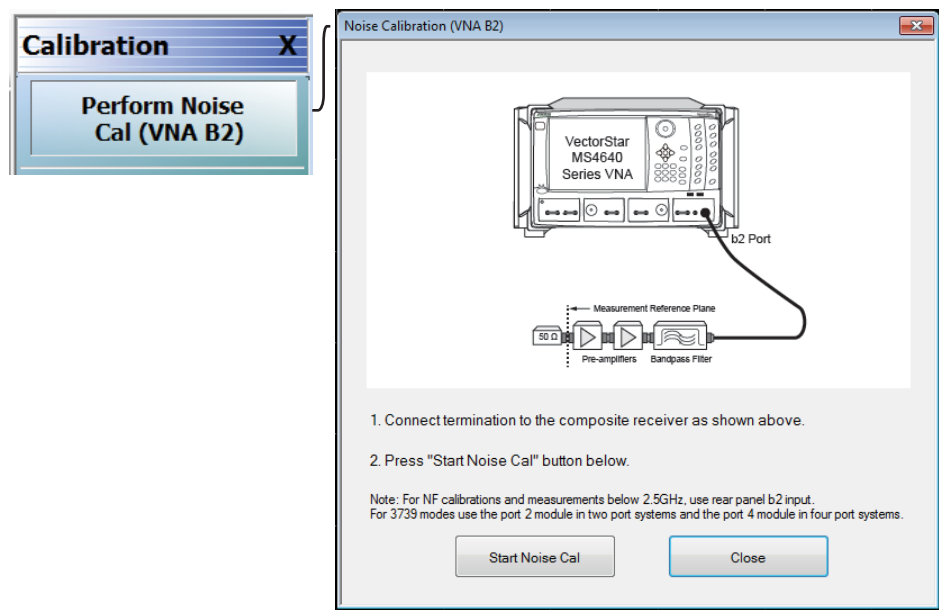


Figure 10-4. CALIBRATION Menu – Noise Figure, Option 48, 2-Port DUT

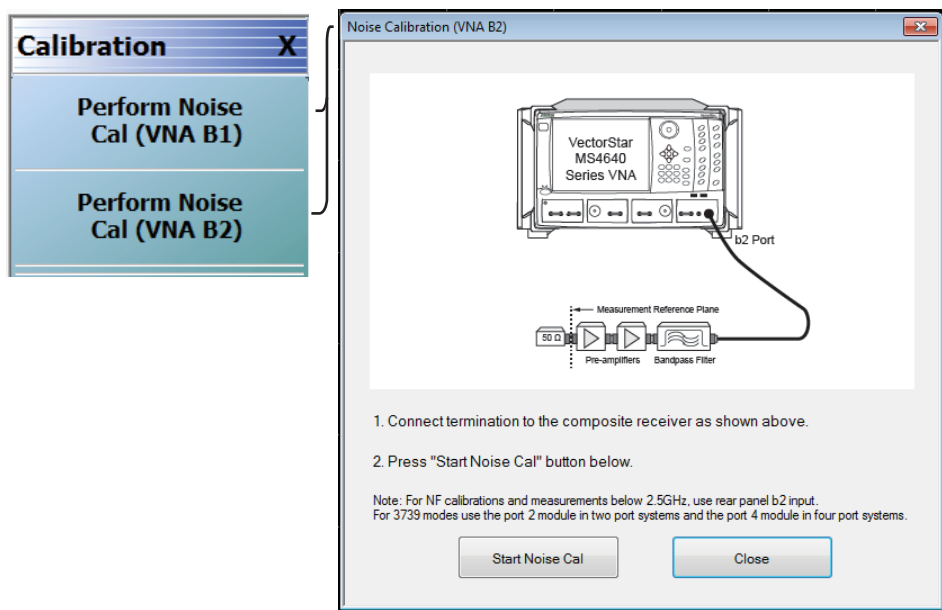


Figure 10-5. CALIBRATION Menu – Noise Figure, Option 48, 4-Port DUT

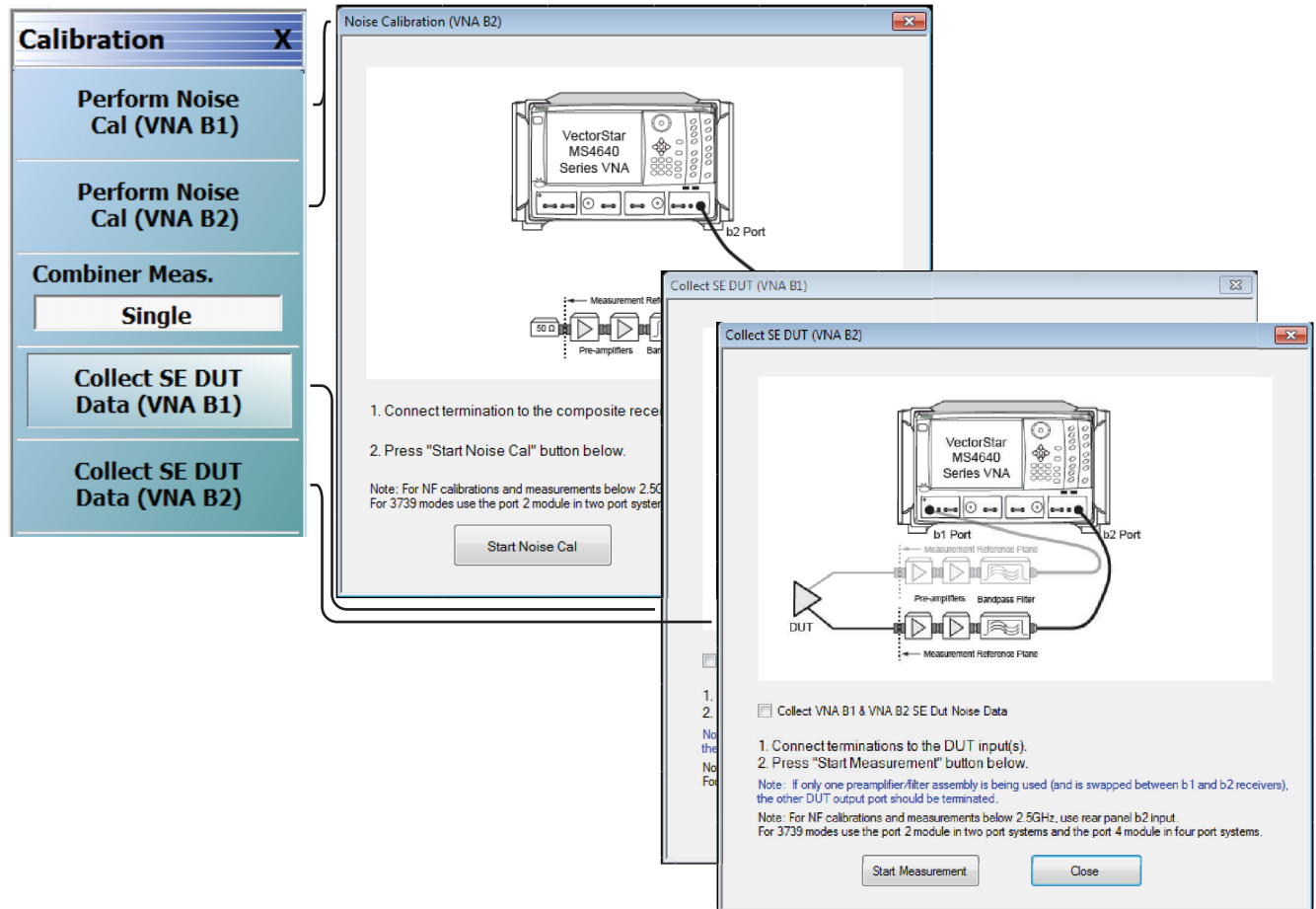


Figure 10-6. CALIBRATION Menu – Noise Figure – Option 48 with 4-Port DUT Configuration, Single Combiner Measurement

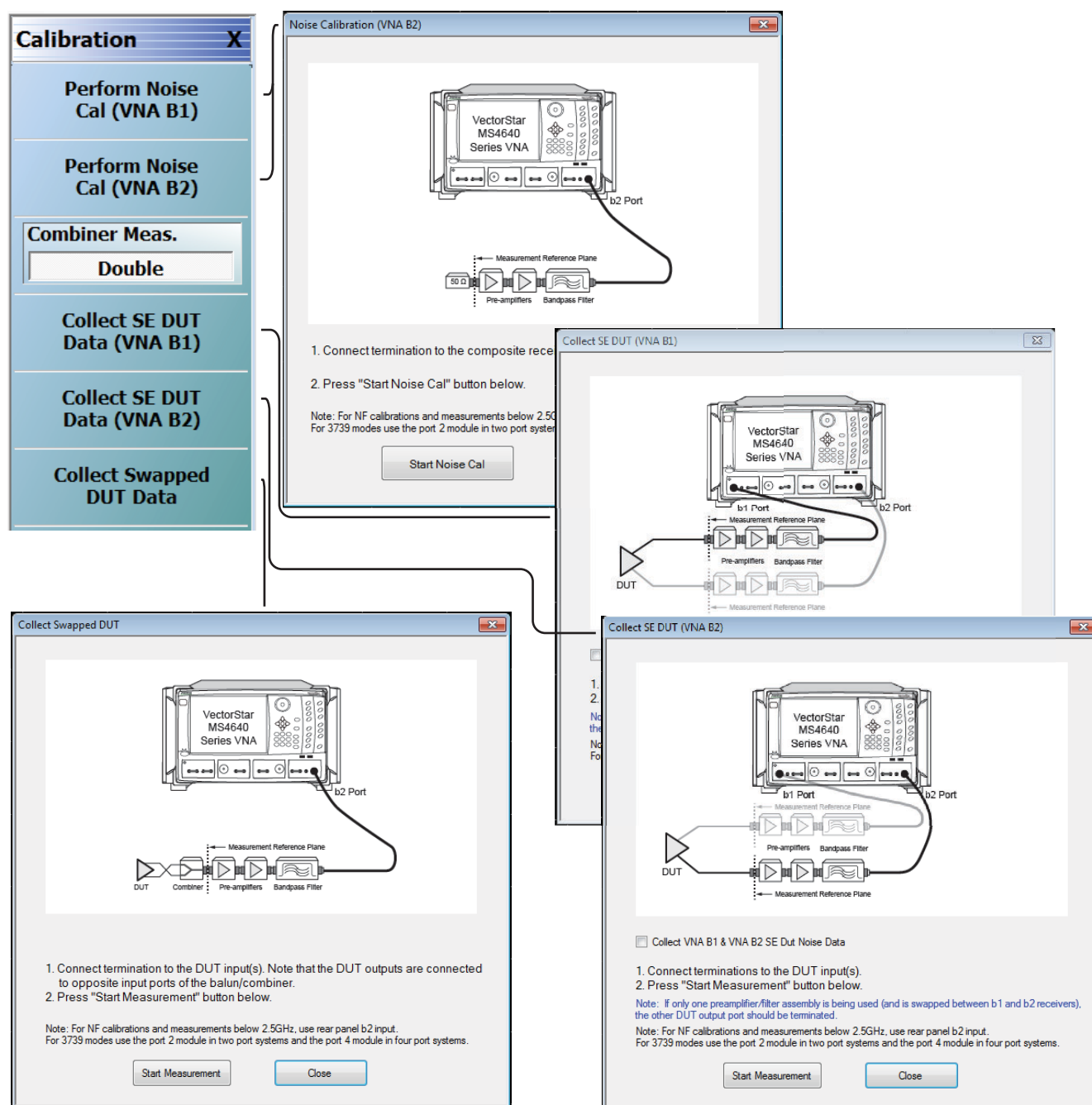


Figure 10-7. CALIBRATION Menu – Noise Figure – Option 48 with 4-Port DUT Configuration, Double Combiner Measurement

CALIBRATE Menu – 4-Port VNAs

Use the CALIBRATE menu to start the AutoCal or manual calibration process. Sub-menus within each category allow selection of calibration parameters, calibration types, calibration methods, line types, and test port connectors.

Previous

- [“CALIBRATION \[TR\] Menu – 4-Port VNAs” on page 10-8](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE

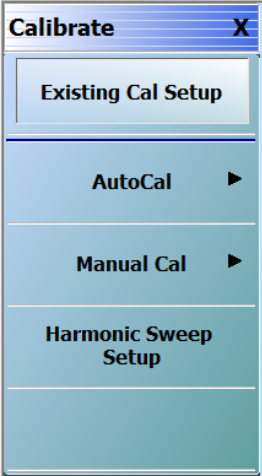
	<p>Existing Cal Setup</p> <p>Restores the setup parameters from the last successful calibration procedure, whether an AutoCal or manual calibration. All menu and dialog box settings are returned to their prior settings and the operator can proceed with the calibration procedure as soon as the necessary external device connections are complete.</p> <p>AutoCal</p> <p>Select displays the AutoCal menu.</p> <ul style="list-style-type: none">• “AUTOCAL PORT Menu – 4-Port VNAs” on page 10-85 <p>Manual Cal</p> <p>Select displays the Manual Calibration menu.</p> <ul style="list-style-type: none">• “MANUAL CAL Menu – 4-Port VNAs” on page 10-99 <p>Harmonic Sweep Setup</p> <p>Select displays the Harmonic Sweep dialog box. This selection is available only when Frequency Sweep (Linear) mode is selected from the SWEEP TYPES Menu.</p> <p>See “HARMONIC SWEEP Setup Dialog Box” on page 10-14.</p>
---	--

Figure 10-8. CALIBRATE Menu – 4-Port VNAs

HARMONIC SWEEP SETUP Dialog Box – 4-Port VNAs

When in Frequency Sweep (Linear) mode, selecting Harmonic Sweep Setup from the Calibrate menu opens the dialog shown below. This is available only when the VNA is in Frequency Sweep (Linear) mode.

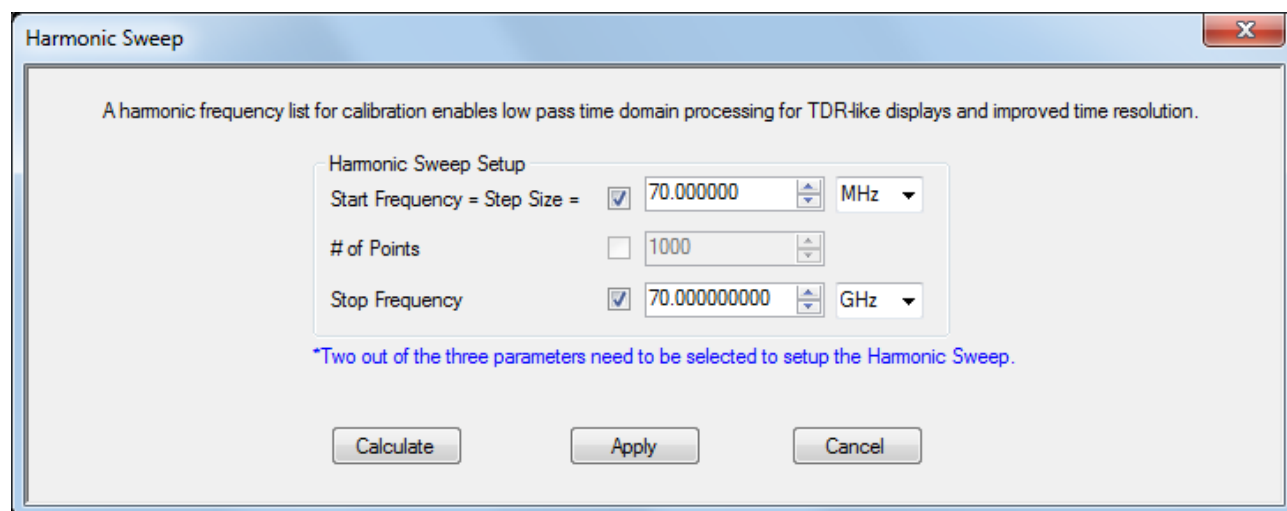
By using Harmonic Sweep, a harmonic frequency list for calibration enables low pass time domain processing for TDR (Time Domain Reflectometer)-like displays and improved time resolution.

Previous

- [“CALIBRATE Menu – 4-Port VNAs” on page 10-13](#)

Navigation

MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Harmonic Sweep Setup | HARMONIC SWEEP



Two of the three parameters (Start Frequency or Number of Points or Stop Frequency) must be selected in order to set the harmonic sweep. The value of the third parameter is adjusted according to the other two.

Even with one free parameter, the entered numbers may not be consistent with a harmonic sweep. Pressing the Calculate button will coerce values to make a valid harmonic sweep and allow the user to fine tune values before leaving the dialog.

Figure 10-9. HARMONIC SWEEP Setup Dialog Box

THRU UPDATE Menu – 4-Port VNAs

The THRU UPDATE menu is a completion button menu. When the through update calibration procedure is complete, the button is annotated with a completion checkmark as shown in the figure below

Previous

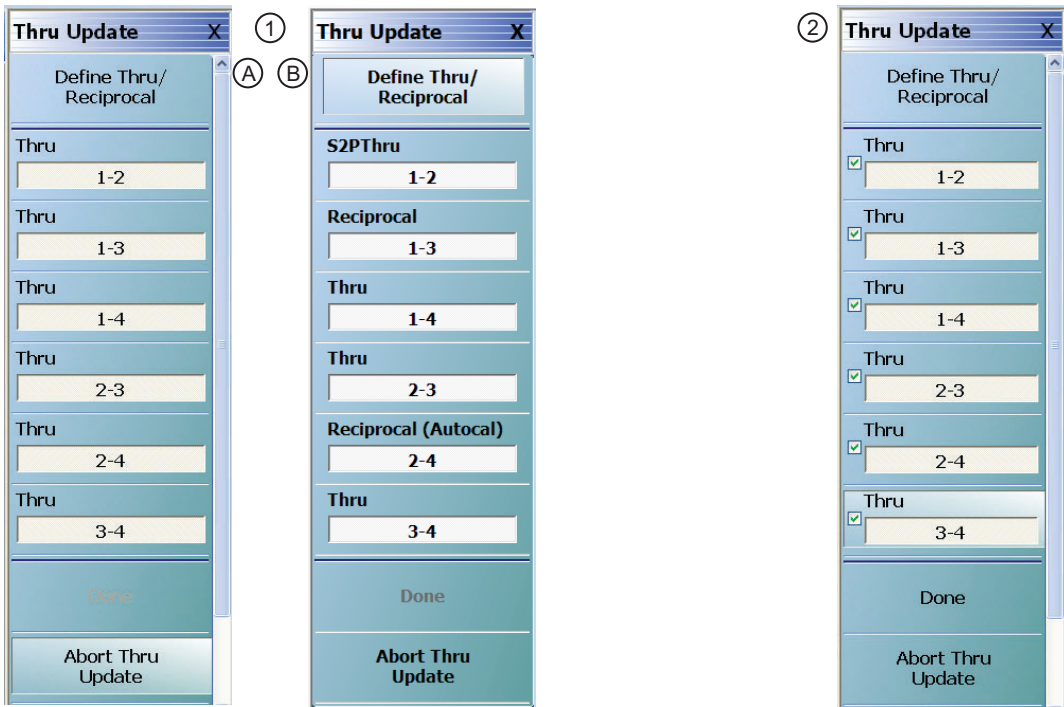
- “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8

Prerequisites

- The Thru Update button on the CALIBRATION menu is not available unless a Full 4-Port, Full 3-Port, Full 2-Port, or a 1 Path-2 Port calibration has been successfully completed.
- The number of Thrus and the Thru pairs presented depends on the user-defined calibration configuration.

Navigation

- MAIN | Calibration | CALIBRATION | Thru Update | THRU UPDATE



- | | |
|---|---|
| 1. Starting THRU UPDATE calibration menus for 4-Port VNA system. The Done button is unavailable. The number of thrus and the thru pairs presented depends on the user configuration before the calibration and thru update. | 2. At right, the completed THRU UPDATE calibration menu for 4-port VNA system on right with completion check marks and Done button available. |
|---|---|

Figure 10-10. THRU UPDATE Calibration Menu – 4-Port VNAs

Define Thru/Reciprocal

Displays the THRU INFO dialog box where the through parameters can be changed.

- “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285

Thru

The number of Thru buttons to appear depend on which were selected during the setup. The possible thru selections in a 4-Port system are 1-2, 1-3, 1-4, 2-3, 2-4, and 3-4. In the example menu above (Callout #1B), all available 4-Port Thru measurements are required.

Reciprocal

Reciprocal is not valid with 1-2 and 3-4 paths.

Reciprocal (Autocal)

Reciprocal (AutoCal) is not valid with 1-2 and 3-4 paths.

Done

When all calibrations are successfully completed, the Done button is available. Select returns to the CALIBRATION menu and the Cal Status button is set to ON.

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Abort Thru Update

Abort Thru Update stops the current calibration procedure and returns to the CALIBRATION menu.

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

CAL KIT/AUTOCAL Menu – 4-Port VNAs

Use the CAL KIT/AUTOCAL menu to install, save, and restore calibration kit characterization files between an external memory device, the instrument firmware, and a hard drive on the instrument or on a network.

Full Name

Full Manual Calibration Kit / Automatic Calibrator (AutoCal)

Previous

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL

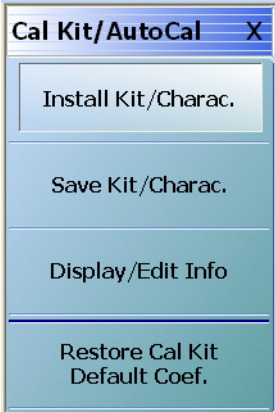
	<p>Install Kit/Charac.</p> <p>Select loads the Calibration Kit file or AutoCal Characterization file from the hard drive or external memory device into the VNA firmware through the INSTALL (AutoCal Characterization/Cal Kit File) dialog box.</p> <ul style="list-style-type: none"> • “INSTALL (AUTOCAL CHARAC./CAL KIT) Dialog Box – 4-Port VNAs” on page 10-18 <p>Save Kit/Charac.</p> <p>Select saves the Cal Kit or AutoCal Characterization file from the firmware to the location of choice (typically the instrument hard drive) for later use through the SAVE (AutoCal Characterization/Cal Kit) File dialog box.</p> <ul style="list-style-type: none"> • “SAVE (AUTOCAL CHARAC./CAL KIT) Dialog Box – 4-Port VNAs” on page 10-20 <p>Display/Edit Info</p> <p>Select displays the CAL KIT INFO dialog box which shows parametric information about the calibration kit and allows user edits of the values.</p> <ul style="list-style-type: none"> • “CAL KIT INFO Dialog Box – 4-Port VNAs” on page 10-22 <p>Restore Cal Kit Default Coef.</p> <p>Select displays the RESTORE DEFAULT COEF dialog box.</p> <ul style="list-style-type: none"> • “RESTORE DEFAULT COEF. Dialog Box – 4-Port VNAs” on page 10-26
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Figure 10-11. CAL KIT/AUTOCAL Menu – 4-Port VNAs

INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box – 4-Port VNAs

Use the INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) dialog box to install the Cal Kit Coefficients file or AutoCal Characterization files in the instrument firmware for subsequent use. A recommended best practice is to keep the cal kit serial number as part of the file name.

Full Name

Install (AutoCal Characterization/Cal Kit Parameters Files)

Previous

- “CAL KIT/AUTOCAL Menu – 4-Port VNAs” on page 10-17

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Install Kit/Charac | INSTALL (Autocal Characterization/cal Kit) Dialog Box

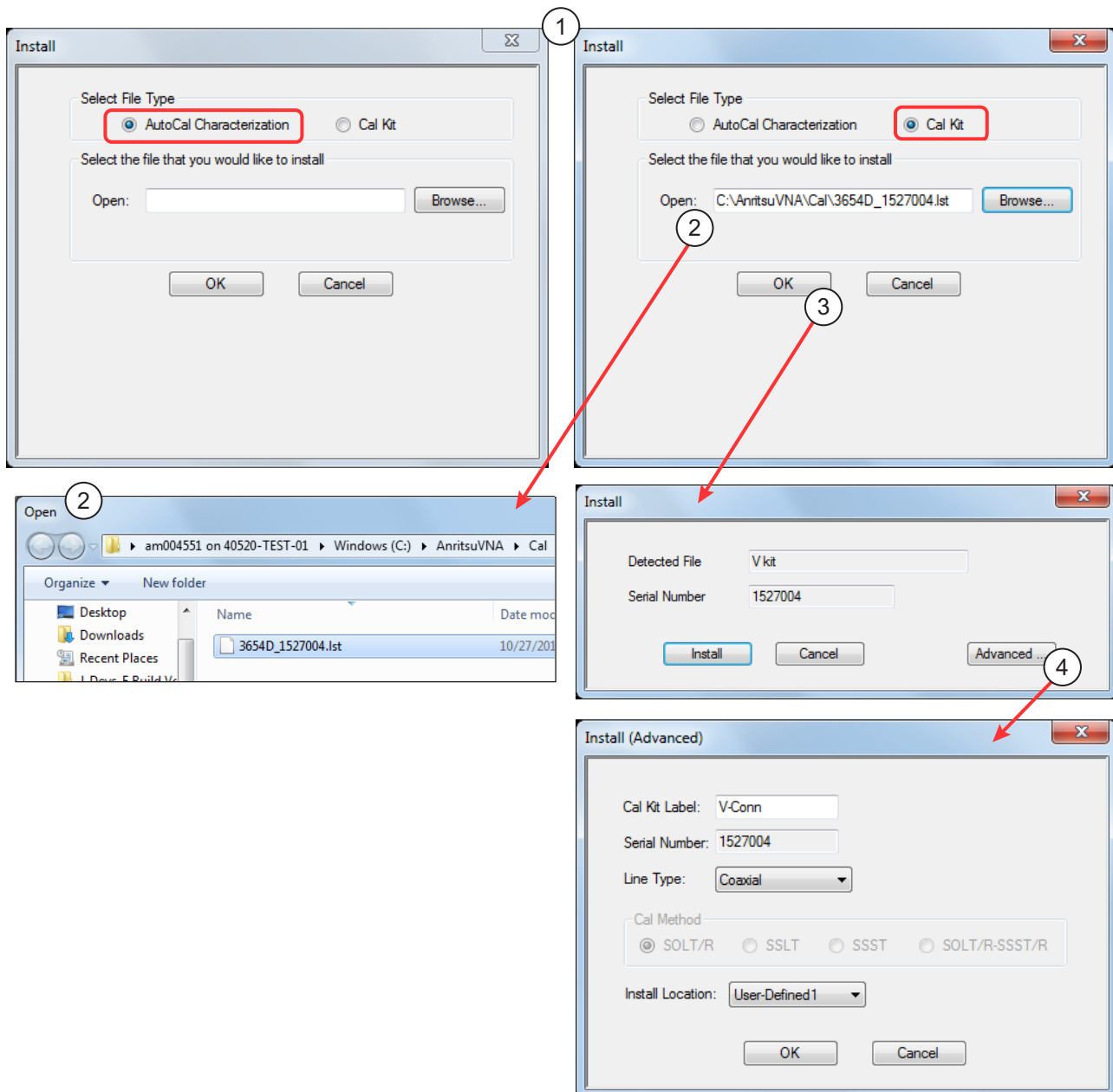


Figure 10-12. INSTALL (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box

Instructions

1. In the Select File Type area, select either the AutoCal Characterization or the Cal Kit radio button.
2. In the Open field, either enter the file name or click **Browse** to navigate manually.
 - If AutoCal Characterization was selected, the file type will be an AutoCal Characterization ACD file.
 - If Cal Kit was selected, the file type choices will be:
 - Cal Kit Coefficient (CCF file)
 - S1P/S2P Files (LST file)
 - LRL/LRM-TRL/TRM Cal Kit Files (LCF file)
 - MTRL Cal Kit Files (MLCF file)
 - Lightning Files
 - Click **Open** to load the file or **Cancel** to return to the menu.
3. Clicking **OK** to accept opens the **Install** window. Click the **Install** button to load the file.
4. Clicking the **Advanced** button opens the **Install (Advanced)** dialog where the user can change the Cal Kit Label, Line Type, or the Install Location to install the LST CalKit to a User Defined install location.

SAVE (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box – 4-Port VNAs

Use the SAVE (AUTOCAL CHARACTERIZATION/CAL KIT) dialog to save a Calibration Kit Coefficients file or an AutoCal Characterization file from the VNA firmware to external location such as the instrument hard drive, a network drive, or an external memory device. This is useful for storing in the instrument hard drive multiple files from available cal kits or AutoCal modules.

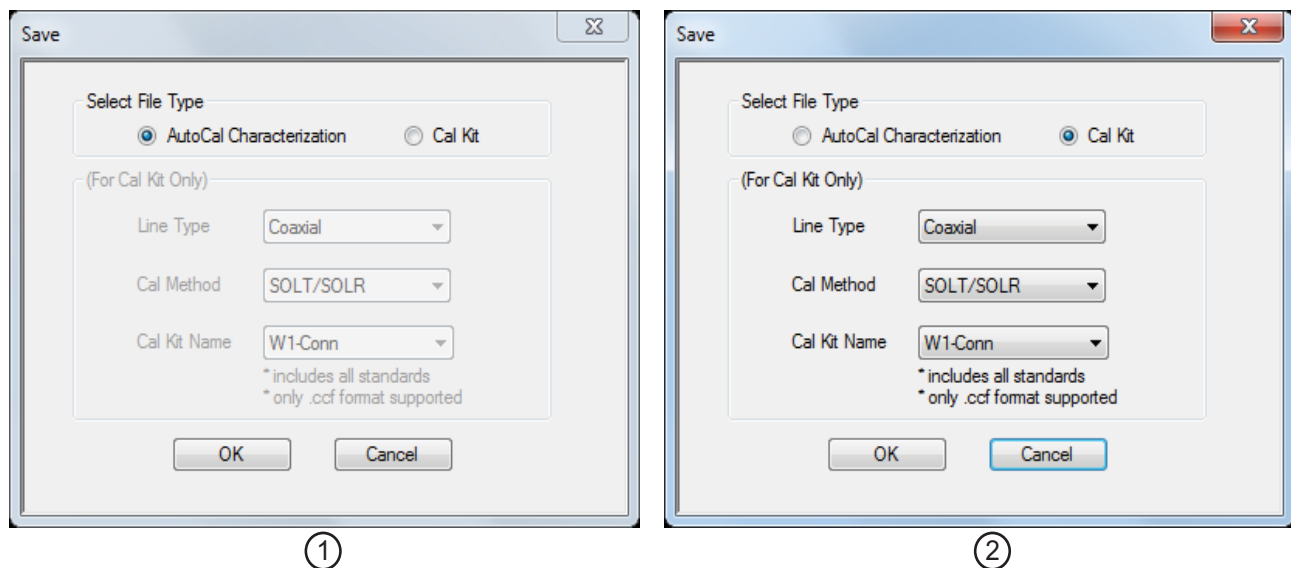
An alternate method is to a Windows program such as File Manager to copy the file from the supplied USB memory device onto the hard drive. In that case, we recommend using the default locations mentioned later in this paragraph.

Previous

- [“CAL KIT/AUTOCAL Menu – 4-Port VNAs” on page 10-17](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Save Kit/Charac | SAVE (AUTOCAL CHARACTERIZATION/CAL KIT) Dialog Box



1. AutoCal Characterization radio button selected.
2. Cal Kit radio buttons selected.

Figure 10-13. SAVE (AUTOCAL CHARACTERIZATION/CAL KIT FILE Dialog Box

Save Dialog Button and Field Availability

The available buttons and fields on the dialog depend on the radio button selection in the Select File Type area.

- If AutoCal Characterization is selected, no other buttons/fields are available and instructions are immediately below.
- If Cal Kit is selected, the For Cal Kit Only area becomes available with fields for Line Type, Cal Method, and Cal Kit Name. Instructions are in the next sub-section following.

Instructions for AutoCal Characterization File Type

1. Click OK to save the AutoCal Characterization file.
 - Click Cancel to stop the save.
2. The SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) dialog box appears.
3. Navigate to the required storage location:
 - C:\AnritsuVNA\AutoCal is recommended.
4. Click Save. The system auto-returns to the Cal Kit/AutoCal menu.

Instructions for Cal Kit File Types

If Cal Kit is selected, the fields of Line Type, Cal Method, and Cal Kit Name are available (shown at right in [Figure 10-13 on page 10-20](#) above) with the values in drop-down menus.

1. In the Line Type field, select a type value:
 - Coaxial
 - Non-Dispersive
 - Waveguide
2. In the Cal Method field, select a method value:
 - SOLT/SOLR
 - SSLT
 - SSST
 - SOLT/R-SSST/R (for Broadband)
3. In the Cal Kit Name field, select a calibration kit characterization file:
 - 0.8 mm-Conn
 - W1-Conn
 - V-Conn
 - K-Conn
 - GPC-3.5
 - SMA
 - N-Conn
 - N-Conn (75)
 - GPC-7
 - 7/16
 - TNC (Kit from Maury Microwave)
 - User-Defined 1 through User-Defined 32
4. Click OK to save the calibration kit characterization file.
 - Click Cancel to stop the save.
5. The SAVE AS (CAL KIT COEFFICIENT CCF FILE) dialog box appears.
6. Navigate to the required storage location:
 - C:\AnritsuVNA\Data is recommended.
7. Click Save. The system auto-returns to the CAL KIT/AUTOCAL menu.
 - Click Cancel to abort the save and return to the CAL KIT/AUTOCAL menu.

CAL KIT INFO Dialog Box – 4-Port VNAs

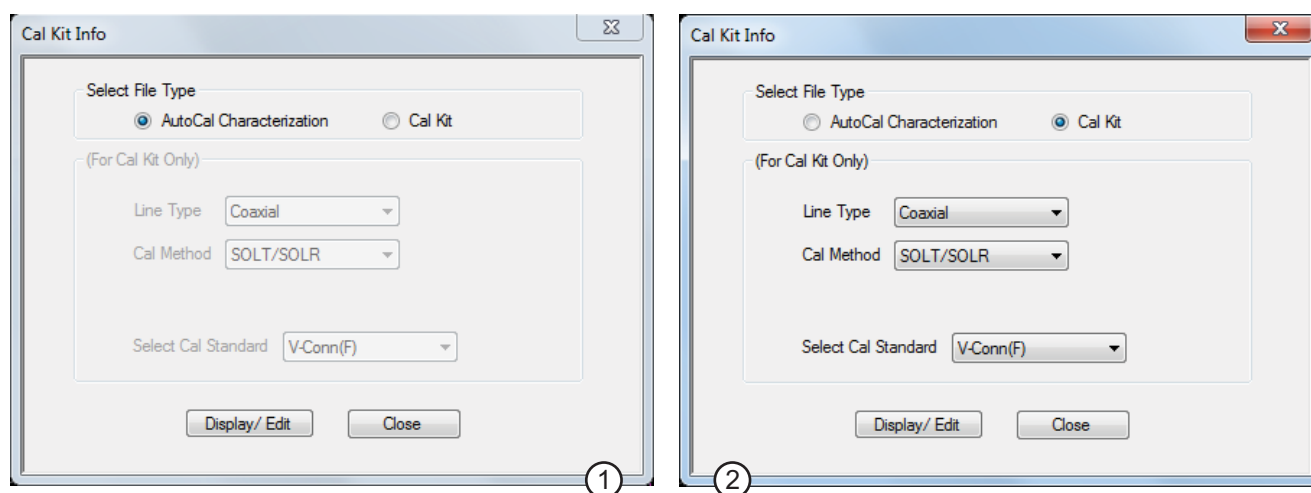
Use the CAL KIT INFO dialog box to review the available instrument calibration kit information.

Previous

- [“CAL KIT/AUTOCAL Menu – 4-Port VNAs” on page 10-17](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Display/Edit Info | CAL KIT INFO Dialog Box



1. At left, controls for AutoCal Characterization files.

2. At right, controls for Cal Kit files.

Figure 10-14. CAL KIT INFO Dialog Box

Button and Field Availability

The available buttons and fields on the dialog depend on the radio button selection in the Select File Type area.

- If AutoCal Characterization is selected, no other buttons/fields are available.
- If Cal Kit is selected, the For Cal Kit Only area becomes available with fields for Line Type, Cal Method, and Select Cal Standard.

Instructions

1. Select AutoCal Characterization or Cal Kit as required.
2. If Cal Kit was selected above, in the For Cal Kit Only area, select a Line Type value:
 - Coaxial
 - Non-Dispersive
 - Microstrip
 - Waveguide
3. Select a Cal Method value:
 - SOLT/SOLR
 - SSLT
 - SSST
 - SOLT/R-SSST/R (for Broadband)

4. Select a Cal Standard value:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1(M) through User-Defined32 (M)
- User-Defined1(F) through User-Defined32 (F)

5. Click Display/Edit.

- The STANDARD INFO read-only dialog box appears.
- Note that the dialog box title and content fields are dependent on the selections made in the steps above for Cal Method, Line Type, and Connector Type.
- For example, if:
 - Calibration type is set to Full 2 Port (12 Term Cal)
 - Calibration method is set to SOLT/SOLR
 - Line type is set to Coaxial
 - Connector type is set to V-Conn (M).
- The read-only dialog box is titled:
 - STANDARD INFO (SOLT/R) STANDARD LABEL (V-Conn (M)) (shown below in [Figure 10-15 on page 10-24](#)).

6. Click OK to close the read-only dialog box.

Note

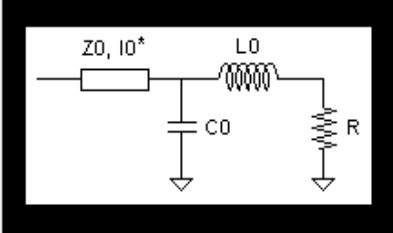
If an LST file has been loaded for either V or K connector, an interactive STANDARD INFO dialog will appear as shown in [Figure 10-16 on page 10-25](#). There, the S1P file can be viewed for each component.

Standard Info (SOLT/R) X

Standard Label

Serial Number

Broadband Load



BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	L0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

BB Load 2 (SN XXXXXX)

R (Ω)	Z0 (Ω)	L0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

10^* : air equivalent length polynomial coef0

Sliding Load BreakPoint Freq (in GHz)

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	0	0	0	5.1	0	0

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	-200	5	0	4.75	0	0

Where $L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3$ and $C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3$

Figure 10-15. STANDARD INFO (SOLT/R) Standard Label (V-Conn (M)) Dialog Box

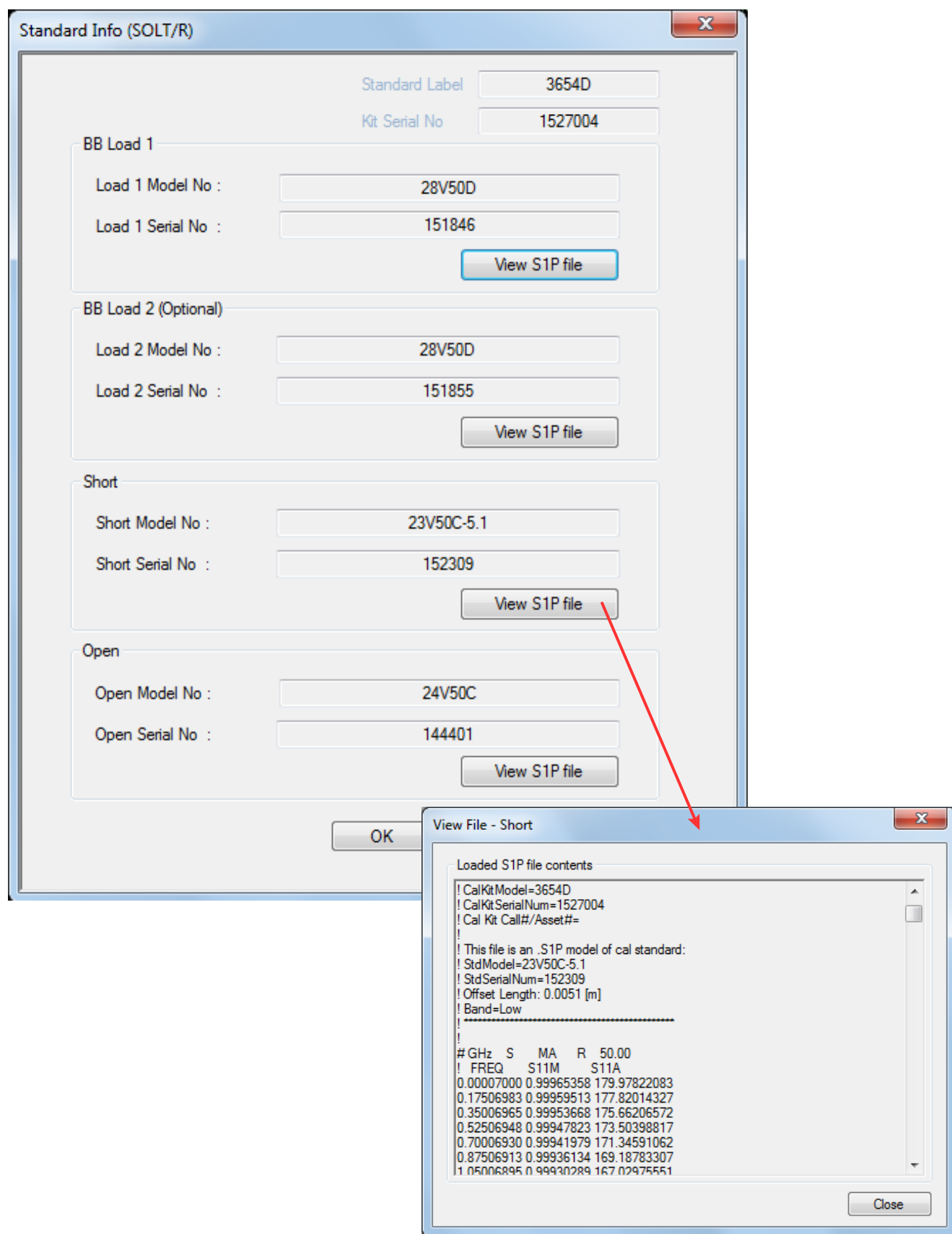


Figure 10-16. STANDARD INFO (SOLT/R) Standard Label (V-Conn (M)) Dialog Box – Loaded from LST file.

RESTORE DEFAULT COEF. Dialog Box – 4-Port VNAs

Use the RESTORE DEFAULT COEF. dialog box to restore firmware-stored Cal Kit Coefficients fields back to their default coefficients. For best performance, either install the cal kit coefficients file supplied with your cal kit, or enter your user-defined coefficients before starting this procedure. The restore function is not available to AutoCal kits as they do not have restorable characterization data.

Full Name

Full Restore Default Coefficients

Previous

- [“CAL KIT/AUTOCAL Menu – 4-Port VNAs” on page 10-17](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Kit/AutoCal Characterization | CAL KIT/AUTOCAL | Restore Cal Kit Default Coef. | RESTORE DEFAULT COEF Dialog Box

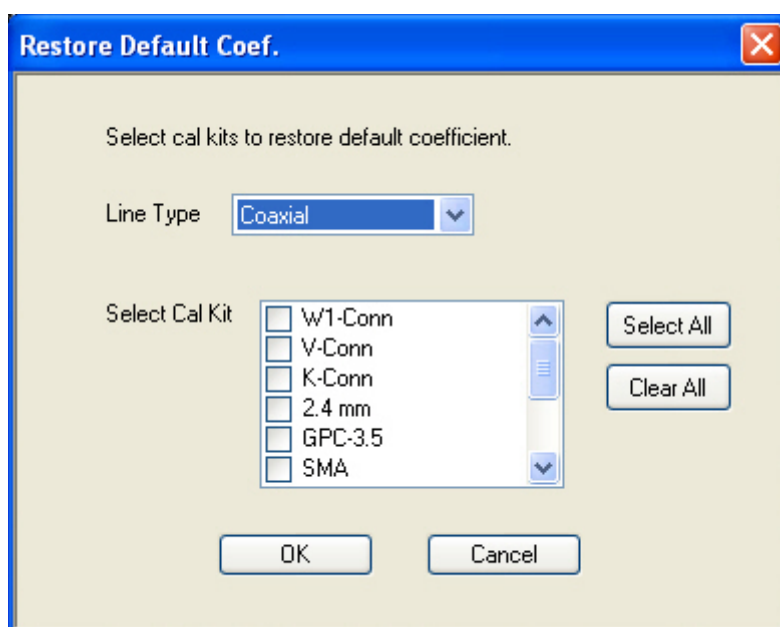


Figure 10-17. RESTORE DEFAULT COEF. (RESTORE DEFAULT COEFFICIENTS) Dialog Box

Instructions Restore Default Calibration Coefficients

Use this dialog to restore factory coefficients to available calibration kits.

1. Select the Line Type as required.
2. Select the Calibration Kits as required to be restored.
3. Click OK.

Available Selections

The table below shows the available calibration kits in the Select Cal Kit field of the RESTORE DEFAULT COEFFICIENTS dialog box. The available kits depend on the input combination selected for Line Type Media and Cal Method

Table 10-1. Calibration Kit Availability in the RESTORE DEFAULT COEF. Dialog Box

LINE TYPE Media Setting	CAL METHOD Setting	Available Calibration Kits
Coaxial	SOLT/SOLR	0.8 mm-Conn, W1-Conn, V-Conn, K-Conn, 2.4 mm, 2.4 mm V, GPC-3.5, SMA, N-Conn, N-Conn (75), GPC-7, 7/16, TNC
	SSLT	0.8 mm-Conn, W1-Conn
	SSST	0.8 mm-Conn, W1-Conn
	SOLT/R-SSST/R (for Broadband)	0.8 mm-Conn, W1-Conn
Non-Dispersive	SOLT/SOLR	0.8 mm-Conn, W1-Conn, V-Conn, K-Conn, 2.4 mm, GPC-3.5, SMA, N-Conn, N-Conn (75), GPC-7, 7/16, TNC
	SSLT	0.8 mm-Conn, W1-Conn
	SSST	0.8 mm-Conn, W1-Conn
Microstrip	SOLT/SOLR	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
	SSLT	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
	SSST	10 Mil Kit, 15 Mil Kit, 25 Mil Kit
Waveguide	SOLT/SOLR	No selections available
	SSLT	WR10, WR12, WR15
	SSST	No selections available

CAL OPTIONS Menu – 4-Port VNAs

The CAL OPTIONS menu and related sub-menus provide access to advanced calibration options either before or after a calibration procedure has been completed.

Previous

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS

The screenshot shows the 'Cal Options' menu with the following items:

- Flexible Cal Status**: OFF
- Flexible Cal Setup**: Not Available
- Interpolation**: OFF
- Apply Isolation**: OFF
- Sec. Match--**: Applies only to Non-(Reflect Only) cals
- Sec. Match Correction**: OFF
- Setup Type**: Normal
- Display Cal Data**: ON
- Update On Rev. Sweep**: OFF

Additional notes in the menu:

- Under 'Flexible Cal Setup': Not Available
- Under 'Display Cal Data': Displays cal data during cal
- Under 'Update On Rev. Sweep': Applies only to full 2 port cals

Flexible Cal Status (Off/On)

Read only display button. Flexible calibration is the ability to select a sub-set of a currently active calibration status. For example, if a Full 2 Port calibration has been completed, flexible calibration allows the calibration to be reduced to a Transmission Frequency Response calibration. Select toggles flexible calibration off and on.

Flexible Cal Setup

Use Flexible Cal Setup to change the parameters above. Select displays the FLEXIBLE CAL SETUP dialog box.

- [“FLEXIBLE CAL SETUP Dialog Box – 4-Port VNAs” on page 10-31](#)

Interpolation (Off/On)

Interpolation allows additional interpolated measurement points between calibrated measurement points. This is useful if the user wants to zoom into a specific area without having to recalibrate the instrument. The interpolated points must lie within the calibration frequency points. Select toggles interpolation OFF and ON with a default state of OFF.

Apply Isolation (Off/On)

If this button is unavailable, isolation calibration was not performed. The isolation calibration procedure is started by a button on the calibration type menu.

If this button is available, isolation calibration was performed, and select toggles isolation calibration OFF and ON.

Sec. Match Correction (Off/On)

Secondary Match Correction provides a calibration enhancement that reduces high-spatial-frequency ripple by removing the effects of the multiple reflection paths within a DUT. Default value is OFF. This feature only applies for full-term calibrations, 1p2p and TFR. This function has no effect when an appropriate calibration is not applied, when the frequency range is too small ($\sim < 2\text{GHz}$), the step size is too large ($\sim > 1\text{GHz}$) or for certain very irregular segmented sweep setups. See the Measurement Guide for more details.

Setup Type

Select displays the SMC Setup Type menu.

- [“SMC Setup Type Menu” on page 10-30](#)

Display Cal Data (On/Off)

When turned on, the Display Cal Data function enables the use of a previous calibration to provide a real-time quasi-corrected view of the current standard being measured. Select toggles Display Cal Data OFF and ON. The default state is ON.

Update On Rev. Sweep (On/Off)

When turned on, updates display data only on the reverse sweep. When turned off, updates display data on every sweep. This feature is only available on 2 port systems and is only used when a full 2-port RF cal is applied. Select toggles Update On Rev. Sweep ON and OFF. The default state is OFF.

Figure 10-18. CAL OPTIONS (CALIBRATION OPTIONS) Menu

SMC Setup Type Menu

The gate parameters, principally the factor K is a multiplier applied to resolution to get gate width and the length scales to the test set mismatch centers are fairly long. Commonly used when a DUT is directly connected to the instrument test port and operating at mm-wave frequencies. But when the mm-wave module test ports are essentially the reference planes, then the length scales are much shorter and the current gate widths may make SMC less effective. The SMC Setup Type menu provides a switch (Normal, Direct Test Port connection, or Electrically Long setup), that can be set to adjust for the search range.

Previous

- [“CAL OPTIONS Menu – 4-Port VNAs” on page 10-28](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS| SMC Setup Type

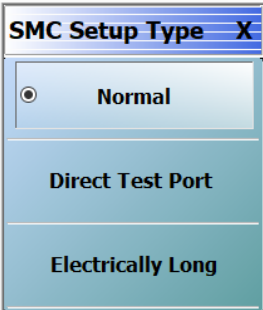
	<div>Normal The normal search range with the K factor of 140.</div> <div>Direct test Port The search range with the K factor of 30. Commonly used when a DUT is directly connected to the instrument test port and operating at mm-wave frequencies.</div> <div>Electrically Long The search range with the K factor of 140 but changes the search range to (0, 1.5 alias free range). Most commonly used with fiber optic setups (e.g., EO and OE measurements) or extremely long RF cables.</div>
--	--

Figure 10-19. SMC Setup Type Menu

FLEXIBLE CAL SETUP Dialog Box – 4-Port VNAs

Use the Flexible Cal Setup dialog box to define a calibration sub-set of the currently active calibration.

Previous

- [“CAL OPTIONS Menu – 4-Port VNAs” on page 10-28](#)

Navigation

- MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Flexible Cal Setup | FLEXIBLE CAL SETUP Dialog Box

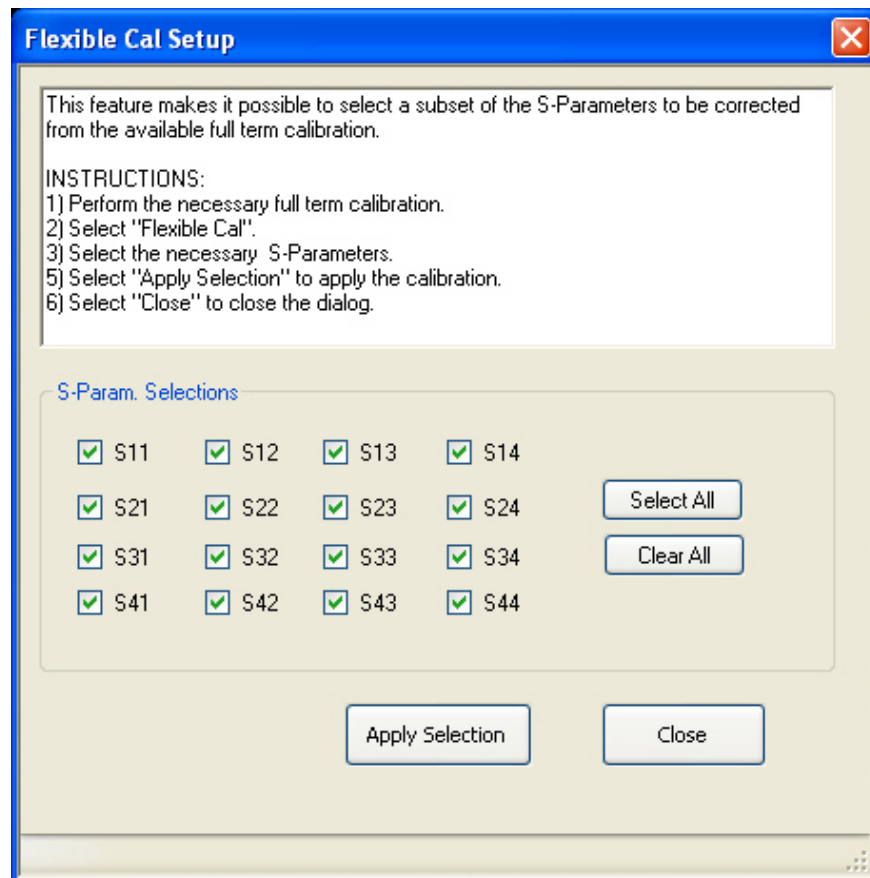


Figure 10-20. FLEXIBLE CAL SETUP (FLEXIBLE CALIBRATION SETUP) Dialog Box – 4-Port VNAs

Instructions

The flexible calibration setup feature makes it possible to select a subset of the S-Parameters to be corrected from the available full-term calibration.

Procedure

1. Perform the necessary full-term calibration.
2. Navigate to the FLEXIBLE CAL SETUP dialog box appears:
 - MAIN | Calibration | CALIBRATION | Cal Options | CAL OPTIONS | Flexible Cal Setup | FLEXIBLE CAL SETUP

3. Select the input method (full term, reflection only, or customize). The default selection is full term calibration with all the ports turned on for the available calibration type. The following radio button options are available in the Input Method area:
 - Full Term Cal (By Port)
 - Reflection Only (By Port)
 - Customize Cal (By S-Param)
4. If Full Term Cal (By Port) is selected above, the area label is Port Selections (Full Term) with available options of:
 - Port 1 and/or
 - Port 2
5. If Reflection Only (By Port) is selected above, the area label is Port Selections (Reflection Only) with the available options of:
 - Port 1 and/or
 - Port 2
6. If Customize Cal (By S-Param) is selected, the S-Param Selections area appears with S-Parameter selection check boxes. Select any combination of:
 - S11
 - S21
 - S12
 - S22
7. Select Apply Selection to apply the selections.
8. Select Close to close the dialog without saving the selections.

DEEMBDED. TOOLS Menu – 4-port VNAs

Use the DEEMBDED. TOOLS menu to for network extraction and adapter removal.

Previous

- [“CALIBRATION \[TRJ\] Menu – 4-Port VNAs” on page 10-8](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS

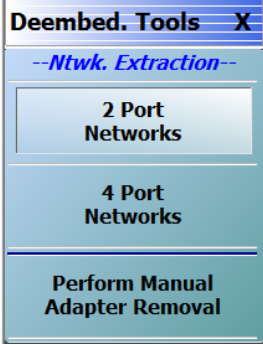
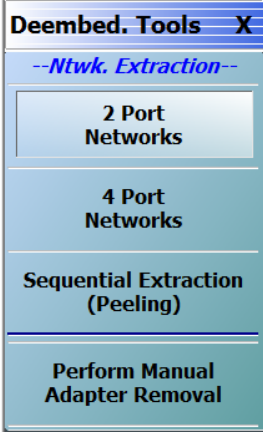
	<p><i>Deembded. Tools Menu (without Option 21)</i></p> <p>2-Port Networks</p> <p>Use network extraction to generate an S-Parameter (.s2p) file for a set of networks. The file can be embedded or de-embedded as required. Select displays the 2-Port NETWORK EXTRACTION dialog box.</p> <ul style="list-style-type: none"> • “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (without Option 21)” on page 10-34 <p>4-Port Networks</p> <p>Use network extraction to generate an S-Parameter (.s2p or .s4p) file for a set of networks. The file can be embedded or de-embedded as required. Select displays the 4-Port NETWORK EXTRACTION dialog box.</p> <ul style="list-style-type: none"> • “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (without Option 21)” on page 10-34
	<p><i>Deembded. Tools Menu (with Option 21)</i></p> <p>2-Port Networks – (with Option 21 installed)</p> <p>Use network extraction to generate an S-Parameter (.s2p) file for a set of networks. The file can be embedded or de-embedded as required. Select displays the 2-Port NETWORK EXTRACTION dialog box.</p> <ul style="list-style-type: none"> • “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (with Option 21)” on page 10-35 <p>4-Port Networks – (with Option 21 installed)</p> <p>Use network extraction to generate an S-Parameter (.s2p or .s4p) file for a set of networks. The file can be embedded or de-embedded as required. Select displays the 4-Port NETWORK EXTRACTION dialog box.</p> <ul style="list-style-type: none"> • “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (with Option 21)” on page 10-35 <p>Sequential Extraction (Peeling) – (with Option 21 Installed)</p> <p>Sequential Extraction will construct a .s2p or .s4p file based on a localization of the selected parameter to isolate a given defect. This process can be used to sequentially de-embed and identify additional defects.</p> <ul style="list-style-type: none"> • “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (with Option 21)” on page 10-35 <p>Perform Manual Adapter Removal</p> <p>Adapter removal permits accurate measurement of non-insertable devices using an adapter of known electrical length and two full 12-term calibrations. Manual adapter removal extracts the behavior of the adapter from the setup after a successful calibration. Select displays the MANUAL ADAPTER REMOVAL dialog box.</p> <ul style="list-style-type: none"> • “MANUAL ADAPTER REMOVAL Dialog Box – 4-Port VNAs” on page 10-78

Figure 10-21. DEEMBDED TOOLS Menu – 2-Port VNAs

NETWORK EXTRACTION Main Dialog – 4-Port VNAs (without Option 21)

Network extraction provides a method of generating an S-Parameter (S2P or S4P) file for a set of networks. The S2P or S4P file can then be embedded or de-embedded into the VNA’s error coefficient as required.

From the DEEMBDED. menu, 2 Port Networks and 4 Port Networks open corresponding NETWORK EXTRACTION dialogs. Each of these are explained with more detail in [Table 10-2 on page 10-36](#).

Previous

- “DEEMBDED. TOOLS Menu – 4-port VNAs” on page 10-33

Navigation: Network Extraction (2-Port Networks)

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box

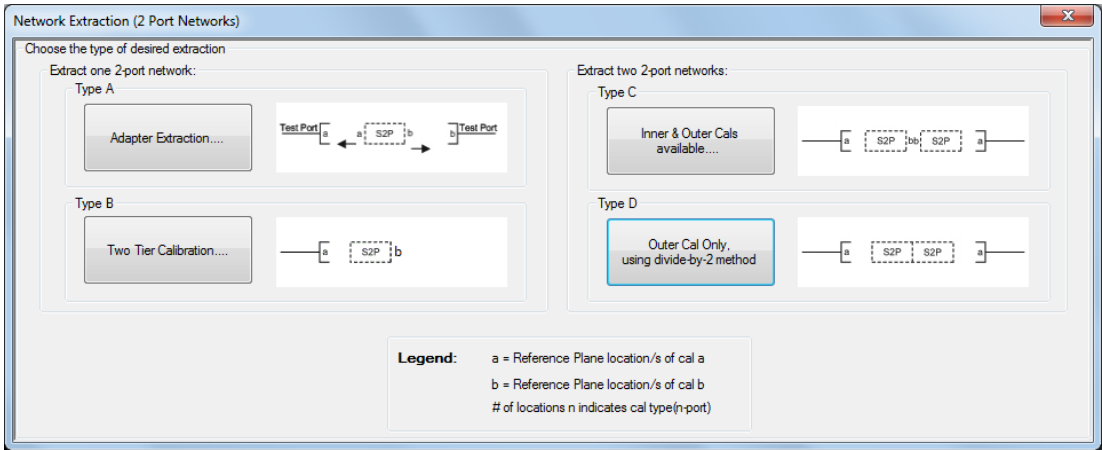


Figure 10-22. NETWORK EXTRACTION (2 Port Networks) Dialog Box – 4-Port VNAs

Navigation: Network Extraction (4-Port Networks)

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | 4 Port Networks | NETWORK EXTRACTION (4 Port Networks) Dialog Box

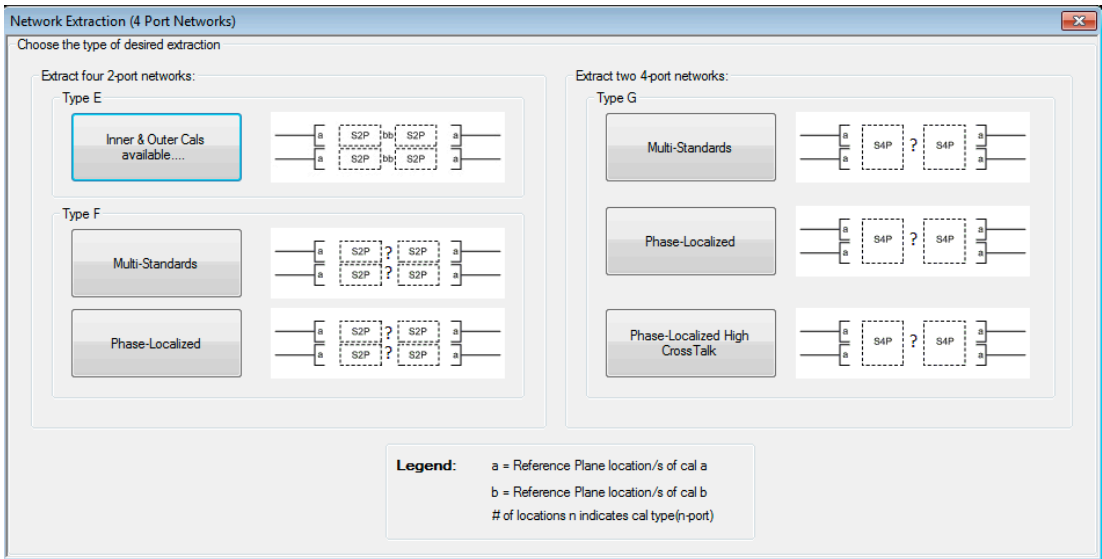


Figure 10-23. NETWORK EXTRACTION (4 Port Networks) Dialog Box – 4-Port VNAs

NETWORK EXTRACTION Main Dialog – 4-Port VNAs (with Option 21)

Network extraction provides a method of generating an S-Parameter (S2P or S4P) file for a set of networks. The S2P or S4P file can then be embedded or de-embedded into the VNA's error coefficient as required.

From the DEEMBDED. menu, 2 Port Networks, 4 Port Networks, or Sequential Extraction open corresponding NETWORK EXTRACTION dialogs. Each of these are explained with more detail in [Table 10-2 on page 10-36](#).

Previous

- [“DEEMBDED. TOOLS Menu – 4-port VNAs” on page 10-33](#)

Navigation: Network Extraction (2-Port Networks)

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box

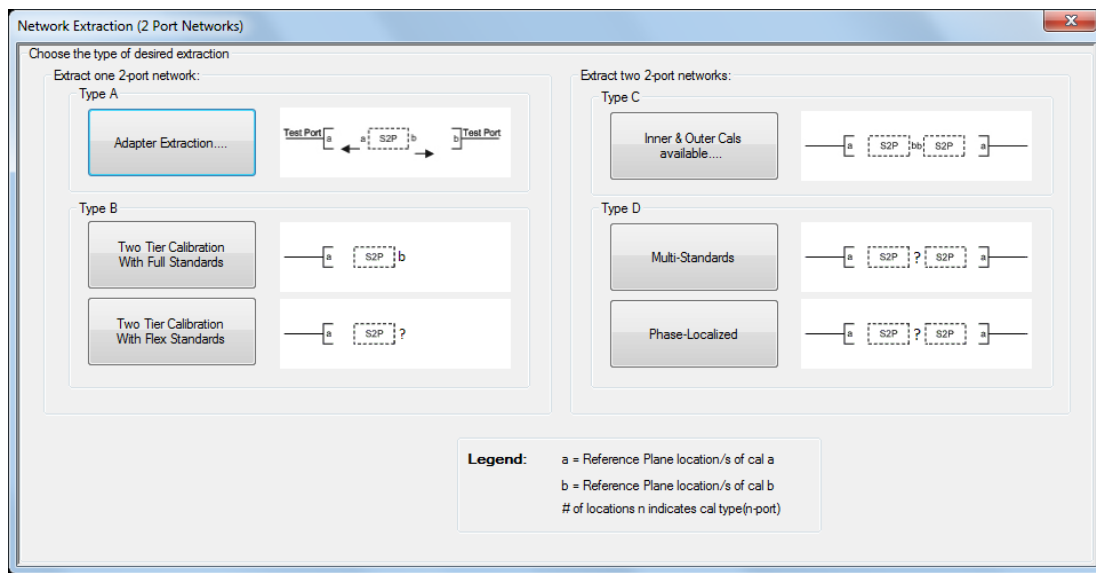
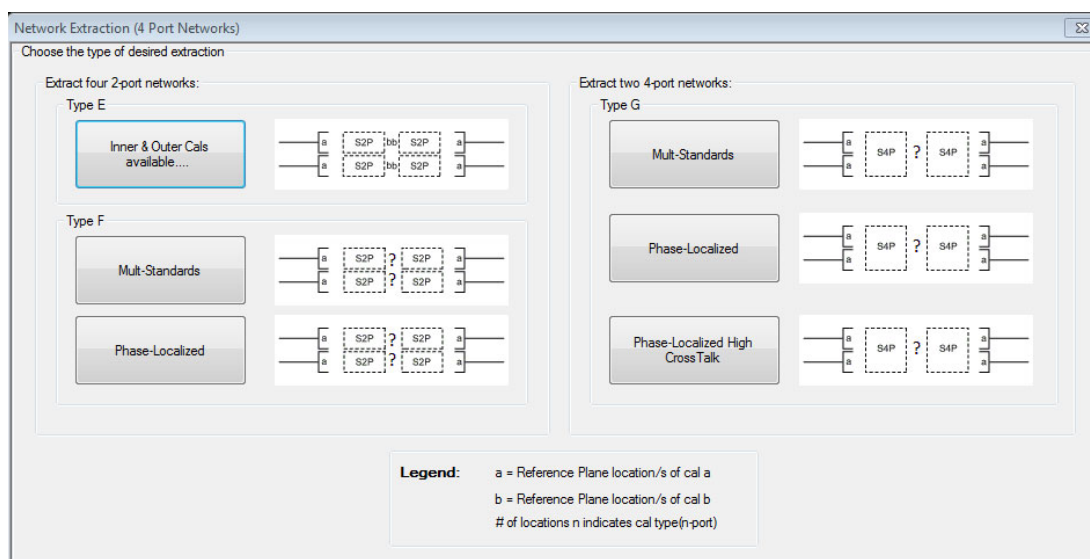


Figure 10-24. NETWORK EXTRACTION (2-Port Networks) Dialog Box – 4-Port VNAs

Navigation: Network Extraction (4-Port Networks—Option 21)

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | 4 Port Networks | NETWORK EXTRACTION (4 Port Networks) Dialog Box

**Figure 10-25.** NETWORK EXTRACTION (4-Port Networks) Dialog Box – 4-Port VNAs – Option 21**Table 10-2.** Network Extraction Type Definitions – 2-Port Networks (1 of 2)

Network Extraction Type	Extract These Networks	Extraction Method	Cross Reference to Dialog Box Description
Type A	One 2-Port Network	Adapter Extraction	“NETWORK EXTRACTION Dialog Box – Type A” on page 10-38
Type B	One 2-Port Network	Two Tier Calibration With Full Standards	“NETWORK EXTRACTION Dialog Box – Type B” on page 10-40
		Two Tier Calibration With Flex Standards ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Type B – With Flex Standards (Option 21)” on page 10-42
Type C	Two 2-Port Networks	Inner and Outer Cals Available	“NETWORK EXTRACTION Dialog Box – Type C” on page 10-46
Type D	Two 2-Port Networks	Outer Cal only using Divide-by-Two Method	“NETWORK EXTRACTION Dialog Box – Type D (No Option 21)” on page 10-48
		Outer Cal only using Divide-by-Two Method (Multi-Standards) ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Type D – Multi-Standards (Option 21)” on page 10-50
		Phase Localized ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Type D – Phase Localized (Option 21)” on page 10-53
Type E	Four 2-Port Networks	Inner and Outer Cals Available	“NETWORK EXTRACTION Dialog Box – Type E” on page 10-56

Table 10-2. Network Extraction Type Definitions – 2-Port Networks (2 of 2)

Network Extraction Type	Extract These Networks	Extraction Method	Cross Reference to Dialog Box Description
Type F	Four 2-Port Networks	Outer Cal only using Divide-by-Two Method	“NETWORK EXTRACTION Dialog Box – Type F (No Option 21)” on page 10-58
		Outer Cal only using Divide-by-Two Method (Multi-Standards) ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Type F – Multi-Standards (Option 21)” on page 10-60
		Phase Localized ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Type F – Phase Localized (Option 21)” on page 10-63
Type G	Two 4-Port Networks	Outer Cal only using Divide-by-Two Method	“NETWORK EXTRACTION Dialog Box – Type G (No Option 21)” on page 10-66
		Outer Cal only using Divide-by-Two Method (Multi-Standards) ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Type G – Multi-Standards (Option 21)” on page 10-68
		Phase Localized ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Type G – Phase Localized (Option 21)” on page 10-71
		Phase Localized High Crosstalk ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Type G – Phase Localized High Crosstalk (Option 21)” on page 10-74
Sequential Extraction	–	Sequential Extraction (Peeling) ^a (Available only with Option 21 installed)	“NETWORK EXTRACTION Dialog Box – Sequential Extraction (Peeling) (Option 21)” on page 10-76

a. For more information on Type B, Type D, Type F, Type G, and Sequential Extraction with Option 21 installed, refer to the Measurement Guide (10410-00218).

NETWORK EXTRACTION Dialog Box – Type A

Full Name

Network Extraction [Extract One 2-Port Network (Type A)]

Previous

- [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(without Option 21\)” on page 10-34](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract One 2-Port Network Extract One 2-Port Network | Type A – Adapter Extraction | NETWORK EXTRACTION [EXTRACT ONE 2-PORT NETWORK (TYPE A)] Dialog Box

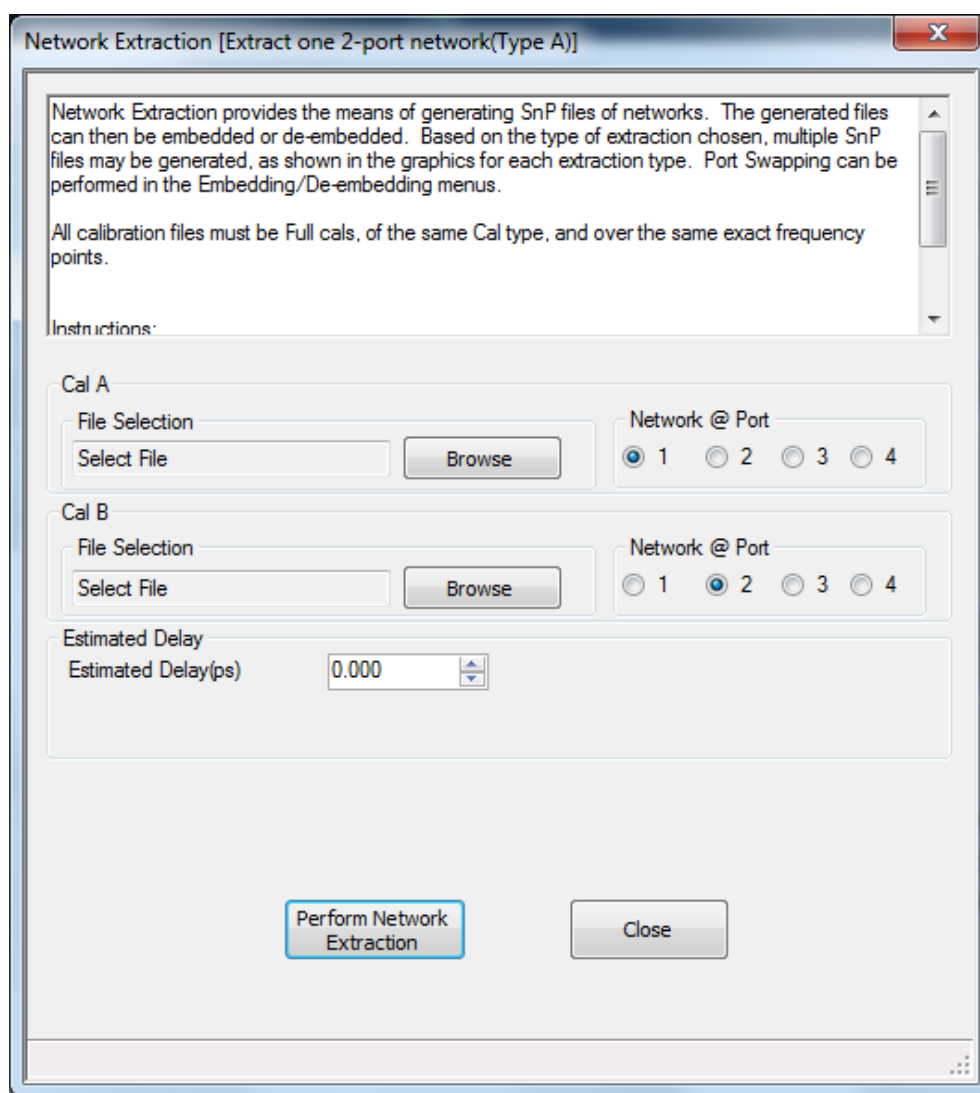


Figure 10-26. NETWORK EXTRACTION – EXTRACT ONE 2-PORT NETWORK – TYPE A – 4-Port

Description

Network Extraction provides the means of generating SnP files of networks. Port Swapping can be performed in the Embedding/De-embedding menus.

All calibration files must be Full cals, of the same Cal type, and over the same exact frequency points.

Instructions

1. Use the **Browse** button to select the appropriate cal file(s).
2. If necessary, enter the **Estimated Delay** in ps.
3. Select **Perform Network Extraction** to perform the extraction.
4. If the extraction is successful, follow the prompt to save the generated SnP file or files.
5. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 4-port VNAs”](#).
6. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network Configuration** panel to recall the .SnP files and configure the network.

NETWORK EXTRACTION Dialog Box – Type B

Full Name

Network Extraction [Extract One 2-Port Network (Type B)]

Previous

- “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (without Option 21)” on page 10-34
- “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (with Option 21)” on page 10-35

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract One 2-Port Network | Type B – Two Tier Calibration – With Full Standards | NETWORK EXTRACTION [EXTRACT ONE 2-PORT NETWORK (TYPE B)] Dialog Box

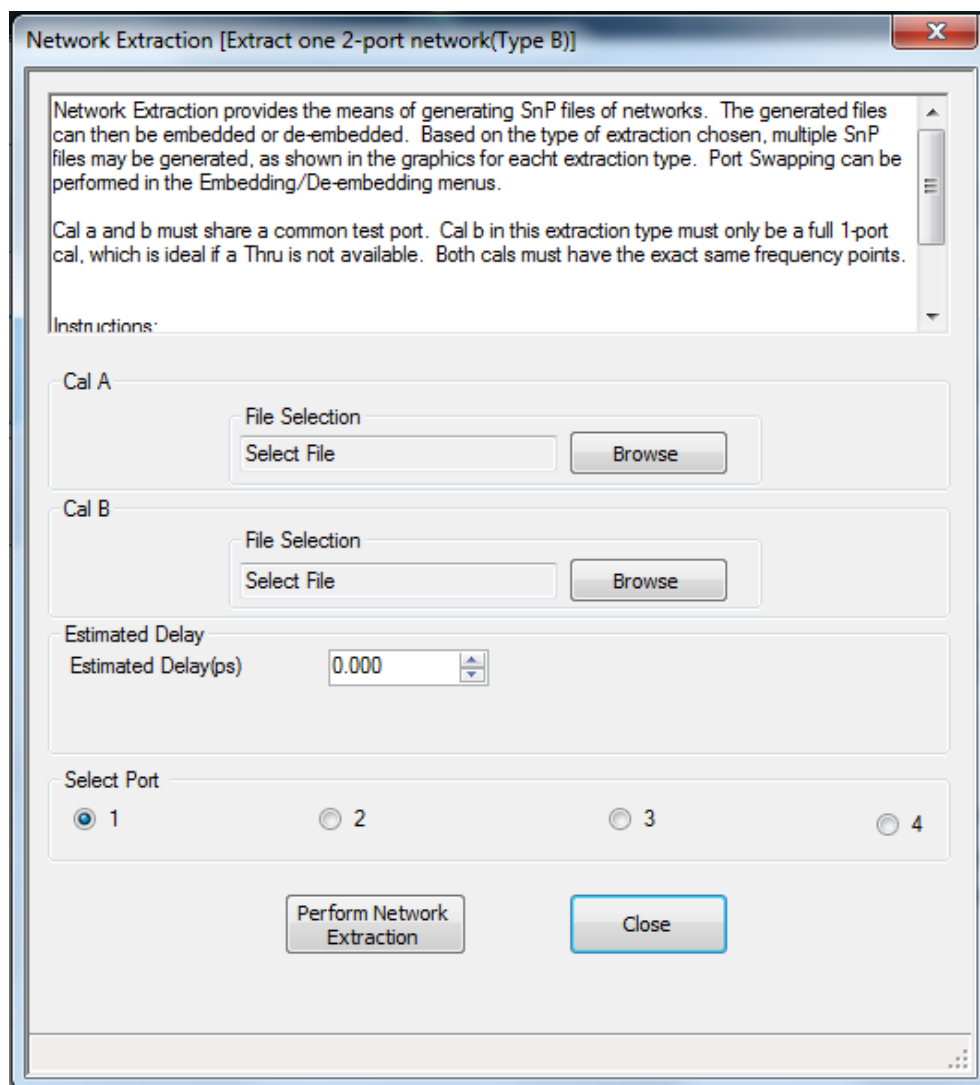


Figure 10-27. NETWORK EXTRACTION – EXTRACT ONE 2-PORT NETWORK – TYPE B

Instructions

Network Extraction provides the means of generating SnP files of networks. Port Swapping can be performed in the Embedding/De-embedding menus.

Cal A and Cal B must share a common test port. Cal A in this extraction type must only be a full 1-port cal, which is ideal if a Thru is not available. Both cals must have the exact same frequency points.

Procedure

1. Use the **Browse** button to select the appropriate cal file(s).
2. If necessary, enter **Estimated Delay** in ps.
3. Select **Perform Network Extraction** to perform the extraction.
4. If the extraction is successful, follow the prompt to save the generated SnP file(s).
5. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 4-port VNAs”](#).
6. After the .s2p files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .s2p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type B – With Flex Standards (Option 21)

Full Name

Network Extraction [Extract One 2-Port Network (Type B – Flex Standards)]

Note that Type B with Flex Standards (Generalized B) is available only with Option 21.

Previous

- “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (with Option 21)” on page 10-35

Prerequisites

- Option 21 – Universal Fixture Extraction installed.
- A full term calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | *Ntwk. Extraction* | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract One 2-Port Network | Type B | Two Tier Calibration With Flex Standards | NETWORK EXTRACTION [EXTRACT ONE 2-PORT NETWORK (TYPE B- FLEX STANDARDS)] Dialog Box

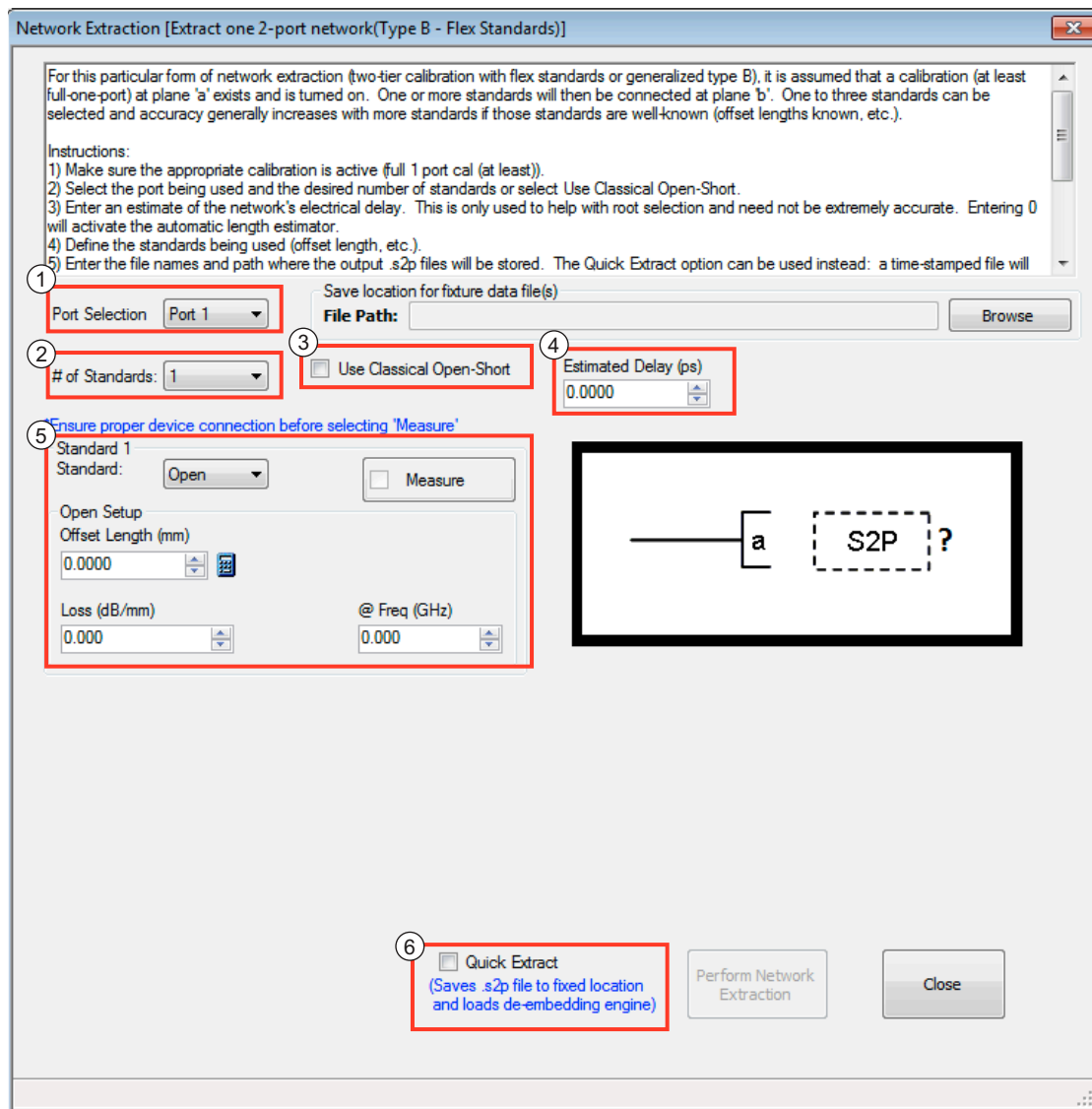


Figure 10-28. NETWORK EXTRACTION – EXTRACT ONE 2-PORT NETWORK – TYPE B – FLEX STANDARDS

1. **Port Selection:** Ports 1-4 available (with 4-Port VectorStar)
2. **# of Standards:** Three standards available; corresponding setup fields appear for up to four standards.
3. **Use Classical Open-Short:** Checking box sets up a special case of the 2-standards scenario where a zero offset open and short are used and the fixture arm is assumed to be electrically short. When selected, dialog options adjust as shown in [Figure 10-29](#).
4. **Estimated Delay (ps):** Here an estimate of the network's electrical delay is entered. This is only used to help with root selection and need not be extremely accurate. Entering 0 will activate the automatic length estimator.
5. **Standard (1, 2, 3): Standard Setup Fields:** (See [Figure 10-29](#)) Depending on Standard selected, provides selections for:
 - **Short Setup:** Setup field for Offset Length (mm) and frequency dependent loss
 - **Open Setup:** Setup field for Offset Length (mm) and frequency dependent loss
 - **Load Setup:** Setup fields for Resistance, Inductance, and Offset Length
 - **S1P Setup:** File Browse navigation for S1P files
6. **Quick Extract:** Checking Quick Extract saves .s2p file to fixed location and opens the embedding/deembedding dialog shown in [Figure 10-30](#).

Figure 10-28. NETWORK EXTRACTION – EXTRACT ONE 2-PORT NETWORK – TYPE B – FLEX STANDARDS

Figure 10-29 displays five numbered screenshots of the Type B – With Flex Standards Extraction Setup Fields (1 of 2) dialog box, showing various configuration options and fields.

1. Port Selection: Port Selection: Port 1, # of Standards: 2, Use Classical Open-Short (unchecked), Standard 1: Open, Offset Length (mm): 0.0000, Loss (dB/mm): 0.000, @ Freq (GHz): 0.000.

2. Port Selection: Port Selection: Port 1, # of Standards: 2, Use Classical Open-Short (unchecked), Standard 1: Open, Offset Length (mm): 0.0000, Loss (dB/mm): 0.000, @ Freq (GHz): 0.000.

3. Standard 3: Standard: Load, Load Setup: Resistance (Ω): 50.000000, Inductance (pH): 0.000000, Offset Length (mm): 0.0000.

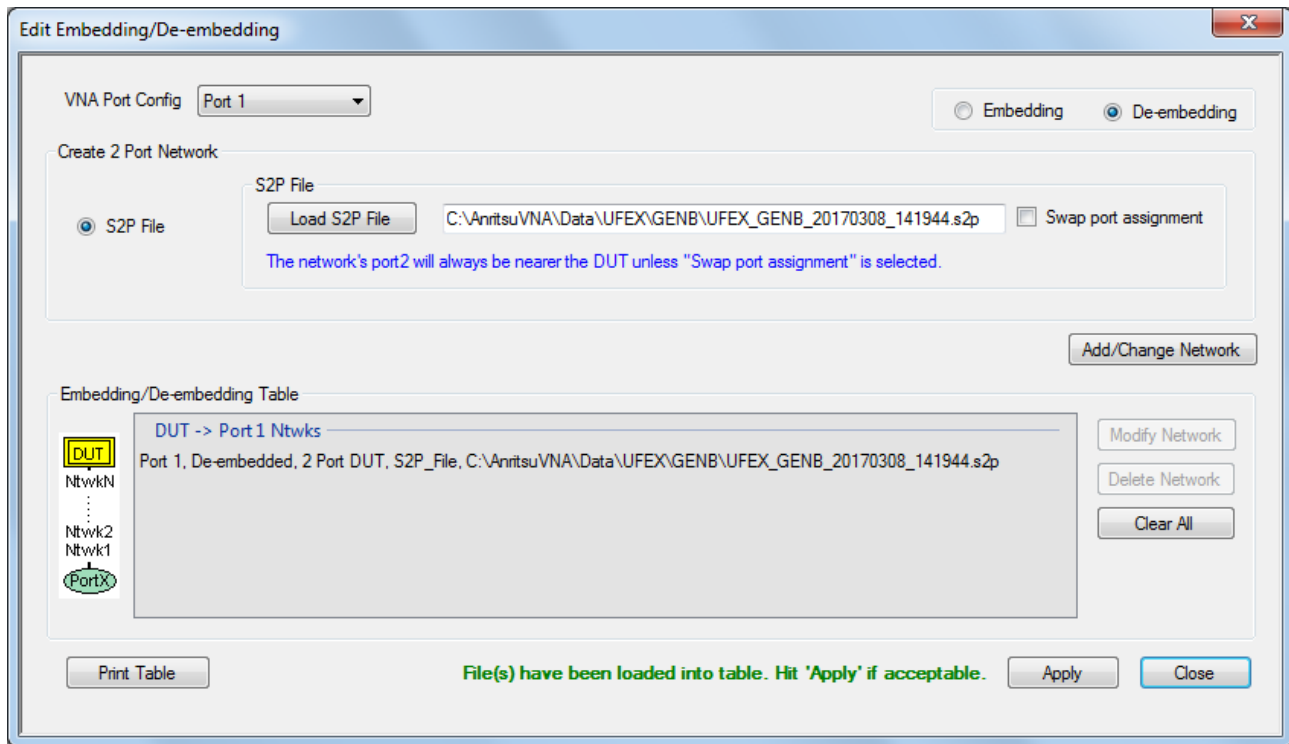
4. Standard 3: Standard: S1P, S1P Setup: Browse.

5. Use Classical Open-Short: Use Classical Open-Short (checked), Measure Open (unchecked), Measure Short (unchecked).

Figure 10-29. Type B – With Flex Standards Extraction Setup Fields (1 of 2)

1. Selecting **Short** from the dropdown opens the setup options as shown.
2. Selecting **Open** from the dropdown opens the setup options as shown.
3. Selecting **Load** from the dropdown opens the setup options as shown.
4. Selecting **S1P** from the dropdown opens the setup options as shown.
5. Checking the **Use Classical Open-Short** box opens the setup options as shown. This selection sets up a special case of the 2-standards scenario where a zero offset open and short are used and the fixture arm is assumed to be electrically short. When selected, dialog options adjust as shown.

Figure 10-29. Type B – With Flex Standards Extraction Setup Fields (2 of 2)



If the option **Quick Extract** is selected, and after **Perform Network Extraction** is executed, the above dialog appears with a pre-loaded Networks table using newly created .SnP files.

Figure 10-30. Quick Extract – Edit Embedding/De-embedding Dialog

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

For this particular form of network extraction (two-tier calibration with flex standards or generalized type B), it is assumed that a calibration (at least full-one-port) at plane 'a' exists and is turned on. One or more standards will then be connected at plane 'b'. One to three standards can be selected and accuracy generally increases with more standards if those standards are well-known (offset lengths known, etc.).

Procedure (Use Classical Open-Short **Is Not** Selected)

1. Make sure the appropriate calibration is active (full 1 port cal (at least)).
2. Select the port being used and the desired number of standards.
3. Enter an estimate of the network's electrical delay. This is only used to help with root selection and need not be extremely accurate. Entering 0 will activate the automatic length estimator.

4. Define the standards being used (offset length, etc.). Note if two standards are of the same type, they should have different parameters.
5. Enter the file names and path where the output .s2p files will be stored. The Quick Extract option can be used instead: a time-stamped file will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files. Remember to keep track of available disk space.
6. Connect each standard sequentially and click the appropriate Measure button when ready. When the sweep is complete, a check will appear in the box and the button will turn green.
7. When all desired standards have been measured, click on Perform Network Extraction. If successful, a confirmation dialog will appear.
8. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 4-port VNAs”](#).
9. If Quick Extract was not selected, after the .s2p files have been saved, go to Measurement | Edit Embed/De-embed | Edit Network configuration panel to recall the .s2p files and configure the network.

Procedure (Use Classical Open-Short *Is* Selected)

1. Select the port being used.
2. Enter an estimate of the network's electrical delay. This is only used to help with root selection and need not be extremely accurate. Entering 0 will activate the automatic delay estimator.
3. Enter the file names where the output .s2p files will be stored. The Quick Extract option can be used instead: the file will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files.
4. Connect each standard sequentially and click the appropriate Measure button when ready. When the sweep is complete, a check will appear in the box and the button will turn green.
5. When all desired standards have been measured, click on Perform Network Extraction.
6. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 4-port VNAs”](#).
7. If Quick Extract was not selected, after the .s2p files have been saved, go to Measurement | Edit Embed/De-embed | Edit Network configuration panel to recall the .s2p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type C

Full Name

Network Extraction – Type C – Extract Two 2-Port Networks – Inner and Outer Cals Available – 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(without Option 21\)” on page 10-34](#)
- [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(with Option 21\)” on page 10-35](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract Two 2-Port Networks | Type C – Inner and Outer Cals Available | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE C)] Dialog Box

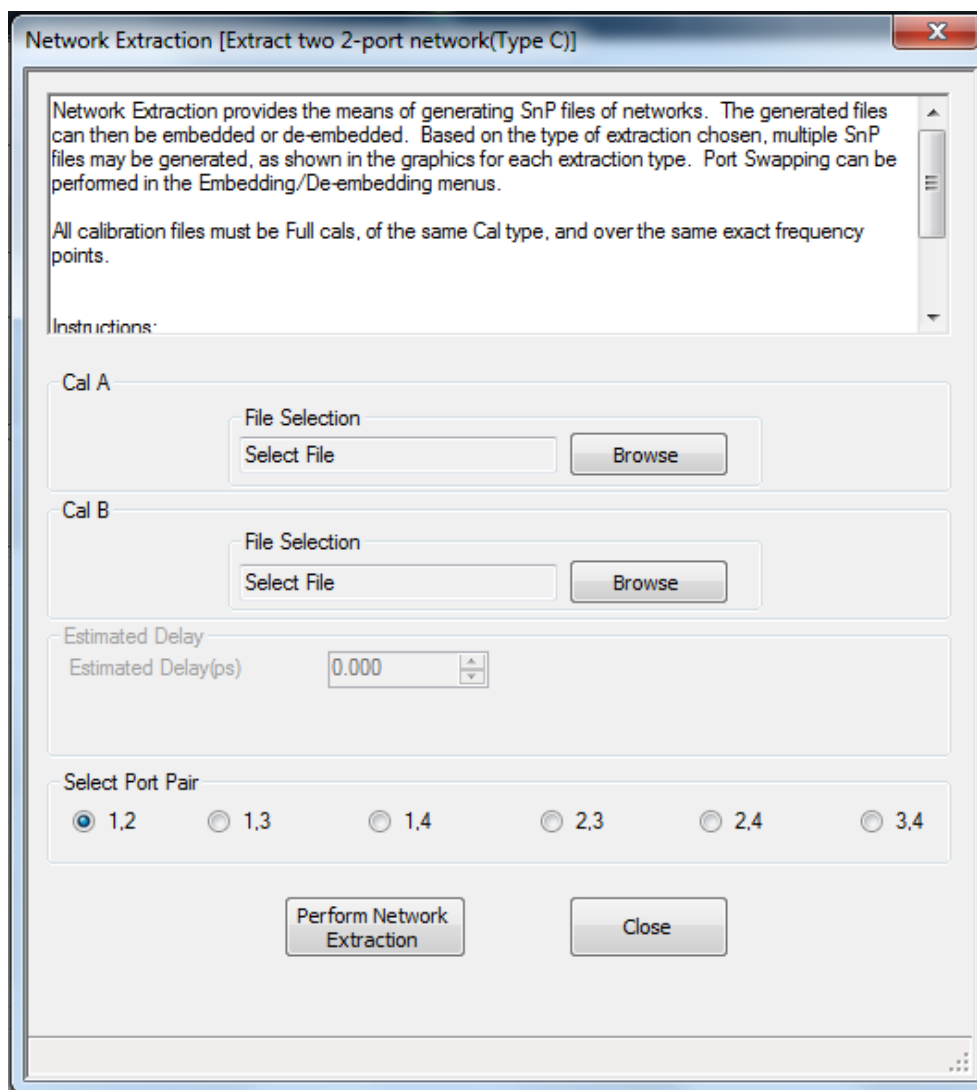


Figure 10-31. NETWORK EXTRACTION – EXTRACT TWO 2-PORT NETWORKS – TYPE C – 4-Port

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

All calibration files must be Full cals, of the same Cal type, and over the same exact frequency points.

Instructions:

1. Use the **Browse** button to define the appropriate cal file(s) path. Note that CalB is the inner file and CalA is the outer file.
2. Select **Perform Network Extraction** to perform the extraction.
3. If the extraction is successful, follow the prompt to save the generated SnP files(s).
4. After the extraction, the focus auto-returns to the [“DEEMBDED. TOOLS Menu – 4-port VNAs”](#).
5. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .SnP files and configure the network.

NETWORK EXTRACTION Dialog Box – Type D (No Option 21)

Full Name

Network Extraction [Extract two 2-port networks (Type D)]

Previous

- [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(without Option 21\)” on page 10-34](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Type D – Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE D)] Dialog Box

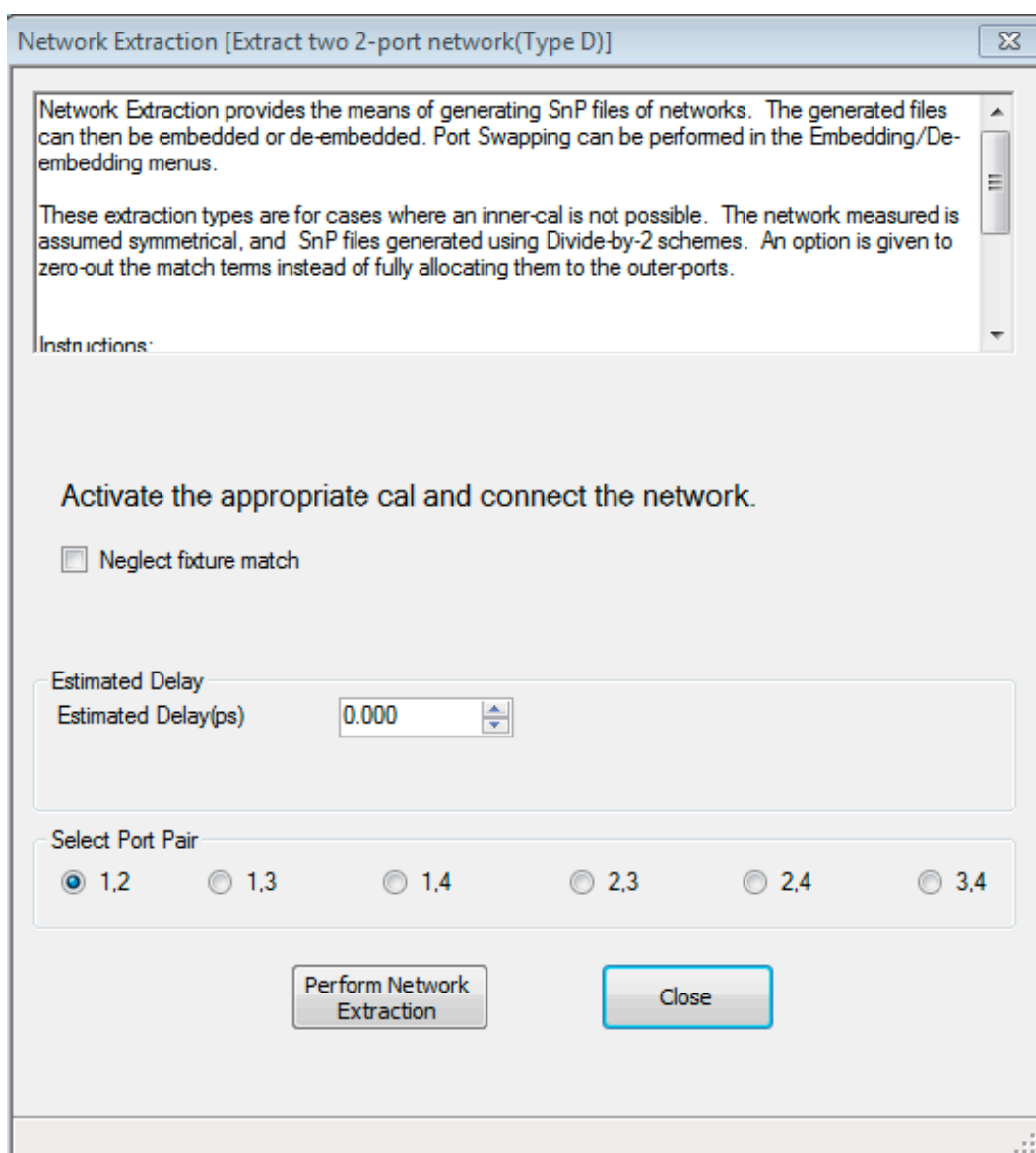


Figure 10-32. NETWORK EXTRACTION – EXTRACT TWO 2-PORT NETWORKS – TYPE D – 4-Port (No Option 21)

Description

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to neglect fixture match terms instead of fully allocating them to the outer-ports.

Procedure

1. Make sure the appropriate calibration is active.
2. Select **Neglect fixture match** terms if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Connect the network and select **Perform Network Extraction**.
4. If the extraction is successful, follow the prompt to save the generated SnP files/s.
5. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .SnP files and configure the network.

NETWORK EXTRACTION Dialog Box – Type D – Multi-Standards (Option 21)

Full Name

Network Extraction [Extract two 2-port networks (Type D – Multi-Standards)]

Previous

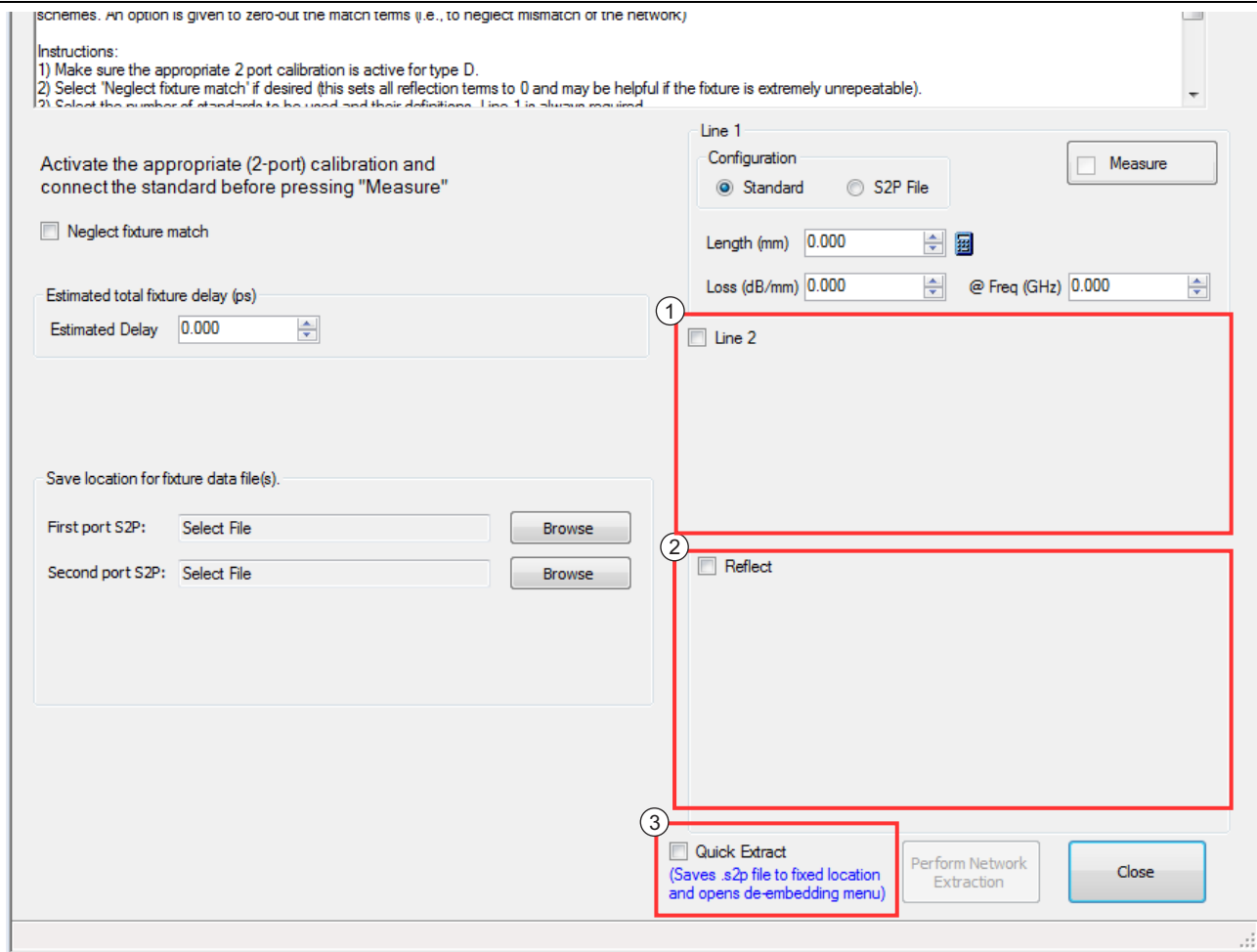
- “[NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(with Option 21\)](#)” on page 10-35

Prerequisites

- Option 21 – Universal Fixture Extraction installed.
- A full term calibration needs to exist and be active.

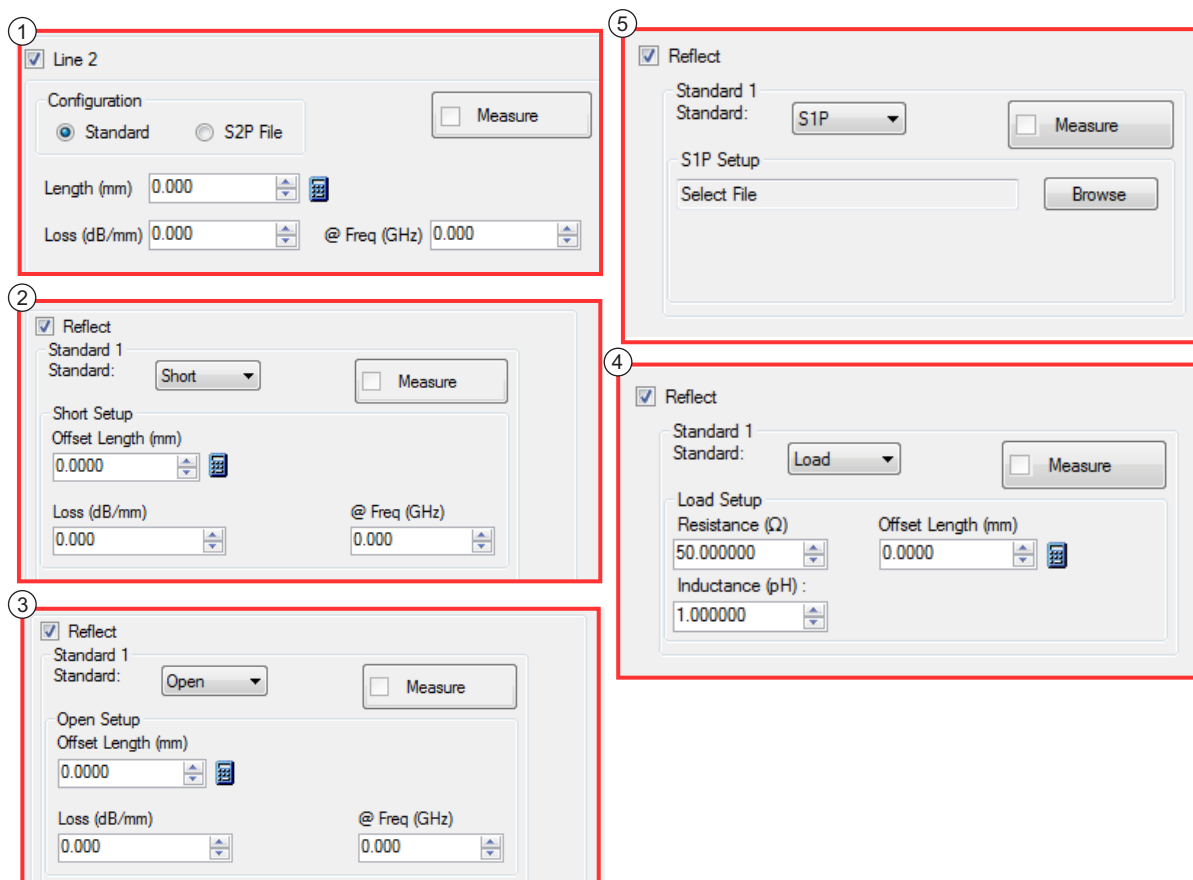
Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Type D – Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE D – MULTI-STANDARDS)] Dialog Box



1. Checking **Line 2 Length** provides entry window as shown in [Figure 10-34](#).
2. Checking **Reflect** provides various options related to Reflect as shown in [Figure 10-34](#)
3. Checking **Quick Extract** saves .s2p file to fixed location and opens the deembedding dialog ([Figure 10-30](#)).

Figure 10-33. NETWORK EXTRACTION – EXTRACT TWO 2-PORT NETWORKS – TYPE D – Multi Standard – 4-Port



1. Checking **Line 2 Length** opens a dialog to adjust length.
2. Checking **Reflect** and selecting **Short** from the dropdown provides the dialog shown.
3. Checking **Reflect** and selecting **Open** from the dropdown provides the dialog shown.
4. Checking **Reflect** and selecting **Load** from the dropdown provides the dialog shown.
5. Checking **Reflect** and selecting **S1P** from the dropdown provides the dialog shown.

Figure 10-34. TYPE D – Multi Standard Dialog – Extraction Setup Fields

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to neglect fixture match terms (i.e., to neglect mismatch of the network)

Procedure

1. Make sure the appropriate calibration is active (2 port cal (at least)) for Type D.
2. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Select the path of interest or indicate how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 2 with high transmission and port 3 is connected to port 4 with high transmission, and the other paths like 1-3 and 2-3 are high loss, then select 1-2 (and 3-4).
4. Select the number of standards to be used and their definitions. Line 1 is always required.

5. Connect each standard (or standards in the case of **Reflect**; all ports must have the Reflect connected simultaneously) before pressing **Measure**.
6. Enter the file names where the output .s2p files will be stored. The **Quick Extract** option can be used instead: files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files. Remember to keep track of available disk space.
7. When all fields have been entered and all standards measurements have been completed (all of the check boxes marked and the buttons turn green), press **Perform Network Extraction**. If successful, a confirmation dialog will appear.
8. After the extraction, the focus auto-returns to the **“DEEMBDED. TOOLS Menu – 4-port VNAs”**.
9. If **Quick Extract** was not selected, after the .s2p files have been saved, go to **Measurement / Edit Embed/De-embed / Edit Network configuration** panel to recall the .s2p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type D – Phase Localized (Option 21)

Shown in [Figure 10-35](#) is the default dialog with Thru Standard selected. Note there is a choice for Port Pair.

Full Name

Network Extraction [Extract Two 2-Port Networks (Type D – Phase-Localized)]

Previous

- “[NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(with Option 21\)](#)” on page 10-35

Prerequisites

- Option 21 – Universal Fixture Extraction installed.
- A full term calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | Ntwk. Extraction | 2 Port Networks | NETWORK EXTRACTION (2 Port Networks) Dialog Box | Extract Two 2-Port Networks | Type D – Phase-Localized | NETWORK EXTRACTION [EXTRACT TWO 2-PORT NETWORKS (TYPE D – Phase-Localized)] Dialog Box

This will construct .s2p files based on a thru or reflect measurement using a single fixture arm or a two-port fixture pair. Phase localization processing is used to aid the extraction.

Instructions:

- 1) Make sure the appropriate 2 port calibration is active (a 1 port calibration is ok for a reflection-based extraction on a single-sided fixture).
- 2) Select 'Neglect fixture match' if desired (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
- 3) Select the measurement type (using thru or reflect standards or both). Note that for reflection, the type of reflection must be the same on all ports. Two different reflection standards may be used but the same type would be connected to both ports at a given time.
- 4) If reflect standards are selected, choose whether one or two will be used (the reflect standards must have different reflection coefficients). If 'both' (thru & reflect) is

Select Port Pair

☒ 1,2 ☐ 1,3 ☐ 1,4 ☐ 2,3 ☐ 2,4 ☐ 3,4

Standard Selection ☐ Neglect fixture match

☒ Thru ☐ Reflect ☐ Both

Thru

Thru Configuration

☒ Standard ☐ S2P File

Magnitude of Thru transmission (usually between 0 and 1)

Thru Length (mm)

Thru Weight (between 0 and 1)

Inner Plane Impedance

☒ Use Ref. Impedance

Estimated Total Fixture Delay (ps)

Save location for fixture data file(s)

Port 1 S2P:

Port 2 S2P:

* Activate the appropriate calibration and connect the standard before pressing "Measure".

☐ Quick Extract (Saves .s2p file to fixed location and loads de-embedding engine)

Figure 10-35. NETWORK EXTRACTION – EXTRACT TWO 2-PORT NETWORKS – TYPE D – 4-Port (1 of 2)

1. Default dialog settings are shown with Thru selected. For Reflect variations of this dialog, see [Figure 10-36 on page 10-54](#).
2. Checking Quick Extract saves .s2p file to fixed location and opens the deembedding dialog ([Figure 10-30](#)).
3. Note that for **Inner Plane Impedance**, the **New Impedance** entry is only shown if **Use Ref. Impedance** is not checked. The Text box next to the “Use Ref. Impedance” is read-only and displays the ref. impedance of the channel.

Figure 10-35. NETWORK EXTRACTION – EXTRACT TWO 2-PORT NETWORKS – TYPE D – 4-Port (2 of 2)

The figure consists of two screenshots of the 'NETWORK EXTRACTION' dialog box, specifically the 'EXTRACT TWO 2-PORT NETWORKS – TYPE D – 4-Port' window. Both screenshots show the 'Reflect' tab selected.

Screenshot 1 (Top): This screenshot shows the 'Reflect' tab with the 'Standard' configuration selected under 'Reflect Configuration'. Under 'Reflect Control', 'Automatic Processing' is selected. The 'Port Selection' section shows 'Both' selected. The 'Reflect Standard' section shows 'Refl 1' selected. The 'Reflect 1 Info' and 'Reflect 2 Info' sections both show a 'Low frequency value of reflection' of 1.0000, an 'Offset Length (mm)' of 0.0000, a 'Loss (dB/mm)' of 0.0000, and a frequency of 0.0000 GHz.

Screenshot 2 (Bottom): This screenshot shows the 'Reflect' tab with 'Manual Control' selected under 'Reflect Control'. The 'Port Selection' section shows 'Both' selected. The 'Reflect Standard' section shows 'Refl 1' selected. The 'Delay to Central Fixture Interface Location' section is enabled, showing 'Port 1 Side (ps)' and 'Port 2 Side (ps)' both set to 0.0000. The 'Reflect 1 Info' and 'Reflect 2 Info' sections are identical to the top screenshot.

1. Checking **Reflect** and selecting **Automatic Processing** opens the dialog shown.
2. Checking **Reflect** and selecting **Manual Control** opens the dialog shown.
3. Note that the port selection labels under Reflect Setup are updated based on the Select Port Pair selection.
4. Note that when Manual Control is selected, the Delay to Central Fixture Interface Location is enabled.

Figure 10-36. TYPE D – Phase Localized Dialog – Reflect Extraction Setup Variations

Instructions

This will construct .s2p files based on a thru or reflect measurement using a single fixture arm or a two-port fixture pair. Phase localization processing is used to aid the extraction.

To do this phase localization, the frequency list must be relatively uniform (no CW or log sweep and segmented sweep step sizes should not deviate more than 3% from the mean) and the range should be large enough that the total fixture length (ns) $> 5/(\text{frequency range (GHz)})$. The frequency step should be small enough that the total fixture length (ns) $< 0.3/(\text{Frequency step (GHz)})$.

1. Make sure the appropriate calibration is active for Type D.
2. Select **Neglect fixture match** terms if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Select the measurement type (using thru or reflect standards). Note that for **Reflection**, the type of reflection must be the same on all ports.
4. Define the standards being used (offset length, transmission or reflection magnitude, include the sign of reflection).
5. Enter an estimate of the network's electrical delay (both sides of the fixture pair). Entering 0 will activate the automatic length estimator. If using a reflect measurement, this can be further refined by selecting **Manual Control** where the fixture halves can be treated as asymmetric and only one side can be done if desired.
6. Enter the file names where the output .s2p files will be stored. The **Quick Extract** option can be used instead: time stamped files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files. Remember to keep track of available disk space.
7. When all fields have been entered and proper connection has been made, click on **Perform Network Extraction**. If successful, files will automatically be saved and a confirmation dialog will appear.
8. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 4-port VNAs”](#).
9. If **Quick Extract** was not selected, after the .s2p files have been saved, go to **Measurement / Edit Embed/De-embed / Edit Network** configuration panel to recall the .s2p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type E

Full Name

Network Extraction – Type E – Extract Four 2-Port Networks – Inner and Outer Cals Available – 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(without Option 21\)” on page 10-34](#)
- [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(with Option 21\)” on page 10-35](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* | 4 Port Networks | NETWORK EXTRACTION (4-PORT NETWORKS) Dialog Box | Extract Four 2-Port Networks | Type E – Inner and Outer Cals Available | NETWORK EXTRACTION [EXTRACT FOUR 2-PORT NETWORKS (TYPE E)] Dialog Box

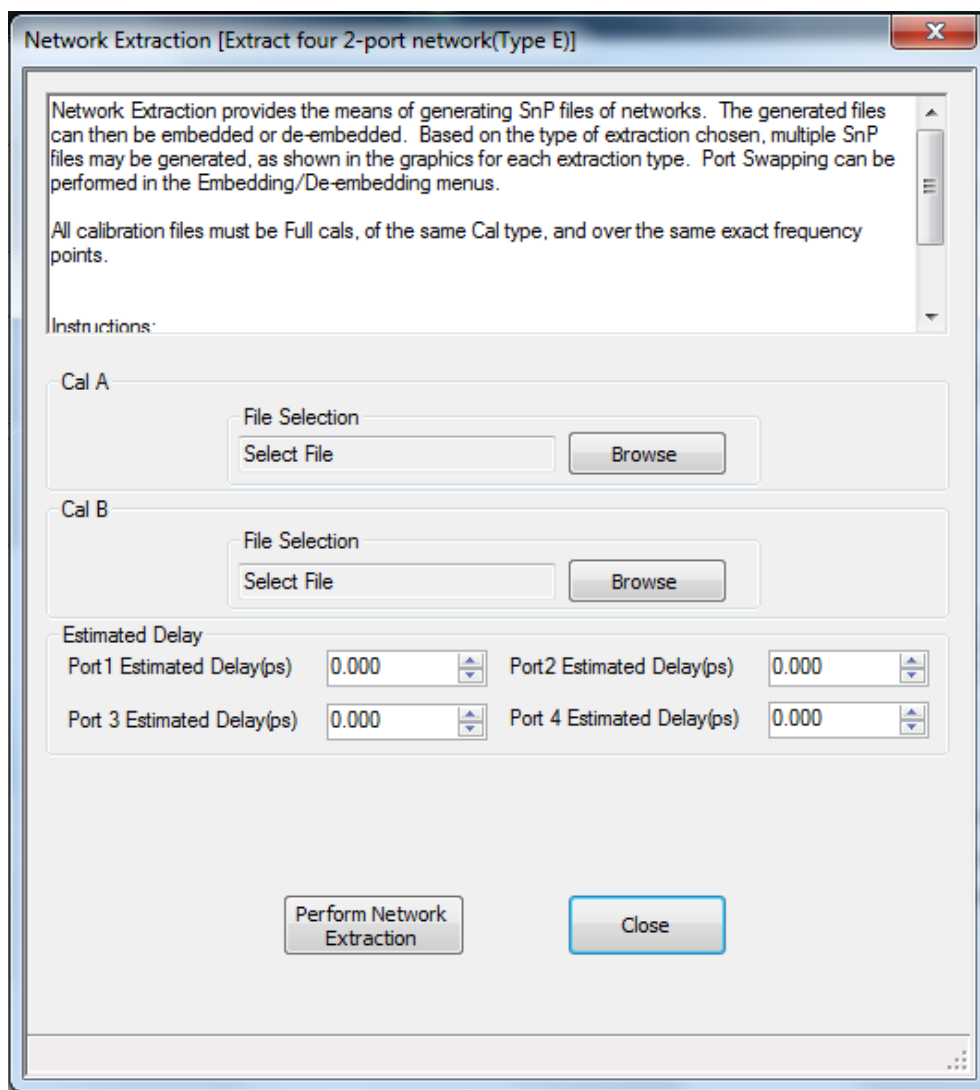


Figure 10-37. NETWORK EXTRACTION – EXTRACT FOUR 2-PORT NETWORKS – TYPE E – 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

All calibration files must be Full cals, of the same Cal type, and over the same exact frequency points.

Procedure

1. Select **Browse** to select the appropriate cal file(s).
2. Select **Perform Network Extraction**.
3. If the extraction is successful, follow the prompt to save the generated SnP file(s).
4. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 4-port VNAs”](#).
5. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .SnP files and configure the network.

NETWORK EXTRACTION Dialog Box – Type F (No Option 21)

Full Name

Network Extraction – Type F – Extract Four 2-Port Networks – Inner and Outer Cals Available – 4-Port VNAs

Previous

- [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(without Option 21\)” on page 10-34](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* | 4 Port Networks | NETWORK EXTRACTION (4-PORT NETWORKS) Dialog Box | Extract Four 2-Port Networks | Type F – Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT FOUR 2-PORT NETWORKS (TYPE F)] Dialog Box

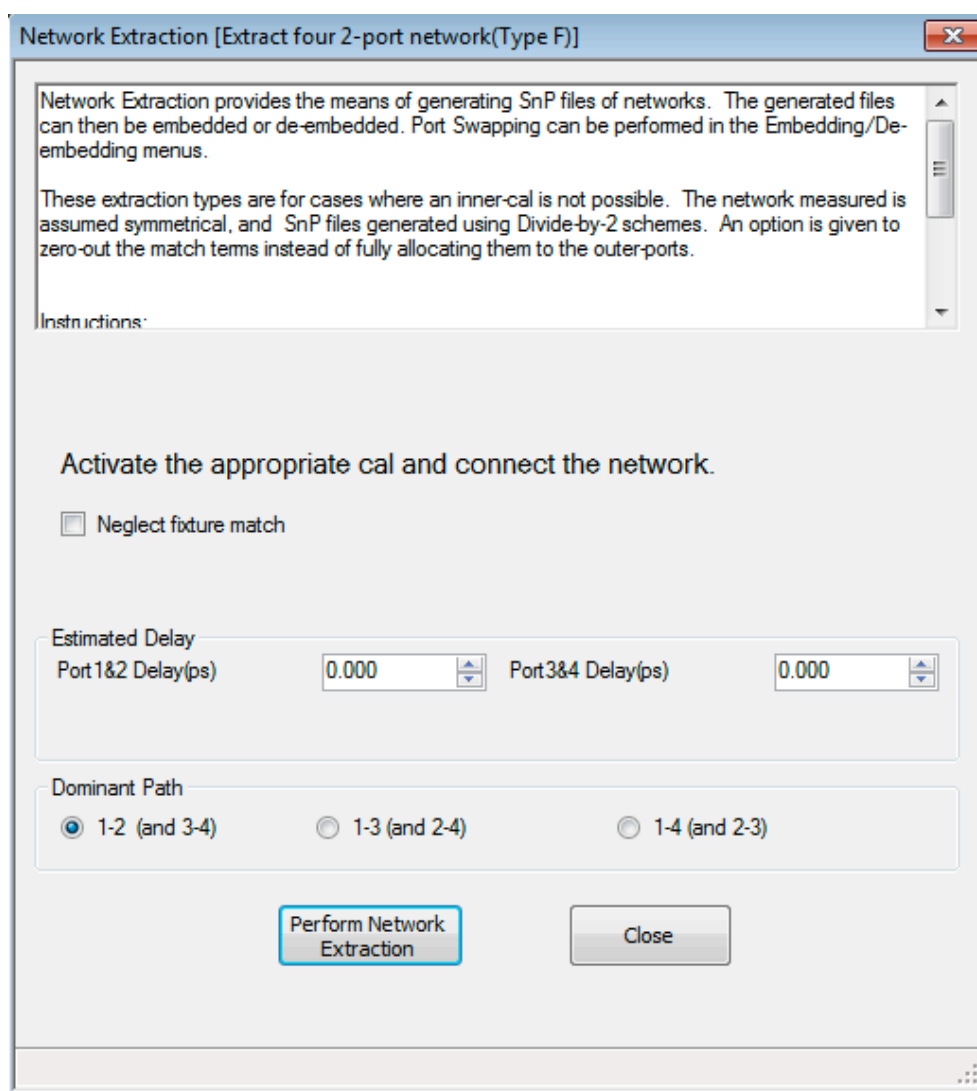


Figure 10-38. NETWORK EXTRACTION – EXTRACT FOUR 2-PORT NETWORKS – TYPE F – 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to neglect fixture match terms instead of fully allocating them to the outer-ports.

Procedure:

1. Make sure the appropriate calibration is active.
2. Select **Neglect fixture match** terms if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Select the dominant paths of the network (i.e., the ports between which thrus are connected within the network assembly for the extraction).
4. Connect the network and select **Perform Network Extraction**.
5. If the extraction is successful, follow the prompt to save the generated SnP file(s).
6. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .SnP files and configure the network.

NETWORK EXTRACTION Dialog Box – Type F – Multi-Standards (Option 21)

Full Name

Network Extraction [Extract Four 2-port Networks (Type F-Multi-Standards)]

Previous

- “[NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(with Option 21\)](#)” on page 10-35

Prerequisites

- Option 21 – Universal Fixture Extraction installed.
- A full term calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMB. TOOLS | *Ntwk. Extraction* | 4 Port Networks | NETWORK EXTRACTION (4-PORT NETWORKS) Dialog Box | Extract Four 2-Port Networks | Type F – Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT FOUR 2-PORT NETWORKS (TYPE F-MULTI-STANDARDS)] Dialog Box

Network Extraction [Extract four 2-port network (Type F - Multi-Standards)]

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

These Type F extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to zero-out the match terms (i.e., to neglect mismatch of the network)

Instructions:
 1) Make sure the appropriate calibration is active (full 4-port cal).
 2) Select 'Neglect fixture match' if desired (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
 3) Select the path of interest as indicated how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 3 with high

Activate the appropriate (4-port) calibration and connect the standard before pressing "Measure"

☐ Neglect fixture match

Estimated total fixture delay (ps)
 Port 1 and Port 2: 0.000 Port 3 and Port 4: 0.000

Dominant Path
☒ 1-2 (and 3-4) ☐ 1-3 (and 2-4) ☐ 1-4 (and 2-3)
☐ 1-2 (and 4-3) ☐ 1-3 (and 4-2) ☐ 1-4 (and 3-2)

Save location for fixture data file(s).

Port 1 S2P: Select File

Port 2 S2P: Select File

Port 3 S2P: Select File

Port 4 S2P: Select File

Line 1
 Configuration: ☒ Standard ☐ S2P File
 Length (mm): 0.000
 Loss (dB/mm): 0.000 @ Freq (GHz): 0.000

☐ Line 2

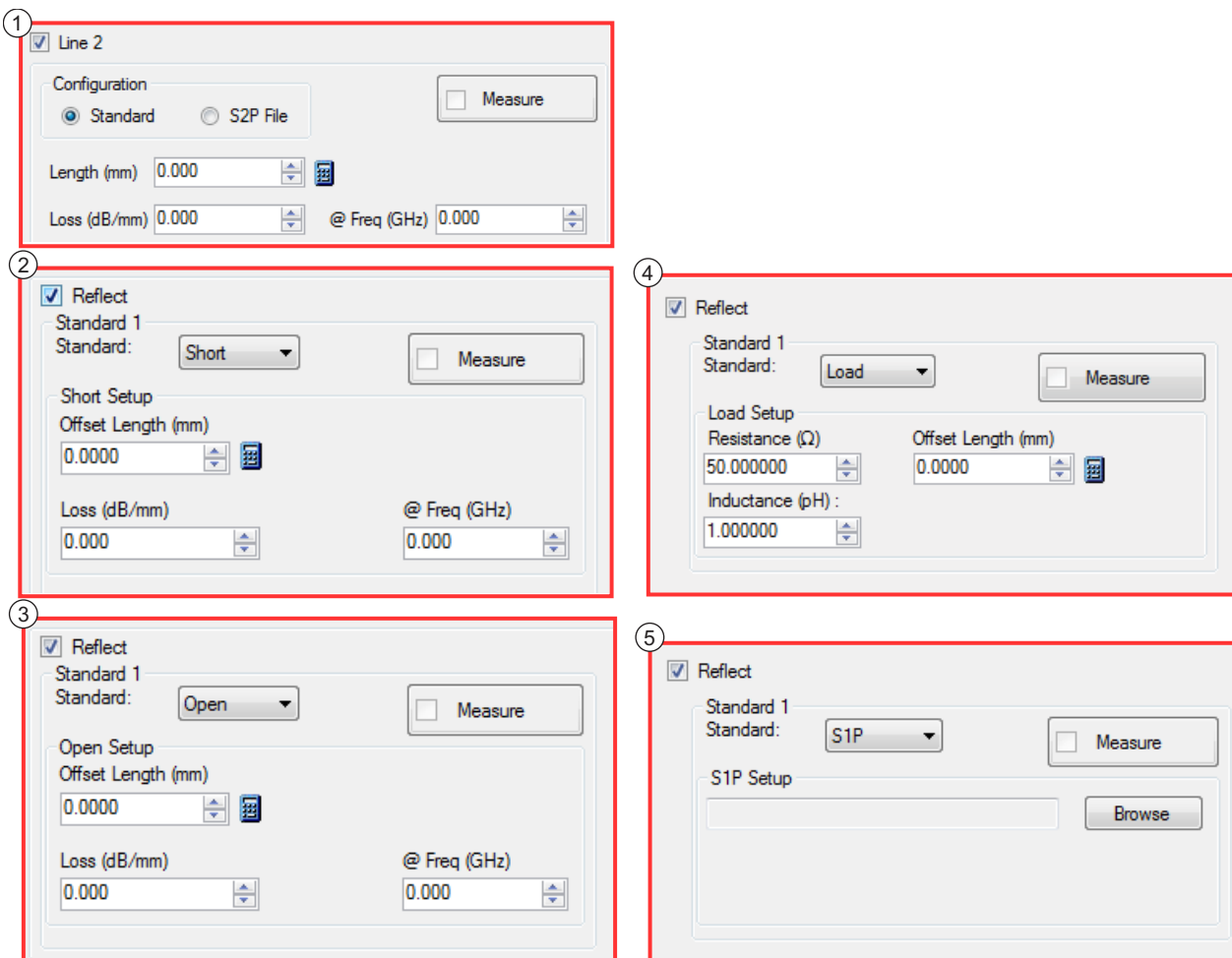
☐ Reflect

☐ Quick Extract
 (Saves .s2p file to fixed location and opens de-embedding menu)

Figure 10-39. NETWORK EXTRACTION – EXTRACT FOUR 2-PORT NETWORKS – TYPE F – Multi-Standards – 4-Port

1. Checking **Line 2 Length** box opens entry window as shown in [Figure 10-40](#).
2. Checking **Reflect** box opens various options related to Reflect as shown in [Figure 10-40](#).
3. Checking **Quick Extract** box saves .s2p file to fixed location and opens the deembedding dialog ([Figure 10-30](#)).

Figure 10-39. NETWORK EXTRACTION – EXTRACT FOUR 2-PORT NETWORKS – TYPE F – Multi-Standards – 4-Port



1. Checking **Line 2 Length** box opens a dialog to adjust length.
2. Checking **Reflect** box and selecting **Short** from the dropdown opens the dialog as shown.
3. Checking **Reflect** box and selecting **Open** from the dropdown opens the dialog as shown.
4. Checking **Reflect** box and selecting **Load** from the dropdown opens the dialog as shown.
5. Checking **Reflect** box and selecting **S1P** from the dropdown opens the dialog as shown.

Figure 10-40. TYPE F – Multi-Standards – Extraction Setup Variations

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus. These Type F extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-By-2 schemes. An option is given to neglect fixture match terms (i.e., to neglect mismatch of the network).

Procedure

1. Make sure the appropriate calibration is active (a full 4-port cal for Type F).
2. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Select the path of interest or indicate how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 2 with high transmission and port 3 is connected to port 4 with high transmission, and the other paths like 1-3 and 2-3 are high loss, then select 1-2 (and 3-4).
4. Select the number of standards to be used and their definitions. **Line 1** is always required.
5. Connect each standard (or standards in the case of **Reflect**; all ports must have the Reflect connected simultaneously) before pressing **Measure**.
6. Enter the file names where the output .s4p files will be stored. The **Quick Extract** option can be used instead: time stamped files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files. Remember to keep track of available disk space.
7. When all fields have been entered and all standards measurements have been completed (all of the check boxes marked and button fields turn green), press **Perform Network Extraction**. If successful, a confirmation dialog will appear.
8. After the extraction, the focus auto-returns to the **“DEEMBED. TOOLS Menu – 4-port VNAs”**.
9. If Quick Extract was not selected, after the .s4p files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .s4p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type F – Phase Localized (Option 21)

Full Name

Network Extraction [Extract Four 2-port Networks (Type F-Phase-Localized)]

Previous

- “[NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(with Option 21\)](#)” on page 10-35

Prerequisites

- Option 21 – Universal Fixture Extraction installed.
- A full term calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | *Ntwk. Extraction* | 4 Port Networks | NETWORK EXTRACTION (4-PORT NETWORKS) Dialog Box | Extract Four 2-Port Networks | Type F – Phase Localized | NETWORK EXTRACTION [EXTRACT FOUR 2-PORT NETWORKS (TYPE F-PHASE-LOCALIZED)] Dialog Box

Network Extraction [Extract four 2-port network (Type F - Phase-Localized)]

This will construct .s2p files based on a thru or reflect measurement using a two-port/four-port fixture pair. Phase localization processing is used to aid the extraction.

Instructions:

- 1) Make sure the appropriate calibration is active (full 4-port cal).
- 2) Select 'Neglect fixture match' if desired (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable) and/or 'Neglect fixture near-end coupling' (sets the transmission terms nearest the ports to 0).
- 3) Select the path of interest or indicate how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 2 with high transmission and port 3 is connected to port 4 with high transmission (and paths like 1-3 are coupled only) then select 1-2 (and 3-4)).
- 4) Select the measurement type (using thru or reflect standards or both). Note that for reflection, the type of reflection must be the same on all ports. Two reflect standards

Dominant Path

☒ 1-2 (and 3-4) ☐ 1-3 (and 2-4) ☐ 1-4 (and 2-3)
☐ 1-2 (and 4-3) ☐ 1-3 (and 4-2) ☐ 1-4 (and 3-2)

Standard Selection ☐ Neglect fixture match

☒ Thru ☐ Reflect ☐ Both

Thru Configuration

☒ Standard ☐ S2P File

Magnitude of Thru transmission (usually between 0 and 1)

Thru Length (mm)

Thru Weight (between 0 and 1)

Inner Plane Impedance

☒ Use Ref. Impedance

Estimated Fixture Delay(1-2) (ps)

Estimated Fixture Delay(3-4) (ps)

Save location for fixture data file(s)

File 1 S2P:

File 2 S2P:

File 3 S2P:

File 4 S2P:

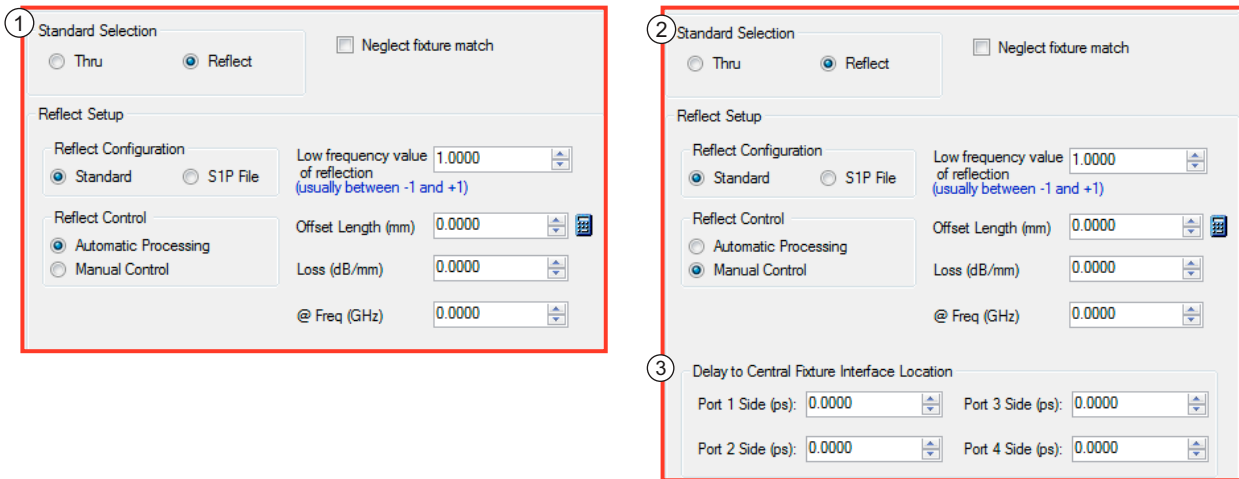
* Activate the appropriate calibration and connect the standard before pressing "Measure".

☐ Quick Extract
 (Saves .s2p file to fixed location and loads de-embedding engine)

1. Default dialog settings are shown with Thru selected. For Reflect variants of this dialog, see [Figure 10-42](#) on page 10-64.

2. Checking Quick Extract saves .s2p file to fixed location and opens the deembedding dialog ([Figure 10-30](#)).

Figure 10-41. NETWORK EXTRACTION – EXTRACT TWO 2-PORT NETWORKS – TYPE F – Phase Localized – 4-Port



1. Checking **Reflect** and selecting **Automatic Processing** opens the dialog shown.
2. Checking **Reflect** and selecting **Manual Control** opens the dialog shown.
3. With Manual Control selected, Delay to Central Fixture Interface Location is enabled.

Figure 10-42. TYPE F – Phase Localized – Extraction Setup Variations

Instructions

This will construct .s4p files based on a thru or reflect measurement using a two-port/four-port fixture pair. Phase localization processing is used to aid the extraction.

To do this phase localization, the frequency list must be relatively uniform (no CW or log sweep and segmented sweep step sizes should not deviate more than 3% from the mean) and the range should be large enough that the total fixture length (ns) $> 5/(\text{frequency range (GHz)})$. The frequency step should be small enough that the total fixture length (ns) $< 0.3/(\text{Frequency step (GHz)})$.

1. Make sure the appropriate calibration is active (a full 4-port cal for Type F).
2. Enter the file names where the output .s4p files will be stored. The **Quick Extract** option can be used instead: time stamped files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files.
3. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
4. Select the path of interest or indicate how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 2 with high transmission and port 3 is connected to port 4 with high transmission (and paths like 1-3 are coupled only) then select 1-2 (and 3-4)).
5. Select the measurement type (using **Thru** or **Reflect** standards). Note that for reflection, the type of reflection must be the same on all ports.
6. Define the standards being used (offset length, transmission or reflection magnitude, include the sign of reflection).
7. Enter an estimate of the network's electrical delay (both sides of the fixture pair). Entering 0 will activate the automatic length estimator. If using a reflect measurement, this can be further refined by selecting **Manual Control** where the fixture halves can be treated as asymmetric and only one side can be done if desired.
8. When all fields have been entered and proper connection of the standard or standards been made, click on **Perform Network Extraction**. If successful, files will automatically be saved and a confirmation dialog will appear.
9. After the extraction, the focus auto-returns to the **"DEEMBED. TOOLS Menu – 4-port VNAs"**.

10. If Quick Extract was not selected, after the .s4p files have been saved, go to Measurement | Edit Embed/De-embed | Edit Network configuration panel to recall the .s4p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type G (No Option 21)

Full Name

Network Extraction [Extract Two 4-port Networks (Type G)]

Previous

- [“NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(without Option 21\)” on page 10-34](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBDED. TOOLS | *Ntwk. Extraction* | 4 Port Networks | NETWORK EXTRACTION (4-PORT NETWORKS) Dialog Box | Extract Two 4-Port Networks | Type G – Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT FOUR 2-PORT NETWORKS (TYPE G)] Dialog Box

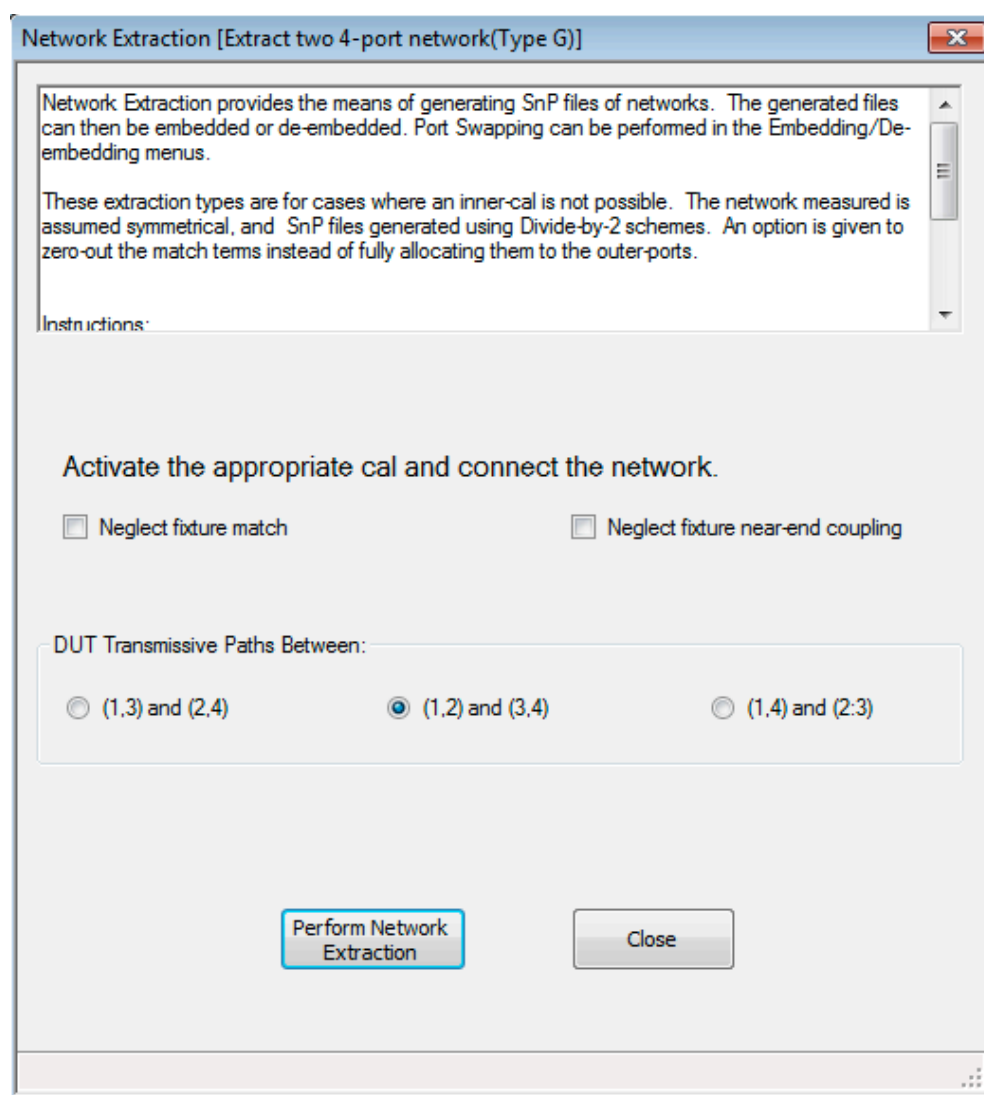


Figure 10-43. NETWORK EXTRACTION – EXTRACT TWO 4-PORT NETWORKS – TYPE G – 4-Port

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

These extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to neglect fixture match terms instead of fully allocating them to the outer-ports.

Procedure:

1. Make sure the appropriate calibration is active.
2. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Connect the network and select **Perform Network Extraction**.
4. If the extraction is successful, follow the prompt to save the generated SnP file(s).
5. After the .SnP files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .SnP files and configure the network.

NETWORK EXTRACTION Dialog Box – Type G – Multi-Standards (Option 21)

Full Name

Network Extraction [Extract Two 4-port Networks (Type G – Multi-Standards)]

Previous

- “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (with Option 21)” on page 10-35

Prerequisites

- Option 21 – Universal Fixture Extraction installed.
- A full term calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMB. TOOLS | *Ntwk. Extraction* | 4 Port Networks | NETWORK EXTRACTION (4-PORT NETWORKS) Dialog Box | Extract Two 4-Port Networks | Type G – Outer Cal Only Using Divide-By-Two Method | NETWORK EXTRACTION [EXTRACT TWO 4-PORT NETWORKS (TYPE G – MULTI-STANDARDS)] Dialog Box

Network Extraction [Extract two 4-port network (Type G - Multi-Standards)]

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

These Type G extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to zero-out the match terms (i.e., to neglect mismatch of the network)

Instructions:

- 1) Make sure the appropriate calibration is active (full 4-port cal).
- 2) Select 'Neglect fixture match' if desired (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
- 3) Select the path of interest or indicate how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 2 with high impedance).

Activate the appropriate (4-port) calibration and connect the standard before pressing "Measure"

☐ Neglect fixture match ☐ Neglect fixture near-end coupling

Dominant Path

☒ 1-2 (and 3-4) ☐ 1-3 (and 2-4) ☐ 1-4 (and 2-3)
☐ 1-2 (and 4-3) ☐ 1-3 (and 4-2) ☐ 1-4 (and 3-2)

Save location for fixture data file(s).

First port S4P: Select File

Second port S4P: Select File

☒ Use first file port assignments for second file
 (no port swapping required on 2nd file for direct de-embedding)
☐ Use current file port assignments for second file

Line 1

Configuration ☒ Standard ☐ S2P File

Length (mm) 0.000

Loss (dB/mm) 0.000 @ Freq (GHz) 0.000

☐ Line 2

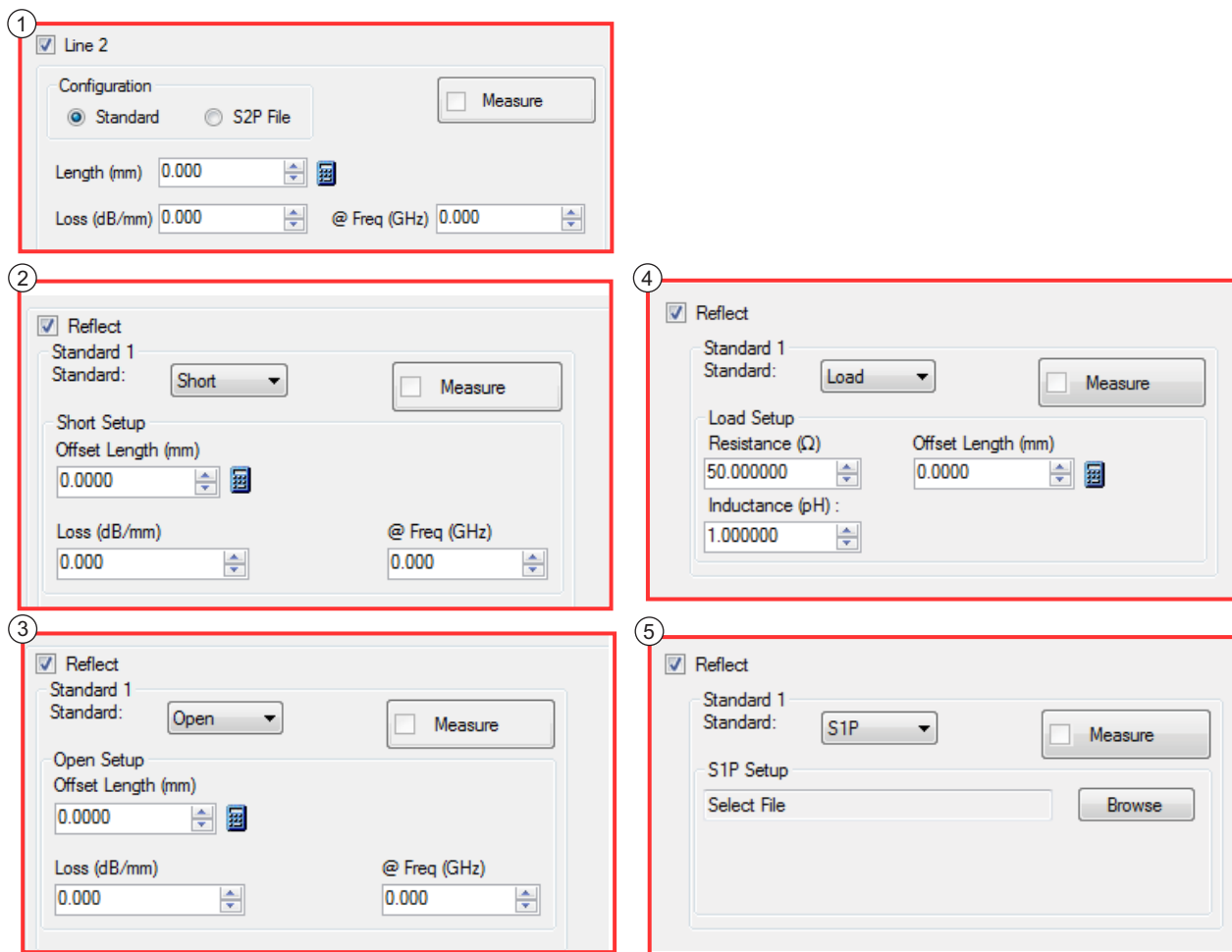
☐ Reflect

☐ Quick Extract
 (Saves .s4p file to fixed location and opens de-embedding menu)

Figure 10-44. NETWORK EXTRACTION – EXTRACT TWO 4-PORT NETWORKS – TYPE G – Multi-Standards – 4-Port

1. Checking **Line 2 Length** box opens entry window as shown in [Figure 10-40](#).
2. Checking **Reflect** box opens various options related to Reflect as shown in [Figure 10-40](#).
3. Checking **Quick Extract** box saves .s4p file to fixed location and opens the deembedding dialog ([Figure 10-30](#)).

Figure 10-44. NETWORK EXTRACTION – EXTRACT TWO 4-PORT NETWORKS – TYPE G – Multi-Standards – 4-Port



1. Checking **Line 2 Length** box opens a dialog to adjust length.
2. Checking **Reflect** box and selecting **Short** from the dropdown opens the dialog as shown.
3. Checking **Reflect** box and selecting **Open** from the dropdown opens the dialog as shown.
4. Checking **Reflect** box and selecting **Load** from the dropdown opens the dialog as shown.
5. Checking **Reflect** box and selecting **S1P** from the dropdown opens the dialog as shown.

Figure 10-45. TYPE G– Multi-Standards – Extraction Setup Variations

Instructions

Network Extraction provides the means of generating SnP files of networks. The generated files can then be embedded or de-embedded. Port Swapping can be performed in the Embedding/De-embedding menus.

These Type G extraction types are for cases where an inner-cal is not possible. The network measured is assumed symmetrical, and SnP files generated using Divide-by-2 schemes. An option is given to neglect fixture match terms (i.e., to neglect mismatch of the network).

1. Make sure the appropriate calibration is active (full 4-port cal for Type G).
2. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Select the path of interest or indicate how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 2 with high transmission and port 3 is connected to port 4 with high transmission, and the other paths like 1-3 and 2-3 are high loss, then select 1-2 (and 3-4)).
4. Select the number of standards to be used and their definitions. **Line 1** is always required.
5. Connect each standard (or standards in the case of **Reflect**; all ports must have the Reflect connected simultaneously) before pressing **Measure**.
6. Enter the file names where the output (.s4p for Type G) files will be stored. The **Quick Extract** option can be used instead: files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files.
7. When all fields have been entered and all standards measurements have been completed (all of the check boxes marked and the button fields have turned green), press **Perform Network Extraction**. If successful, a confirmation dialog will appear.
8. After the extraction, the focus auto-returns to the **“DEEMBED. TOOLS Menu – 4-port VNAs”**.
9. If Quick Extract was not selected, after the .s4p files have been saved, go to **Measurement | Edit Embed/De-embed | Edit Network** configuration panel to recall the .s4p files and configure the network.

NETWORK EXTRACTION Dialog Box – Type G – Phase Localized (Option 21)

Full Name

Network Extraction [Extract Two 4-port Networks (Type G – Phase-Localized)]

Previous

- “[NETWORK EXTRACTION Main Dialog – 4-Port VNAs \(with Option 21\)](#)” on page 10-35

Prerequisites

- Option 21 – Universal Fixture Extraction installed.
- A full term calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | *Ntwk. Extraction* | 4 Port Networks | NETWORK EXTRACTION (4-PORT NETWORKS) Dialog Box | Extract Two 4-Port Networks | Type G – Phase Localized | NETWORK EXTRACTION [EXTRACT TWO 4-PORT NETWORKS (TYPE G – PHASE-LOCALIZED)] Dialog Box

Network Extraction [Extract two 4-port network (Type G - Phase-Localized)]

This will construct .s4p files based on a thru or reflect measurement using a two-port/four-port fixture pair. Phase localization processing is used to aid the extraction.

Instructions:

- 1) Make sure the appropriate calibration is active (full 4-port cal in general or a 2-port cal for a reflection-based extraction with a single-sided fixture).
- 2) Select 'Neglect fixture match' if desired (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable) and/or 'Neglect fixture near-end coupling' (sets the transmission terms nearest the ports to 0).
- 3) Select the path of interest or indicate how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 2 with high transmission and port 3 is connected to port 4 with high transmission (and paths like 1-3 are coupled only) then select 1-2 (and 3-4)).
- 4) Select the measurement type (using thru or reflect standards or both). Note that for reflection, the type of reflection must be the same on all ports. Two reflect standards

Dominant Path

☒ 1-2 (and 3-4) ☐ 1-3 (and 2-4) ☐ 1-4 (and 2-3)
☐ 1-2 (and 4-3) ☐ 1-3 (and 4-2) ☐ 1-4 (and 3-2)

Standard Selection (1)

☒ Thru ☐ Reflect ☐ Both

☐ Neglect fixture match
☐ Neglect fixture near-end coupling

Thru Configuration

☒ Standard ☐ S2P File

Magnitude of Thru transmission (usually between 0 and 1)

Thru Length (mm)

Thru Weight (between 0 and 1)

Inner Plane Impedance

☒ Use Ref. Impedance

Estimated Fixture Delay(1-2) (ps)

Save location for fixture data file(s)

(1,3) S4P:

(2,4) S4P:

☒ Use first file port assignments for second file (no port swapping required on 2nd file for direct de-embedding)
☐ Use current file port assignments for second file

* Activate the appropriate calibration and connect the standard before pressing "Measure". (2)

 ☐ Quick Extract (Saves .s4p file to fixed location and loads de-embedding engine)

Figure 10-46. NETWORK EXTRACTION – EXTRACT TWO 4-PORT NETWORKS – TYPE G – Phase-Localized – 4-Port (1 of 2)

1. Default dialog settings are shown with Thru selected. For Reflect variants of this dialog, see [Figure 10-47 on page 10-72](#).
2. Checking Quick Extract saves .s4p file to fixed location and opens the deembedding dialog ([Figure 10-30](#)).

Figure 10-46. NETWORK EXTRACTION – EXTRACT TWO 4-PORT NETWORKS – TYPE G – Phase-Localized – 4-Port (2 of 2)

1 Standard Selection

☐ Thru ☒ Reflect ☐ Neglect fixture match
☐ Neglect fixture near-end coupling

Reflect Setup

Reflect Configuration
☒ Standard ☐ S1P File
 Low frequency value of reflection (usually between -1 and +1): 1.0000

Reflect Control
☒ Automatic Processing
☐ Manual Control
 Offset Length (mm): 0.0000
 Loss (dB/mm): 0.0000

Port Selection
☒ (1,3) ☐ (2,4) ☐ Both
 @ Freq (GHz): 0.0000

2 Reflect Setup

Reflect Configuration
☒ Standard ☐ S1P File
 Low frequency value of reflection (usually between -1 and +1): 1.0000

Reflect Control
☐ Automatic Processing
☒ Manual Control
 Offset Length (mm): 0.0000
 Loss (dB/mm): 0.0000

Port Selection
☒ (1,3) ☐ (2,4) ☐ Both
 @ Freq (GHz): 0.0000

3 Delay to Central Fixture Interface Location

Port 1 Side (ps): 0.0000 Port 3 Side (ps): 0.0000
 Port 2 Side (ps): 0.0000 Port 4 Side (ps): 0.0000

1. Checking **Reflect** and selecting **Automatic Processing** opens the dialog shown.
2. Checking **Reflect** and selecting **Manual Control** opens the dialog shown.
3. With Manual Control selected, Delay to Central Fixture Interface Location is enabled.

Figure 10-47. TYPE G – Phase Localized – Extraction Setup Variations

Description

This will construct .s4p files based on a thru or reflect measurement using a two-port/four-port fixture pair. Phase localization processing is used to aid the extraction.

To do this phase localization, the frequency list must be relatively uniform (no CW or log sweep and segmented sweep step sizes should not deviate more than 3% from the mean) and the range should be large enough that the total fixture length (ns) > 5/(frequency range (GHz)). The frequency step should be small enough that the total fixture length (ns) < 0.3/(Frequency step (GHz)).

Instructions

1. Make sure the appropriate calibration is active (full 4-port cal in general or a 2-port cal for a reflection-based extraction with a single-sided fixture).
2. Select 'Neglect fixture match' if desired (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable) and/or 'Neglect fixture near-end coupling' (sets the transmission terms nearest the ports to 0).
3. Select the path of interest or indicate how the dominant transmission paths are aligned (e.g., if the network is a differential pair with port 1 connected to port 2 with high transmission and port 3 is connected to port 4 with high transmission (and paths like 1-3 are coupled only) then select 1-2 (and 3-4)).
4. Select the measurement type (using thru or reflect standards or both). Note that for reflection, the type of reflection must be the same on all ports. Two reflect standards may be selected (and they must have different reflection coefficients) and for each of those measurement cycles, the same reflection standard should be on all ports. When 'both' (thru and reflect) is selected, there is also an available weighting factor with a range of 0 to 1. At 0, the reflect standard will dominate. At 1, the thru standard will dominate.
5. Define the standards being used (offset length, transmission or reflection magnitude, include the sign of reflection)

6. If reflect standards are selected, choose whether one or two will be used (the reflect standards must have different reflection coefficients). If 'both' (thru & reflect) is selected, only one reflect may be used. Two different reflection standards may be used but the same type would be connected to all ports at a given time.
7. Enter an estimate of the network's electrical delay (both sides of the fixture pair). Entering 0 will activate the automatic length estimator. If using a reflect measurement, this can be further refined using 'Manual Control' where the fixture halves can be treated as asymmetric and only one side can be done if desired.
8. Enter the file names and path where the output .s4p files will be stored. The Quick Extract option can be used instead: files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files.
9. When all fields have been entered and proper connection of the standard(s) has(have) been made, click on the appropriate 'Measure' button. If 'both' types of standards were selected, then two measurements are required. If only reflect standards are being used but two are defined, then two measurement cycles will also be needed.
10. When measurement(s) is(are) complete, click on Perform Network Extraction. If successful, files will automatically be saved and a confirmation dialog will appear.
11. If Quick Extract was not selected, after the .s4p files have been saved, go to MEASUREMENT | Edit Embed/De-embed | Edit Network | EDIT EMBEDDING/DE-EMBEDDING configuration panel to recall the .s4p files and configure the network.
12. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 4-port VNAs”](#).

NETWORK EXTRACTION Dialog Box – Type G – Phase Localized High Crosstalk (Option 21)

Full Name

Network Extraction [Extract Two 4-port Network (Type G – Phase-Localized High Crosstalk)]

Previous

- “NETWORK EXTRACTION Main Dialog – 4-Port VNAs (with Option 21)” on page 10-35

Prerequisites

- Option 21 – Universal Fixture Extraction installed.
- A full term calibration needs to exist and be active.

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | *Ntwk. Extraction* | 4 Port Networks | NETWORK EXTRACTION (4-PORT NETWORKS) Dialog Box | Extract Two 4-Port Networks | Type G – Phase Localized High Cross Talk | NETWORK EXTRACTION [EXTRACT TWO 4-PORT NETWORKS (TYPE G – PHASE-LOCALIZED HIGH CROSSTALK)] Dialog Box

Network Extraction [Extract two 4-port network (Type G - Phase-Localized High CrossTalk)]

This will construct a .s4p file based on a reflect measurements using a port-pair fixture half. The effect of coupling to a neighboring pair is captured and parameterized against the terminating impedances on that neighboring pair. Phase localization processing is used to aid the extraction.

Instructions:

- 1) Make sure the appropriate 4 port calibration is active.
- 2) Select 'Neglect fixture match' if desired (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
- 3) Define the reflection standards being used (offset length, reflection magnitude, include the sign of reflection). The same reflection type must be used on all ports.
- 4) The VNA ports will be connected to the 'outer' ports of the desired fixture port pair and the neighboring pair (the crosstalk to which that will be analyzed). Note the port

Dominant Path

1-2 (and 3-4; with 1st differential pair as 1-3) ☒ 1-3 (and 2-4; with 1st differential pair as 1-2) ☐ 1-4 (and 2-3; with 1st differential pair as 1-2) ☐
 1-2 (and 4-3; with 1st differential pair as 1-4) ☐ 1-3 (and 4-2; with 1st differential pair as 1-4) ☐ 1-4 (and 3-2; with 1st differential pair as 1-3) ☐

Measurement Port Assignment (Second pair of ports are the connection to the coupled network) ☐ Neglect fixture match

☒ 1-3-2-4 ☐ 1-3-4-2

1 Reflect Setup

Reflect Configuration: ☒ Standard ☐ S1P File

Low frequency value of reflection (usually between -1 and +1):

Reflect Offset Length (mm):

Loss (dB/mm):

@ Freq (GHz):

Save location for fixture data file(s)

S4P File:

Inner Plane Impedance

☒ Use Ref. Impedance

Estimated Fixture Delay (1-2) (ps):

Terminating Reflection Coefficients on aggressor lines

☒ Fixed values (Linear) (usually between -1 and +1) ☐ S1P Files

Outer plane, near Port:

Outer plane, far Port:

Inner plane, near Port:

Inner plane, far Port:

* Please ensure proper connection before selecting "Perform Network Extraction".

☐ Quick Extract (Saves .s4p file to fixed location and loads de-embedding engine) ☐ Use previous network measurement

Figure 10-48. NETWORK EXTRACTION – EXTRACT TWO 4-PORT NETWORKS – TYPE G – Phase-Localized High Crosstalk – 4-Port

Description

This will construct a .s4p file based on a reflect measurement using a port-pair fixture half. The effect of coupling to a neighboring pair is captured and parameterized against the terminating impedances on that neighboring pair. Phase localization processing is used to aid the extraction.

To do this phase localization, the frequency list must be relatively uniform (no CW or log sweep and segmented sweep step sizes should not deviate more than 3% from the mean) and the range should be large enough that the total fixture length (ns) $> 5/(\text{frequency range (GHz)})$. The frequency step should be small enough that the total fixture length (ns) $< 0.3/(\text{Frequency step (GHz)})$.

Instructions

1. Make sure the appropriate 4 port calibration is active (full 4-port cal for Type G High Crosstalk).
2. Select **Neglect fixture match** if needed (this sets all reflection terms to 0 and may be helpful if the fixture is extremely unrepeatable).
3. Define the reflection standards being used (offset length, reflection magnitude, include the sign of reflection). The same reflection type must be used on all ports.
4. The VNA ports will be connected to the 'outer' ports of the desired fixture port pair and the neighboring pair (the crosstalk to which will be analyzed). Note the port connection choice in the dialog. The reflection standards will be connected to the 'inner' ports of the fixture.
5. Enter an estimate of the network's electrical delay (both sides of the fixture pair). Entering 0 will activate the automatic length estimator.
6. Enter the terminating reflection coefficients (either frequency-independent scalars or .s2p files) for the neighboring pair (as it will be used in practice).
7. Enter the file name and path where the output .s4p file will be stored. The **Quick Extract** option can be used instead; time-stamped files will be saved to a predetermined hard disk location and the de-embedding engine will automatically load those files. Remember to keep track of available disk space. The output .s4p file will be for the desired port pair using the defined terminations on the neighboring pair. Internally, a .s8p is generated that generically defines the dual network. This file is saved so a new .s4p file can be generated later using new neighboring pair terminations (see **Use Previous Measurement** checkbox).
8. When all fields have been entered and proper connection of the standard(s) has (have) been made, click on **Perform Network Extraction**. If successful, files will automatically be saved and a confirmation dialog will appear.
9. After the extraction, the focus auto-returns to the **"DEEMBED. TOOLS Menu – 4-port VNAs"**.
10. If Quick Extract was not selected, after the .s4p file has been saved, go to the **MEASUREMENT | EDIT EMBED/DE-EMBED / EDIT NETWORK CONFIGURATION** dialog to recall the .s4p file and configure the network.

NETWORK EXTRACTION Dialog Box – Sequential Extraction (Peeling) (Option 21)

Sequential Extraction will construct a .s2p or .s4p file based on a localization of the selected parameter to isolate a given defect. This process can be used to sequentially de-embed and identify additional defects.

Full Name

Sequential Extraction (Peeling)

Previous

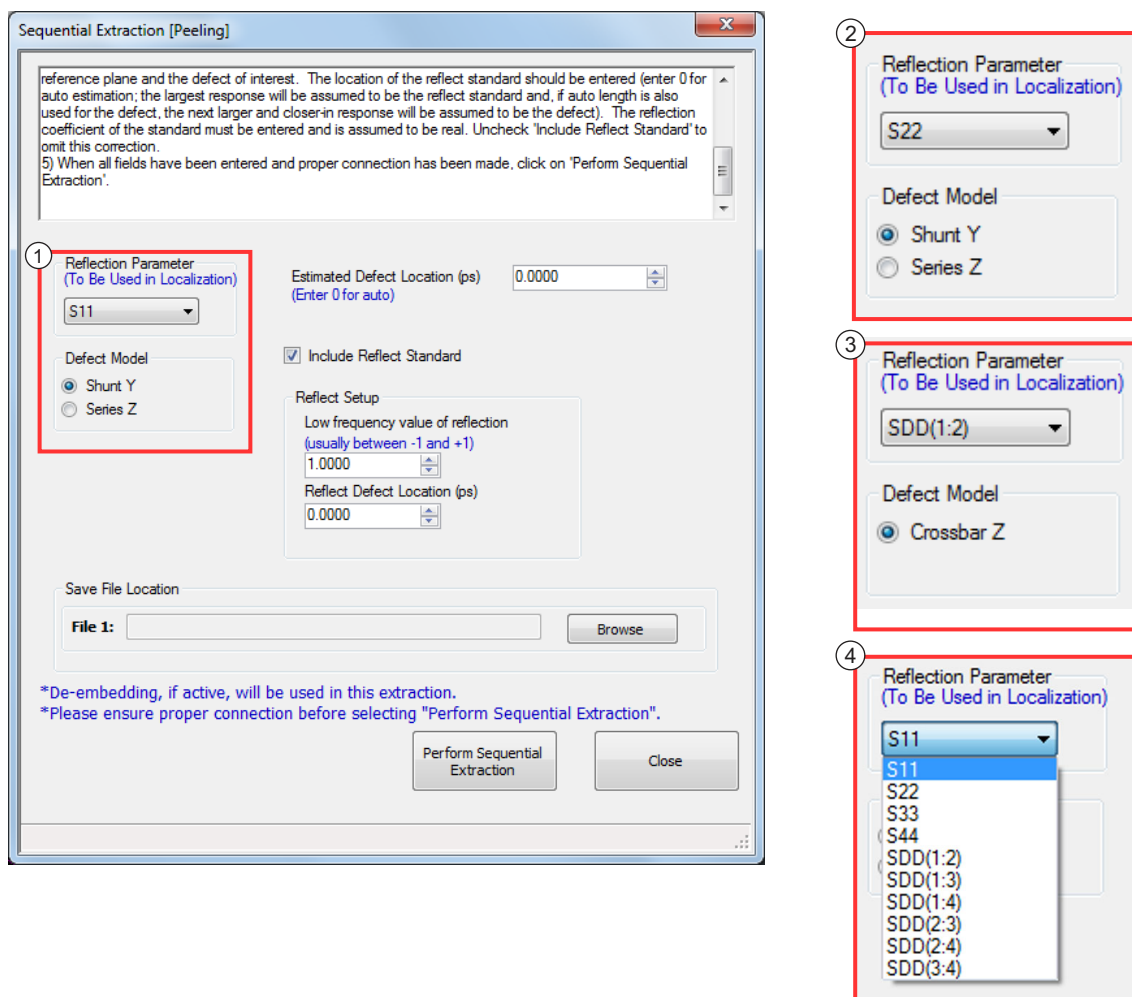
- “DEEMBED. TOOLS Menu – 4-port VNAs” on page 10-33

Prerequisites

- Option 21 Universal Fixture Extraction installed

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | Sequential Extraction (Peeling) | SEQUENTIAL EXTRACTION (PEELING) Dialog Box



1. Reflection Parameter selected is S11
2. Reflection Parameter selected is S22
3. Reflection Parameter selected is SDD(1:2), Mixed Mode Selection Defect Model is Crossbar Z, file would be .s4p
4. Available selections for a full 4-port calibration

Figure 10-49. NETWORK EXTRACTION – SEQUENTIAL EXTRACTION (PEELING) Dialog Box

Description

Sequential Extraction will construct a .s2p or .s4p file based on a model of an isolated defect (treated as lumped). This process can be used to sequentially de-embed and identify additional defects.

Notes:

- The Reflection Parameter selection is dynamic and will be based on active cal settings.
*Note: If no active cal is in place or cal is off, the **Reflection Parameter** drop down list will be disabled with a note indicating requirement.*
- If the Reflection Parameter is switched between Standard and Mixed, the file name will be cleared. The Browse button on file name will bring up appropriate filter (.s2p or .s4p) based on current selected reflect parameter.
- When Perform Sequential Extraction is selected, measurement will be taken and the processing of the mixed mode will occur internally.

Instructions

1. Select the Reflection Parameter to be used in the localization. *Note: If no active cal is in place or cal is off, the Reflection Parameter drop down list will be disabled with a note indicating requirement.*
2. Enter an Estimated Defect Location. This is only used to help with root selection and need not be extremely accurate. Entering 0 will activate the automatic length estimator.
3. Select the Defect Model (shunt admittance Y, series impedance Z, or in the case of differential parameters, a crossbar impedance).
4. Select Include Reflect Standard to include the reflect standard to help compensate for loss between the reference plane and the defect of interest. The location of the reflect standard should be entered (enter 0 for auto estimation; the largest response will be assumed to be the reflect standard and, if auto length is also used for the defect, the next larger and closer-in response will be assumed to be the defect). The reflection coefficient of the standard must be entered and is assumed to be real. Uncheck Include Reflect Standard to omit this correction.
5. When all fields have been entered and proper connection has been made, click on Perform Sequential Extraction.
6. After the extraction, the focus auto-returns to the [“DEEMBED. TOOLS Menu – 4-port VNAs”](#)

MANUAL ADAPTER REMOVAL Dialog Box – 4-Port VNAs

Use manual adapter removal to extract the electrical behavior of an adapter after a successful calibration procedure. This is especially useful when the DUT configuration is not entirely compatible with common calibration procedures such as having different connectors at each end.

Previous

- [“DEEMBED. TOOLS Menu – 4-port VNAs” on page 10-33](#)

Navigation

- MAIN | Calibration | CALIBRATION | De-embedding Tools | DEEMBED. TOOLS | Perform Manual Adapter Removal | MANUAL ADAPTER REMOVAL Dialog Box

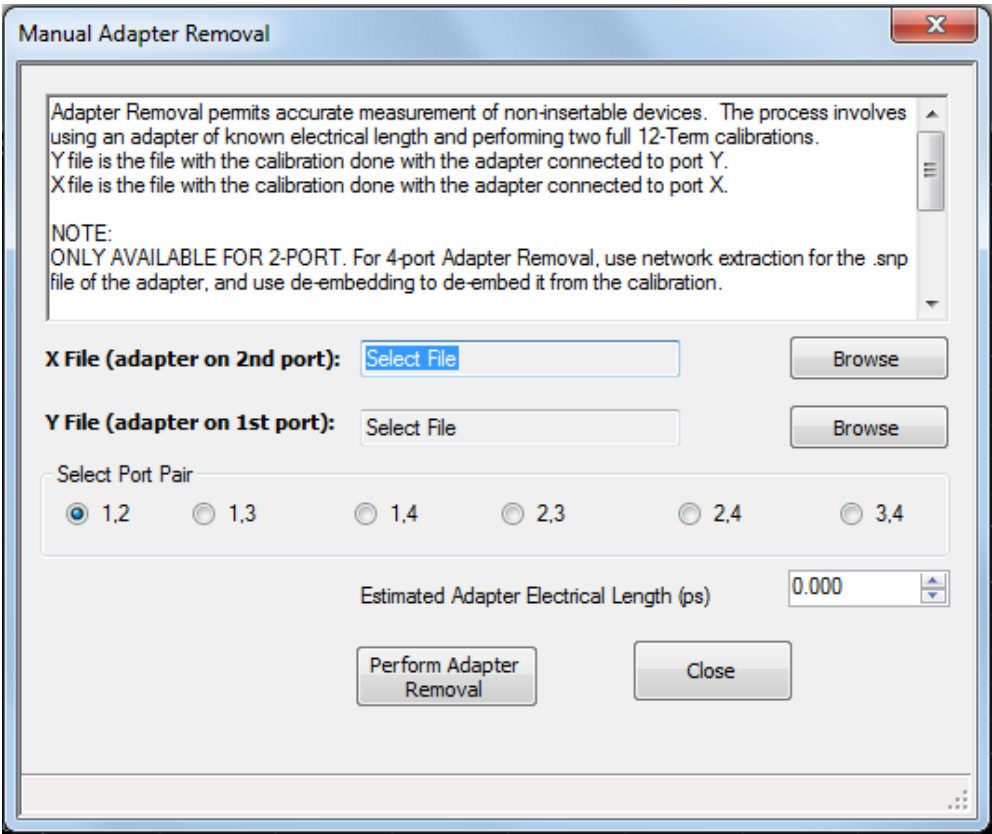


Figure 10-50. MANUAL ADAPTER REMOVAL Dialog Box

Instructions

Adapter removal permits accurate measurement of non-insertable devices. The process involves using an adapter of known electrical length and performing two full 12-term calibrations. In the procedure below:

- The Y file is the file with the calibration when the adapter connected to Port 1.
- The X file is the file with the calibration when the adapter connected to Port 2.

Note

ONLY AVAILABLE FOR 2-PORT.
For 4-port Adapter Removal, use network extraction for the SnP file of the adapter, and use de-embedding to de-embed it from the calibration.

Procedure

Select the port pair to be used.

1. Connect the adapter to Port X where X signifies any port. Perform a full 12-term calibration using Y' and Y as the test ports and store calibration to disk.
2. Connect the adapter to Port Y where Y signifies any port that is not X. Perform a full 12-term calibration using X and X' as the test ports and store calibration to disk.
3. Call up the X and Y files.
4. Input the estimated adapter electrical length in picoseconds (ps).
5. Select **Perform Adapter Removal** to remove adapter.

ALTERNATIVE CALS Menu – 4-Port VNAs

Use the ALTERNATIVE CALS menu to hybridize and merge calibrations.

Previous

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals| ALTERNATIVE CALS

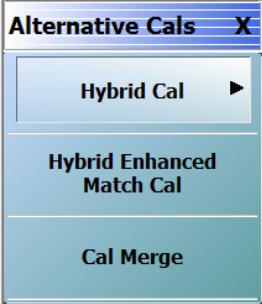
	<p>Hybrid Cal</p> <p>Hybrid calibration takes either up to four 1-port cals and hybridizes them into a 2-port, 3-port, or 4-port cal, or takes two 2-port cals and hybridizes them into one 4-port cal.</p> <ul style="list-style-type: none">• “HYBRID CAL Menu – 4-Port VNAs” on page 10-81 <p>Hybrid Enhanced Match Cal (Disabled when 4-Port Test Set Connected)</p> <p>Available only on 2-port instruments with Option 7, Receiver Offset (disabled when Option 7 is not installed and when a 4-port test set is connected). Allows a version of hybrid calibrations (mentioned above) for frequency converting devices (mixers) to take two enhanced match calibrations and hybridize them into a new enhanced match calibration with the input media of the first calibration and the output media of the second calibration. This allows a mixed-media calibration for a device that may have coaxial and waveguide connections.</p> <p>Cal Merge</p> <p>Cal Merge allows merging two calibration files into a single file where the calibrations can use different methods at different frequencies. The calibrations must be of the same calibration type. Select displays the CAL MERGE dialog box.</p> <ul style="list-style-type: none">• “CAL MERGE Dialog Box – 4-Port VNAs” on page 10-83
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Figure 10-51. ALTERNATIVE CALS Menu – 4-Port VNAs

HYBRID CAL Menu – 4-Port VNAs

Previous

- [“ALTERNATIVE CALS Menu – 4-Port VNAs” on page 10-80](#)

Prerequisites

- 4-Port Mode

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals | ALTERNATIVE CALS | Hybrid Cal | HYBRID CAL

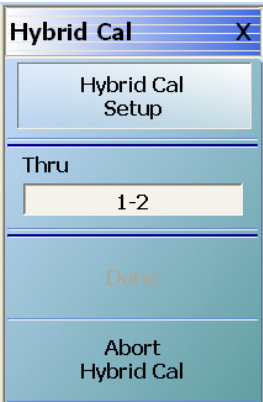
	<p>Hybrid Cal Setup</p> <p>Use Hybrid Cal Setup to change the hybrid calibration parameters. Select displays the HYBRID CAL SETUP dialog box.</p> <ul style="list-style-type: none">• “HYBRID CAL SETUP Dialog Box – 4-Port VNAs” on page 10-82 <p>Thru</p> <p>Read-only display. Shows the thru port pair configured in the HYBRID CAL SETUP dialog box.</p> <p>Done</p> <p>The Done button is unavailable until a successful hybrid calibration has been completed. When available, select returns to the CALIBRATION menu.</p> <ul style="list-style-type: none">• “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8 <p>Abort Hybrid Cal</p> <p>The Abort button is unavailable until a hybrid calibration is started. Selection cancels the hybrid calibration, and returns to the CALIBRATION menu.</p> <ul style="list-style-type: none">• “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8
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Figure 10-52. HYBRID CAL Menu-4 Port VNAs

HYBRID CAL SETUP Dialog Box – 4-Port VNAs

Previous

- “HYBRID CAL Menu – 4-Port VNAs” on page 10-81

Prerequisites

- 4-Port Mode

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals | ALTERNATIVE CALS | Hybrid Cal | HYBRID CAL | Hybrid Cal Setup | HYBRID CAL SETUP Dialog Box

Hybrid Cal Setup

Hybrid Cal takes either up to four 1-port cals and hybridizes them into a 2-port, 3-port, or 4-port cal or takes two 2-port cals and hybridizes them into a 4-port cal. This allows a mixed-media calibration for a device that may have coaxial and waveguide connections. It also allows 4-port cals where the two 2-port cals are not restricted to be the same type, allowing SOLT/R on the first two ports and LRL/M on the other two ports.

Select Type

☐ Using 1 port Cals to generate 2,3,4 ports cals ☒ Using 2 port Cals to generate 4 ports cals

2 port Cals to 4 ports Cal

Cal 1 Port Selection

☐ 1,2 ☐ 1,3 ☐ 1,4 ☐ 2,3 ☐ 2,4 ☒ 3,4

Cal 2 Port Selection

☒ 1,2 ☐ 1,3 ☐ 1,4 ☐ 2,3 ☐ 2,4 ☐ 3,4

Recall File(Ensure that the cal is done at at the appropriate port selected above.)

File 1:

File 2:

Select appropriate thrus/recip.[At least 1 additional thru/recip is needed.]

toolStripStatusLabel1

Figure 10-53. HYBRID CAL (CALIBRATION) Dialog Box – 4-Port VNAs

CAL MERGE Dialog Box – 4-Port VNAs

Calibration merge allows merging two calibration files into a single file where the prior calibrations can use different methods (such as SOLT and SSLT) at different frequencies. The calibrations must be the same calibration type (such as Full 1 Port) and be available on the instrument hard drive. Calibration merge has other requirements (described below) as to the number of points, start and stop frequencies, and front panel settings.

Previous

- [“ALTERNATIVE CALS Menu – 4-Port VNAs” on page 10-80](#)

Prerequisites

- 4-Port Mode

Navigation

- MAIN | Calibration | CALIBRATION | Alternative Cals | ALTERNATIVE CALS | Cal Merge | CAL MERGE Dialog Box

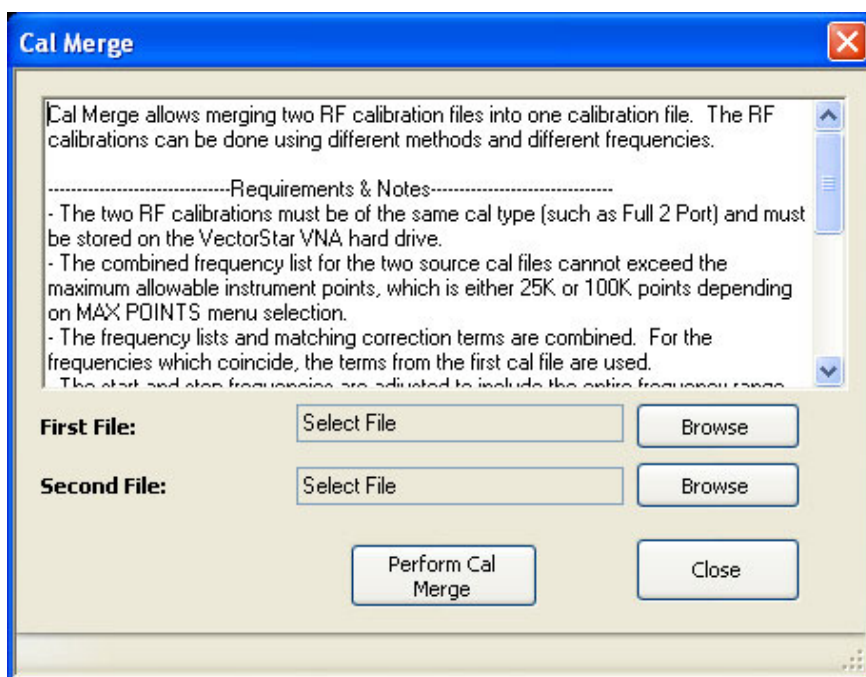


Figure 10-54. CAL MERGE Dialog Box

Instructions

Cal Merge allows merging two RF calibration files into one calibration file. The RF calibrations can be done using different methods and different frequencies.

Requirements and Notes

- The two RF calibrations must be of the same calibration type (such as Full 2 Port) and must be stored on the VectorStar VNA hard drive.
- The combined frequency list for the two source cal files cannot exceed the maximum allowable instrument points, which is either 25K or 100K points, depending on MAX POINTS menu selection.
- The frequency lists and matching correction terms are combined. For the frequencies which coincide, the terms from the first cal file are used.
- The start and stop frequencies are adjusted to include the entire frequency range provided by the two cal files.

- The first cal file provides all other front panel setup configuration information.
- Since Calibration Merge can result in non-discrete step size, the cal merge file sweep type is set to Frequency-Based Segmented Sweep.

Procedure

1. 1) Select **Browse** to select the appropriate cal files. For example, select a file such as `calfile1.chx` for the first file and `calfile2.chx` for the second file.
2. Select **Perform Cal Merge** to perform the merge of the frequency lists and matching correction terms.
3. For best practices it is recommend saving the resultant Cal Merge file, but a save is not required.

10-5 AutoCal Port Cal Setup – 4-Port VNAs

AUTOCAL PORT Menu – 4-Port VNAs

Use the AUTOCAL PORT menu to define whether the AutoCal procedure will be for 4-port, 2-port, or 1-port calibration.

Previous

- [“CALIBRATE Menu – 4-Port VNAs” on page 10-13](#)

Prerequisites

- 4-Port VNA Mode

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT

	<p>4-Port Cal (4-Port VNAs)</p> <p>Sets the AutoCal calibration function for 2-Port VNAs to a 2-port method and displays the AUTOCAL PROCEDURE (2-PORT CAL) menu.</p> <ul style="list-style-type: none">• “AUTOCAL SETUP Menu – 4-Port Cal – 4-Port VNAs” on page 10-86 <p>2-Port Cal (4-Port VNAs)</p> <p>Sets the AutoCal calibration function for 4-Port VNAs to a 2-port method and displays the AUTOCAL PROCEDURE (2-PORT CAL) menu.</p> <ul style="list-style-type: none">• “AUTOCAL SETUP Menu – 2-Port Cal – 4-Port VNAs” on page 10-90 <p>1-Port Cal (4-Port VNAs)</p> <p>Sets the AutoCal calibration function for 4-Port VNAs to a 1-port method and displays the AUTOCAL PROCEDURE (1-PORT CAL) menu.</p> <ul style="list-style-type: none">• “AUTOCAL SETUP Menu – 1-Port Cal – 4-Port VNAs” on page 10-94
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Figure 10-55. AUTOCAL PORT Menu – 4-Port VNAs

AUTOCAL SETUP Menu – 4-Port Cal – 4-Port VNAs

Previous

- [“AUTOCAL PORT Menu – 4-Port VNAs” on page 10-85](#)

Prerequisites

- 4-Port Mode

Navigation

MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 4-Port Cal | AUTOCAL SETUP

<div><div>AutoCal Setup</div><div><div>Modify Cal Setup</div></div><div><div>Current Char File is for PLD# 529E39BD</div></div><div><div>Port Selection</div><div>1,2,3,4</div></div><div><div>Cal Type</div><div>Four Port Cal</div></div><div><div>Thru Type</div><div>Internal Thru</div></div><div><div>Thru Type[Cal B]</div><div>Internal Thru</div></div><div><div>Cal A Orientation</div><div>Left=P1;Right=P2</div></div><div><div>Cal B Orientation</div><div>Left=P3;Right=P4</div></div><div><div>Begin Cal</div></div></div>	<div><div>Modify Cal Setup</div><div>Select displays the MODIFY 4-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for Auto Sense Module Orientation, Select Cal Type, Through Setup, Adapter Removal Port, and links to the THRU INFO and AIR EQUIVALENT LENGTH CALCULATOR dialog boxes.<ul style="list-style-type: none">• “MODIFY 4-PORT AUTOCAL SETUP Dialog Box” on page 10-87</div><div><div>Port Selection (Read Only)</div><div>Displays the Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 4-PORT AUTOCAL SETUP dialog box.</div></div><div><div>Cal Type (Read Only)</div><div>Displays the Cal Type selected for the AutoCal procedure. The settings are determined in the MODIFY 4-PORT AUTOCAL SETUP dialog box.</div></div><div><div>Thru Type (Read Only)</div><div>Displays the Thru Type selected for the AutoCal procedure as either Internal Thru, Internal Reciprocal, True Thru, or True Reciprocal. The settings are determined in the MODIFY 4-PORT AUTOCAL SETUP dialog box.</div></div><div><div>Cal A/B Orientation (Read Only)</div><div>Displays the left/right VNA Port orientation and assignment for the AutoCal procedure. The settings are determined in the MODIFY 4-PORT AUTOCAL SETUP dialog box.</div></div><div><div>Begin Cal (AutoCal 4-Port Cal)</div><div>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu where the Cal Status button is enabled and set to ON.<ul style="list-style-type: none">• “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8</div></div></div>
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Figure 10-56. AUTOCAL SETUP Menu – 4-Port Cal – 4-Port VNAs

MODIFY 4-PORT AUTOCAL SETUP Dialog Box

Use the MODIFY 4-PORT AUTOCAL SETUP dialog box to change the calibration parameters prior to an AutoCal calibration procedure. Options include the calibration and thru types to be used. The left/right port sense is manually configured.

Previous

- “AUTOCAL SETUP Menu – 4-Port Cal – 4-Port VNAs” on page 10-86

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 4-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY 4-PORT AUTOCAL SETUP Dialog Box

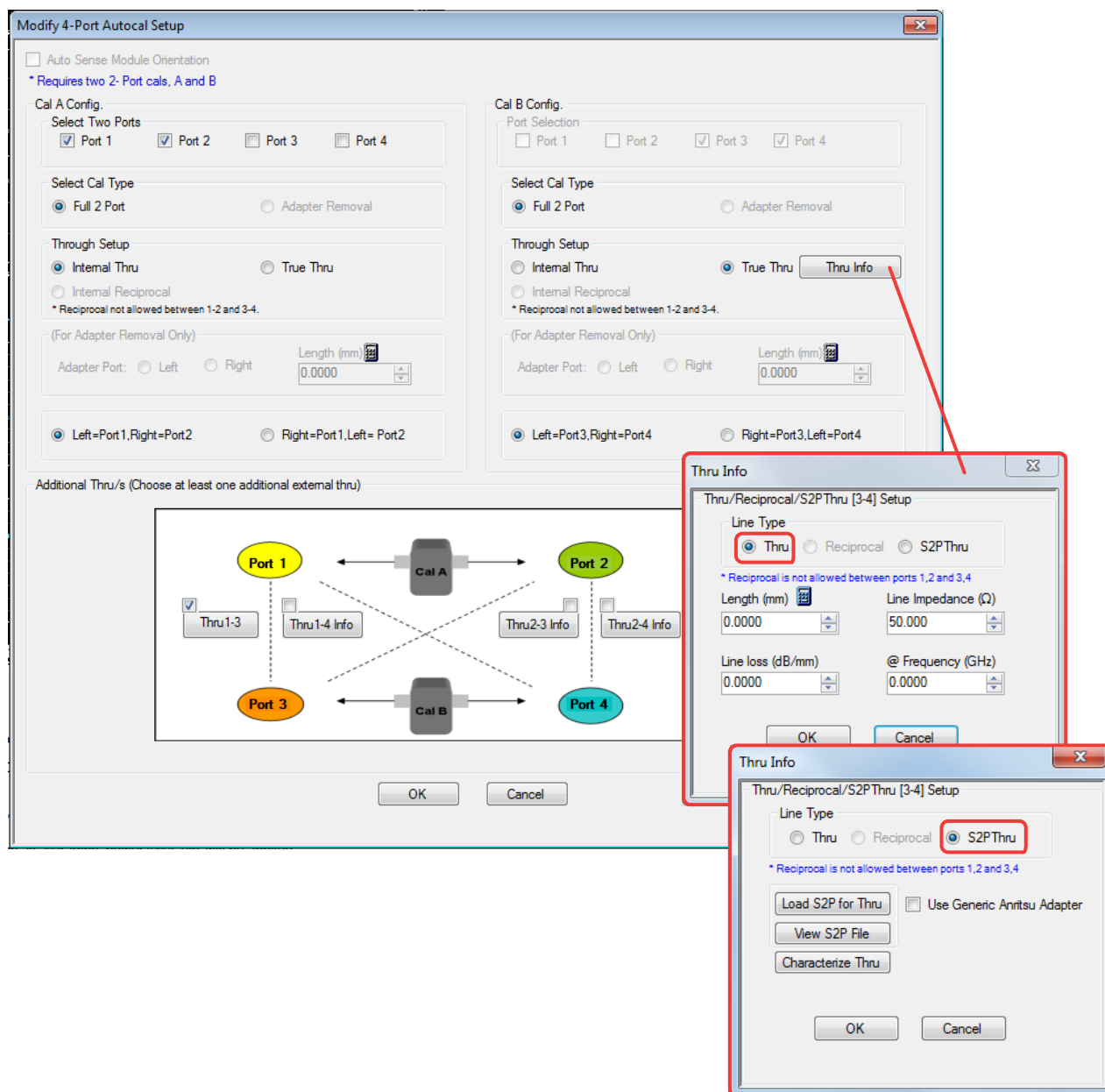


Figure 10-57. MODIFY 4-PORT AUTOCAL SETUP Dialog Box (1 of 2)

1. Thru selected allows user entries for length, line impedance, line loss, and frequency.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).
Reciprocal selected allows user entries for length.
Note: Reciprocal is not available on paths 1-2 and 3-4 (greyed out), but is available on other paths.

Figure 10-57. MODIFY 4-PORT AUTOCAL SETUP Dialog Box (2 of 2)

General

The calibration requires two 2-Port calibrations: Cal A and Cal B.

Auto Sense Module Orientation

The Auto Sense Module Orientation is not available for 4-Port AutoCal calibrations.

Cal A Configuration

Select two ports for the Cal A configuration. choose from Port 1, Port 2, Port 3, or Port 4.

Cal A Configuration – Select Cal Type

Only the Full 2 Port selection is available.

Cal A Configuration – Through Setup

Select either Internal Through or True Thru.

If True Thru is selected, the Thru Info button is available. Select displays the [THRU INFO Dialog Box – 4-Port VNAs](#).

For Adapter Removal

The For Adapter Removal area and its controls are not available in 4-Port AutoCal Setup.

Cal A Manual Port Sense Configuration

The selections available are dependent on the ports selected above in Cal A Configuration. For example:

- If Port 1 and Port 2 were selected above, your choices are:
 - Left = Port 1 and Right = Port 2
 - Left = Port 2 and Right = Port 1
- If Port 1 and Port 3 were selected above, your choices are:
 - Left = Port 1 and Right = Port 3
 - Left = Port 3 and Right = Port 1

Cal B Configuration

Auto selects whichever ports were not selected in Cal A Configuration.

Cal B Configuration – Select Cal Type

Only the Full 2 Port selection is available.

Cal B Configuration – Through Setup

Select either Internal Through or True Thru.

If True Thru is selected, the Thru Info button is available. Select displays the [THRU INFO Dialog Box – 4-Port VNAs](#).

Cal B Manual Port Sense Configuration

The selections available are dependent on the ports selected above in Cal A Configuration. For example:

- If Port 1 and Port 2 were selected for Cal A above, your choices are:
 - Left = Port 3 and Right = Port 4
 - Left = Port 4 and Right = Port 3

- If Port 1 and Port 3 were selected for Cal A above, your choices are:
 - Left = Port 2 and Right = Port 4
 - Left = Port 4 and Right = Port 2

Additional Thru

Choose at least one additional external thru from the check boxes in the port diagrams. More than one selection may be made. Select from:

- Thru 1-2
- Thru 1-4
- Thru 2-3
- Thru 3-4

Completing AutoCal Setup

When all AutoCal Setup functions are completed, click OK to return to the AutoCal menu. Click Cancel to make no changes and close the dialog box.

- [“AUTOCAL SETUP Menu – 4-Port Cal – 4-Port VNAs” on page 10-86](#)

10-6 AutoCal 2-Port Cal Setup – 4-Port VNAs

AUTOCAL SETUP Menu – 2-Port Cal – 4-Port VNAs

Instrument Mode

- 4-Port Mode

Previous

- [“AUTOCAL PORT Menu – 4-Port VNAs” on page 10-85](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 2-Port Cal | AUTOCAL SETUP

<div><div>AutoCal Setup X</div><div>Modify Cal Setup</div><div>Current Char File is for PLD# 529E39BD</div><div>Port Selection 1,2,3,4</div><div>Cal Type Two Port Cal/s</div><div>Thru Type Internal Thru</div><div>Thru Type[Cal B] Internal Thru</div><div>Cal A Orientation Left=P1;Right=P2</div><div>Cal B Orientation Left=P3;Right=P4</div><div>Begin Cal</div></div>	<div>Modify Cal Setup</div> <p>Select displays the MODIFY 2-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for Auto Sense Module Orientation, Select Cal Type, Through Setup, Adapter Removal Port, and links to the THRU INFO and AIR EQUIVALENT LENGTH CALCULATOR dialog boxes.</p> <ul style="list-style-type: none">• “MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-91• “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285• “AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278 <div>Port Selection (Read Only)</div> <p>Displays the Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <div>Cal Type (Read Only)</div> <p>Displays the Cal Type selected for the AutoCal procedure. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <div>Thru Type (Read Only)</div> <p>Displays the Thru Type selected for the AutoCal procedure as Internal Thru, Internal Reciprocal, True Thru, or True Reciprocal. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <div>Module Orientation (Read Only)</div> <p>Displays the left/right VNA Port orientation and assignment for the AutoCal procedure. Options are either Left=P1 Right =P2 or Left=P2 and Right=P1. The settings are determined in the MODIFY 2-PORT AUTOCAL SETUP dialog box.</p> <div>Begin Cal (AutoCal 2-Port Cal) (2-Port VNAs)</div> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu when the Cal Status button is enabled and set to ON.</p> <ul style="list-style-type: none">• “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8
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Figure 10-58. AUTOCAL SETUP Menu – 2-Port Cal – 4-Port VNAs

MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs

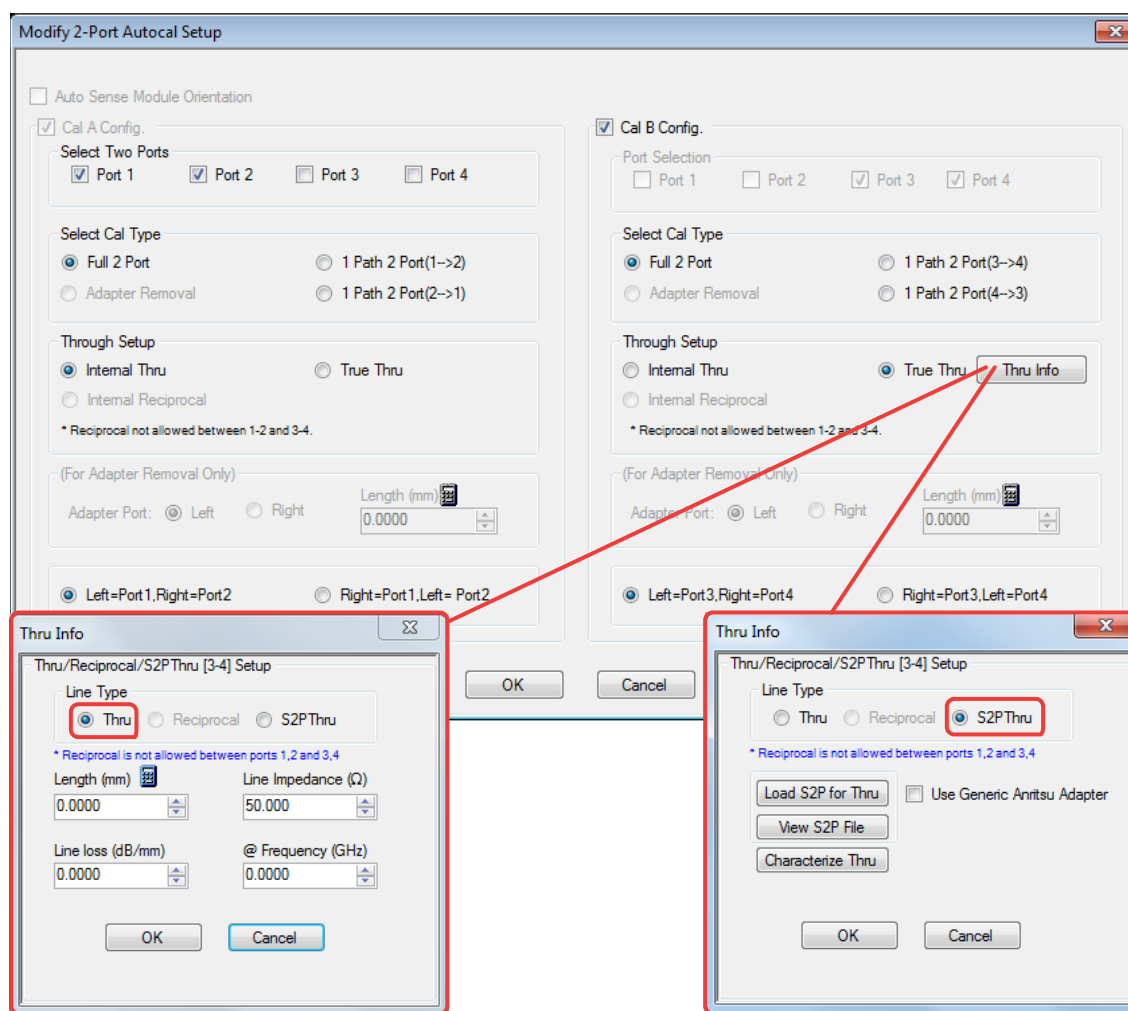
Use the MODIFY 2-PORT AUTOCAL SETUP dialog box to change the calibration parameters prior to an AutoCal calibration procedure. Options include the calibration and thru types to be used. If required, an adapter removal calibration can be configured. For production installations, the left/right port sense can be automatically or manually configured.

Previous

- “AUTOCAL SETUP Menu – 2-Port Cal – 4-Port VNAs” on page 10-90

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 2-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY 2-PORT AUTOCAL SETUP Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
Reciprocal when selected allows user entries for length.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-59. MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs

Auto Sense Module Orientation

The Auto Sense Module Orientation is not available for 2-Port AutoCal calibrations.

Cal A Configuration

The Cal A Configuration is auto-selected.

Select two ports for the Cal A configuration from either:

- Port 1
- Port 2
- Port 3
- Port 4.

Whichever two ports are not selected are auto selected for Cal B Configuration.

Cal A Configuration – Select Cal Type

Select calibration types from the following choices. Note that the 1 Path 2 Port choices depend on the ports selected above in Cal A Configuration. The examples below assume that Port 1 and Port 3 were selected above.

- Full 2 Port
- 1 Path 2 Port (1→3)
- 1 Path 2 Port (3→1)

Cal A Configuration – Through Setup

Select one of:

- Internal Thru
- Internal Reciprocal
- True Thru
 - If True Thru is selected, the Thru Info button is available. Select displays the THRU INFO dialog box which is described in the section above.
 - [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)

For Adapter Removal

The For Adapter Removal area and its controls are not available in 2-Port AutoCal Setup.

Cal A Manual Port Sense Configuration

The port sense configuration options are dependent on the ports selected above in Cal A Configuration. For example:

- If Port 1 and Port 3 were selected above, your choices are:
 - Left = Port 1 and Right = Port 3
 - Left = Port 3 and Right = Port 1

Cal B Configuration

The configuration auto selects whichever ports were not selected in Cal A Configuration.

Cal B Configuration – Select Cal Type

Select calibration types from the following choices. Note that the 1 Path 2 Port choices depend on the ports selected above in Cal A Configuration. The examples below assume that Port 1 and Port 3 were selected above and that the Cal B ports are Port 2 and Port 4.

- Full 2 Port
- 1 Path 2 Port (2→4)
- 1 Path 2 Port (4→2)

Cal B Configuration – Through Setup

Select one of:

- Internal Thru
- Internal Reciprocal
- True Thru
 - If True Thru is selected, the Thru Info button is available. Select displays the THRU INFO dialog box.
 - [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)

Cal B Manual Port Sense Configuration

The selections available are dependent on the ports selected above in Cal A Configuration. For example:

- If Port 1 and Port 3 were selected for Cal A above, your choices are:
 - Left = Port 2 and Right = Port 4
 - Left = Port 4 and Right = Port 2

Completing AutoCal Setup

When all AutoCal Setup functions are completed, click **OK** to return to the AutoCal menu. Click **Cancel** to make no changes and close the dialog box.

- [“AUTOCAL SETUP Menu – 2-Port Cal – 4-Port VNAs” on page 10-90](#)

10-7 AutoCal 1-Port Cal Setup – 4-Port VNAs

AUTOCAL SETUP Menu – 1-Port Cal – 4-Port VNAs

Previous

- [“AUTOCAL PORT Menu – 4-Port VNAs” on page 10-85](#)

Prerequisites

- 4-Port Mode

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 1-Port Cal | AUTOCAL SETUP

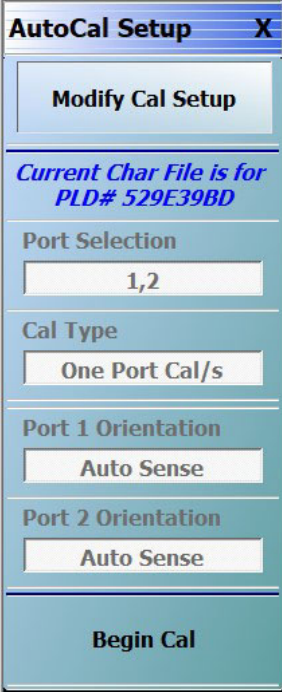
	<p>Modify Cal Setup</p> <p>Select displays the MODIFY 1-PORT AUTOCAL SETUP dialog box. The dialog box provides control settings for 1-Port Calibration Ports and Port Left/Right Identification.</p> <ul style="list-style-type: none">• “MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-95 <p>Port Selection (Read Only)</p> <p>Displays the Port or Ports selected for the AutoCal procedure. The settings are determined in the MODIFY 1-PORT AUTOCAL SETUP dialog box.</p> <p>Cal Type (Read Only)</p> <p>Displays the Cal Type selected for the AutoCal procedure. The setting is defined in the AUTOCAL PORT menu.</p> <ul style="list-style-type: none">• “AUTOCAL PORT Menu – 4-Port VNAs” on page 10-85 <p>Port 1 Orientation (Read Only)</p> <p>This read-only button only appears if Port 1 was selected in the MODIFY 1-PORT AUTOCAL SETUP dialog box. If available, shows the left/right assignment for Port 1.</p> <ul style="list-style-type: none">• “MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-95 <p>Port 2 Orientation (Read Only)</p> <p>This read-only button only appears if Port 2 was selected in the MODIFY 1-PORT AUTOCAL SETUP dialog box. If available, shows the left/right assignment for Port 2.</p> <ul style="list-style-type: none">• “MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-95 <p>Begin Cal (AutoCal 1-Port Cal)</p> <p>Starts the AutoCal procedure. On-screen dialogs and prompts provide user instructions for the selected calibration procedure. When the calibration is complete, the display returns to the CALIBRATION [TR] menu where the Cal Status button is now enabled and set to ON.</p> <ul style="list-style-type: none">• “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8
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Figure 10-60. AUTOCAL PROCEDURE Menu – 1-Port Calibration – 4-Port VNA

MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs

Previous

- [“AUTOCAL SETUP Menu – 1-Port Cal – 4-Port VNAs” on page 10-94](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL PORT | 4-Port Cal | AUTOCAL SETUP | Modify Cal Setup | MODIFY 1-PORT AUTOCAL SETUP Dialog Box

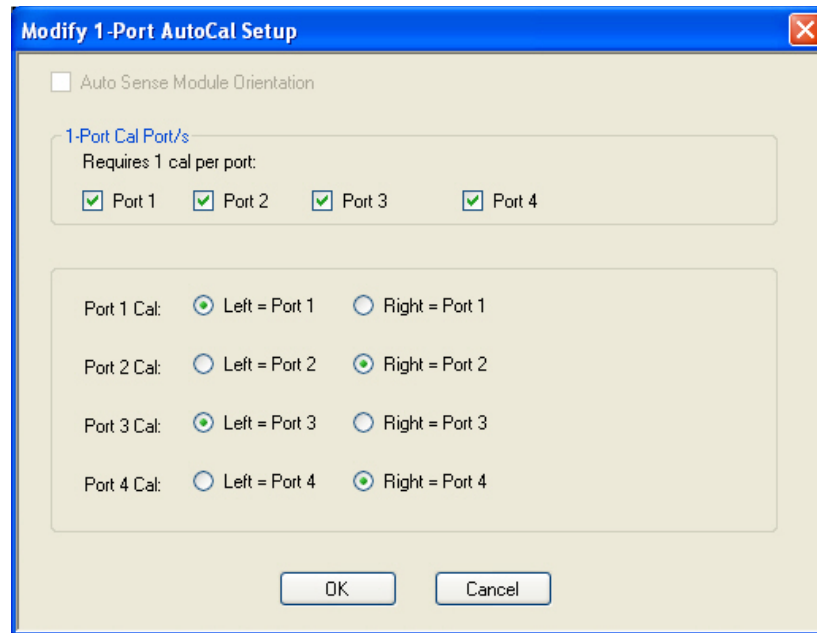


Figure 10-61. MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs

Auto Sense Module Orientation

The Auto Sense Module Orientation is not available for 2-Port AutoCal calibrations.

1-Port Cal Port(2)

Select any combination of ports from Port 1, Port 2, Port 3, or Port 4.

For each port selected above, a left/right configuration radio button becomes available below.

Port Sense Left/Right Configuration

For each selected port above, select the left/right assignment:

- Port 1 Cal: Left = Port 1 or Right = Port 1
- Port 2 Cal: Left = Port 2 or Right = Port 2
- Port 3 Cal: Left = Port 3 or Right = Port 3
- Port 4 Cal: Left = Port 4 or Right = Port 4

Completing AutoCal Setup

When all AutoCal Setup functions are completed, click OK to return to the AutoCal menu. Click Cancel to make no changes and close the dialog box.

- [“AUTOCAL SETUP Menu – 1-Port Cal – 4-Port VNAs” on page 10-94](#)

10-8 Manual Calibration Menus and Dialog Boxes – 4-Port VNAs

Once a manual calibration type such as 3-Port Cal has been selected, the main setup menu (which is named for the cal type such as THREE PORT CAL) appears. The Modify Cal Setup button provides access to the CAL SETUP, CAL METHOD, and LINE TYPE configuration menus with further access to the appropriate calibration parameter configuration dialog box. The manual calibration setup and procedure menus – FOUR PORT CAL, THREE PORT CAL, TWO PORT CAL, ONE PORT CAL, TRANS. RESPONSE, and REFL. RESPONSE and their supporting dialog boxes – change depending on the configuration made during the in the calibration setup. The figure below summarizes the configuration menus and dialogs.

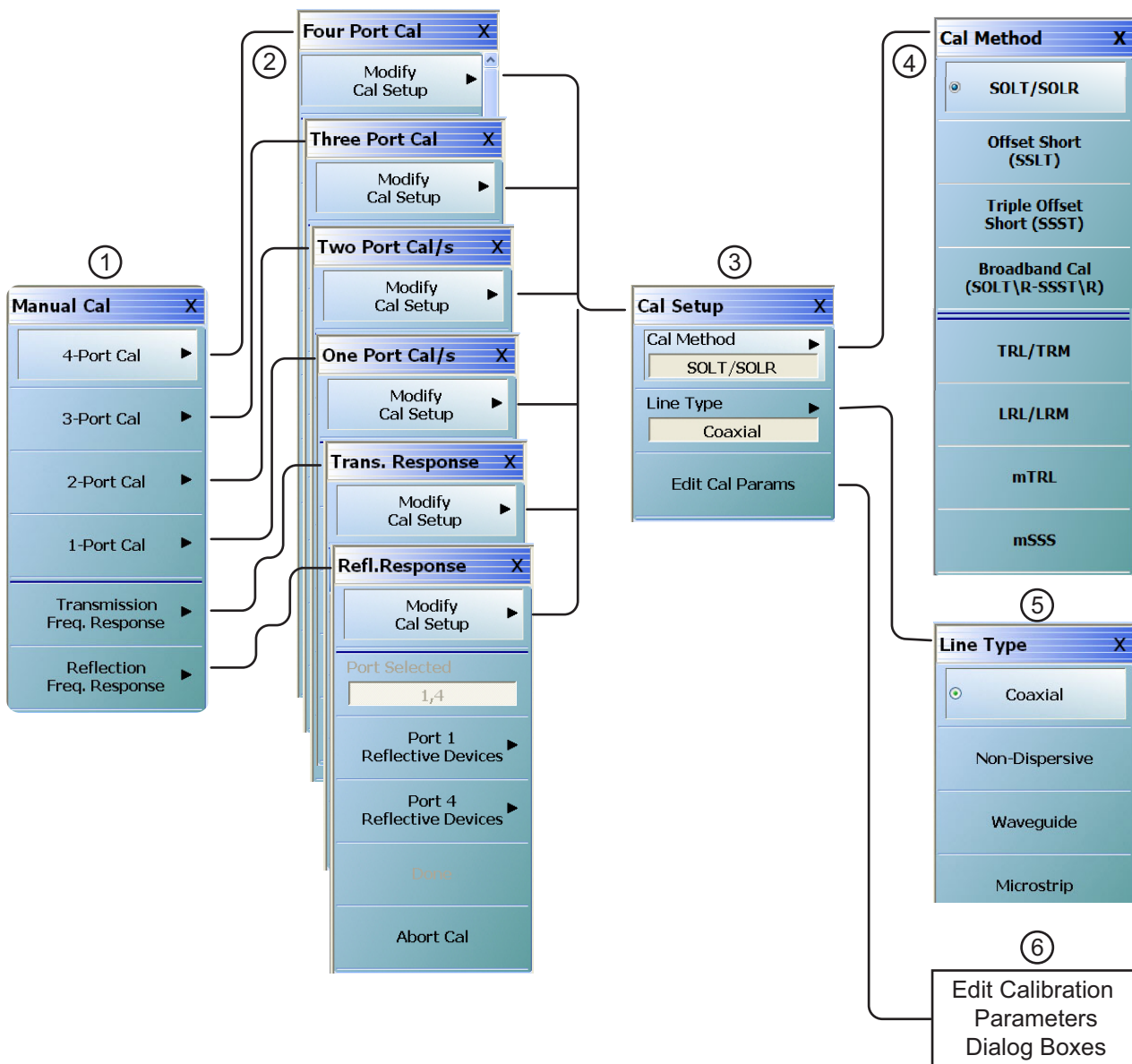


Figure 10-62. Manual Calibration Setup Menus – 4-Port VNAs

Primary menus for manual calibration setup.

1. MANUAL CAL port selection menu.
 2. Calibration setup menus with titles of FOUR PORT CAL, THREE PORT CAL, TWO PORT CAL, ONE PORT CAL, TRANS. RESPONSE, or REFL. RESPONSE.
 3. CAL SETUP selection menu.
 4. CAL METHOD selection menu. (Broadband Cal available only in Broadband configuration with Option 08x and 3739 Test Set.)
 5. LINE TYPE selection menu.
 6. Edit Cal Params button accesses calibration configuration dialog boxes. Dialog box titles vary depending on the calibration type, method, and line type selected.
-

Figure 10-62. Manual Calibration Setup Menus – 4-Port VNAs

About Manual Cal Combinations

The manual calibration setup menus and dialog boxes provide the following port configurations, calibration types, and calibration methods, and line types:

- Manual Calibration Types
 - 4-Port Calibration
 - 3-Port Calibration
 - 2-Port Calibration
 - 1-Port Calibration
 - Transmission Frequency Response Calibration
 - Reflection Frequency Response Calibration
- Calibration Methods
 - SOLT/SOLR – Short-Open-Load-Thru / Short-Open-Load-Return
 - SSLT – Offset Short or Short-Short-Load-Thru
 - SSST – Triple Offset Short or Short-Short-Short-Thru
 - Broadband Cal, Merged (SOLT/SOLR-SSST/SSSR)
 - TRL/TRM – Through-Reflect-Line / Through-Reflect-Match
 - LRL/LRM – Line-Reflect-Line / Line-Reflect-Match
 - mTRL – Multiline Thru-Reflect-Line
 - mSSS – Multiple Offset Short
- Line Types
 - Coaxial
 - Non-Dispersive – Essentially the same as coaxial
 - Waveguide
 - Microstrip

About Manual Cal Setup Dialog Boxes – 4-Port VNAs

Most combinations of the calibration parameters above can be further modified through a series of dialog boxes that control DUT connectors, load types such as broadband or sliding loads, port selection, through types, reference plane location, number of bands, and similar settings. Many of these dialog boxes are shown in this document and all are summarized in tables.

The instrument supports all combinations of 4-port calibration method and line types with configuration dialog boxes. In the interest of document length, not all combinations are described in detail. However, all combinations are summarized in the table at the end of this section.

- [“FULL FOUR PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 10-111](#)

- “FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-114
- “FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-117
- “FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-122
- “FULL FOUR PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-125
- “FULL FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-129
- “FULL FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-135
- “FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-140
- Table: “4-Port Manual Cal Setup Dialog Box Summary” on page 10-143

MANUAL CAL Menu – 4-Port VNAs

Full Name

Manual Calibration

Previous

- [“CALIBRATE Menu – 4-Port VNAs” on page 10-13](#)

Prerequisites

- 4-Port Mode

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL

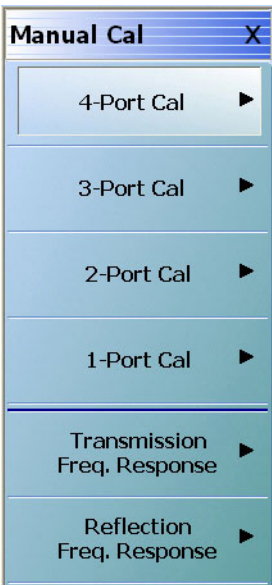
	<p>4-Port Cal</p> <p>Select displays the Four Port Cal menu where the calibration step-by-step procedure is carried out. The button composition of the menu depends on the settings established in the CAL SETUP, CAL METHOD, and LINE TYPE menus and in the related FULL FOUR PORT CAL SETUP dialog boxes. Generally this is the most complete calibration and fully corrects the available four-port S-parameters:</p> <ul style="list-style-type: none"> • S11, S12, S13, S14, S21, S22, S23, S24, S31, S32, S33, S34, S41, S42, S43, S44. <p>The menu shown below is representative of a typical 4-port calibration menu:</p> <ul style="list-style-type: none"> • “FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107 <p>3-Port Cal</p> <p>Select displays the THREE PORT CAL menu where the calibration step-by-step procedure is carried out. The menu shown below is representative of a typical 3-port calibration menu:</p> <ul style="list-style-type: none"> • “THREE PORT CAL Menu – 4-Port VNAs” on page 10-153 <p>2-Port Cal</p> <p>Select displays the TWO PORT CAL menu where the calibration step-by-step procedure is carried out.</p> <p>The menu below is representative of a typical 2-port calibration menu:</p> <ul style="list-style-type: none"> • “TWO PORT CAL Menu – 4-Port VNAs” on page 10-185 <p>The following 2-port calibration procedure examples are provided:</p> <p>1-Port Cal</p> <p>Select displays the One Port Cal menu.</p> <p>The menu below is representative of a typical 1-port calibration.</p> <ul style="list-style-type: none"> • “ONE PORT CAL Menu – 4-Port VNAs” on page 10-223 <p>The following 1-port calibration procedure examples are provided:</p> <p>Transmission Freq. Response</p> <p>Selecting the Transmission Frequency Response button displays the TRANS. RESPONSE menu. During the calibration configuration in the Edit Cal Params CAL SETUP dialog, select forward or reverse or both directions. The menu below is representative of a typical trans. freq. resp. calibration menu:</p> <ul style="list-style-type: none"> • “TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245
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Figure 10-63. MANUAL CALIBRATION Menu – 4-Port VNAs (1 of 2)

	<div><div>Reflection Freq. Response</div><div>Selecting the Reflection Frequency Response button displays the Refl. Response menu. During the calibration configuration in the Edit Cal Params CAL SETUP dialog, select an Open or Short cal component. The menu below is representative of a typical refl. freq. resp. calibration menu:</div><div><ul style="list-style-type: none">• “REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255</div></div>
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Figure 10-63. MANUAL CALIBRATION Menu – 4-Port VNAs (2 of 2)

CAL SETUP Menu – 4-Port VNAs

Use the CAL SETUP menu to set the calibration method (such as SOLT/R or SSLT), the calibration line type (such as coaxial or microwave), and more detailed parameters for ports and connectors through the Edit Cal Parameters button and the linked CAL SETUP dialogs.

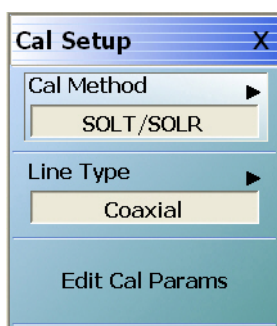
Previous

The CAL SETUP menu can be accessed from multiple menus depending on the manual calibration type selected on the MANUAL CAL menu.

- [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
- [“THREE PORT CAL Menu – 4-Port VNAs” on page 10-153](#)
- [“TWO PORT CAL Menu – 4-Port VNAs” on page 10-185](#)
- [“ONE PORT CAL Menu – 4-Port VNAs” on page 10-223](#)
- [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)
- [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)

Navigation

- The navigation path below assumes that 4-Port Cal manual calibration type was selected on the MANUAL CAL menu.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP
- The general navigation path is:
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | [# of Ports] Cal | [NUM OF PORTS] CAL | Modify Cal Setup | CAL SETUP



Cal Method

The field displays the currently selected calibration method, such as SOLT/SOLR, Broadband Cal, SSLT, SSST, TRL/TRM, LRL/LRM, mTRL, mSSS, or broadband (which is a combination of SOLT/SOLR and SSST/SSSR). Select displays the CAL METHOD menu where a calibration method is selected. Once a selection is made on the CAL METHOD menu, the system auto-returns to this CAL SETUP menu.

- [“CAL METHOD Menu – 4-Port VNA” on page 10-104](#)

Line Type

The field displays the currently selected line type such as Coaxial or Microstrip. Select displays the LINE TYPE menu where a line type is selected. Once a selection is made on the LINE TYPE menu, the system auto-returns to this CAL SETUP menu.

- [“LINE TYPE Menu – 4-Port VNA” on page 10-106](#)

Edit Cal Params

Select displays the appropriate calibration setup dialog box. The exact name of the dialog box varies depending on the calibration type, calibration method, and line type selected.

Dialog box name format: [Cal Type] [Cal Method] Cal Setup [Line Type]

- For example, if Full 2 Port, SOLT/SOLR, and Coaxial were selected, the dialog box name is:
- Full Two Port Cal Setup (SOLT/R, Coaxial)

Figure 10-64. CAL SETUP (CALIBRATION SETUP) Menu (1 of 3)

	<p>Examples of Cal Setup dialog boxes using Coaxial line type are available in the links below:</p> <ul style="list-style-type: none"> • “FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-111 • “FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-114 • “FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-117 • “FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-122 • “FULL FOUR PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-125 • “FULL FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-129 • “FULL FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-135 • “FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-140 • “THREE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-155 • “THREE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-161 • “THREE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-164 • “THREE PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-166 • “THREE PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-170 • “THREE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-174 • “TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-187 • “TWO PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-194 • “TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-198 • “TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-201 • “TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-205 • “TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-208 • “ONE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-226 • “ONE PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-228 • “ONE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-230 • “ONE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-234 • “ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-236 • “TRANS. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-247 • “REFL. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-257
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Figure 10-64. CAL SETUP (CALIBRATION SETUP) Menu (2 of 3)

	<p>The summary tables below list the contents of all calibration setup dialog boxes based on the number of ports involved in the calibration:</p> <ul style="list-style-type: none">• “4-Port Manual Cal Setup Dialog Box Summary” on page 10-143• “3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-177• “2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-213• “1-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-239• “Trans. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-253• “Refl. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-264
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Figure 10-64. CAL SETUP (CALIBRATION SETUP) Menu (3 of 3)

CAL METHOD Menu – 4-Port VNA

Use the CAL METHOD menu to select whether the method of SOLT/SOLR, SSLT, SSST, Broadband Cal (SOLT/R-SSST/R), TRL/TRM, LRL/LRM, mTRL, or mSSS will be used during the calibration.

Previous

- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Navigation

- The navigation path below assumes that Full 2 Port calibration type was selected on the Manual Cal menu.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method | CAL METHOD

<div><div>Cal MethodX</div><div><div><div>SOLT/SOLR</div></div><div><div>Offset Short (SSLT)</div></div><div><div>Triple Offset Short (SSST)</div></div><div><div>TRL/TRM</div></div><div><div>LRL/LRM</div></div><div><div>mTRL</div></div><div><div>mSSS</div></div></div></div>	<div>Auto-Return Button Selection Group:</div> <p>The buttons of the CAL METHOD menu form an auto-return button selection group. Selecting any one button marks the selection with the select icon, de-selects the other buttons, and then auto-returns to the CAL SETUP menu.</p> <ul style="list-style-type: none">• “CAL SETUP Menu – 4-Port VNAs” on page 10-101 <div>SOLT/SOLR</div> <p>Selecting the SOLT/SOLR button sets the calibration method to Short-Open-Load-Thru (or Short-Open-Load-Reciprocal) and then auto-returns to the CAL SETUP menu.</p> <div>Offset Short (SSLT)</div> <p>Selecting the Offset Short (SSLT) button sets the calibration method to Short-Short-Load-Thru and then auto-returns to the CAL SETUP menu.</p> <div>Triple Offset Short (SSST)</div> <p>Selecting the Triple Offset Short (SSST) button sets the calibration method to Short-Short-Short-Thru and then auto-returns to the CAL SETUP menu.</p> <div>Broadband Cal (SOLT/R-SSST/R) – (VNA in Broadband Mode)</div> <p>Broadband Cal is available on systems with Option 08x and the channel is in 3739 mode (via Rcvr Config or Multiple Source). Broadband cal is only valid for full term cals (1-port, 2-port cal, 1-path 2-port, 3-port, 4-port). When Broadband cal is selected the linetype must be set to Coaxial</p> <p>Selecting the Broadband Cal (SOLT/R-SSST/R) button sets the calibration method to Broadband Cal (SOLT/R-SSST/R) and then auto-returns to the CAL SETUP menu.</p> <div>TRL/TRM</div> <p>Selecting the TRL/TRM button sets the calibration method to Through-Reflect-Line or Through-Reflect-Match and then auto-returns to the CAL SETUP menu.</p> <div>LRL/LRM</div> <p>Selecting the LRL/LRM button sets the calibration method to Line-Reflect-Line or Line-Reflect-Match and then auto-returns to the CAL SETUP menu.</p> <div>mTRL</div> <p>Selecting the mTRL button sets the calibration method to multiline TRL (Thru-Reflect-Line) and then auto-returns to the CAL SETUP menu.</p> <div>mSSS</div> <p>Selecting the mSSS button sets the calibration method to multiple offset short (mSSS) and then auto-returns to the CAL SETUP menu.</p>
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Figure 10-65. CAL METHOD Menu (1 of 2)



Figure 10-65. CAL METHOD Menu (2 of 2)

LINE TYPE Menu – 4-Port VNA

Use the LINE TYPE menu to select from coaxial, non-dispersive, waveguide, or microstrip line types. Non-dispersive is for line types such as coplanar waveguide, stripline, or twin-lead and is treated the same as coaxial line.

Procedure Reference

- [Figure 10-66, “LINE TYPE Menu” on page 10-106](#) Callout #4

Previous

- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101.](#)

Navigation

- The navigation path below assumes that Full 2 Port calibration type was selected on the Manual Cal menu.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Line Type | LINE TYPE

Line Type

Coaxial

Non-Dispersive

Waveguide

Microstrip

Auto-Return Button Selection Group

- The four (4) buttons of the LINE TYPE menu form an auto-return button selection group.
- Selecting any one button marks the selection with the select icon, de-selects the other three (3) buttons, and auto-returns to the CAL SETUP menu.

Coaxial (Line Type)

Select sets the line type to coaxial, marks the button with the select icon, de-selects the Non-Dispersive, Waveguide, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.

- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Non-Dispersive (Line Type)

Non-dispersive line types, such as Coplanar Waveguide, Stripline, or twin-lead, are used on transmissions. The system treats non-dispersive lines the same as coaxial line types. Select sets the line type to non-dispersive, marks the button with the select icon, de-selects the Coaxial, Waveguide, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.

- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Waveguide (Line Type)

Waveguide is transmission media such as rectangular or circular waveguide. Select sets the line type to waveguide, marks the button with the select icon, de-selects the Coaxial, Non-Dispersive, and Microstrip buttons, and then auto-returns to the CAL SETUP menu.

- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Microstrip (Line Type)

Microstrip line is typically used in on-wafer media. Select sets the line type to microstrip, marks the button with the select icon, de-selects the Coaxial, Non-Dispersive, and Waveguide buttons, and then auto-returns to the CAL SETUP menu.

- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Figure 10-66. LINE TYPE Menu

10-106

PN: 10410-00319 Rev: AE

MS4640B Series VNA UIRM

10-9 Manual 4-Port Cal Setup – 4-Port VNAs

The FOUR PORT CAL Setup menu and its related dialog boxes is used to set the calibration parameters for the four port calibration.

FOUR PORT CAL Menu – 4-Port VNAs

Button Availability

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant FULL FOUR PORT CAL SETUP dialog box.
- The example procedures at the end of this chapter show examples of various FOUR PORT CAL menus.

Previous

- [“MANUAL CAL Menu – 4-Port VNAs” on page 10-99](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL

	<h4>Modify Cal Setup</h4> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the FULL FOUR PORT CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu – 4-Port VNAs” on page 10-101 <p>The following Cal Method/Line Type combinations are represented with a figure and complete description:</p> <ul style="list-style-type: none"> • “FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-111 • “FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-114 • “FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-117 • “FULL FOUR PORT CAL SETUP (SSST, Waveguide) Dialog Box” on page 10-120 • “FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-122 • “FULL FOUR PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-125 • “FULL FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-129 • “FULL FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-135 • “FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-140 <p>Dialog boxes for all Cal Method/Line Type combinations are summarized in the table below:</p> <ul style="list-style-type: none"> • Table: “Summary of 4-Port Calibration Setup Dialog Boxes” on page 10-143 <p>Port Selected: Read-only display of the ports selected for the pending calibration.</p>
--	---

Figure 10-67. FOUR PORT CAL Menu – 4-Port VNAs – Typical Example (1 of 3)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark.

When all the procedures on the submenu are completed, use the Back button to return to the FOUR PORT CAL menu. The Port 1 Reflective Devices button (shown below at #2) is now marked with a completion checkmark.

**Port 1 Reflective Devices**

Select displays the REFL. DEVICES PORT 1 submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

- Example: [“REFL. DEVICE\(S\) Menu – 4-Port VNAs” on page 10-267](#)

Port 2 Reflective Devices

Select displays the REFL. DEVICES PORT 2 submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Port 3 Reflective Devices

Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Port 4 Reflective Devices

Select displays the REFL. DEVICES PORT 4 submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

Thru/Recip

Select displays the THRU/RECIP submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

- [“THRU/RECIP Menu – 4-Port VNAs” on page 10-273](#)

Isolation (Optional)

If required, select displays the ISOLATION submenu. When all procedures are complete, select the Back button to return to the FOUR PORT CAL menu where this button is now marked with a completion checkmark.

- [“ISOLATION \(OPTIONAL\) Menu” on page 10-275](#)

Done

This button is unavailable until all measurements for a particular cal setup is completed. When it is available and is clicked, it returns the user to the CALIBRATION menu where the Cal Status button is set to ON.

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Figure 10-67. FOUR PORT CAL Menu – 4-Port VNAs – Typical Example (2 of 3)

However, when LRL/LRM is selected for 4-Port Cal, and the setup procedure has been completed for the devices, the ALRM Match Devices Calculated Values dialog appears to allow for further modifications.

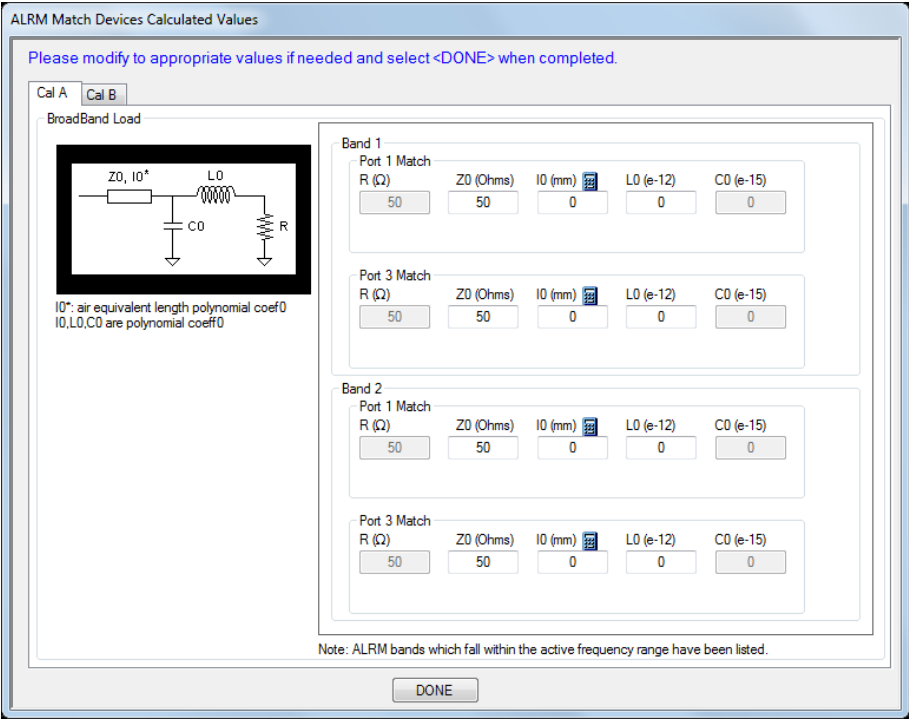
- [“ALRM Match Devices Calculated Values Dialog for Cal A Match Devices” on page 10-109](#)

Abort Cal

This button stops the current calibration procedure and returns to the CALIBRATION menu.

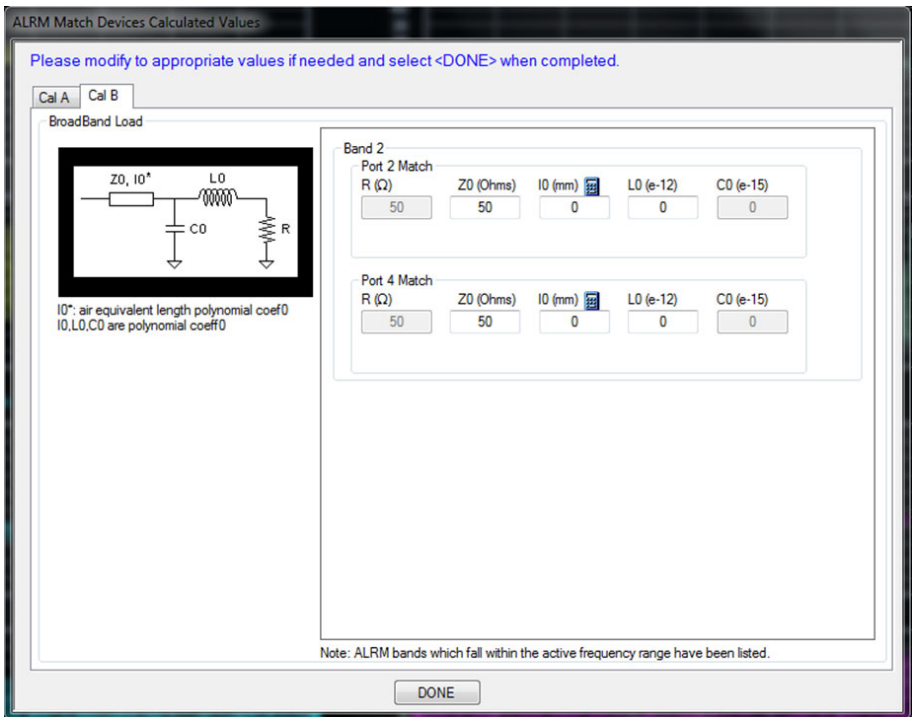
- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Figure 10-67. FOUR PORT CAL Menu – 4-Port VNAs – Typical Example (3 of 3)



When ALRM is selected for 4-Port Cal, and the setup procedure has been completed for the devices in the [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#), this dialog appears when Done is clicked on the menu.

Figure 10-68. ALRM Match Devices Calculated Values Dialog for Cal A Match Devices



When ALRM is selected for 4-Port Cal, and the setup procedure has been completed for the devices in the [“FOUR PORT CAL Menu – 4-Port VNAs”](#) on page 10-107, this dialog appears when Done is clicked on the menu.

Figure 10-69. ALRM Match Devices Calculated Values Dialog for Cal B Match Devices

FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Previous

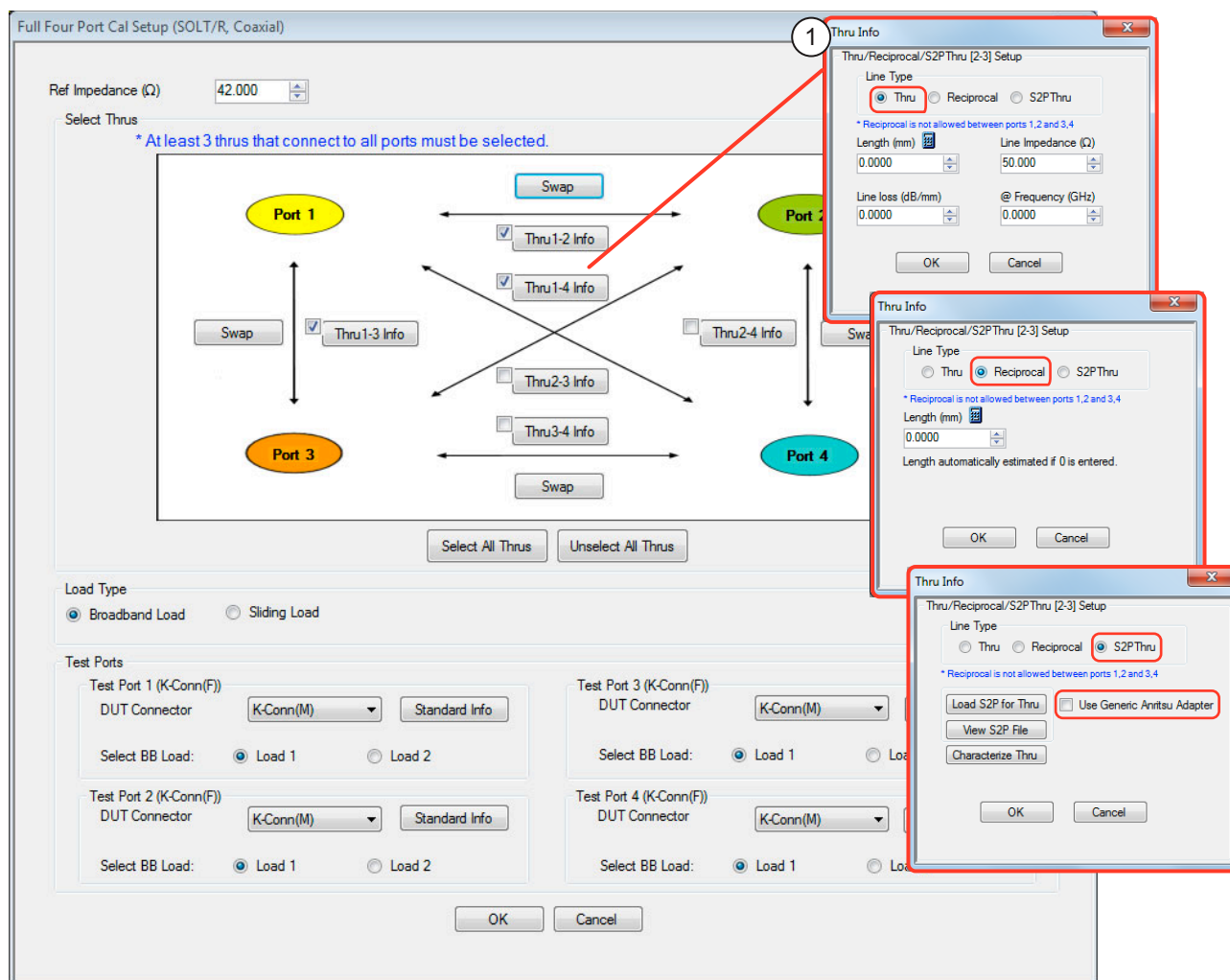
- “FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SOLT/SOLR
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 Reciprocal selected allows user entry for length.
 S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-70. FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Through Area

Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3,4

Thru Buttons

Each of the Throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Swap Buttons

Each of the Swap buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Load Type Area

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected, a message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”

Test Port 1 Connector Type Area

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)

- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)

Test Port 1 Select BB Load Area

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2, Test Port 3, and Test Port 4 Connector Type Area

Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

Test Port 2, Test Port 3, and Test Port 4 Select BB Load Area

Identical function as with the Test Port 1 Select BB Load Area above. Select between Load 1 and Load 2.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box

Previous

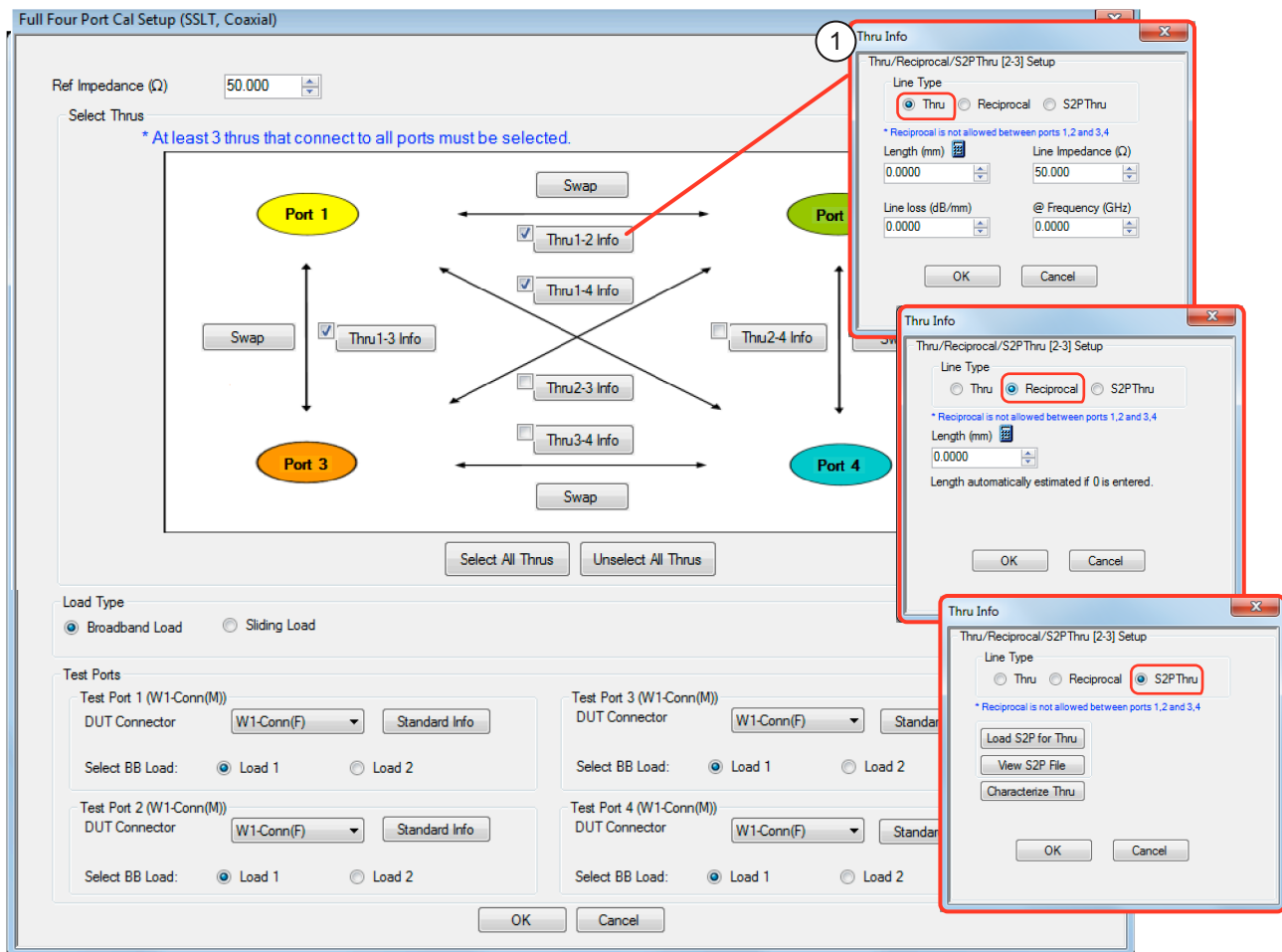
- “FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSLT
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 Reciprocal selected allows user entry for length.
 S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-71. FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Throughs

Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Swap Buttons

Each of the **Swap** buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Thru Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Load Type

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected, a message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”

Test Port 1 Connector Type

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)

Test Port 1 Select BB Load

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2, Test Port 3, and Test Port 4 Connector Type

Identical function as with the Test Port 1 Connector above. Select the DUT Connector Type from a drop-down menu list.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

Test Port 2, Test Port 3, and Test Port 4 Select BB Load

Identical function as with the Test Port 1 Select BB Load above. Select between Load 1 and Load 2.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box

Previous

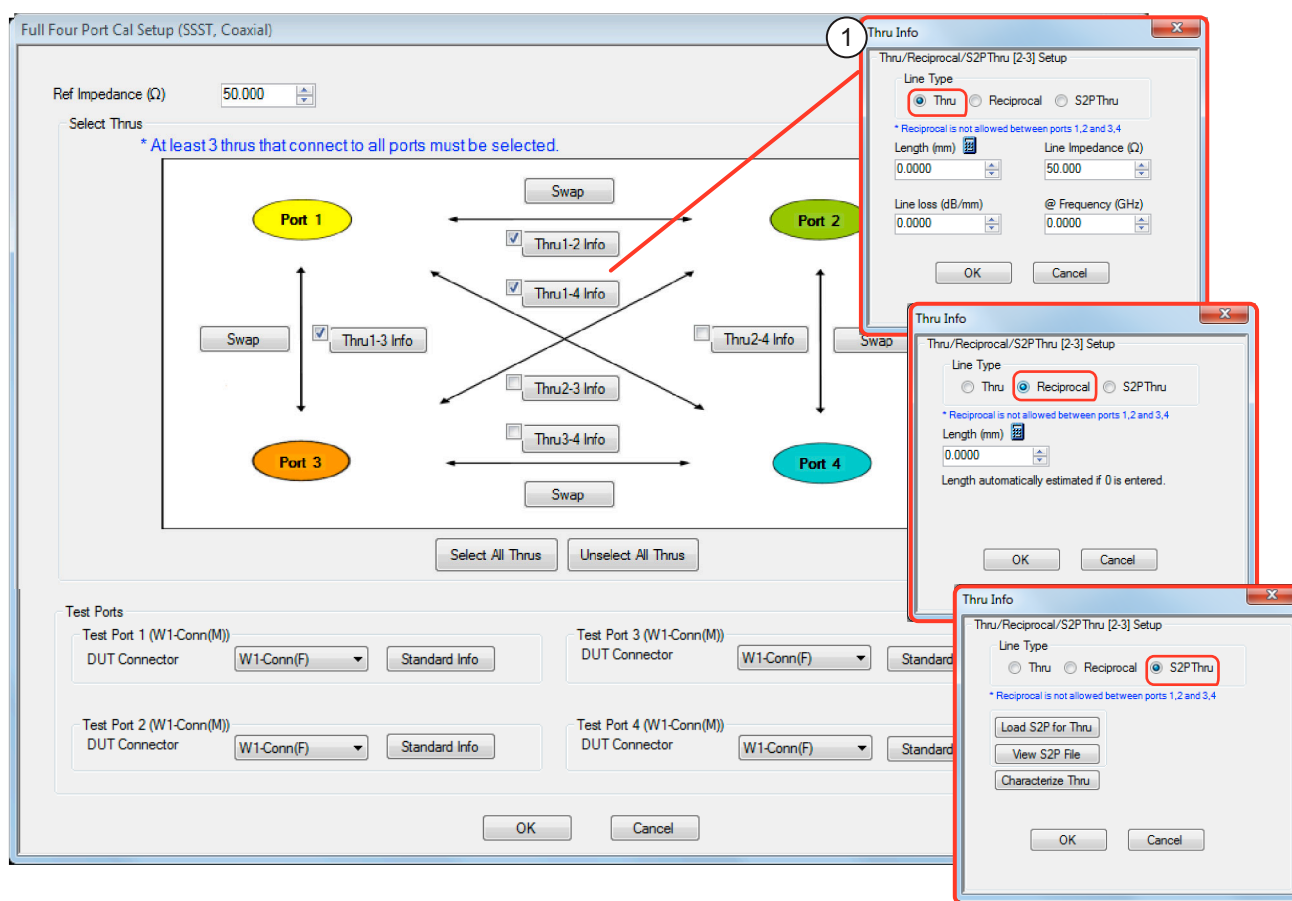
- “FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSST
- Line Type = Coaxial

Navigation

- This dialog box is available from multiple menus.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 Reciprocal selected allows user entry for length.
 S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-72. FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Throughs

Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Swap Buttons

Each of the Swap buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Thru Info Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Test Port 1 Connector Type

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)

Test Port 2, Test Port 3, and Test Port 4 Connector Type

Identical function as with the Test Port 1 Connector above. Select the DUT Connector Type from a drop-down menu list.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (SSST, Waveguide) Dialog Box

Previous

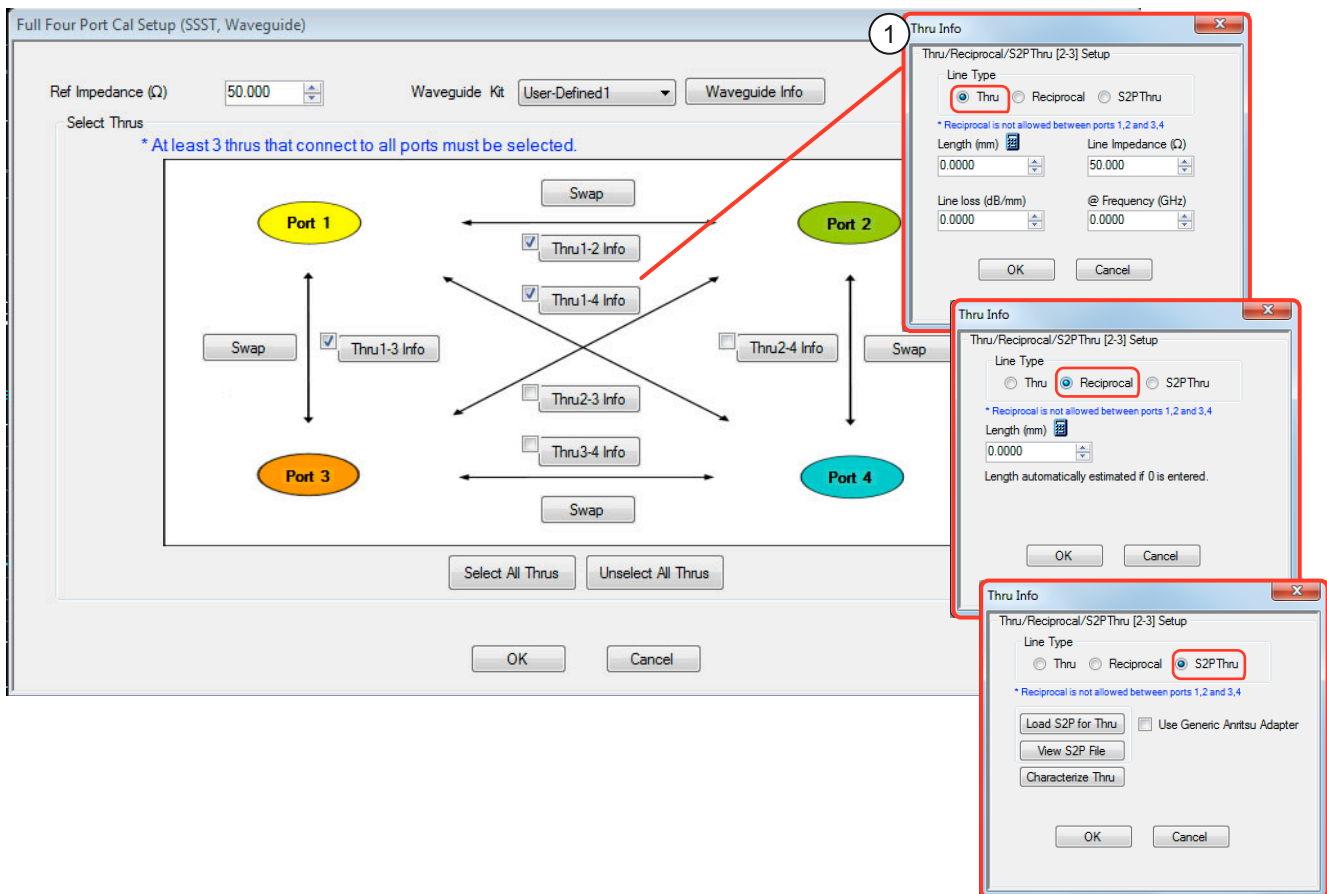
- “FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSST
- Line Type = Waveguide

Navigation

- This dialog box is available from multiple menus.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Waveguide | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSST, Waveguide) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 Reciprocal selected allows user entry for length.
 S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-73. FULL FOUR PORT CAL SETUP (SSST, Waveguide) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Waveguide Kit

Select the **Waveguide Kit** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Select Throughs

Select any combination of throughs as long as three are selected that connect to all ports. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Swap Buttons

Each of the Swap buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Thru Buttons

As each through is selected, it enables a Thru Info button that displays the THRU INFO configuration dialog box for the selected port pair. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box

Full Name

Full Four Port Cal Setup (Broadband Cal, Merged SOLT-SOLR/SSST-SSSR)

Previous

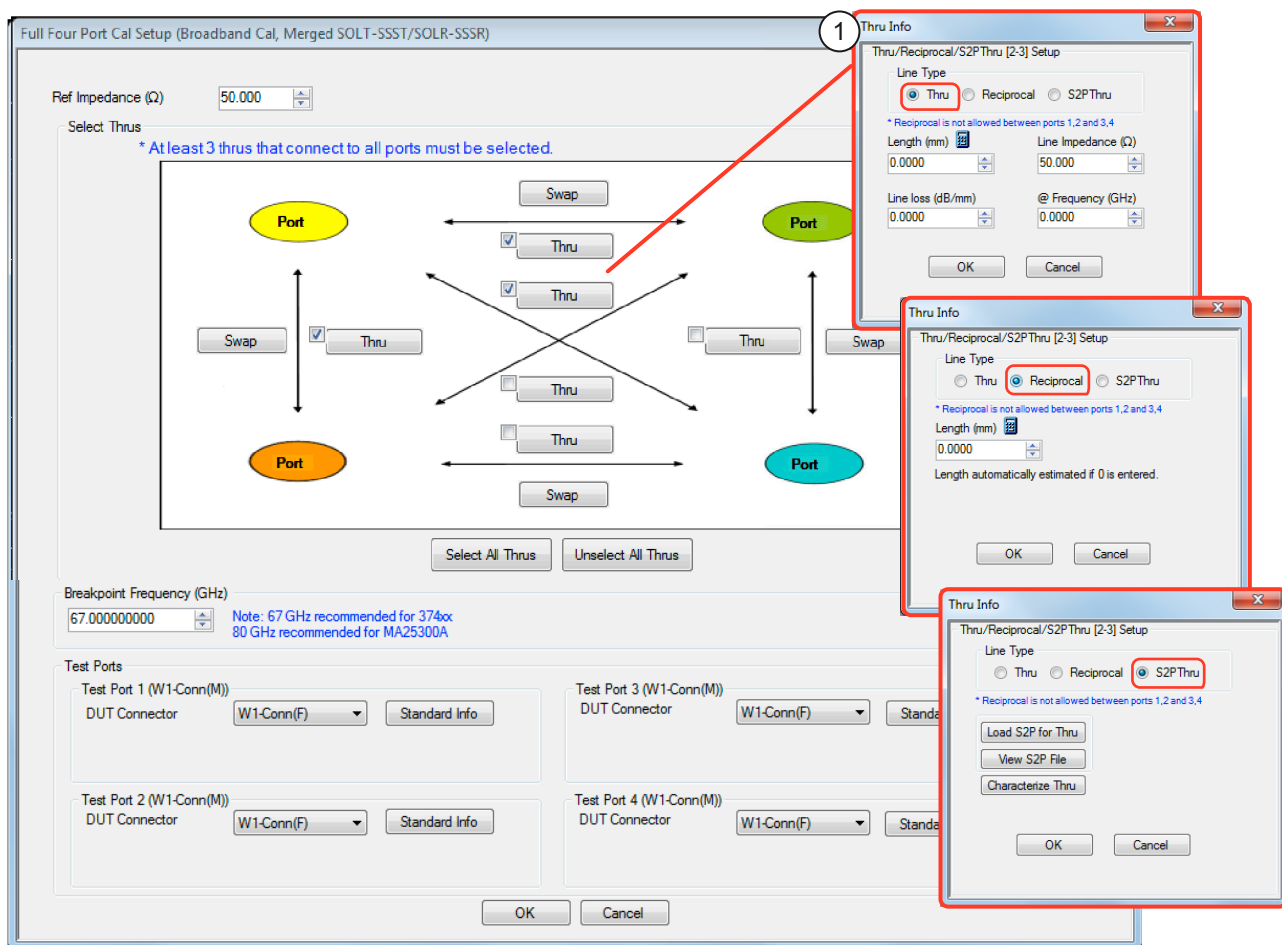
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “CAL METHOD Menu – 4-Port VNA” on page 10-104
- “FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = Broadband Cal (SOLT/R-SSST/R) – Appears only with VNA in Broadband Mode (3739)
- Line Type = Coaxial

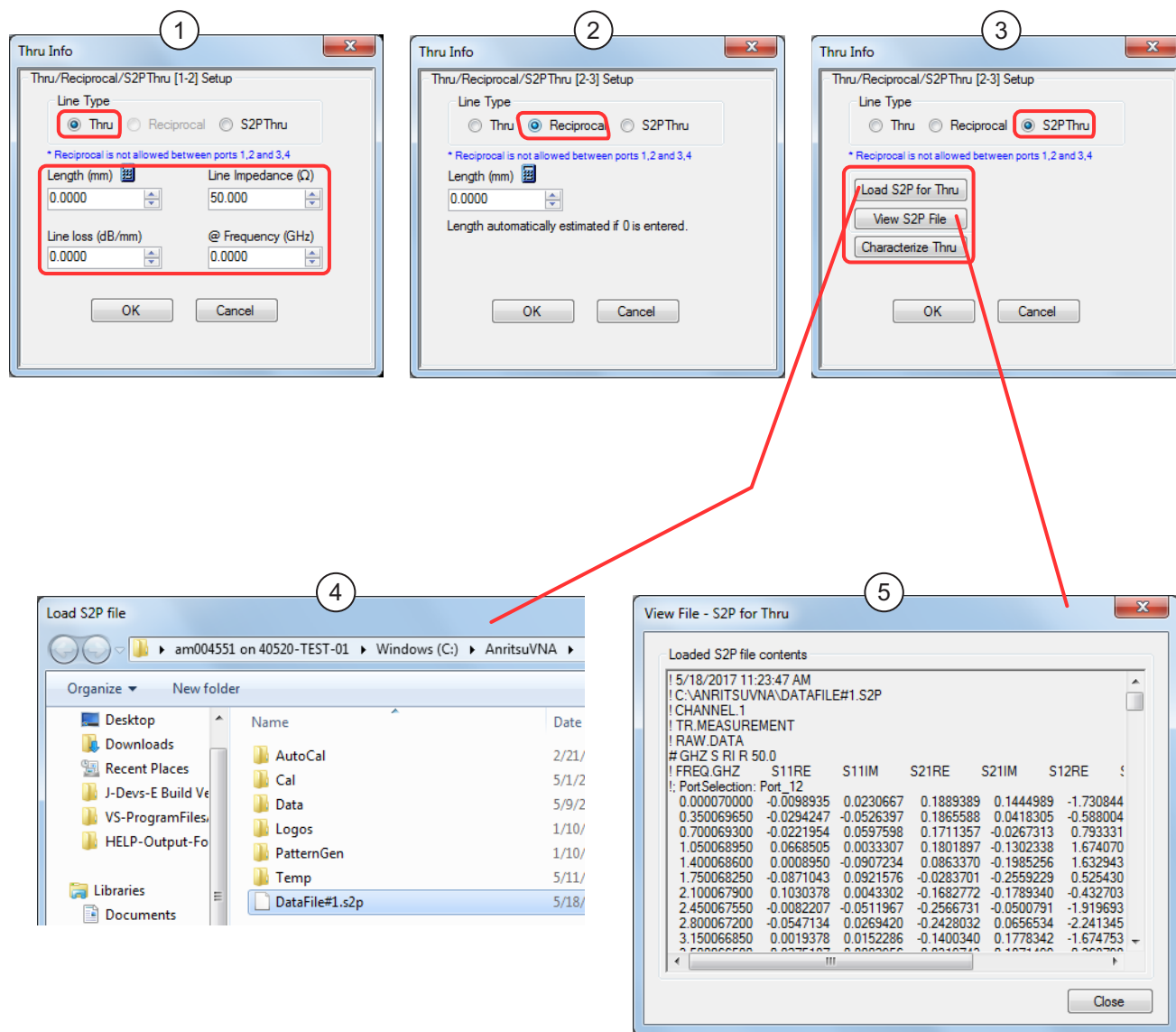
Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = Broadband Cal (SOLT/R-SSST/R) | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
Reciprocal selected allows user entry for length.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-74. FULL FOUR PORT CAL SETUP Broadband Cal, Merged (SOLT/SOLR-SSST/SSSR) Dialog Box



1. Thru Info Dialog – Line Type Thru selected, allowing configuration of Thru
2. Thru Info Dialog – Line Type S2P Thru selected, allowing loading, viewing and generation of S2P files
3. File Load Dialog
4. View S2P File contents window

Figure 10-74. FULL FOUR PORT CAL SETUP Broadband Cal, Merged (SOLT/SOLR-SSST/SSSR) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Through Area

Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 2-3
- Thru 1-3
- Thru 2-4
- Thru 1-4
- Thru 3.4

Thru Buttons

Each of the Throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through, or loading of an S2P file. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)

Swap Buttons

Each of the Swap buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Breakpoint Frequency

- 67 GHz is recommended for the 3656 (1 mm) calibration kit.
- 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
- In this combined calibration, the breakpoint frequency defines the frequency above which the SSS algorithm will be used (and SOL will be used for the frequencies at or below the breakpoint). Default values are based on Anritsu calibration kits and are optimal for those components.

Test Port 1 Connector Type Area

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal.

- [“STANDARD INFO \(Broadband Cal\) 0.8 mm Connector \(M\) Dialog Box” on page 10-282](#)

The following link shows a typical User-defined Standard information dialog box for broadband cal.

- [“USER DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 10-287](#)

Test Port 2, Test Port 3, and Test Port 4 Connector Type Area

Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

OK / Cancel

Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

Previous

- [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Prerequisites

- VNA Mode = 4-Port Mode; Cal Method = TRL/TRM; Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = TRL/TRM | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

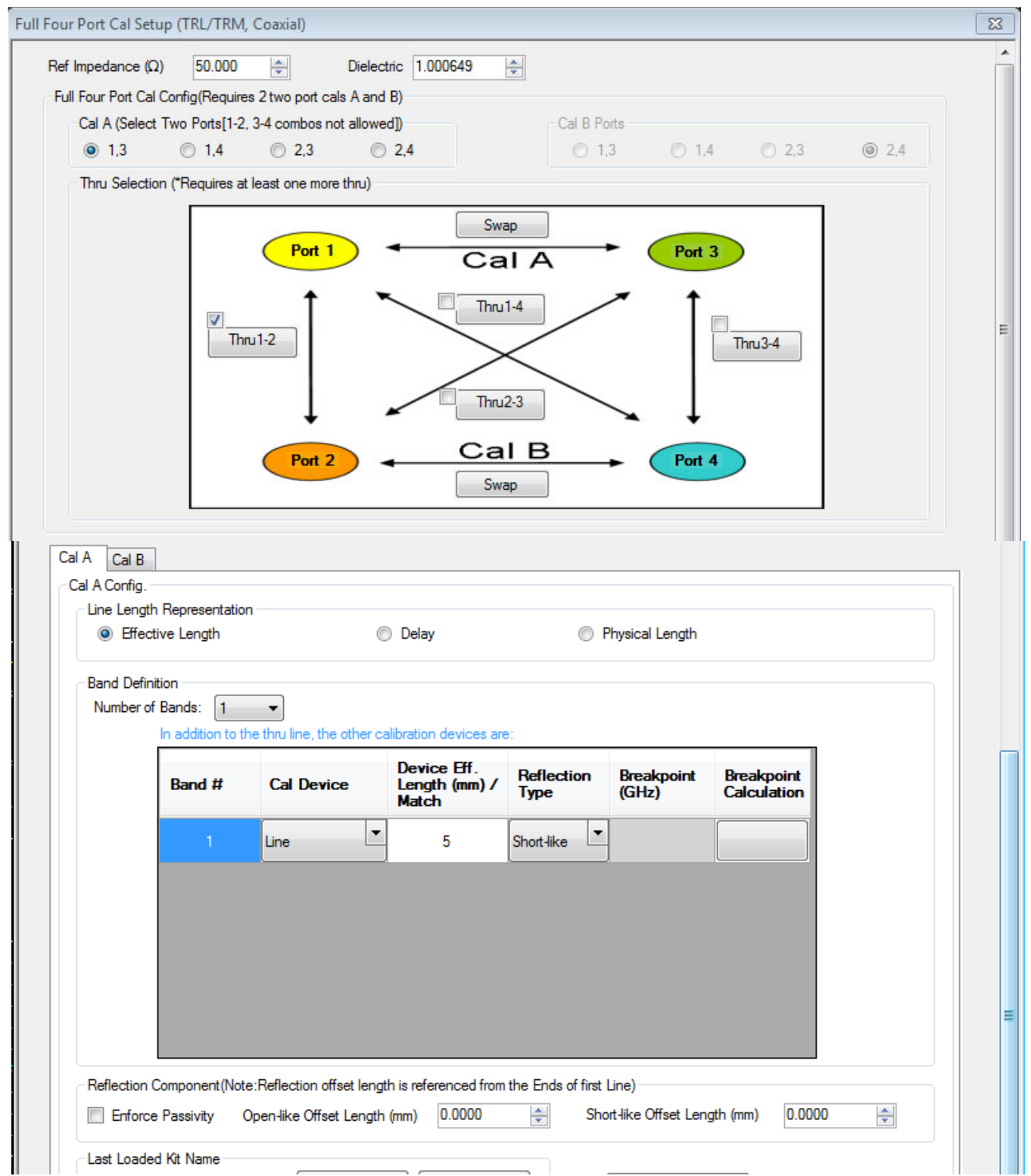


Figure 10-75. FOUR PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

Overview

The dialog box provides common areas for Reference Impedance, Full Four Port Calibration Configuration, and Thru Selection. Below this common section are two tabbed dialog areas for Cal A and Cal B.

Full Four Port Cal Configuration

Requires two 2-port calibrations as Cal A and Cal B, configured below.

Reference Impedance

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Cal A Ports

Allows selection of the calibration A port pair. Combinations of ports 1-2 and ports 3-4 are not allowed.

- Port 1, 3
- Port 1, 4
- Port 2, 3
- Port 2, 4

Cal B Ports

This area is read-only and defined by the port pair choice for Cal A.

- If Cal A = Ports 1, 3, then Cal B = Ports 2, 4
- If Cal A = Ports 1, 4, then Cal B = Ports 2, 3
- If Cal A = Ports 2, 3, then Cal B = Ports 1, 4
- If Cal A = Ports 2, 4, then Cal B = Ports 1, 3

Thru Selection

Any combination of Throughs may be selected as long as least one additional through is selected from:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 3-4

Swap Buttons

Each of the Swap buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Cal A / Cal B Tabs

Access the Cal A or Cal B functions and controls by selecting either the Cal A or Cal B tab.

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

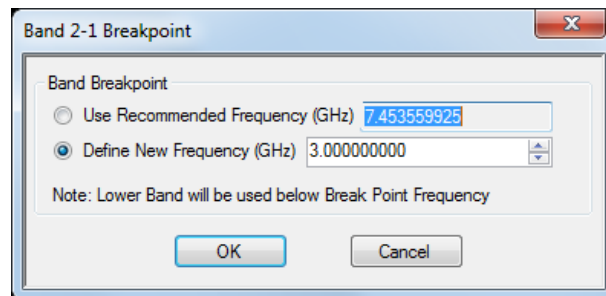
Band Definition

Select one to five bands from the drop-down menu.

- Number of Bands = 1. Only the Band 1 Definition and editable parameters appear.
- Number of Bands = 2. The Band 2 Definition and editable parameters appear.
- Number of Bands = 3. The Band 3 Definition and editable parameters appear.
- Number of Bands = 4. The Band 4 Definition and editable parameters appear.
- Number of Bands = 5. The Band 5 Definition and editable parameters appear.

Band Parameter Definitions

- **Cal Device**
 - Line
 - Match
- **Device Effective Length (mm) / Match**
 - Line: Enter device effective length for each band
 - Match: [“USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM” on page 10-288](#)
- **Reflection Type**
 - Enter a reflection type for each band.
 - Short-like
 - Open-like
 - Both (available only if Cal Device Y= Match)
- **Breakpoint (GHz)**
 - Enter a breakpoint frequency for Bands 2–5. (This area only active for band 2–5.)
- **Breakpoint Calculation**
 - Select to Calculate a breakpoint frequency for band 2:



Reflection Component

- Enforce Passivity – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- Enter Open-like and/or Short-like offset length

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- Last Loaded Kit Name – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- Save Kit saves the present cal setup.
- Load Kit loads a previously saved cal setup.
- Restore Defaults loads the instrument default values for the Cal Setup.

OK/Cancel

- OK and Cancel returns user to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box

Previous

- [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Prerequisites

- VNA Mode = 4-Port Mode; Cal Method = LRL/LRM; Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box

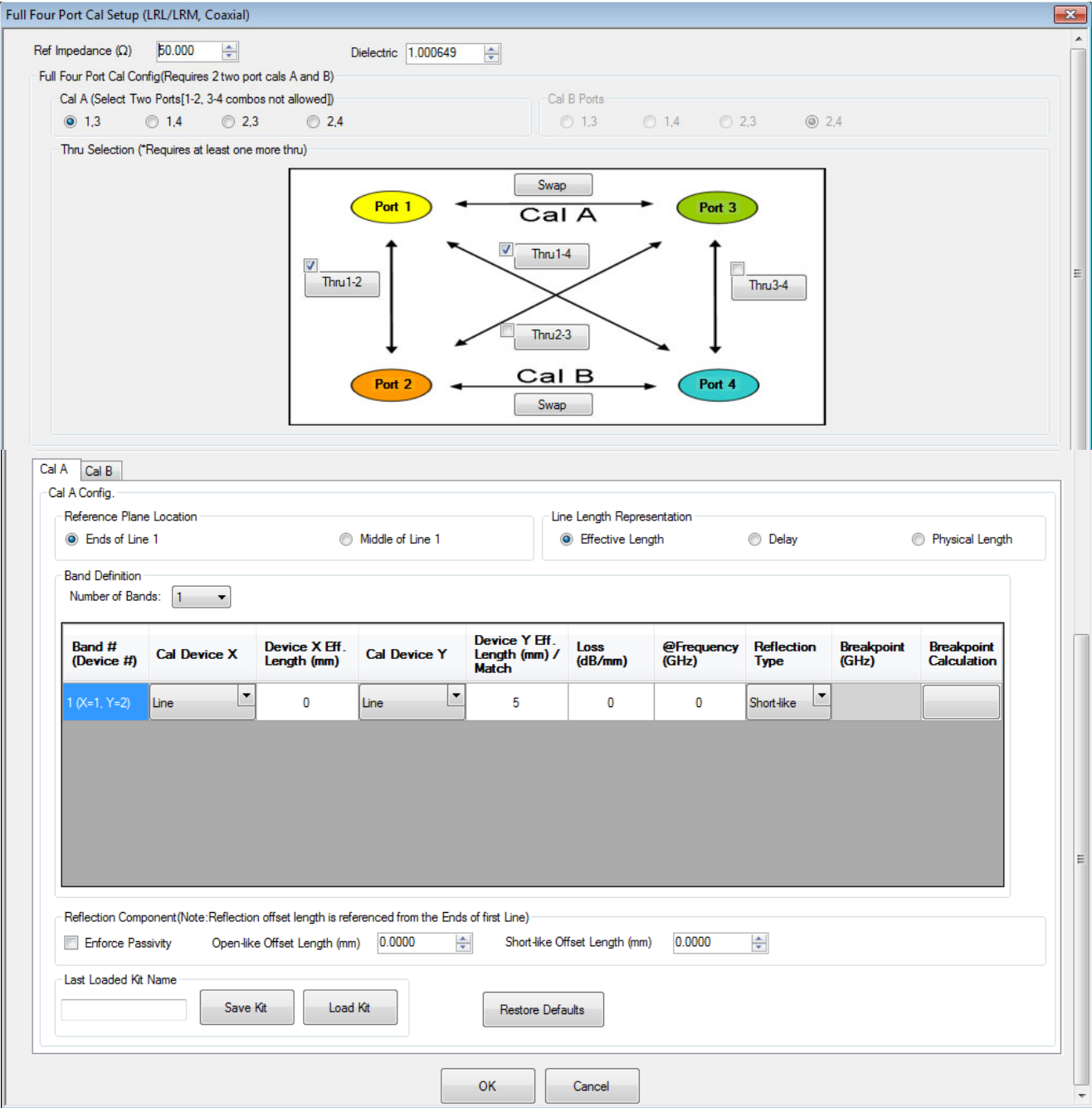
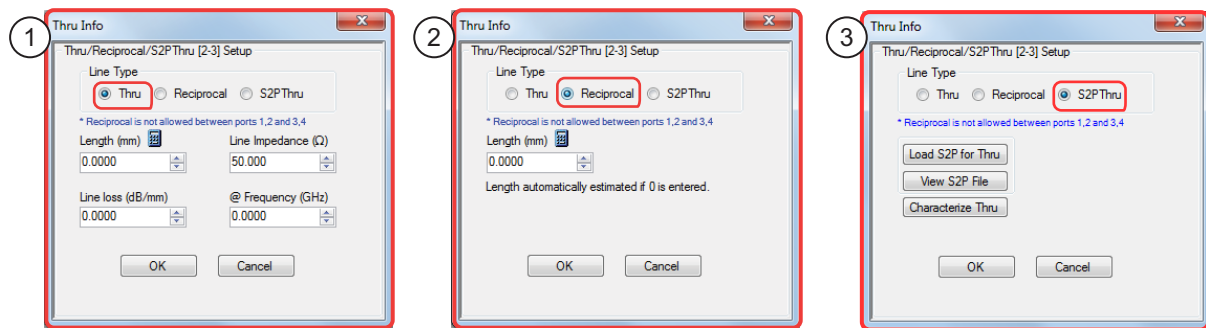


Figure 10-76. FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box (1 of 2)

**Thru 2-3 Info Example:**

1. Through selected allows user entries for length, line impedance, line loss, and frequency.
2. Reciprocal selected allows user entry for length.
3. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-76. FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box (2 of 2)**Overview**

The dialog box provides common areas for Reference Impedance, Full Four Port Calibration Configuration, and Thru Selection. Below this common section are two tabbed dialog areas for Cal A and Cal B.

Full Four Port Cal Configuration

Requires two 2-port calibrations as Cal A and Cal B, configured below.

Reference Impedance

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Cal A Ports

Allows selection of the calibration A port pair. Combinations of ports 1-2 and ports 3-4 are not allowed.

- Port 1, 3
- Port 1, 4
- Port 2, 3
- Port 2, 4

Cal B Ports

This area is read-only and defined by the port pair choice for Cal A.

- If Cal A = Ports 1, 3, then Cal B = Ports 2, 4
- If Cal A = Ports 1, 4, then Cal B = Ports 2, 3
- If Cal A = Ports 2, 3, then Cal B = Ports 1, 4
- If Cal A = Ports 2, 4, then Cal B = Ports 1, 3

Thru Selection

Any combination of Thru's may be selected as long as at least one additional through is selected from:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 3-4

Swap Buttons

Each of the Swap buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Cal A / Cal B Tabs

Access the Cal A or Cal B functions and controls by selecting either the Cal A or Cal B tab.

Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Band Definition

Select one to five bands from the drop-down menu.

- Number of Bands = 1. Only the Band 1 Definition and editable parameters appear.
- Number of Bands = 2. The Band 2 Definition and editable parameters appear.
- Number of Bands = 3. The Band 3 Definition and editable parameters appear.
- Number of Bands = 4. The Band 4 Definition and editable parameters appear.
- Number of Bands = 5. The Band 5 Definition and editable parameters appear.

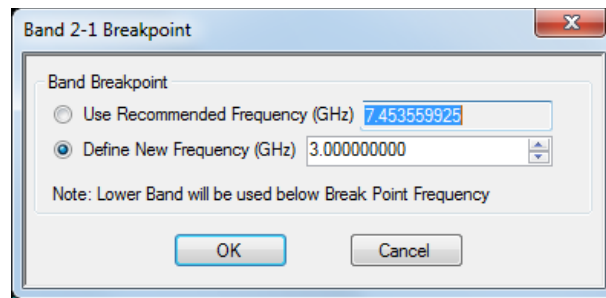
Band Parameter Definitions

- **Band # (Device #)**
 - Band 1 defines Devices as $X = 1$ and $Y = 2$
 - Band 2 defines Devices as $X = 3$ and $Y = 4$
 - Band 3 defines Devices as $X = 5$ and $Y = 6$
 - Band 4 defines Devices as $X = 7$ and $Y = 8$
 - Band 5 defines Devices as $X = 9$ and $Y = 10$
- **Cal Device X**
 - Band 1 choice is
 - Line
 - Band 2 choices are
 - New Line
 - Bnd1 Cal Dev X
 - Bnd1 Cal Dev Y
 - Band 3 choices are

- New Line
- Bnd1 Cal Dev X
- Bnd1 Cal Dev Y
- Bnd2 Cal Dev X
- Bnd2 Cal Dev Y
- Band 4 choices are
 - New Line
 - Bnd1 Cal Dev X, Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X, Bnd2 Cal Dev Y
 - Bnd3 Cal Dev X, Bnd3 Cal Dev Y
- Band 5 choices are
 - New Line
 - Bnd1 Cal Dev X, Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X, Bnd2 Cal Dev Y
 - Bnd3 Cal Dev X, Bnd3 Cal Dev Y
 - Bnd4 Cal Dev X, Bnd4 Cal Dev Y
- **Device X Length (mm)**
 - Enter device length for each band
- **Cal Device Y**
 - Select Line or Match for each band.
- **Device Y Length (mm)/Match**
 - Enter device length for each band if Device Y is Line.
 - Select Match Info if Device Y is Match. Opens [“USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM”](#) on page 10-289.
- **Loss (dB/mm)**
 - Enter loss for each band.
- **@Frequency (GHz)**
 - Enter frequency for line loss for each band.
- **Reflection Type**
 - Enter a reflection type for each band.
 - Short-like
 - Open-like
 - Both (available only if Cal Device Y= Match)
- **Breakpoint (GHz)**
 - Enter a breakpoint frequency for Bands 2–5. (This area only active for band 2–5.)

- **Breakpoint Calculation**

- Select to Calculate a breakpoint frequency for band 2:

**Reflection Component**

- **Enforce Passivity** – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- **Enter Open-like and/or Short-like offset length**

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- **Last Loaded Kit Name** – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- **Save Kit** saves the present cal setup.
- **Load Kit** loads a previously saved cal setup.
- **Restore Defaults** loads the instrument default values for the Cal Setup.

OK/Cancel

- **OK and Cancel** returns user to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box

Previous

- [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Prerequisites

- VNA Mode = 4-Port Mode; Cal Method = mTRL; Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mTRL | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box

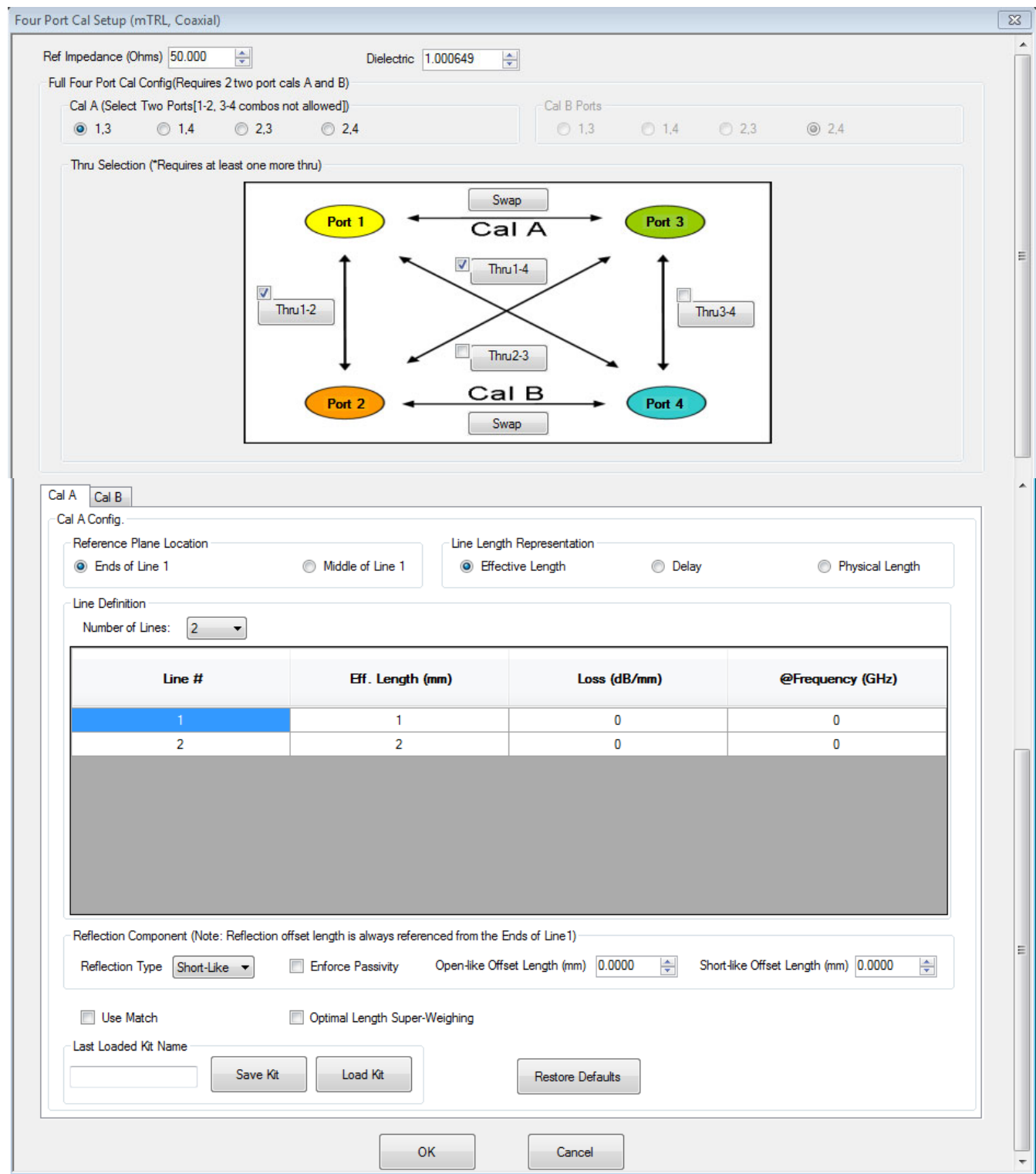
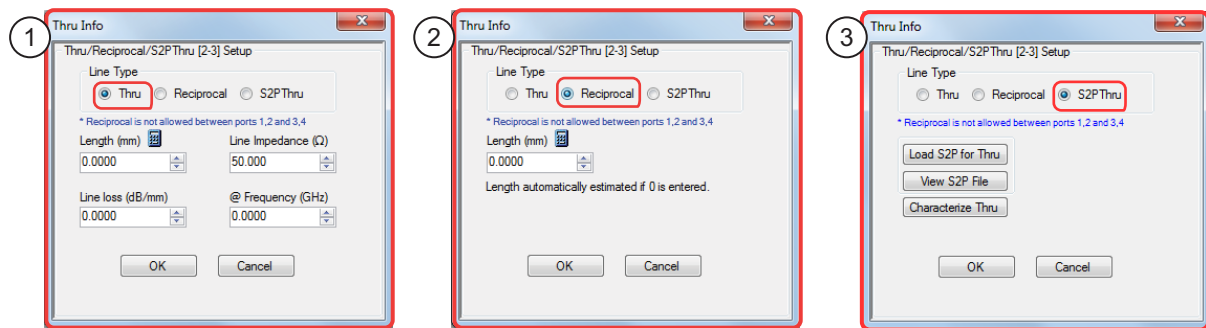


Figure 10-77. FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box (1 of 2)



Thru 2-3 Info Example:

1. Through selected allows user entries for length, line impedance, line loss, and frequency.
2. Reciprocal selected allows user entry for length.
3. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-77. FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box (2 of 2)

Overview

The dialog box provides common areas for Reference Impedance, Dielectric, Full Four Port Calibration Configuration, and Thru Selection. Below this common section are two tabbed dialog areas for Cal A and Cal B.

Full Four Port Cal Configuration

Requires two 2-port calibrations as Cal A and Cal B, configured below.

Reference Impedance

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Cal A Ports

Allows selection of the calibration A port pair. Combinations of ports 1-2 and ports 3-4 are not allowed.

- Port 1, 3
- Port 1, 4
- Port 2, 3
- Port 2, 4

Cal B Ports

This area is read-only and defined by the port pair choice for Cal A.

- If Cal A = Ports 1, 3, then Cal B = Ports 2, 4
- If Cal A = Ports 1, 4, then Cal B = Ports 2, 3
- If Cal A = Ports 2, 3, then Cal B = Ports 1, 4
- If Cal A = Ports 2, 4, then Cal B = Ports 1, 3

Thru Selection

Any combination of Thrus may be selected, as long as least one additional through is selected from:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 3-4

Swap Buttons

Each of the **Swap** buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Cal A / Cal B Tabs

Access the Cal A or Cal B functions and controls by selecting either the Cal A or Cal B tab.

Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Line Definition

Select two to ten line from the drop-down menu.

- Number of Lines = 2. The Lines 1 and 2 editable parameters appear.
- Number of Lines = 3. The Lines 1 through 3 editable parameters appear.
- Number of Lines = 4. The Lines 1 through 4 editable parameters appear.
- ...
- Number of Lines = 10. The Lines 1 through 10 editable parameters appear.

Line Parameter Definitions

- **Line #**
- **Effective Length (mm) (If Effective Length is selected)**
 - Enter effective length for each line.
- **Delay (ps) (If Delay is selected)**
 - Enter delay for each line.
- **Physical Length (mm) (If Physical Length is selected)**
 - Enter physical length for each line.
- **Loss (dB/mm)**
 - Enter loss for each line.
- **@Frequency (GHz)**
 - Enter frequency for line loss for each line.

Reflection Component

- Select Reflection Type
- Enforce Passivity – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- Enter Open-like and/or Short-like offset length.

Use Match

- If selected, will display the Match Info button to open the [USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM](#).

Optimal Length Super-Weighting

- Enables the use of an enhanced weighting scheme during the calibration to further emphasize line pairs that have optimal line length deltas. The use of this feature further de-emphasizes non-optimal pairs and reduces the impact of repeatability differences.

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- Last Loaded Kit Name – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- Save Kit saves the present cal setup.
- Load Kit – Click opens window to navigate to a desired existing mTRL cal kit file (.mlcf).
- Restore Defaults loads the instrument default values for the Cal Setup.

OK/Cancel: Returns user to the CAL SETUP menu.

FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Previous

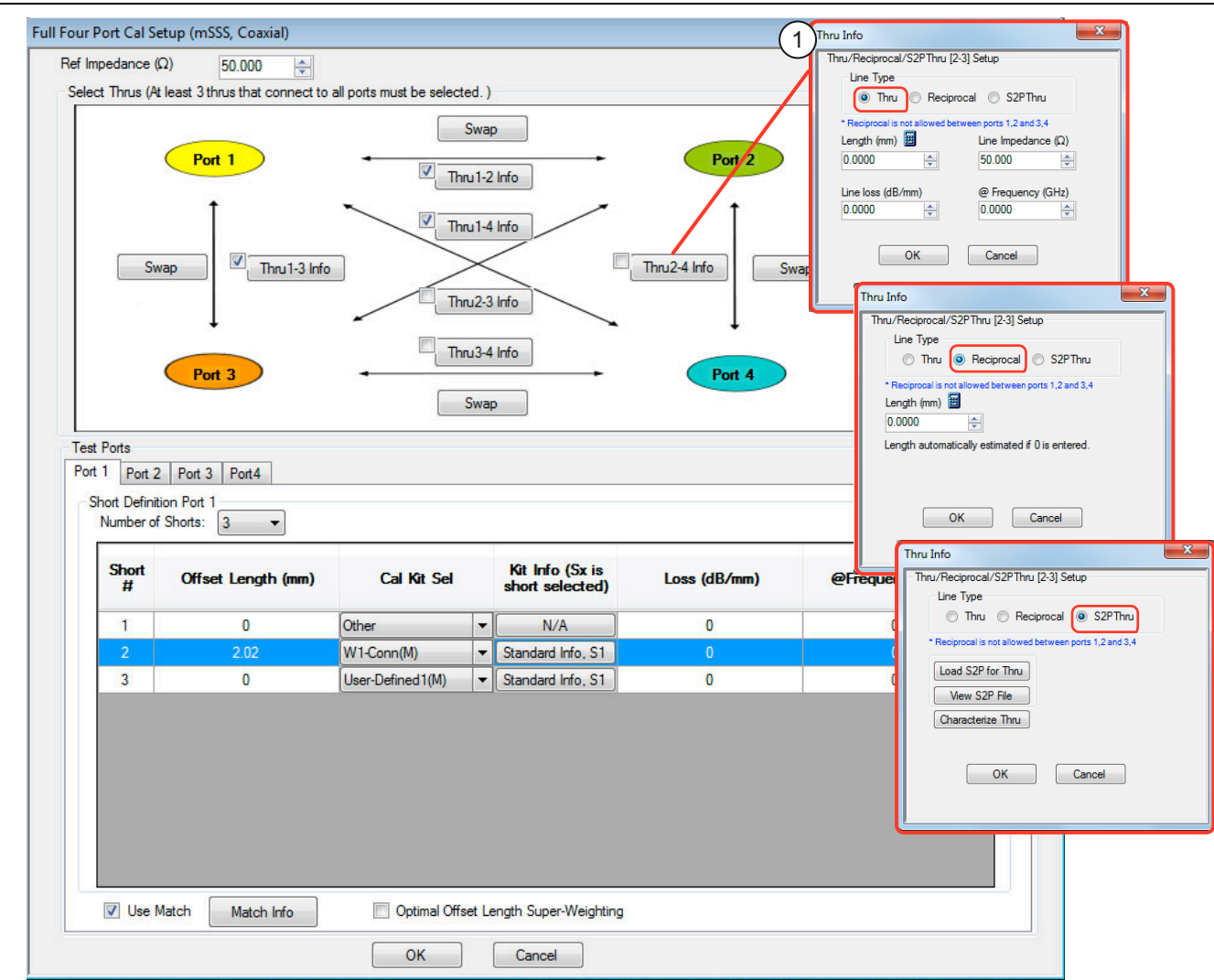
- “FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = mSSS
- Line Type = Coaxial

Navigation

- This dialog box is available from multiple menus.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mSSS | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
Reciprocal selected allows user entry for length.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-78. FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Thru

Select any combination of thru's as long as three (that are connected to all ports) are selected. For a 4-port calibration, the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Swap Buttons

Each of the Swap buttons allows the associated ports to be swapped, so that the port configuration diagram better matches the physical setup.

Thru Info Buttons

Each of the thru's above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Test Ports: Port 1 Tab – Short Definition

Number of Shorts

Select number of shorts from 3-10.

Offset Length (mm)

Editable if the Cal Kit Sel selected is “Other”; otherwise it will reflect the offset length of the selected short in the cal kit standard (Kit Info column).

Cal Kit Selection

Select the **DUT Connector Type** from a drop-down menu list with options of:

- Other
- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Kit Info Button

Select displays the STANDARD INFO or USER DEFINED STANDARD dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The examples show typical standard information dialog boxes.

- [“STANDARD INFO \(TRIPLE OFFSET SHORT\) W1-Connector \(M\) Dialog Box” on page 10-284](#)
 - Since the STANDARD INFORMATION (mSSS) dialog derives from the SSS calibration kit definition, three shorts are available and the one to be used for the current line in the mSSS table is defined by the Select Short to use field. All of the shorts in the kit can be employed in the mSSS calibration, but each must be assigned to a separate line in the table.
- [“USER DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 10-287](#)

Loss (dB/mm)

This field (in conjunction with the @Frequency field and the offset length) is used to compute the loss in the short and hence the magnitude of its reflection coefficient. This is mainly relevant for very large offset lengths (> 10 mm) at microwave frequencies or somewhat shorter lengths at millimeter wave frequencies.

@Frequency (GHz)

This field (in conjunction with the loss in dB/mm and the offset length) is used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency. If a non-zero value is entered here, it is treated as the reference frequency f_{ref} at which the loss (dB/mm) was defined and the loss at all other frequencies is scaled by $\sqrt{f/f_{ref}}$. If 0 is entered here, the loss is assumed to be constant with frequency.

Use Match Checkbox

When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation (value defined within the USER DEFINED MATCH dialog: Electrical line length delta for match use, expressed in degrees). The decision to use the match data is made on a frequency-by-frequency basis. See the *MS464XB Calibration and Measurement Guide* for more information. This helps increase bandwidth of the calibration, particularly at lower frequencies, if a match standard is available.

Match Info Button

Opens the USER DEFINED MATCH dialog.

- [“USER DEFINED MATCH Dialog Box – mSSS” on page 10-296](#)

Optimal Offset Length Super-Weighting Checkbox

When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration. More details can be found in the *MS464XB Calibration and Measurement Guide*. Using this feature can increase the available bandwidth of the calibration, but does reduce immunity to repeatability variances in the setup, so it is not advised in more repeatability challenged scenarios (e.g., fixtures where the short standards are attached by spring force alone).

Port 2, Port 3, and Port 4 Tabs – Short Definition

Identical functions as with the Test Ports: Port 1 Tab above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 4-Port Calibration Setup Dialog Boxes

The table below summarizes the available fields in all available 4-port calibration setup dialog boxes. If the dialog box is described above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All dialog boxes are named either “Full Four Port Cal Setup (Cal Method, Line Type)” or “Four Port Cal Setup (Cal Method, Line Type)”

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (1 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Coaxial	<p>See full description at “FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-111</p> <p>Reference Impedance (Ohms)</p> <p>Select Throughs: At least 3 throughs that connect to all ports must be selected. Select from Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4.</p> <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Load Type: Select from Broadband Load or Sliding Load</p> <p>Test Ports: Port 1, Port 2, Port 3, Port 4.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION or USER-DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 <p>Test Port Select BB Load: Load 1, Load 2.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
SOLT/R Non-Dispersive	<p>Same controls and functions as SOLT/R Coaxial above.</p>
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SOLT/R Microstrip	<p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector: User-Defined 1 through User Defined 32.</p> <p>Test Port DUT Connector Standard Info Button: For each port, displays the USER DEFINED STANDARD dialog box for the selected connector:</p>

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (2 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
SSLT Coaxial	<p>See full description at “FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-114</p> <p>Reference Impedance (Ohms)</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • At least 3 throughs that connect to all ports must be selected. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 <p>Thru Info buttons:</p> <ul style="list-style-type: none"> • Displays the THRU INFO dialog box for the selected through. • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Load Type: Broadband Load, Sliding Load</p> <p>Test Ports: Port 1, Port 2, Port 3, Port 4</p> <p>Test Port 1 DUT Connector: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port 1 Connector Standard Info Button:</p> <ul style="list-style-type: none"> • Displays the STANDARD INFORMATION dialog box for the selected connector. • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port 1 BB Load: Load 1, Load 2.</p> <p>Test Port 2, Test Port 3, and Test Port 4 controls are the same as Test Port 1.</p>
SSLT Non-Dispersive	Same controls and functions as SSLT Coax above.
SSLT Waveguide	<p>Same controls as SSLT Coaxial with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSLT Microstrip	<p>Same controls as SSLT Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector: User-Defined 1 through User Defined 32.</p> <p>Test Port DUT Connector Standard Info Button:</p> <ul style="list-style-type: none"> • Select displays the USER DEFINED STANDARD dialog box for the selected connector.

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (3 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
SSST Coaxial	<p>See full description at “FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-117</p> <p>Reference Impedance (Ohms)</p> <p>Select Throughs: At least 3 throughs that connect to all ports must be selected. Select from Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4</p> <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Test Ports: Port 1, Port 2, Port 3, Port 4</p> <p>Test Port DUT Connector: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: Displays the STANDARD INFORMATION or USER DEFINED STANDARD dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280 • “USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287 <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
SSST Non-Dispersive	<p>Same controls as SSST Coaxial above.</p>
SSST Waveguide	<p>See full description at “FULL FOUR PORT CAL SETUP (SSST, Waveguide) Dialog Box” on page 10-120</p> <p>Same controls as SSST Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSST Microstrip	<p>Same controls as SSST Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector: User-Defined 1 through User Defined 32.</p> <p>Test Port DUT Connector Standard Info Button:</p> <ul style="list-style-type: none"> • Select displays the USER DEFINED STANDARD dialog box for the selected connector.

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (4 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
Broadband (SOLT/SOLR-SSST/SSSR) Coaxial	<p>See full description of controls and display logic at “FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-122.</p> <p>Note: Broadband Calibration is available only in Broadband configuration enabled with Option 08x and 3739 Test Set.</p> <p>Reference Impedance</p> <p>Input the reference impedance. Input field defaulted to 50 Ohms.</p> <p>Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.</p> <p>Select Through Area</p> <p>Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:</p> <p>Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3,4,</p> <p>Thru Buttons</p> <p>Each of the Throughs enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.</p> <p>“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285</p> <p>“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278</p> <p>Breakpoint Frequency</p> <p>67 GHz is recommended for the 3656 (1 mm) calibration kit.</p> <p>80 GHz is recommended for the 3659 (0.8 mm) calibration kit.</p> <p>Test Port 1 Connector Type Area</p> <p>Select the DUT Connector Type from a drop-down menu list with options of:</p> <p>0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port 1 Connector Standard Info Button</p> <p>Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The link below shows an example typical standard information dialog box.</p> <p>“STANDARD INFO (Broadband Cal) 0.8 mm Connector (M) Dialog Box” on page 10-282</p> <p>The following link shows a typical User-defined Standard information dialog box for broadband cal.</p> <p>“USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287</p> <p>Test Port 2, Test Port 3, and Test Port 4 Connector Type Area</p> <p>Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.</p> <p>Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button</p> <p>Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.</p> <p>OK / Cancel: Click OK to accept changes or Cancel to abandon and return to CAL SETUP.</p>

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (5 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
TRL/TRM Coaxial	<p>See full description of controls and display logic at “FULL FOUR PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-125.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric – Enter a value if different than the default.</p> <p>Cal A Ports – Select two from 1-3, 1-4, 2-3, 2-4</p> <p>Cal B Ports – Auto-selected non-Cal A Ports of 1-3, 1-4, 2-3, 2-4</p> <p>Thru Selection:</p> <ul style="list-style-type: none"> • Requires at least one additional thru. • Four thru combinations of Cal A and Cal B Ports are displayed. • Only four of Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 are shown • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Cal A Configuration Parameters:</p> <ul style="list-style-type: none"> • Line Length Representation: Effective Length, Delay, Physical Length • Cal A Number of Bands: 1 through 5 • Cal A Band 1-5 Type: Line, Match; Device Effective Length (mm)/Match; If Device X = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. • “USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM” on page 10-288 • Reflection Type: Short-like, Open-like. • Cal A Band Breakpoint: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz). • Cal A Reflection Component: Enforce Passivity • Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm) • Last Loaded Kit Name – TRL/TRM/LRL/LRM Cal Kit file name last loaded • Save Kit – Save calibration kit data to an TRL/TRM/LRL/LRM cal kit file (.lcf) • Load Kit – Recall existing TRL/TRM/LRL/LRM cal kit file (.lcf). <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
TRL/TRM Non-Dispersive	Same controls as TRL/TRM Coaxial.
TRL/TRM Waveguide	<p>Same controls as TRL/TRM Coaxial with the following changes:</p> <p>Cutoff Frequency (GHz): The TE₁₀ mode cutoff frequency for the waveguide in use.</p>
TRL/TRM Microstrip	<p>Same controls as TRL/TRM Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (6 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Coaxial	<p>See full description of controls and display logic at “FULL FOUR PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-129.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric – Enter a value if different than the default.</p> <p>Cal A Ports – Select two from 1-3, 1-4, 2-3, 2-4</p> <p>Cal B Ports – Auto-selected non-Cal A Ports of 1-3, 1-4, 2-3, 2-4</p> <p>Select Through:</p> <ul style="list-style-type: none"> • Requires at least one additional through. • Four through combinations of Cal A and Cal B Ports are displayed. • Only four of Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 are shown • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Number of Bands: 1 through 5:</p> <ul style="list-style-type: none"> • If 1, only Band 1 Device 1 and Band 1 Device 2 controls appear. • If 2, the above plus Band 2 Device 3 and Band 2 Device 4 controls appear. • If 3, the above plus Band 3 Device 5 and Band 3 Device 6 controls appear. • If 4, the above plus Band 4 Device 7 and Band 4 Device 8 controls appear. • If 5, the above plus Band 5 Device 9 and Band 5 Device 10 controls appear. <p>Cal A Configuration Parameters:</p> <ul style="list-style-type: none"> • Cal A Reference Plane Location: Ends of Line, Middle of Line 1 • Line Length Representation: Effective Length, Delay, Physical Length • Cal A Number of Bands: 1 through 5 • Cal A Band 1 Device 1 Line: Line Length (mm) or Delay (ps), Line Loss (dB/mm), @ Frequency (GHz) • Cal A Band 1 Device 2 Type: Line, Match; Use Short-like component, Use Open-like component, Use both; If Device 2 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. • “USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM” on page 10-289 • Cal A Band 2 Device 3: Use device 1, Use new line • Cal A Band 2 Device 4: Line, Match, Type of Reflection (Use Open-like component, Use Short-like component), Line Length (mm) • Cal A Band Break Point: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz). • Cal A Reflection Component: Enforce Passivity • Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm) • Last Loaded Kit Name – TRL/TRM/LRL/LRM Cal Kit file name last loaded • Save Kit – Save calibration kit data to an TRL/TRM/LRL/LRM cal kit file (.lcf) • Load Kit – Recall existing TRL/TRM/LRL/LRM cal kit file (.lcf). <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
LRL/LRM Non-Dispersive	<p>Same controls as LRL/LRM Coaxial.</p>
LRL/LRM Waveguide	<p>Same controls as LRL/LRM Coaxial with the following changes:</p> <p>Cutoff Frequency (GHz): The TE₁₀ mode cutoff frequency for the waveguide in use.</p>

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (7 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Microstrip	<p>Same controls as LRL/LRM Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279
mTRL Coaxial	<p>See full description of controls and display logic at “FULL FOUR PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-135.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric – Enter a value if different than the default.</p> <p>Cal A Ports – Select two from 1-3, 1-4, 2-3, 2-4</p> <p>Cal B Ports – Auto-selected non-Cal A Ports of 1-3, 1-4, 2-3, 2-4</p> <p>Thru Selection:</p> <ul style="list-style-type: none"> • Requires at least one additional thru. • Four through combinations of Cal A and Cal B Ports are displayed. • Only four of Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 are shown • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Cal A Configuration Parameters:</p> <ul style="list-style-type: none"> • Reference Plane Location: Ends of Line 1 or Middle of Line 1 • Line Length Representation: Effective Length, Delay, Physical Length • Number of Lines: 2 through 10: • Line#: Up to 10 devices <p>Line 1: Effective Length defaults to 1, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 3.3356 ps • If Use Physical Length selected: Physical Length defaults to 0.9997 mm <p>Line 2: Effective Length defaults to 2, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 6.6713 ps • If Use Physical Length selected: Physical Length defaults to 1.9994 mm <p>Line 3: Effective Length defaults to 3, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 10.0069 ps • If Use Physical Length selected: Physical Length defaults to 2.9990 mm <p>Line 4: Effective Length defaults to 4, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 13.3426 ps • If Use Physical Length selected: Physical Length defaults to 3.9987 mm <p>Line 5: Effective Length defaults to 5, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 16.6782 ps • If Use Physical Length selected: Physical Length defaults to 4.9984 mm <p>Line 6: Effective Length defaults to 6, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 20.0138 ps • If Use Physical Length selected: Physical Length defaults to 5.9981 mm

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (8 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
mTRL Coaxial (continued)	<p>Line 7: Effective Length defaults to 7, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> •If Use Delay selected: Delay defaults to 23.3495 ps •If Use Physical Length selected: Physical Length defaults to 6.9977 mm <p>Line 8: Effective Length defaults to 8, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> •If Use Delay selected: Delay defaults to 26.6851 ps •If Use Physical Length selected: Physical Length defaults to 7.9974 mm <p>Line 9: Effective Length defaults to 9, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> •If Use Delay selected: Delay defaults to 30.0208 ps •If Use Physical Length selected: Physical Length defaults to 8.9971 mm <p>Line 10: Effective Length defaults to 10, Line Loss (dB/mm), @ Frequency (GHz)</p> <ul style="list-style-type: none"> •If Use Delay selected: Delay defaults to 33.3564 ps •If Use Physical Length selected: Physical Length defaults to 9.9968 mm <ul style="list-style-type: none"> • Reflection Component: Reflection Type • Reflection Component: Enforce Passivity • Reflection Component: Open-like Length (mm) and/or Short-like Offset Length (mm) • Use Match: If selected, will display the Match Info button to open the USER DEFINED MATCH DEVICES dialog box. • “USER DEFINED MATCH DEVICES Dialog Box – mTRL” on page 10-292 • Optimal Length Super-Weighting: Enables the use of an enhanced weighting scheme during the calibration to further emphasize line pairs that have optimal line length deltas. The use of this feature further de-emphasizes non-optimal pairs and reduces the impact of repeatability differences. • Last Loaded Kit Name – mTRL Cal Kit file name last loaded • Save Kit – Save calibration kit data to an mTRL cal kit file (.mlcf) • Load Kit – Recall existing mTRL cal kit file (.mlcf). <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
mTRL Non-Dispersive	<p>Same controls as mTRL Coaxial.</p>
mTRL Waveguide	<p>Same controls as mTRL Coaxial with the following changes:</p> <p>Cutoff Frequency (GHz): The TE₁₀ mode cutoff frequency for the waveguide in use.</p>
mTRL Microstrip	<p>Same controls as mTRL Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (9 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
mSSS Coaxial	<p>See full description at “FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-140</p> <p>Reference Impedance (Ohms)</p> <p>Select Throughs: At least 3 throughs that connect to all ports must be selected. Select from Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4.</p> <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Test Ports: Port 1 Tab</p> <p>Number of Shorts: 3-10</p> <p>Offset Length: Cal Kit Sel selected is “Other”, otherwise reflects the offset length of the selected short in the cal kit standard (Kit Info column)</p> <p>Cal Kit Selection: Other, 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Kit Info Standard Info Button: Displays the STANDARD INFORMATION (mSSS) or USER DEFINED STANDARD (mSSS) dialog box for the selected short.</p> <ul style="list-style-type: none"> • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-284 <ul style="list-style-type: none"> • The short to be used for the current line in the mSSS table is defined by the Select Short to use field. • “USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287 <p>Loss (dB/mm): Used to compute the loss in the short and hence the magnitude of its reflection coefficient.</p> <p>@Frequency: Used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency.</p> <p>Use Match: When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation.</p> <p>Optimal Offset Length Super-Weighting: When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 tab controls are the same.</p>
mSSS Non-Dispersive	Same controls as mSSS Coaxial above.
mSSS Waveguide	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Cutoff Frequency: The cutoff frequency for the TE₁₀ mode in the waveguide size being used for this calibration (all shorts are assumed to have the same aperture dimensions and hence the same cutoff frequency).</p> <p>Dielectric: The dielectric constant of any filling material in the waveguide interface being used for the calibration (assumed 100% fill; default value is 1).</p>

Table 10-3. 4-Port Manual Cal Setup Dialog Box Summary (10 of 10)

Cal Method Line Type	Dialog Box Controls and Functions
mSSS Microstrip	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none">• “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

10-10 Manual 3-Port Cal Setup – 4-Port VNAs

This sections described the menus and dialog boxes uses for manual 3-port calibration on a VectorStar 4-Port VNA.

THREE PORT CAL Menu – 4-Port VNAs

Button Availability

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant THREE PORT CAL SETUP dialog box.
- The example procedures at the end of this chapter show examples of various THREE PORT CAL menus.

Previous

- [“MANUAL CAL Menu – 4-Port VNAs” on page 10-99](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL

	<h4>Modify Cal Setup</h4> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the THREE PORT CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu – 4-Port VNAs” on page 10-101 <p>The following Cal Method/Line Type combinations and their dialog boxes are represented with a figure and complete description:</p> <ul style="list-style-type: none"> • “THREE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-155 • “THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box” on page 10-158 • “THREE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-161 • “THREE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-164 • “THREE PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-166 • “THREE PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-170 • “THREE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-174 <p>This table summarizes the dialog boxes for all Cal Method/Line Type combinations:</p> <ul style="list-style-type: none"> • Table 10-4, “3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-177 <h4>Port Selected</h4> <p>Read-only display of the ports selected for the pending calibration.</p>
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Figure 10-79. THREE PORT CAL Menu – 4-Port VNAs – Typical example (1 of 2)

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the THREE PORT CAL menu. (continued)

The Port 1 Reflective Devices button (shown below at #2) is now marked with a completion checkmark.

**Port 1 Reflective Devices**

Select displays the REFL. DEVICES PORT 1 submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

- Example: [“REFL. DEVICE\(S\) Menu – 4-Port VNAs” on page 10-267](#)

Port 2 Reflective Devices

Select displays the REFL. DEVICES PORT 2 submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

Port 3 Reflective Devices

Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

Thru/Recip

Select displays the THRU/RECIP submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

- [“THRU/RECIP Menu – 4-Port VNAs” on page 10-273](#)

Isolation (Optional)

If required, select displays the ISOLATION submenu. When all procedures are complete, select the Back button to return to the THREE PORT CAL menu where this button is now marked with a completion checkmark.

- [“ISOLATION \(OPTIONAL\) Menu” on page 10-275](#)

Done

This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the CALIBRATION menu where the Cal Status button is set to ON.

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Abort Cal

This button stops the current calibration procedure and returns to the CALIBRATION menu.

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Figure 10-79. THREE PORT CAL Menu – 4-Port VNAs – Typical example (2 of 2)

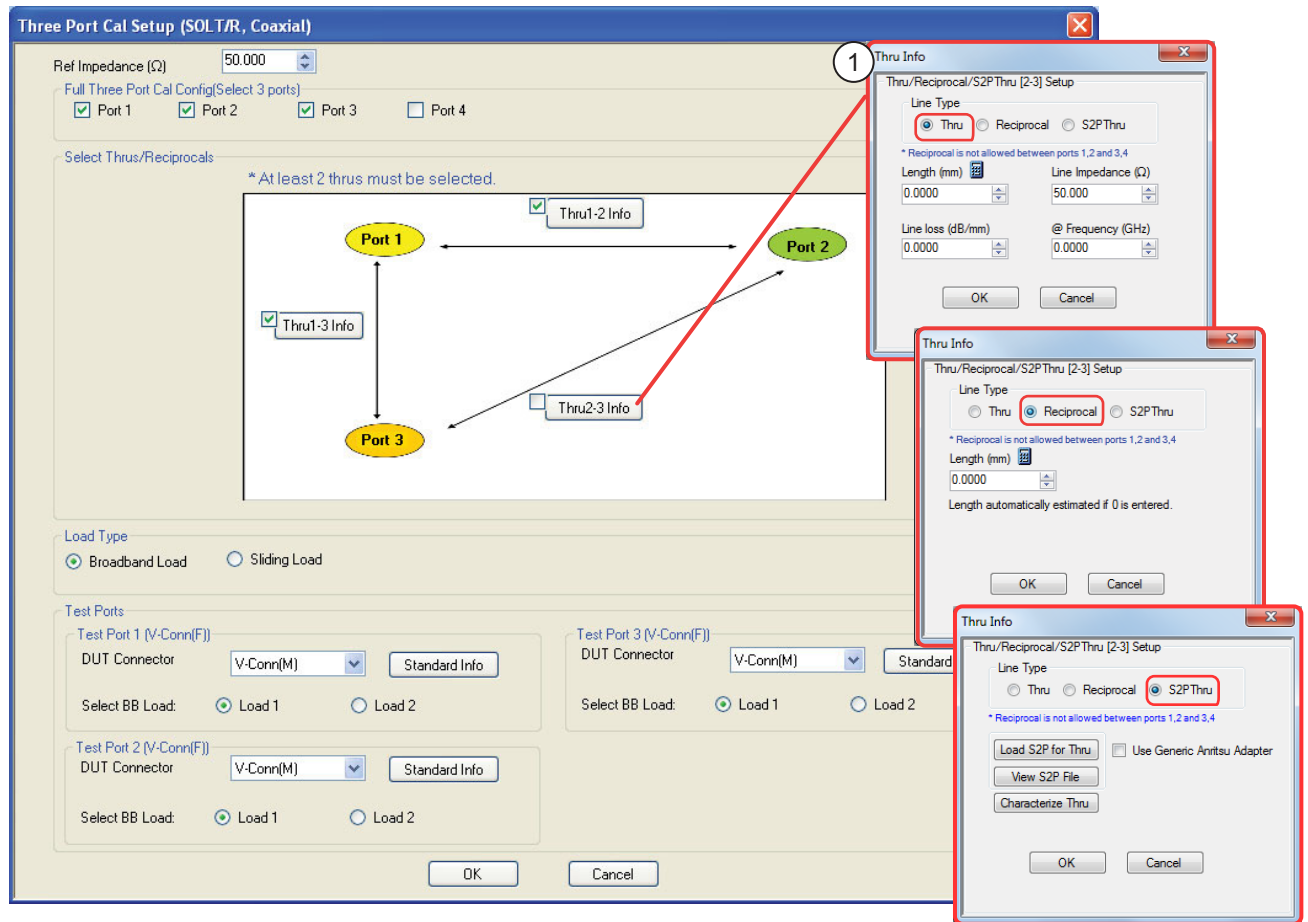
THREE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “THREE PORT CAL Menu – 4-Port VNAs” on page 10-153

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
Reciprocal selected allows user entry for length.
S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-80. THREE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Full Three Port Calibration Configuration

Select three (3) ports from the list below. If a fourth port selection is attempted, an earlier port is discarded:

- Port 1
- Port 2
- Port 3
- Port 4

Select Throughs

Select any combination of three possible throughs as long as two (2) are selected. The available port pair throughs are based on the ports selected above. For a 3-port calibration, only three of the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Thru Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Load Type

Select from two radio button controlled options:

- Broadband Load
- Sliding Load. If Sliding Load is selected, a message appears in the “Still requires broadband loads below sliding load breakpoint frequency.”

Only three of the Test Port configuration area are available based on the port selection above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)

- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 DUT Connector Standard Info Button

If Port 1 was selected above, select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)

Test Port 1 Select BB Load

If Port 1 was selected above, select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2 Configuration

If Port 2 was selected above, provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

If Port 3 was selected above, provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

If Port 4 was selected above, provides the same controls as Test Port 4 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box

Previous

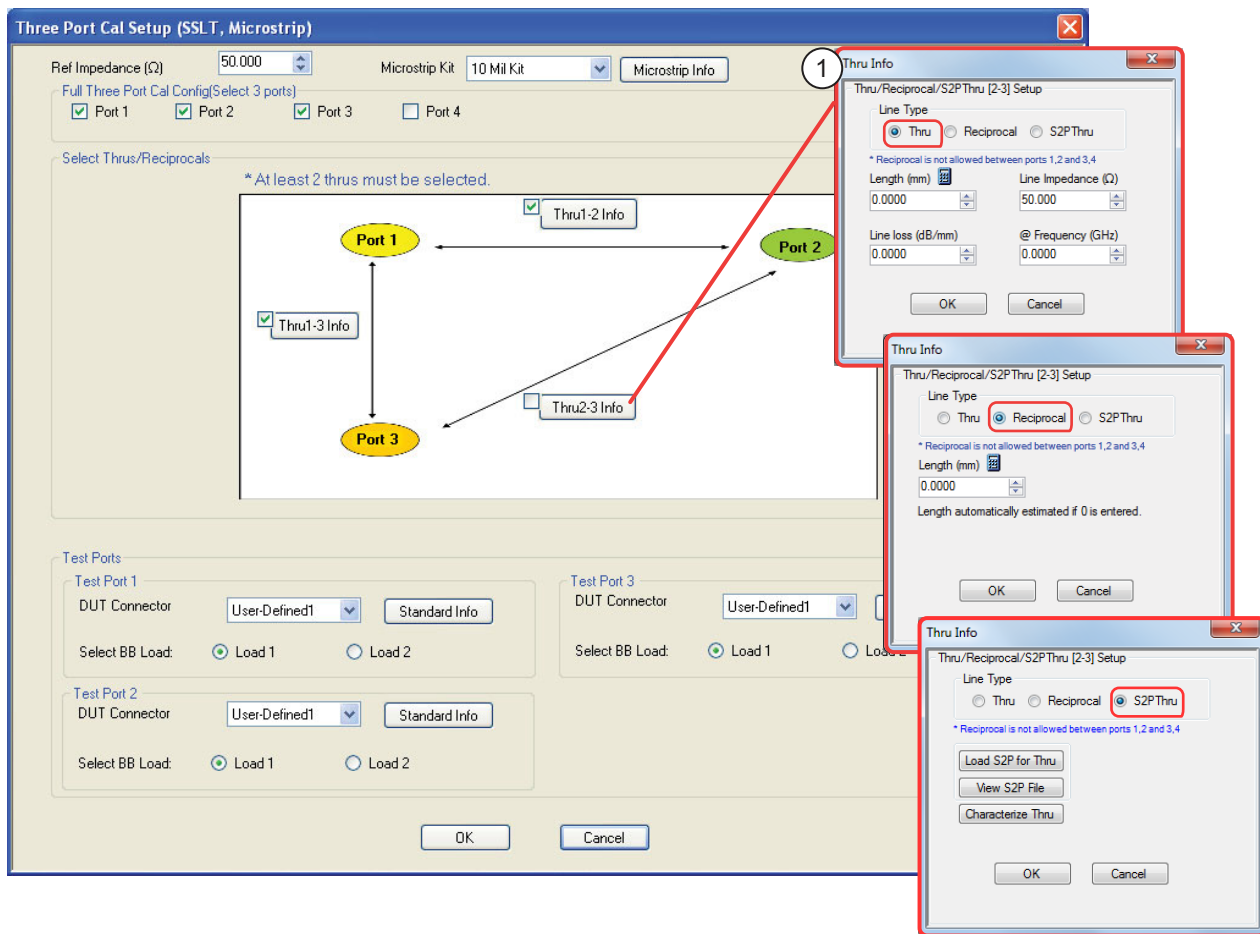
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “THREE PORT CAL Menu – 4-Port VNAs” on page 10-153

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSLT
- Line Type = Microstrip

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Microstrip | Edit Cal Params | THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 Reciprocal selected allows user entry for length.
 S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-81. THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

OK / Cancel

- Click OK to accept the changes and return to the CAL SETUP menu. Click Cancel to abandon any changes and return to the CAL SETUP menu.

Full Three Port Calibration Configuration

Select three (3) ports from the list below. If a fourth port selection is attempted, an earlier port is discarded:

- Port 1
- Port 2
- Port 3
- Port 4

Select Throughs

Select any combination of three possible throughs as long as two (2) are selected. The available port pair throughs are based on the ports selected above. For a 3-port calibration, only three of the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Thru Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Only three of the Test Port configuration areas are available based on the port selection above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port 1 DUT Connector Standard Info Button

If Port 1 was selected above, select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279](#)

Test Port 1 Select BB Load

If Port 1 was selected above, select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2 Configuration

If Port 2 was selected above, provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

If Port 3 was selected above, provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

If Port 4 was selected above, provides the same controls as Test Port 4 Connector above.

THREE PORT CAL SETUP (SSST, Coaxial) Dialog Box

Previous

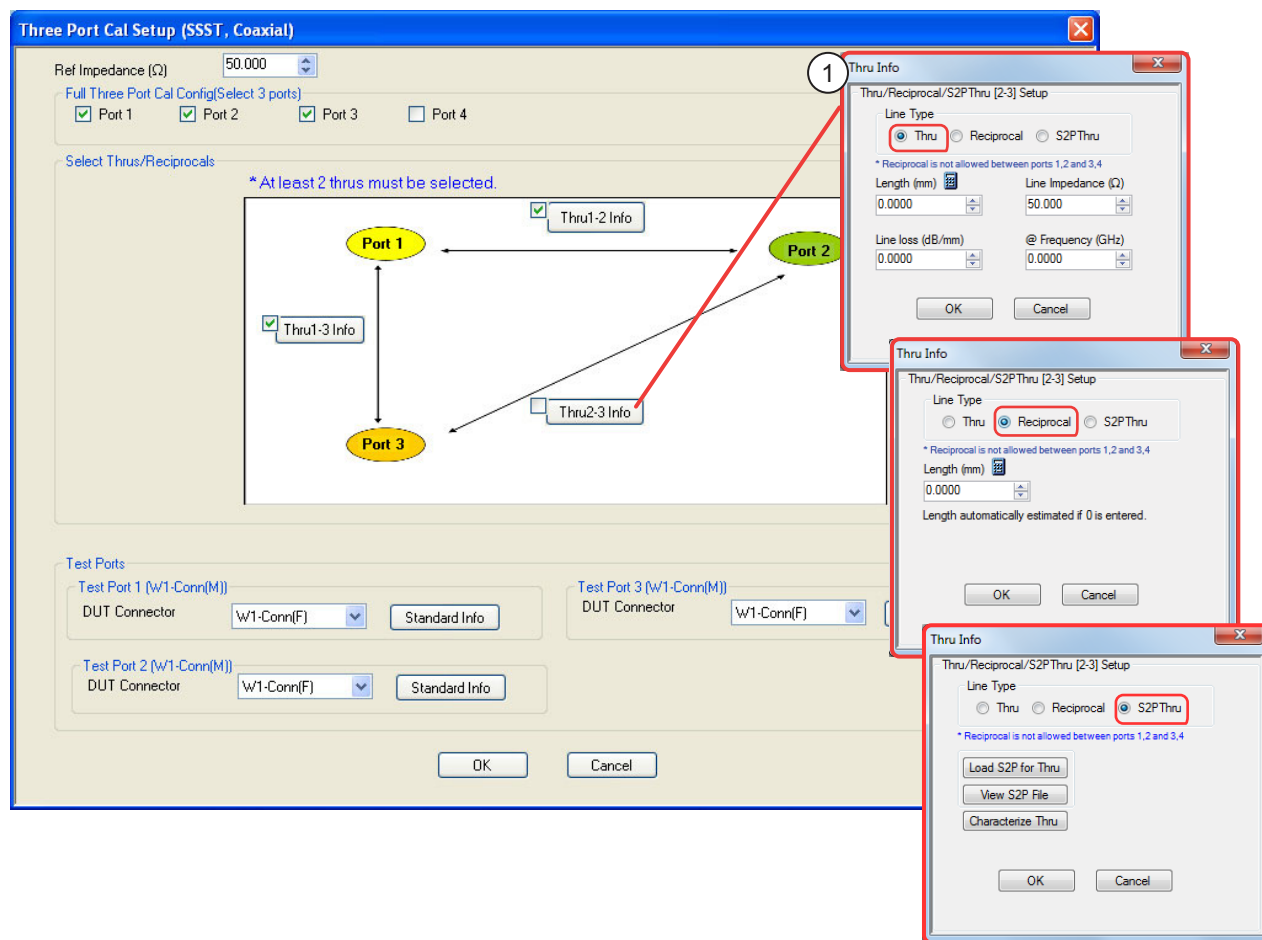
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “THREE PORT CAL Menu – 4-Port VNAs” on page 10-153

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = SSST
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (SSST, Coaxial) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 Reciprocal selected allows user entry for length.
 S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-82. THREE PORT CAL SETUP (SSST, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Full Three Port Calibration Configuration

Select three (3) ports from the list below. If a fourth port selection is attempted, an earlier port is discarded:

- Port 1
- Port 2
- Port 3
- Port 4

Select Throughs/Reciprocals

Select any combination of three possible throughs as long as two (2) are selected. The available port pair throughs are based on the ports selected above. For a 3-port calibration, only three of the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Thru Info Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box accesses the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Only three of the Test Port Configuration areas are available based on the port selection above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 DUT Connector Standard Info Button

If Port 1 was selected above, select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)

Test Port 2 Configuration

If Port 2 was selected above, provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

If Port 3 was selected above, provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

If Port 4 was selected above, provides the same controls as Test Port 4 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

THREE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box

Full Name

Three Port Cal Setup (Broadband Cal, Merged SOLT/SOLR-SSST/SSSR)

Previous

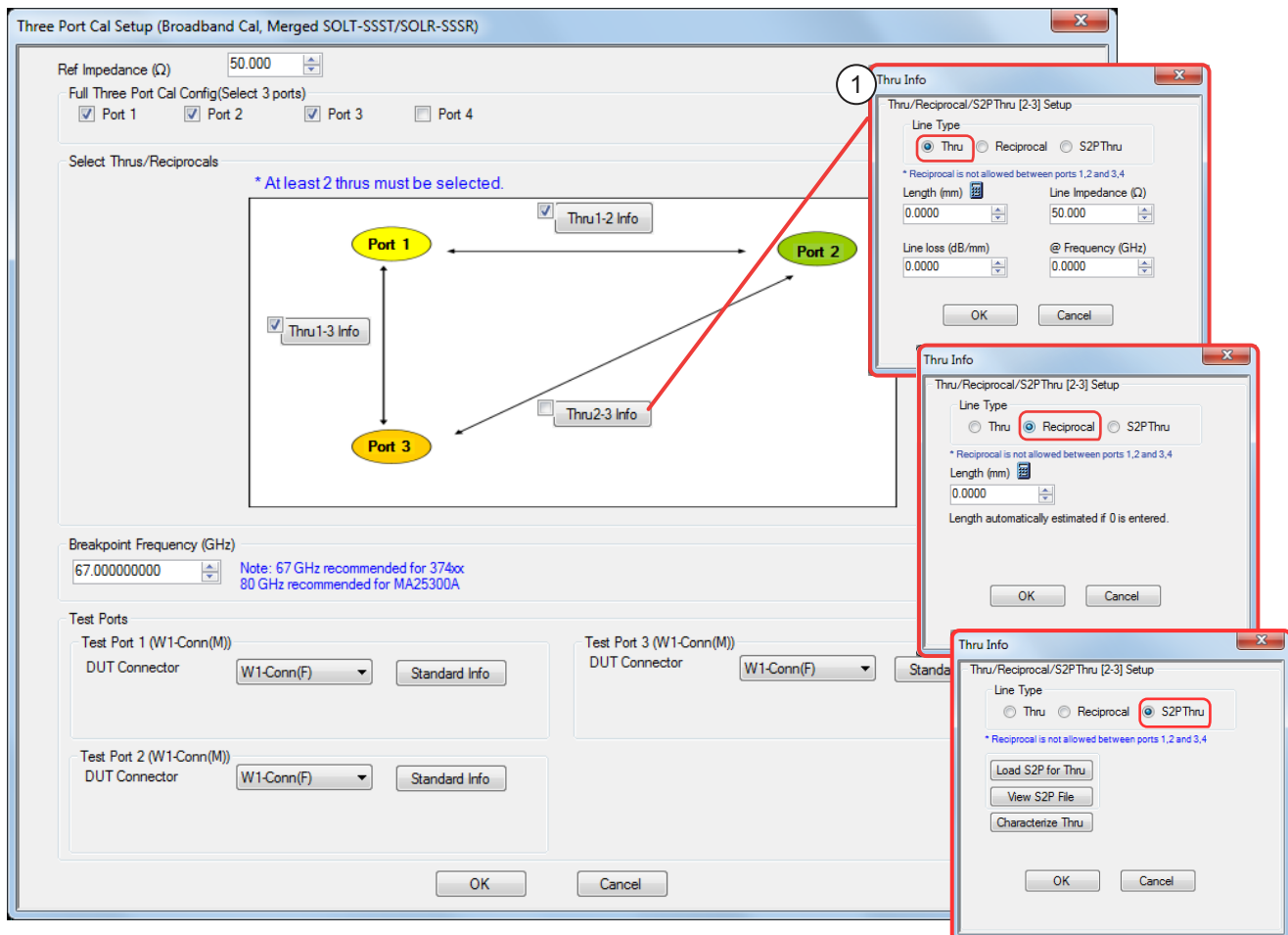
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “CAL METHOD Menu – 4-Port VNA” on page 10-104
- “THREE PORT CAL Menu – 4-Port VNAs” on page 10-153

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = Broadband Cal (SOLT/R-SSST/R) – Appears only with VNA in Broadband Mode (3739)
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = Broadband Cal (SOLT/R-SSST/R) | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 Reciprocal selected allows user entry for length.
 S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-83. THREE PORT CAL SETUP Broadband Cal, Merged (SOLT/SOLR-SSST/SSSR) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Full Three Port Cal Config (Select 3 ports)

- Select three (3) ports from the list below. If a fourth port selection is attempted, an earlier port is discarded.

Select Thrus/Reciprocals Area

Select any combination of throughs as long as two are selected. For a 3-port calibration, the following port pairs are available:

- Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4

Thru Buttons

Each of the Throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Breakpoint Frequency

- 67 GHz is recommended for the 3656 (1 mm) calibration kit.
- 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
- In this combined calibration, the breakpoint frequency defines the frequency above which the SSS algorithm will be used (and SOL will be used for the frequencies at or below the breakpoint). Default values are based on Anritsu calibration kits and are optimal for those components.

Test Port 1 Connector Type Area

Select the **DUT Connector** type from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- W1-Conn (M)
- User-Defined1 (M) through User-Defined32 (M)
- 0.8 mm-Conn (F)
- W1-Conn (F)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal.

- [“STANDARD INFO \(Broadband Cal\) 0.8 mm Connector \(M\) Dialog Box” on page 10-282](#)

The following link shows a typical User-defined Standard information dialog box for broadband cal.

- [“USER DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 10-287](#)

Test Port 2 and Test Port 3 Connector Type Area

Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.

Test Port 2 and Test Port 3 Connector Standard Info Button

Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

OK / Cancel

Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.

THREE PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

Previous

- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)
- [“THREE PORT CAL Menu – 4-Port VNAs” on page 10-153](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = TRL/TRM | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (TRL/TRM, Coaxial)

Three Port Cal Setup (TRL/TRM, Coaxial)

Ref Impedance (Ω) Dielectric

Select Cal Type

☐ TRL/M + Singleton ☒ Two TRL/Ms

Two TRL/Ms

Full Three Port Cal Config(1-2,3-4 combos are not allowed)

Cal A (Select Port Pair)

☒ 1,3 ☐ 1,4 ☐ 2,3 ☐ 2,4

Cal B Ports(Select Port Pair, One port must be shared with Cal A)

☐ 1,3 ☐ 1,4 ☒ 2,3 ☐ 2,4

Cal A Cal B

Cal A Config.

Line Length Representation

☒ Effective Length ☐ Delay ☐ Physical Length

Band Definition

Number of Bands:

In addition to the thru line, the other calibration devices are:

Band #	Cal Device	Device Eff. Length (mm) / Match	Reflection Type	Breakpoint (GHz)	Breakpoint Calculation
1	Match	Match Info	Short-like		

Reflection Component (Note: Reflection offset length is always referenced from the Ends of Line1)

☐ Enforced Passivity

Open-like Offset Length (mm) Short-like Offset Length (mm)

Last Loaded Kit Name

Save Kit Load Kit Restore Defaults

OK Cancel

Figure 10-84. THREE PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box – Cal A Tab

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Select Cal Type

Select one of the calibration options from:

- TRL/M + Singleton
- Two TRL/Ms

Full Three Port Cal Config (1-2, 3-4 combos are not allowed):

Cal A (Select Port Pair)

- 1,3
- 1,4
- 2,3
- 2,4

Cal B (Select Port Pair, One port must be shared with Cal A)

- 1,3
- 1,4
- 2,3
- 2,4

Cal A / Cal B Tabs

Access the Cal A or Cal B functions and controls by selecting either the Cal A or Cal B tab.

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Band Definition

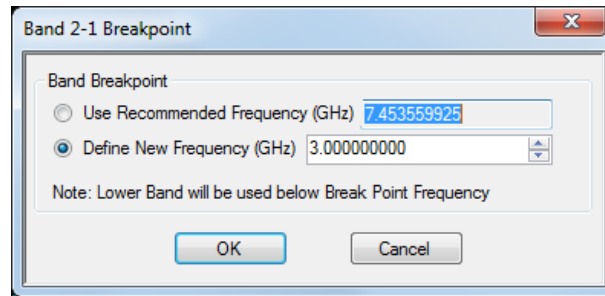
Select one to five bands from the drop-down menu.

- Number of Bands = 1. Only the Band 1 Definition and editable parameters appear.
- Number of Bands = 2. The Band 2 Definition and editable parameters appear.
- Number of Bands = 3. The Band 3 Definition and editable parameters appear.
- Number of Bands = 4. The Band 4 Definition and editable parameters appear.
- Number of Bands = 5. The Band 5 Definition and editable parameters appear.

Band Parameter Definitions

- **Cal Device**
 - Line
 - Match
- **Device Effective Length (mm)/Match**
 - Line: Enter device effective length for each band
 - Match: [“USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM”](#) on page 10-288

- **Reflection Type**
 - Enter a reflection type for each band.
 - Short-like
 - Open-like
- **Breakpoint (GHz)**
 - Enter a breakpoint frequency for Band 2–5. (The entries are active for bands 2–5.)
- **Breakpoint Calculation**
 - Select to calculate a breakpoint frequency for band:



Reflection Component

- **Enforce Passivity** – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- **Enter Open-like and/or Short-like offset length**

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- **Last Loaded Kit Name** – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- **Save Kit** – Saves the present cal setup.
- **Load Kit** – Click opens window to navigate to a desired existing TRL/TRM cal kit file (.lcf).
- **Restore Defaults** – Loads the instrument default values for the Cal Setup.

OK/Cancel

- **OK and Cancel** returns user to the CAL SETUP menu.

THREE PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “THREE PORT CAL Menu – 4-Port VNAs” on page 10-153

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (LRL/LRM, Coaxial)

Three Port Cal Setup (LRL/LRM, Coaxial)

Ref Impedance (Ω) 50.000 Dielectric 1.000649

Select Cal Type

☐ LRL/M + Singleton ☒ Two LRL/Ms

Two LRL/Ms

Full Three Port Cal Config(1-2,3-4 combos are not allowed)

Cal A (Select Port Pair)

☒ 1,3 ☐ 1,4 ☐ 2,3 ☐ 2,4

Cal B Ports(Select Port Pair, One port must be shared with Cal A)

☐ 1,3 ☐ 1,4 ☒ 2,3 ☐ 2,4

Cal A Cal B

Cal A Config.

Reference Plane Location

☒ Ends of Line 1 ☐ Middle of Line 1

Line Length Representation

☒ Effective Length ☐ Delay ☐ Physical Length

Band Definition

Number of Bands: 1

Band # (Device #)	Cal Device X	Device X Eff. Length (mm)	Cal Device Y	Device Y Eff. Length (mm) / Match	Loss (dB/mm)	@Frequency (GHz)	Reflection Type	Breakpoint (GHz)	Breakpoint Calculation
1 (X=1, Y=2)	Line	0	Line	5	0	0	Short-like		

Reflection Component(Note:Reflection offset length is referenced from the Ends of first line)

☐ Enforce Passivity

Open-like Offset Length (mm) 0.0000

Short-like Offset Length (mm) 0.0000

Last Loaded Kit Name

Save Kit Load Kit Restore Defaults

OK Cancel

Figure 10-85. THREE PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box – Cal A Tab

Overview

The dialog box provides common areas at the top for Reference Impedance, Three Port Calibration Configuration, and Thru Selection. Below these common sections are two tabbed dialog areas for Cal A and Cal B.

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Select Cal Type

Select one of the calibration options from:

- LRL/M + Singleton
- Two LRL/Ms

Full Three Port Cal Config (1-2, 3-4 combos are not allowed):**Cal A (Select Port Pair)**

- 1,3
- 1,4
- 2,3
- 2,4

Cal B (Select Port Pair, One port must be shared with Cal A)

- 1,3
- 1,4
- 2,3
- 2,4

Cal A / Cal B Tabs

Access the Cal A or Cal B functions and controls by selecting either the Cal A or Cal B tab.

Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Band Definition

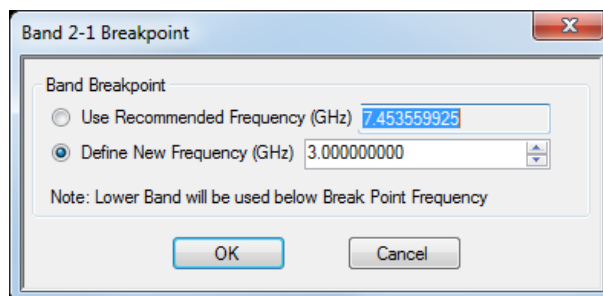
Select one to five bands from the drop-down menu.

- Number of Bands = 1. Only the Band 1 Definition and editable parameters appear.
- Number of Bands = 2. The Band 2 Definition and editable parameters appear.
- Number of Bands = 3. The Band 3 Definition and editable parameters appear.
- Number of Bands = 4. The Band 4 Definition and editable parameters appear.
- Number of Bands = 5. The Band 5 Definition and editable parameters appear.

Band Parameter Definitions

- **Band # (Device #)**
 - Band 1 defines Devices as $X = 1$ and $Y = 2$
 - Band 2 defines Devices as $X = 3$ and $Y = 4$
 - Band 3 defines Devices as $X = 5$ and $Y = 6$
 - Band 4 defines Devices as $X = 7$ and $Y = 8$
 - Band 5 defines Devices as $X = 9$ and $Y = 10$
- **Cal Device X**
 - Band 1 choice is
 - Line
 - Band 2 choices are
 - New Line
 - Bnd1 Cal Dev X
 - Bnd1 Cal Dev Y
 - Band 3 choices are
 - New Line
 - Bnd1 Cal Dev X
 - Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X
 - Bnd2 Cal Dev Y
 - Band 4 choices are
 - New Line
 - Bnd1 Cal Dev X, Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X, Bnd2 Cal Dev Y
 - Bnd3 Cal Dev X, Bnd3 Cal Dev Y
 - Band 5 choices are
 - New Line
 - Bnd1 Cal Dev X, Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X, Bnd2 Cal Dev Y
 - Bnd3 Cal Dev X, Bnd3 Cal Dev Y
 - Bnd4 Cal Dev X, Bnd4 Cal Dev Y
- **Device X Length (mm)**
 - Enter device length for each band
- **Cal Device Y**
 - Select Line or Match for each band.
- **Device Y Length (mm)/Match**
 - Enter device length for each band if Device Y is Line.
 - Select Match Info if Device Y is Match. Opens “[USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM](#)” on page 10-289.
- **Loss (dB/mm)**
 - Enter loss for each band.

- **@Frequency (GHz)**
 - Enter frequency for line loss for each band.
- **Reflection Type**
 - Enter a reflection type for each band.
 - Short-like
 - Open-like
 - Both (available only if Cal Device Y= Match)
- **Breakpoint (GHz)**
 - Enter a breakpoint frequency for Band 2–5. (The entries are active for bands 2–5.)
- **Breakpoint Calculation**
 - Select to calculate a breakpoint frequency for band:



Reflection Component

- **Enforce Passivity** – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- **Enter Open-like and/or Short-like offset length**

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- **Last Loaded Kit Name** – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- **Save Kit** – Saves the present cal setup.
- **Load Kit** – Click opens window to navigate to a desired existing LRL/LRM cal kit file (.lcf).
- **Restore Defaults** – Loads the instrument default values for the Cal Setup.

OK/Cancel

- **OK and Cancel** returns user to the CAL SETUP menu.

THREE PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Previous

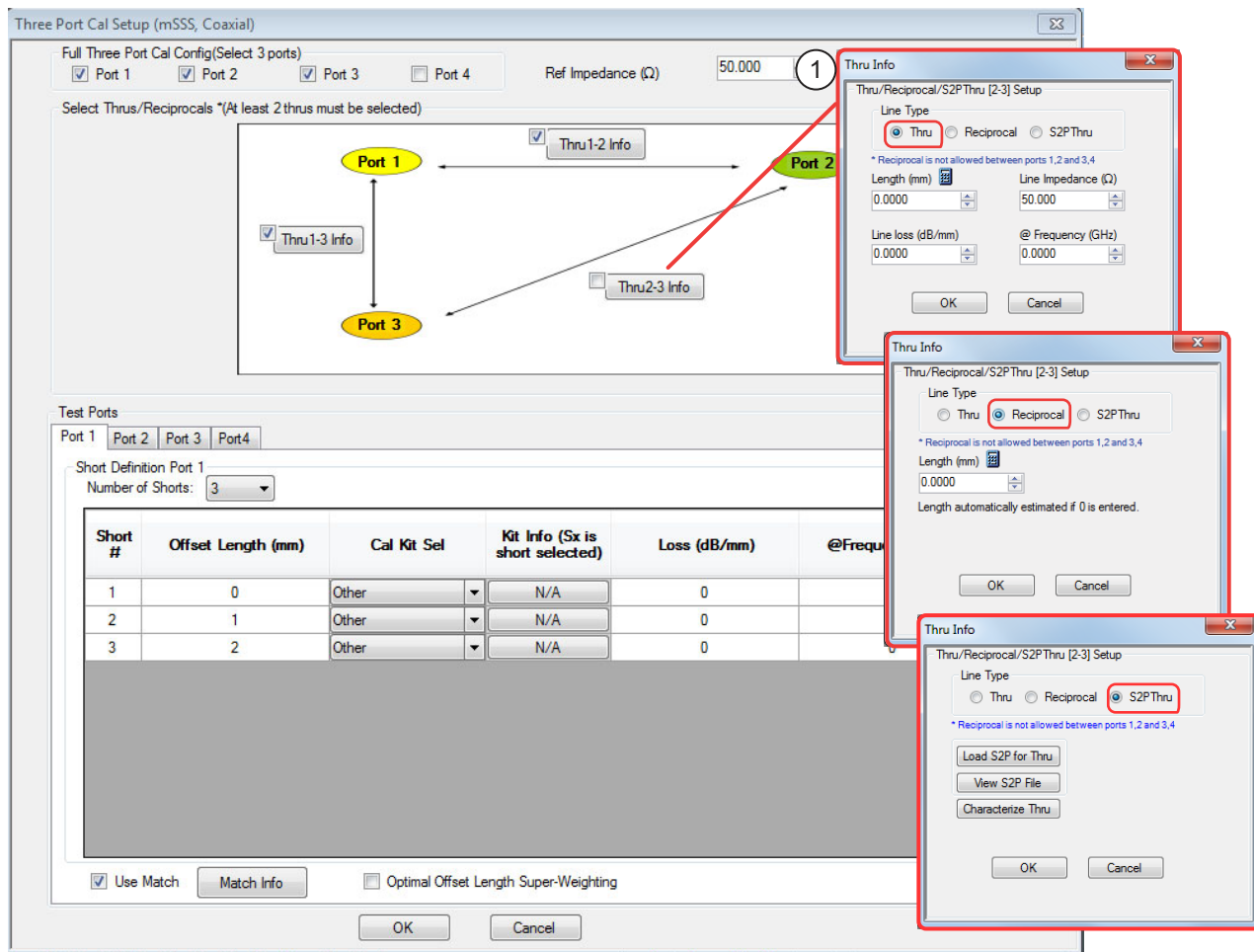
- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “THREE PORT CAL Menu – 4-Port VNAs” on page 10-153

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = mSSS
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mSSS | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (mSSS, Coaxial) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 Reciprocal selected allows user entry for length.
 S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-86. THREE PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Select Throughs

Select any combination of three possible throughs as long as two (2) are selected. The available port pair throughs are based on the ports selected above. For a 3-port calibration, only three of the following port pairs are available:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Thru Info Buttons

Each of the throughs above enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Test Ports: Port 1 Tab – Short Definition

Number of Shorts

Select number of shorts from 3-10.

Offset Length (mm)

Editable if the Cal Kit Sel selected is “Other”; otherwise it will reflect the offset length of the selected short in the cal kit standard (Kit Info column).

Cal Kit Selection

Select the **DUT Connector Type** from a drop-down menu list with options of:

- Other
- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Kit Info Button

Select displays the STANDARD INFO or USER DEFINED STANDARD dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The examples show typical standard information dialog boxes.

- [“STANDARD INFO \(TRIPLE OFFSET SHORT\) W1-Connector \(M\) Dialog Box” on page 10-284](#)
 - Since the STANDARD INFORMATION (mSSS) dialog derives from the SSS calibration kit definition, three shorts are available and the one to be used for the current line in the mSSS table is defined by the Select Short to use field. All of the shorts in the kit can be employed in the mSSS calibration, but each must be assigned to a separate line in the table.
- [“USER DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 10-287](#)

Loss (dB/mm)

This field (in conjunction with the @Frequency field and the offset length) is used to compute the loss in the short and hence the magnitude of its reflection coefficient. This is mainly relevant for very large offset lengths (> 10 mm) at microwave frequencies or somewhat shorter lengths at millimeter wave frequencies.

@Frequency (GHz)

This field (in conjunction with the loss in dB/mm and the offset length) is used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency. If a non-zero value is entered here, it is treated as the reference frequency f_{ref} at which the loss (dB/mm) was defined and the loss at all other frequencies is scaled by $\sqrt{f/f_{ref}}$. If 0 is entered here, the loss is assumed to be constant with frequency.

Use Match Checkbox

When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation (value defined within the USER DEFINED MATCH dialog: Electrical line length delta for match use, expressed in degrees). The decision to use the match data is made on a frequency-by-frequency basis. See the *MS464XB Calibration and Measurement Guide* for more information. This helps increase bandwidth of the calibration, particularly at lower frequencies, if a match standard is available.

Match Info Button

Opens the USER DEFINED MATCH dialog.

- [“USER DEFINED MATCH Dialog Box – mSSS” on page 10-296](#)

Optimal Offset Length Super-Weighting Checkbox

When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration. More details can be found in the *MS464XB Calibration and Measurement Guide*. Using this feature can increase the available bandwidth of the calibration, but does reduce immunity to repeatability variances in the setup, so it is not advised in more repeatability challenged scenarios (e.g., fixtures where the short standards are attached by spring force alone).

Port 2, Port 3, and Port 4 Tabs – Short Definition

Identical functions as with the Test Ports: Port 1 Tab above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 3-Port Calibration Setup Dialog Boxes

The table below summarizes the available fields in all available 3-port calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All three-port dialog boxes are named “Three Port Cal Setup (Cal Method, Line Type)”

Table 10-4. 3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (1 of 8)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Coaxial	<p>See full description at “THREE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-155</p> <p>Reference Impedance (Ohms)</p> <p>Test Ports: Select 3 ports from Port 1, Port 2, Port 3, Port 4.</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • At least 2 throughs that connect to all ports must be selected. Only three throughs are available from the ports selected above. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Load Type: Broadband Load, Sliding Load</p> <p>The Test Port Configuration areas below are only available if the port was selected above.</p> <p>Test Port 1 DUT Connector: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) to User-Defined32 (M), User-Defined1 (F) to User-Defined32 (F)</p> <p>Test Port 1 Connector Standard Info Button: For each DUT port connector, displays the STANDARD INFORMATION dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 <p>Test Port 1 Select BB Load: Load 1, Load 2.</p> <p>Test Port 2, Test Port 3, and Test Port 4 controls are the same as Test Port 1, but only available if that test port was selected.</p>
SOLT/R Non-Dispersive	<p>Same controls and functions as SOLT/R Coaxial above.</p>
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298

Table 10-4. 3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (2 of 8)

Cal Method Line Type	Dialog Box Controls and Functions
SOLT/R Microstrip	<p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector: User-Defined1 to User-Defined32</p> <p>Test Port 1 Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p>
SSLT Coaxial	<p>See full description at “THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box” on page 10-158 above.</p> <p>Reference Impedance (Ohms)</p> <p>Test Ports: Select 3 ports from Port 1, Port 2, Port 3, Port 4.</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • At least 2 throughs that connect to all ports must be selected. Only three throughs are available from the ports selected above. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Load Type: Broadband Load, Sliding Load</p> <p>The Test Port Configuration areas below are only available if the port was selected above.</p> <p>Test Port DUT Connector: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) to User-Defined32 (M), User-Defined1 (F) to User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 <p>Test Port Select BB Load: Load 1, Load 2.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
SSLT Non-Dispersive	<p>Same controls SSLT Coaxial above.</p>
SSLT Waveguide	<p>Warning: Not recommended to perform waveguide cal with SOLT/R method.</p> <p>Same controls as SSLT Coaxial with the following changes:</p> <p>Waveguide Kit: Select from WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298

Table 10-4. 3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (3 of 8)

Cal Method Line Type	Dialog Box Controls and Functions
SSLT Microstrip	<p>See full description at “THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box” on page 10-158</p> <p>Same controls as SSLT Coaxial with the following changes:</p> <p>Microstrip Kit: Select from 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector: User-Defined1 to User-Defined32</p> <p>Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p>
SSST Coaxial	<p>See full description at “THREE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-161 above.</p> <p>Reference Impedance (Ohms)</p> <p>Test Ports: Select 3 ports from Port 1, Port 2, Port 3, Port 4.</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • At least 2 throughs that connect to all ports must be selected. Only three throughs are available from the ports selected above. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>The Test Port Configuration areas below are only available if the port was selected above.</p> <p>Test Port DUT Connector: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) to User-Defined 32 (M), User-Defined 1 (F) to User-Defined 32 (F)</p> <p>Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
SSST Non-Dispersive	Same controls as SSST Coaxial.
SSST Waveguide	<p>Same controls as SSST Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSST Microstrip	<p>Same controls as SSST Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector: User-Defined1 to User-Defined32</p> <p>Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p>

Table 10-4. 3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (4 of 8)

Cal Method Line Type	Dialog Box Controls and Functions
Broadband (SOLT/SOLR-SSST/SSSR) Coaxial	<p>See full description of controls and display logic at “THREE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-164.</p> <p>Note: Broadband Calibration is available only in Broadband configuration enabled with Option 08x and 3739 Test Set.</p> <p>Reference Impedance</p> <p>Input the reference impedance. Input field defaulted to 50 Ohms. Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.</p> <p>Select Through Area</p> <p>Select any combination of throughs as long as three are selected. For a 4-port calibration, the following port pairs are available:</p> <p>Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3,4,</p> <p>Thru Buttons</p> <p>Each of the Throughs enables a Thru Info button that displays the THRU INFO dialog box allowing configuration of each through. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.</p> <p>“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 “AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278</p> <p>Breakpoint Frequency</p> <p>67 GHz is recommended for the 3656 (1 mm) calibration kit. 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.</p> <p>Test Port 1 Connector Type Area</p> <p>Select the DUT Connector Type from a drop-down menu list with options of:</p> <p>0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port 1 Connector Standard Info Button</p> <p>Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal.</p> <p>“STANDARD INFO (Broadband Cal) 0.8 mm Connector (M) Dialog Box” on page 10-282</p> <p>The following link shows a typical User-defined Standard information dialog box for broadband cal.</p> <p>“USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287</p> <p>Test Port 2, Test Port 3, and Test Port 4 Connector Type Area: Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.</p> <p>Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button: Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.</p> <p>OK / Cancel: Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.</p>

Table 10-4. 3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (5 of 8)

Cal Method Line Type	Dialog Box Controls and Functions
TRL/TRM Coaxial	<p>See full description of controls and display logic at “THREE PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-166.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric – Enter a value if different than the default.</p> <p>Select Cal Type: TRL/M + Singleton, Two TRL/Ms</p> <p>Cal A Ports: Select two port pairs from 1-3, 1-4, 2-3, 2-4</p> <p>Cal B Ports: Auto-selected non-Cal A Port Pairs: 1-3, 1-4, 2-3, 2-4</p> <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Line Length Representation: Effective Length, Delay, Physical Length</p> <p>Number of Bands: 1 through 5</p> <p>Cal A Configuration Parameters:</p> <ul style="list-style-type: none"> • Cal A Reference Plane Location: Ends of Line, Middle of Line 1 • Cal A Number of Bands: 1 through 5 • Cal A Band 1 Device 1 Line: Line Length (mm) or Delay (ps), Line Loss (dB/mm), @ Frequency (GHz) • Cal A Band 1-5 Type: Line, Match; Device Effective Length (mm)/Match; If Device 1 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. <p>“USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM” on page 10-288</p> <ul style="list-style-type: none"> • Reflection Type: Open-Like Short-Like; Cal A Band Breakpoint: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz). • Cal A Reflection Component: Enforce Passivity • Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm) • Last Loaded Kit Name – TRL/TRM/LRL/LRM Cal Kit file name last loaded • Save Kit – Save calibration kit data to an TRL/TRM/LRL/LRM cal kit file (.lcf) • Load Kit – Recall existing TRL/TRM/LRL/LRM cal kit file (.lcf) <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
TRL/TRM Non-Dispersive	Same controls as TRL/TRM Coaxial above.
TRL/TRM Waveguide	<p>Same controls as TRL/TRM Coaxial above with the following changes:</p> <p>Cutoff Frequency (GHz)</p> <p>Dielectric Value</p>
TRL/TRM Microstrip	<p>Same controls as TRL/TRM Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

Table 10-4. 3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (6 of 8)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Coaxial	<p>See full description of controls and display logic at “THREE PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-170.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric – Enter a value if different than the default.</p> <p>Select Cal Type: LRL/M + Singleton, Two LRL/Ms</p> <p>Cal A Ports: Select two port pairs from 1-3, 1-4, 2-3, 2-4</p> <p>Cal B Ports: Auto-selected non-Cal A Port Pairs: 1-3, 1-4, 2-3, 2-4</p> <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Reference Plane Location: Ends of Line 1, Middle of Line 1</p> <p>Line Length Representation: Effective Length, Delay, Physical Length</p> <p>Number of Bands: 1 through 5</p> <ul style="list-style-type: none"> • If 1, only Band 1 Device 1 and Band 1 Device 2 controls appear. • If 2, the above plus Band 2 Device 3 and Band 2 Device 4 controls appear. • If 3, the above plus Band 3 Device 5 and Band 3 Device 6 controls appear. • If 4, the above plus Band 4 Device 7 and Band 4 Device 8 controls appear. • If 5, the above plus Band 5 Device 9 and Band 5 Device 10 controls appear. <p>Cal A Configuration Parameters:</p> <ul style="list-style-type: none"> • Cal A Reference Plane Location: Ends of Line, Middle of Line 1 • Cal A Number of Bands: 1 through 5 • Cal A Band 1 Device 1 Line: Line Length (mm) or Delay (ps), Line Loss (dB/mm), @ Frequency (GHz) • Cal A Band 1 Device 2 Type: Line, Match; Use Short-like component, Use Open-like component, Use both; If Device 2 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. • “USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM” on page 10-289 • Cal A Band 2 Device 3: Use device 1, Use new line • Cal A Band 2 Device 4: Line, Match, Type of Reflection (Use Open-like component, Use Short-like component), Line Length (mm) • Cal A Band Break Point: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz). • Cal A Reflection Component: Enforce Passivity • Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm) • Last Loaded Kit Name – TRL/TRM/LRL/LRM Cal Kit file name last loaded • Save Kit – Save calibration kit data to an TRL/TRM/LRL/LRM cal kit file (.lcf) • Load Kit – Recall existing TRL/TRM/LRL/LRM cal kit file (.lcf) <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
LRL/LRM Non-Dispersive	<p>Same controls as LRL/LRM Coaxial above.</p>
LRL/LRM Waveguide	<p>Same controls as LRL/LRM Coaxial above with the following changes:</p> <p>Cutoff Frequency (GHz)</p> <p>Dielectric Value</p>

Table 10-4. 3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (7 of 8)

Cal Method Line Type	Dialog Box Controls and Functions
LRL/LRM Microstrip	<p>Same controls as LRL/LRM Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279
mTRL	The mTRL calibration method is not available for three-port calibrations.
mSSS Coaxial	<p>See full description at “THREE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-174</p> <p>Reference Impedance (Ohms)</p> <p>Test Ports: Select 3 ports from Port 1, Port 2, Port 3, Port 4.</p> <p>Select Throughs:</p> <ul style="list-style-type: none"> • At least 2 throughs that connect to all ports must be selected. Only three throughs are available from the ports selected above. • Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, Thru 3-4 <p>Thru Info buttons: Displays the THRU INFO dialog box for the selected through.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 <p>Test Ports: Port 1, Port 2, Port 3, Port 4</p> <p>Number of Shorts: 3-10</p> <p>Offset Length: Cal Kit Sel selected is “Other”, otherwise reflects the offset length of the selected short in the cal kit standard (Kit Info column)</p> <p>Cal Kit Selection: Other, 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Kit Info Standard Info Button: Displays the STANDARD INFORMATION (mSSS) or USER DEFINED STANDARD (mSSS) dialog box for the selected short.</p> <ul style="list-style-type: none"> • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-284 • The short to be used for the current line in the mSSS table is defined by the Select Short to use field. • “USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287 <p>Loss (dB/mm): Used to compute the loss in the short and hence the magnitude of its reflection coefficient.</p> <p>@Frequency: Used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency.</p> <p>Use Match: When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation.</p> <p>Optimal Offset Length Super-Weighting: When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
mSSS Non-Dispersive	Same controls as mSSS Coaxial above.

Table 10-4. 3-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (8 of 8)

Cal Method Line Type	Dialog Box Controls and Functions
mSSS Waveguide	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cutoff Frequency: The cutoff frequency for the TE₁₀ mode in the waveguide size being used for this calibration (all shorts are assumed to have the same aperture dimensions and hence the same cutoff frequency).</p> <p>Dielectric: The dielectric constant of any filling material in the waveguide interface being used for the calibration (assumed 100% fill; default value is 1).</p>
mSSS Microstrip	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

10-11 Manual 2-Port Cal Setup – 4-Port VNAs

TWO PORT CAL Menu – 4-Port VNAs

Button Availability:

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TWO PORT CAL SETUP dialog box.
- A representative menu is shown below.
- The example procedures at the end of this chapter show examples of various TWO PORT CAL menus.

Previous

- [“MANUAL CAL Menu – 4-Port VNAs” on page 10-99](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL

	<h4>Modify Cal Setup</h4> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the THREE PORT CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu – 4-Port VNAs” on page 10-101 <p>Example two-port dialog boxes are available at the following links:</p> <ul style="list-style-type: none"> • “TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-187 • “TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box” on page 10-191 • “TWO PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-194 • “TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-198 • “TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-201 • “TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-205 • “TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-208 <p>A summary of all 2-Port Cal Method and Line Type combinations is available at:</p> <ul style="list-style-type: none"> • Table 10-5, “2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-213 <h4>Port Selected</h4> <p>Read-only display of the ports selected for the pending calibration.</p> <h4>Completion Menu Buttons</h4> <p>For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.</p> <p>For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the TWO PORT CAL menu.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>①</p> </div> <div style="text-align: center;"> <p>②</p> </div> </div>
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Figure 10-87. TWO PORT CAL Menu – 4-Port VNAs – Typical example (1 of 2)



Figure 10-87. TWO PORT CAL Menu – 4-Port VNAs – Typical example (2 of 2)

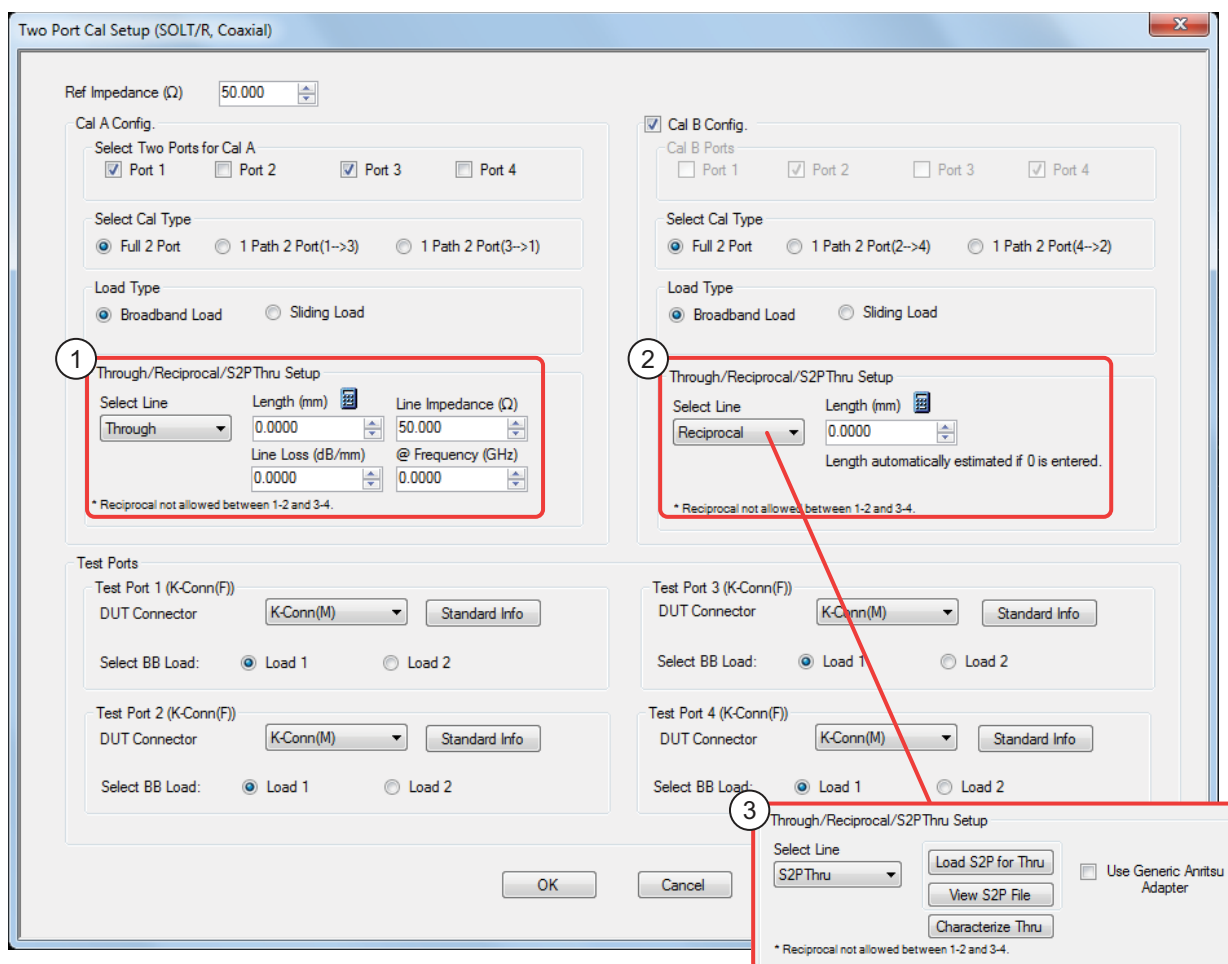
TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “TWO PORT CAL Menu – 4-Port VNAs” on page 10-185

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, Coaxial)



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
2. Reciprocal selected allows user entry for length.
3. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-88. TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Cal A and Cal B Configuration

The dialog box is divided into two calibration areas for Calibration A and Calibration B. Of the four test ports, the user selects two ports for the Cal A procedure. The instrument autoselects the remaining two test ports for the Cal B procedure.

Cal A Test Ports

Select any two test ports from Port 1, Port 2, Port 3, and Port 4. The non-selected ports are autoselected for Cal B.

Cal A Cal Type

Select the calibration type from the following options:

- Full 2 Port
- 1 Path 2 Port forward. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (1→2).
- 1 Path 2 Port reverse. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (2→1).

Cal A Load Type

Select from:

- Broadband Load
- Sliding Load. If selected, a message appears: “Still required broadband loads below sliding load breakpoint frequency.”

Cal A Through/Reciprocal/S2P Thru Setup

- **Through Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)
 - Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
 - Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
 - @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.
- **Reciprocal Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)
- **S2P Thru Selected**
 - Load S2P for Thru
 - Opens navigation window to load S2P file.
 - View S2P File
 - Opens window to view contents of S2P file.
 - Characterize Thru
 - Allows a thru characterization and generation of an .s2p file.
 - Use Generic Anritsu Adapter (check box)

- Checking this box will automatically load a default .s2p file for a generic Anritsu adapter. Note that selecting the checkbox disables the Load S2P for Thru and Characterize Thru buttons.

Cal B Setup Areas

The Cal B functions and controls are the same as Cal A above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the DUT Connector Type from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 DUT Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector with its calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298](#)

Test Port 1 Select BB Load

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2 Configuration

Provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

Provides the same controls as Test Port 3 Connector above.

Test Port 4 Configuration

Provides the same controls as Test Port 4 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

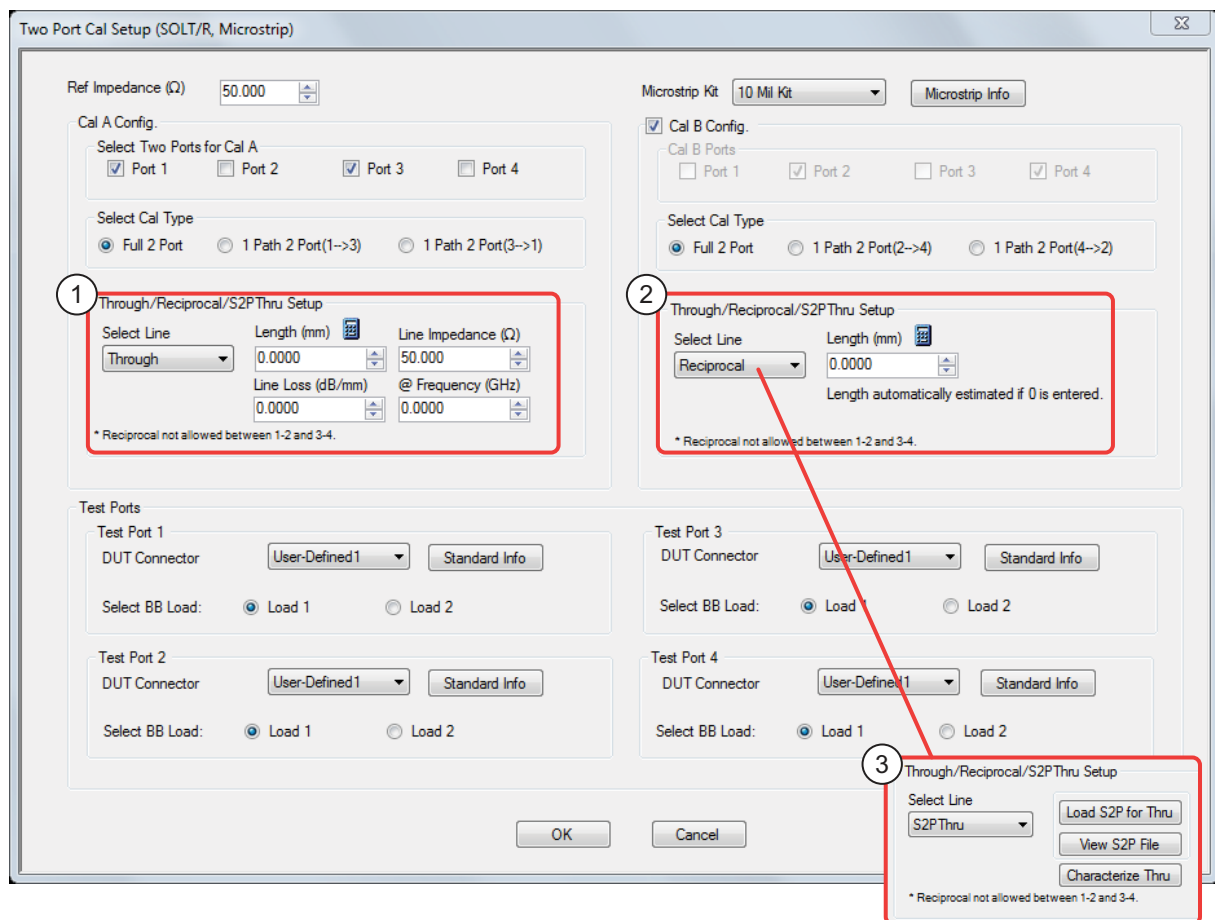
TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “TWO PORT CAL Menu – 4-Port VNAs” on page 10-185

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
2. Reciprocal selected allows user entry for length.
3. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-89. TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted.

Cal A and Cal B Configuration

The dialog box is divided into two calibration areas for Calibration A and Calibration B. Of the four test ports, the user selects two ports for the Cal A procedure. The instrument autoselects the remaining two test ports for the Cal B procedure.

Cal A Test Ports

Select any two test ports from Port 1, Port 2, Port 3, and Port 4. The non-selected ports are autoselected for Cal B.

Cal A Cal Type

Select the calibration type from the following options:

- Full 2 Port
- 1 Path 2 Port forward. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (1→2).
- 1 Path 2 Port reverse. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (2→1).

Cal A Load Type

Select from:

- Broadband Load
- Sliding Load. If selected, a message appears: “Still required broadband loads below sliding load breakpoint frequency.”

Cal A Through/Reciprocal/S2P Thru Setup Area

- **Through Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)
 - Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
 - Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
 - @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.
- **Reciprocal Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)
- **S2P Thru Selected**
 - Load S2P for Thru
 - Opens navigation window to load S2P file.
 - View S2P File
 - Opens window to view contents of S2P file.
 - Characterize Thru
 - Allows a thru characterization and generation of an .s2p file.

Cal B Setup Areas

The functions of the Cal B areas is the same as the Cal A above.

Test Port 1 DUT Connector

If Port 1 was selected above, select the **DUT Connector Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port 1 DUT Connector Standard Info Button

Select displays the STANDARD INFO dialog box for the selected connector with its calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The example here shows a typical standard information dialog box.

- [“MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279](#)

Test Port 1 Select BB Load

Select BB Load number for Test Port 1:

- Load 1
- Load 2

Test Port 2 Configuration

Provides the same controls as Test Port 1 Connector above.

Test Port 3 Configuration

Provides the same controls as Test Port 1 Connector above.

Test Port 4 Configuration

Provides the same controls as Test Port 1 Connector above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box

Full Name

Two Port Cal Setup (Broadband Cal, Merged SOLT/SOLR-SSST/SSSR)

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “CAL METHOD Menu – 4-Port VNA” on page 10-104
- “TWO PORT CAL Menu – 4-Port VNAs” on page 10-185

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = Broadband Cal (SOLT/R-SSST/R) – Appears only with VNA in Broadband Mode (3739)
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = Broadband Cal (SOLT/R-SSST/R) | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box

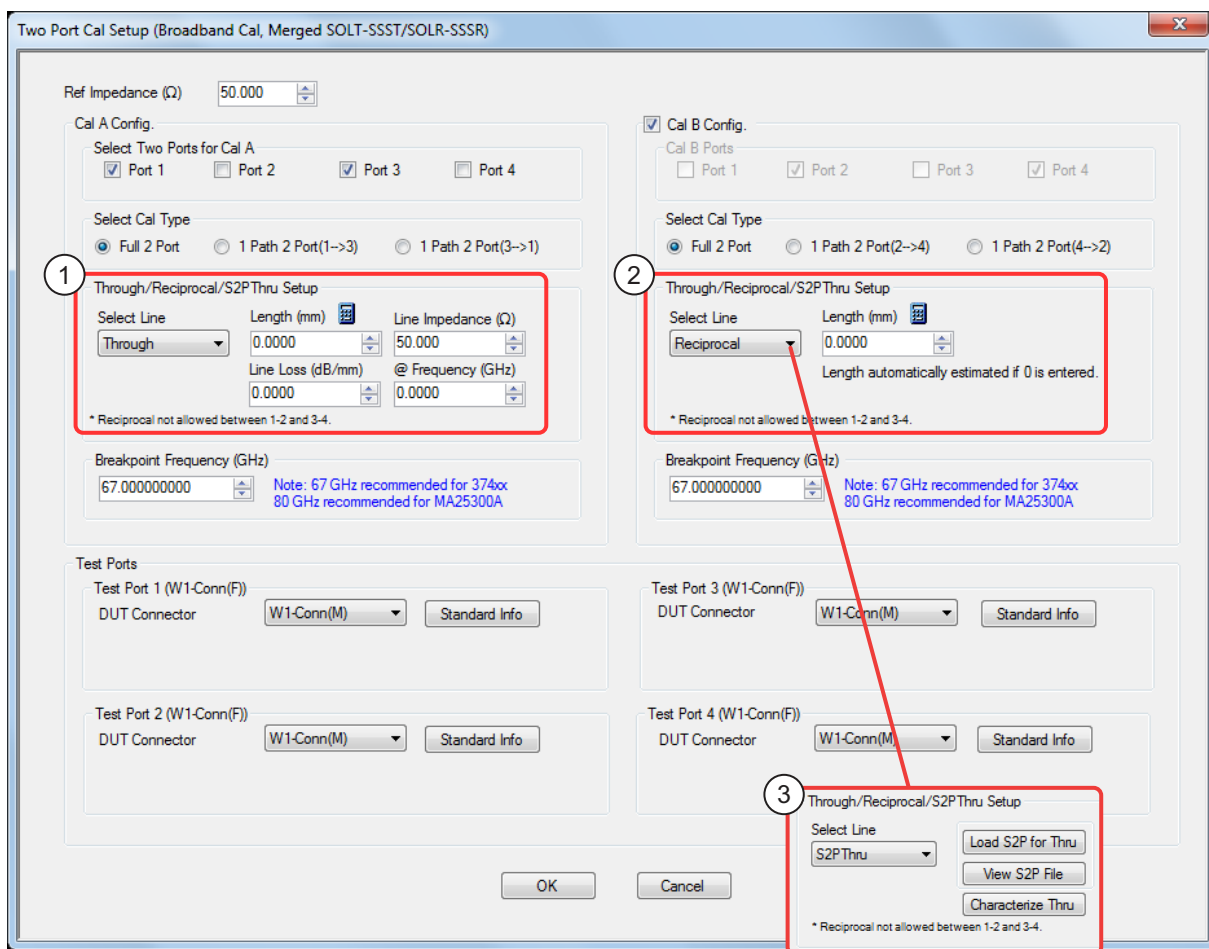


Figure 10-90. TWO PORT CAL SETUP Broadband Cal, Merged (SOLT/SOLR-SSST/SSSR) Dialog Box

-
1. Through selected allows user entries for length, line impedance, line loss, and frequency.
 2. Reciprocal selected allows user entry for length.
 3. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).
-

Figure 10-90. TWO PORT CAL SETUP Broadband Cal, Merged (SOLT/SOLR-SSST/SSSR) Dialog Box

Reference Impedance

- Input field is defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Cal A Config Area**Select 2 Ports for Cal A**

- Select two (2) ports: Select from Port 1, Port, 2, Port 3, or Port 4

Select Cal Type

- Select either Full 2 Port, 1 Path 2 Port (1→2), 1 Path 2 Port (2→1),

Through/Reciprocal/S2P Thru Setup Area**Through Selected**

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

Reciprocal Selected

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

S2P Thru Selected

- Load S2P for Thru
 - Opens navigation window to load S2P file.
- View S2P File
 - Opens window to view contents of S2P file.
- Characterize Thru
 - Allows a thru characterization and generation of an .s2p file.

Breakpoint Frequency

- 67 GHz is recommended for the 3656 (1 mm) calibration kit.
- 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
- In this combined calibration, the breakpoint frequency defines the frequency above which the SSS algorithm will be used (and SOL will be used for the frequencies at or below the breakpoint). Default values are based on Anritsu calibration kits and are optimal for those components.

Cal B Config Area (when enabled)

The Cal B Config area can be enabled by clicking the check box. Cal B Config has the same functions as Cal A config area, except the Cal B Ports selection is dependent on which ports were selected in Cal A Config. For example, if Port 1 and Port 2 are selected in the Cal A area, Port 3 and Port 4 are selected automatically in the Cal B Config area.

Test Ports Area**Test Port 1 DUT Connector**

- Select the **DUT Connector** type from a drop-down menu list with options of:
 - 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M) and W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), and User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

- Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal.
- [“STANDARD INFO \(Broadband Cal\) 0.8 mm Connector \(M\) Dialog Box” on page 10-282](#)
The following link shows a typical User-defined Standard information dialog box for broadband cal.
- [“USER DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 10-287](#)

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

- Identical function as with the Test Port 1 DUT Connector Area above. DUT Connector Type is selected from a drop-down menu list.

Test Port 2 and Test Port 3 Connector Standard Info Button

- Identical function as with the Test Port 1 DUT Connector Standard Info button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

OK / Cancel:

Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.

TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “TWO PORT CAL Menu – 4-Port VNAs” on page 10-185

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (TRL/TRM) | Line Type (Coaxial) | Edit Cal Parameters | TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

Two Port Cal Setup (TRL/TRM, Coaxial)

Ref Impedance (Ω) 50.000 Dielectric 1.000649

Cal A Cal B

☒ Cal A Config.

Select Port Pair(1-2,3-4 combos are not allowed)

☒ 1,3 ☐ 1,4 ☐ 2,3 ☐ 2,4

Line Length Representation

☒ Effective Length ☐ Delay ☐ Physical Length

Band Definition

Number of Bands: 1

In addition to the thru line, the other calibration devices are:

Band #	Cal Device	Device Eff. Length (mm) / Match	Reflection Type	Breakpoint (GHz)	Breakpoint Calculation
1	Line	5	Short-like		

Reflection Component(Note:Reflection offset length is referenced from the Ends of first line)

☐ Enforced Passivity Open-like Offset Length (mm) 0.0000 Short-like Offset Length (mm) 0.0000

Last Loaded Kit Name

Save Kit Load Kit Restore Defaults

OK Cancel

Figure 10-91. TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Cal A / Cal B Tabs

Access the Cal A or Cal B functions and controls by selecting either the Cal A or Cal B tab.

Cal A Config:**Select Port Pair (1-2, 3-4 combos are not allowed):**

- 1,3
- 1,4
- 2,3
- 2,4

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Band Definition

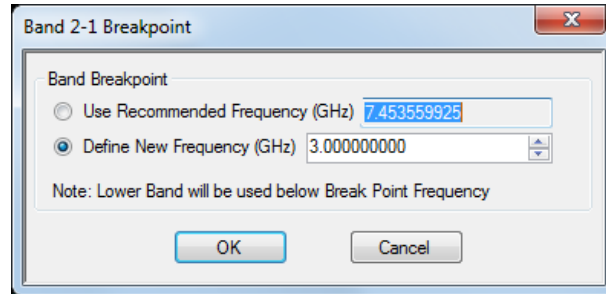
Select one to five bands from the drop-down menu.

- Number of Bands = 1. Only the Band 1 Definition and editable parameters appear.
- Number of Bands = 2. The Band 2 Definition and editable parameters appear.
- Number of Bands = 3. The Band 3 Definition and editable parameters appear.
- Number of Bands = 4. The Band 4 Definition and editable parameters appear.
- Number of Bands = 5. The Band 5 Definition and editable parameters appear.

Band Parameter Definitions

- **Band #**
- **Cal Device**
 - Band choices are
 - Line
 - Match
- **Device Effective Length (mm) / Match**
 - Line: Enter device effective length for each band
 - Match: [“USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM” on page 10-288](#)
- **Loss (dB/mm)**
 - Enter loss for each band.
- **@Frequency (GHz)**
 - Enter frequency for line loss for each band.
- **Reflection Type**
 - Enter a reflection type for each band.

- Short-like
- Open-like
- Both (available only if Cal Device Y= Match)
- **Breakpoint (GHz)**
 - Enter a breakpoint frequency for Band 2–5. (The entries are active for bands 2–5.)
- **Breakpoint Calculation**
 - Select to Calculate a breakpoint frequency for band 2:



Reflection Component

- Enforce Passivity – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- Enter Open-like and/or Short-like offset length

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- Last Loaded Kit Name – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- Save Kit – Saves the present cal setup.
- Load Kit – Loads a previously saved cal setup.
- Restore Defaults – Loads the instrument default values for the Cal Setup.

OK/Cancel

- OK and Cancel returns user to the CAL SETUP menu.

TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “TWO PORT CAL Menu – 4-Port VNAs” on page 10-185

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (LRL/LRM) | Line Type (Coaxial) | Edit Cal Parameters | TWO PORT CAL SETUP (LRL/M, Coaxial) Dialog Box

Two Port Cal Setup (LRL/LRM, Coaxial)

Ref Impedance (Ω) 50.000 Dielectric 1.000649

Cal A Cal B

☒ Cal A Config.

Select Port Pair(1-2,3-4 combos are not allowed)

☒ 1,3 ☐ 1,4 ☐ 2,3 ☐ 2,4

Reference Plane Location

☒ Ends of Line 1 ☐ Middle of Line 1

Line Length Representation

☒ Effective Length ☐ Delay ☐ Physical Length

Band Definition

Number of Bands: 1

Band # (Device #)	Cal Device X	Device X Eff. Length (mm)	Cal Device Y	Device Y Eff. Length (mm) / Match	Loss (dB/mm)	@Frequency (GHz)	Reflection Type	Breakpoint (GHz)	Breakpoint Calculation
1 (X=1, Y=2)	Line	0	Line	5	0	0	Short-like		

Reflection Component(Note: Reflection offset length is referenced from the Ends of first line)

☐ Enforce Passivity Open-like Offset Length (mm) 0.0000 Short-like Offset Length (mm) 0.0000

Last Loaded Kit Name

Save Kit Load Kit Restore Defaults

OK Cancel

Figure 10-92. TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Cal A / Cal B Tabs

Access the Cal A or Cal B functions and controls by selecting either the Cal A or Cal B tab.

Cal A Config:**Select Port Pair (1-2, 3-4 combos are not allowed):**

- 1,3
- 1,4
- 2,3
- 2,4

Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Band Definition

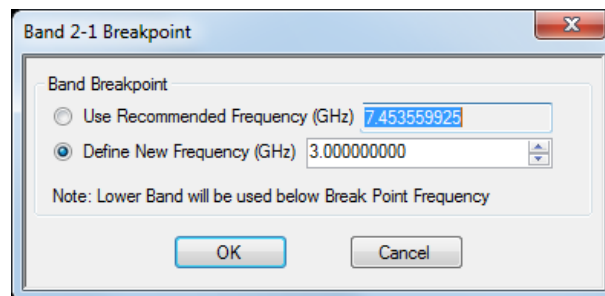
Select one to five bands from the drop-down menu.

- Number of Bands = 1. Only the Band 1 Definition and editable parameters appear.
- Number of Bands = 2. The Band 2 Definition and editable parameters appear.
- Number of Bands = 3. The Band 3 Definition and editable parameters appear.
- Number of Bands = 4. The Band 4 Definition and editable parameters appear.
- Number of Bands = 5. The Band 5 Definition and editable parameters appear.

Band Parameter Definitions

- **Band # (Device #)**
 - Band 1 defines Devices as $X = 1$ and $Y = 2$
 - Band 2 defines Devices as $X = 3$ and $Y = 4$
 - Band 3 defines Devices as $X = 5$ and $Y = 6$
 - Band 4 defines Devices as $X = 7$ and $Y = 8$
 - Band 5 defines Devices as $X = 9$ and $Y = 10$
- **Cal Device X**
 - Band 1 choice is
 - Line
 - Band 2 choices are
 - New Line
 - Bnd1 Cal Dev X
 - Bnd1 Cal Dev Y
 - Band 3 choices are
 - New Line
 - Bnd1 Cal Dev X
 - Bnd1 Cal Dev Y

- Bnd2 Cal Dev X
 - Bnd2 Cal Dev Y
- Band 4 choices are
 - New Line
 - Bnd1 Cal Dev X, Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X, Bnd2 Cal Dev Y
 - Bnd3 Cal Dev X, Bnd3 Cal Dev Y
- Band 5 choices are
 - New Line
 - Bnd1 Cal Dev X, Bnd1 Cal Dev Y
 - Bnd2 Cal Dev X, Bnd2 Cal Dev Y
 - Bnd3 Cal Dev X, Bnd3 Cal Dev Y
 - Bnd4 Cal Dev X, Bnd4 Cal Dev Y
- **Device X Length (mm)**
 - Enter device length for each band
- **Cal Device Y**
 - Select Line or Match for each band.
- **Device Y Length (mm)/Match**
 - Enter device length for each band if Device Y is Line.
 - Select Match Info if Device Y is Match. Opens [“USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM” on page 10-289.](#)
- **Loss (dB/mm)**
 - Enter loss for each band.
- **@Frequency (GHz)**
 - Enter frequency for line loss for each band.
- **Reflection Type**
 - Enter a reflection type for each band.
 - Short-like
 - Open-like
 - Both (available only if Cal Device Y= Match)
- **Breakpoint (GHz)**
 - Enter a breakpoint frequency for Band 2–5. (The entries are active for bands 2–5.)
- **Breakpoint Calculation**
 - Select to Calculate a breakpoint frequency for band 2:



Reflection Component

- Enforce Passivity – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- Enter Open-like and/or Short-like offset length

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- Last Loaded Kit Name – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- Save Kit – Saves the present cal setup.
- Load Kit – Loads a previously saved cal setup.
- Restore Defaults – Loads the instrument default values for the Cal Setup.

OK/Cancel

- OK and Cancel returns user to the CAL SETUP menu.

TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box

When mTRL Cal Method is selected, the Edit Cal Parameters button opens the Two Port Cal Setup (mTRL, Coaxial) dialog that provides from two to ten lines.

Previous

- [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Prerequisites

- Cal Method = mTRL
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO-PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO-PORT CAL SETUP (mTRL, Coaxial) Dialog Box

Two Port Cal Setup (mTRL, Coaxial)

Ref Impedance (Ω) Dielectric

Cal A Cal B

☒ Cal A Config.

Select Port Pair(1-2,3-4 combos are not allowed)

☒ 1,3 ☐ 1,4 ☐ 2,3 ☐ 2,4

Reference Plane Location

☒ Ends of Line 1 ☐ Middle of Line 1

Line Length Representation

☒ Effective Length ☐ Delay ☐ Physical Length

Line Definition

Number of Lines:

Line #	Eff. Length (mm)	Loss (dB/mm)	@Frequency (GHz)
1	1	0	0
2	2	0	0

Reflection Component (Note: Reflection offset length is always referenced from the Ends of Line1)

Reflection Type ☐ Enforce Passivity Open-like Offset Length (mm) Short-like Offset Length (mm)

☐ Use Match ☐ Optimal Length Super-Weighing

Last Loaded Kit Name

Figure 10-93. Edit Cal Params – TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box

Overview

The dialog box provides common areas for Reference Impedance and Dielectric. Below this common section are two tabbed dialog areas for Cal A and Cal B.

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Dielectric

Enter a value if different than the default.

Cal A and Cal B tabs

The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box. The Cal A tab is always selected. Cal B calibration parameters can be set by selecting the **Cal B Config** checkbox.

Cal A Ports

Allows selection of the calibration A port pair. Combinations of ports 1-2 and ports 3-4 are not allowed.

- Port 1, 3
- Port 1, 4
- Port 2, 3
- Port 2, 4

Cal B Ports

This area is read-only and defined by the port pair choice for Cal A.

- If Cal A = Ports 1, 3, then Cal B = Ports 2, 4
- If Cal A = Ports 1, 4, then Cal B = Ports 2, 3
- If Cal A = Ports 2, 3, then Cal B = Ports 1, 4
- If Cal A = Ports 2, 4, then Cal B = Ports 1, 3

Reference Plane Location

Select from two radio button controlled options:

- Ends of Line 1
- Middle of Line 1

Line Length Representation

Select from three radio button controlled options:

- Effective Length (the free-space equivalent length)
- Delay
- Physical Length

Line Definition

Select two to ten line from the drop-down menu.

- Number of Lines = 2. The Lines 1 and 2 editable parameters appear.
- Number of Lines = 3. The Lines 1 through 3 editable parameters appear.
- Number of Lines = 4. The Lines 1 through 4 editable parameters appear.
- ...
- Number of Lines = 10. The Lines 1 through 10 editable parameters appear.

Line Parameter Definitions

- **Line #**
- **Effective Length (mm)** (If Effective Length is selected)
 - Enter effective length for each line.
- **Delay (ps) (If Delay is selected)**
 - Enter delay for each line.
- **Physical Length (mm)** (If Physical Length is selected)
 - Enter physical length for each line.
- **Loss (dB/mm)**
 - Enter loss for each line.
- **@Frequency (GHz)**
 - Enter frequency for line loss for each line.

Reflection Component

- Select Reflection Type
- Enforce Passivity – Forces the reflection value to be passive at an intermediate step in the calibration, which rescales the reflection tracking terms.
- Enter Open-like and/or Short-like offset length.

Use Match

- If selected, will display the Match Info button to open the [USER DEFINED MATCH DEVICES Dialog Box – mTRL](#).

Optimal Length Super-Weighting

- Enables the use of an enhanced weighting scheme during the calibration to further emphasize line pairs that have optimal line length deltas. The use of this feature further de-emphasizes non-optimal pairs and reduces the impact of repeatability differences.

Last Loaded Kit Name, Save Kit, Load Kit, Restore Defaults

- Last Loaded Kit Name – Loaded kit name appears in the field. The name can be edited in this field and then saved as another kit.
- Save Kit saves the present cal setup.
- Load Kit – Click opens window to navigate to a desired existing mTRL cal kit file (.mlcf).
- Restore Defaults loads the instrument default values for the Cal Setup.

OK/Cancel: Returns user to the CAL SETUP menu.

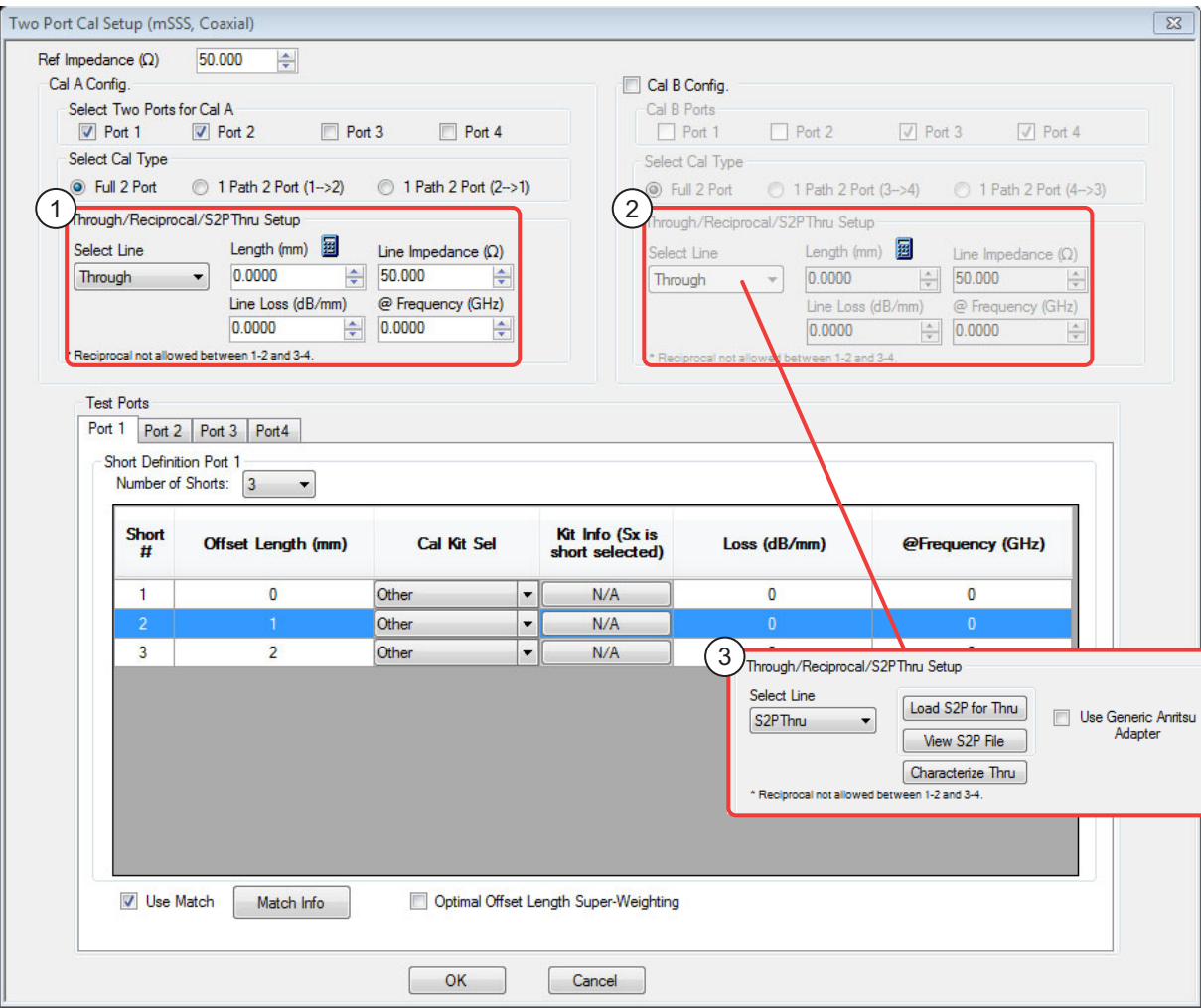
TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “TWO PORT CAL Menu – 4-Port VNAs” on page 10-185

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | TWO PORT CAL SETUP (mSSS, Coaxial)



1. Through selected allows user entries for length, line impedance, line loss, and frequency.
2. Reciprocal selected allows user entry for length.
3. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).

Figure 10-94. TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Cal A and Cal B Configuration

The dialog box is divided into two calibration areas for Calibration A and Calibration B. Of the four test ports, the user selects two ports for the Cal A procedure. The instrument autoselects the remaining two test ports for the Cal B procedure.

Cal A Test Ports

Select any two test ports from Port 1, Port 2, Port 3, and Port 4. The non-selected ports are autoselected for Cal B.

Cal A Cal Type

Select the calibration type from the following options:

- Full 2 Port
- 1 Path 2 Port forward. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (1→2).
- 1 Path 2 Port reverse. If port 1 and port 2 are selected, this is labeled as 1 Path 2 Port (2→1).

Cal A Through/Reciprocal/S2P Thru Setup

- **Through Selected**
 - Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)
 - Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
 - Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
 - @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.
- **Reciprocal**
 - Not allowed between 1-2 and 3-4.
 - Length (mm)
 - Input line length in mm.
- **S2P Thru Selected**
 - Load S2P for Thru
 - Opens navigation window to load S2P file.
 - View S2P File
 - Opens window to view contents of S2P file.
 - Characterize Thru
 - Allows a thru characterization and generation of an .s2p file.
 - Use Generic Anritsu Adapter (check box)
 - Checking this box will automatically load a default .s2p file for a generic Anritsu adapter. Note that selecting the checkbox disables the Load S2P for Thru and Characterize Thru buttons.

Cal B Setup Areas

The Cal B functions and controls are the same as Cal A above.

Test Ports: Port 1 Tab – Short Definition**Number of Shorts**

Select number of shorts from 3-10.

Offset Length (mm)

Editable if the Cal Kit Sel selected is “Other”; otherwise it will reflect the offset length of the selected short in the cal kit standard (Kit Info column).

Cal Kit Selection

Select the **DUT Connector Type** from a drop-down menu list with options of:

- Other
- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Kit Info Button

Select displays the STANDARD INFO or USER DEFINED STANDARD dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The examples show typical standard information dialog boxes.

- [“STANDARD INFO \(TRIPLE OFFSET SHORT\) W1-Connector \(M\) Dialog Box” on page 10-284](#)
 - Since the STANDARD INFORMATION (mSSS) dialog derives from the SSS calibration kit definition, three shorts are available and the one to be used for the current line in the mSSS table is defined by the Select Short to use field. All of the shorts in the kit can be employed in the mSSS calibration, but each must be assigned to a separate line in the table.
- [“USER DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 10-287](#)

Loss (dB/mm)

This field (in conjunction with the @Frequency field and the offset length) is used to compute the loss in the short and hence the magnitude of its reflection coefficient. This is mainly relevant for very large offset lengths (> 10 mm) at microwave frequencies or somewhat shorter lengths at millimeter wave frequencies.

@Frequency (GHz)

This field (in conjunction with the loss in dB/mm and the offset length) is used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency. If a non-zero value is entered here, it is treated as the reference frequency f_{ref} at which the loss (dB/mm) was defined and the loss at all other frequencies is scaled by $\sqrt{f/f_{ref}}$. If 0 is entered here, the loss is assumed to be constant with frequency.

Use Match Checkbox

When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation (value defined within the USER DEFINED MATCH dialog: Electrical line length delta for match use, expressed in degrees). The decision to use the match data is made on a frequency-by-frequency basis. See the *MS464XB Calibration and Measurement Guide* for more information. This helps increase bandwidth of the calibration, particularly at lower frequencies, if a match standard is available.

Match Info Button

Opens the USER DEFINED MATCH dialog.

- [“USER DEFINED MATCH Dialog Box – mSSS” on page 10-296](#)

Optimal Offset Length Super-Weighting Checkbox

When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration. More details can be found in the *MS464XB Calibration and Measurement Guide*. Using this feature can increase the available bandwidth of the calibration, but does reduce immunity to repeatability variances in the setup, so it is not advised in more repeatability challenged scenarios (e.g., fixtures where the short standards are attached by spring force alone).

Port 2, Port 3, and Port 4 Tabs – Short Definition

Identical functions as with the Test Ports: Port 1 Tab above.

OK / Cancel

Click **OK** to accept the changes and return to the **CAL SETUP** menu.

Click **Cancel** to abandon any changes and return to the **CAL SETUP** menu.

Summary of 2-Port Calibration Setup Dialog Boxes

The table below summarizes the available fields in all available 3-port calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All three-port dialog boxes are named “Three Port Cal Setup (Cal Method, Line Type)”

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (1 of 10)

Cal Method Line Type	Input Selections
SOLT/R Coaxial	<p>See full description at “TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-187</p> <p>Reference Impedance (Ohms)</p> <p>Cal A Test Ports: Select 2 ports from Port 1, Port 2, Port 3, Port 4. Ports not selected are assigned to Cal B</p> <p>Cal A Cal Type: Select Full 2 Port, 1 Path 2 Port Forward, or 1 Path 2 Port Reverse</p> <p>Cal A Load Type: Select Broadband Load or Sliding Load</p> <p>Cal A Through/Reciprocal/S2P Thru Setup</p> <ul style="list-style-type: none"> Through selected allows user entries for length, line impedance, line loss, and frequency. Reciprocal selected allows user entry for length. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files). <p>Cal B Test Ports: Test Ports are auto-selected the remaining non-Cal A Ports</p> <ul style="list-style-type: none"> • All other controls and functions are the same as Cal A. <p>Test Port DUT Connector: Select from 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) to User-Defined32 (M), User-Defined1 (F) to User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: Select displays the STANDARD INFORMATION dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 <p>Test Port Select BB Load: Select Load 1 or Load 2.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
SOLT/R Non-Dispersive	Same controls as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (2 of 10)

Cal Method Line Type	Input Selections
SOLT/R Microstrip	<p>See full description at “TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box” on page 10-191</p> <p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port 1, 2, 3, and 4 Connector Standard Info Button: Select displays the USER DEFINED STANDARD dialog box for the selected connector.</p>
SSLT Coaxial	<p>See full description at “TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-187</p> <p>Same controls as SOLT/R Coaxial with the following exception:</p> <p>Test Port DUT Connector: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn(F), User-Defined1(M) to User-Defined32 (M), User-Defined1(F) to User-Defined32 (F)</p> <p>Test Port Connector Standard Info Button: Select displays either the STANDARD INFORMATION or the USER DEFINED dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280
SSLT Non-Dispersive	Same controls as SSLT Coaxial.
SSLT Waveguide	<p>Same controls as SSLT Coaxial with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSLT Microstrip	<p>Same controls as SSLT Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (3 of 10)

Cal Method Line Type	Input Selections
SSST Coaxial	<p>See full description at above.</p> <p>Reference Impedance (Ohms)</p> <p>Cal A Test Ports: Select 2 ports from Port 1, Port 2, Port 3, Port 4.</p> <p>Cal A Cal Type: Select from Full 2 Port, 1 Path 2 Port Forward, or 1 Path 2 Port Reverse</p> <p>Cal A Through/Reciprocal/S2P Thru Setup</p> <p>Through selected allows user entries for length, line impedance, line loss, and frequency.</p> <p>Reciprocal selected allows user entry for length.</p> <p>S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).</p> <p>Cal B Configuration</p> <p>Cal B can be included or not in the calibration.</p> <p>If included, Test Ports are autoselected from the remaining non-Cal A Ports</p> <p>All other controls and functions are the same</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 Controls are the same.</p> <p>Test Port DUT Connector: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn(F), User-Defined1(M) to User-Defined32 (M), User-Defined1(F) to User-Defined32 (F)</p> <p>Test Port DUT Connector Standard Info Button: Select displays the USER DEFINED STANDARD dialog box for the selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-284
SSST Non-Dispersive	Same controls as SSST Coaxial.
SSST Waveguide	<p>Same controls as SSST Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298 <p>Test Port DUT Connector: User-Defined1 to User-Defined32</p>
SSST Microstrip	<p>Same controls as SSST Coaxial with the following exception:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector Standard Info Button: Select displays the USER DEFINED STANDARD dialog box for the selected connector.</p>

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (4 of 10)

Cal Method Line Type	Input Selections
Broadband (SOLT/SOLR- SSST/SSSR) Coaxial	See full description at “TWO PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-194
	Reference Impedance (Ohms)
	Cal A Config. Test Ports: Select 2 ports from Port 1, Port 2, Port 3, Port 4. Ports not selected are assigned to Cal B
	Cal A Cal Type: Select Full 2 Port, 1 Path 2 Port Forward, or 1 Path 2 Port Reverse
	Cal A Through/Reciprocal/S2P Thru Setup: Select Through, Reciprocal, or S2P Thru
	Through selected allows user entries for length, line impedance, line loss, and frequency.
	Reciprocal selected allows user entry for length.
	S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).
	Breakpoint Frequency (Cal A)
	67 GHz is recommended for the 3656 (1 mm) calibration kit.
	80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
	Cal B Config. Test Ports: Test Ports are auto-selected from the remaining non-Cal A Ports
	All other controls and functions are the same as Cal A.
	Breakpoint Frequency (Cal B)
	67 GHz is recommended for the 3656 (1 mm) calibration kit.
	80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
	Test Port 1 Connector Type Area
	Select the DUT Connector Type from a drop-down menu list with options of: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)
	Test Port 1 Connector Standard Info Button
	Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal. “STANDARD INFO (Broadband Cal) 0.8 mm Connector (M) Dialog Box” on page 10-282
	The following link shows a typical User-defined Standard information dialog box for broadband cal. “USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287
	Test Port 2, Test Port 3, and Test Port 4 Connector Type Area: Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.
	Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button: Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.
	OK / Cancel: Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (5 of 10)

Cal Method Line Type	Input Selections
TRL/TRM Coaxial	<p>See full description at “TWO PORT CAL SETUP (TRL/TRM, Coaxial) Dialog Box” on page 10-198 above.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric – Enter a value if different than the default.</p> <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Cal A Configuration Parameters:</p> <ul style="list-style-type: none"> • Cal A Port Pair – Select from 1-3, 1-4, 2-3, 2-4 • Line Length Representation: Effective Length, Delay, Physical Length • Cal A Number of Bands: 1 through 5 • Cal A Band 1-5 Type: Line, Match; Device Effective Length (mm)/Match; If Device 1 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit. • “USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM” on page 10-288 • Reflection Type: Open-Like Short-Like. • Cal A Band Breakpoint: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz). • Cal A Reflection Component: Enforce Passivity • Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm) • Last Loaded Kit Name – TRL/TRM/LRL/LRM Cal Kit file name last loaded • Save Kit – Save calibration kit data to an TRL/TRM/LRL/LRM cal kit file (.lcf) • Load Kit – Recall existing TRL/TRM/LRL/LRM cal kit file (.lcf). <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
TRL/TRM Non-Dispersive	Same controls as TRL/TRM Coaxial.
TRL/TRM Waveguide	<p>Same controls as TRL/TRM Coaxial above with the following changes:</p> <p>Cutoff Frequency (GHz)</p> <p>Dielectric Value</p>
TRL/TRM Microstrip	<p>Same controls as TRL/TRM Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (6 of 10)

Cal Method Line Type	Input Selections
LRL/LRM Coaxial	<p>See full description at “TWO PORT CAL SETUP (LRL/LRM, Coaxial) Dialog Box” on page 10-201 above.</p> <p>Reference Impedance (Ohms)</p> <p>Dielectric – Enter a value if different than the default.</p> <p>Cal A Ports – Select two port pairs from 1-3, 1-4, 2-3, 2-4</p> <p>Cal B Ports – Auto-selected non-Cal A Port Pairs: 1-3, 1-4, 2-3, 2-4</p> <p>Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box.</p> <p>Reference Plane Location: Ends of Line 1, Middle of Line 1</p> <p>Line Length Representation: Effective Length, Delay, Physical Length</p> <p>Number of Bands: 1 through 5</p> <p style="padding-left: 40px;">If 1, only Band 1 Device 1 and Band 1 Device 2 controls appear.</p> <p style="padding-left: 40px;">If 2, the above plus Band 2 Device 3 and Band 2 Device 4 controls appear.</p> <p style="padding-left: 40px;">If 3, the above plus Band 3 Device 5 and Band 3 Device 6 controls appear.</p> <p style="padding-left: 40px;">If 4, the above plus Band 4 Device 7 and Band 4 Device 8 controls appear.</p> <p style="padding-left: 40px;">If 5, the above plus Band 5 Device 9 and Band 5 Device 10 controls appear.</p> <p>Cal A Configuration Parameters:</p> <p style="padding-left: 40px;">Cal A Reference Plane Location: Ends of Line, Middle of Line 1</p> <p style="padding-left: 40px;">Cal A Number of Bands: 1 or 2</p> <p style="padding-left: 40px;">Cal A Band 1 Device 1 Line: Line Length (mm) or Delay (ps), Line Loss (dB/mm), @ Frequency (GHz)</p> <p style="padding-left: 40px;">Cal A Band 1 Device 2 Type: Line, Match; Use Short-like component, Use Open-like component, Use both; If Device 2 = Match, Match Info button displays USER DEFINED MATCH DEVICES dialog box for selected calibration kit.</p> <p style="padding-left: 40px;">“USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM” on page 10-289</p> <p style="padding-left: 40px;">Cal A Band 2 Device 3: Use device 1, Use new line</p> <p style="padding-left: 40px;">Cal A Band 2 Device 4: Line, Match, Type of Reflection (Use Open-like component, Use Short-like component), Line Length (mm)</p> <p style="padding-left: 40px;">Cal A Band Break Point: Calculate Recommended Value, Use Recommended Frequency (GHz), Define New Frequency (GHz).</p> <p style="padding-left: 40px;">Cal A Reflection Component: Enforce Passivity</p> <p style="padding-left: 40px;">Cal A Reflection Component: Open-like Length (mm), Short-like Offset Length (mm)</p> <p style="padding-left: 40px;">Last Loaded Kit Name – TRL/TRM/LRL/LRM Cal Kit file name last loaded</p> <p style="padding-left: 40px;">Save Kit – Save calibration kit data to an TRL/TRM/LRL/LRM cal kit file (.lcf)</p> <p style="padding-left: 40px;">Load Kit – Recall existing TRL/TRM/LRL/LRM cal kit file (.lcf).</p> <p>Cal B Configuration Parameters</p> <ul style="list-style-type: none"> • Cal B parameters are the same as those for Cal A.
LRL/LRM Non-Dispersive	Same controls as LRL/LRM Coaxial.

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (7 of 10)

Cal Method Line Type	Input Selections
LRL/LRM Waveguide	Same controls as LRL/LRM Coaxial above with the following changes: Cutoff Frequency (GHz) Dielectric Value
LRL/LRM Microstrip	Same controls as LRL/LRM Coaxial with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32 Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279
mTRL Coaxial	See full description above display logic and controls at “TWO PORT CAL SETUP (mTRL, Coaxial) Dialog Box” on page 10-205 . Reference Impedance (Ohms) Dielectric: Enter a value if different than the default. Cal A and Cal B tabs: The “A” and “B” calibration parameters are selected via a tabbed menu within the dialog box. The Cal A tab is always selected. Cal B calibration parameters can be set by selecting the Cal B Config checkbox. Select Port Pair: 1,3 or 1,4 or 2,3 or 2,4 Reference Plane Location: Ends of Line 1 or Middle of Line 1 Line Length Representation: Effective Length, Delay, Physical Length Number of Lines: 2 through 10 Line#: Up to 10 devices Line 1: Effective Length defaults to 1, Line Loss (dB/mm), @ Frequency (GHz) • If Use Delay selected: Delay defaults to 3.3356 ps • If Use Physical Length selected: Physical Length defaults to 0.9997 mm Line 2: Effective Length defaults to 2, Line Loss (dB/mm), @ Frequency (GHz) • If Use Delay selected: Delay defaults to 6.6713 ps • If Use Physical Length selected: Physical Length defaults to 1.9994 mm Line 3: Effective Length defaults to 3, Line Loss (dB/mm), @ Frequency (GHz) • If Use Delay selected: Delay defaults to 10.0069 ps • If Use Physical Length selected: Physical Length defaults to 2.9990 mm Line 4: Effective Length defaults to 4, Line Loss (dB/mm), @ Frequency (GHz) • If Use Delay selected: Delay defaults to 13.3426 ps • If Use Physical Length selected: Physical Length defaults to 3.9987 mm Line 5: Effective Length defaults to 5, Line Loss (dB/mm), @ Frequency (GHz) • If Use Delay selected: Delay defaults to 16.6782 ps • If Use Physical Length selected: Physical Length defaults to 4.9984 mm Line 6: Effective Length defaults to 6, Line Loss (dB/mm), @ Frequency (GHz) • If Use Delay selected: Delay defaults to 20.0138 ps • If Use Physical Length selected: Physical Length defaults to 5.9981 mm Line 7: Effective Length defaults to 7, Line Loss (dB/mm), @ Frequency (GHz) • If Use Delay selected: Delay defaults to 23.3495 ps • If Use Physical Length selected: Physical Length defaults to 6.9977 mm

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (8 of 10)

Cal Method Line Type	Input Selections
mTRL Coaxial (continued)	Line 8: Effective Length defaults to 8, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 26.6851 ps • If Use Physical Length selected: Physical Length defaults to 7.9974 mm
	Line 9: Effective Length defaults to 9, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 30.0208 ps • If Use Physical Length selected: Physical Length defaults to 8.9971 mm
	Line 10: Effective Length defaults to 10, Line Loss (dB/mm), @ Frequency (GHz) <ul style="list-style-type: none"> • If Use Delay selected: Delay defaults to 33.3564 ps • If Use Physical Length selected: Physical Length defaults to 9.9968 mm
	Reflection Component: Reflection Type
	Reflection Component: Enforce Passivity
	Reflection Component: Open-like Length (mm) and/or Short-like Offset Length (mm)
	Use Match: If selected, will display the Match Info button to open the USER DEFINED MATCH DEVICES dialog box. Optimal Length Super-Weighting: Enables the use of an enhanced weighting scheme during the calibration to further emphasize line pairs that have optimal line length deltas. The use of this feature further de-emphasizes non-optimal pairs and reduces the impact of repeatability differences. Last Loaded Kit Name: Provides the name of the mTRL Cal Kit file that was last loaded. Save Kit: Provides the ability to save calibration kit data. Click opens a Save Cal Kit window to save current settings to an mTRL cal kit file (.mlcf) in a desired location. Load Kit: Provides the ability to recall calibration kit data. Click opens window to navigate to a desired existing mTRL cal kit file (.mlcf).
mTRL Non-Dispersive	Same controls and functions as mTRL Coaxial above.
mTRL Waveguide	Same controls and functions as mTRL Coaxial above with the following changes: Cutoff frequency (GHz): The TE ₁₀ mode cutoff frequency for the waveguide in use.
mTRL Microstrip	Same controls and functions as mTRL Coaxial above with the following changes: Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32 Microstrip Info button: Displays a dialog box for selected calibration method and kit. <ul style="list-style-type: none"> • Typical “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (9 of 10)

Cal Method Line Type	Input Selections
mSSS Coaxial	<p>See full description at “TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-208</p> <p>Reference Impedance (Ohms)</p> <p>Cal A Test Ports: Select 2 ports from Port 1, Port 2, Port 3, Port 4. Ports not selected are assigned to Cal B.</p> <p>Cal A Cal Type: Select Full 2 Port, 1 Path 2 Port Forward, or 1 Path 2 Port Reverse</p> <p>Cal A Through/Reciprocal/S2P Thru Setup</p> <p>Through selected allows user entries for length, line impedance, line loss, and frequency.</p> <p>Reciprocal selected allows user entry for length. Not allowed between ports 1-2 and 3-4.</p> <p>S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).</p> <p>Cal B Test Ports: Test Ports are auto-selected the remaining non-Cal A Ports</p> <ul style="list-style-type: none"> • All other controls and functions are the same as Cal A. <p>Test Ports: Port 1, Port 2, Port 3, Port 4</p> <p>Number of Shorts: 3-10</p> <p>Offset Length: Cal Kit Sel selected is “Other”, otherwise reflects the offset length of the selected short in the cal kit standard (Kit Info column)</p> <p>Cal Kit Selection: Other, 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Kit Info Standard Info Button: Displays the STANDARD INFORMATION (mSSS) or USER DEFINED STANDARD (mSSS) dialog box for the selected short.</p> <ul style="list-style-type: none"> • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-284 <ul style="list-style-type: none"> • The short to be used for the current line in the mSSS table is defined by the Select Short to use field. • “USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287 <p>Loss (dB/mm): Used to compute the loss in the short and hence the magnitude of its reflection coefficient.</p> <p>@Frequency: Used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency.</p> <p>Use Match: When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation.</p> <p>Optimal Offset Length Super-Weighting: When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
mSSS Non-Dispersive	Same controls as mSSS Coaxial above.

Table 10-5. 2-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (10 of 10)

Cal Method Line Type	Input Selections
mSSS Waveguide	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Cutoff Frequency: The cutoff frequency for the TE₁₀ mode in the waveguide size being used for this calibration (all shorts are assumed to have the same aperture dimensions and hence the same cutoff frequency).</p> <p>Dielectric: The dielectric constant of any filling material in the waveguide interface being used for the calibration (assumed 100% fill; default value is 1).</p>
mSSS Microstrip	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

10-12 Manual 1-Port Cal Setup – 4-Port VNAs

ONE PORT CAL Menu – 4-Port VNAs

Button Availability:

- The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant ONE PORT CAL SETUP dialog box.
- The example procedures at the end of this chapter show examples of various TWO PORT CAL menus.

Previous

- [“MANUAL CAL Menu – 4-Port VNAs” on page 10-99](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL

One Port Cal/s

Modify Cal Setup

Port Selected

1,2,3,4

Port 1 Reflective Devices

Port 2 Reflective Devices

Port 3 Reflective Devices

Port 4 Reflective Devices

Done

Abort Cal

Modify Cal Setup

Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the FULL ONE PORT CAL SETUP dialog box for the selected calibration method and line type.

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101

Example one-port dialog boxes are available at the following links:

- “ONE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-226
- “ONE PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-228
- “ONE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-230
- “ONE PORT CAL SETUP (SSLT, Waveguide) Dialog Box” on page 10-232
- “ONE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-234
- “ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-236

Port Selected

Read-only display of the ports selected for the pending calibration.

Completion Menu Buttons

For this example menu, the Port 1 Reflective Devices to the Isolation (Optional) buttons link to completion submenus where additional calibration procedures are performed.

For example, the Port 1 Reflective Devices button (shown below at #1) links to the REFL. DEVICES PORT 1 submenu. As each procedure is completed, the submenu button is marked with a completion checkmark. When all the procedures on the submenu are completed, use the Back button to return to the TWO PORT CAL menu.

①

Port 1 Reflective Devices

Port 1 Reflective Devices

②

The Port 1 Reflective Devices button (shown above at #2) is now marked with a completion checkmark.

Port 1 Reflective Devices

Select displays the REFL. DEVICES PORT 1 submenu. When all procedures are complete, select the Back button to return to the ONE PORT CAL menu where this button is now marked with a completion checkmark.

- “REFL. DEVICE(S) Menu – 4-Port VNAs” on page 10-267

Figure 10-95. ONE PORT CAL Menu – 4-Port VNAs – Typical example (1 of 2)

	<div><div>Port 2 Reflective Devices</div><div>Select displays the REFL. DEVICES PORT 2 submenu. When all procedures are complete, select the Back button to return to the ONE PORT CAL menu where this button is now marked with a completion checkmark.</div><div>Port 3 Reflective Devices</div><div>Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the ONE PORT CAL menu where this button is now marked with a completion checkmark.</div><div>Port 3 Reflective Devices</div><div>Select displays the REFL. DEVICES PORT 3 submenu. When all procedures are complete, select the Back button to return to the ONE PORT CAL menu where this button is now marked with a completion checkmark.</div><div>Done</div><div>This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the CALIBRATION menu where the Cal Status button is set to ON.<ul style="list-style-type: none">• “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8</div><div>Abort Cal</div><div>This button stops the current calibration procedure and returns to the CALIBRATION menu.<ul style="list-style-type: none">• “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8</div></div>
--	--

Figure 10-95. ONE PORT CAL Menu – 4-Port VNAs – Typical example (2 of 2)

ONE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “ONE PORT CAL Menu – 4-Port VNAs” on page 10-223

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Figure 10-96. ONE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)

- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. The example in the link below shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)

Test Port 1 Load Type

Select the load for Test Port 1:

- Broadband Load
- Sliding Load
 - If sliding load is selected, a message appears: “Still required broadband loads below sliding load breakpoint frequency.”

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Load Type

Select the load as either Broadband Load or Sliding Load as describe above in Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (SSLT, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “ONE PORT CAL Menu – 4-Port VNAs” on page 10-223

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (SSLT, Coaxial) Dialog Box

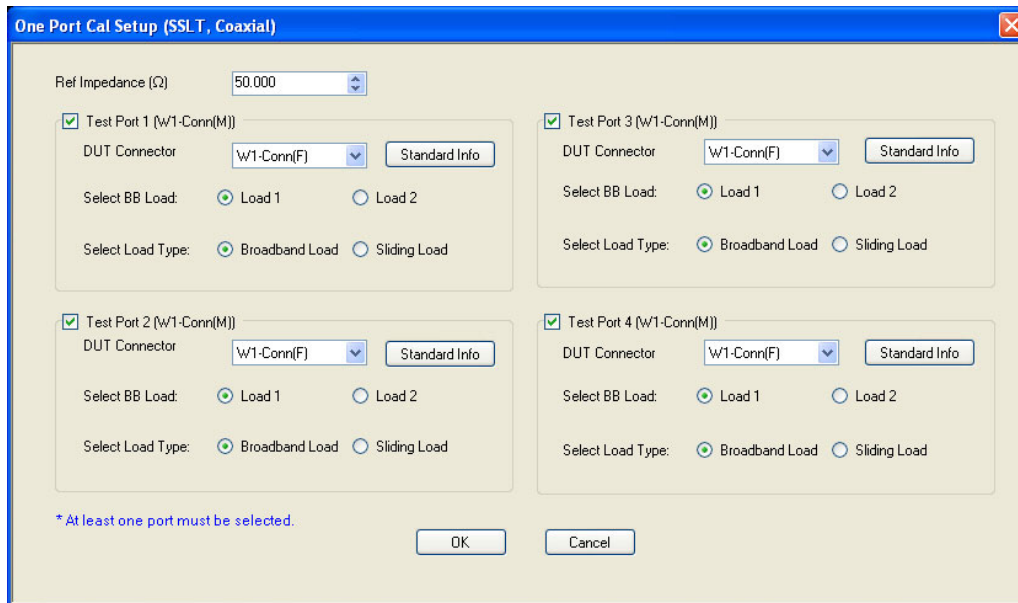


Figure 10-97. ONE PORT CAL SETUP (SSLT, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. The examples in the link below shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box” on page 10-280](#)

Test Port 1 BB Load

Select the broadband load for Test Port 1:

- Load 1
- Load 2

Test Port 1 Load Type

Select the load for Test Port 1:

- Broadband Load
- Sliding Load
 - If sliding load is selected, a message appears: “Still required broadband loads below sliding load breakpoint frequency.”

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 BB Load

Select the broadband load as either Load 1 or Load 2 as describe above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Load Type

Select the load as either Broadband Load or Sliding Load as describe above in Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (SSST, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “ONE PORT CAL Menu – 4-Port VNAs” on page 10-223

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (SSST, Coaxial) Dialog Box

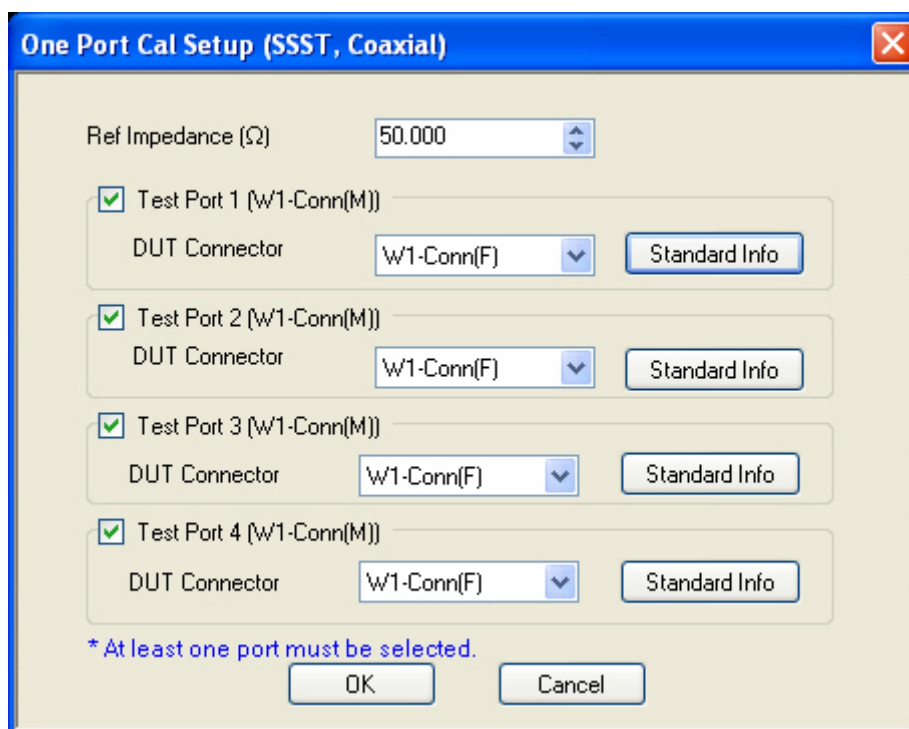


Figure 10-98. ONE PORT CAL SETUP (SSST, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. The examples in the link below shows a typical standard information dialog box.

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box” on page 10-280](#)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (SSLT, Waveguide) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “ONE PORT CAL Menu – 4-Port VNAs” on page 10-223

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL (SSLT, Waveguide) Dialog Box

Full One Port Cal (SSLT, Waveguide)

Ref Impedance (Ω) 50.000

Waveguide Kit WR10 Waveguide Info

☒ Test Port 1
Select Load Type: ☒ Broadband Load ☐ Sliding Load

☒ Test Port 2
Select Load Type: ☒ Broadband Load ☐ Sliding Load

☐ Test Port 3
Select Load Type: ☐ Broadband Load ☐ Sliding Load

☐ Test Port 4
Select Load Type: ☐ Broadband Load ☐ Sliding Load

* At least one port must be selected.

OK Cancel

Figure 10-99. ONE PORT CAL SETUP (SSLT, Waveguide) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Waveguide Kit Selection

Select the **Waveguide Kit Type** from a drop-down menu list with options of:

- User-Defined 1 through User-Defined 32

Waveguide Info Button

Select displays the USER DEFINED WAVEGUIDE (SSST) parameters dialog box. The dialog box allows user input of waveguide calibration parameters of:

- Waveguide kit label. A user-defined kit label can be input here.
- Cutoff frequency (GHz)
- Dielectric
- Offset short 1 length (mm)
- Offset short 2 length (mm)
- Offset short 3 length (mm)
- A calculator icon provides access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box described in the AutoCal sections above.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

The dialog box contents depend on the selected connector, calibration method, and line type. The example in the link below shows a typical standard information dialog box.

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298](#)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box

Full Name

One Port Cal Setup (Broadband Cal, Merged SOLT/SOLR-SSST/SSSR)

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “CAL METHOD Menu – 4-Port VNA” on page 10-104
- “ONE PORT CAL Menu – 4-Port VNAs” on page 10-223

Prerequisites

- VNA Mode = 4-Port Mode
- Cal Method = Broadband Cal (SOLT/R-SSST/R) – Appears only with VNA in Broadband Mode (3739)
- Line Type = Coaxial

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = Broadband Cal (SOLT/R-SSST/R) | Line Type = Coaxial | Edit Cal Params | ONE PORT CAL SETUP BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box

One Port Cal Setup (Broadband Cal, Merged SOLT-SSST/SOLR-SSSR)

Ref Impedance (Ω) 50.000

☒ Test Port 1 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Breakpoint Frequency (GHz) 67.000000000 Note: 67 GHz recommended for 374xx 80 GHz recommended for MA25300A

☒ Test Port 2 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Breakpoint Frequency (GHz) 67.000000000 Note: 67 GHz recommended for 374xx 80 GHz recommended for MA25300A

☒ Test Port 3 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Breakpoint Frequency (GHz) 67.000000000 Note: 67 GHz recommended for 374xx 80 GHz recommended for MA25300A

☒ Test Port 4 (W1-Conn(M))

DUT Connector W1-Conn(F) Standard Info

Breakpoint Frequency (GHz) 67.000000000 Note: 67 GHz recommended for 374xx 80 GHz recommended for MA25300A

* At least one port must be selected.

OK Cancel

Figure 10-100. ONE PORT CAL SETUP Broadband Cal, Merged (SOLT/SOLR-SSST/SSSR) Dialog Box

Reference Impedance

- Input field is defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Ports Area**Test Port 1 DUT Connector**

- Select the **DUT Connector** type from a drop-down menu list with options of:
 - 0.8 mm-Conn (M)
 - 0.8 mm-Conn (F)
 - W1-Conn (M)
 - W1-Conn (F)
 - User-Defined1 (M) through User-Defined32 (M)
 - User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

- Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal.
- [“STANDARD INFO \(Broadband Cal\) 0.8 mm Connector \(M\) Dialog Box” on page 10-282](#)
The following link shows a typical User-defined Standard information dialog box for broadband cal.
- [“USER DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 10-287](#)

Test Port 1 Breakpoint Frequency

- 67 GHz is recommended for the 3656 (1 mm) calibration kit.
- 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.
- In this combined calibration, the breakpoint frequency defines the frequency above which the SSS algorithm will be used (and SOL will be used for the frequencies at or below the breakpoint). Default values are based on Anritsu calibration kits and are optimal for those components.

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

- Identical function as with the Test Port 1 DUT Connector Area above. DUT Connector Type is selected from a drop-down menu list.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

- Identical function as with the Test Port 1 DUT Connector Standard Info button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.

Test Port 2, Test Port 3, and Test Port 4 Breakpoint Frequency

- Identical function as with the Test Port 1 Breakpoint Frequency above.

OK / Cancel:

- Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.

ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Previous

- “CAL SETUP Menu – 4-Port VNAs” on page 10-101
- “ONE PORT CAL Menu – 4-Port VNAs” on page 10-223

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Edit Cal Params | ONE PORT CAL SETUP (mSSS, Coaxial)

One Port Cal Setup (mSSS, Coaxial)

Ref Impedance (Ω)50.000

Select Port(s) To Calibrate

☒ Port 1

☒ Port 2

☐ Port 3

☐ Port 4

* At least one port must be selected.

Port 1Port 2Port 3Port 4

Short Definition Port 1

Number of Shorts:3

Short #	Offset Length (mm)	Cal Kit Sel	Kit Info (Sx is short selected)	Loss (dB/mm)	@Frequency (GHz)
1	0	Other	N/A	0	0
2	1	Other	N/A	0	0
3	2	Other	N/A	0	0

☒ Use Match

Match Info

☐ Optimal Offset Length Super-Weighting

OK

Cancel

Figure 10-101. ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Ports to Calibrate

Select any test port(s) from Port 1, Port 2, Port 3, and Port 4. At least one test port must be selected.

Test Ports: Port 1 Tab – Short Definition**Number of Shorts**

Select number of shorts from 3-10.

Offset Length (mm)

Editable if the Cal Kit Sel selected is “Other”; otherwise it will reflect the offset length of the selected short in the cal kit standard (Kit Info column).

Cal Kit Selection

Select the **DUT Connector Type** from a drop-down menu list with options of:

- Other
- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Kit Info Button

Select displays the STANDARD INFO or USER DEFINED STANDARD dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The examples show typical standard information dialog boxes.

- [“STANDARD INFO \(TRIPLE OFFSET SHORT\) W1-Connector \(M\) Dialog Box” on page 10-284](#)
 - Since the STANDARD INFORMATION (mSSS) dialog derives from the SSS calibration kit definition, three shorts are available and the one to be used for the current line in the mSSS table is defined by the Select Short to use field. All of the shorts in the kit can be employed in the mSSS calibration, but each must be assigned to a separate line in the table.
- [“USER DEFINED STANDARD \(Broadband Cal\) Dialog Box” on page 10-287](#)

Loss (dB/mm)

This field (in conjunction with the @Frequency field and the offset length) is used to compute the loss in the short and hence the magnitude of its reflection coefficient. This is mainly relevant for very large offset lengths (> 10 mm) at microwave frequencies or somewhat shorter lengths at millimeter wave frequencies.

@Frequency (GHz)

This field (in conjunction with the loss in dB/mm and the offset length) is used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency. If a non-zero value is entered here, it is treated as the reference frequency f_{ref} at which the loss (dB/mm) was defined and the loss at all other frequencies is scaled by $\sqrt{f/f_{ref}}$. If 0 is entered here, the loss is assumed to be constant with frequency.

Use Match Checkbox

When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation (value defined within the USER DEFINED MATCH dialog: Electrical line length delta for match use, expressed in degrees). The decision to use the match data is made on a frequency-by-frequency basis. See the *MS464XB Calibration and Measurement Guide* for more information. This helps increase bandwidth of the calibration, particularly at lower frequencies, if a match standard is available.

Match Info Button

Opens the USER DEFINED MATCH dialog.

- [“USER DEFINED MATCH Dialog Box – mSSS” on page 10-296](#)

Optimal Offset Length Super-Weighting Checkbox

When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration. More details can be found in the *MS464XB Calibration and Measurement Guide*. Using this feature can increase the available bandwidth of the calibration, but does reduce immunity to repeatability variances in the setup, so it is not advised in more repeatability challenged scenarios (e.g., fixtures where the short standards are attached by spring force alone).

Port 2, Port 3, and Port 4 Tabs – Short Definition

Identical functions as with the Test Ports: Port 1 Tab above.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of 1-Port Calibration Setup Dialog Boxes

The table below summarizes the fields and controls in all 1-port calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All three-port dialog boxes are named “Three Port Cal Setup (Cal Method, Line Type)”

Table 10-6. 1-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (1 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See full description above at “ONE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-226</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Ports: Select any combination of Test Port 1, Test Port 2, Test Port 3, and/or Test Port 4 as long as one port is selected.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors from a drop-down list: 0.8 mm-Conn (M), 0.8 mm-Conn (F)W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port DUT Connector Standard Info Button: Select displays the STANDARD INFO dialog box for the selected connector above.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280 <p>Test Port BB Load: For each Test Port selected above, select either Load 1 or Load 2</p> <p>Test Port Load Type: For each Test Port selected above, select either Broadband Load, Sidling Load</p>
SOLT/R Non-Dispersive	Same controls as SOLT/R Coaxial.
SOLT/R Waveguide	<p>SOLT/R is not recommended for Waveguide calibrations.</p> <p>The same controls as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SOLT/R Microstrip	<p>Same controls as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: Select from 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, or User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

Table 10-6. 1-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (2 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Coaxial	<p>See full description above at “ONE PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-228</p> <p>Reference Impedance (Ohms).</p> <p>Select Test Ports: Select any combination of Test Port 1, Test Port 2, Test Port 3, and/or Test Port 4 as long as one port is selected.</p> <p>Test Port DUT Connector: For each test port, select one of the following connectors from a drop-down list: 0.8 mm-Conn (M), 0.8 mm-Conn (F) W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port DUT Connector Standard Info Button: Select displays the STANDARD INFO dialog box for the selected connector above.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280 <p>Test Port BB Load: For each Test Port selected above, select either Load 1 or Load 2</p> <p>Test Port Load Type: For each Test Port selected above, select either Broadband Load, Sidling Load</p>
SSLT Non-Dispersive	Same controls and functions options as SSLT Coax.
SSLT Waveguide	<p>See full description above at “ONE PORT CAL SETUP (SSLT, Waveguide) Dialog Box” on page 10-232</p> <p>Same controls and functions as SSLT Coaxial with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298 • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSLT Microstrip	<p>Same controls and functions as SSLT Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays the MICROSTRIP INFO or USER DEFIND dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port Connector Standard Info Button: For each port selected, displays the USER DEFINED STANDARD dialog box for the selected calibration method and connector. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280

Table 10-6. 1-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (3 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Coaxial	<p>See full description above at “ONE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-230</p> <p>Reference Impedance (Ohms)</p> <p>Test Ports: Select any combination of Test Port 1, Test Port 2, Test Port 3, Test Port 3 as long a one port is selected.</p> <p>Test Port DUT Connector: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined 1 (M) to User-Defined 32 (M), User-Defined 1 (F) to User-Defined 32 (F)</p> <p>Test Port DUT Connector Standard Info button: Displays the STANDARD INFO (Triple Offset Short) dialog box for selected connector.</p> <ul style="list-style-type: none"> • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-284
SSST Non-Dispersive	<p>Same controls and functions as SSST Coaxial.</p>
SSST Waveguide	<p>Same controls and functions as SSST Coaxial with the following changes</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSST Microstrip	<p>Same controls and functions as SSST Coaxial with the following changes</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

Table 10-6. 1-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (4 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
Broadband (SOLT/SOLR- SSST/SSSR) Coaxial	<p>See full description at “ONE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-234</p> <p>Reference Impedance (Ohms)</p> <p>Test Port 1 Connector Type Area</p> <p>Select the DUT Connector Type from a drop-down menu list with options of: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Test Port 1 Connector Standard Info Button</p> <p>Select displays the STANDARD INFO dialog box for the selected connector and calibration method that displays the connector calibration coefficients. The dialog box contents depend on the selected connector, Cal Method, and Line Type. The following link shows a typical standard information dialog box for broadband cal.</p> <p>“STANDARD INFO (Broadband Cal) 0.8 mm Connector (M) Dialog Box” on page 10-282</p> <p>The following link shows a typical User-defined Standard information dialog box for broadband cal.</p> <p>“USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287</p> <p>Test Port 1 Breakpoint Frequency</p> <p>67 GHz is recommended for the 3656 (1 mm) calibration kit. 80 GHz is recommended for the 3659 (0.8 mm) calibration kit.</p> <p>Test Port 2, Test Port 3, and Test Port 4 Connector Type Area:</p> <p>Identical function as with the Test Port 1 Connector Area above. Select the DUT Connector Type from a drop-down menu list.</p> <p>Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button:</p> <p>Identical function as with the Test Port 1 Connector Standard Info Button above. Select displays the STANDARD INFO dialog box for the selected DUT Connector.</p> <p>Test Port 2, Test Port 3, and Test Port 4 Breakpoint Frequency</p> <p>Identical function as with the Test Port 1 Breakpoint Frequency area above.</p> <p>OK / Cancel:</p> <p>Click OK to accept the changes or Cancel to abandon any changes and return to the CAL SETUP menu.</p>
TRL/TRM	The TRL/TRM calibration method is not available for 1-port calibrations.
LRL/LRM	The LRL/LRM calibration method is not available for 1-port calibrations.
mTRL	The mTRL calibration method is not available for 1-port calibrations.

Table 10-6. 1-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (5 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
mSSS Coaxial	<p>See full description at “ONE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-236</p> <p>Reference Impedance (Ohms)</p> <p>Select Ports to Calibrate: Select port(s) from Port 1, Port 2, Port 3, Port 4. At least one port must be selected.</p> <p>Test Ports: Port 1, Port 2, Port 3, Port 4</p> <p>Number of Shorts: 3-10</p> <p>Offset Length: Cal Kit Sel selected is “Other”, otherwise reflects the offset length of the selected short in the cal kit standard (Kit Info column)</p> <p>Cal Kit Selection: Other, 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>Kit Info Standard Info Button: Displays the STANDARD INFORMATION (mSSS) or USER DEFINED STANDARD (mSSS) dialog box for the selected short.</p> <ul style="list-style-type: none"> • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-284 <ul style="list-style-type: none"> • The short to be used for the current line in the mSSS table is defined by the Select Short to use field. • “USER DEFINED STANDARD (Broadband Cal) Dialog Box” on page 10-287 <p>Loss (dB/mm): Used to compute the loss in the short and hence the magnitude of its reflection coefficient.</p> <p>@Frequency: Used to compute the loss of the offset short (and hence the magnitude of its reflection coefficient) at each frequency.</p> <p>Use Match: When this box is checked, a match measurement is acquired during the calibration and is used whenever even the collection of offset shorts does not have enough phase separation.</p> <p>Optimal Offset Length Super-Weighting: When this box is checked, more weight is given to those offset shorts that contribute most to large electrical length deltas and hence to bandwidth of the calibration.</p> <p>Test Port 1, Test Port 2, Test Port 3, and Test Port 4 controls are the same.</p>
mSSS Non-Dispersive	<p>Same controls as mSSS Coaxial above.</p>
mSSS Waveguide	<p>Same controls as mSSS Coaxial with the following changes:</p> <p>Cal Kit Selection: User-Defined1 through User-Defined32.</p> <p>Cutoff Frequency: The cutoff frequency for the TE₁₀ mode in the waveguide size being used for this calibration (all shorts are assumed to have the same aperture dimensions and hence the same cutoff frequency).</p> <p>Dielectric: The dielectric constant of any filling material in the waveguide interface being used for the calibration (assumed 100% fill; default value is 1).</p>

Table 10-6. 1-Port Manual Cal Setup Dialog Box Summary – 4-Port VNAs (6 of 6)

Cal Method Line Type	Dialog Box Input Selections and Controls
mSSS Microstrip	Same controls as mSSS Coaxial with the following changes: Cal Kit Selection: User-Defined1 through User-Defined32. Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32 Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. <ul style="list-style-type: none">• “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279

10-13 Manual Trans. Freq. Resp. Cal Menus and Dialog Boxes

Full Name

Transmission Frequency Response Calibration

Menu Name

Trans. Response

Button Name

Transmission Freq. Response

TRANS. RESPONSE Menu – 4-Port VNAs

The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box. A representative menu is shown below. There is one example procedure of a TRANS. RESPONSE calibration in this chapter.

Full Name

Transmission Frequency Response

Previous

- [“MANUAL CAL Menu – 4-Port VNAs” on page 10-99](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE

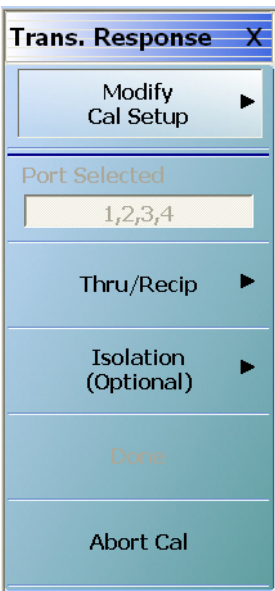
	<h3>Modify Cal Setup</h3> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu – 4-Port VNAs” on page 10-101 <p>Example transmission frequency response calibration dialog boxes are available below:</p> <ul style="list-style-type: none"> • “TRANS. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-247 • “TRANS. FREQ. RESP. CAL SETUP (SSLT, Waveguide) Dialog Box” on page 10-249 • “TRANS. FREQ. RESP. CAL SETUP (SSST, Microstrip) Dialog Box” on page 10-251 <p>A summary table of all transmission frequency response calibration configuration dialog boxes is available here:</p> <ul style="list-style-type: none"> • Table 10-7, “Trans. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-253
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Figure 10-102. TRANS. RESPONSE Menu – 4-Port VNAs – Typical example (1 of 2)

	<p>Port Selected</p> <p>Read-only display of the ports selected for the pending calibration.</p> <p>Other Menu Buttons</p> <p>For this example menu, the buttons below Port Selected to the Isolation (Optional) button each display calibration completion submenus. Once the calibration steps on each submenu are complete, these menu buttons are marked as completed.</p>  <p>Done</p> <p>This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the CALIBRATION menu where the Cal Status button is set to ON.</p> <ul style="list-style-type: none"> • “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8 <p>Abort Cal</p> <p>This button stops the current calibration procedure and returns to the CALIBRATION menu.</p> <ul style="list-style-type: none"> • “Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8
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Figure 10-102. TRANS. RESPONSE Menu – 4-Port VNAs – Typical example (2 of 2)

TRANS. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box

Full Name

Transmission Frequency Response Calibration Setup

Previous

- [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | TRANSMISSION FREQUENCY RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box
- CAL SETUP must be set to Cal Method = SOLT/SOLR and Line Type = Coaxial.

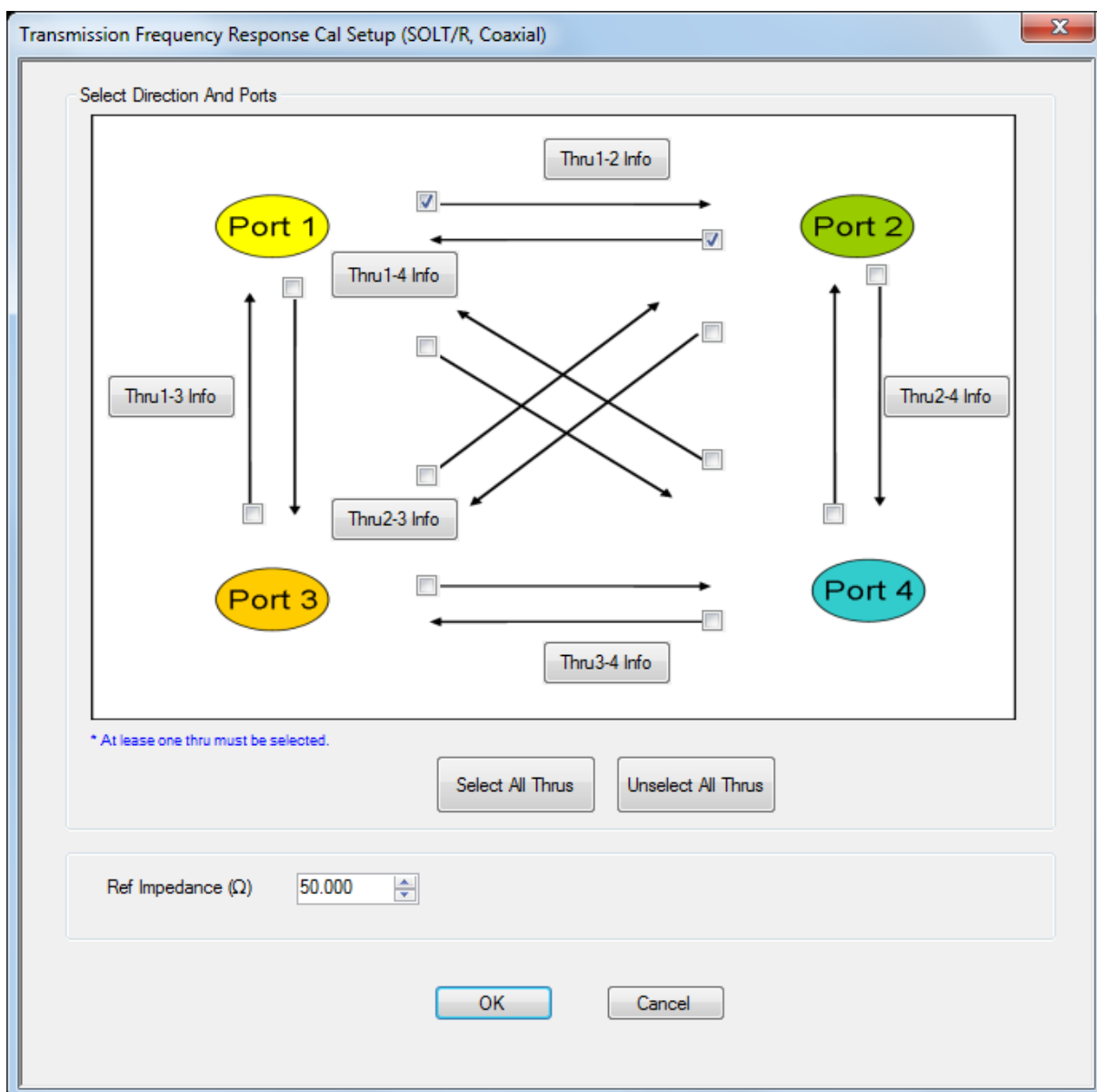


Figure 10-103. TRANS. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box

Test Port Thru Selection Boxes

Allows selection of any combination of the test port throughs for the available port pairs:

- Thru 1-2
- Thru 1-3
- Thru 1-4
- Thru 2-3
- Thru 2-4
- Thru 3-4

Test Port Pair Thru Info Buttons

A Thru Info button becomes available for each port pair through selected above. Select displays the THRU INFO configuration dialog box for the selected port pair. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TRANS. FREQ. RESP. CAL SETUP (SSLT, Waveguide) Dialog Box

Full Name

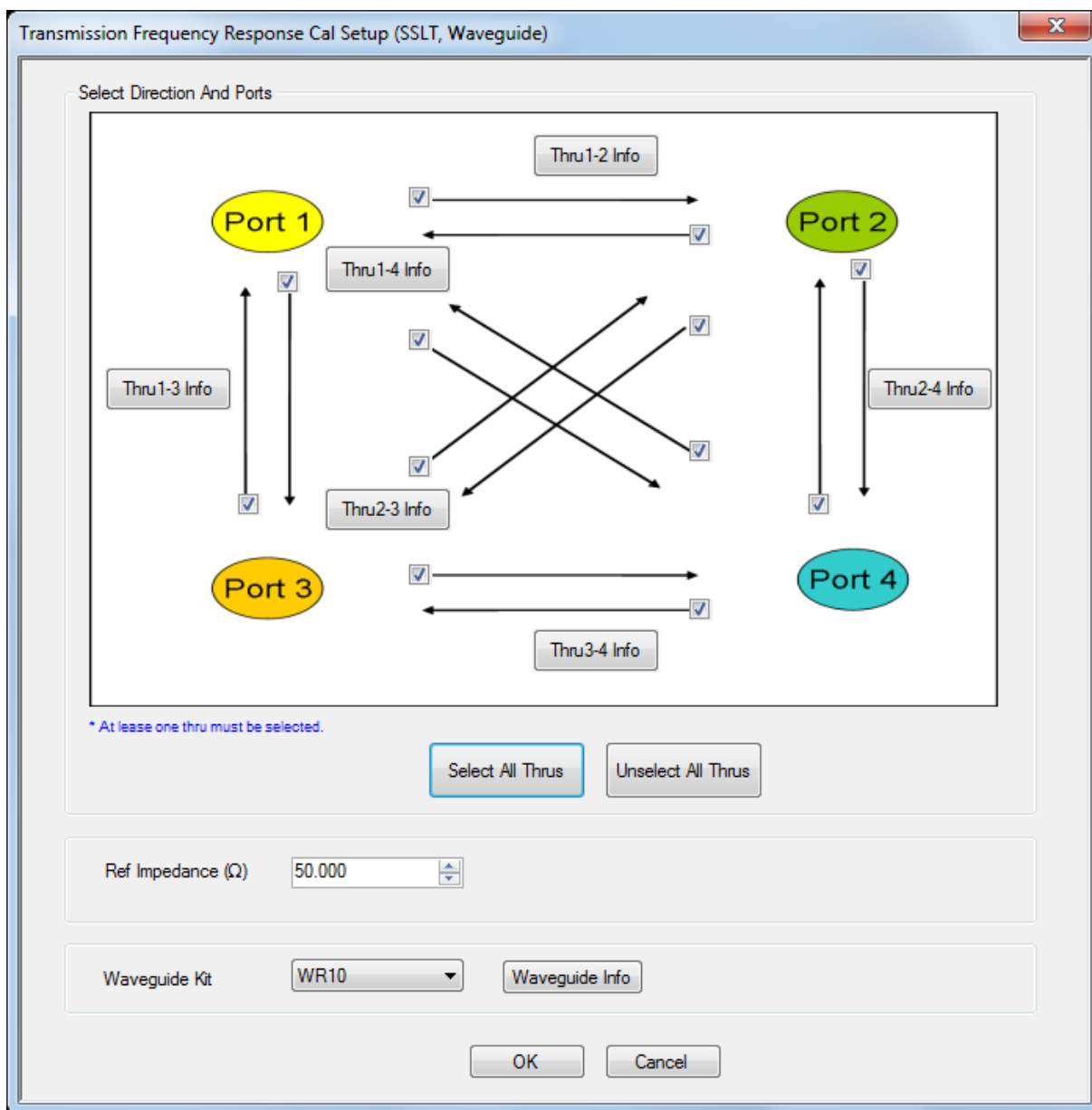
Transmission Frequency Response Calibration Setup

Previous

- [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | TRANSMISSION FREQUENCY RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box
- CAL SETUP must be set to Cal Method = SSLT and Line Type = Waveguide.



TRANSMISSION FREQUENCY RESPONSE CALIBRATION SETUP

Figure 10-104. TRANS. FREQ. RESP. CAL SETUP (SSLT, Waveguide) Dialog Box

Test Port Pair Thru Info Buttons

A Thru Info button becomes available for each port pair through selected above. Select displays the THRU INFO configuration dialog box for the selected port pair. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Waveguide Kit Selection

Select the **Waveguide Kit Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Waveguide Info Button

Select displays the USER DEFINED WAVEGUIDE (SSST) parameters dialog box. The dialog box allows user input of waveguide calibration parameters of:

- Waveguide kit label. A user-defined kit label can be input here.
- Cutoff frequency (GHz)
- Dielectric
- Offset short 1 length (mm)
- Offset short 2 length (mm)
- Offset short 3 length (mm)
- A calculator icon provides access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box described in the AutoCal sections above.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

The dialog box contents depend on the selected connector, calibration method, and line type. The example in the link below shows a typical standard information dialog box.

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298](#)

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

TRANS. FREQ. RESP. CAL SETUP (SSST, Microstrip) Dialog Box**Full Name**

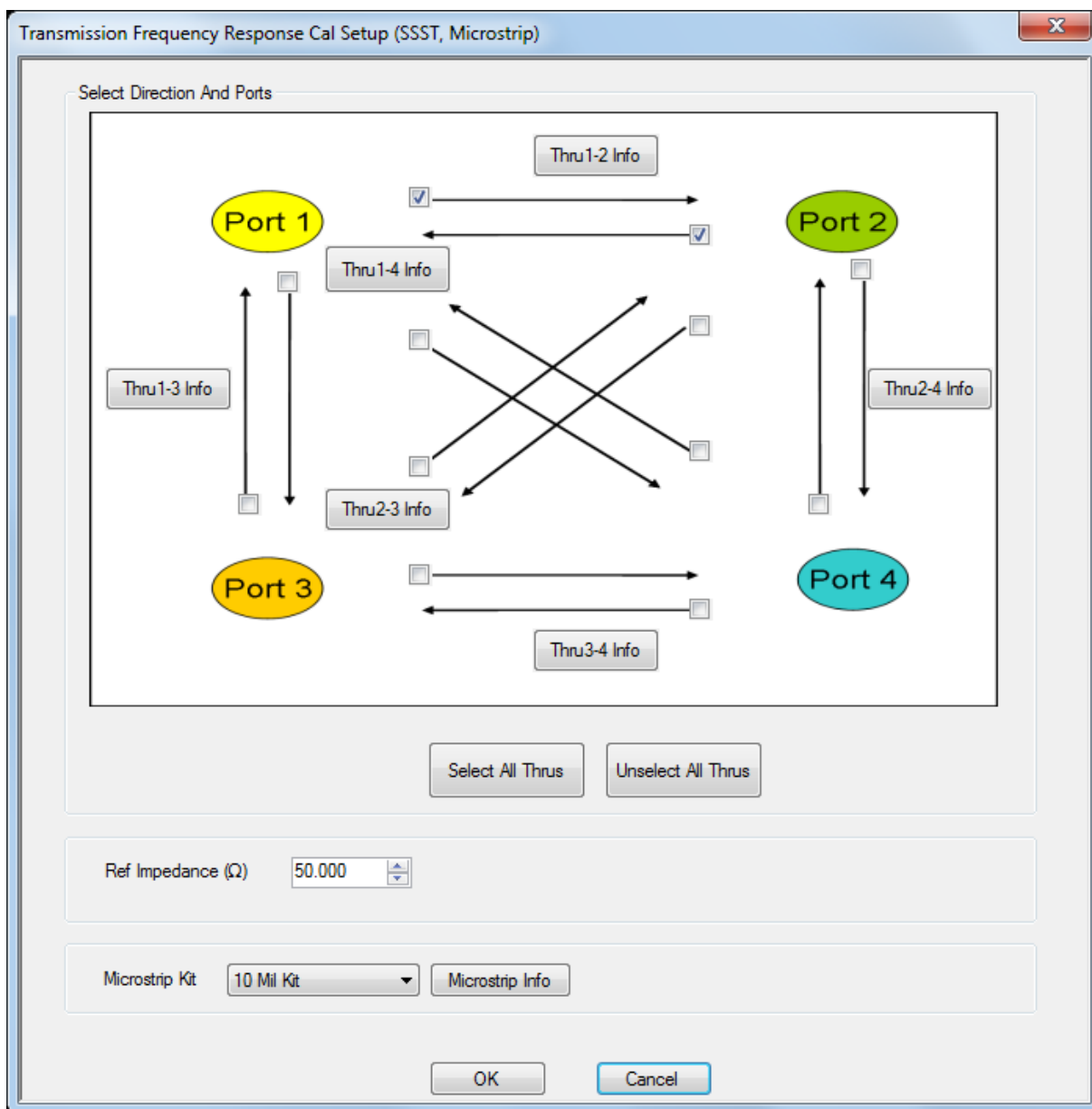
Transmission Frequency Response Calibration Setup

Previous

- [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Transmission Freq. Response | TRANS. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | TRANSMISSION FREQUENCY RESPONSE CAL SETUP (SSST, Coaxial) Dialog Box
- CAL SETUP must be set to Cal Method = SSST and Line Type = Microstrip.

**Figure 10-105.** TRANS. FREQ. RESP. CAL SETUP (SSST, Microstrip) Dialog Box

Test Port Pair Thru Info Buttons

A Thru Info button becomes available for each port pair through selected above. Select displays the THRU INFO configuration dialog box for the selected port pair. A calculator icon in the THRU INFO dialog box allows access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box.

- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 Select Cal Component

Select from Offset Short 1, Offset Short 2, or Offset Short 3

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port 1 Connector Standard Info Button

Select displays the USER DEFINED OFFSET SHORT INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. See the following links for typical examples:

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298](#)
- [“USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM” on page 10-289](#)

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the USER DEFINED SHORT INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of Trans. Freq. Resp. Cal Setup Dialog Boxes

The table below summarizes the fields and controls in all transmission frequency response calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All transmission frequency response dialog boxes are named “Transmission Frequency Response Cal Setup (Cal Method, Line Type)”

Table 10-7. Trans. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs (1 of 2)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See full description above at “TRANS. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-247</p> <p>Select Test Port Throughs: Select any combination of port pair throughs from Thru 1-2, Thru 1-3, Thru 1-4, Thru 2-3, Thru 2-4, and/or Thru 1-3. At least one through must be selected.</p> <p>Thru Info Button: For each through selected above, the Thru Info [Port Pair] button is enabled. Select the Thru Info button to display the THRU INFO dialog box.</p> <ul style="list-style-type: none"> • “THRU INFO Dialog Box – 4-Port VNAs” on page 10-285 • In the Thru Info dialog box, select the Calculator icon to display the AIR EQUIVALENT LENGTH CONVERSION dialog box to change units. • “AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278 <p>Reference Impedance (Ohms)</p>
SOLT/R Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SOLT/R Waveguide	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: Select from User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays the USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above. Define the waveguide by entering values for: Cutoff frequency (GHz), Dielectric constant</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: Select from 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, or User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSLT Coaxial	Same controls and functions as SOLT/R Coaxial above.
SSLT Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SSLT Waveguide	<p>See full description above “TRANS. FREQ. RESP. CAL SETUP (SSLT, Waveguide) Dialog Box” on page 10-249</p> <p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: Select from Wr10, WR15, WR20, and User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Select displays either the WAVEGUIDE INFO (SSLT) or the USER DEFINED WAVEGUIDE dialog box for the waveguide kit selected above. Define the user waveguide by entering values for: Cutoff frequency (GHz), Dielectric constant</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298

Table 10-7. Trans. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs (2 of 2)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Microstrip	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. Typical dialog boxes on the links below.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279
SSST Coaxial	Same controls and functions as SOLT/R Coaxial above.
SSST Non-Dispersive	Same controls and functions as SOLT/R Coaxial above.
SSST Waveguide	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Displays WAVEGUIDE INFO dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSST Microstrip	<p>See full description above at “TRANS. FREQ. RESP. CAL SETUP (SSST, Microstrip) Dialog Box” on page 10-251</p> <p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for selected calibration method and kit.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279
TRL/TRM	The TRL/TRM calibration method is not available for the Transmission Frequency Response calibrations.
LRL/LRM	The LRL/LRM calibration method is not available for the Transmission Frequency Response calibrations.
mTRL	The mTRL calibration method is not available for Transmission Frequency Response calibrations.
mSSS	The mSSS calibration method is not available for Transmission Frequency Response calibrations.

10-14 Manual Refl. Freq. Resp. Menus and Dialog Boxes

Calibration Full Name

Reflection Frequency Response Calibration

Menu Full Name

Reflection Frequency Response

Button Name

- Reflection Freq. Response

REFL. RESPONSE Menu – 4-Port VNAs

The exact composition of the menu depends on the settings made on the CAL SETUP, CAL METHOD, and LINE TYPE menus and on the resultant TRANSMISSION FREQUENCY RESPONSE CAL SETUP dialog box. A representative menu is shown below. The example procedures in this chapter show one example of a TRANS. RESPONSE menu.

Previous

- [“MANUAL CAL Menu – 4-Port VNAs” on page 10-99](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE

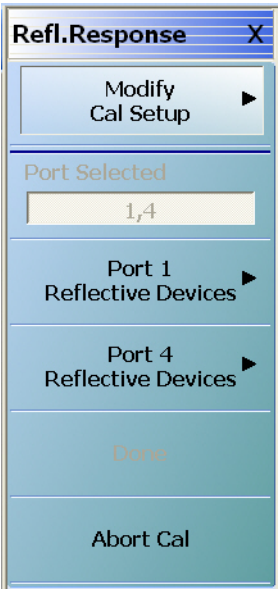
	<p>Modify Cal Setup</p> <p>Select displays the CAL SETUP menu where the Edit Cal Params button provides access to the REFLECTION FREQ. RESPONSE CAL SETUP dialog box for the selected calibration method and line type.</p> <ul style="list-style-type: none"> • “CAL SETUP Menu – 4-Port VNAs” on page 10-101 <p>Example reflection frequency response calibration dialog boxes are available at the following links:</p> <ul style="list-style-type: none"> • “REFL. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-257 • “REFL. FREQ. RESP. CAL SETUP (SSLT, Microstrip) Dialog Box” on page 10-260 • “REFL. FREQ. RESP. CAL SETUP (SSST, Waveguide) Dialog Box” on page 10-262 <p>A summary table of all reflection frequency response calibration dialog boxes is available here:</p> <ul style="list-style-type: none"> • Table 10-8, “Refl. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs” on page 10-264 <p>Port Selected</p> <p>Read-only display of the ports selected for the pending calibration.</p>
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Figure 10-106. REFL. RESPONSE Menu – 4-Port VNAs – Typical example (1 of 2)

Other Menu Buttons

For this example menu, the buttons below **Port Selected** to the **Isolation (Optional)** button each display calibration completion submenus. Once the calibration steps on each submenu are complete, these menu buttons are marked as completed.



Done

This button is unavailable until a successful calibration procedure has been completed. When available, it returns to the **CALIBRATION** menu where the **Cal Status** button is set to **ON**.

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Abort Cal

This button stops the current calibration procedure and returns to the **CALIBRATION** menu.

- [“Primary Cal Menu, Sub-Menus and Dialog Boxes – 4-Port VNAs” on page 10-8](#)

Figure 10-106. REFL. RESPONSE Menu – 4-Port VNAs – Typical example (2 of 2)

REFL. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box

Full Name

Reflection Frequency Response Calibration Setup (SOLT/R, Coaxial)

Previous

- [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | REFLECTION FREQ. RESPONSE CAL SETUP (SOLT/R, Coaxial) Dialog Box
- CAL SETUP must be set to Cal Method = SOLT/R and Line Type = Coaxial.

Reflection Freq. Response Cal Setup (SOLT/R, Coaxial)

Ref Impedance (Ω) 50.000

☒ Test Port 1 (V-Conn(F))

Select Cal Component Open

DUT Connector V-Conn(M) Standard Info

☒ Test Port 2 (V-Conn(F))

Select Cal Component Open

DUT Connector V-Conn(M) Standard Info

☒ Test Port 3 (V-Conn(F))

Select Cal Component Open

DUT Connector V-Conn(M) Standard Info

☒ Test Port 4 (V-Conn(F))

Select Cal Component Open

DUT Connector V-Conn(M) Standard Info

* At least one port must be selected.

OK Cancel

REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP

Figure 10-107. REFL. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 Select Cal Component

Select from Open or Short

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- 0.8 mm-Conn (M)
- 0.8 mm-Conn (F)
- W1-Conn (M)
- W1-Conn (F)
- V-Conn (M)
- V-Conn (F)
- K-Conn (M)
- K-Conn (F)
- 2.4 mm (M)
- 2.4 mm (F)
- GPC-3.5 (M)
- GPC-3.5 (F)
- SMA (M)
- SMA (F)
- N-Conn (M)
- N-Conn (F)
- N-Conn (75) (M)
- N-Conn (75) (F)
- GPC-7
- 7/16 (M)
- 7/16 (F)
- TNC (M) (Kit from Maury Microwave)
- TNC (F) (Kit from Maury Microwave)
- User-Defined1 (M) through User-Defined32 (M)
- User-Defined1 (F) through User-Defined32 (F)

Test Port 1 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. See the following links for typical examples:

- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box” on page 10-280](#)

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the STANDARD INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

OK / Cancel

- Click OK to accept the changes and return to the CAL SETUP menu.
- Click Cancel to abandon any changes and return to the CAL SETUP menu.

REFL. FREQ. RESP. CAL SETUP (SSLT, Microstrip) Dialog Box**Full Name**

Reflection Frequency Response Calibration Setup (SSLT, Microstrip)

Previous

- [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | REFLECTION FREQ. RESPONSE CAL SETUP (SSLT, Microstrip) Dialog Box
- CAL SETUP must be set to Cal Method = SSLT and Line Type = Microstrip.

Reflection Freq. Response Cal Setup (SSLT, Microstrip)

Ref Impedance (Ω) 50.000

Microstrip Kit 10 Mil Kit [Microstrip Info](#)

☒ Test Port 1

Select Cal Component Offset short1

DUT Connector User-Defined1 [Standard Info](#)

☒ Test Port 2

Select Cal Component Offset short1

DUT Connector User-Defined1 [Standard Info](#)

☐ Test Port 3

Select Cal Component Offset short1

DUT Connector User-Defined1 [Standard Info](#)

☐ Test Port 4

Select Cal Component Offset short1

DUT Connector User-Defined1 [Standard Info](#)

* At least one port must be selected.

OK Cancel

REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP**Figure 10-108.** REFL. FREQ. RESP. CAL SETUP (SSLT, Microstrip) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Test Port 1 Select Cal Component

Select from Offset Short 1 or Offset Short 2

Test Port 1 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port 1 Connector Standard Info Button

Select displays the USER DEFINED SHORT INFO dialog box with connector calibration coefficients for the selected connector and calibration method. The dialog box contents depend on the selected connector, calibration method, and line type. See the following links for typical examples:

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298](#)
- [“USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM” on page 10-289](#)

Test Port 2, Test Port 3, and Test Port 4 DUT Connector

Select the **DUT Connector Type** from a drop-down menu list as shown above in Test Port 1.

Test Port 2, Test Port 3, and Test Port 4 Connector Standard Info Button

Select displays the USER DEFINED SHORT INFO dialog box with connector calibration coefficients for the selected connector and calibration method as described above in Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

REFL. FREQ. RESP. CAL SETUP (SSST, Waveguide) Dialog Box**Full Name**

Reflection Frequency Response Calibration Setup (SSST, Waveguide)

Previous

- [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Reflection Freq. Response | REFL. RESPONSE | Modify Cal Setup | CAL SETUP | Edit Cal Params | REFLECTION FREQ. RESPONSE CAL SETUP (SSST, Waveguide) Dialog Box
- CAL SETUP must be set to Cal Method = SSST and Line Type = Waveguide.

Reflection Freq. Response Cal Setup (SSST, Waveguide)

Ref Impedance (Ω) 50.000

Waveguide Kit User-Defined1

☒ Test Port 1

Select Cal Component Offset short1

Waveguide Info

☒ Test Port 2

Select Cal Component Offset short1

Waveguide Info

☐ Test Port 3

Select Cal Component Offset short1

Waveguide Info

☐ Test Port 4

Select Cal Component Offset short1

Waveguide Info

* At least one port must be selected.

OK Cancel

REFLECTION FREQUENCY RESPONSE CALIBRATION SETUP**Figure 10-109.** REFL. FREQ. RESP. CAL SETUP (SSST, Waveguide) Dialog Box

Reference Impedance

Input the reference impedance.

- Input field defaulted to 50 Ohms.
- Any numerical value accepted, although input values < 0.01 Ohms are converted to 0.01 Ohms.

Waveguide Kit Selection

Select the **Waveguide Kit Type** from a drop-down menu list with options of:

- User-Defined1 through User-Defined32

Test Port Selection Boxes

Allows selection of any combination of Test Port 1, Test Port 2, Test Port 3, or Test Port 4 as long as one port is selected.

If a port is not selected, its buttons and controls are not available.

Select Test Port 1 Cal Component

Select a cal component from:

- Offset short 1
- Offset short 2
- Offset short 3

Test Port 1 Waveguide Info Button

Select displays the USER DEFINED WAVEGUIDE (SSST) parameters dialog box. The dialog box allows user input of waveguide calibration parameters of:

- Waveguide kit label. A user-defined kit label can be input here.
- Cutoff frequency (GHz)
- Dielectric
- Offset short 1 length (mm)
- Offset short 2 length (mm)
- Offset short 3 length (mm)
- A calculator icon provides access to the AIR EQUIVALENT LENGTH CALCULATOR dialog box described in the AutoCal sections above.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

The dialog box contents depend on the selected connector, calibration method, and line type. The example in the link below shows a typical standard information dialog box.

- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298](#)

Test Port 2, Test Port 3, and Test Port 4 Controls

The controls for these test ports are the same as those for Test Port 1.

OK / Cancel

Click OK to accept the changes and return to the CAL SETUP menu.

Click Cancel to abandon any changes and return to the CAL SETUP menu.

Summary of Refl. Freq. Resp. Calibration Setup Dialog Boxes

The table below summarizes the fields and controls in all Reflection Frequency Response calibration setup dialog boxes. If the dialog box is described in greater detail above, a link is provided to that description. To view each dialog box, set the CAL METHOD and LINE TYPE menus to the appropriate settings, and then select the Edit Cal Params button. All reflection frequency response dialog boxes are named “Reflection Freq. Response Cal Setup (Cal Method, Line Type)”

Table 10-8. Refl. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs (1 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SOLT/R Coaxial	<p>See full description above at “REFL. FREQ. RESP. CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-257</p> <p>Reference Impedance (Ohms)</p> <p>Select Test Ports: Select any combination of Test Port 1, Test Port 2, Test Port 3, and/or Test Port 4 as long as one port is selected.</p> <p>Select Test Port Cal Component: For each selected test port, select Open or Short.</p> <p>Test Port DUT Connector: For each selected test port, select one of the following connectors from a drop-down list: 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1-Conn (M), W1-Conn (F), V-Conn (M), V-Conn (F), K-Conn (M), K-Conn (F), 2.4 mm (M), 2.4 mm (F), 2.4 mm V (M), 2.4 mm V (F), GPC-3.5 (M), GPC-3.5 (F), SMA (M), SMA (F), N-Conn (M), N-Conn (F), N-Conn (75) (M), N-Conn (75) (F), GPC-7, 7/16 (M), 7/16 (F), TNC (M), TNC (F), User-Defined1 (M) through User-Defined32 (M), User-Defined1 (F) through User-Defined32 (F)</p> <p>DUT Connector Standard Info Button: Select displays the STANDARD INFO dialog box for the selected connector above.</p> <ul style="list-style-type: none"> • “STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box” on page 10-281 • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280
SOLT/R Non-Dispersive	<p>Same controls and functions as SOLT/R Coaxial</p>
SOLT/R Waveguide	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: Select User-Defined 1 to User-Defined 32</p> <p>Waveguide Info button: Depending on the Open/Short component selection above, displays either the USER DEFINED WAVEGUIDE PARAMS or the USER DEFINED WAVEGUIDE SHORT dialog box for the waveguide kit selected above.</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SOLT/R Microstrip	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: Select from 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, or User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays either the MICROSTRIP INFO or the USER DEFINED MICROSTRIP dialog box for the microstrip kit selected above.</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector: Select User-Defined 1 to User-Defined 32</p> <p>Test Port DUT Connector Standard Info Button: Depending on the Cal Component selected above, displays either the USER DEFINED OPEN or the USER DEFINED SHORT dialog box. See the following links for typical examples:</p>

Table 10-8. Refl. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs (2 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSLT Coaxial	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Select Cal Component: Offset short 1 or Offset short 2</p> <p>Test Port DUT Connector: Select 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1 Conn (F), W1 Conn (M), User-Defined 1 (F) to User-Defined 32 (F), User-Defined 1 (M) to User Defined 32 (M)</p> <p>Test Port DUT Connector Standard Info Button: Depending on the Cal Component selected above, displays either the STANDARD INFO or the USER DEFINED OFFSET SHORT dialog box. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280
SSLT Non-Dispersive	<p>Same controls and functions as SSLT Coaxial</p>
SSLT Waveguide	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Waveguide Kit: WR10, WR12, WR15, User-Defined 1 to User-Defined 32</p> <p>Select Cal Component: Offset short 1 or Offset short 2</p> <p>Test Port Waveguide Info Button: Depending on the Cal Component selected above, displays either the STANDARD INFO or the USER DEFINED OFFSET SHORT dialog box. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSLT Microstrip	<p>See full description above at “REFL. FREQ. RESP. CAL SETUP (SSLT, Microstrip) Dialog Box” on page 10-260</p> <p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port Cal Component: Offset short 1 or Offset short 2.</p> <p>Test Port DUT Connector: User-Defined 1 to User-Defined 32</p> <p>Test Port Connector Standard Info Button: For each port selected above, displays the USER DEFINED STANDARD dialog box for the selected calibration method and connector. See the following links for typical examples:</p>
SSST Coaxial	<p>Same controls and functions as SOLT/R Coaxial with the following changes:</p> <p>Test Port Cal Component: Offset short 1 or Offset short 2.</p> <p>Test Port DUT Connector: Select 0.8 mm-Conn (M), 0.8 mm-Conn (F), W1 Conn (F), W1 Conn (M), User-Defined 1 (F) to User-Defined 32 (F), User-Defined 1 (M) to User Defined 32 (M)</p> <p>Test Port Connector Standard Info Button: For each port selected above, displays the STANDARD INFO dialog box for the selected calibration method and connector. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box” on page 10-280 • “STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box” on page 10-284

Table 10-8. Refl. Freq. Resp. Manual Cal Setup Dialog Box Summary – 4-Port VNAs (3 of 3)

Cal Method Line Type	Dialog Box Input Selections and Controls
SSST Non-Dispersive	Same controls and functions as SSST Coaxial above.
SSST Waveguide	<p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Waveguide Kit: User-Defined 1 to User-Defined 32</p> <p>Test Port Cal Component: Offset short 1, Offset short, Offset short 3.</p> <p>Waveguide Info button: Displays USER DEFINED WAVEGUIDE INFO dialog box for selected calibration method and kit. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298
SSST Microstrip	<p>See full description above at “REFL. FREQ. RESP. CAL SETUP (SSST, Waveguide) Dialog Box” on page 10-262</p> <p>Same controls and functions as SSST Coaxial above with the following changes:</p> <p>Microstrip Kit: 10 Mil Kit, 15 Mil Kit, 25 Mil Kit, User-Defined 1 to User-Defined 32</p> <p>Microstrip Info button: Displays MICROSTRIP INFO dialog box for selected calibration method and kit. See the following links for typical examples:</p> <ul style="list-style-type: none"> • “MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279 <p>Test Port DUT Connector: User-Defined 1 to User-Defined 32</p> <p>Test Port Connector Standard Info Button: For each port, displays the USER DEFINED OFFSET SHORT dialog box for the selected calibration method and connector. See the following links for typical examples:</p>
TRL/TRM	The TRL/TRM calibration method is not available for the Reflection Frequency Response calibrations.
LRL/LRM	The LRL/LRM calibration method is not available for the Reflection Frequency Response calibrations.
mTRL	The mTRL calibration method is not available for Reflection Frequency Response calibrations.
mSSS	The mSSS calibration method is not available for Reflection Frequency Response calibrations.

10-15 Typical Calibration Sub-Menus

The menus in this section are example menus for the calibration step procedures. The exact content and presence of each menu is dependent on the settings for each calibration run.

REFL. DEVICE(S) Menu – 4-Port VNAs

Full Name

Reflective Device(s)

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A SOLT/SOLR calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the REFL. DEVICE(S) menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
 - [“THREE PORT CAL Menu – 4-Port VNAs” on page 10-153](#)
 - [“TWO PORT CAL Menu – 4-Port VNAs” on page 10-185](#)
 - [“ONE PORT CAL Menu – 4-Port VNAs” on page 10-223](#)
 - [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)
 - [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)
- The REFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)
 - [“CAL METHOD Menu – 4-Port VNA” on page 10-104](#)
 - [“LINE TYPE Menu – 4-Port VNA” on page 10-106](#)
 - [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Similar Menus

- The REFL. DEVICE(S) Port 1 menu is nearly identical to typical REFL. DEVICE(S) Port 2, REFL. DEVICE(S) Port 3, and REFL. DEVICE(S) Port 4 menus.

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | [# of Ports] Cal | [NUM OF PORTS] CAL | Port X Reflective Devices | REFL.DEVICE(S) [Port x]

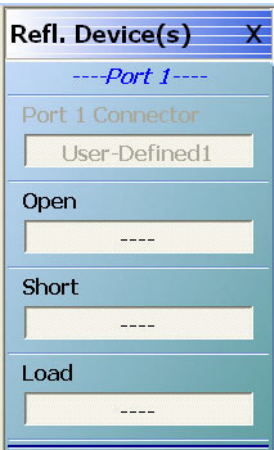
	<p>A typical REFL. DEVICE(S) menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete.</p> <p>Button selection will vary with calibration type.</p> <p>Port 1 Connector</p> <p>A read only button showing the configured connector for the indicated port.</p> <p>Open</p> <p>In general, prepare the indicated connections and components and then select the button. Starts the open calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Short</p> <p>Starts the short calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>For mSSS, the number of shorts listed will match the Number of Shorts (from 3 to 10) selected in the FULL FOUR PORT CAL SETUP (mSSS) dialog. The label also indicates the kit selected, with [S1], [S2], [S3] corresponding to the kit selection for the short. If [Other] is selected, then the offset length is displayed.</p> <p>Load</p> <p>Starts the load calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Sliding Load</p> <p>If present, selecting this button displays the SLIDING LOADS menu which is described in the section below.</p> <ul style="list-style-type: none">• “SLIDING LOADS Menu – 4-Port VNAs” on page 10-271 <p>Match</p> <ul style="list-style-type: none">• For mSSS only, the match button will appear if the Use Match checkbox is selected in the FULL FOUR PORT CAL SETUP (mSSS) dialog. Starts the match calibration procedure for the indicated port. When the calibration task is completed, the button is marked with a checkmark.
--	--

Figure 10-110. REFL. DEVICE(S) Menu – 4-Port VNAs – Typical Example

LINES/MATCHES DEVICE(S) Menu – 4-Port VNAs

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A LRL/LRM calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the LINES/MATCHES menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
 - [“THREE PORT CAL Menu – 4-Port VNAs” on page 10-153](#)
 - [“TWO PORT CAL Menu – 4-Port VNAs” on page 10-185](#)
 - [“ONE PORT CAL Menu – 4-Port VNAs” on page 10-223](#)
 - [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)
 - [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)
- The LINES/MATCHES menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)
 - [“CAL METHOD Menu – 4-Port VNA” on page 10-104](#)
 - [“LINE TYPE Menu – 4-Port VNA” on page 10-106](#)
 - [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)

Similar Menus

- The LINES/MATCHES Port 1 menu is nearly identical to typical LINES/MATCHES Port 2, LINES/MATCHES Port 3, and LINES/MATCHES Port 4 menus.

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | [# of Ports] Cal | [NUM OF PORTS] CAL | Port X-Y Lines/Matches | LINES/MATCHES [*Port X-Y*]

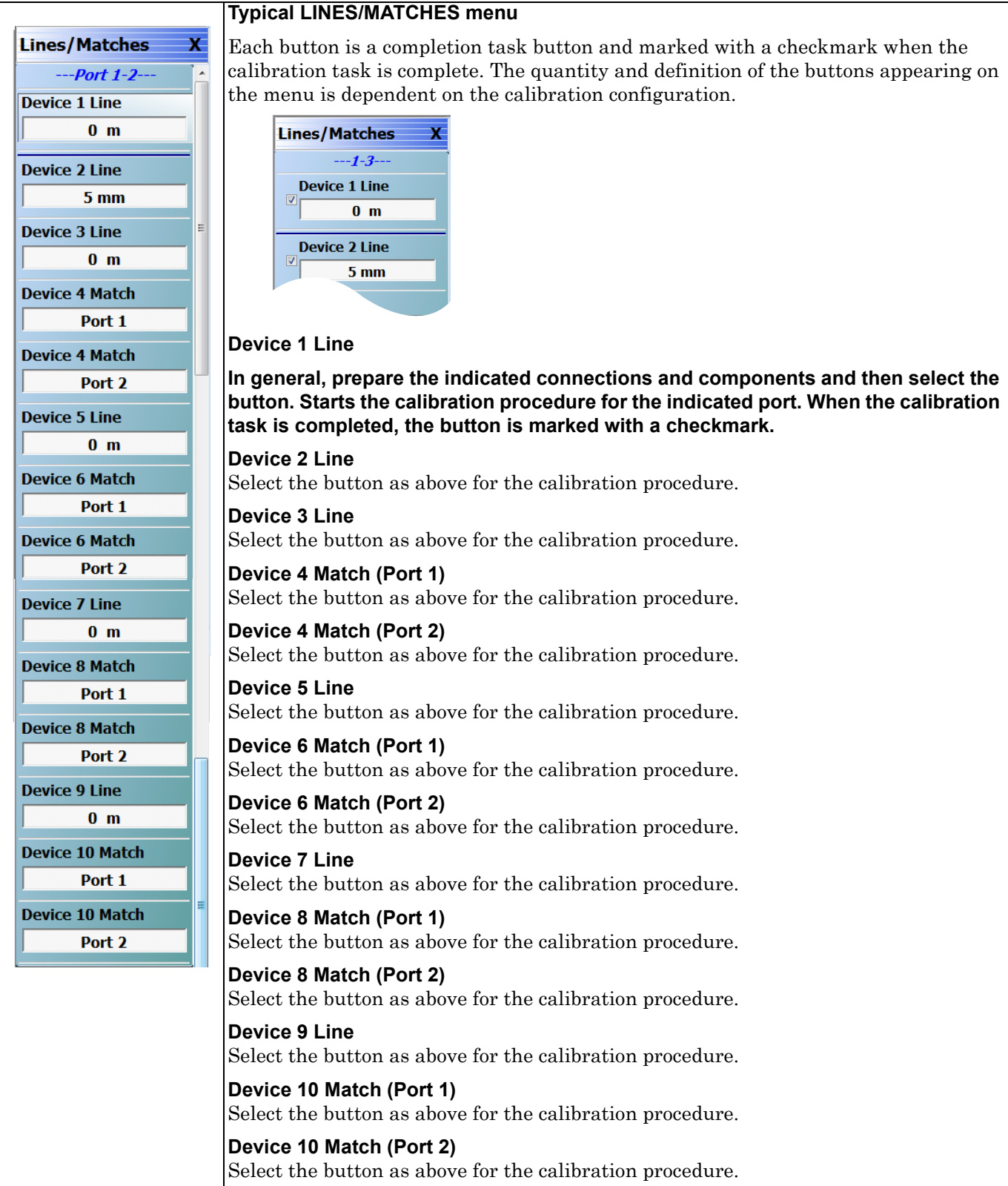


Figure 10-111. LINES/MATCHES Menu – 4-Port VNAs – Typical Example

SLIDING LOADS Menu – 4-Port VNAs

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A SOLT/SOLR calibration method
- Sliding loads selected
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the SLIDING LOADS menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“REFL. DEVICE\(S\) Menu – 4-Port VNAs” on page 10-267](#)
 - [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
 - [“THREE PORT CAL Menu – 4-Port VNAs” on page 10-153](#)
 - [“TWO PORT CAL Menu – 4-Port VNAs” on page 10-185](#)
 - [“ONE PORT CAL Menu – 4-Port VNAs” on page 10-223](#)
 - [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)
 - [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)
- The SLIDING LOADREFL. DEVICE(s) menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)
 - [“CAL METHOD Menu – 4-Port VNA” on page 10-104](#)
 - [“LINE TYPE Menu – 4-Port VNA” on page 10-106](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | [# of Ports] Cal | [NUM OF PORTS] CAL | Port X Reflective Devices | REFL.DEVICE(S) [Port x] | Sliding Load | SLIDING LOADS

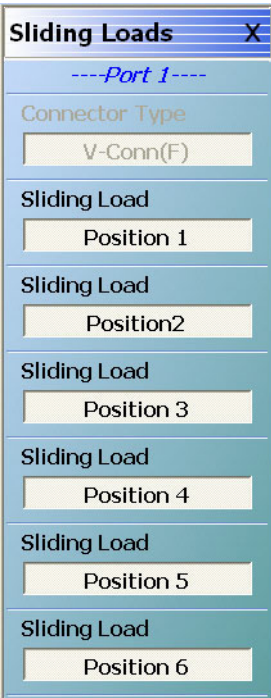
	<p>A typical SLIDING LOADS menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete. The number of buttons appearing on the menu is dependent on the calibration settings.</p> <p>Connector Type</p> <p>A read only button showing the configured connector for the indicated port.</p> <p>Sliding Load (Position 1)</p> <p>In general, prepare the indicated connections and components and then select the button. Starts the sliding load calibration procedure at position 1 for the indicated port. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Sliding Load (Position 2)</p> <p>As above for sliding load calibration procedure at position 2.</p> <p>Sliding Load (Position 3)</p> <p>As above for sliding load calibration procedure at position 3.</p> <p>Sliding Load (Position 4)</p> <p>As above for sliding load calibration procedure at position 4.</p> <p>Sliding Load (Position 5)</p> <p>As above for sliding load calibration procedure at position 5.</p> <p>Sliding Load (Position 6)</p> <p>As above for sliding load calibration procedure at position 6.</p> <p>When all calibration procedures are complete, use the Back button to return to the REFL DEVICE menu.</p> <ul style="list-style-type: none">• “REFL. DEVICE(S) Menu – 4-Port VNAs” on page 10-267
--	---

Figure 10-112. SLIDING LOADS Menu – 4-Port VNAs – Typical Example

THRU/RECIP Menu – 4-Port VNAs

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A SOLT/SOLR calibration method
- Sliding loads selected
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the THRU/RECIP menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
 - [“THREE PORT CAL Menu – 4-Port VNAs” on page 10-153](#)
 - [“TWO PORT CAL Menu – 4-Port VNAs” on page 10-185](#)
 - [“ONE PORT CAL Menu – 4-Port VNAs” on page 10-223](#)
 - [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)
 - [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)
- The THRU/RECIP menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)
 - [“CAL METHOD Menu – 4-Port VNA” on page 10-104](#)
 - [“LINE TYPE Menu – 4-Port VNA” on page 10-106](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | [# of Ports] Cal | [NUM OF PORTS] CAL | Thru/Recip | THRU/RECIP |

	<p>A typical THRU/RECIP menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete.</p> <p>Thru (Port Pair 1-2)</p> <p>In general, prepare the indicated connections and components and then select the button. Starts the through calibration procedure for the indicated port pair. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Thru (Port Pair 1-3)</p> <p>As above for through calibration at port pair 1-3.</p> <p>Reciprocal (Port Pair 1-4)</p> <p>As above for reciprocal calibration at port pair 1-4.</p> <p>Thru (Port Pair 2-3)</p> <p>As above for through calibration at port pair 2-3.</p> <p>Thru (Port Pair 2-4)</p> <p>As above for through calibration at port pair 2-4.</p> <p>Thru (Port Pair 3-4)</p> <p>As above for through calibration at port pair 3-4.</p> <p>When all calibration procedures are complete, use the Back button to return to the REFL DEVICE menu.</p> <ul style="list-style-type: none">• “REFL. DEVICE(S) Menu – 4-Port VNAs” on page 10-267
--	---

Figure 10-113. THRU/RECIP Menu – 4-Port VNAs – Typical Example

ISOLATION (OPTIONAL) Menu

Typical Configuration

This menu example is a representative menu based on the following configuration:

- VNA is in 4-port mode
- A 4-port calibration
- A SOLT/SOLR calibration method
- A coaxial line type
- A V (f) Connector

Using a different configuration set can change the appearance of the THRU/RECIP menu.

Previous

- The previous menu can be any of the following manual calibration menus and their associated configuration dialog boxes.
 - [“FOUR PORT CAL Menu – 4-Port VNAs” on page 10-107](#)
 - [“THREE PORT CAL Menu – 4-Port VNAs” on page 10-153](#)
 - [“TWO PORT CAL Menu – 4-Port VNAs” on page 10-185](#)
 - [“ONE PORT CAL Menu – 4-Port VNAs” on page 10-223](#)
 - [“TRANS. RESPONSE Menu – 4-Port VNAs” on page 10-245](#)
 - [“REFL. RESPONSE Menu – 4-Port VNAs” on page 10-255](#)
- The THRU/RECIP menu controls and functions are also subject to the settings in the following:
 - [“CAL SETUP Menu – 4-Port VNAs” on page 10-101](#)
 - [“CAL METHOD Menu – 4-Port VNA” on page 10-104](#)
 - [“LINE TYPE Menu – 4-Port VNA” on page 10-106](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | [# of Ports] Cal | [NUM OF PORTS] CAL | Isolation (Optional) | ISOLATION(S)

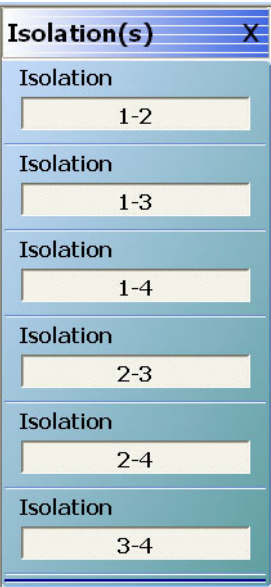
	<p>A typical ISOLATION(S) menu.</p> <p>Each button is a completion task button and marked with a checkmark when the calibration task is complete.</p> <p>Isolation (Port Pair 1-2)</p> <p>In general, prepare the indicated connections and components and then select the button. Starts the optional isolation calibration procedure for the indicated port pair. When the calibration task is completed, the button is marked with a checkmark.</p> <p>Isolation (Port Pair 1-3)</p> <p>As above for isolation calibration at port pair 1-3.</p> <p>Isolation (Port Pair 1-4)</p> <p>As above for isolation calibration at port pair 1-4.</p> <p>Isolation (Port Pair 2-3)</p> <p>As above for isolation calibration at port pair 2-3.</p> <p>Isolation (Port Pair 2-4)</p> <p>As above for isolation calibration at port pair 2-4.</p> <p>Isolation (Port Pair 3-4)</p> <p>As above for isolation calibration at port pair 3-4.</p> <p>When all calibration procedures are complete, use the Back button to return to the REFL DEVICE menu.</p> <ul style="list-style-type: none">• “REFL. DEVICE(S) Menu – 4-Port VNAs” on page 10-267
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Figure 10-114. ISOLATION(S) Menu – 4-Port VNAs – Typical Example

10-16 Manual Calibration General Dialog Boxes

These are general information dialog boxes that can be linked to from most manual calibration procedures. A representative typical of dialog box contents are shown below:

- [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)
- [“MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes” on page 10-279](#)
- [“STANDARD INFO \(OFFSET SHORT\) W1-Connector \(F\) Dialog Box” on page 10-280](#)
- [“STANDARD INFO \(SOLT/R\) V-Connector \(M\) Dialog Box” on page 10-281](#)
- [“STANDARD INFO \(Broadband Cal\) 0.8 mm Connector \(M\) Dialog Box” on page 10-282](#)
- [“STANDARD INFO \(TRIPLE OFFSET SHORT\) W1-Connector \(M\) Dialog Box” on page 10-284](#)
- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
- [“USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM” on page 10-289](#)
- [“WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes” on page 10-298](#)

AIR EQUIVALENT LENGTH Calculator Dialog Box

Use the AIR EQUIVALENT LENGTH calculator dialog box to speed configuration of a through line by entering its length in picoseconds (ps) and its dielectric constant. The calculator returns the air equivalent length in millimeters (mm).

Previous

- The AIR EQUIVALENT LENGTH dialog box can be accessed from multiple locations.
- [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL | Modify Cal Setup | MODIFY AUTOCAL SETUP Dialog Box | Thru Info | THRU INFO Dialog Box | Calculator Icon | AIR EQUIVALENT LENGTH Dialog Box ‘

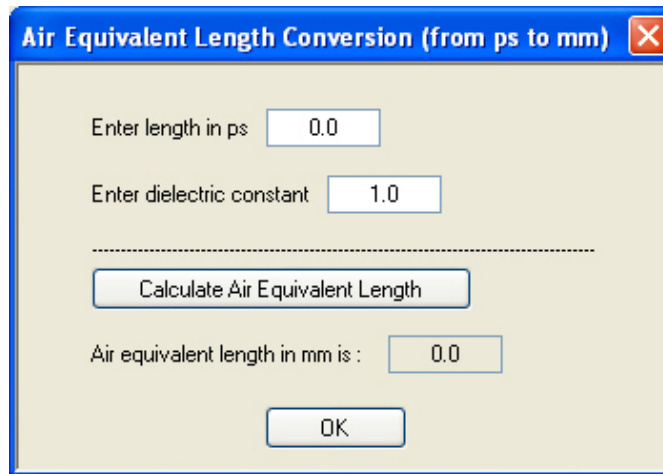


Figure 10-115. AIR EQUIVALENT LENGTH CONVERSION CALCULATOR Dialog Box

Using the Calculator

1. Use the Enter length in ps (picoseconds) to input a length.
 - For example, enter a value of 250 ps.
2. Use the Enter constant to change the dielectric constant as required.
 - For example, change the dielectric constant to 1.2.
3. Click the Calculate Air Equivalent Length button.
4. The required value appears in the Air Equivalent Length in mm field.
 - Using the examples above, an air equivalent length of 68.465319... appears in the field.
5. Click OK.
6. The Thru Info dialog box reappears with the calculated value in the Length (mm) field.
7. Using the examples above, the Length (mm) field displays 68.4653 mm.
 - [“THRU INFO Dialog Box – 4-Port VNAs” on page 10-285](#)
8. Click OK on the Thru Info dialog box.
9. The Modify AutoCal Setup dialog box reappears.
 - [“MODIFY 4-PORT AUTOCAL SETUP Dialog Box” on page 10-87](#)
 - [“MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-91](#)
 - [“MODIFY 1-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-95](#)

MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes

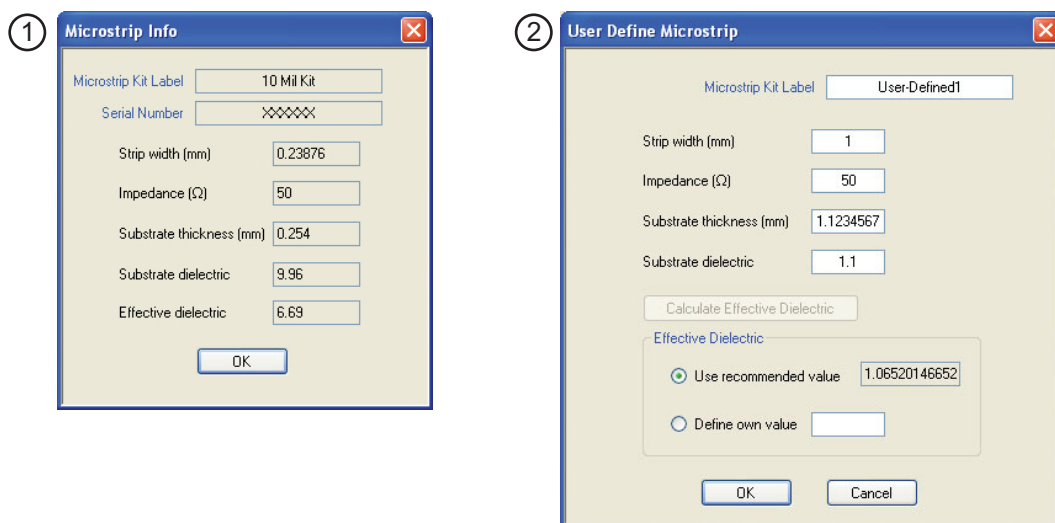
Dialog Box Name Changes

The exact names of these dialog boxes change depending on the calibration method and connector type selected.

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“TWO PORT CAL SETUP \(SOLT/R, Microstrip\) Dialog Box” on page 10-191.](#)
- [“TWO PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box” on page 10-201.](#)
- [“TRANS. FREQ. RESP. CAL SETUP \(SSST, Microstrip\) Dialog Box” on page 10-251.](#)
- [“REFL. FREQ. RESP. CAL SETUP \(SSLT, Microstrip\) Dialog Box” on page 10-260.](#)

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Microstrip | Edit Cal Params | THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/R | Line Type = Microstrip | Edit Cal Params | TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Microstrip | Edit Cal Params | TWO PORT CAL SETUP (LRL/LRM, Microstrip) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Trans. Freq. Resp. | TRANS. RESP. | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Microstrip | Edit Cal Params | TRANSMISSION REFLECTION RESPONSE SETUP (SSST, Microstrip) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | Refl. Freq. Resp. | REFL. RESP. | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Microstrip | Edit Cal Params | REFLECTION RESPONSE SETUP (SSLT, Microstrip) Dialog Box



1. At left MICROSTRIP INFO for 10 Mil Kit.
2. At right USER DEFINED MICROSTRIP Input Dialog Box

Figure 10-116. MICROSTRIP INFO and USER DEFINED MICROSTRIP Dialog Boxes

STANDARD INFO (OFFSET SHORT) W1-Connector (F) Dialog Box

The figure below shows a typical connector standard information dialog box. The contents depend on the calibration method, the calibration line type, and the calibration connectors and genders used. Anritsu-provided dialogs provide read-only information. User-defined dialogs allow user input of parameters and names.

Previous

This dialog box can be linked to from multiple dialog sources.

- “FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-114
- “FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-117

Navigation

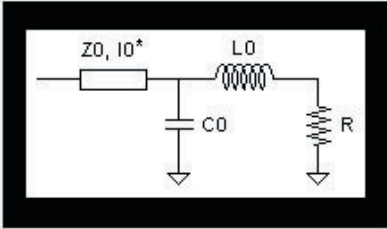
- The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box | DUT Connector = W1-Conn (F) | Standard Info | STANDARD INFO (OFFSET SHORT, W1-CONN (F)) Dialog Box

Standard Info (Offset Short) ⌵

Standard LabelW1-Conn(F)

Serial NumberXXXXXX

Broadband Load



10*: air equivalent length polynomial coef0

Sliding Load BreakPoint Freq (in GHz)

2

BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	l0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

Offset Short 1 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-4.193	1308.5	-25.137	0.1282	2.02	0	0

Offset Short 2 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0.945	544.52	-12.32	0.0724	2.65	0	0

Where L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3 and C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3

OK

Representative Standard Information Dialog Box

Figure 10-117. STANDARD INFO (OFFSET SHORT) W-1Conn (F)

STANDARD INFO (SOLT/R) V-Connector (M) Dialog Box

Figure 10-118 shows a typical connector standard information dialog box. The contents depend on the calibration method, the calibration line type, and the calibration connectors and genders used. Anritsu dialogs provide read-only information. User-defined dialogs allow user input of parameters and names.

Previous

This dialog box can be linked from multiple dialog sources. The links below are for dialogs that appear in this chapter.

- [“FULL FOUR PORT CAL SETUP \(SOLT/R, Coaxial\) Dialog Box” on page 10-111](#)
- [“FULL FOUR PORT CAL SETUP \(SSLT, Coaxial\) Dialog Box” on page 10-114](#)
- [“FULL FOUR PORT CAL SETUP \(SSST, Coaxial\) Dialog Box” on page 10-117](#)

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SOLT/SOLR | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box | DUT Connector = V-Conn (M) | Standard Info | STANDARD INFO (SOLT/R, V-CONN(M))

Standard Info (SOLT/R)

Standard Label: V-Conn(M)

Serial Number: XXXXXX

Broadband Load

BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	l0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

BB Load 2 (SN XXXXXX)

R (Ω)	Z0 (Ω)	l0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

10*: air equivalent length polynomial coef0

Sliding Load BreakPoint Freq (in GHz): 4

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	0	0	0	5.1	0	0

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
0	-200	5	0	4.75	0	0

Where $L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3$ and $C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3$

OK

Figure 10-118. I (SOLT/R) V-Conn (M)

STANDARD INFO (Broadband Cal) 0.8 mm Connector (M) Dialog Box

Figure 10-119 shows a typical connector standard information dialog box for broadband cal. The contents depend on the calibration line type, and the calibration connectors and genders used. Figure 10-122 shows standard information for a user-defined connector dialog box.

Previous

- “FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-122.
- “THREE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-164
- “TWO PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-194
- “ONE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-234

Navigation

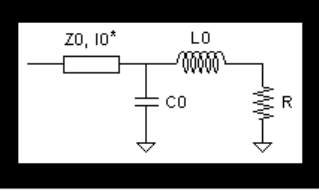
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = Broadband Cal (SOLT/R-SSST/R) | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box | DUT Connector = 0.8 mm-Conn (M) | Standard Info | STANDARD INFO (Broadband)

Standard Info (Broadband Cal)

Standard Label: 0.8mm-Conn(M)

Serial Number: XXXXXX

Broadband Load



BB Load 1 (SN XXXXXX)

R (Ω)	Z0 (Ω)	L0 (mm)	L0 (e-12)	C0 (e-15)
50	50	0	0	0

L0*: air equivalent length polynomial coef0

Short (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
1.418	-116.1	0.3827	0.01922	1.2	0	0

Open (SN XXXXXX)

C0 (e-15)	C1 (e-27)	C2 (e-36)	C3 (e-45)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
11.47	-145.7	4.276	-0.02419	1.2	0	0

Offset Short 1 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-0.03045	-593.6	12.01	-0.05528	1.2	0	0

Offset Short 2 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-0.03214	-462.7	9.442	-0.04441	1.63	0	0

Offset Short 3 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-0.02782	-514.3	10.14	-0.04637	2.06	0	0

Where $L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3$ and $C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3$

OK

Figure 10-119. I Standard Info (Broadband Cal) Dialog

STANDARD INFO (TRIPLE OFFSET SHORT) W1-Connector (M) Dialog Box

The figure below shows a typical connector standard information dialog box. The box format and contents vary depending on the calibration method, the calibration line type, and the calibration connectors and genders used. Anritsu-provided dialogs provide read-only information. User-defined dialogs allow user input of parameters and names.

Previous

- This dialog box can be linked from multiple dialog sources. The links below are for dialogs that appear in this chapter.

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box | DUT Connector = W1-Conn (M) | Standard Info | STANDARD INFO (TRIPLE OFFSET SHORT,W1-CONN(M))

Standard Info (Triple Offset Short)

Standard Label

W1-Conn(M)

Serial Number

XXXXXX

Offset Short 1 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
3.13	-971.86	25.01	-0.1464	2.02	0	0

Offset Short 2 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-2.13	1117.4	-20.445	0.0968	2.65	0	0

Offset Short 3 (SN XXXXXX)

L0 (e-12)	L1 (e-24)	L2 (e-33)	L3 (e-42)	Offset length (mm)	Line Loss (dB/mm)	@ Frequency (GHz)
-0.0018	-150.246	3.138	-0.0107	3.18	0	0

Where $L(H) = L0 + L1 * f + L2 * f^2 + L3 * f^3$ and $C(F) = C0 + C1 * f + C2 * f^2 + C3 * f^3$

OK

Representative Standard Information Dialog Box

Figure 10-120. STANDARD INFO (TRIPLE OFFSET SHORT) W1-Conn (M)

THRU INFO Dialog Box – 4-Port VNAs

Use the THRU INFO dialog to update the thru information for most calibration types. The dialog includes access to the AIR EQUIVALENT LENGTH calculator function dialog box to speed configuration.

The dialog box name includes the port-pair being configured.

Previous

The THRU INFO dialog box can be accessed from multiple locations, including:

- “MODIFY 4-PORT AUTOCAL SETUP Dialog Box” on page 10-87
- “MODIFY 2-PORT AUTOCAL SETUP Dialog Box – 4-Port VNAs” on page 10-91
- “FULL FOUR PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-111
- “FULL FOUR PORT CAL SETUP (SSLT, Coaxial) Dialog Box” on page 10-114
- “FULL FOUR PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-117
- “FULL FOUR PORT CAL SETUP (SSST, Waveguide) Dialog Box” on page 10-120
- “FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-122
- “FULL FOUR PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-140
- “THREE PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-155
- “THREE PORT CAL SETUP (SSLT, Microstrip) Dialog Box” on page 10-158
- “THREE PORT CAL SETUP (SSST, Coaxial) Dialog Box” on page 10-161
- “THREE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-164
- “THREE PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-174
- “TWO PORT CAL SETUP (SOLT/R, Coaxial) Dialog Box” on page 10-187
- “TWO PORT CAL SETUP (SOLT/R, Microstrip) Dialog Box” on page 10-191
- “TWO PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-194
- “TWO PORT CAL SETUP (mSSS, Coaxial) Dialog Box” on page 10-208

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | AutoCal | AUTOCAL | Modify Cal Setup | MODIFY AUTOCAL SETUP Dialog Box | Thru Info | THRU INFO Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port CAL | Modify Cal Setup | CAL SETUP Menu | Cal Method | SOLT/SOLR | Edit Cal Params | Full Four PORT CAL SETUP (SOLT/R, Coaxial) | Thru x-y Info | THRU INFO Dialog Box

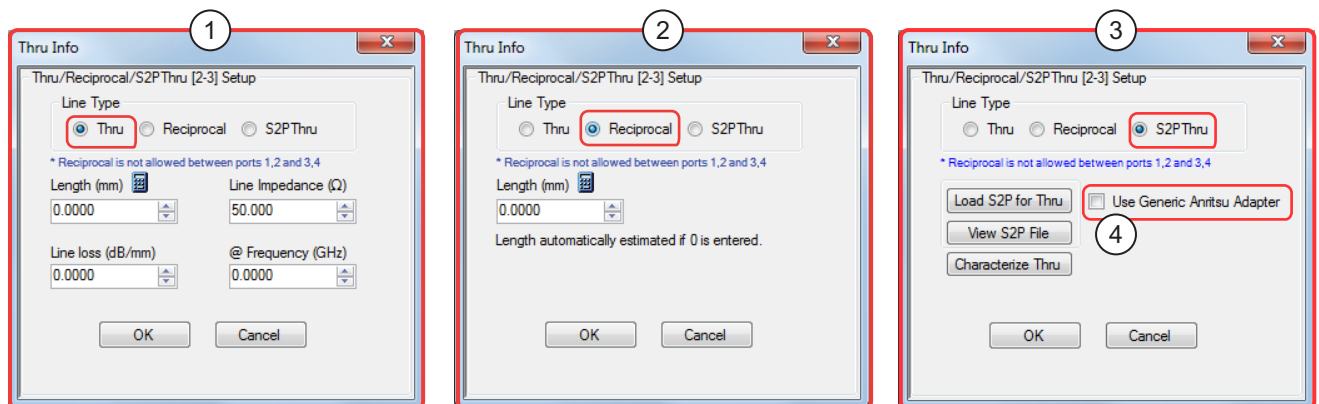


Figure 10-121. THRU INFO (Thru/Reciprocal Ports 1-2 Setup) Dialog Box (1 of 2)

Thru 2-3 Info Example:

1. Through selected allows user entries for length, line impedance, line loss, and frequency.
2. Reciprocal selected allows user entry for length.
3. S2P Thru selected provides buttons for loading, viewing, and characterization (to generate S2P files).
4. (Only available with K and V connector and when Cal Method is SOLT/R.) Use Generic Anritsu Adapter (checkbox) – Checking this box will automatically load a default .s2p file for a generic Anritsu adapter. Note that selecting the checkbox disables the Load S2P for Thru and Characterize Thru buttons.

Figure 10-121. THRU INFO (Thru/Reciprocal Ports 1-2 Setup) Dialog Box (2 of 2)

Overview

The THRU INFO dialog box is available for all possible through combinations for all 4-port, 3-port, and 2-port calibrations. Each box is labeled with the port pair it represents.

Through Info

• Through Selected

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)
- Line Impedance (Ohms)
 - Input defaults to be 50 Ohms. Any numeric value accepted.
- Line Loss (dB/mm)
 - Allows input of a line loss in dB per mm at the frequency specified in the field below.
- @ Frequency (GHz)
 - Allows input of a frequency setting for the Line Loss factor input above.

• Reciprocal Selected

- Length (mm)
 - Input line length in mm.
 - Calculator icon displays the AIR EQUIVALENT LENGTH CONVERSION dialog box.
 - [“AIR EQUIVALENT LENGTH Calculator Dialog Box” on page 10-278](#)

• S2P Thru Selected

- Load S2P for Thru
 - Opens navigation window to load S2P file.
- View S2P File
 - Opens window to view contents of S2P file.
- Characterize Thru
 - Allows a thru characterization and generation of an .s2p file.
- Use Generic Anritsu Adapter (checkbox)
 - Checking this box will automatically load a default .s2p file for a generic Anritsu adapter. Note that selecting the checkbox disables the Load S2P for Thru and Characterize Thru buttons.

USER DEFINED STANDARD (Broadband Cal) Dialog Box

Figure 10-122 shows a typical connector standard information dialog box for broadband cal with user-defined standard. This dialog allows user input of parameters and names or file names.

Previous

- “FULL FOUR PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-122.
- “THREE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-164
- “TWO PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-194
- “ONE PORT CAL SETUP Broadband Cal (SOLT/R-SSST/R, Coaxial) Dialog Box” on page 10-234.

Navigation

- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = Broadband Cal (SOLT/R-SSST/R) | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP BROADBAND CAL, MERGED SOLT-SSST/SOLR-SSSR) Dialog Box | DUT Connector = User-Defined (M) | Standard Info | USER DEFINED STANDARD INFO (Broadband Cal)

User Defined Standard (Broadband Cal)

Standard Label: **User-Defined1(M)**

Broadband Load

BB Load

☒ Define circuit model

R (Ω): 50 Z0 (Ω): 50 L0 (mm): 0 L0 (e-12): 0 C0 (e-15): 0

☐ Load S1P from file

Edit Polynomial Terms(Lenth,Ind.,Cap.)

Short

☒ Define circuit model

L0 (e-12): 0 L1 (e-24): 0 L2 (e-33): 0 L3 (e-42): 0 Offset length (mm): 0 Line Loss (dB/mm): 0.0000 @ Frequency (GHz): 0.0000

☐ Load S1P from file

Open

☒ Define circuit model

C0 (e-15): 0 C1 (e-27): 0 C2 (e-36): 0 C3 (e-45): 0 Offset length (mm): 0 Line Loss (dB/mm): 0.0000 @ Frequency (GHz): 0.0000

☐ Load S1P from file

Offset Short 1

☒ Define circuit model

L0 (e-12): 0 L1 (e-24): 0 L2 (e-33): 0 L3 (e-42): 0 Offset length (mm): 0 Line Loss (dB/mm): 0.0000 @ Frequency (GHz): 0.0000

☐ Load S1P from file

Offset Short 2

☒ Define circuit model

L0 (e-12): 0 L1 (e-24): 0 L2 (e-33): 0 L3 (e-42): 0 Offset length (mm): 0 Line Loss (dB/mm): 0.0000 @ Frequency (GHz): 0.0000

☐ Load S1P from file

Offset Short 3

☒ Define circuit model

L0 (e-12): 0 L1 (e-24): 0 L2 (e-33): 0 L3 (e-42): 0 Offset length (mm): 0 Line Loss (dB/mm): 0.0000 @ Frequency (GHz): 0.0000

☐ Load S1P from file

Where $L(H) = L_0 + L_1 * f + L_2 * f^2 + L_3 * f^3$ and $C(F) = C_0 + C_1 * f + C_2 * f^2 + C_3 * f^3$

OK Cancel

Figure 10-122. | USER DEFINED (Broadband Cal) Dialog for User-Defined Connector

USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM

Previous

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(TRL/TRM, Coaxial\) Dialog Box” on page 10-125.](#)
- [“THREE PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box” on page 10-170.](#)
- [“TWO PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box” on page 10-201.](#)

Navigation

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = TRL/TRM | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (TRL/TRM, Coaxial) | Band X (Match) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = TRL/TRM | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (TRL/TRM, Coaxial) | Band X (Match) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = TRL/TRM | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP (TRL/TRM, Coaxial) | Band X (Match) | Match Info | USER DEFINED MATCH Dialog Box

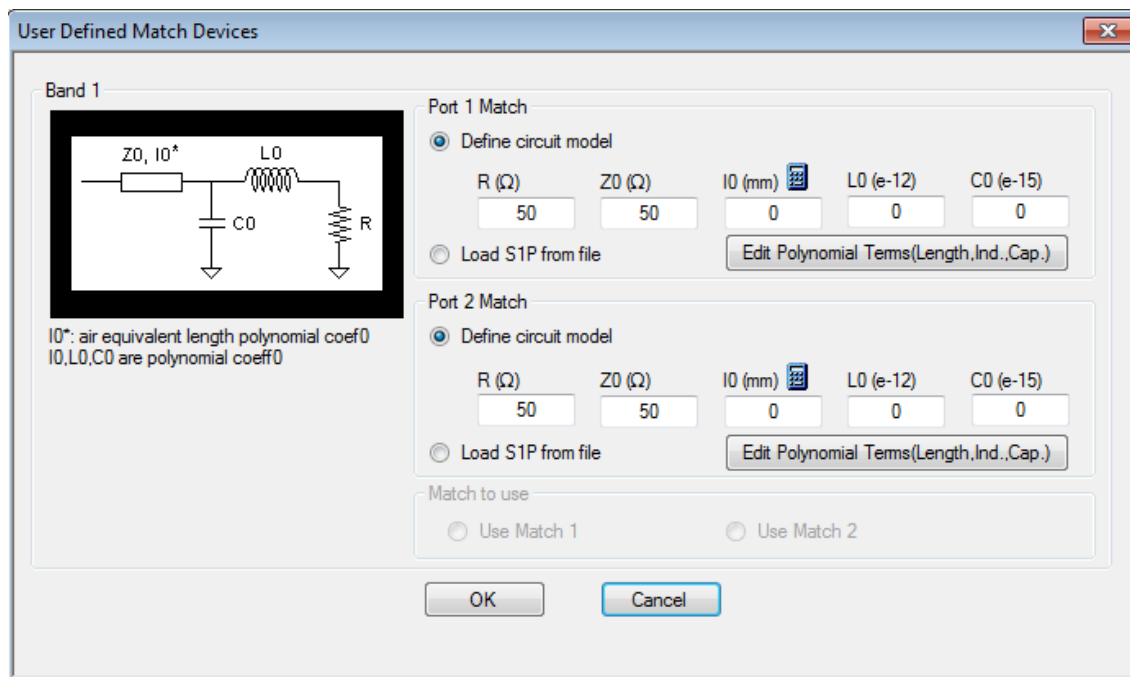


Figure 10-123. Example: USER DEFINED MATCH DEVICES Dialog Box – TRL/TRM

USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM

Previous

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box”](#) on page 10-129.
- [“THREE PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box”](#) on page 10-170.
- [“TWO PORT CAL SETUP \(LRL/LRM, Coaxial\) Dialog Box”](#) on page 10-201.

Navigation

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (LRL/LRM, Coaxial) | Band 1, Device 2 (Match) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 3-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (LRL/LRM, Coaxial) | Band 1, Device 2 (Match) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = LRL/LRM | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP (LRL/LRM, Coaxial) | Band 1, Device 2 (Match) | Match Info | USER DEFINED MATCH Dialog Box

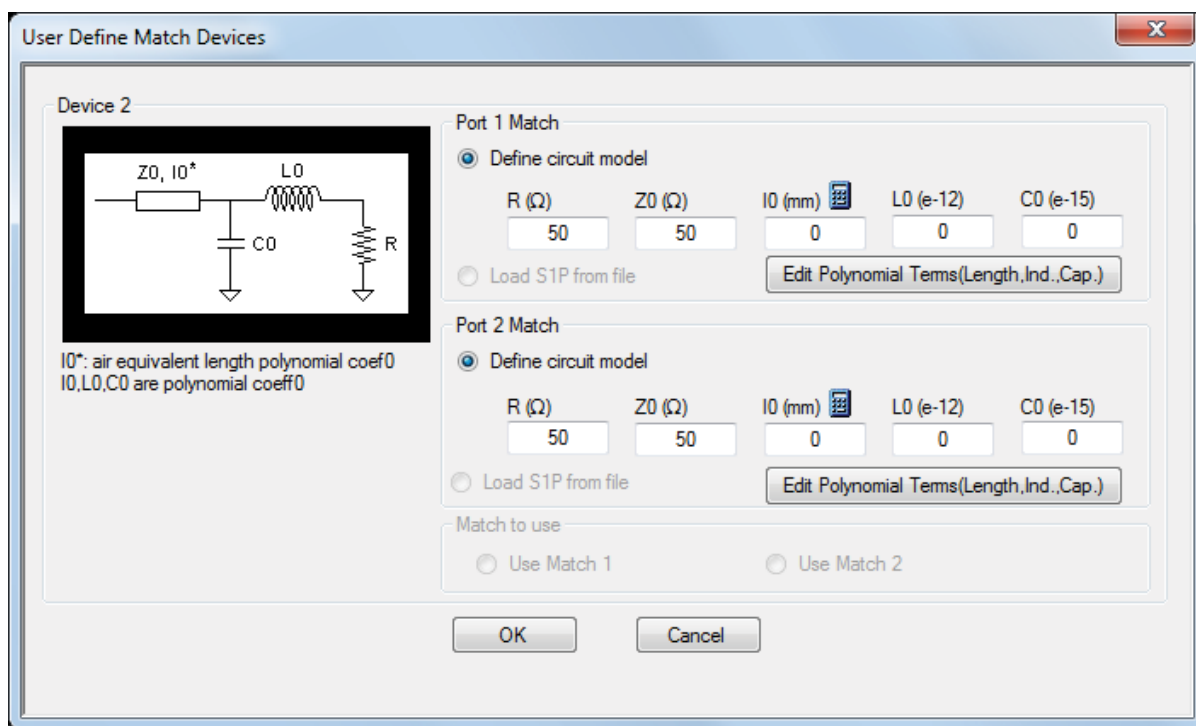


Figure 10-124. Example: USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM

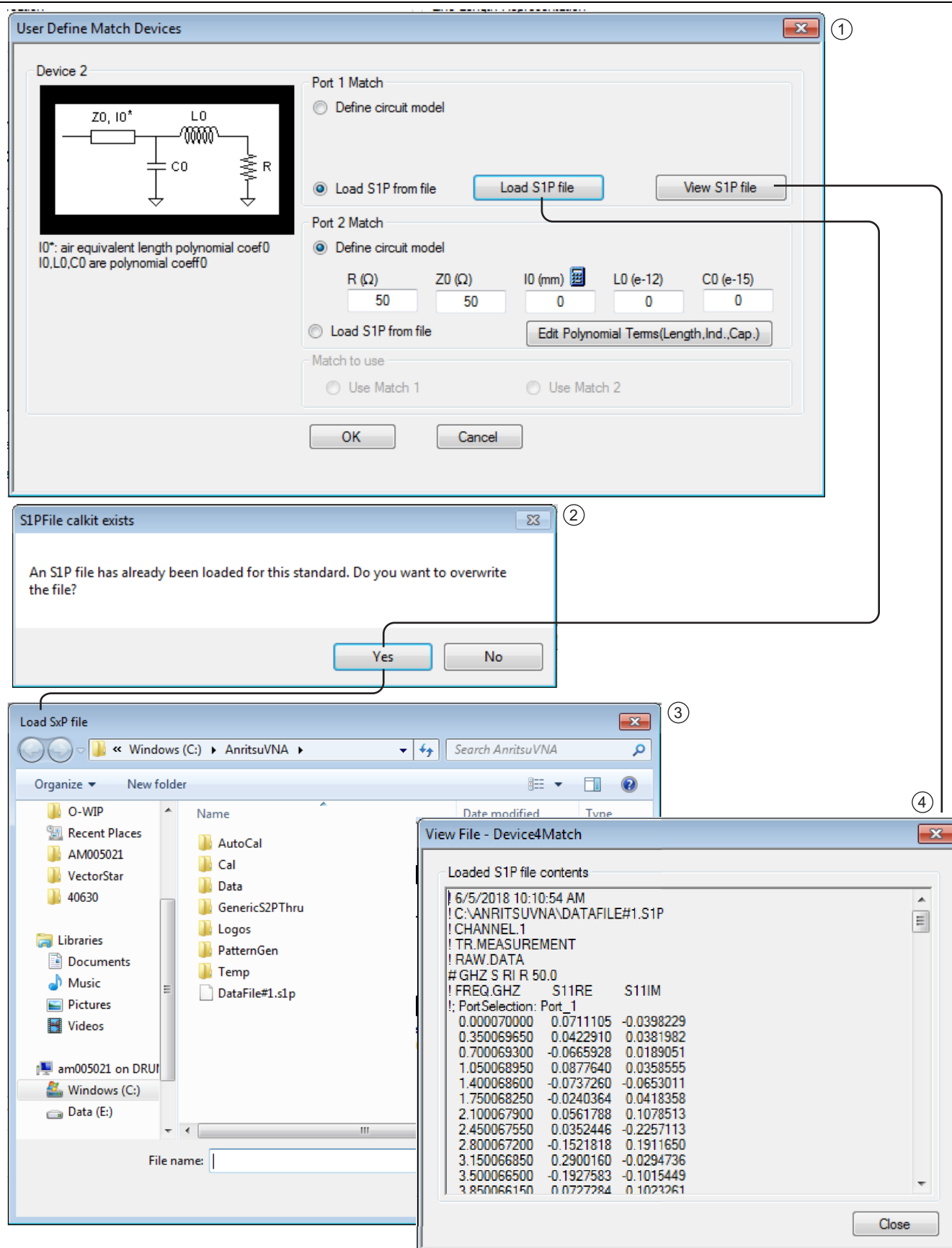


Figure 10-125. USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM Load/View S1P from File (1 of 2)

1. USER DEFINED MATCH DEVICES Dialog	3. LOAD SxP FILE Dialog
2. S1PFILE CALKIT EXISTS Dialog	4. VIEW FILE – DEVICE4MATCH Dialog

Figure 10-125. USER DEFINED MATCH DEVICES Dialog Box – LRL/LRM Load/View S1P from File (2 of 2)

USER DEFINED MATCH DEVICES Dialog Box – mTRL

Previous

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(mTRL, Coaxial\) Dialog Box” on page 10-135.](#)
- [“TWO PORT CAL SETUP \(mTRL, Coaxial\) Dialog Box” on page 10-205](#)

Navigation

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mTRL | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (mTRL, Coaxial) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mTRL | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP (mTRL, Coaxial) | Match Info | USER DEFINED MATCH Dialog Box



Figure 10-126. Example: USER DEFINED MATCH DEVICES Dialog Box – mTRL

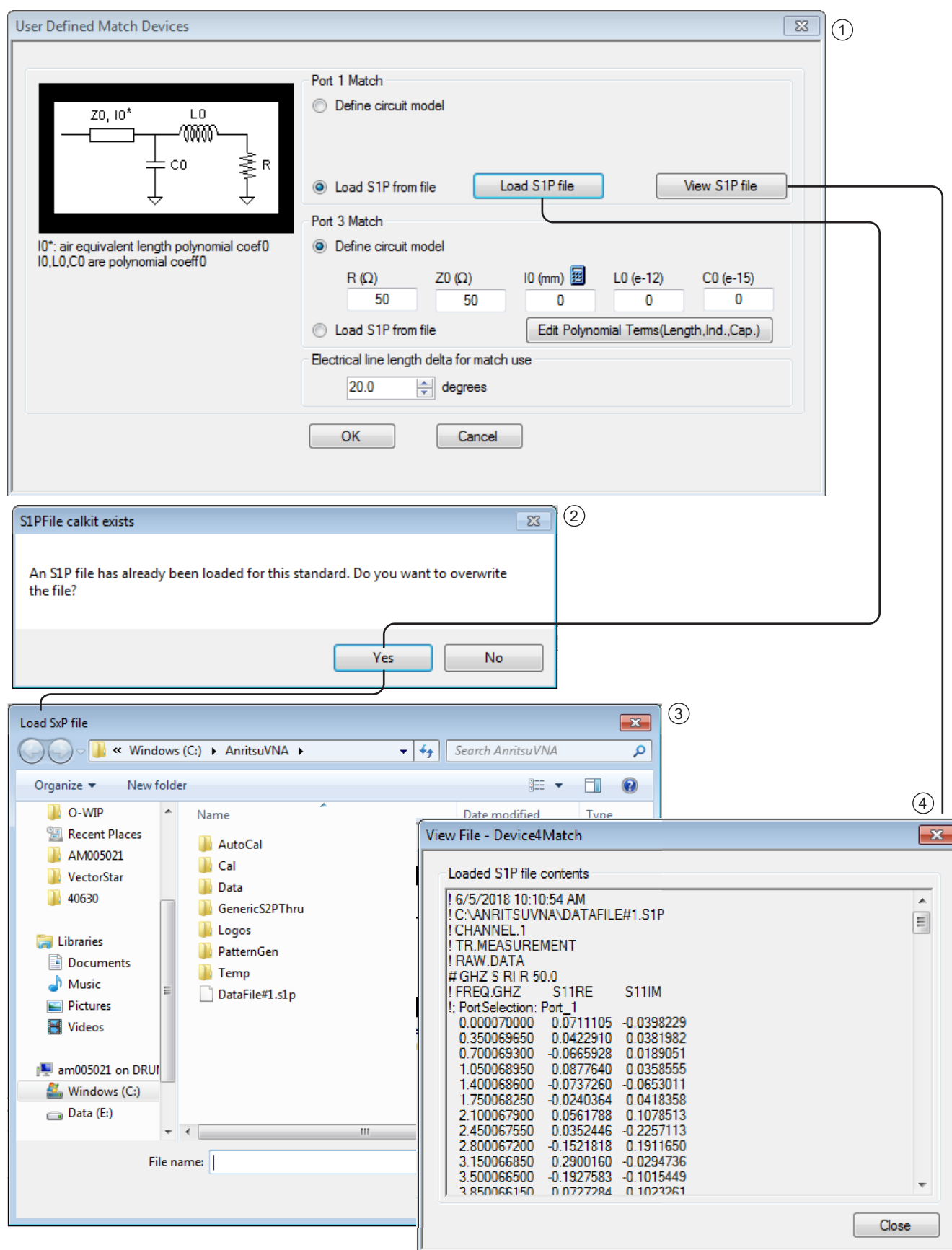


Figure 10-127. USER DEFINED MATCH DEVICES Dialog Box – mTRL Load/View S1P from File (1 of 2)

1. USER DEFINED MATCH DEVICES Dialog	3. LOAD SxP FILE Dialog
2. S1PFILE CALKIT EXISTS Dialog	4. VIEW FILE – DEVICE4MATCH Dialog

Figure 10-127. USER DEFINED MATCH DEVICES Dialog Box – mTRL Load/View S1P from File (2 of 2)

USER DEFINED MATCH Dialog Box – mSSS

Previous

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(mSSS, Coaxial\) Dialog Box” on page 10-140.](#)
- [“THREE PORT CAL SETUP \(mSSS, Coaxial\) Dialog Box” on page 10-174](#)
- [“TWO PORT CAL SETUP \(mSSS, Coaxial\) Dialog Box” on page 10-208](#)
- [“ONE PORT CAL SETUP \(mSSS, Coaxial\) Dialog Box” on page 10-236](#)

Navigation

- This dialog box can be linked to from multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mSSS | Line Type = Coaxial | Edit Cal Params | FULL FOUR PORT CAL SETUP (mSSS, Coaxial) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | THREE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mSSS | Line Type = Coaxial | Edit Cal Params | THREE PORT CAL SETUP (mSSS, Coaxial) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | TWO PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mSSS | Line Type = Coaxial | Edit Cal Params | TWO PORT CAL SETUP (mSSS, Coaxial) | Match Info | USER DEFINED MATCH Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 2-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = mSSS | Line Type = Coaxial | Edit Cal Params | ONE PORT CAL SETUP (mSSS, Coaxial) | Match Info | USER DEFINED MATCH Dialog Box

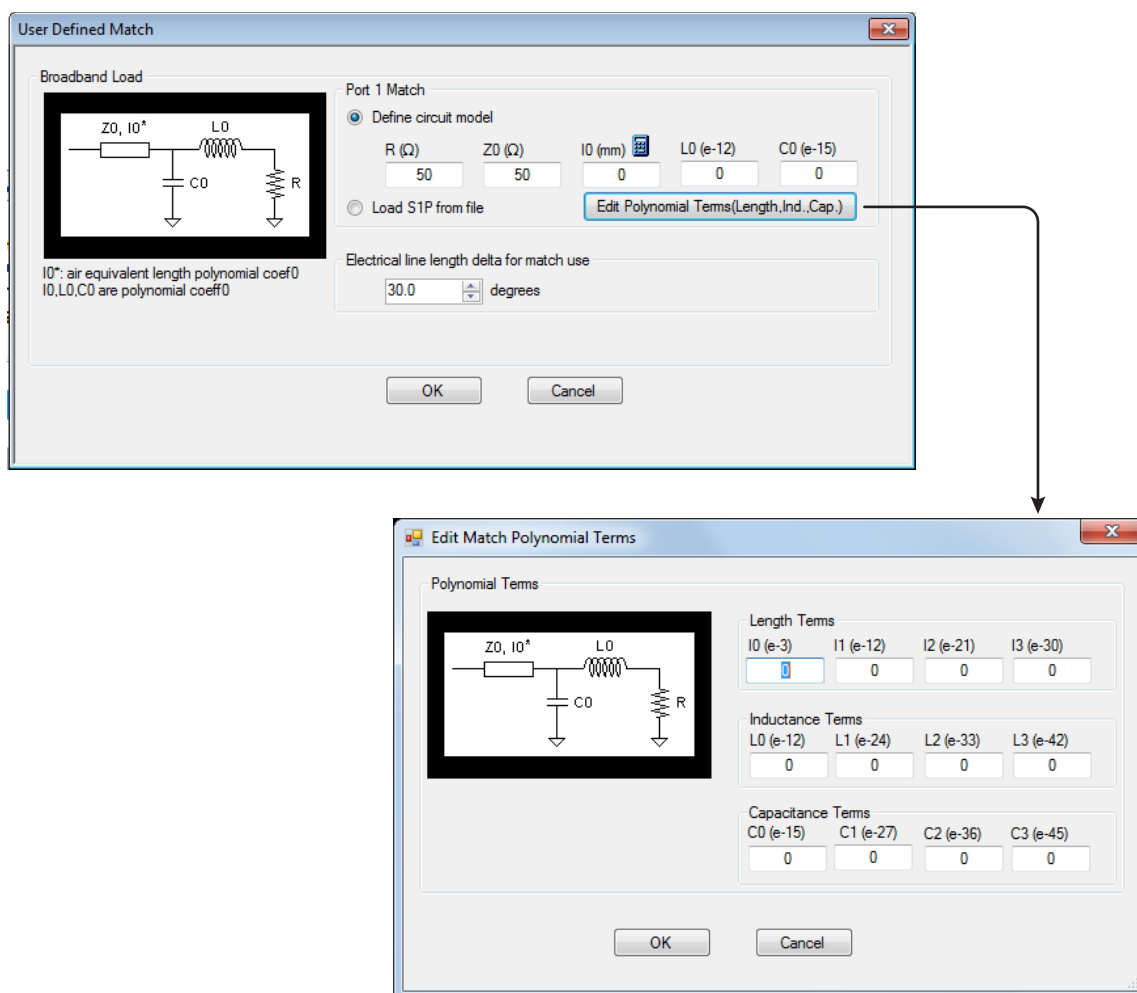


Figure 10-128. Example: USER DEFINED MATCH Dialog Box – mSSS

- | | |
|------------------------------|---------------------------------------|
| 1. USER DEFINED MATCH Dialog | 2. EDIT MATCH POLYNOMIAL TERMS Dialog |
|------------------------------|---------------------------------------|

Figure 10-129. USER DEFINED MATCH DEVICES Dialog Box – mSSS Load/View S1P from File

WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes

Dialog Box Name Changes

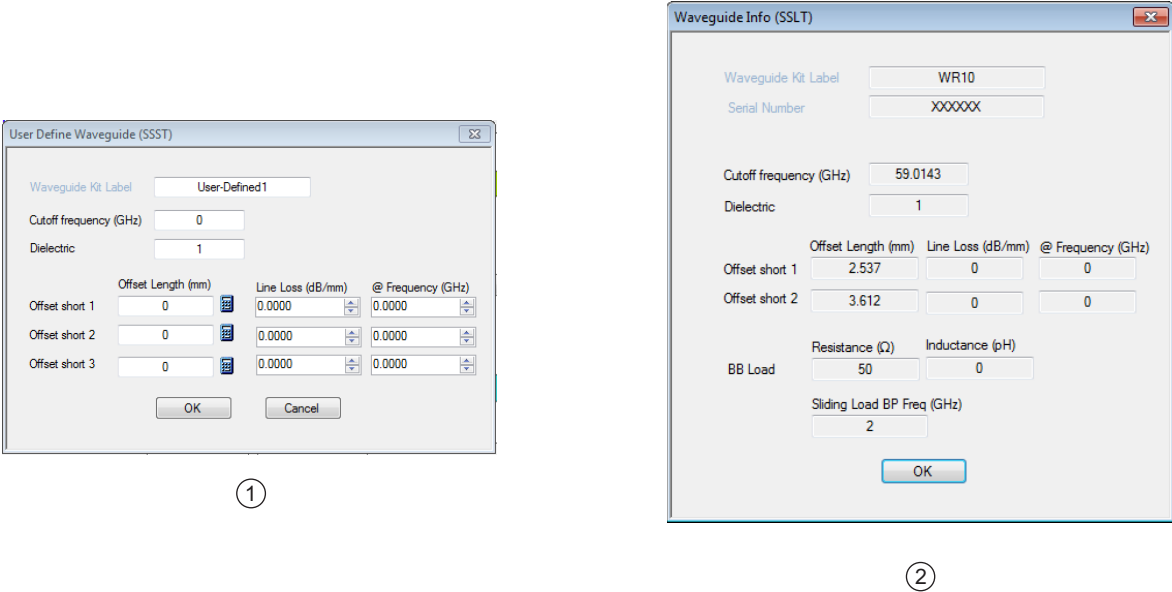
- The exact title and content of these dialog boxes varies depending on the selected calibration method and waveguide kit.

Previous

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- [“FULL FOUR PORT CAL SETUP \(SSST, Waveguide\) Dialog Box” on page 10-120](#)
- [“ONE PORT CAL SETUP \(SSLT, Waveguide\) Dialog Box” on page 10-232](#)

Navigation

- This dialog box can be linked to from a multiple dialog sources. The links below are for dialogs that appear in this chapter.
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 4-Port Cal | FOUR PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSST | Line Type = Waveguide | Edit Cal Params | FULL FOUR PORT CAL SETUP (SSST, Waveguide) Dialog Box
- MAIN | Calibration | CALIBRATION | Calibrate | CALIBRATE | Manual Cal | MANUAL CAL | 1-Port Cal | ONE PORT CAL | Modify Cal Setup | CAL SETUP | Cal Method = SSLT | Line Type = Waveguide | Edit Cal Params | FULL ONE PORT CAL (SSLT, Waveguide) | Waveguide Info Button | WAVEGUIDE INFO (SSLT) Dialog Box



1. At left, USER DEFINED WAVEGUIDE Input Dialog Box.
2. At right WAVEGUIDE INFO for WR10 Connector.

Figure 10-130. WAVEGUIDE INFO and USER DEFINED WAVEGUIDE Dialog Boxes

- For mSSS, the Cutoff Frequency and Dielectric are defined globally in the FULL [FOUR, THREE, TWO, ONE] PORT CAL SETUP (mSSS, Waveguide) Dialog Box.

Chapter 11 — Measurement Menus

11-1 Chapter Overview

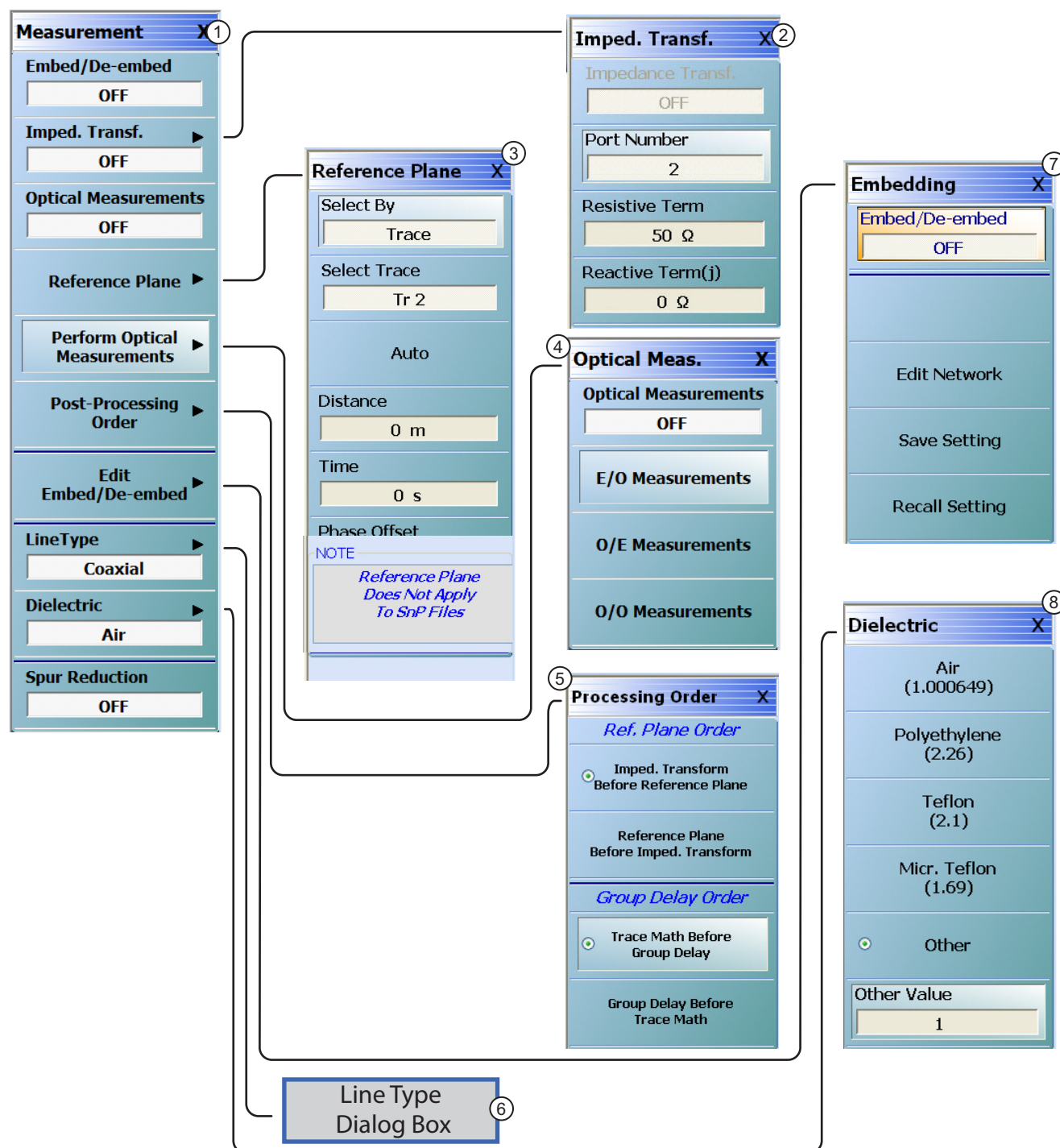
This chapter provides information for the measurement menu system which controls the embed/de-embed functions, the impedance transformations, reference plane location, optical (O/E-E/O-O/O) measurement, and the post-processing order functions along with their related configuration dialog boxes. The measurement system functions are available to VectorStar MS464xB Series VNAs.

11-2 Overview of Measurement Menus

These are the menus and dialog boxes in the measurement menus:

- “MEASUREMENT Menu” on page 11-3
- “IMPED. TRANSF. Menu – 2-Port VNAs” on page 11-6
- “REFERENCE PLANE Menu” on page 11-12
- “OPTICAL MEASUREMENT Menu” on page 11-18
 - “2-Port E/O Measurement Dialog Box” on page 11-19
 - “2-Port O/E Measurement Dialog Box” on page 11-21
 - “2-Port O/O Measurement Dialog Box” on page 11-23
 - “2-Port MEASURE E/O Dialog Box” on page 11-25
 - “4-PORT E/O MEASUREMENT Dialog Box” on page 11-26
 - “4-PORT O/E MEASUREMENT Dialog Box” on page 11-28
 - “4-PORT O/O MEASUREMENT Dialog Box” on page 11-30
 - “4-Port MEASURE E/O or O/E Dialog Boxes” on page 11-32
- “PROCESSING ORDER Menu” on page 11-33
- “EMBEDDING Menu” on page 11-34
 - “EDIT EMBEDDING/DE-EMBEDDING (2 Port DUT) Dialog Box” on page 11-35
 - “SAVE AS (EMBED/DE-EMBED EDL FILE) Dialog Box” on page 11-39
 - “OPEN (EMBED/DE-EMBED EDL File) Dialog Box” on page 11-40
 - “LINE TYPE Dialog Box” on page 11-41
- “DIELECTRIC Menu” on page 11-45

The Measurement Menu Set is shown in [Figure 11-1](#).



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. MEASUREMENT Menu 2. IMPED. TRANSF. (Impedance Transformation) Menu 3. REFERENCE PLANE Adjustment Menu 4. OPTICAL MEAS. Menu | <ol style="list-style-type: none"> 5. PROCESSING ORDER Menu – Select Reference Plane Order at top and Group Delay Order at bottom. 6. Line Type Dialog Boxes – Not shown here. 7. EMBEDDING/De-Embedding Menu 8. DIELECTRIC Selection Menu – If Other is selected, Other Value field is available for input. |
|---|--|

Figure 11-1. MEASUREMENT Menu and Submenus

MEASUREMENT Menu

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Measurement | MEASUREMENT

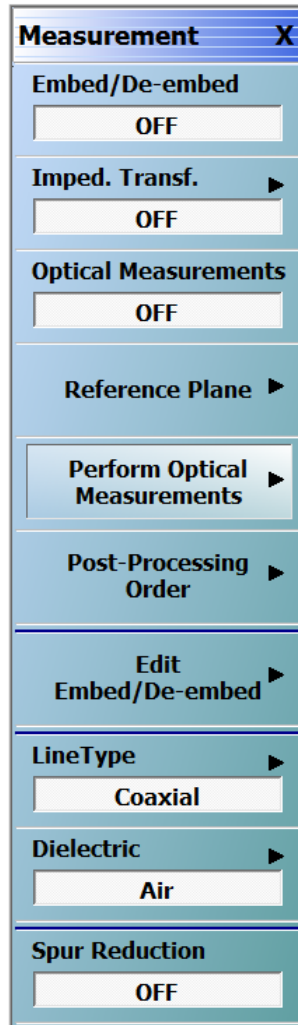
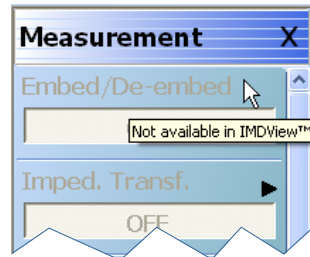


Figure 11-2. MEASUREMENT Menu

Measurement Menu Note (when IMDView is active)

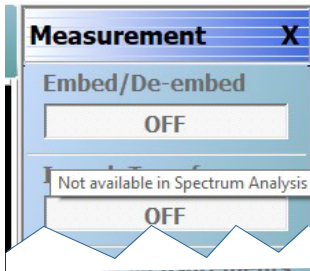
When the IMDView application is active, the following MEASUREMENT menu buttons are disabled: Embed/De-embed, Imped. Transf., Optical Measurements, Perform Optical Measurements, Post-Processing Order, Edit Embed/De-embed, Line Type, and Dielectric.

When the pointer is placed over a menu item, a tool tip noting “Not available in IMDView” will appear.

**Measurement Menu Note (when Spectrum Analysis is active)**

When the Spectrum Analysis application is active, the following MEASUREMENT menu buttons are disabled: Embed/De-embed, Imped. Transf., Optical Measurements, Perform Optical Measurements, Post-Processing Order, Edit Embed/De-embed, and Line Type.

When the pointer is placed over a menu item, a tool tip noting “Not available in Spectrum Analysis” will appear.

**Embed/De-embed (Off/On)**

Select toggles the embedding/de-embedding function off and on.

If a successful calibration has not been previously performed, select displays a warning message. Click OK to clear.

Imped Transf (Impedance Transformation)

Select impedance transfer displays the IMPED TRANSF menu.

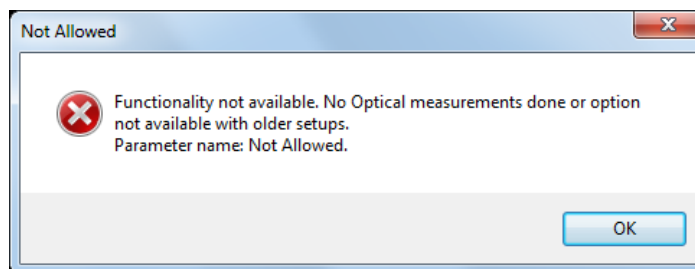
- [“IMPED. TRANSF. Menu – 2-Port VNAs” on page 11-6](#)

Optical Measurements (Off/On)

Select toggles the Optical Measurement function off and on.

If a successful calibration has not been previously performed, select displays a warning message. Click OK to clear.

If an O/E measurement has not been performed, the following message is displayed. Click OK to clear.



Reference Plane

Select displays the REFERENCE PLANE menu.

- [“REFERENCE PLANE Menu” on page 11-12](#)

Perform Optical Measurements

Select displays the OPTICAL MEAS. menu.

- [“OPTICAL MEASUREMENT Menu” on page 11-18](#)

Post-Processing Order

Select displays the PROCESSING ORDER menu.

- [“PROCESSING ORDER Menu” on page 11-33](#)

Edit Embed/De-embed

Select displays the EMBEDDING menu.

- [“EMBEDDING Menu” on page 11-34](#)

Line Type

Select displays the LINE TYPE dialog box.

- [“LINE TYPE Dialog Box” on page 11-41](#)

Dielectric

Select displays the DIELECTRIC menu and allows the user to select from pre-defined dielectric materials or create the value for a user-defined material.

- [“DIELECTRIC Menu” on page 11-45](#)

Spur Reduction (Off/On)

Select toggles Spur Reduction off and on. Turning Spur Reduction ON eliminates the effect of spurious signals being reflected back from DUTs such as deep stop-band filters, which will cause a decrease in dynamic range. Spur Reduction ON turns off the unused test receiver during each S-parameter measurement, thus requiring 4 sweeps to measure all 4 S-parameters.

IMPED. TRANSF. Menu – 2-Port VNAs

Full Name

Impedance Transformation

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Imped. Transf. | IMPED. TRANSF. (IMPEDANCE TRANSFORMATION)

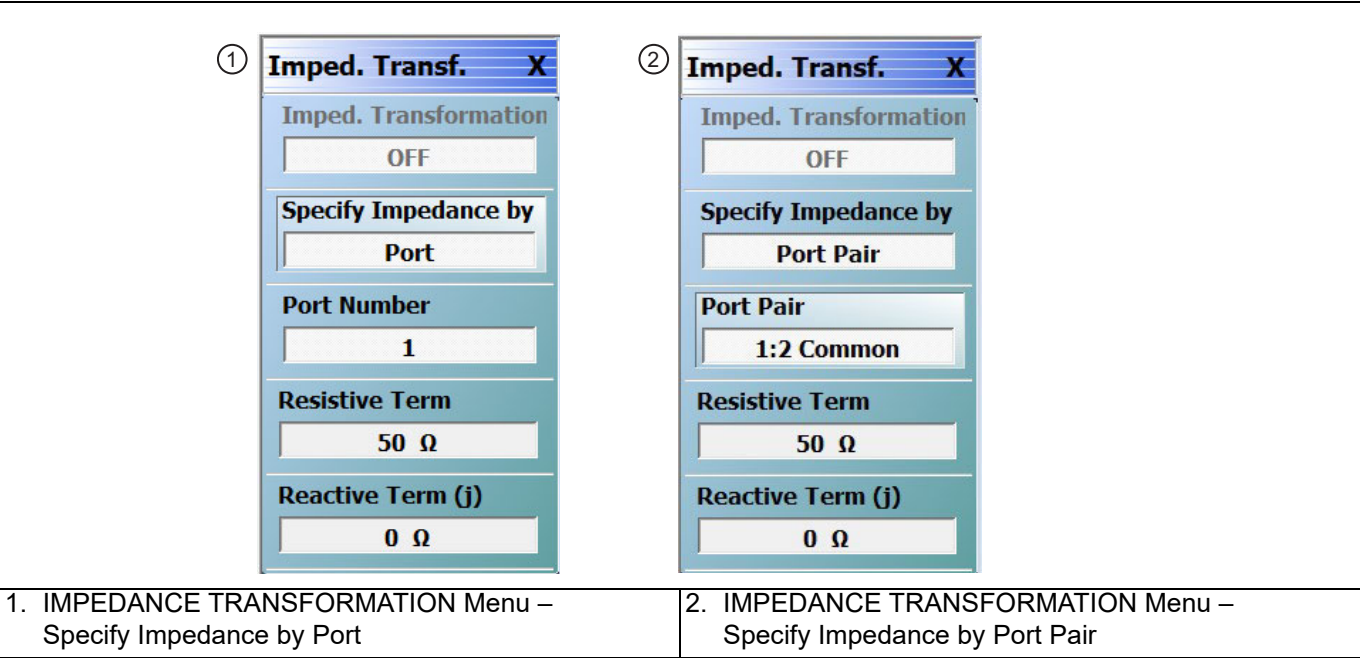


Figure 11-3. IMPED. TRANSF. (IMPEDANCE TRANSFORMATION) Menu – 2-Port VNAs

Impedance Trans (Off/On)

Select toggles impedance transformation off and on. Calibration is required to enable impedance transformation.

Specify Impedance by

Select toggles between Port and Port Pair.

Port Number

When Specify Impedance by is set to Port, select toggles between Port 1 and Port 2.

Port Pair

When Specify Impedance by is set to Port Pair, select toggles between 1:2 Common and 1:2 Differential.

Resistive Term (Ohms)

Select displays the Resistive Term field toolbar and allows the user to define the resistive term in Ohms. The default value is 50.000 ohms.



Figure 11-4. Resistive Term Field Toolbar

Reactive Term (j) (Ohms)

Select displays the Reactive Term field toolbar and allows the user to define the reactive (j) term in Ohms.



Figure 11-5. Reactive Term Field Toolbar

IMPED. TRANSF. Menu – 4-Port VNAs

Full Name

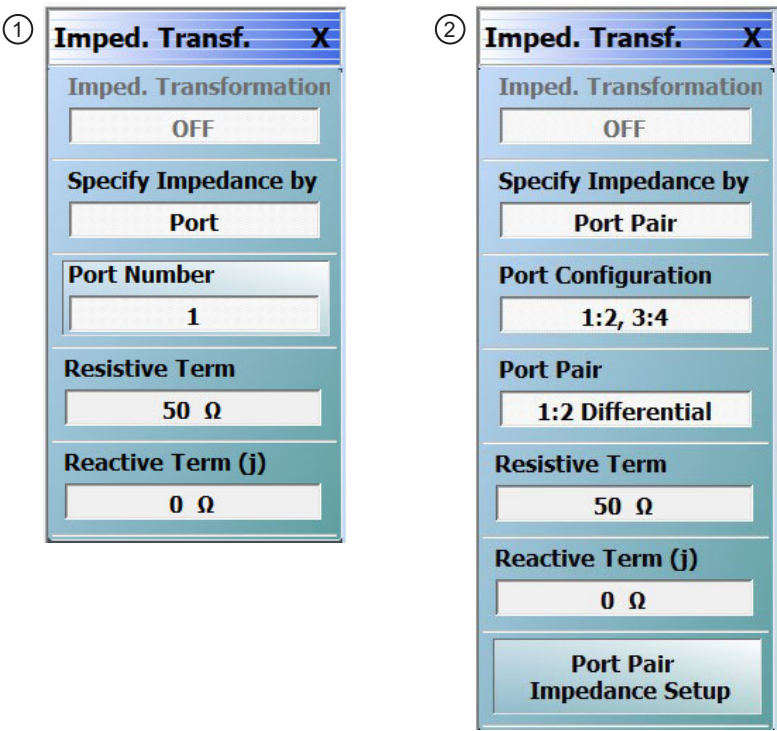
Impedance Transformation

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Imped. Transf. | IMPED. TRANSF. (IMPEDANCE TRANSFORMATION)



1. IMPEDANCE TRANSFORMATION Menu – Specify Impedance by Port	2. IMPEDANCE TRANSFORMATION Menu – Specify Impedance by Port Pair
--	---

Figure 11-6. IMPED. TRANSF. (IMPEDANCE TRANSFORMATION) Menu – 4-Port VNAs

Impedance Trans (Off/On)

Select toggles impedance transformation off and on. Calibration is required to enable impedance transformation.

Specify Impedance by

Toggles between Port and Port Pair.

Port Number

When Specify Impedance by is set to Port, select displays the SELECT PORT dialog box with large easy-to-select buttons. Selecting a port auto-returns to the IMPED. TRANSF. menu.

Port Configuration

Select displays the SELECT PORT CONFIG dialog box with large, easy-to-select buttons. Selecting a port configuration auto-returns to the IMPED. TRANSF. menu.

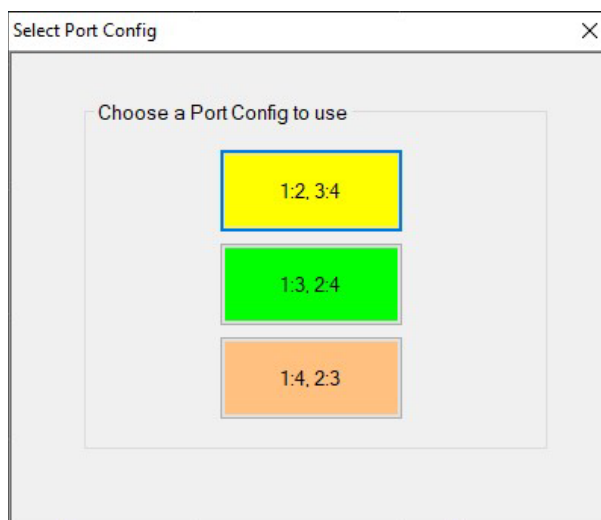


Figure 11-7. SELECT PORT CONFIG Dialog Box

Port Pair

Select displays a SELECT PORT PAIR dialog box with large, easy-to-select buttons. Selecting a port pair auto-returns to the IMPED. TRANSF. menu.

When the port configuration is changed, the port pair shown on the menu will be the default one for that particular Port Configuration. For Port Configuration 1:2,3:4 the default port pair is 1:2 Differential, for 1:3,2:4 the default port pair is 1:3 Differential, and for 1:4,2:3 the default port pair is 1:4 Differential.

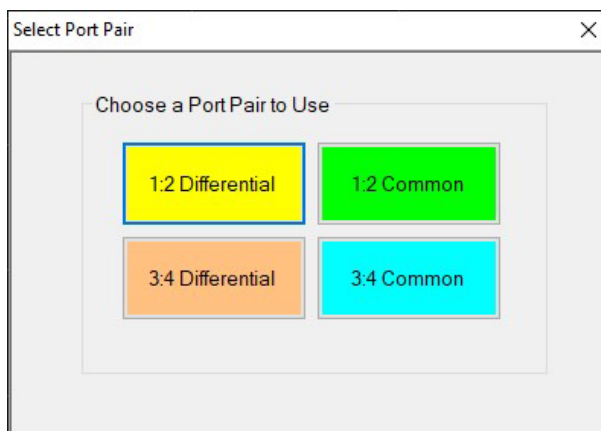


Figure 11-8. Example: SELECT PORT PAIR Dialog Box for Port Configuration 1:2, 3:4

Resistive Term (Ohms)

Select displays the Resistive Term field toolbar and allows the user to define the resistive term for the port pair shown in the menu in Ohms. The default value is 50.000 ohms.



Figure 11-9. Resistive Term Field Toolbar

Reactive Term (j) (Ohms)

Select displays the Reactive Term field toolbar and allows the user to define the reactive (j) term for the port pair shown in the menu in Ohms.



Figure 11-10. Reactive Term Field Toolbar

Port Pair Impedance Setup

Select displays the IMPEDANCE TRANSFORMATION PORT PAIR GLOBAL IMPEDANCE SETUP dialog box, which allows the user to set all the reactive and resistive terms for all the port pairs for a given port configuration at once.

The dialog box is titled "Impedance Transformation Port Pair Global Impedance Setup" and features a close button (X) in the top right corner. The main content area is labeled "1:2, 3:4" and contains four sub-sections arranged in a 2x2 grid:

- 1:2 Differential:** Contains "Resistive Term" and "Reactive Term (j)" fields, both set to 50.000 Ω and 0.000 Ω respectively.
- 1:2 Common:** Contains "Resistive Term" and "Reactive Term (j)" fields, both set to 50.000 Ω and 0.000 Ω respectively.
- 3:4 Differential:** Contains "Resistive Term" and "Reactive Term (j)" fields, both set to 50.000 Ω and 0.000 Ω respectively.
- 3:4 Common:** Contains "Resistive Term" and "Reactive Term (j)" fields, both set to 50.000 Ω and 0.000 Ω respectively.

At the bottom of the dialog box are two buttons: "OK" and "Cancel".

Figure 11-11. Example: IMPEDANCE TRANSFORMATION PORT PAIR GLOBAL IMPEDANCE SETUP Dialog Box for Port Configuration 1:2,3:4

REFERENCE PLANE Menu

A simplified means of performing de-embedding (and embedding in some contexts) can be accomplished using reference plane control. The function of this control is to remove transmission line lengths from the data. By entering a time or distance, this length of line will be removed (negative lengths are allowed to effectively add length). Various dielectrics and the full dispersion choices are available.

The VectorStar VNA supports both per-port and per-trace reference plane extensions, whereas other instruments support only either per-port or per-trace. As a result, if the programming language mode is changed from Native the reference plane control selections may be affected. (e.g., Lightning only supports per-trace reference planes and the HP8510 only supports per-port reference planes).

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Reference Plane | REFERENCE PLANE

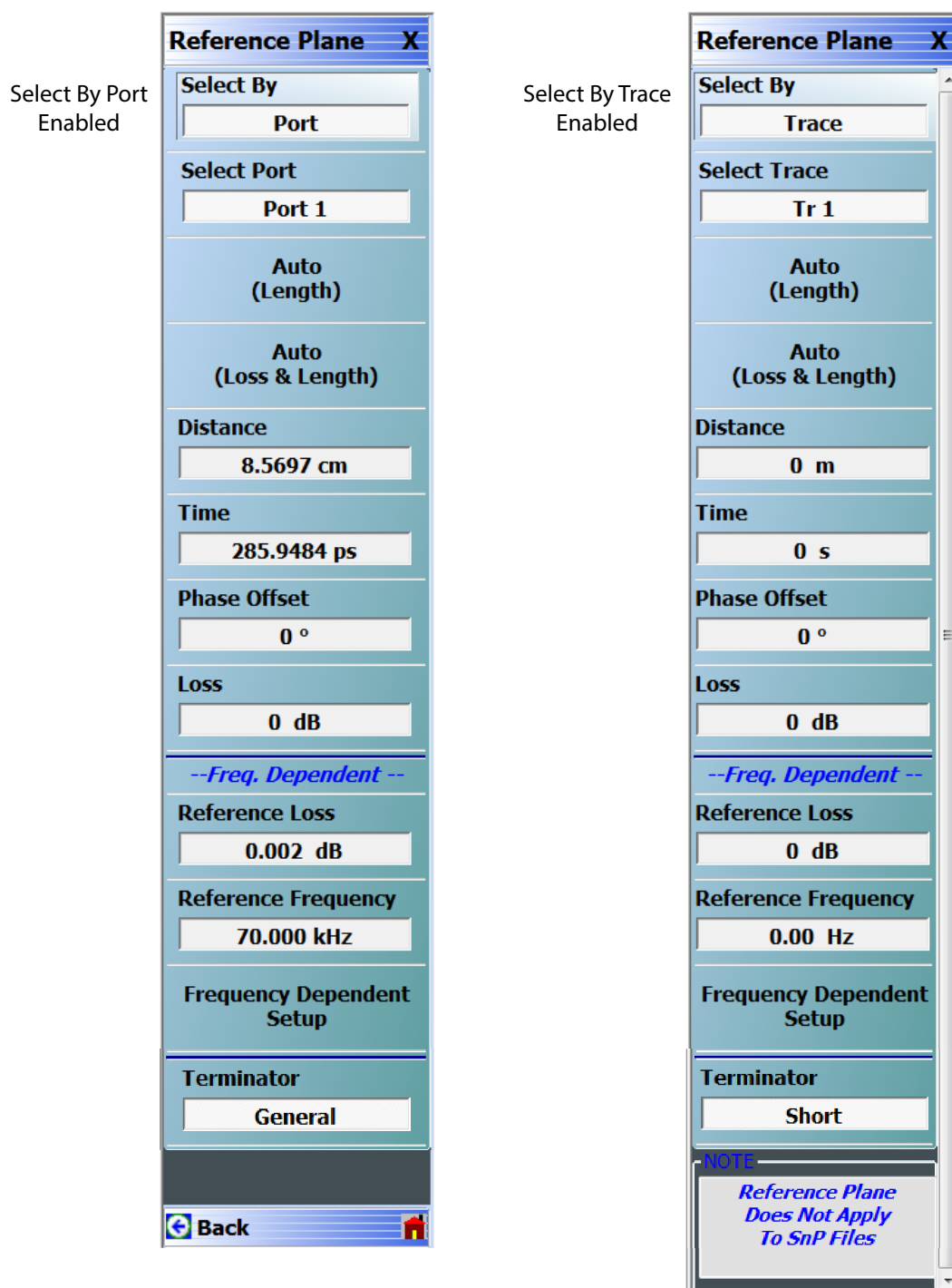


Figure 11-12. REFERENCE PLANE Menu

Button Functionalities when IMDView (Option 44) is Enabled

When IMDView application is ON, the following Reference Plane menu buttons are disabled:

- Select By, Select Port, Auto (Length), Auto (Loss & Length), Distance, Time, Phase Offset, and the Freq. Dependent loss fields (Reference Loss and Reference Frequency)

Select By (Port/Trace)

The Select By toggle button changes between Select Reference Plane By Port and Select Reference Plane By Trace. When the selection is changed, the name of the next button changes as:

- **Select By = Port:** The button below is set to **Select Port**. If Port is selected, reference plane adjustments are on a per-port basis.
- **Select By = Trace:** The button below is set to **Select Trace**. If Trace is selected, reference plane adjustments are on a per-trace basis.

Select Port (Port 1/Port 2)

This button is only present when the Select By button above is set to Port. If present, when the VNA is in 2-Port Mode, select toggles between Port 1 or Port 2. If present, when the VNA is in 4-Port Mode, select displays the SELECT PORT (REFERENCE PLANE) dialog box with large easy-to-select buttons. Selecting a port auto-returns to the REFERENCE PLANE menu.

Select Trace

This button is only present when the Select By button above is set to Trace. If present, the reference plane adjustments available in the buttons and toolbars following can be modified on a per-trace basis. Selecting the button displays the large SELECT TRACE Dialog Box (below) where the trace number can be selected. After a trace is selected, the focus auto-returns to the REFERENCE PLANE menu.



Auto (Length)

The Auto (Length) button automatically extends the test port location by removing the effects of the electrical delay of a device.

Auto (Loss & Length)

When the Auto (Loss & Length) is used, fits are done on both the phase and the magnitude independently. Values for the fit parameters are entered in the appropriate menu fields and the adjustments applied to the trace data.

Distance (Reference Plane)

Select displays the Distance field toolbar. Allows the user to enter a distance in units of km (kilometers), m (meters), cm (centimeters), mm (millimeters), or μm (micrometers).

Distance : 0.0000 m ^ v km m cm mm um X

Time (Reference Plane)

Select displays the Time field toolbar. Allows the user to enter a reference time in units of s (seconds), ms (milliseconds), us (microseconds), ns (nanoseconds), or ps (picoseconds).

Time : 16.6836 ns ^ v s ms us ns ps X

Phase Offset (Degrees) (Reference Plane)

Select displays the Phase Offset field toolbar. Allows the user to enter a phase offset in degrees from -360° (degrees) to $+360^\circ$ in 0.01° increments.

Phase Offset : 5.00 ° ^ v ° X

Loss (dB) (Reference Plane)

Displays the Loss (dB) field toolbar. Allows the user to enter a loss factor in dB.

Loss : 10.0000 dB ^ v dB X

Freq. Dependent Fields**Reference Loss**

Displays current Reference Loss setting in dB. Selecting this field opens the Reference Loss field toolbar.

Reference Loss : 1.0000 dB ^ v

Reference Frequency

Displays current Reference Loss setting in dB. Selecting this field opens the Reference Frequency field toolbar.

Reference Frequency : 3.000000000 GHz ^ v GHz MHz kHz Hz

Frequency Dependent Setup

Opens the FREQUENCY DEPENDENT SETUP (by Port or by Trace) dialog box. This frequency-dependent loss aspect of reference plane extension can be useful for very simplified de-embedding of fixtures or cabling.

- [“FREQUENCY DEPENDENT SETUP Dialog Box” on page 11-16](#)

Terminator

Opens the SELECT TERMINATOR TYPE (for Port or for Trace) dialog box.

- [“SELECT TERMINATOR TYPE Dialog Box” on page 11-17](#)

FREQUENCY DEPENDENT SETUP Dialog Box

Depending on whether Select By Port or Select By Trace is selected on the REFERENCE PLANE menu, upon clicking Frequency Dependent Setup button, the appropriate FREQUENCY DEPENDENT SETUP (by Port or by Trace) dialog appears.

- MAIN | Measurement | MEASUREMENT | Reference Plane | REFERENCE PLANE | Frequency Dependent Setup | FREQUENCY DEPENDENT SETUP

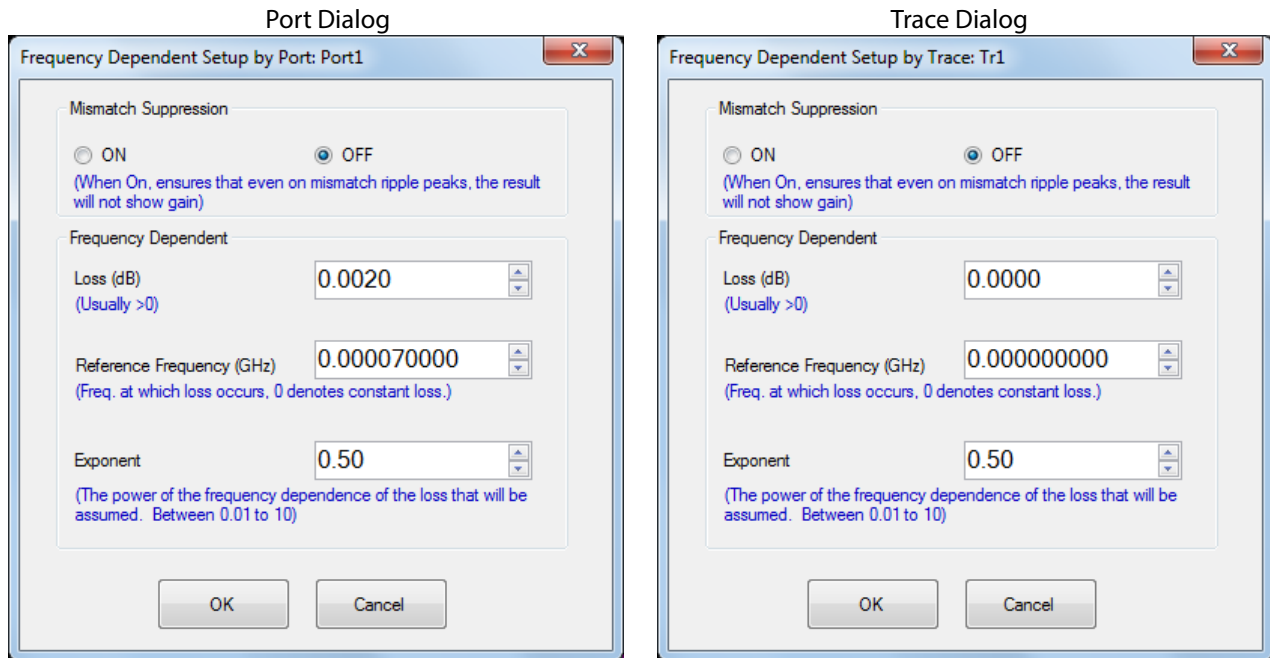


Figure 11-13. FREQUENCY DEPENDENT SETUP Dialog

Mismatch Suppression

When Mismatch Suppression is activated, the fitting process is modified so any ripple peaks will stay below the nominal initial value of the parameter in question. The concept is to limit that amount of loss correction so that no ripple peaks in the adjusted result exceed the initial (lowest loss) value of the parameter. If the DUT has very low loss at low frequency, not suppressing the effect of mismatch-induced ripple could result in an adjusted parameter value above 0 dB which may be objectionable in some applications.

Frequency Dependent Settings:

Loss

Usually greater than zero (but can be negative for gain). This is the loss at some known frequency and then a loss at other frequencies will be calculated using the frequency raised to the 'exponent' power.

Reference Frequency

Frequency at which the loss specified above is defined. The loss at other frequencies is scaled by $(\text{frequency}/(\text{reference frequency}))^n$ where n is the exponent specified next.

Exponent

Exponent has a default value of 0.5 which tends to describe loss in coaxial lines and in coplanar waveguide rather well for many materials. The exponent may be closer to 1 for microstrip structures and other values for other geometries. The allowed range for the exponent is 0.01 to 10 but it is fairly rare to get outside the range of 0.25 to 2.

SELECT TERMINATOR TYPE Dialog Box

Depending on whether Select By Port or Select By Trace is selected on the REFERENCE PLANE menu, upon clicking Terminator button, the appropriate SELECT TERMINATOR TYPE (for Port or for Trace) dialog appears.

- MAIN | Measurement | MEASUREMENT | Reference Plane | REFERENCE PLANE | Terminator | SELECT TERMINATOR TYPE

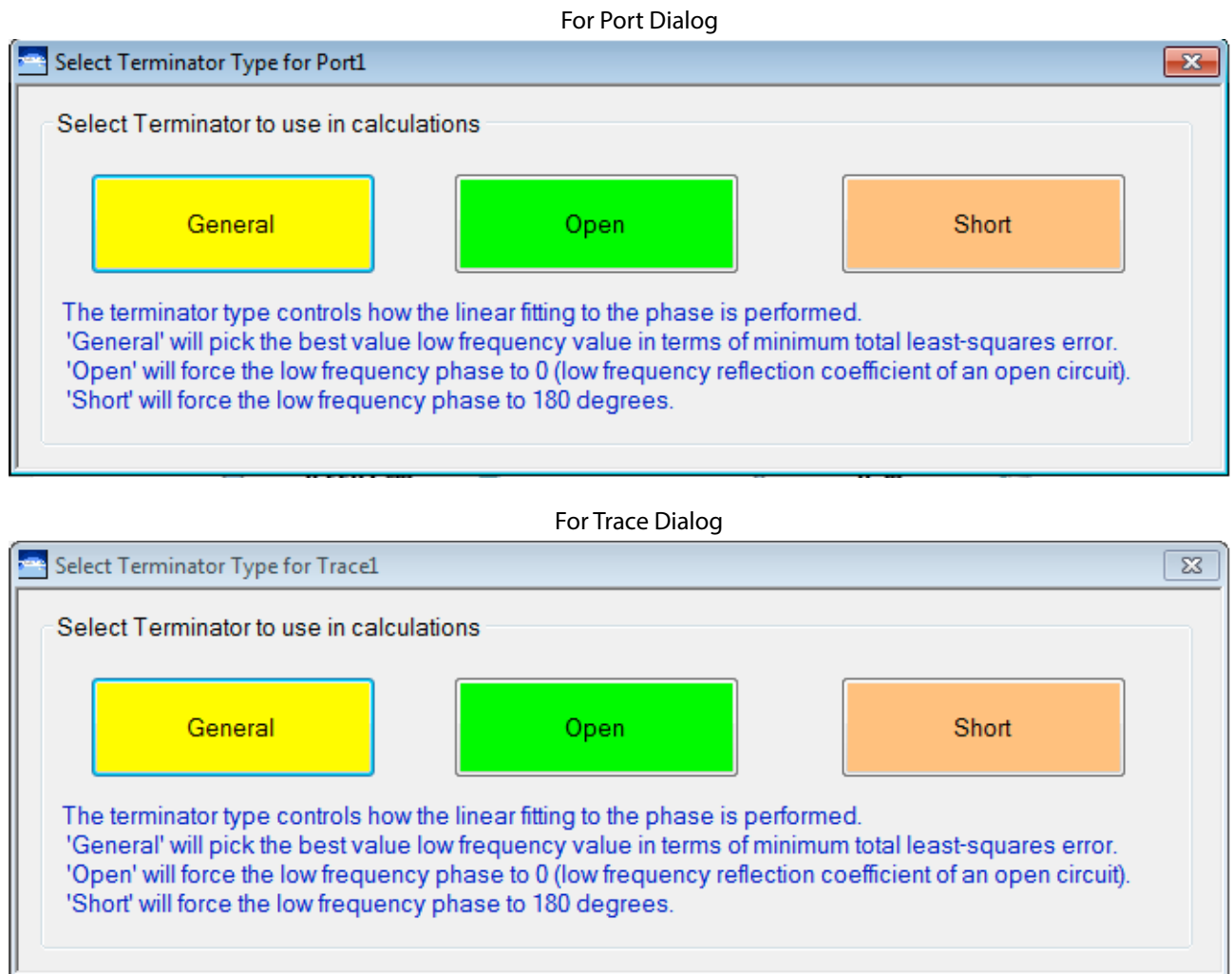


Figure 11-14. SELECT TERMINATOR TYPE Dialog

Each port and each trace has its own terminator.

OPTICAL MEASUREMENT Menu

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Perform Optical Measurements | OPTICAL MEAS.

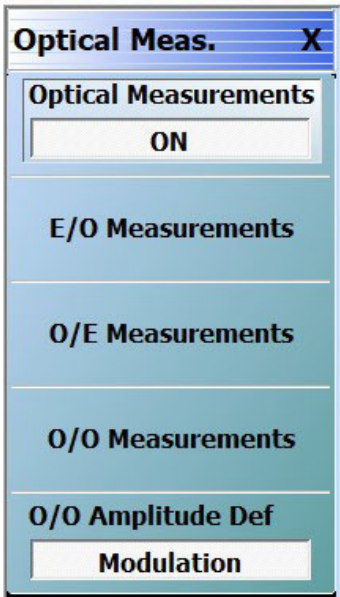


Figure 11-15. OPTICAL MEAS. Menu

Note

Depending on the EO_OE_OO status in the CHX file, and once the E/O or O/E or O/O measurement setup through the respective dialog is complete, the Channel Status on the display will indicate an O/E, E/O, or O/O measuring state as shown in [Figure 11-16](#).

O/O Amplitude Def

- Toggle button selects between Modulation and Optical Power. Only available for O/O Measurements. This allows a choice in the domain of reference (in terms of sideband amplitude in the modulation sense or inferred differences in net optical power). There is a 2x difference in dB terms.

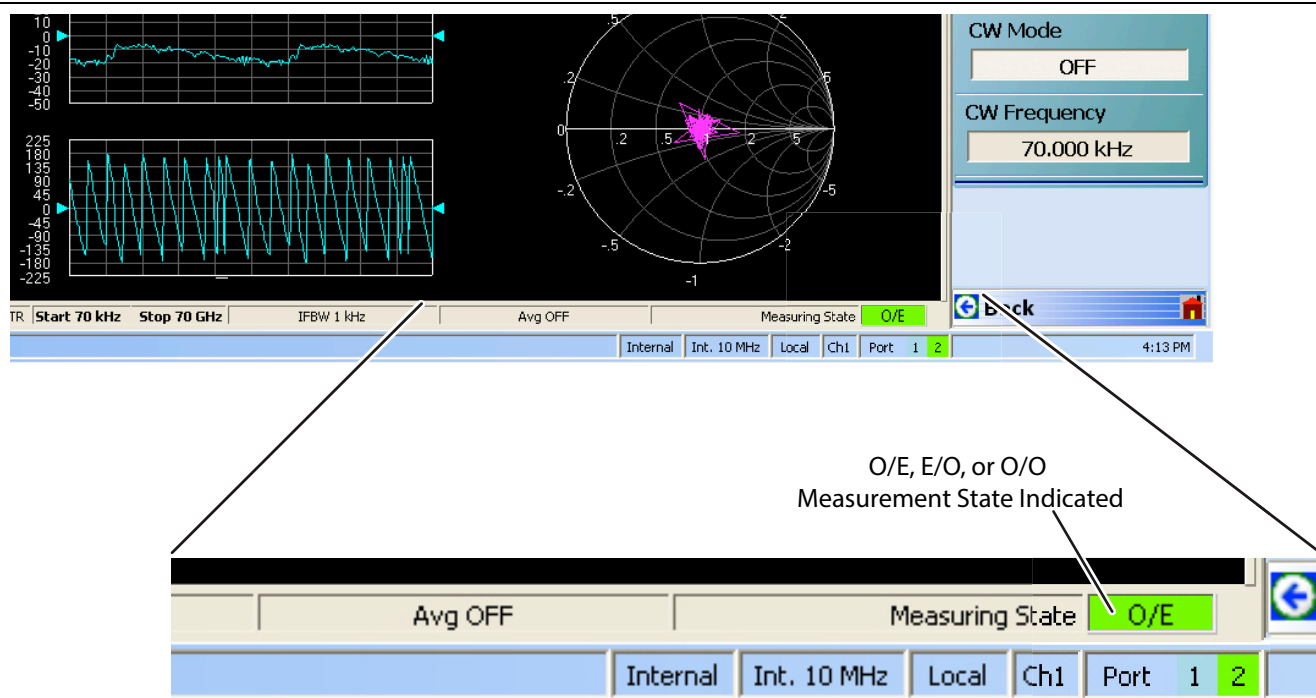


Figure 11-16. O/E – E/O – O/O Measuring State Indication

2-Port E/O Measurement Dialog Box

Upon clicking E/O Measurements button, the 2-PORT E/O MEASUREMENT dialog appears.

The E/O MEASUREMENT dialog enables the user to determine the microwave frequency response characteristics of E/O devices (such as E/O modulators).

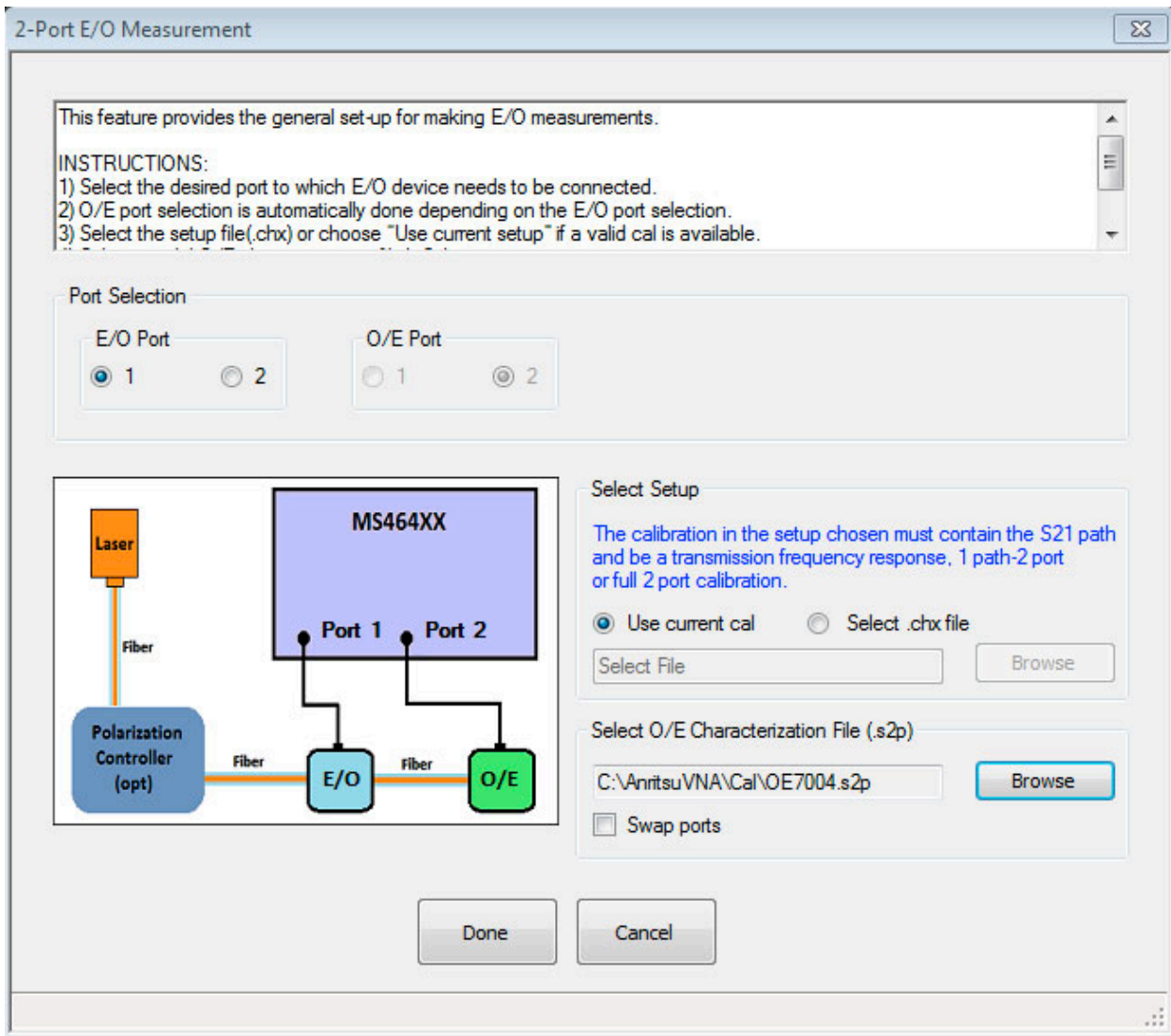


Figure 11-17. 2-PORT E/O MEASUREMENT Dialog

Port Selection Radio Buttons

- Select the desired port to which E/O device needs to be connected. The O/E port selection is automatically done depending on the E/O port selection.

Select Setup

- Use current calibration setup or browse to CHX file and select. The option to use the current calibration will be enabled only if a valid calibration exists.

Select O/E Characterization File (.s2p)

- Browse to and select .s2P file.

Swap Ports

- Check the Swap Ports option if the S-parameters assignment present in the file needs to be swapped.

On clicking Done button, the calibration in the selected CHX file is loaded, if necessary, and the calibration error terms are modified using the .s2p file data.

2-Port O/E Measurement Dialog Box

Upon clicking the O/E Measurements button, the 2-PORT O/E MEASUREMENT dialog appears.

The O/E MEASUREMENT dialog enables the user to determine the microwave frequency response characteristics of O/E devices (such as O/E detectors and receivers).

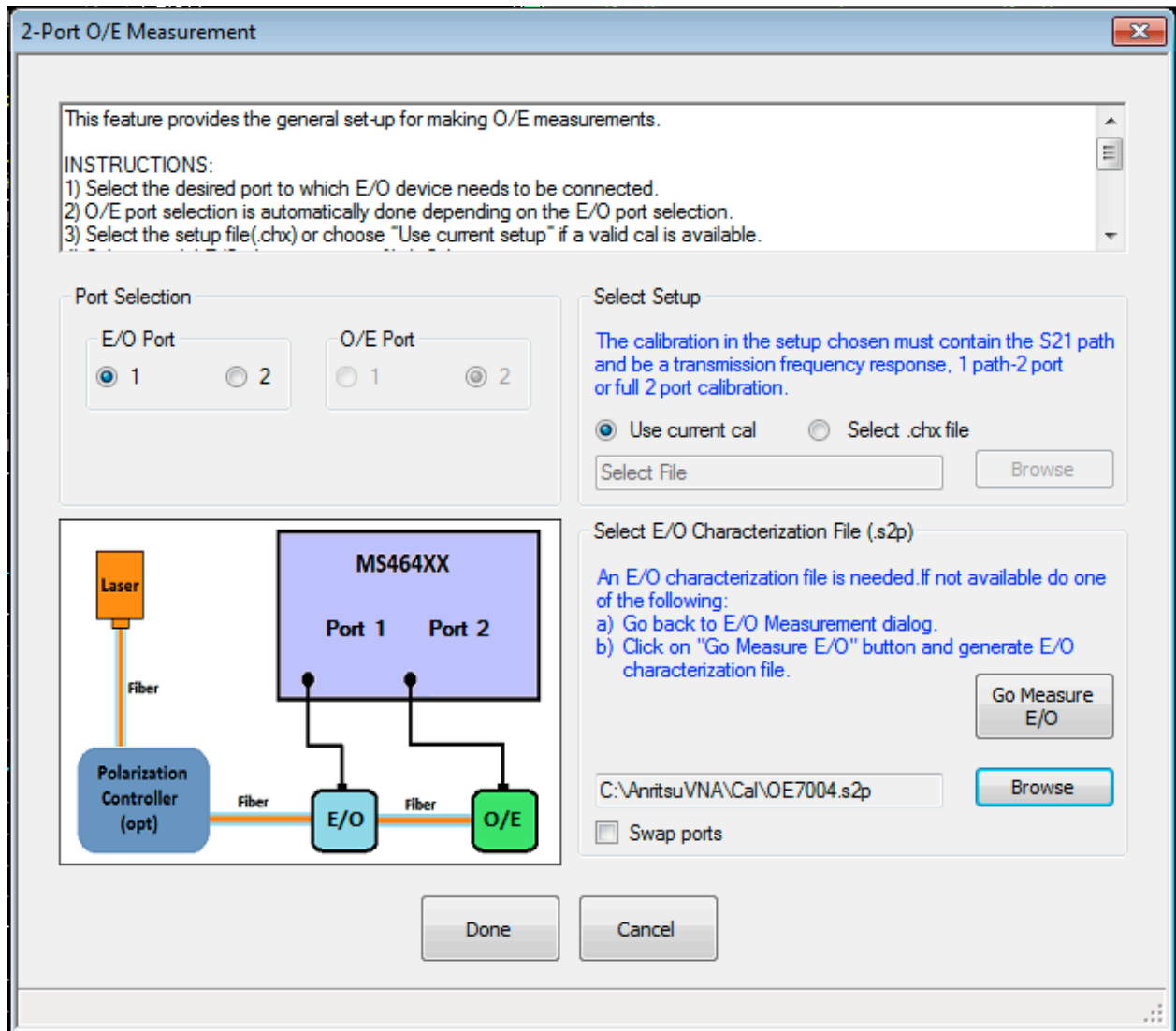


Figure 11-18. 2-PORT O/E MEASUREMENT Dialog

Port Selection Radio Buttons

- Select the desired port to which E/O device needs to be connected. The O/E port selection is automatically done depending on the E/O port selection.

Select Setup

- Use current calibration setup or browse to CHX file and select. The option to use the current calibration will be enabled only if a valid calibration exists.

Select E/O Characterization File (.s2p)

- Browse to and select a valid s2p file. If an E/O file is not available, do one of the following:
- Go back to the Optical Meas. menu, select E/O MEASUREMENT dialog and after performing an E/O measurement, save the data in .snp format.

-OR-

- Use the Go Measure E/O button to generate a .sNp file:

Go Measure E/O Button

- Click the Go Measure E/O button (after selecting a valid port configuration and CHX file), which opens the MEASURE E/O dialog shown in [Figure 11-20](#). In this dialog, using the reference O/E file selected, the E/O data will be saved in a .s2p file format. Now this saved E/O file is available for the O/E measurement in the parent dialog ([Figure 11-18](#)).

Swap Ports

- Check the Swap Ports option if the S-parameters assignment present in the file needs to be swapped.

Done/Cancel

- On clicking the Done button, the calibration in the selected CHX file is loaded and the calibration error terms are modified using the .s2p file data.

2-Port O/O Measurement Dialog Box

Upon clicking the O/O Measurements button, the 2-PORT O/O MEASUREMENT dialog appears.

The O/O MEASUREMENT dialog enables the user to determine the microwave frequency response characteristics of certain purely optical (O/O) components (couplers, amplifiers, filters, etc.). Although a fiber is shown as the only element between the detector and modulator in [Figure 11-19](#), an optical DUT may be there for O/O measurements.

The O/O measurement is somewhat like the E/O and O/E measurement setups in series; both the detector and the modulator must be de-embedded to leave the reference planes in the optical domain. As suggested by [Figure 11-19](#), if both .s2p files exist, their file names can be entered directly and the de-embedding will ensue.

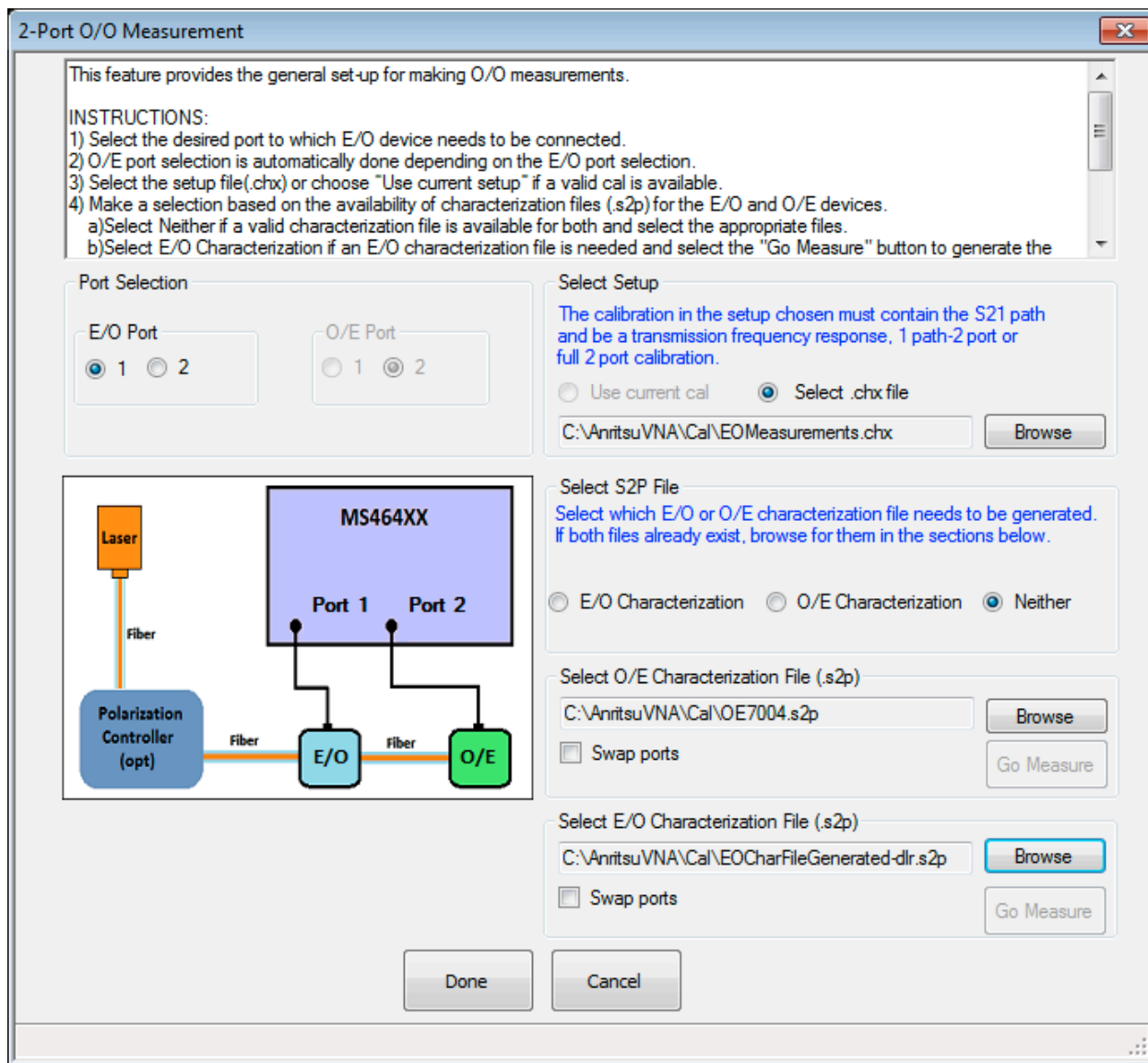


Figure 11-19. 2-PORT O/O MEASUREMENT Dialog

When measuring O/O devices, the characteristics of both O/E and E/O devices must be known. If a file for one does not already exist, the GO MEASURE E/O dialog shown in [Figure 11-20](#) can help in doing the intermediate measurement with the help of the file for the other device (usually a calibration O/E device such as the MN4765X). At least one converter must have a .s2p file to do the measurement. This Go Measure process allows one to enter the known device's file and to define the file name for the newly created file.

Note that the .s2p file name for the known device is assumed to be the same as that used on the main O/O dialog as this device normally doesn't change between Measure and O/O configuration steps. If a different device is to be used, the file name on the main O/O dialog can simply be changed after the Measure process is completed.

Port Selection Radio Buttons

- Select the desired port to which E/O device needs to be connected. The O/E port selection is automatically done depending on the E/O port selection.

Select Setup

- Use current calibration setup or browse to CHX file and select. The option to use the current calibration will be enabled only if a valid calibration exists.

Select S2P File

Make a selection based on the availability of characterization files (.s2p) for the E/O and O/E devices.

- Select **Neither** if a valid characterization file is available for both, then select the appropriate files.
- Select **E/O Characterization** if an E/O characterization file is needed and select the **Go Measure** button.
- Select **O/E Characterization** if an O/E characterization file is needed and select the **Go Measure** button.

Go Measure Buttons

- If the .s2p file does not exist, clicking this button opens the MEASURE E/O (or MEASURE O/E) dialog shown in [Figure 11-20](#).

Here, one can navigate and select the O/E file, then create a name for the E/O .s2p file to be created when Measure Device is clicked.

Swap Ports

- Check the Swap Ports option if the S-parameters assignment present in the file needs to be swapped.

Done/Cancel

On clicking the Done button (shown in [Figure 11-19](#)), the calibration in the selected CHX file is loaded and the calibration error terms are modified using the .s2p file data.

2-Port MEASURE E/O Dialog Box

On either the O/E Measurement or O/O MEASUREMENT dialog, clicking on the Go Measure button displays the MEASURE E/O dialog shown in [Figure 11-20](#).

The calibration in the selected CHX file is loaded and the S-parameters measured with the loaded calibration will be modified by the reference O/E characterization data when Measure Device is clicked. This modified S-parameter data is saved as a .s2p file in the location designated for E/O data.

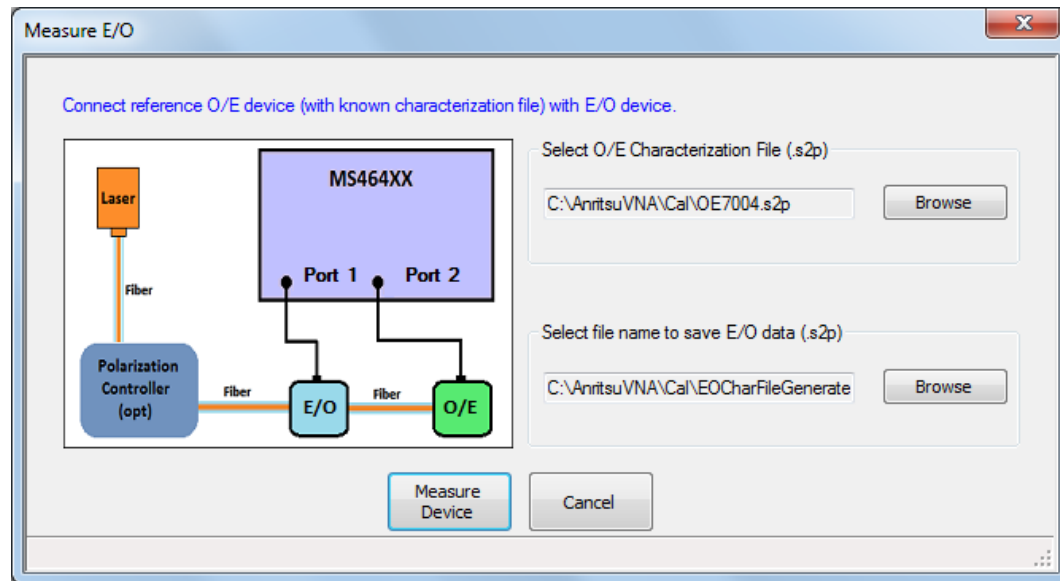


Figure 11-20. MEASURE E/O Dialog

Connect Reference O/E Device (that has a known characterization file) With E/O Device

- After connection, select O/E file and enter or select E/O file:

Select O/E Characterization File (.s2p)

- Browse to and select the reference O/E characterization file (.s2p).

Select File Name to Save E/O Data (.s2p)

- Browse to the desired location, then enter or select an existing (.s2p) file name for the E/O characterization file that will be generated.

Click on Measure Device

- After saving the E/O data, the user is returned to the parent O/E MEASUREMENT or O/O MEASUREMENT dialog to complete the measurement.

4-PORT E/O MEASUREMENT Dialog Box

Upon clicking E/O Measurements button, the 4-PORT E/O MEASUREMENT dialog appears.

The E/O MEASUREMENT dialog enables the user to determine the microwave frequency response characteristics of E/O devices (such as E/O modulators).

4-Port E/O Measurement

This feature provides the general set-up for making 4-port E/O measurements.

INSTRUCTIONS:

- 1) Select the configuration from the four different options available.
- 2) Select the desired ports to which E/O device and O/E device need to be connected.
[One or two checks are allowed based on the configuration selected.]

Schematic Diagram: A diagram showing a Laser connected via Fiber to a Polarization Controller (opt). The Polarization Controller is connected via Fiber to an E/O device, which is then connected via Fiber to an O/E device. The E/O device is labeled MS464XX/MN and has four ports, with ports 1 and 3 highlighted in red.

Select Setup

Case 1: Must be a full 2, 3 or 4 port cal, 1 path 2 port cal or a Transmission Frequency Response cal.
Cases 2 and 3: Must be a full 3 port or full 4 port cal.
(and port numbers selected must match with that in the file)
Case 4: Must be a full 4 port cal.

☐ Use current cal ☒ Select .chx file

Select File Browse

Configuration

Select any one of the below four cases available.

Case 1: ☒ Single ended E/O - Single ended O/E
Case 2: ☐ Differential E/O - Single ended O/E
Case 3: ☐ Single ended E/O - Differential O/E
Case 4: ☐ Differential E/O - Differential O/E

Port Selection

One or two checks are allowed based on the configuration selected.

E/O Port(s)
☒ 1 ☐ 2 ☐ 3 ☐ 4

O/E Port(s)
☒ 1 ☐ 2 ☐ 3 ☐ 4

Select O/E Characterization File (.snp)
Select File Browse

☐ Swap ports

Done Cancel

Figure 11-21. 4-PORT E/O MEASUREMENT Dialog

Configuration

- Select the configuration from the four different options available.

Port Selection

Select the desired ports to which E/O device and O/E device need to be connected. (One or two checks are allowed based on the configuration selected. The O/E ports are also selectable but the current E/O selection numbers will be grayed out and unavailable.)

Select Setup

- Use current calibration setup or browse to CHX file and select. The option to use the current calibration will be enabled only if a valid calibration exists.

Select O/E Characterization File (.sNp)

- Select a valid O/E characterization file (.s2p if the O/E device is single-ended, .s3p/.s4p if the O/E device is differential).
- For case 4, a dominant path (in the case of asymmetric DUTs) is considered to run from the lower numbered E/O port to the O/E port (and another dominant path between the remaining ports).
- Reconnect the DUT if necessary.

Swap Ports

- In the case of a .s2p file, use the **Swap Ports** checkbox option if the S-parameters assignment present in the file need to be swapped.
- In the case of a .s3p file: 1:2 and 2:3 paths are dominant ($S_{21} > S_{12}$ and $S_{23} > S_{32}$)
- In the case of a .s4p file: 1:2 and 3:4 paths are dominant ($S_{21} > S_{12}$ and $S_{43} > S_{34}$)

Reassign Ports

- Use the port reassignment dialog by clicking on the Reassign Ports button if the dominant paths are different from the above.

Done/Cancel

- Upon clicking the **Done** button, the calibration in the selected CHX file is loaded and the calibration error terms are modified using the O/E characterization file data.

4-PORT O/E MEASUREMENT Dialog Box

Upon clicking O/E Measurements button, the 4-PORT O/E MEASUREMENT dialog appears.

The O/E MEASUREMENT dialog enables the user to determine the microwave frequency response characteristics of O/E devices (such as O/E detectors and receivers).

4-Port O/E Measurement

This feature provides the general set-up for making 4-port O/E measurements.

INSTRUCTIONS:

- 1) Select the configuration from the four different options available.
- 2) Select the desired ports to which E/O device and O/E device need to be connected.
[One or two checks are allowed based on the configuration selected.]

Schematic Diagram:

The diagram shows a Laser connected via Fiber to a Polarization Controller (opt). The Polarization Controller is connected via Fiber to an E/O device. The E/O device is connected via Fiber to an O/E device. The E/O and O/E devices are connected to the MS464XX/MN device at ports 1 and 1.

Configuration

Select any one of the below four cases available.

Case 1: ☒ Single ended E/O - Single ended O/E

Case 2: ☐ Differential E/O - Single ended O/E

Case 3: ☐ Single ended E/O - Differential O/E

Case 4: ☐ Differential E/O - Differential O/E

Port Selection

One or two checks are allowed based on the configuration selected.

E/O Port(s)

☒ 1 ☐ 2 ☐ 3 ☐ 4

O/E Port(s)

☒ 1 ☐ 2 ☐ 3 ☐ 4

Select Setup

Case 1: Must be a full 2, 3 or 4 port cal, 1 path 2 port cal or a Transmission Frequency Response cal.

Cases 2 and 3: Must be a full 3 port or full 4 port cal.
(and port numbers selected must match with that in the file)

Case 4: Must be a full 4 port cal.

☐ Use current cal ☒ Select .chx file

Select File Browse

Select E/O Characterization File (.snp)

An E/O characterization file is needed. If not available do one of the following:

- a) Go back to E/O Measurement dialog.
- b) Click on "Go Measure E/O" button and generate E/O characterization file.

Select File Browse ☐ Swap ports

Go Measure E/O

Done Cancel

Figure 11-22. 4-PORT O/E MEASUREMENT Dialog

Configuration

- Select the configuration from the four different options available.

Port Selection

- Select the desired ports to which E/O device and O/E device need to be connected. One or two checks are allowed based on the configuration selected. The O/E ports are also selectable but the current E/O selection numbers will be greyed out and unavailable.

Select Setup

- Use current calibration setup or browse to CHX file and select. The option to use the current calibration will be enabled only if a valid calibration exists.

Select E/O Characterization File (.sNp)

- Select a valid E/O characterization file (.s2p if the E/O device is single-ended, .s3p/.s4p if the E/O device is differential).
- For Case 4 Configuration, a dominant path (in the case of asymmetric DUTs) is considered to run from the lower numbered E/O port to the O/E port (and another dominant path between the remaining ports).
- Reconnect the DUT if necessary.

Go Measure E/O Button

- If an E/O file is not available do one of the following:
 - Go back to E/O Measurement dialog and after performing E/O measurement, save the data in .sNp format.
 - OR-
 - Use the "Go Measure E/O" button to generate a .sNp file:
Click the Go Measure E/O button (after selecting a valid port configuration and CHX file), which opens the Measure E/O dialog shown in [Figure 11-24](#). In this dialog, using the reference O/E file selected, the E/O data will be saved in a file format (.s2p/.s3p/.s4p – depending on the configuration selected). Now this saved E/O file is available for the O/E measurement in the parent dialog ([Figure 11-22](#)).

Swap Ports

- In the case of a .s2p file, use the Swap Ports checkbox option if the S-parameters assignment present in the file need to be swapped.
- In the case of a .s3p file: 1:2 and 2:3 paths are dominant ($S_{21} > S_{12}$ and $S_{23} > S_{32}$)
- In the case of a .s4p file: 1:2 and 3:4 paths are dominant ($S_{21} > S_{12}$ and $S_{43} > S_{34}$)

Reassign Ports

- Use the port reassignment dialog by clicking on the Reassign Ports button if the dominant paths are different from the above.

Done/Cancel

- Click "Done" to perform O/E measurement.

On clicking the Done button, the calibration in the selected CHX file is loaded and the calibration error terms are modified using the O/E characterization file data.

4-PORT O/O MEASUREMENT Dialog Box

Upon clicking O/O Measurements button, the 4-PORT O/O MEASUREMENT dialog appears.

The O/O MEASUREMENT dialog enables the user to determine the microwave frequency response characteristics of certain purely optical (O/O) components (couplers, amplifiers, filters, etc.). Although a fiber is shown as the only element between the detector and modulator in [Figure 11-23](#), some optical DUT may be there for O/O measurements.

The O/O measurement is somewhat like the E/O and O/E measurement setups in series; both the detector and the modulator must be de-embedded to leave the reference planes in the optical domain. As suggested by dialog, if both .sNp files exist, their file names can be entered directly and the de-embedding will proceed.

4-Port O/O Measurement

This feature provides the general set-up for making 4-port O/O measurements.

INSTRUCTIONS:
 1) Select the configuration from the four different options available.
 2) Select the desired ports to which E/O device and O/E device need to be connected.
 One or two checks are allowed based on the configuration selected.

Configuration
 Select any one of the below four cases available.

Case 1: ☒ Single ended E/O - Single ended O/E
 Case 2: ☐ Differential E/O - Single ended O/E
 Case 3: ☐ Single ended E/O - Differential O/E
 Case 4: ☐ Differential E/O - Differential O/E

Port Selection
 One or two checks are allowed based on the configuration selected.

E/O Port(s)
☒ 1 ☐ 2 ☐ 3 ☐ 4

O/E Port(s)
☒ 1 ☐ 2 ☐ 3 ☐ 4

Select Setup
 Case 1: Must be a full 2, 3 or 4 port cal, 1 path 2 port cal or a Transmission Frequency Response cal.
 Cases 2 and 3: Must be a full 3 port or full 4 port cal.
 (and port numbers selected must match with that in the file)
 Case 4: Must be a full 4 port cal.

☐ Use current cal ☒ Select .chx file

Select File

Select S2P File
 Select which characterization file needs to be generated. If both files already exist, browse for them in the sections below.

☐ E/O Characterization File ☐ O/E Characterization File ☒ Neither

O/E Characterization File (.sNp)
 Select File
☐ Swap Ports

E/O Characterization File (.sNp)
 Select File
☐ Swap Ports

Figure 11-23. 4-PORT O/O MEASUREMENT Dialog

When measuring O/O devices, the characteristics of both O/E and E/O devices must be known. If a file for one does not already exist, the MEASURE E/O dialog (or MEASURE O/E dialog) shown in [Figure 11-24](#) can help in doing the intermediate measurement with the help of the file for the other device (usually a calibration O/E device such as the MN4765X). At least one converter must have a .s2p file to do the measurement. This Go Measure process allows one to enter the known device's file and to define the file name for the newly created file.

Configuration

- Select any one of the four configuration cases available.

Port Selection

- Select a valid port configuration. One or two checks are allowed based on the Configuration selected. The O/E ports are also selectable but the current E/O selection numbers will be greyed out and unavailable.

Select Setup

- Use current calibration setup or browse to CHX file and select. The option to use the current calibration will be enabled only if a valid calibration exists.

Select Characterization File (.sNp)

- Select which, if any, characterization file needs to be generated. Select at least 1 characterization file. The other file can be generated by clicking the associated Go Measure button.
- For Case 4 Configuration, a dominant path (in the case of asymmetric DUTs) is considered to run from the lower numbered E/O port to the O/E port (and another dominant path between the remaining ports).
- Reconnect the DUT if necessary.

Go Measure Button

- If the .sNp file does not exist, clicking this button opens the Measure E/O (or Measure O/E) dialog shown in [Figure 11-24](#).

Here, one can navigate and select the O/E file, then create a name for the E/O .sNp file to be created when Measure Device is clicked.

Swap Ports

- In the case of a .s2p file, use the Swap Ports checkbox option if the S-parameters assignment present in the file need to be swapped.
- In the case of a .s3p file: 1:2 and 2:3 paths are dominant ($S_{21} \leftrightarrow S_{12}$ and $S_{23} \leftrightarrow S_{32}$)
- In the case of a .s4p file: 1:2 and 3:4 paths are dominant ($S_{21} \leftrightarrow S_{12}$ and $S_{43} \leftrightarrow S_{34}$)

Reassign Ports

- Use the port reassignment dialog by clicking on the Reassign Ports button if the dominant paths are different from the above.

Done/Cancel

- On clicking the Done button, the calibration in the selected .CHX file is loaded and the calibration error terms are modified using the O/E characterization file data.

4-Port MEASURE E/O or O/E Dialog Boxes

On the parent O/O MEASUREMENT dialog, clicking on the Go Measure button displays the MEASURE E/O (or MEASURE O/E) dialog shown in Figure 11-24.

The calibration in the selected CHX file is loaded and the S-parameters measured with the loaded calibration will be modified by the reference O/E characterization data when Measure Device is clicked. This modified S-parameter data is saved as a .snp file in the location designated for E/O data.

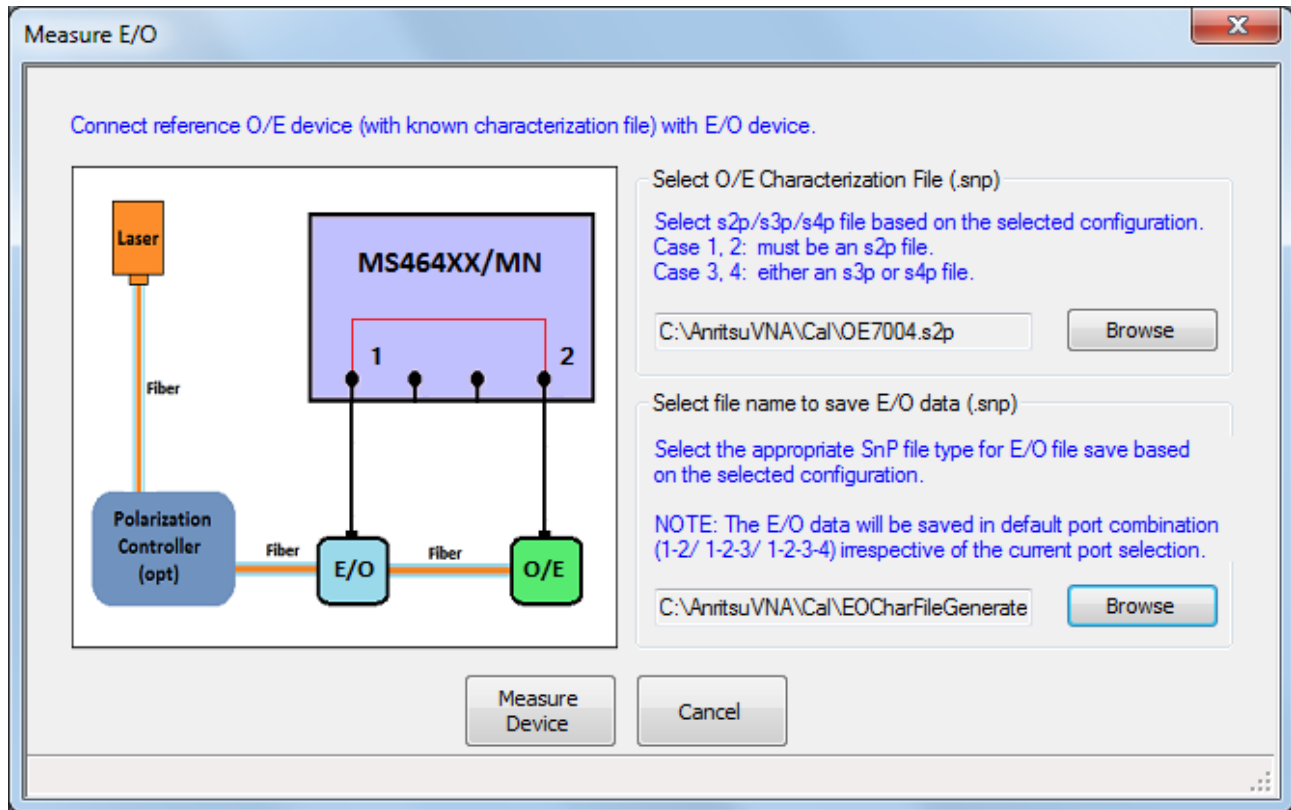


Figure 11-24. MEASURE E/O Dialog – 4-Port

Connect Reference O/E Device (that has a known characterization file) With E/O Device

- After connected, select an O/E file, then enter or select an E/O file:

Select O/E Characterization File (.snp)

- Browse to and select the reference O/E characterization file (.s2p/.s3p/.s4p – depending on the configuration selected).

Select file name to save E/O data (.snp).

- Browse to the desired location, then enter or select an existing file name (.s2p/.s3p/.s4p – depending on the configuration selected) for the E/O characterization file that will be generated.

Click on Measure Device

- After saving the E/O data, the user is returned to the parent O/O Measurement dialog to complete the O/O measurement.

PROCESSING ORDER Menu

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Post-Processing Order | PROCESSING ORDER

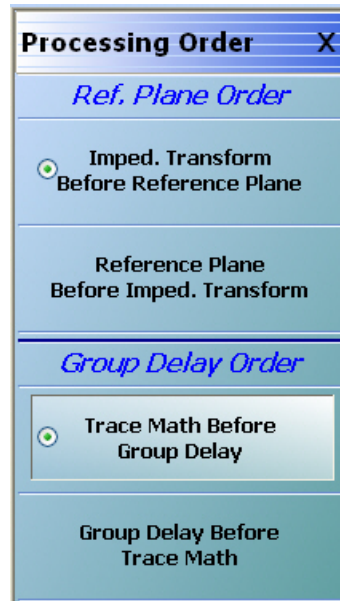


Figure 11-25. PROCESSING ORDER Menu

Reference Plane Order Button Selection Group

The two buttons in the Reference Plane area of the PROCESSING ORDER menu form a button group where selection of one button de-selects the other button.

Imped. Transform Before Reference Plane

Select sets the processing order to first process the impedance transformation and then process the reference plane data. Click **Back** to return to the MEASUREMENT menu.

Reference Plane Before Imped. Transform

Select sets the processing order to first process the reference plane data and then process the impedance transformation. Click **Back** to return to the MEASUREMENT menu.

Group Delay Order Button Selection Group

The two buttons in the Group Delay area of the PROCESSING ORDER menu form a button group where selection of one button de-selects the other button.

Trace Math Before Group Delay

Select sets the processing order to first process the trace math data and then process the group delay data. Click **Back** to return to the MEASUREMENT menu.

Group Delay Before Trace Math

Select sets the processing order to first process the group delay data and then process the trace math data. Click **Back** to return to the MEASUREMENT menu.

EMBEDDING Menu

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Edit Embed/De-embed | EMBEDDING

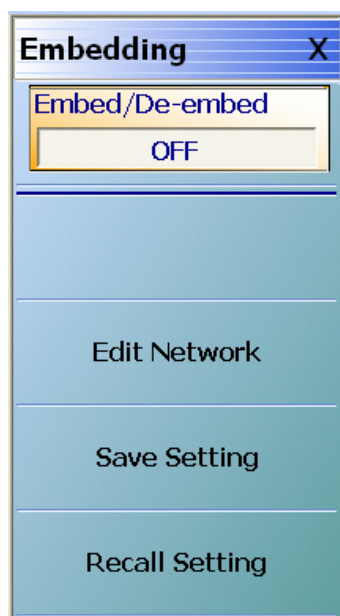


Figure 11-26. EMBEDDING Menu

Embed/De-Embed (Off/On)

Toggles embedding/de-embedding off and on.

If calibration has not been applied, and a toggle to ON is attempted, a **Not Allowed** warning message is displayed.

Edit Network (Embedding)

Select displays the EDIT EMBEDDING/DE-EMBEDDING (2 Port DUT) dialog box.

- [“EDIT EMBEDDING/DE-EMBEDDING \(2 Port DUT\) Dialog Box” on page 11-35](#)

Save Setting (Embedding)

Select displays the SAVE AS (Embed/De-Embed EDL File) dialog box.

- [“SAVE AS \(EMBED/DE-EMBED EDL FILE\) Dialog Box” on page 11-39](#)

Recall Setting (Embedding)

Select displays the OPEN (Embed/De-Embed EDL File) dialog box.

- [“OPEN \(EMBED/DE-EMBED EDL File\) Dialog Box” on page 11-40](#)

EDIT EMBEDDING/DE-EMBEDDING (2 Port DUT) Dialog Box

Previous

- “[EMBEDDING Menu](#)” on page 11-34

Navigation

- MAIN | Measurement | MEASUREMENT | Edit Embed/De-embed | EMBEDDING | Edit Network | EDIT EMBEDDING/DE-EMBEDDING (DUT TYPE) Dialog Box

Figure 11-27. EDIT EMBEDDING/DE-EMBEDDING (DUT Type) Dialog Box

Overview

The dialog box allows user setup of the embedding/de-embedding for the DUT. The available parameters for each dialog box area are described below.

VNA Port Configuration

The available port list depends if the VNA is in 2-Port Mode or in 4-Port Mode. Port 3 and/or Port 4 are only available if the VNA is in 4-Port Mode:

- Port 1
- Port 2
- Port 3
- Port 4
- Ports 1-2 (and 3-4)
- Ports 1-2 (and 4-3)
- Ports 1-3 (and 2-4)
- Ports 1-3 (and 4-2)
- Ports 1-4 (and 2-3)
- Ports 1-4 (and 3-2)
- Ports 2-3 (and 1-4)
- Ports 2-3 (and 4-1)
- Ports 2-4 (and 1-3)
- Ports 2-4 (and 3-1)
- Ports 3-4 (and 1-2)
- Ports 3-4 (and 2-1)

Embedding/De-embedding Radio Buttons

The configuration can be set to either embedding or de-embedding.

- Embedding
- De-embedding

Create 2 Port Network

Allows user selection of one of four types 2-Port Networks:

- L Circuit
- C Circuit
- R Circuit
- Trans. (Transmission) Line
- S2P File

Once an option above has been selected, other sub-options, described in the sections below, are available.

L Circuit Selected in Create 2 Port Network

If L Circuit is selected above in Create 2 Port Network, the L Circuit area appears with the following options:

- Radio button selections for L(S) or L(P)
- Input field for Inductance (nH)

C Circuit Selected in Create 2 Port Network

If C Circuit is selected above in Create 2 Port Network, the C Circuit area appears with the following options:

- Radio button selections for C(S) or C(P)
- Input field for Capacitance (pF)

R Circuit Selected in Create 2 Port Network

If R Circuit is selected above in Create 2 Port Network, the R Circuit area appears with the following options:

- Radio button selections for R(S) or R(P)

- Input field for Resistance (Ohms)

Trans. Line Circuit Selected in Create 2 Port Network

If Trans. Line is selected above in Create 2 Port Network, the Transmission Line area appears with the following options:

- Input field for Impedance (Ohms)
- Input field for Length (mm) or Calculator icon
 - The transmission line length can be directly input in millimeters.
 - If the Calculator icon is selected, the AIR EQUIVALENT LENGTH CONVERSION (from ps to mm) dialog appears. Enter the length in ps, enter dielectric constant, calculate equivalent air equivalent length, obtain the air equivalent length in millimeters. Click OK. The calculated value is entered into the Length field.
- Input field for Loss (dB/mm)
- Input field for @ Frequency (GHz)
- Input field for Dielectric constant:
 - Provides menu selections for Air (1.000649), Polyethylene (2.26), Teflon (2.10), Microporous Teflon (1.69), Other.
 - If other is selected, an Other input field is provided for a user-defined dielectric constant.

S2P File Selected in Create 2 Port Network

If S2P File is selected above in Create 2 Port Network, the following options are available:

- The Load S2P file button appears. Select displays the OPEN (Display S2P File) dialog box to allow the user to navigate to a previously saved S2P file. Once a file is selected, its path and file names appears in the field next to the button.
- Swap Port Assignment check box. Normally, the network's Port 2 will be nearer the DUT. If the Swap Port check box is selected, the port assignments are swapped.

Add/Change Network

As each network is configured, select the Add/Change Network button to add it to the Embedding/De-embedding Table. The newest configured networks are entered closest to the Test Port.

To modify or delete a network, delete the network in the Embedding/De-embedding Table. The Modify Network and Delete Network buttons become available. Use the Clear All button to clear all entries. Use the Print Table button to output a network table to a connected printer.

When all network changes are made, select Apply and then Close. On the EMBEDDING menu, select Save Setting to store the network configuration.

SAVE AS (EMBED/DE-EMBED EDL FILE) Dialog Box

Previous

- [“EMBEDDING Menu” on page 11-34](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Edit Embed/De-embed | EMBEDDING | Save Setting | SAVE AS (EMBED/DE-EMBED EDL FILE) Dialog Box

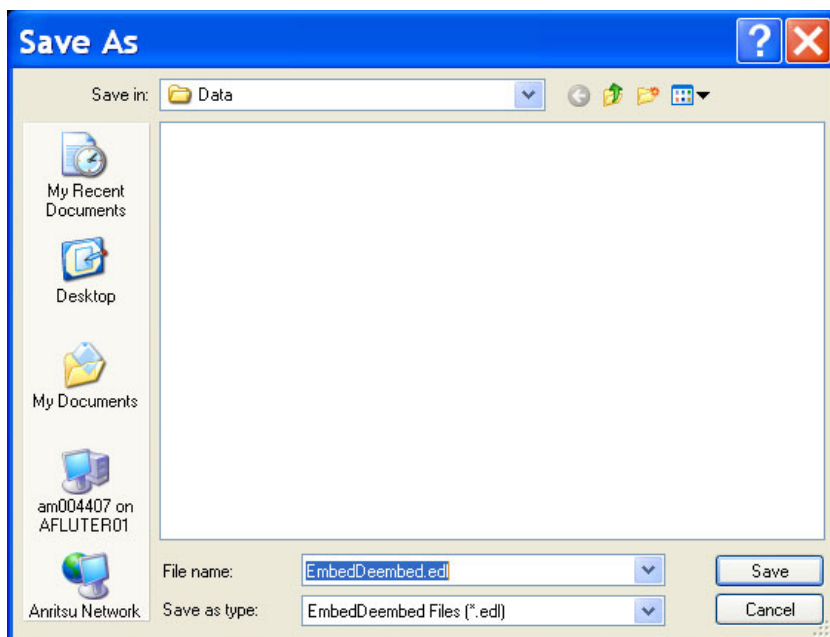


Figure 11-28. SAVE AS (EMBED/DE-EMBED EDL FILE) Dialog Box

OPEN (EMBED/DE-EMBED EDL File) Dialog Box

Previous

- [“EMBEDDING Menu” on page 11-34](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Edit Embed/De-embed | EMBEDDING | Recall Setting | OPEN (EMBED/DE-EMBED EDL FILE) Dialog Box

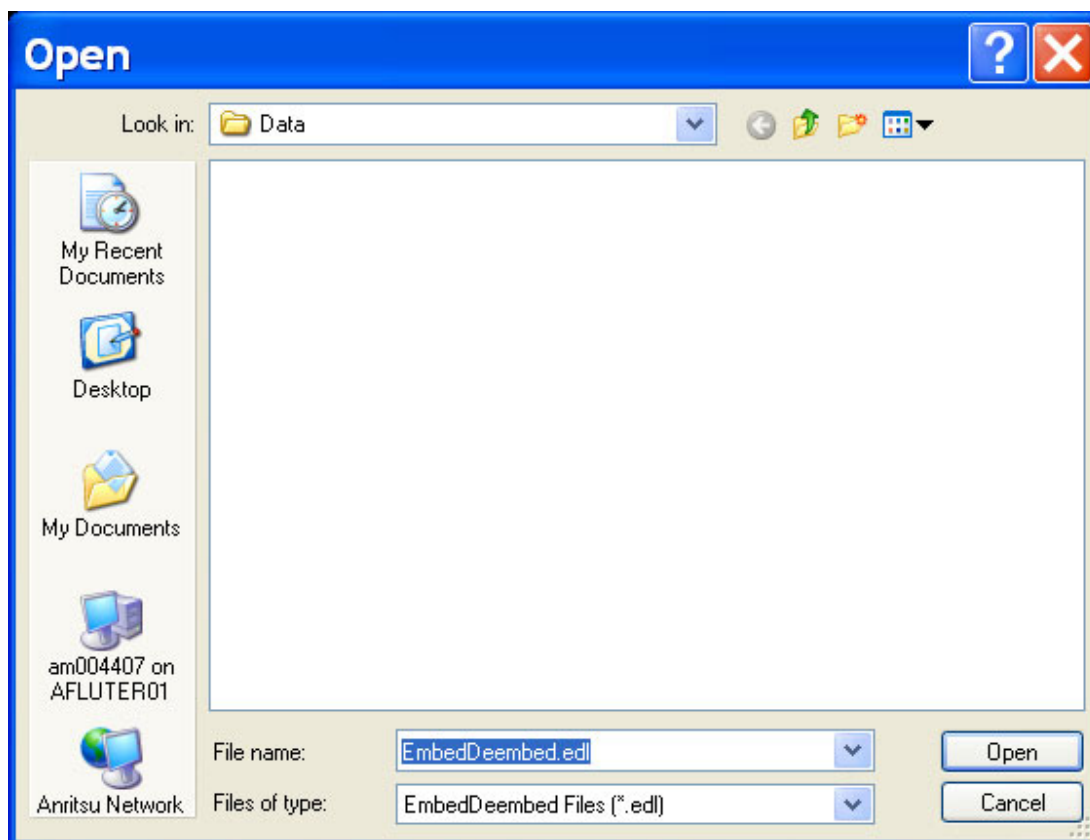


Figure 11-29. OPEN (EMBED/DE-EMBED EDL FILE) Dialog Box

LINE TYPE Dialog Box

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Line Type | LINE TYPE Dialog Box

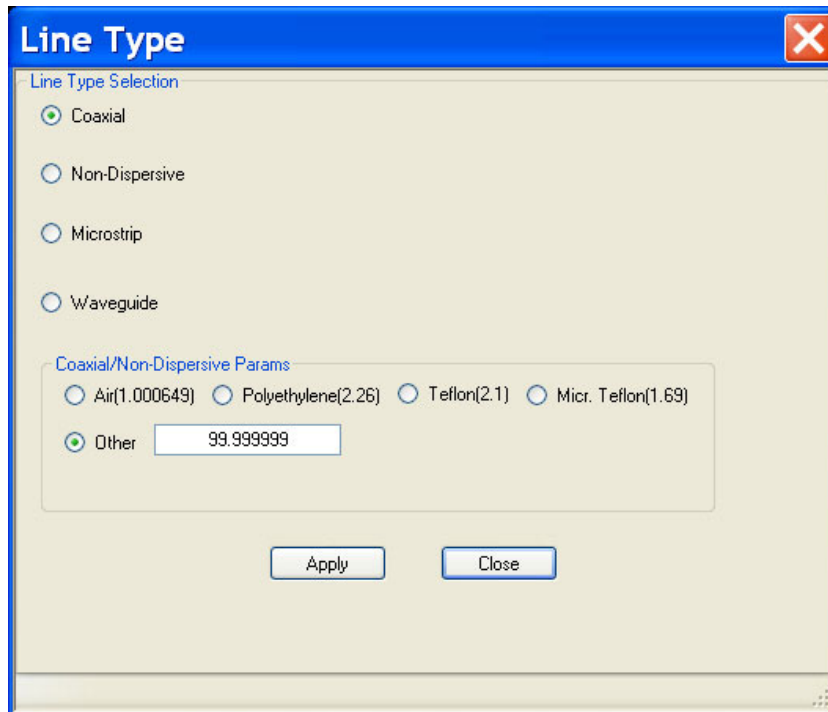


Figure 11-30. LINE TYPE Dialog Box – Coaxial, Non-Dispersive, Microstrip, or Waveguide

Line Type Selection Area

The Line Type Selection area allows user choice of four (4) different line types:

- Coaxial
 - Select causes the Coaxial/Non-Dispersive Line Type Area (described below) to appear.
- Non-Dispersive
 - Select causes the Coaxial/Non-Dispersive Line Type Area to appear.
- Microstrip
 - Select causes the Microstrip Parameters Area (described below) to appear.
- Waveguide
 - Select causes the Waveguide Line Type Area (described below) to appear.

The options and selectable parameters for each option are described in the sections below.

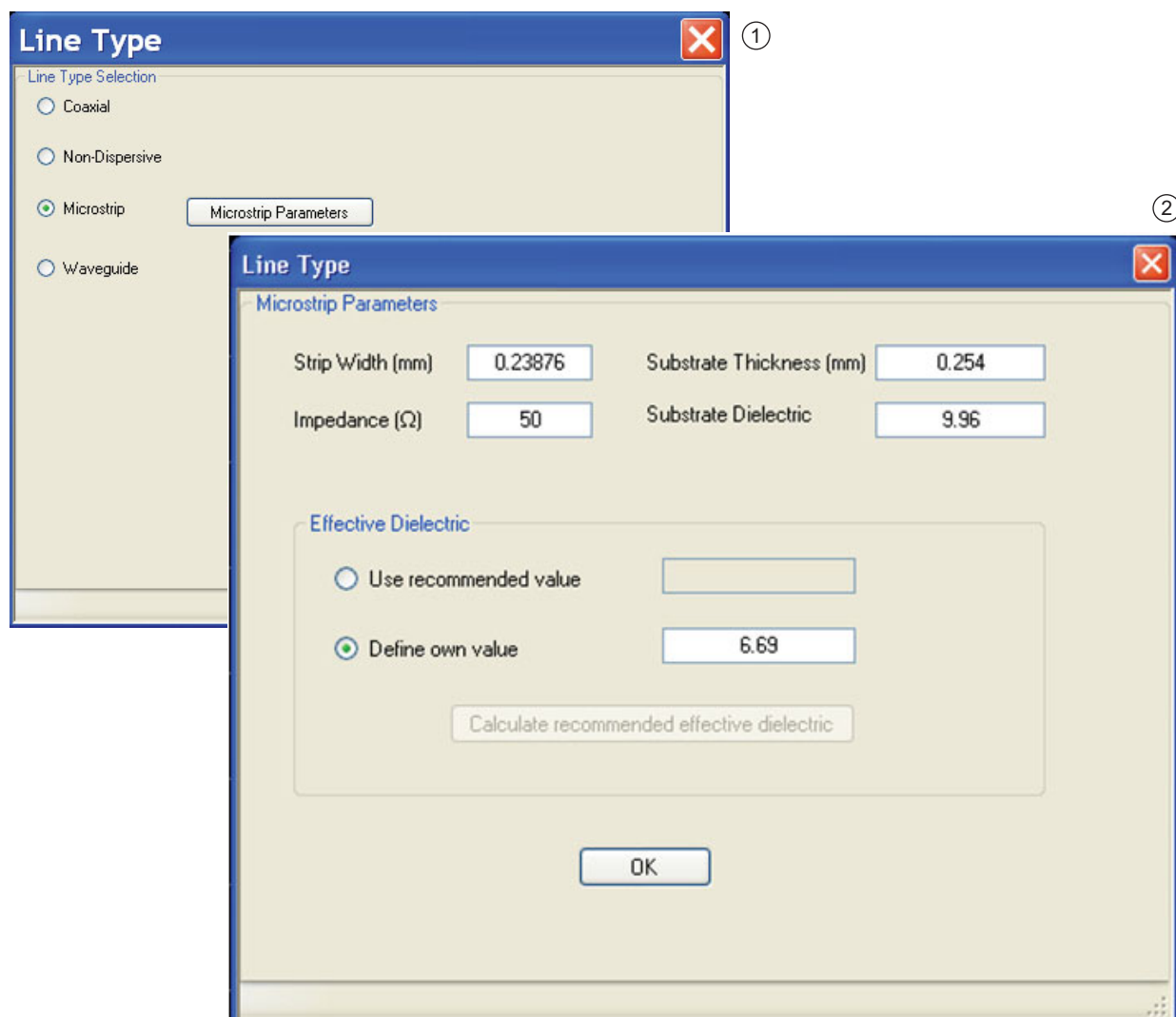
Coaxial or Non-Dispersive Line Types Area

If Coaxial or Non-Dispersive line type is selected, the Coaxial/Non-Dispersive Parameters area appears with a button selection group and selections of:

- Air (1.000649)
- Polyethylene (2.26)
- Teflon (2.1)
- Micr. Teflon (Microporous Teflon) (1.69)
- Other.
 - If other is selected, a field appears allowing user entry of a line type dielectric parameter between 0 (zero) and 99.

Microstrip Parameters Area

If Microstrip line type is selected, the Microstrip Parameters button appears (shown below at left). Clicking Microstrip Parameters displays an additional dialog with areas for Microstrip Parameters and Effective Dielectric (shown below at right).



1. Line Type Selector Area – Microstrip Selected

2. Microstrip Parameters Area – Microstrip Parameters for User-Defined Values

Figure 11-31. LINE TYPE Dialog Box – Microstrip Selected

Microstrip Params Area

The system default microstrip parameters are displayed:

- Strip width (mm): 0.23876
- Impedance (Ω): 50
- Substrate thickness (mm): 0.254
- Substrate dielectric: 9.96

To change a value, click in the field, and then enter the required parameter value.

Effective Dielectric Area

In the Effective Dielectric Area of the dialog box, select one of the two options:

- Use recommended value
- Define own value. If Define own value was selected, click in the field and enter the required dielectric value.

Click OK to close the Microstrip Parameters Area.

Waveguide Line Type Area

If Waveguide line type is selected, the Waveguide Parameters Area appears.

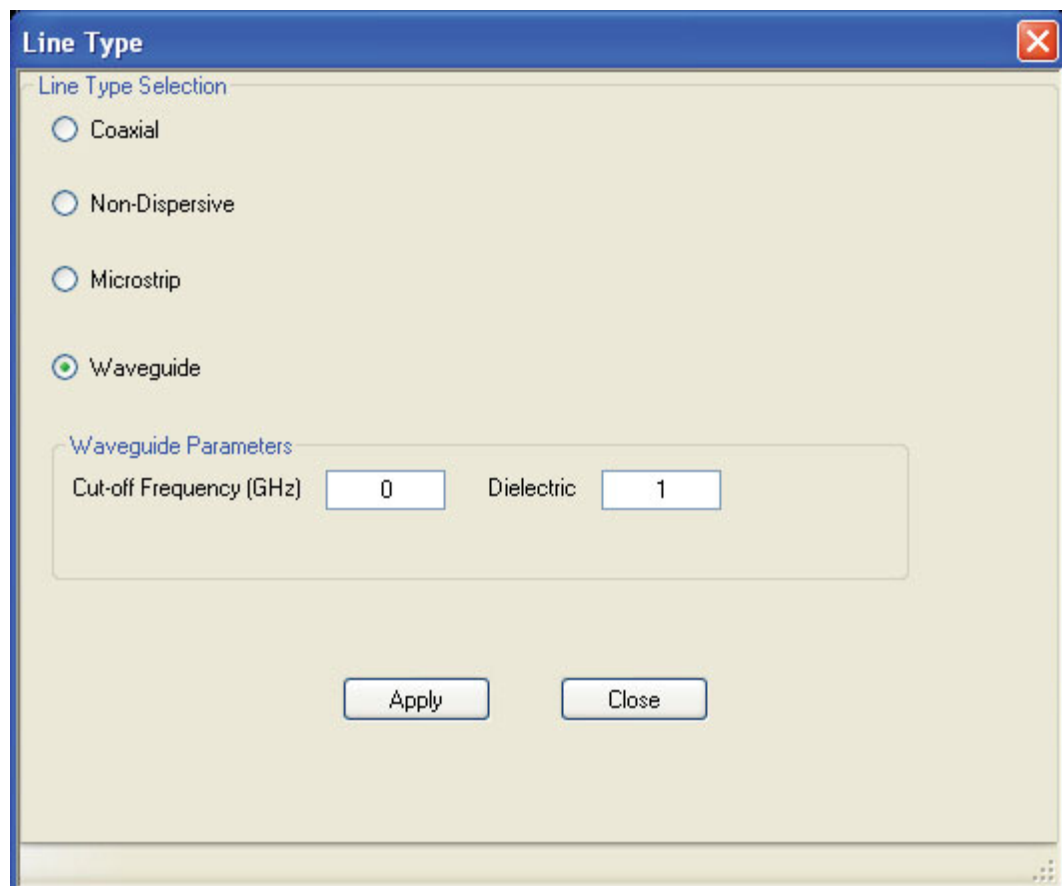


Figure 11-32. LINE TYPE Dialog Box -Waveguide Selected – Waveguide Parameters Area

Waveguide Parameters Area

Cut-off Frequency (GHz):

- User entry field

Dielectric value:

- User entry field

Applying Line Type Changes

1. After making a selection, you must click the **Apply** button to apply the changes made and then click **Close**.
2. On the **MEASUREMENT** menu, the read-only **Line Type** and **Dielectric** buttons show the entered values.
3. Clicking **Close** without clicking **Apply** abandons any changes and returns to the **MEASUREMENT** menu with the prior current instrument setting.

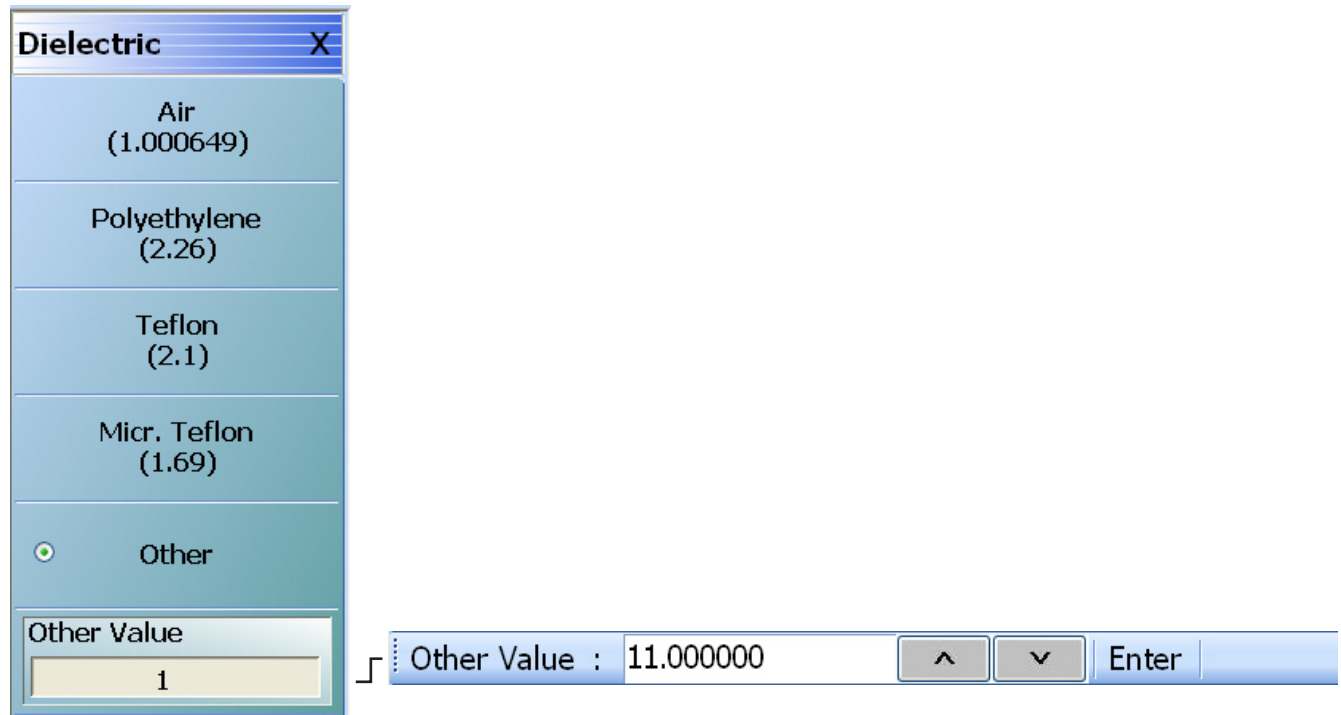
DIELECTRIC Menu

Previous

- [“MEASUREMENT Menu” on page 11-3](#)

Navigation

- MAIN | Measurement | MEASUREMENT | Dielectric | DIELECTRIC



The **Other** button must be selected to make the **Other Value** button and its related Field Toolbar available.

Figure 11-33. DIELECTRIC Menu

DIELECTRIC Menu Button Selection Group

The DIELECTRIC menu variably displays five (5) or six (6) buttons that are all members of a button selection group. If any single button is selected, the other buttons are deselected.

If the Other (Dielectric) button is selected, a sixth button, Other Value (Dielectric) appears at the bottom of the menu and allows the user to enter a user-defined dielectric constant.

The dielectric material selected here is displayed in the MEASUREMENT menu in the read-only Dielectric button field.

- [“MEASUREMENT Menu” on page 11-3](#)
- MAIN | Measurement | MEASUREMENT

After selecting a dielectric value, click **Back** to return to the MEASUREMENT menu.

Air (1.000649) (Dielectric)

Select sets the dielectric as air (1.000649) and de-selects Polyethylene, Teflon, Micr. Teflon, and Other.

Polyethylene (2.26) (Dielectric)

Select sets the dielectric as polyethylene (2.26) and de-selects Air, Teflon, Micr. Teflon, and Other.

Teflon (2.1) (Dielectric)

Select sets the dielectric as Teflon (2.1) and de-selects Air, Polyethylene, Micr. Teflon, and Other.

Micr. Teflon (1.69) (Dielectric)

Select sets the dielectric as Microporous Teflon (1.69) and de-selects Air, Polyethylene, Teflon, and Other.

Other (Dielectric)

Select sets the dielectric as Other (Dielectric) and de-selects Air, Polyethylene, Teflon, and Micr. Teflon. Select also displays the Other Value (Dielectric) button at the bottom of the menu.

Other Value (Dielectric)

The Other Value (Dielectric) button only appears if the Other button (above) has been selected. Once the Other Value (Dielectric) button is available, select displays the Other Value (Dielectric) field toolbar for entry of a user-defined dielectric constant.

Chapter 12 — Application Menus – Overview

12-1 Chapter Overview

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode. It provides links to the relevant APPLICATION menu chapters, each of which focuses on a separate VNA application and configuration controls.

The APPLICATION menu can be conveniently divided into the following the following groups:

- Instrument mode selection
- Receiver configuration
- Application and VNA configuration setups

In general, the receiver configuration is selected first, and then the setup for that configuration completed. Each is briefly described in the sections below followed by a cross reference to a full chapter description of each mode and control group.

Detailed Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

12-2 APPLICATION Menu Overview

The top level APPLICATION menu structure is shown in [Figure 12-1](#) through [Figure 12-5](#). The number and location of buttons available on the Application menu depend on the VNA model and installed options. *The appearance of the Application menu and availability of submenus change depending on the options installed and which option is activated on the Application menu:*

APPLICATION Menu

Previous

- “MAIN Menu” on page 2-2

Navigation

- MAIN | Application | APPLICATION.

Application Menu with Transmission/Reflection Selected, Showing IMDView Setup

- Transmission Reflection selected: See [Figure 12-1](#)
- IMDView – See [Figure 12-1](#)

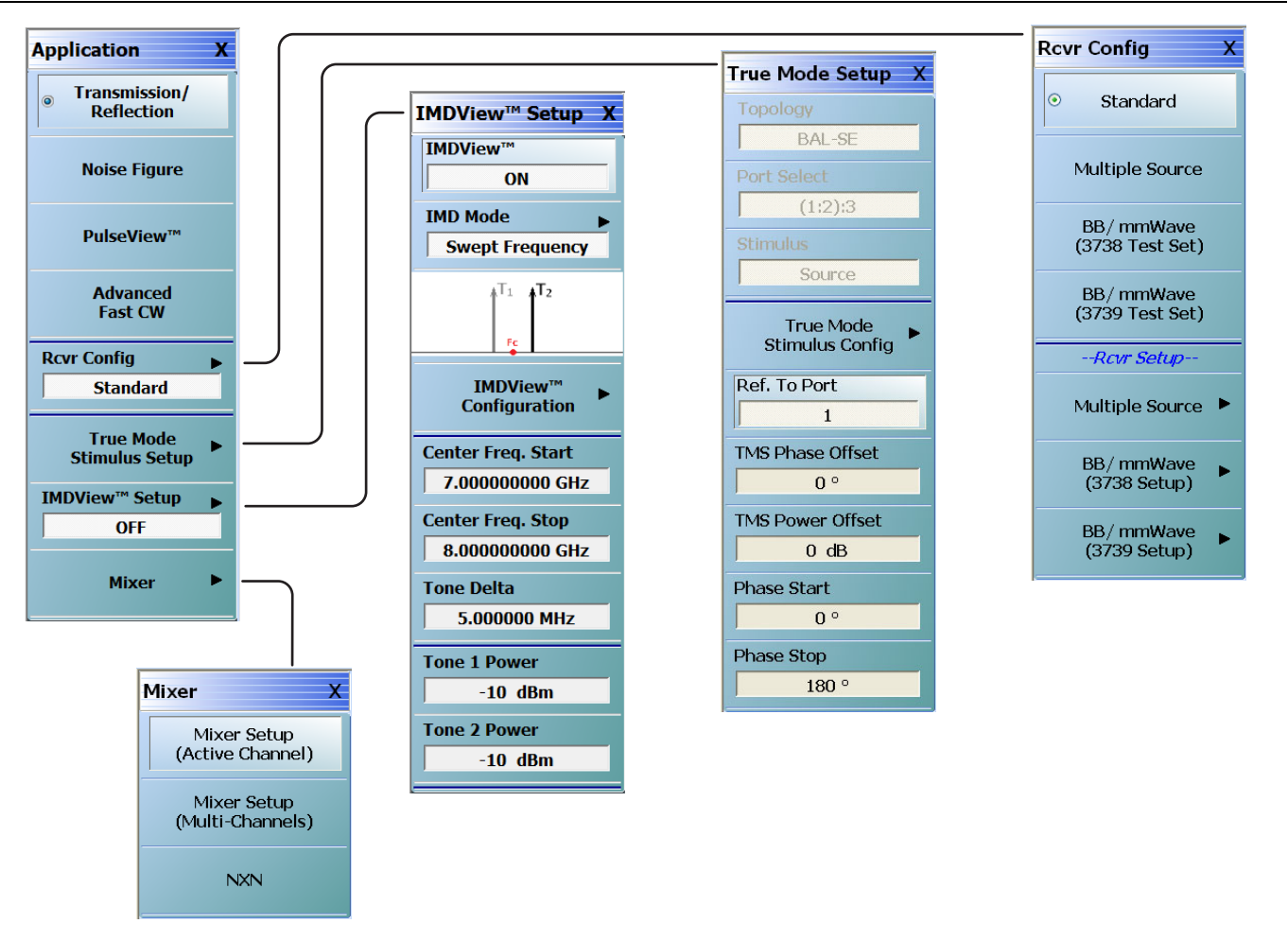


Figure 12-1. APPLICATION Menu – Transmission/Reflection App Selected – IMDView App

Application Menu with Noise Figure Selected

See:

- “RCVR CONFIG Menu” on page 12-10
- “NOISE FIGURE SETUP Menu” on page 12-13
- “MIXER Menu” on page 12-20

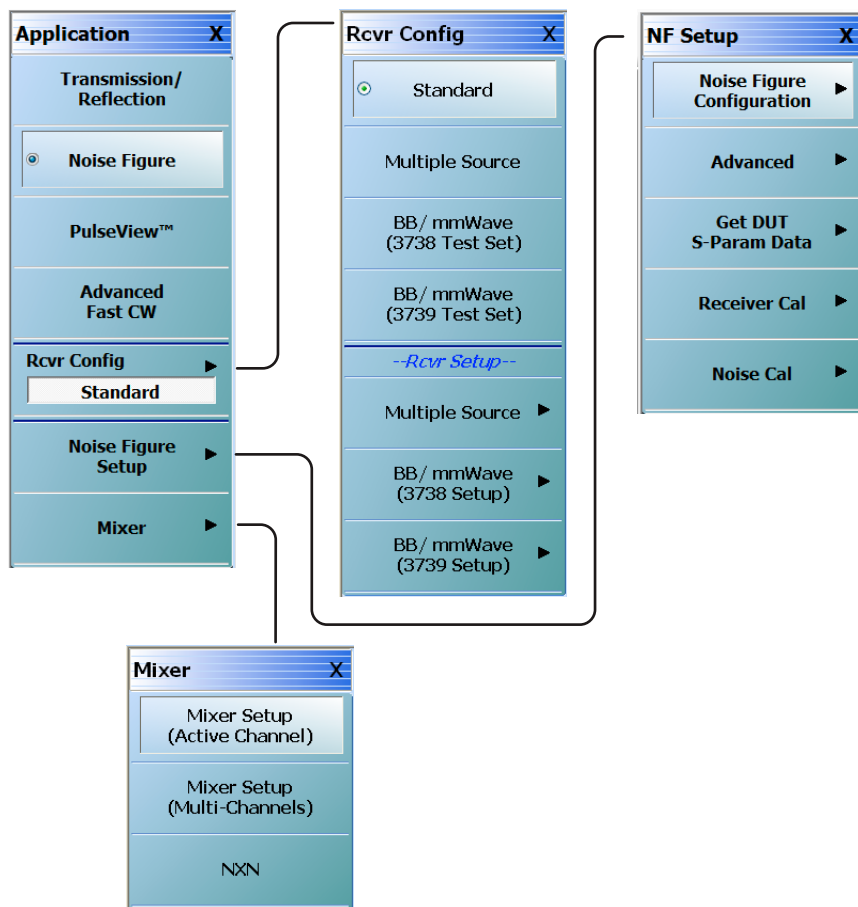


Figure 12-2. APPLICATION Menu – Noise Figure App Selected (Option 41)

Application Menu with Differential Noise Figure Selected

See

- “RCVR CONFIG Menu” on page 12-10
- “DIFFERENTIAL NOISE FIGURE SETUP Menu” on page 12-14
- “MIXER Menu” on page 12-20

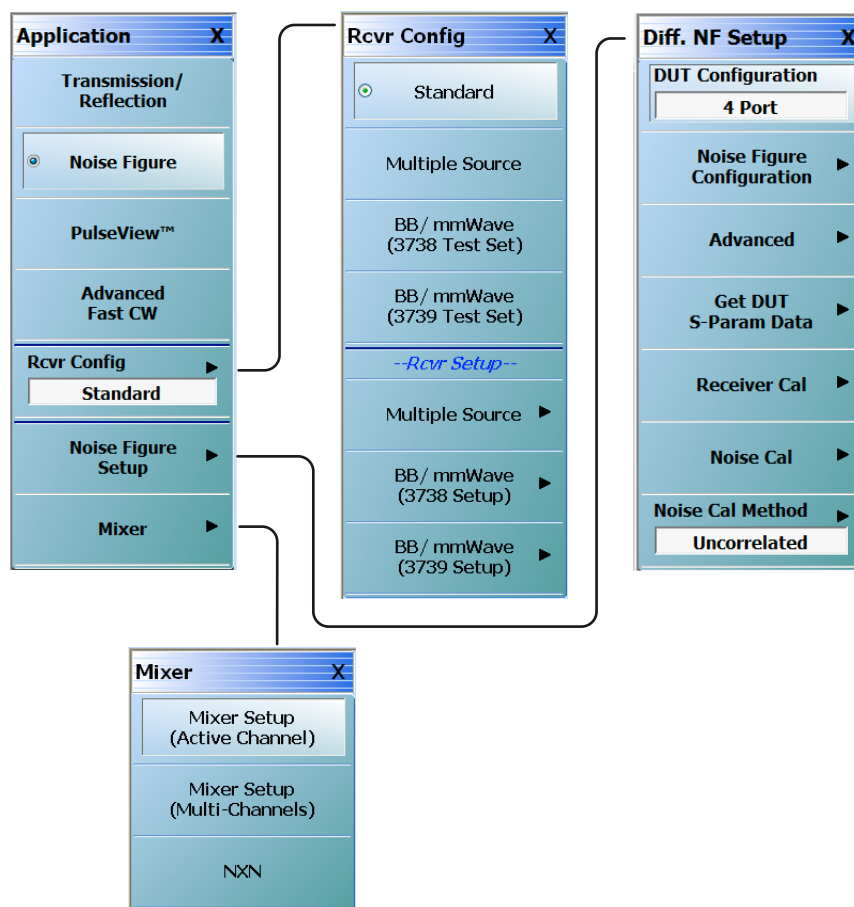


Figure 12-3. APPLICATION Menu – Differential Noise Figure App Selected (Option 48)

Application Menu with PulseView Selected

See

- “RCVR CONFIG Menu” on page 12-10
- “PULSEVIEW SETUP Menu” on page 12-16
- “MIXER Menu” on page 12-20

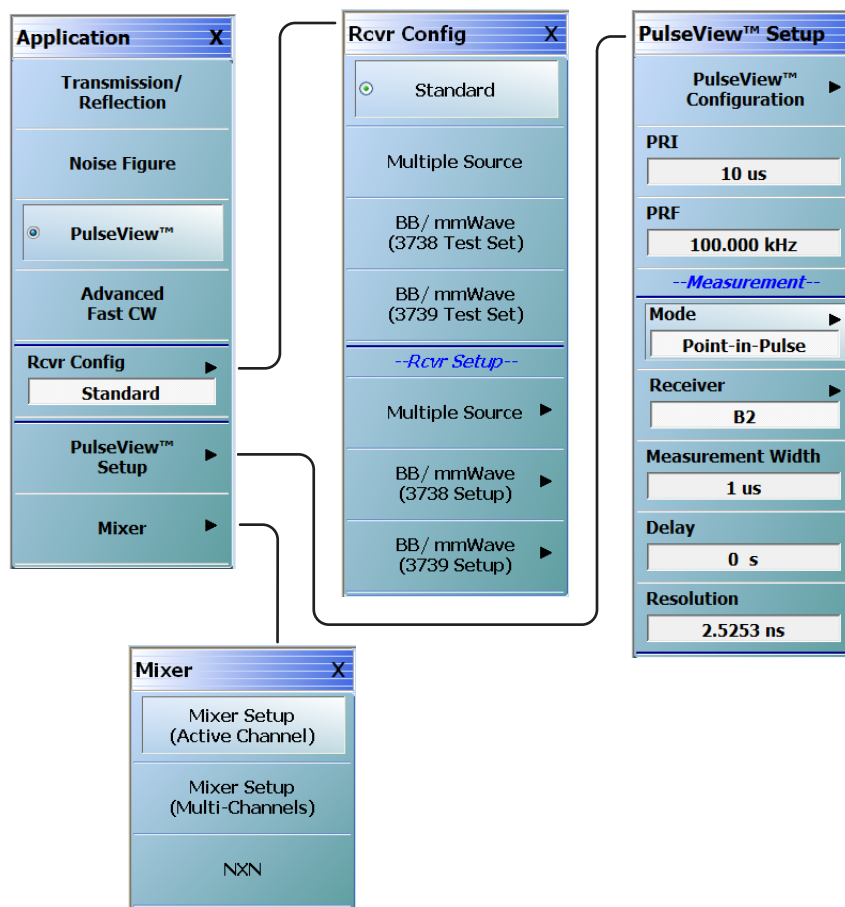


Figure 12-4. APPLICATION Menu – PulseView App Selected

Application Menu with Advanced Fast CW Selected

Note that when Advanced Fast CW application is selected, the PulseView Setup button is replaced with the Advanced Fast CW Setup button.

See

- “RCVR CONFIG Menu” on page 12-10
- “FAST CW SETUP Menu” on page 12-17
- “MIXER Menu” on page 12-20
- “MULTIPLE SOURCE Menu” on page 13-3

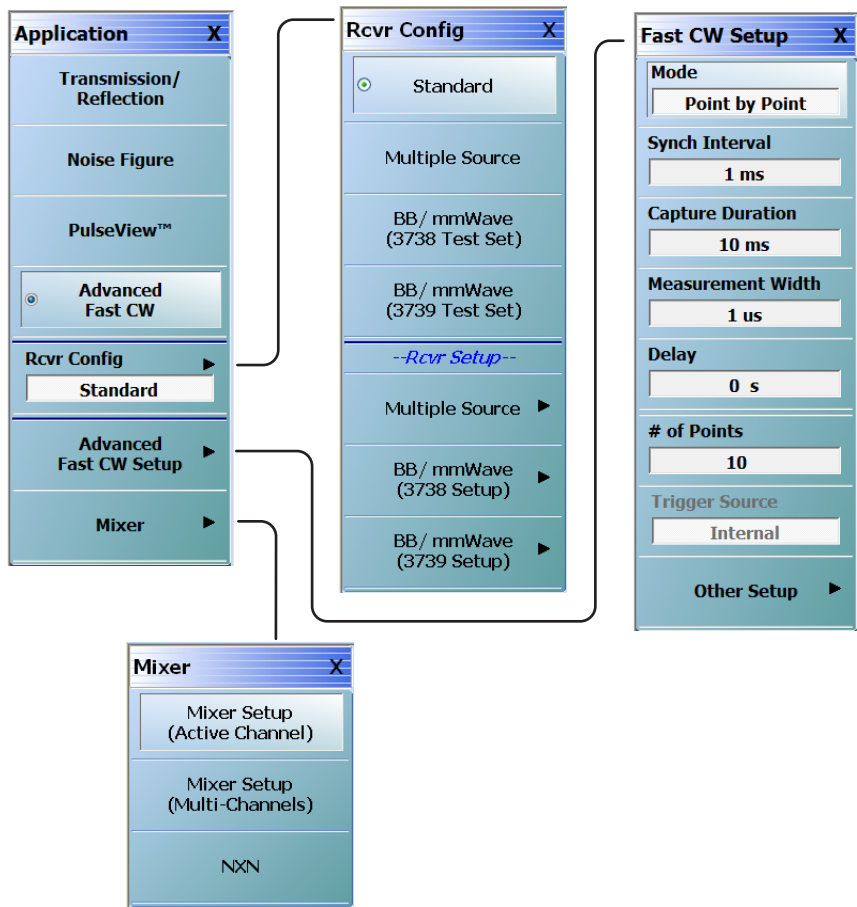


Figure 12-5. APPLICATION Menu – Advanced Fast CW App Selected

Application Menu with Spectrum Analysis Selected

See

- [“SPECTRUM ANALYSIS SETUP Menu” on page 12-21](#)
- [“MULTIPLE SOURCE Menu” on page 13-3](#)

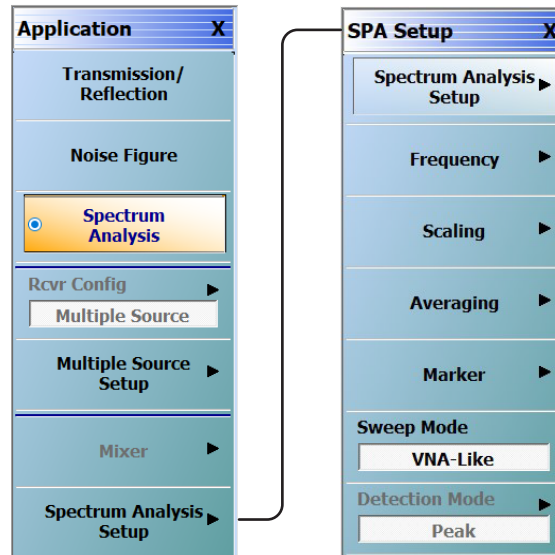


Figure 12-6. APPLICATION Menu – Spectrum Analysis App Selected

APPLICATION Menu Instrument Mode Controls

The instrument application mode button selection group consists of the Transmission/Reflection, Noise Figure, PulseView, Advanced Fast CW, IMDView, and Spectrum Analysis modes, and their respective buttons. In general, access to application specific controls require that the relevant application is first selected; otherwise, some controls may be unavailable.

Transmission/Reflection

All instrument models. This shows the instrument mode set to Transmission/Reflection measurement. This setting changes the CALIBRATION menu name to CALIBRATION [TR].

- [“Calibration Menus – 2-Port VNAs” on page 9-1](#)
- [“Calibration Menus – 4-Port VNAs” on page 10-1](#)

If Option 41 (Noise Figure) or Option 48 (Differential Noise Figure) is installed, selection of the Noise Figure mode de-selects the Transmission/Reflection button, and enables the Noise Figure Setup button lower on the menu. *Note that when Noise Figure mode is selected, the normal calibration menus are not available.*

Noise Figure

Available on all VNA instruments equipped with Option 41 (Noise Figure) or Option 48 (Differential Noise Figure) and Option 51, 61, or 62. If the instrument is in another mode and the Noise Figure button is selected, an entry dialog provides the opportunity to save the current configuration before proceeding. Similarly, if the VNA is in Noise Figure mode, and another mode is selected, an exit dialog provides the opportunity to save the current Noise Figure configuration before exiting. For an overview of the menus, see:

- [“NOISE FIGURE SETUP Menu” on page 12-13](#)
- [“DIFFERENTIAL NOISE FIGURE SETUP Menu” on page 12-14](#)

For detailed information, see:

- [Chapter 15, “Noise Figure \(Option 41\)” for Option 41](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)” for Option 48](#)

PulseView

Available on 2-port VNA instruments equipped with Options 35 and 42. If the instrument is in another mode and the PulseView button is selected, an entry dialog provides the opportunity to save the current mode configuration before proceeding. Similarly, if the VNA is in PulseView mode and another mode is selected, an exit dialog provides the opportunity to save the current configuration before exiting. For an overview of the menu, see:

- [“PULSEVIEW SETUP Menu” on page 12-16](#)

For detailed information, see:

- [Chapter 19, “PulseView™”](#)

Advanced Fast CW

Available on all VNA instruments equipped with Option 35 and Option 46. For an overview of the menu, see:

- [“FAST CW SETUP Menu” on page 12-17](#)

For detailed information, see:

- [Chapter 22, “Advanced Fast CW”](#)

IMDView

Available on VNA instruments equipped with Option 44 and Transmission/Reflection mode activated. IMDView is disabled in 100K-point mode.

If the instrument is in another mode and the IMDView button is selected, an entry dialog provides the opportunity to save the current mode configuration before proceeding. Similarly, if the VNA is in IMDView mode and another mode is selected, an exit dialog provides the opportunity to save the current configuration before exiting. For an overview of the menu, see:

- [“IMDView SETUP Menu” on page 12-19](#)

For detailed information, see:

- [Chapter 21, “IMDView™”](#)

Spectrum Analysis

Available on all VNA instruments equipped with Option 7 and Option 49.

If the instrument is in another mode and the Spectrum Analysis button is selected, an entry dialog provides the opportunity to save the current mode configuration before proceeding. Similarly, if the VNA is in Spectrum Analysis mode and another mode is selected, an exit dialog provides the opportunity to save the current configuration before exiting. For an overview of the menu, see:

For an overview of the menu, see:

- [“SPECTRUM ANALYSIS SETUP Menu” on page 12-21](#)

For detailed information, see:

- [Chapter 23, “Spectrum Analysis”](#)

12-3 APPLICATION Menu – Receiver Configuration

The buttons in this menu group are mutually exclusive and selecting one button de-selects all others.
The RCVR CONFIG application is not available when using the Spectrum Analysis application.

RCVR CONFIG Menu

Previous

- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- See definitions below.

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG

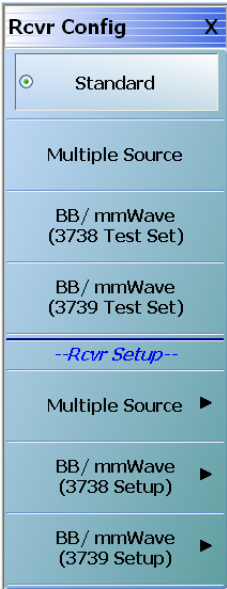
	<p>Standard</p> <p>Sets the Standard receiver configuration and de-selects all other receiver configurations and their respective selection buttons.</p> <p>Multiple Source</p> <p>Requires the installation of Option 7 – Receiver Offset. Select sets the Multiple Source receiver configuration and de-selects all other receiver configurations and their respective selection buttons.</p> <p>If selected, use the Rcvr Setup section of the menu (Multiple Source setup) described below to configure the multiple sources, including external sources. For detailed information, see:</p> <ul style="list-style-type: none">• Chapter 13, “Multiple Source” <p>mmWave (3738 Test Set)</p> <p>This button name appears on MS4642B, 44B, or 45B VNAs with Option 7. Sets the receiver configuration as mmWave (3738 Test Set). Use the Rcvr Setup section of the menu (mmWave (3738 Test Set) to set up this receiver configuration.</p> <ul style="list-style-type: none">• Chapter 14, “Broadband/mmWave” <p>BB/mmWave (3738 Test Set)</p> <p>This button name (shown in screen shot) appears on MS4647B VNAs with Option 7. Sets the receiver configuration as BB/mmWave (3738 Test Set). Use the Rcvr Setup section of the menu (BB/mmWave (3738 Test Set) to set up this receiver configuration.</p> <ul style="list-style-type: none">• Chapter 14, “Broadband/mmWave” <p>mmWave (3739 Test Set)</p> <p>This button name appears on MS4642B, 44B, or 45B VNAs with Option 7 and a compatible Option 8x. Sets the receiver configuration as mmWave (3739 Test Set). Use the Rcvr Setup section of the menu (mmWave (3739 Test Set) to set up this receiver configuration.</p> <ul style="list-style-type: none">• Chapter 14, “Broadband/mmWave” <p>(Continued)</p>
--	--

Figure 12-7. RCVR CONFIG Menu (1 of 2)

	<p>BB/mmWave (3739 Test Set)</p> <p>This button name (shown in screen shot) appears on MS4647B VNAs with Option 7 and a compatible Option 8x. Sets the receiver configuration as BB/mmWave (3739 Test Set). Use the Rcvr Setup section of the menu (mmWave (3739 Test Set) to set up this receiver configuration.</p> <ul style="list-style-type: none"> • Chapter 14, “Broadband/mmWave” <p>Receiver Setup Section:</p> <p>Multiple Source Setup</p> <p>Available on all VNAs. Select displays the MULTIPLE SOURCE SETUP menu. Use this button if the Multiple Source Receiver Configuration was selected above.</p> <ul style="list-style-type: none"> • Chapter 13, “Multiple Source” <p>mmWave (3738 Setup)</p> <p>Only available on MS4642B, 44B, or 45B VNAs with Option 7. Select displays the 3738 SETUP menu. Use this button for configuration if the mmWave (3738 Test Set) was selected above.</p> <ul style="list-style-type: none"> • Chapter 14, “Broadband/mmWave” <p>BB/mmWave (3738 Setup)</p> <p>Available on MS4647B VNAs with Option 7. Select displays the 3738 SETUP menu. Use this button for configuration if the BB/mmWave (3738 Test Set) was selected above.</p> <ul style="list-style-type: none"> • Chapter 14, “Broadband/mmWave” <p>mmWave (3739 Setup)</p> <p>Available on MS4642B, 44B, or 45B VNAs with Option 7 and a compatible Option 8x. Select displays the 3739 SETUP menu. Use this button for configuration if the mmWave (3739 Test Set) was selected above.</p> <ul style="list-style-type: none"> • Chapter 14, “Broadband/mmWave” <p>BB/mmWave (3739 Setup)</p> <p>Available on MS4647B VNAs with Option 7 and a compatible Option 8x. Select displays the 3739 SETUP menu. Use this button for configuration if the BB/mmWave (3739 Test Set) was selected above.</p> <ul style="list-style-type: none"> • Chapter 14, “Broadband/mmWave”
--	--

Figure 12-7. RCVR CONFIG Menu (2 of 2)

12-4 APPLICATION Menu – True Mode Stimulus Setup

The buttons in this menu group are mutually exclusive and selecting one button de-selects all others.

TRUE MODE STIMULUS SETUP Menu

Previous

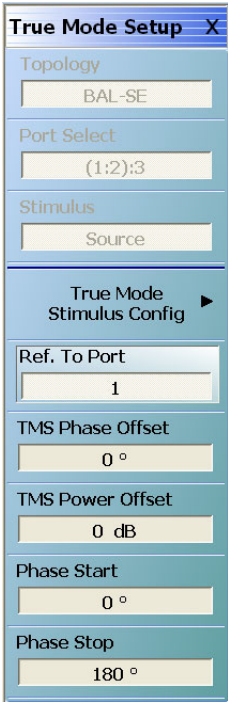
- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- Options 031 and 043 installed on VNA

Navigation

- MAIN | Application | APPLICATION | True Mode Stimulus Setup | TRUE MODE SETUP



The screenshot shows the 'True Mode Setup' menu with a close button (X) in the top right corner. The menu items are: Topology (BAL-SE), Port Select ((1:2):3), Stimulus (Source), True Mode Stimulus Config (with a right arrow), Ref. To Port (1), TMS Phase Offset (0 °), TMS Power Offset (0 dB), Phase Start (0 °), and Phase Stop (180 °).

For detailed information, see [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)

Topology
Identifies the stimulus configuration that is set in the True Mode Stimulus Configuration dialog box. The following topologies and port assignments are available in 4-port instruments:

Port Select
Identifies the port selection that is set in the True Mode Stimulus Configuration dialog box. Differential port pair selection of (1:2) or (3:4) is not valid when in TMS mode.

Stimulus
Identifies the stimulus that is set in the True Mode Stimulus Configuration dialog box.

True Mode Stimulus Config
Opens the DifferentialView – True Mode Stimulus dialog to select and configure a differential stimulus measurement.

Ref. To Port
Opens a dialog to select the frequency and phase offset reference port (can be any port 1 through 4).

TMS Phase Offset
Sets the fixed phase offset that is applied to the true differential drive for situations that require stimulus compensation.

TMS Power Offset
Sets the fixed power offset (in dB) that is applied to the true differential drive for situations that require stimulus compensation.

Phase Start
Sets the starting phase offset ($\pm 3600^\circ$) in phase sweep configuration (CW only).

Phase Stop
Sets the starting phase offset ($\pm 3600^\circ$) in phase sweep configuration (CW only).

Figure 12-8. TRUE MODE STIMULUS SETUP Menu

12-5 APPLICATION Menu – Noise Figure Setup

NOISE FIGURE SETUP Menu

Previous

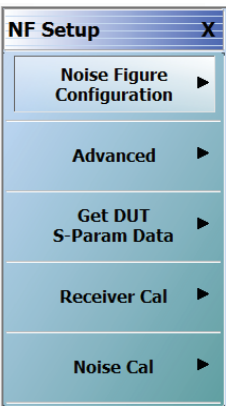
- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- Option 41 is installed on the VNA.
- The DUT S-Parameter Data file has been stored and is available on the VNA as an S2P or TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Noise Figure Setup | NF SETUP



For detailed information, see [Chapter 15, “Noise Figure \(Option 41\)”](#)

Noise Figure Configuration

Select displays the NF CONFIG menu.

Advanced

Select displays the NF ADVANCED menu.

Get DUT S-Param Data

Select displays the DUT S-PARAM DATA dialog box.

Receiver Cal

Select displays the NF RECEIVER CAL menu.

Noise Cal

Select displays the NF NOISE CAL menu.

Figure 12-9. NOISE FIGURE SETUP Menu

12-6 APPLICATION Menu – Differential Noise Figure Setup

DIFFERENTIAL NOISE FIGURE SETUP Menu

Previous

- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- Option 48 is installed on the VNA.
- The DUT S-Parameter Data file has been stored and is available on the VNA as an SnP or TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Noise Figure Setup | Diff. NF SETUP

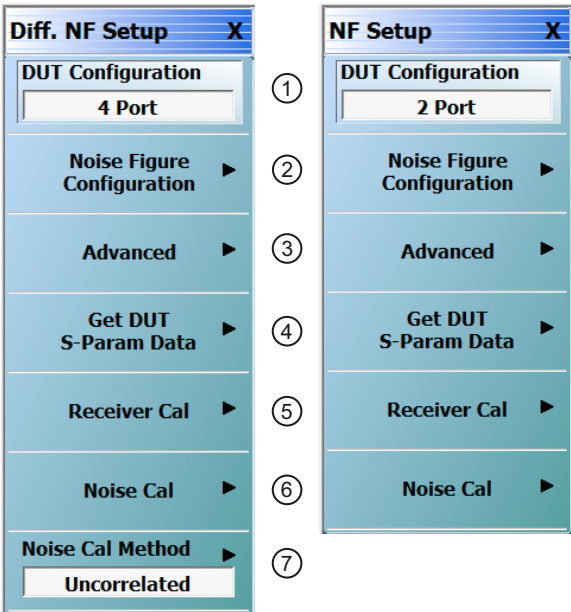


Figure 12-10. DIFFERENTIAL NOISE FIGURE SETUP Menu

For detailed information, see [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)

1. DUT Configuration

Selects 2-port or 4-port DUT configuration.

2. Noise Figure Configuration

Select displays the NF CONFIG menu.

3. Advanced

Select displays the NF ADVANCED menu.

4. Get DUT S-Param Data

Select displays the DUT S-PARAM DATA dialog box.

5. Receiver Cal

Select displays the NF RECEIVER CAL menu.

6. Noise Cal

Select displays the NF NOISE CAL menu.

7. Noise Cal Method (Only available for 4-Port DUT Configuration)

Select displays the DIFF. NF METHODS menu.

Figure 12-10. DIFFERENTIAL NOISE FIGURE SETUP Menu

12-7 APPLICATION Menu – PulseView Setup

The buttons in this menu group are mutually exclusive and selecting one button de-selects all others.

PULSEVIEW SETUP Menu

Previous

- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- Options 035 and 042 Installed and system is 2-Port VNA (PulseView menus are disabled when a 4-port test set is connected).

Navigation

- MAIN | Application | APPLICATION | PulseView Setup | PULSEVIEW SETUP

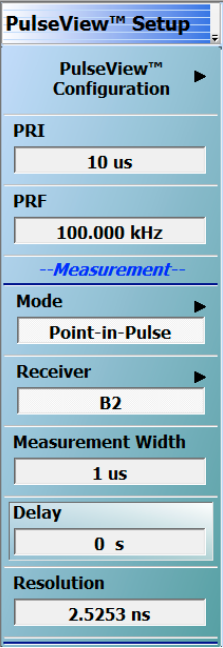
	<p>For detailed information, see Chapter 19, “PulseView™”</p> <p>PulseView Configuration Opens the PulseView Configuration Dialog Box.</p> <p>PRI Pulse Repetition Interval – Sets the primary clock synch pulse period in units of time.</p> <p>PRF Pulse Repetition Frequency – Sets the primary clock synch pulse repetition rate in units of hertz.</p> <p>Mode Opens the Pulse Mode menu to select the pulse mode.</p> <p># of Points Sets the number of measurement points from the Start to the Stop time settings.</p> <p># of Pulses Sets the number of pulse measurements to acquire.</p> <p>Receiver Selects a receiver channel to configure.</p> <p>Measurement Width Sets the measurement width time (aperture).</p> <p>Start Time Time to wait relative to T_0 before measuring a pulse.</p> <p>Stop Time Time relative to T_0 at which the measurement should stop.</p> <p>Delay Time relative to T_0 before starting the measurement.</p> <p>Resolution Defines the minimum time resolution.</p>
--	---

Figure 12-11. PULSEVIEW SETUP Menu

12-8 APPLICATION Menu – Advanced Fast CW Setup

The buttons in this menu group are mutually exclusive and selecting one button de-selects all others.

FAST CW SETUP Menu

Previous

- [“APPLICATION Menu” on page 12-2](#)

Prerequisites:

- Options 35 and 46 Installed

Navigation

- MAIN | Application | APPLICATION | Advanced Fast CW | ADVANCED FAST CW

Fast CW Setup X

Mode

Point by Point

Synch Interval

1 ms

Capture Duration

10 ms

Measurement Width

1 us

Delay

0 s

of Points

10

Trigger Source

Internal

Other Setup ▶

Fast CW Setup X

Mode

Full Time Record

Synch Interval

1 ms

Capture Duration

10 ms

Measurement Width

1 us

Start

0 s

Stop

2 us

of Points

10

Trigger Source

Internal

Other Setup ▶

For detailed information on this application menu, see [Chapter 22, “Advanced Fast CW”](#)

Mode

Toggles the mode between Point by Point and Full Time Record. Note that depending on the mode selected, the time parameters change from Delay (for PBP) to Start/Stop (for FTR).

Synch Interval

Synchronization Interval – Sets the synch interval in units of time.

Capture Duration

Sets the amount of data (in terms of time) that will be collected.

Measurement Width

Sets the width of the time window that will be used in transforming to the frequency domain. The wider the measurement width, the lower the effective processing IF bandwidth.

Delay (Point by Point mode only)

Sets the delay time from the synch interval beginning (whether that is internally or externally generated) to the time when a measured width-worth of data will be analyzed.

Start Time (Full Time Record mode only)

Sets the beginning of the portion of the collected time record that will be analyzed.

Stop Time (Full Time Record mode only)

Sets the end of the portion of the time record that will be analyzed.

Figure 12-12. Fast CW SETUP Menu (1 of 2)

	<p># of Points</p> <p>Sets the number of measurement points from the Start to the Stop time settings.</p> <p>Trigger Source</p> <p>Displays the trigger source that is selected from Other Setup (Addl.FCW Setup) menu. This becomes active as a manual trigger button when the Trigger source is set to Manual.</p> <p>Other Setup</p> <p>Select opens the Addl.FCW Setup menu for more Fast CW setup parameters.</p>
--	---

Figure 12-12. Fast CW SETUP Menu (2 of 2)

12-9 APPLICATION Menu – IMDView Setup

The buttons in this menu group are mutually exclusive and selecting one button de-selects all others.

Note

In the Application menu, IMDView Setup button is disabled unless Option 44 is installed on the VNA, and Transmission/Reflection mode is activated. IMDView is also disabled in 4-port systems and if in 100K-point mode.

IMDView SETUP Menu

Previous

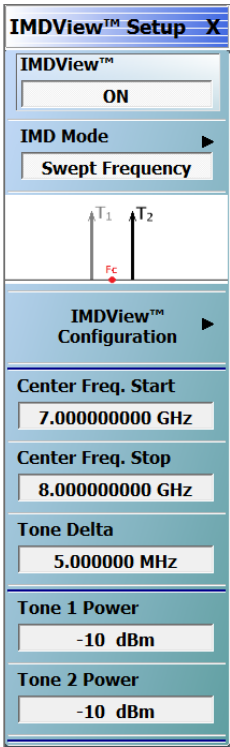
- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- Option 44 is installed on the VNA, and Application menu Transmission/Reflection mode activated.

Navigation

- MAIN | Application | APPLICATION | IMDView Setup | IMDVIEW SETUP



Note: The IMDVIEW SETUP menu selections vary depending on the IMD Mode selection. For detailed information on the IMDVIEW SETUP menu, see [Chapter 21, “IMDView™”](#)

IMDView ON/OFF

Toggles the IMDView Application on or off.

IMD Mode

Opens the IMD MODE SELECT menu. Choices are Swept Frequency or SpectrumView.

IMDView Configuration

Opens the IMDVIEW CONFIGURATION dialog box.

Center Frequency Start

Sets the center frequency (f_c) start.

Center Frequency Stop

Sets the center frequency (f_c) stop.

Tone Delta

Sets the spacing between the main tones. In other literature, it is sometimes called “offset” or “tone spacing”.

Tone 1 Power

Sets the IMD measurement Tone 1 power level.

Tone 2 Power

Sets the IMD measurement Tone 2 power level.

Figure 12-13. IMDVIEW SETUP Menu

12-10 APPLICATION Menu – Mixer Setup

Use this menu to set up the receiver configurations above.

MIXER Menu

Previous

- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- For Mixer Setup (Active Channel) and Mixer Setup (Multi-Channels) buttons to be active, VNA must be in 2-Port mode.

Navigation

- MAIN | Application | APPLICATION | Mixer | MIXER

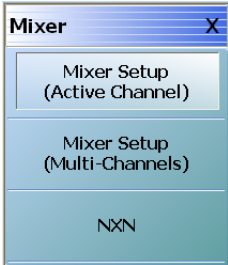
	<p>Mixer Setup (Active Channel)</p> <p>Displays the single channel version of the mixer setup, the MIXER SETUP [SWEEP TYPE] dialog boxes. The setup allows setting the sweep type, the port correspondence to RF and IF, and the signal source for the LO. There are separate setup configurations for frequency-based sweep and power-based sweep.</p> <p>Note: Mixer Setup (Active Channel) button is active in 2-Port mode.</p> <ul style="list-style-type: none">• Chapter 17, “Mixer Setup” <p>Mixer Setup (Multi-Channels)</p> <p>Displays the MIXER SETUP CONFIGURATION dialog boxes. The mixer setup dialogs provide setup guidance for different mixer types, and supports measurement of various parameters on different channels. Once the mixer configuration and measurement requirements are input, the system responds with the necessary calibrations required. The mixer measurement configuration can be saved and recalled.</p> <p>Note: Mixer Setup (Multi-Channels) is active in 2-Port mode.</p> <ul style="list-style-type: none">• Chapter 17, “Mixer Setup” <p>NxN</p> <p>Select displays the NXN SOLUTION USING S2P FILES dialog box.</p> <ul style="list-style-type: none">• Chapter 18, “NxN”
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Figure 12-14. MIXER Menu

12-11 APPLICATION Menu – Spectrum Analysis Setup

SPECTRUM ANALYSIS SETUP Menu

Previous

- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- Options 7 and 49 are installed on the VNA.
- The APPLICATION menu mode is set to Spectrum Analysis mode.

Navigation

- MAIN | Application | APPLICATION | Spectrum Analysis Setup | SPA SETUP

<div><p>VNA-like Mode</p></div> <p>Classical Mode</p>

Figure 12-15. SPECTRUM ANALYSIS SETUP Menu

Chapter 13 — Multiple Source

13-1 Chapter Overview

This chapter provides information for the single APPLICATION menu multiple source instrument controls.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

13-2 Application Menus and Dialog Boxes for Multiple Source

The APPLICATION menu set for configuration and control of multiple source contains the following menus and dialogs:

- [“Application Menus for Multiple Source” on page 13-2](#)
 - [Figure 13-1, “Multiple Source Menus” on page 13-2](#)
- [“Multiple and External Source Control” on page 13-3](#)
 - [“MULTIPLE SOURCE Menu” on page 13-3](#)
 - [“Multiple Source Tableau Dialog” on page 13-6](#)
 - [“EXT. SRC CONTROL Menu” on page 13-9](#)
 - [“EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box” on page 13-12](#)
 - [“EXTERNAL MODULE CTRL Dialog Box Overview” on page 14-22](#)
 - [“INT. SRC CONTROL Menu” on page 13-14](#)

13-3 Application Menus for Multiple Source

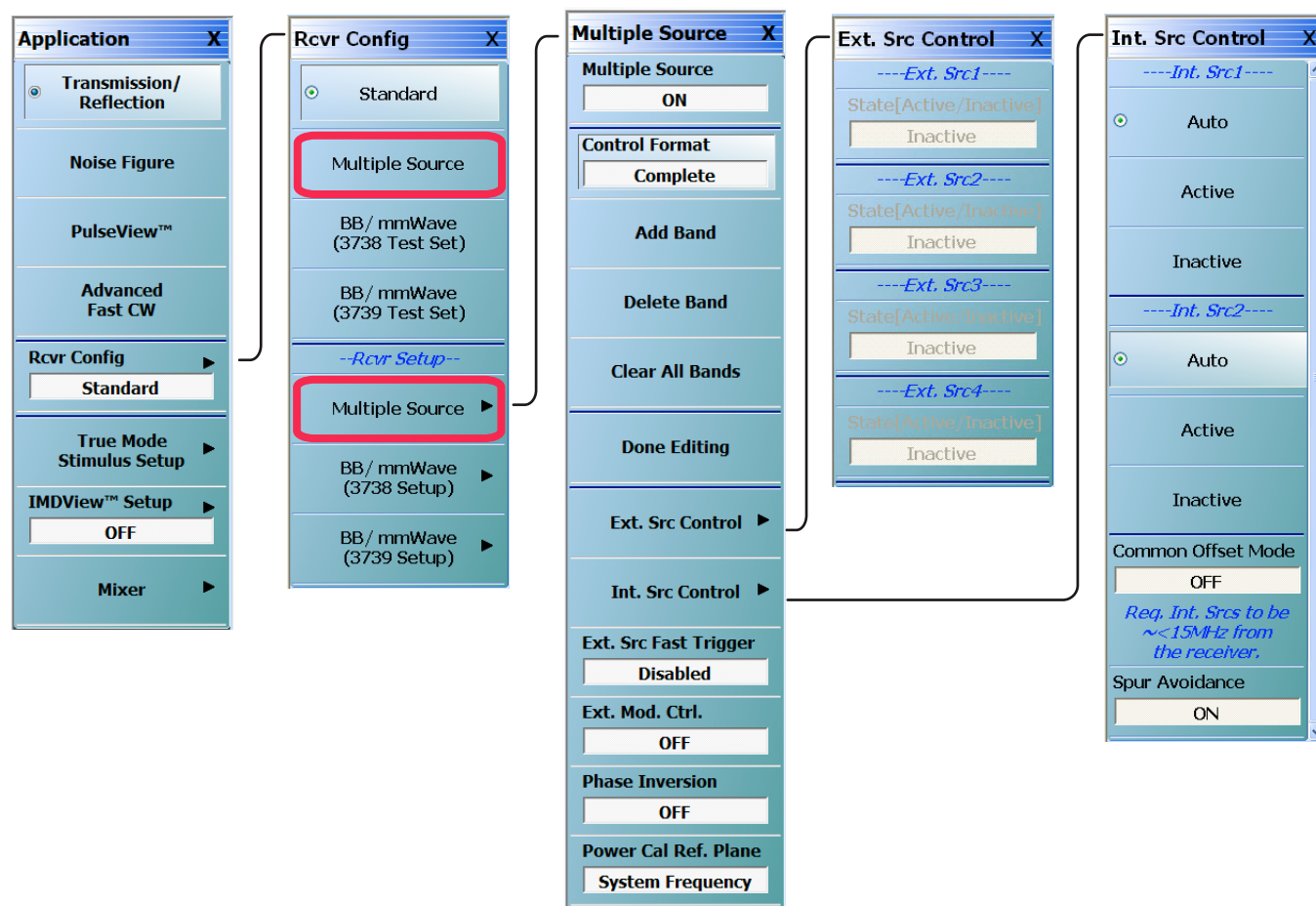


Figure 13-1. Multiple Source Menus

See the other APPLICATION menu chapters for descriptions of other menu button selections.

Multiple Source

Part of the Receiver Configuration menu. Requires the installation of Option 7 – Receiver Offset. Select sets the Multiple Source receiver configuration and de-selects all other receiver configurations and their respective selection buttons.

If selected, use the Multiple Source setup button described below to configure the multiple sources including external sources.

Multiple Source Setup

Present on all VNAs. Select displays the MULTIPLE SOURCE SETUP menu. Use this button if the Multiple Source Receiver Configuration was selected above.

- “MULTIPLE SOURCE Menu” on page 13-3 below.

13-4 Multiple and External Source Control

MULTIPLE SOURCE Menu

Previous

- [“RCVR CONFIG Menu” on page 12-10](#)

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | Multiple Source | MULTIPLE SOURCE

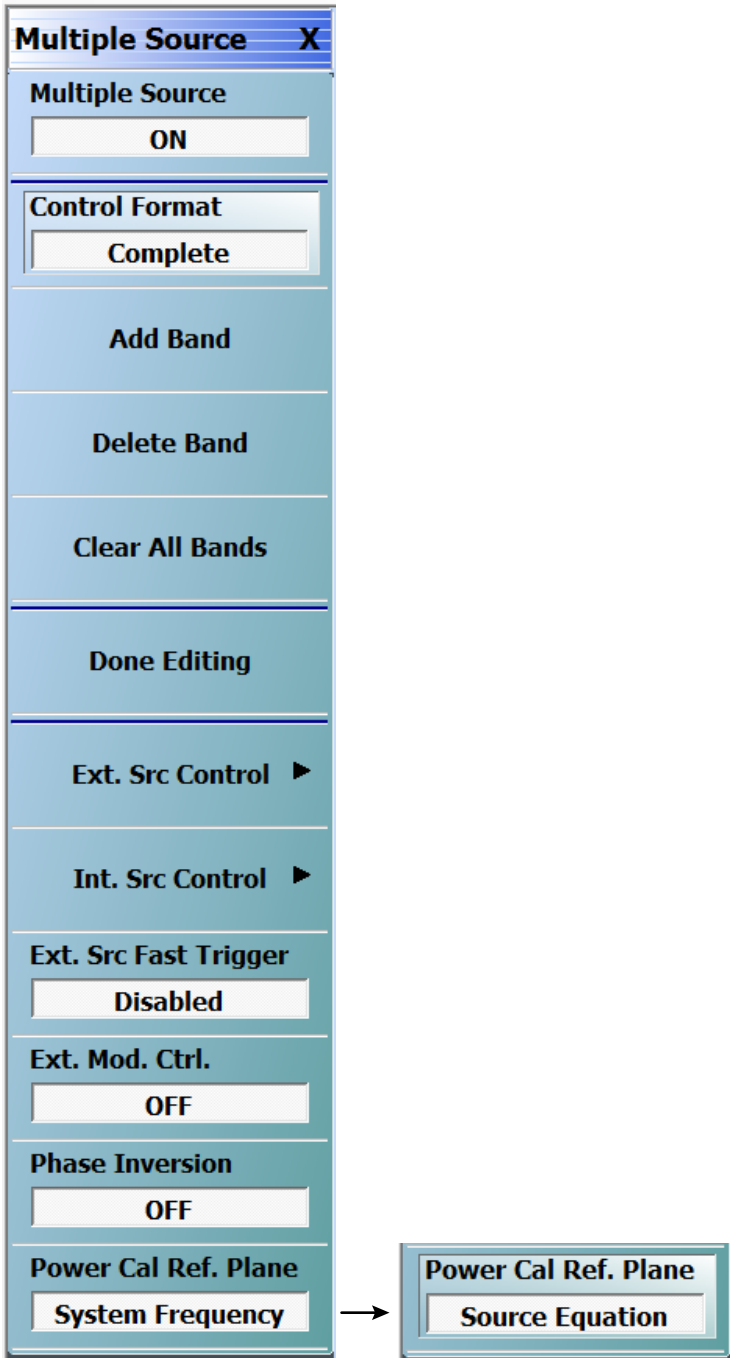


Figure 13-2. MULTIPLE SOURCE Menu: Complete

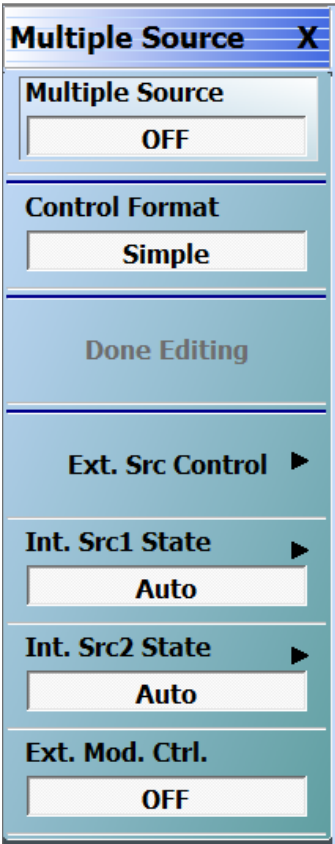


Figure 13-3. MULTIPLE SOURCE Menu: Simple

MULTIPLE SOURCE Menu Source Tableau

When the MULTIPLE SOURCE menu is selected, the [Multiple Source Tableau Dialog](#) appears at the bottom of the main display area.

Multiple Source (Off/On)

Select toggles multiple source capability to off or on and sets the Rcvr Config to Multiple Source.

Note	For multiple source to take effect, the “Done Editing” button should be selected. If you are in the middle of defining the bands and have not selected “Done Editing”, the band in effect will be the previous band and not the one currently being defined.
-------------	--

Control Format

Present Simple or Complete Multiple Source menu.

Add Band

Select adds a frequency band to the multiple source tableau at the bottom of the display.

- [“Multiple Source Tableau Dialog” on page 13-6](#)

Delete Band

Select a row in the frequency band tableau at the bottom of the display. Click the Delete Band button to permanently delete it.

- [“Multiple Source Tableau Dialog” on page 13-6](#)

Clear All Bands

Select deletes all band entries in the tableau.

Note One default band remains even after Clear All Bands is executed.

- [“Multiple Source Tableau Dialog” on page 13-6](#)

Done Editing

If no changes have been made to the frequency band settings, this button is unavailable.

Once changes are made, the button becomes available.

When all changes are complete, select the **Done Editing** button to apply the frequency band changes (additions, edits, and deletions) to the current running measurement and its attached test sets and modules.

After the change have been applied, the button again becomes unavailable.

If the button is not selected, the changes are not applied to the instrument.

Ext. Src Control

Select displays the EXT. SRC CONTROL menu.

- [“EXT. SRC CONTROL Menu” on page 13-9](#)

Int. Src Control (Option 31 only)

Select displays the INT. SRC CONTROL menu. This menu is not available when any of the TMS modes are active. When TMS mode is active, the internal sources are controlled by the TMS mode settings. Refer to [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#) for information on TMS configuration.

- [“INT. SRC CONTROL Menu” on page 13-14](#)

Ext. Src Fast Trigger (Enabled/Disabled)

Select displays the EXT SRC FAST TRIGGER dialog box where the trigger mode can be enabled or disabled. The button shows the current fast trigger mode.

- [“EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box” on page 13-12](#)

Ext. Mod. Ctrl.

The button displays the current broadband setting as either OFF, mmWave [3738], mmWave [3739], Broadband to 125 GHz, Broadband to 145 GHz, E-Band 56 GHz to 96 GHz, or W-Band 65 GHz to 110 GHz.

Select displays the EXTERNAL MODULE CTRL dialog box. The dialog box allows the module type to be set as OFF, mmWave [3738], mmWave [3739], Broadband to 125 GHz, Broadband to 145 GHz, E-Band 56 GHz to 96 GHz, or W-Band 65 GHz to 110 GHz which also depends on the connected equipment and installed options. If any configuration other than OFF is selected, additional configuration parameters are available for each defined band. The dialog box content depends on the broadband mode and the number of bands selected. Sample dialogs for some configurations are shown below:

- [“EXTERNAL MODULE CTRL Dialog Box Overview” on page 14-22](#)
- [“EXTERNAL MODULE CTRL Dialog Box – Module Type = OFF” on page 14-27](#)
- [“EXTERNAL MODULE CTRL Dialog Box – Module Type = mmWave \(3738\)” on page 14-28](#)
- [“EXTERNAL MODULE CTRL Dialog Box – Module Type = mmWave \(3739\)” on page 14-30](#)
- [“EXTERNAL MODULE CTRL Dialog Box – Module Type = BB/mmWave \(3739\)” on page 14-32](#)

Phase Inversion (Off/On)

Select toggles the phase inversion function off and on.

Power Cal Ref. Plane

Select toggles the Power Cal Reference Plane between System Frequency and Source Equation.

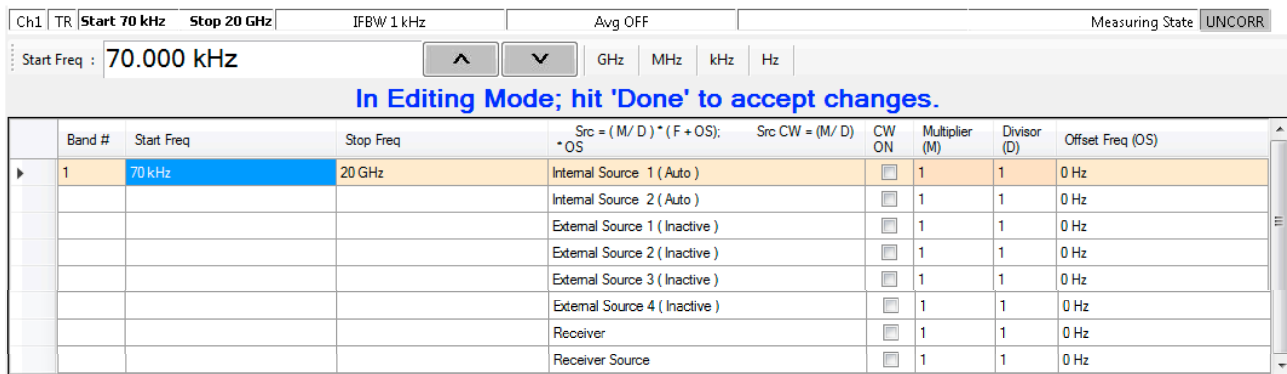
For a given multiple source setup, there are a number of different physical configurations that exist and the user may desire to perform power calibrations at different frequency reference planes.

For example, if $\text{Source 1} = (1/4) \cdot (f)$ and the DUT is a multiplier, one would want to power calibrate the source at the $(1/4) \cdot (f)$ plane. With the same equation but with the VNA source driving a mmWave module used for amplifier measurements, one may instead want to power calibrate the source at the f plane.

Thus some flexibility in what plane the user power calibration routine uses (in terms of what power meters the system looks for and what frequency is programmed into the power meter) is desirable. This switch defines that reference plane.

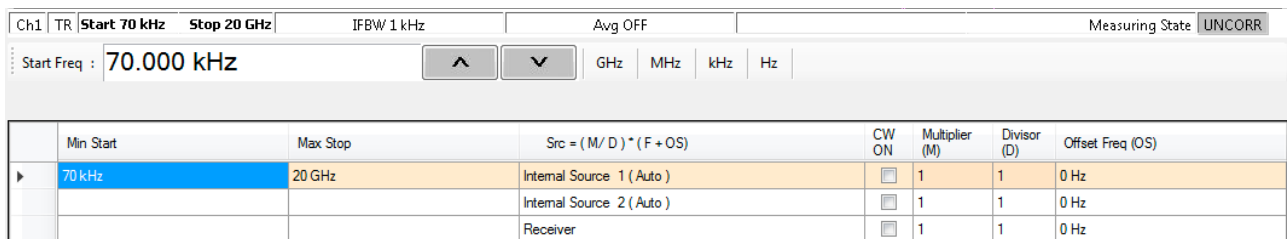
Multiple Source Tableau Dialog

The multiple source tableau is available at the bottom of the screen when the MULTIPLE SOURCE menu is selected. Typical Complete and Simple examples are shown below.



Band #	Start Freq	Stop Freq	Src = (M/D) * (F + OS) + OS	Src CW = (M/D)	CW ON	Multiplier (M)	Divisor (D)	Offset Freq (OS)
1	70 kHz	20 GHz	Internal Source 1 (Auto)		☐	1	1	0 Hz
			Internal Source 2 (Auto)		☐	1	1	0 Hz
			External Source 1 (Inactive)		☐	1	1	0 Hz
			External Source 2 (Inactive)		☐	1	1	0 Hz
			External Source 3 (Inactive)		☐	1	1	0 Hz
			External Source 4 (Inactive)		☐	1	1	0 Hz
			Receiver		☐	1	1	0 Hz
			Receiver Source		☐	1	1	0 Hz

Figure 13-4. MULTIPLE SOURCE TABLEAU Dialog – Complete Example



Min Start	Max Stop	Src = (M/D) * (F + OS)	CW ON	Multiplier (M)	Divisor (D)	Offset Freq (OS)
70 kHz	20 GHz	Internal Source 1 (Auto)	☐	1	1	0 Hz
		Internal Source 2 (Auto)	☐	1	1	0 Hz
		Receiver	☐	1	1	0 Hz

Figure 13-5. MULTIPLE SOURCE TABLEAU Dialog – Simple Example

Band Tableau Controls: Complete

Bands are added by selecting the Add Band button on the MULTIPLE SOURCE menu. Up to 50 Bands can be added. Each band can be defined for any combination of the following sources:

- Internal Source 1
- Internal Source 2 (Option 31)
- External Source 1
- External Source 2
- External Source 3
- External Source 4
- Receiver

- Receiver Source

Band Tableau Controls: Simple

Bands are added by selecting the Add Band button on the MULTIPLE SOURCE menu. Up to 50 Bands can be added. Each band can be defined for any combination of the following sources:

- Internal Source 1
- Internal Source 2 (Option 31)
- External Source 1
- External Source 2
- External Source 3
- External Source 4
- Receiver
- Receiver Source

General Operation

The following general operation notes and requirements apply:

- Tabular field data can be entered in any sequence.
- If invalid data is entered, a warning icon appears in the left margin of the table. Selecting the Done Editing button with invalid data results in a warning dialog.
- Read-only tabular elements are distinguished from editable contents.
- Table focus remains on the last added/ deleted band.
- Data is not applied to the instrument and its attached equipment until the Done Editing button is selected. When successful, the button again becomes unavailable.

CW OFF

Each source is defaulted as CW off. A check box can be selected to enable CW for each source. If CW is not selected, the source equation is:

$$\text{Source (Src)} = \left(\frac{M}{D} \right) \times (F + OS)$$

Where:

- M = Multiplier
- D = Divisor
- F = Frequency in user-defined units of Hz, kHz, MHz, or GHz. This is the current instrument frequency within the band being defined.
- OS = Offset frequency in Hertz

CW ON

If CW is selected, the source equation is:

$$\text{Source (Src)} = \left(\frac{M}{D} \right) \times (OS)$$

Where:

- M = Multiplier
- D = Divisor
- OS = Offset frequency in Hertz

Band Management

Band management is done by using the Add Band, Delete Band, and Clear All Bands button. After all bands are configured, select Done Editing button to apply the setting to the instrument and its attached equipment.

Saving/Recalling Band Configurations

A multiple source band configuration can be saved by using MENU BAR | File | Save Setup. On the SAVE SETUP dialog box, the setup can be saved as a:

- Active Channel Setup and Calibration CHX file
- Active Channel Setup STX file
- All Channel Setup and Calibration CHA file
- All Channel Setup STA file

Recall previously saved setups by using MENU BAR | File | Recall Setup.

File operations are duplicated on the FILE menu at MAIN | File | FILE.

EXT. SRC CONTROL Menu

Full Name

External Source Control

Previous

- [“MULTIPLE SOURCE Menu” on page 13-3](#)

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | (select Multiple Source | (in Rcvr Setup, select) Multiple Source | MULTIPLE SOURCE | Ext. Src Control | EXT. SRC CONTROL

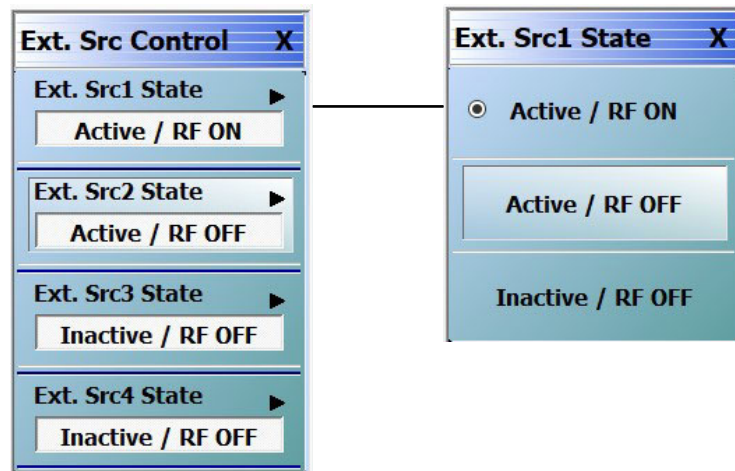


Figure 13-6. EXT. SRC CONTROL (EXTERNAL SOURCE CONTROL) Menus

EXT. SRC CONTROL Menu Note

The RF of External Sources is not automatically turned on. See the installation and configuration procedure below this figure.

EXT. SRC CONTROL Menu Note (when IMDView is active)

When IMDView is active, any external source which is being used for a tone in IMDView is disabled.

Ext. Src1 State [Inactive/Active, RF On/Off]

For External Source 1, opens the EXT. SRC1 STATE menu, which toggles the State from active to inactive.

- If the State is Inactive / RF OFF, either:
 - No external source is connected, or
 - The GPIB address set by the VNA instrument for External Source 1 differs from the GPIB address set on the external source instrument.
- If the State is Active / RF OFF, an external source is connected with a GPIB address that matches that set in the external source instrument.
 - Select toggles the Ext. Src1 State button between states of Inactive and Active.
- When the State is Active / RF ON, the external source is controlled by the VNA instrument via the GPIB connection.

See the procedure section below this figure a more detailed description.

If in Modular BB mode, each external source is turned on/off manually from this menu.

If in BB/mmWave mode, and external source is set to ON, Source 1 and Source 2 are automatically set to Active.

Ext. Src2 State [Inactive/Active, RF On/Off]

For External Source 2, select opens the EXT. SRC STATE menu.

- See the description above in the Ext. Src1 State button.

Ext. Src3 State [Inactive/Active, RF On/Off]

For External Source 3, select opens the EXT. SRC STATE menu.

- See the description above in the Ext. Src1 State button.

Ext. Src4 State [Inactive/Active, RF On/Off]

For External Source 4, select opens the EXT. SRC STATE menu.

- See the description above in the Ext. Src1 State button.

External Source State Menu

This description applies to the EXT. SRC1 STATE menu described in [Figure 13-6](#):

- Active / RF ON button
- Active / RF OFF button
- Inactive / RF OFF button (Default if source is connected.)

In this section, these buttons are referred to as the External Source State buttons.

External Source State Buttons Inactive and Unavailable

If the External Source State buttons are Inactive and Unavailable (grayed out), either no external sources are connected to the instrument, or the external sources have different GPIB addresses from those set on the VNA instrument. Once one or more external sources are connected with matching GPIB addresses, the buttons change to Inactive and Available (not grayed out).

Connecting an External Source

Connect from one (1) to four (4) external sources via the rear panel **Dedicated GPIB Port D-24 (f) Connector**.

This GPIB port is used when the VNA instrument controls external instruments such as power meters, frequency counters, and in this case, external sources. Up to four (4) external sources can be connected to the instrument.

Note that each external instrument and the VNA must have a unique GPIB address with no duplicates. The factory-default GPIB addresses for the four external sources and other likely external instruments are:

- External Source 1 = GPIB Address 4
- External Source 2 = GPIB Address 5
- External Source 3 = GPIB Address 2
- External Source 4 = GPIB Address 3
- Power Meter = GPIB Address 13
- W-Band Power Meter = GPIB Address 15
- Frequency Counter = GPIB Address 7
- MN469xB/C Series Multiport Test Set = GPIB Address 16
- Frequency Counter = GPIB Address 7
- The VNA Instrument itself = GPIB Address 6

The default addresses for external sources can be changed at the EXT. SRC. ADDR. (EXTERNAL SOURCE ADDRESS) menu

- [“EXT. SRC ADDR. Menu” on page 30-47](#)
- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Ext. Sources | EXT. SRC. ADDR.

The default addresses for the instrument itself, the external power meter, and the external frequency counter can be changed at the REMOTE INTER. menu.

- “REMOTE INTER. Menu” on page 30-43
- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
- Only Anritsu external sources such as the MG3696A Signal Generator or the MS3695B Signal Generator can be connected.
- The external sources must be off during the connection process. The VNA instrument can be running.
- Connect the GPIB cables between the instrument and the external sources.

Note

Best practices recommend no more than two (2) GPIB cable connectors be connected to any one GPIB port. Once connected, do not bend the connectors as this might damage the instrument Dedicated GPIB Port Connector.

Matching GPIB Addresses Between the VNA and the External Source

The GPIB addresses set on the VNA instrument must match those set on each external source.

If the GPIB addresses set on the VNA match those on the external source, the appropriate External Source State button should change from unavailable (grayed out) to available. Once an External Source State button is available, it can be used to toggle the external source between Inactive and Active.

Manual Refresh Required for the EXT. SRC. CONTROL Menu

Note that the EXT. SRC. CONTROL menu does not refresh itself if address changes are made in any of the external sources. If in doubt about the state of connected external sources, click the Back button at the bottom of the display, and then re-enter the menu.

- For example, if a single external source with a GPIB address of 4 is connected to the VNA, the (Ext. Src1) State [Inactive/Active] button is available and can toggle the source as Active or Inactive.
- The user changes the GPIB address of the external source from 4 to 5.
- The current EXT. SRC. CONTROL menu will still show the (Ext. Src1) State [Inactive/Active] button as available.
- To verify the currently connected external sources, select Back to exit the EXT. SRC ADDR. menu to the REMOTE INTER. menu and then select again the Ext. Sources button to re-enter the EXT. SRC. CONTROL menu.
- In this example, the EXT. SRC. CONTROL menu will now show:
 - The (Ext. Src1) State [Inactive/Active] button as unavailable
 - The (Ext. Src2) State [Inactive/Active] button as available

All external source control buttons follow this behavior.

EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box

Previous

This menu can be accessed from multiple locations.

- “MULTIPLE SOURCE Menu” on page 13-3
- “3738 SETUP Menu” on page 14-4

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | Multiple Source Setup | MULTIPLE SOURCE | Ext. Src Fast Trigger | EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3738 Setup) | 3738 SETUP | Ext. Src Fast Trigger | EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mm Wave (3738 Setup) | 3738 SETUP | Ext. Src Fast Trigger | EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box

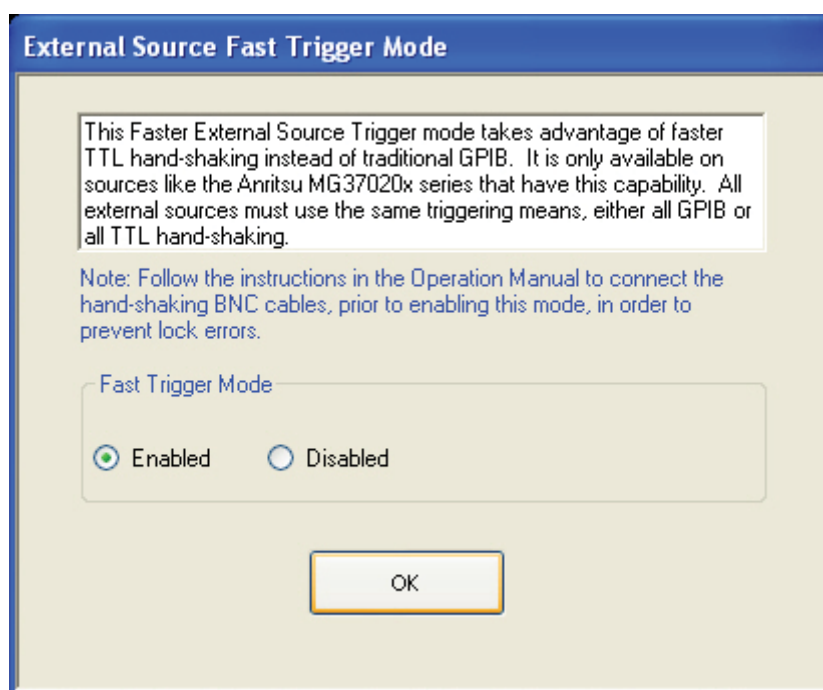


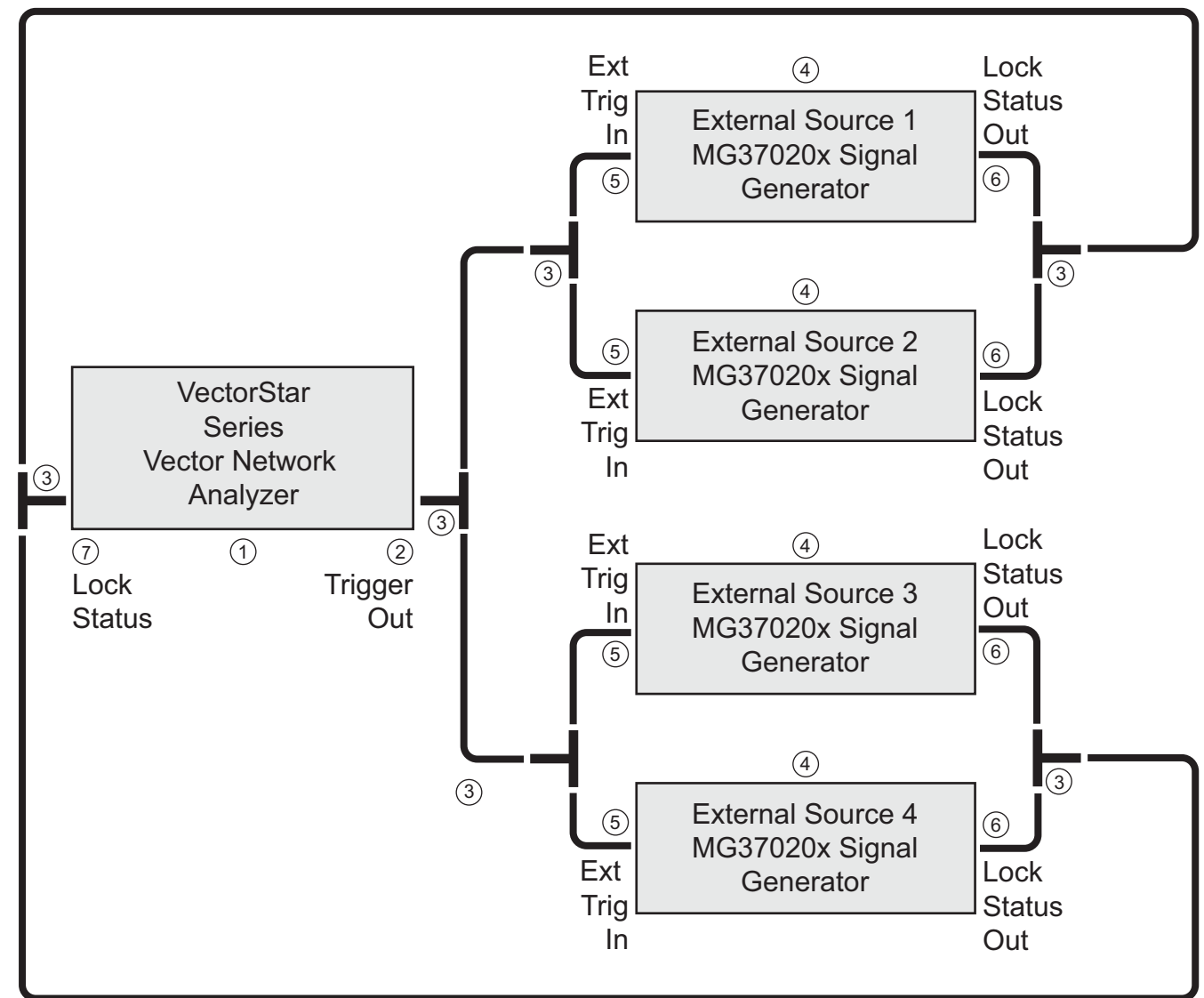
Figure 13-7. EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box

Instructions

This Fast External Source Trigger mode takes advantage of faster TTL hand-shaking instead of traditional GPIB. It is only available on sources such as the Anritsu MG37020x Series Signal Generators that have this capability. All external sources must use the same triggering means, either all GPIB or all TTL hand-shaking.

Note	Ensure that the BNC cable is connected properly before enabling this mode to prevent source lock errors. The length of the BNC cables can vary, while the BNC T-Connectors should all be the same type from the same manufacturer. Select OK when done.
-------------	---

In the Fast Trigger Mode area, select Enabled or Disabled, and then select OK. The general configuration is shown in the figure below.



- | | |
|--|--|
| 1. VectorStar MS464xB Series VNA. | 4. Anritsu MG3702xX Signal Generators – Up to four (4) signal generators can be connected. |
| 2. VNA Trigger Out – Rear Panel External Trigger Output (Ext Trig Out) Port. | 5. MS37020x Rear Panel External Trigger (External Trigger In) Port. |
| 3. BNC T-Connectors – For this application, the best practice recommendation is to use the same model number BNC T-connectors from the same manufacturer. The BNC cables do not need to be identical length nor do they need to be from the same manufacturer. | 6. MS37020x Rear Panel Lock Status (Lock Status Output) Port. |
| | 7. VNA Lock Status – Rear Panel Lock Status (Lock Status In) Port. |

Figure 13-8. External Source Fast Trigger BNC Cable Connections

INT. SRC CONTROL Menu

Full Name

Internal Source Control

Previous

- [“MULTIPLE SOURCE Menu” on page 13-3](#)

Prerequisites

- Option 31
- This menu is not available when any of the TMS modes are active. When TMS mode is active, the internal sources are controlled by the TMS mode settings. Refer to [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#) for information on TMS configuration.

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | Multiple Source | MULTIPLE SOURCE | Int. Src Control | INT. SRC CONTROL

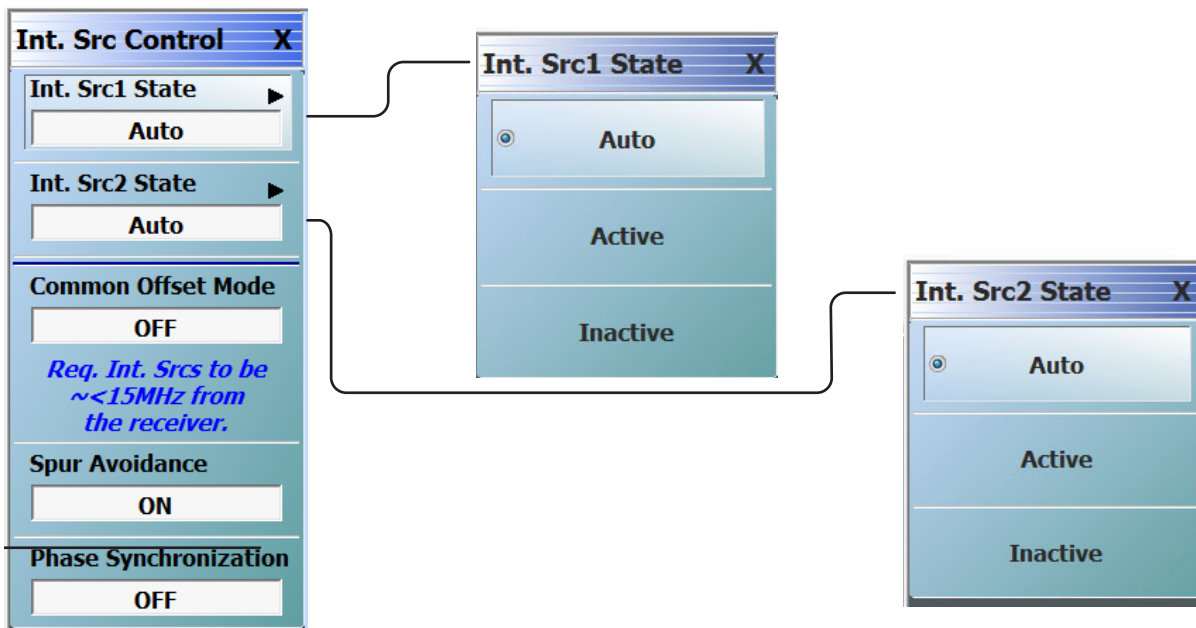


Figure 13-9. INT. SRC CONTROL (INTERNAL SOURCE CONTROL) Menu

INT. SRC CONTROL Menu Note

Initiates the dual source drive at both ports. As shown, the setup includes identification of two internal sources that can be set to “Auto” or “Manual” mode. In “Manual” mode, they are either “Active” (always on) or “Inactive” (always off). The setting of the internal sources is controlled via the [“Multiple Source Tableau Dialog” on page 13-6](#).

INT. SRC CONTROL Menu Note (when IMDView is active)

When IMDView is active, any internal source which is being used for a tone in IMDView is disabled.

Int. Src1 State [Auto/Active/Inactive]

For Internal Source 1, opens the INT. SRC1 STATE menu, which allow setting the state as auto, active, or inactive.

Int. Src2 State [Auto/Active/Inactive]

For Internal Source 2, opens the INT. SRC2 STATE menu, which allow setting the state as auto, active, or inactive.

Common Offset Mode

When Common Offset Mode is ON, both the LO and Source signals are referenced to a common oscillator. When Common Offset Mode is OFF, the LO and Source signals are referenced to independent oscillators. The factory phase calibration is performed with Common Offset Mode ON.

Requires Internal Sources to be $\sim < 15$ MHz from the receiver.

Spur Avoidance

Spur Avoidance uses a modified frequency algorithm to offset known system spurs outside of the measurement. The factory phase calibration is performed with Spur Avoidance OFF.

Note Spur Avoidance is OFF when DifferentialView – True Mode Stimulus is active.

Phase Synchronization

Toggles the phase synchronization state from OFF to ON. When ON, the two internal sources can be programmed phase coherently (same phase relationship sweep to sweep) at the expense of a small increase in trace noise. The phase synchronization only has effect if both internal sources are set to Active.

Chapter 14 — Broadband/mmWave

14-1 Chapter Overview

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode, and whether broadband or multiple sources are used. The menu also provides access to NXN setup.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

14-2 Application Menus and Dialog Boxes for BB/mmWave

The APPLICATION menu set contains the following menus and dialogs:

- [“Application Menus for BB/mmWave” on page 14-3](#)
- [“Broadband/mmWave Setup” on page 14-4](#)
 - [“3738 SETUP Menu” on page 14-4](#)
 - [“3739 SETUP Menu” on page 14-6](#)
 - [“NLTL MODULE Menu” on page 14-9](#)
 - [“mmWAVE WG Menu” on page 14-11](#)
 - [“mmWAVE ALC CAL Menu” on page 14-14](#)
 - [“mmWAVE ALC CAL \(MM MODULE NAME\) Dialog Box” on page 14-16](#)
 - [“MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box” on page 14-12](#)
 - [“EXTERNAL MODULE SELECTION Dialog Box” on page 14-20](#)
- [“Broadband/mmWave Control” on page 14-22](#)
 - [“EXTERNAL MODULE CTRL Dialog Box Overview” on page 14-22](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Module Type = OFF” on page 14-27](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Module Type = mmWave \(3738\)” on page 14-28](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Module Type = mmWave \(3739\)” on page 14-30](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Module Type = BB/mmWave \(3739\)” on page 14-32](#)
 - [“EXTERNAL MODULE CTRL Dialog Box – Options 086, 087, 088, or 089” on page 14-34](#)

- “EXTERNAL MODULE CTRL Dialog Box – with Low Power Leveling and RF/VNA Leveling”
on page 14-36

14-3 Application Menus for BB/mmWave

For links to other APPLICATION menus and button definitions, refer to [Chapter 12](#).



Figure 14-1. BB/mmWave Menus

Rcvr Config Menu:

BB/mmWave (3738 Test Set)

Select sets the BB/mmWave receiver configuration and de-selects other receiver configuration buttons.

BB/mmWave (3739 Test Set)

Select sets the BB/mmWave receiver configuration and de-selects other receiver configuration buttons.

BB/mmWave (3738 Setup)

In *Receiver Setup* section of the Receiver Config menu. Select displays the 3738 SETUP menu. Use this button for configuration if the BB/mmWave (3738 Test Set) was selected above.

- [“3738 SETUP Menu” on page 14-4](#)

BB/mmWave (3739 Setup)

In *Receiver Setup* section of the Receiver Config menu. Select displays the 3739 SETUP menu. Use this button for configuration if the BB/mmWave (3739 Test Set) was selected above.

- [“3739 SETUP Menu” on page 14-6](#)

14-4 Broadband/mmWave Setup

3738 SETUP Menu

Previous

- [“RCVR CONFIG Menu” on page 12-10](#)

Prerequisites

- Option 7

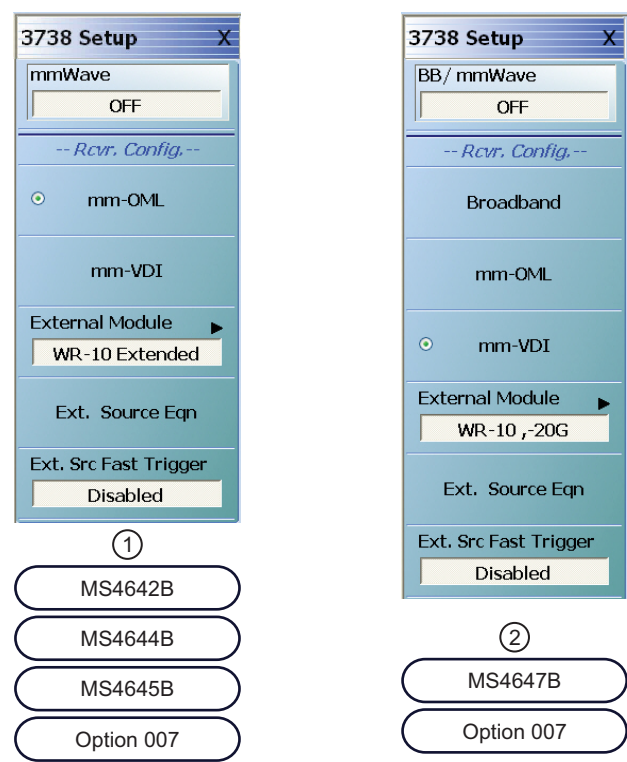
Navigation

The navigation path changes depending on the instrument model and the equipped options. For MS4642B, 44B, and 45B with Option 7:

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3738 Setup) | 3738 SETUP

For MS4647B with Option 7:

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3738 Setup) | 3738 SETUP



1. 3738 SETUP menu for MS4642B, 44B, and 45B VNAs equipped with Receiver Offset Option 007.	2. 3738 SETUP menu for MS4647B VNA equipped with Option 007.
---	--

Figure 14-2. 3738 SETUP Menu Variants

Receiver Configuration Button Group Start

Depending on the instrument model and equipped options, the receiver configuration button group allows only one type to be selected.

mmWave

Shown on MS4642B, 44B, or 45B VNAs with Option 7. Select toggles the broadband capability on and off. The broadband state is shown in the button field.

BB/mmWave

Shown on the MS4647B VNA with Option 7. Select toggles the broadband/mmWave capability on and off. The state is shown in the button field.

Broadband

Select sets the receiver configuration as Broadband.

mm-OML

Select sets the receiver configuration as mm-OML using OML brand mmWave modules.

mm-VDI

Select sets the receiver configuration as mm-VDI using VDI brand mmWave modules.

Receiver Configuration Button Group End

The mm-VDI button is the last button in the receiver configuration button group.

External Module

Select displays the EXTERNAL MODULE SELECTION dialog box.

- [“EXTERNAL MODULE SELECTION Dialog Box” on page 14-20](#)

Ext. Source Eqn

Select displays the MODIFY EXTERNAL SOURCE EQUATIONS dialog box.

- [“MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box” on page 14-12](#)

Ext. Src Fast Trigger

Select displays the EXTERNAL SOURCE FAST TRIGGER MODE dialog box.

- [“EXTERNAL SOURCE FAST TRIGGER MODE Dialog Box” on page 13-12](#)

3739 SETUP Menu

Previous

- [“RCVR CONFIG Menu” on page 12-10](#)

Prerequisites

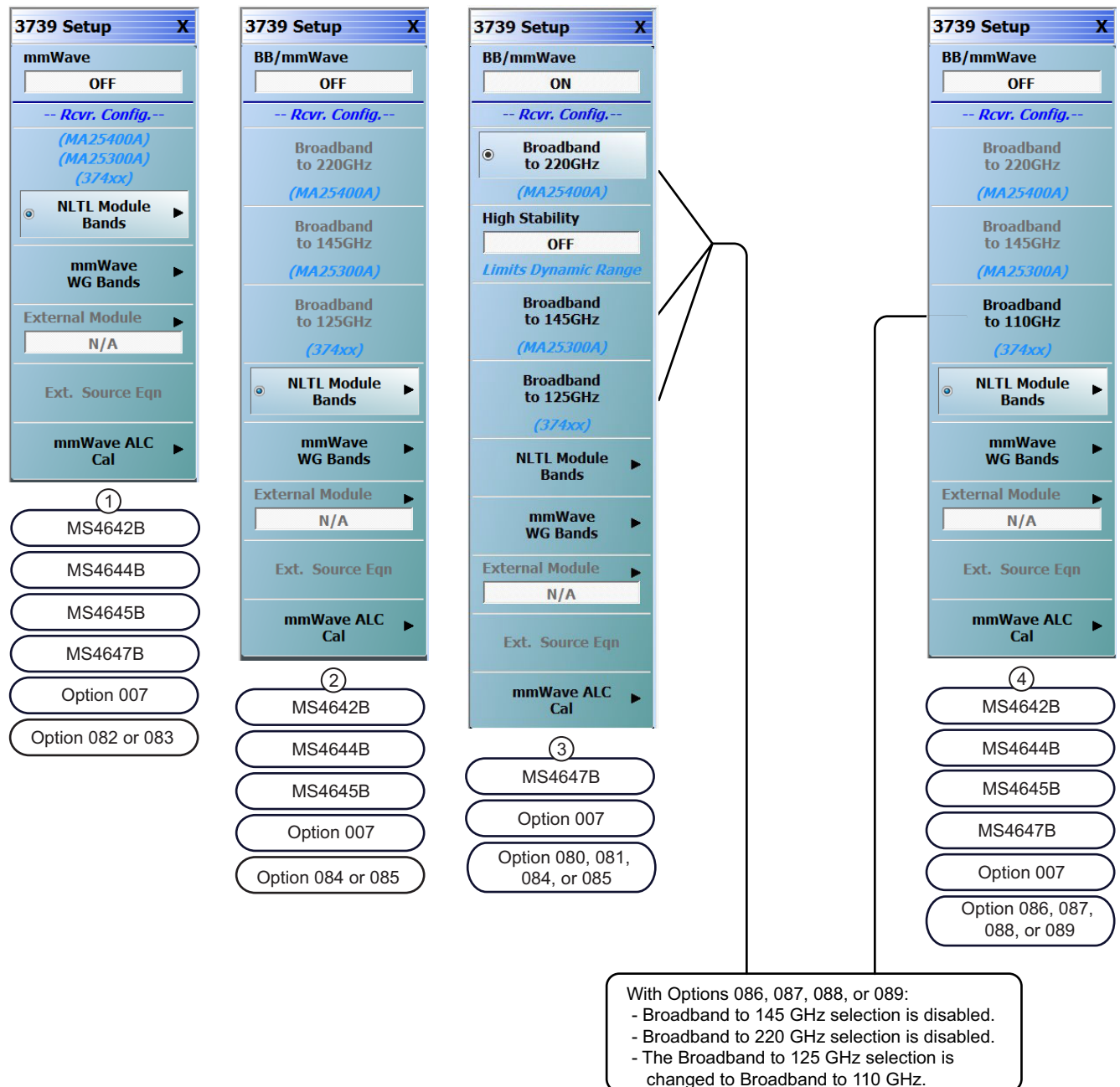
- Option 7 and a compatible Option 8x

Navigation path for MS4642B, 44B, and 45B:

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3739 Setup) | 3739 SETUP

Navigation path for MS4647B:

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3739 Setup) | 3739 SETUP



1. The 3739 SETUP Menu for MS4642B, 44B, 45B, and 47B VNAs with Option 7 and Option 082 or 083.
2. The 3739 SETUP Menu for MS4642B, 44B, and 45B VNAs with Option 7 and Option 084 or 085.
3. The 3739 SETUP Menu for MS4647B VNAs with Option 7 and a Option 80, 081, 084, or 085.
4. The 3739 SETUP Menu for MS4642B, 44B, 45B, and 47B VNAs with Options 086, 087, 088, or 089. The 145 GHz and 220GHz selections are disabled and the 125 GHz selection is changed to 110 GHz.

Figure 14-3. 3739 SETUP Menu Variants

mmWave

Part of the Receiver Configuration button selection group. Only on MS4642B, MS4644B, and MS4645B VNAs equipped with Option 8x. Toggles the mmWave capabilities on and off.

BB/mmWave

Part of the Receiver Configuration button selection group. Only on MS4647B VNAs equipped with Option 08x. Toggles the broadband/mmWave capabilities on and off.

Broadband to 220 GHz

Part of the Receiver Configuration button selection group. Only on MS4647B VNAs equipped with Option 08x. If this is selected, the External Module and Ext. Source Eqn buttons below are not available.

High Stability

Provides increased stability in the face of temperature changes. Dynamic range will be reduced. Toggles the High Stability mode on and off. This button is only available if a 220 GHz band with the MA25400A module is selected.

Broadband to 145 GHz

Part of the Receiver Configuration button selection group. Only on MS4647B VNAs equipped with Option 08x. If this is selected, the External Module and Ext. Source Eqn buttons below are not available.

Broadband to 125 GHz

Part of the Receiver Configuration button selection group. Only on MS4647B VNAs equipped with Option 08x. If this is selected, the External Module and Ext. Source Eqn buttons below are not available.

Broadband to 110 GHz

Part of the Receiver Configuration button selection group. Only on MS4647B VNAs equipped with Options 086, 087, 088, or 089. If this is selected, the External Module and Ext. Source Eqn buttons below are not available.

NLTL Module Bands

Select displays the NLTL MODULE dialog box, which allows one of the banded NLTL sweep bands to be chosen. Only on MS464xB VNAs equipped with Option 08x.

If this item is selected, the External Module and Ext. Source Eqn buttons (below) are not available.

- [“NLTL MODULE Menu” on page 14-9](#)

mmWave WG Bands

Select displays the mmWAVE WG dialog box, which allows operation with OML or VDI mmWave modules to be chosen.

Only on MS464xB VNAs equipped with Option 08x.

If this item is selected, the External Module and Ext. Source Eqn buttons (below) become available.

- [“mmWAVE WG Menu” on page 14-11](#)

External Module

Select displays the EXTERNAL MODULE SELECTION dialog box, where separate control tabs allow configuration of either OML or VDI mmWave modules. Once a module has been selected, the module name appears in the button field.

- [“EXTERNAL MODULE SELECTION Dialog Box” on page 14-20.](#)

Ext. Source Eqn

Select displays the MODIFY EXTERNAL SOURCE EQUATIONS dialog box for OML or VDI module selected.

- [“MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box” on page 14-12.](#)

mmWave ALC Cal

Select displays the MMWAVE ALC CAL (mmWave Automatic Level Control Calibration) menu.

- [“mmWAVE ALC CAL Menu” on page 14-14.](#)

NLTL MODULE Menu

Full Name

Non-linear Transmission Line Module

Previous

- [“3739 SETUP Menu” on page 14-6](#)

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3739 Setup) | 3739 SETUP | NLTL Module Bands | NLTL MODULE Menu
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mm Wave (3739 Setup | 3739 SETUP | NLTL Module Bands | NLTL MODULE Menu

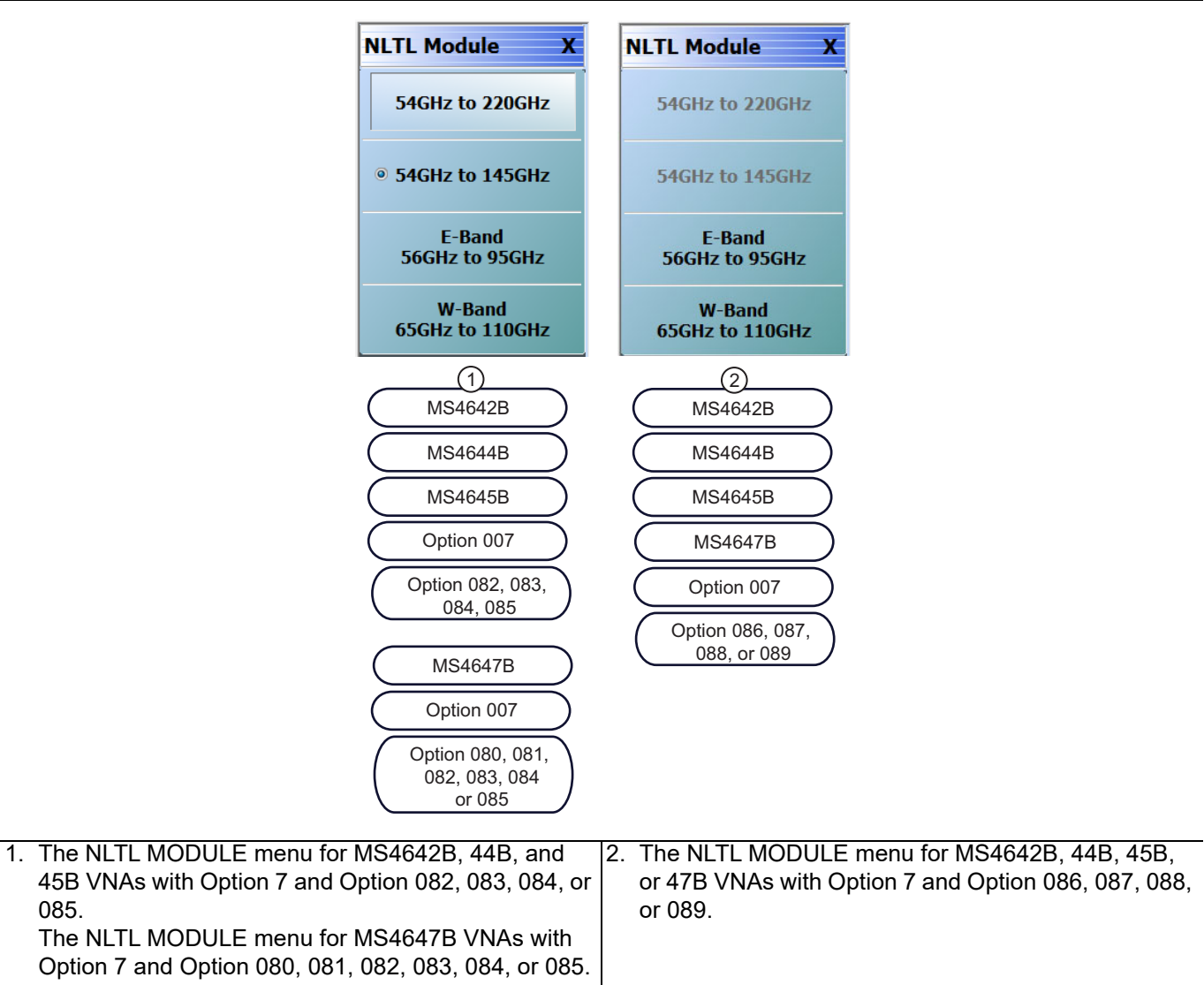


Figure 14-4. NLTL Module Menu

54 GHz to 220 GHz

Part of the Receiver Configuration button selection group. Only on MS464xB VNAs equipped with Option 08x. If this is selected, the External Module and Ext. Source Eqn buttons on the 3739 Menu are not available.

54 GHz to 145 GHz

Part of the Receiver Configuration button selection group. Only on MS464xB VNAs equipped with Option 08x. If this is selected, the External Module and Ext. Source Eqn buttons on the 3739 Menu are not available.

E-Band 56 GHz to 95 GHz

Part of the Receiver Configuration button selection group. Only on MS464xB Series VNAs equipped with Option 8x. If this is selected, the External Module and Ext. Source Eqn buttons on the 3739 Menu are not available.

W-Band 65 GHz to 110 GHz

Part of the Receiver Configuration button selection group. Only on MS464xB Series VNAs equipped with Option 8x. If this is selected, the External Module and Ext. Source Eqn buttons on the 3739 Menu are not available.

mmWAVE WG Menu

Previous

- [“3739 SETUP Menu” on page 14-6](#)

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3739 Setup) | 3739 SETUP | mmWave WG Bands | mmWAVE WG Menu
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mm Wave (3739 Setup | 3739 SETUP | mmWave WG Bands | mmWAVE WG Menu

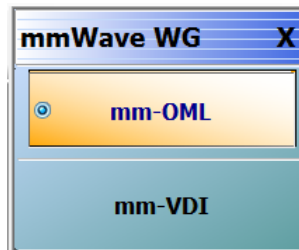


Figure 14-5. mmWAVE WG Menu

mm-OML

Only on MS464xB Series VNAs equipped with Option 8x. Select enables the External Module and the Ext. Source Eqn buttons on the 3739 Menu. The External Module button links to a module selection dialog and configures the VNA to use OML mmWave modules. The module selection is done using the External Module button described below to access the EXTERNAL MODULE SELECTION dialog box. The Ext. Source Eqn (External Source Equation) button links to the MODIFY EXTERNAL SOURCE EQUATIONS dialog box.

mm-VDI

Only on MS464xB Series VNAs equipped with Option 8x. Select enables the External Module button which links to a module selection dialog and configures the VNA to use VDI mmWave modules. The module selection is done using the External Module button below to access the EXTERNAL MODULE SELECTION dialog box.

MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box

Previous

- The previous menu varies depending on the instrument model.
- MS4642B or MS4644B VNAs: “3738 SETUP Menu” on page 14-4
- MS4645B or MS4647B VNAs: “3739 SETUP Menu” on page 14-6

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3738 Setup) | 3738 SETUP | Ext. Source Eqn | MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mm Wave (3738 Setup | 3738 SETUP | Ext. Source Eqn | MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3739 Setup) | 3739 SETUP | Ext. Source Eqn | MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mm Wave (3739 Setup | 3739 SETUP | Ext. Source Eqn | MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box

1

Modify External Source Equations

Start F (GHz)

67.000000000

Stop F (GHz)

110.000000000

Broadband Break F (GHz)

67.000000000

Multiplier / Divisor

IF

LO (Ext Src 1) =

1

/

8

*

(F - 12.35 MHz)

RF (Ext Src 2) =

1

/

6

*

F

OK

Cancel

2

Modify External Source Equations

Start F (GHz)

67.000000000

Stop F (GHz)

110.000000000

Multiplier / Divisor

IF

LO (Ext Src 1) =

1

/

8

*

(F - 12.35 MHz)

RF (Ext Src 2) =

1

/

6

*

F

OK

Cancel

3

Modify external Source Equations (WR-10 Extended)

Start F (GHz)

67.000000000

Stop F (GHz)

110.000000000

Multiplier / Divisor

IF

LO (Ext Src 1) =

1

/

8

*

(F + 12.35 MHz)

RF (Ext Src 2) =

1

/

6

*

F

OK

Cancel

1. 3738 SETUP Menu and setup dialog for Broadband External Source Equations at top left.

- Note the minus sign (“-”) in the frequency portion of the equation.

2. 3738 SETUP Menus and setup dialog for mmWave External Source Equations at bottom left.

- Note the minus sign (“-”) in the frequency portion of the equation.

3. 3739 SETUP Menu and setup dialog for mmWave External Source Equations at bottom right.

- Note the plus sign (“+”) in the frequency portion of the equation.
- Also, there is no corresponding dialog with a breakpoint frequency as shown above left at #1.

Figure 14-6. MODIFY EXTERNAL SOURCE EQUATIONS Dialog Box

Broadband Source Equation

For broadband source equations, enter the following parameters:

- Start Frequency (GHz)
- Stop Frequency (GHz)
- Broadband Break Frequency (GHz)
- LO External Source 1 Multiplier (Integer)
- LO External Source 1 Divisor (Integer)
- RF External Source 2 Multiplier (Integer)
- RF External Source 2 Divisor (Integer)

Millimeter Wave Source Equation

For the millimeter wave source equations, the same parameters above are entered omitting the Broadband Break Frequency.

mmWAVE ALC CAL Menu

Full Name

mmWave Automatic Level Control Calibration

Previous

- “3739 SETUP Menu” on page 14-6
- “POWER Menu – Frequency-Based Sweep – 2-Port VNAs” on page 5-16
- “POWER Menu – Frequency-Based Sweep – 2-Port VNAs (Option 32)” on page 5-18
- “POWER Menu – Segment-Based Sweeps – 2-Port VNAs” on page 5-20
- “POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs” on page 5-39
- “POWER SETUP Menu – Power-Based Sweep Menu – 2-Port VNAs (Option 32)” on page 5-42
- “POWER Menu – Frequency-Based Sweep – 4-Port VNAs” on page 6-16
- “POWER Menu – Frequency-Based Sweep – 4-Port VNAs with Option 32” on page 6-18
- “POWER Menu – Segment-Based Sweep – 4-Port VNAs” on page 6-20
- “POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs” on page 6-39
- “POWER SETUP Menu – Power-Based Sweep Menu – 4-Port VNAs with Option 32” on page 6-42

Navigation

- There are multiple navigation paths to this menu.
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3739 Setup) | 3739 SETUP | mmWave ALC Cal | mmWAVE ALC CAL



Figure 14-7. mmWAVE ALC CAL Menu – mmWave Automatic Level Control Calibration

Type of Leveling Button Group Start

The IF, RF, and Base VNA Cal buttons at the top of the menu form a button selection group where only one type of leveling can be selected.

IF

If the IF type of leveling is selected, it provides the advantages of RF leveling described below plus the benefit of greater power control range and a lower minimum leveled power (at least 20 dB lower typically). As one approaches a 100 MHz difference between source and receiver frequencies, the power control range will start to decrease as will power control accuracy. The use of IF leveling is not recommended for source-receiver frequency differences greater than 100 MHz.

RF

If the RF type of leveling is selected, it provides a leveled RF output power with improved source match, protection against over powering the DUT, and insuring that the DUT is operating in its designated power range.

Base VNA Cal

If the VNA type of leveling is selected, it turns the RF or IF ALC off and the ALC accuracy is set as that for the standalone VNA instrument.

Type of Leveling Button Group End

The Base VNA Cal button is the end of the Type of Leveling button group.

Perform Cal

Select starts the calibration type selected above (IF, RF, or VNA) and displays the mmWAVE ALC CAL dialog box. A suffix is added to the dialog name denoting the selected mmWave module.

- [“mmWAVE ALC CAL \(MM MODULE NAME\) Dialog Box” on page 14-16](#)

Save IF Leveling Cal

Select displays a SAVE IF LEVELING dialog box. Navigate to the required folder to save the calibration.

Save RF Leveling Cal

Select displays a SAVE RF LEVELING dialog box. Navigate to the required folder to save the calibration.

Recall IF Leveling Cal

Select displays a RECALL IF LEVELING dialog box. Navigate to the required folder to recall the calibration.

Recall RF Leveling Cal

Select displays a RECALL RF LEVELING dialog box. Navigate to the required folder to recall the calibration.

Erase IF Leveling Cal

Select displays a ERASE IF LEVELING menu. Select the port to erase IF Leveling for.

Erase RF Leveling Cal

Select displays a ERASE RF LEVELING menu. Select the port to erase RF Leveling for.

mmWAVE ALC CAL (MM MODULE NAME) Dialog Box

Full Name

mmWave Automatic Level Control (Typical module name such as WR-10 Extended)

Previous

- [“mmWAVE ALC CAL Menu” on page 14-14.](#)

Prerequisites

- 3739 Setup | BB/mmWave option should be set to ON
- Either mm-OML or mm-VDL should be selected

Navigation

- There are multiple navigation paths to this menu.
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3739 Setup) | 3739 SETUP | mmWave ALC Cal | mmWAVE ALC CAL | Perform Cal | mmWAVE ALC CAL dialog box

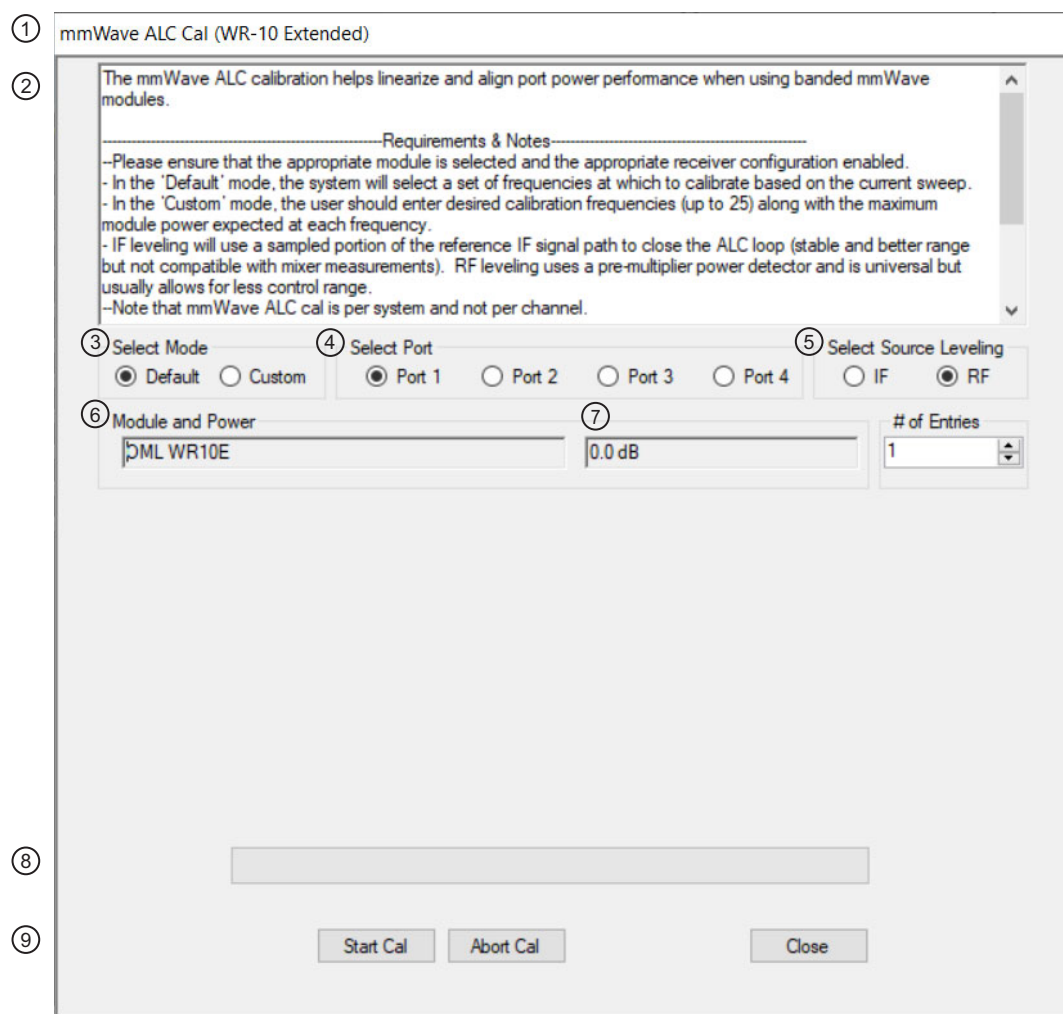


Figure 14-8. mmWAVE ALC CAL (MODULE NAME) Dialog Box (Default Mode) (1 of 2)

1. mmWAVE ALC CAL (MODULE NAME) Dialog Box	5. Select Source Leveling as either IF or RF.
2. General instructions. See below.	6. Connected Module Name Display.
3. Select Mode Radio Buttons.	7. Power (dB) Level Display.
4. Select Port Radio Buttons – Select either Port 1 or Port 2.	8. Calibration Progress Bar
	9. Dialog Box Control Buttons.

Figure 14-8. mmWAVE ALC CAL (MODULE NAME) Dialog Box (Default Mode) (2 of 2)

General Instructions

ALC Calibration consists of several sub calibrations that ensure accurate output power and overall system.

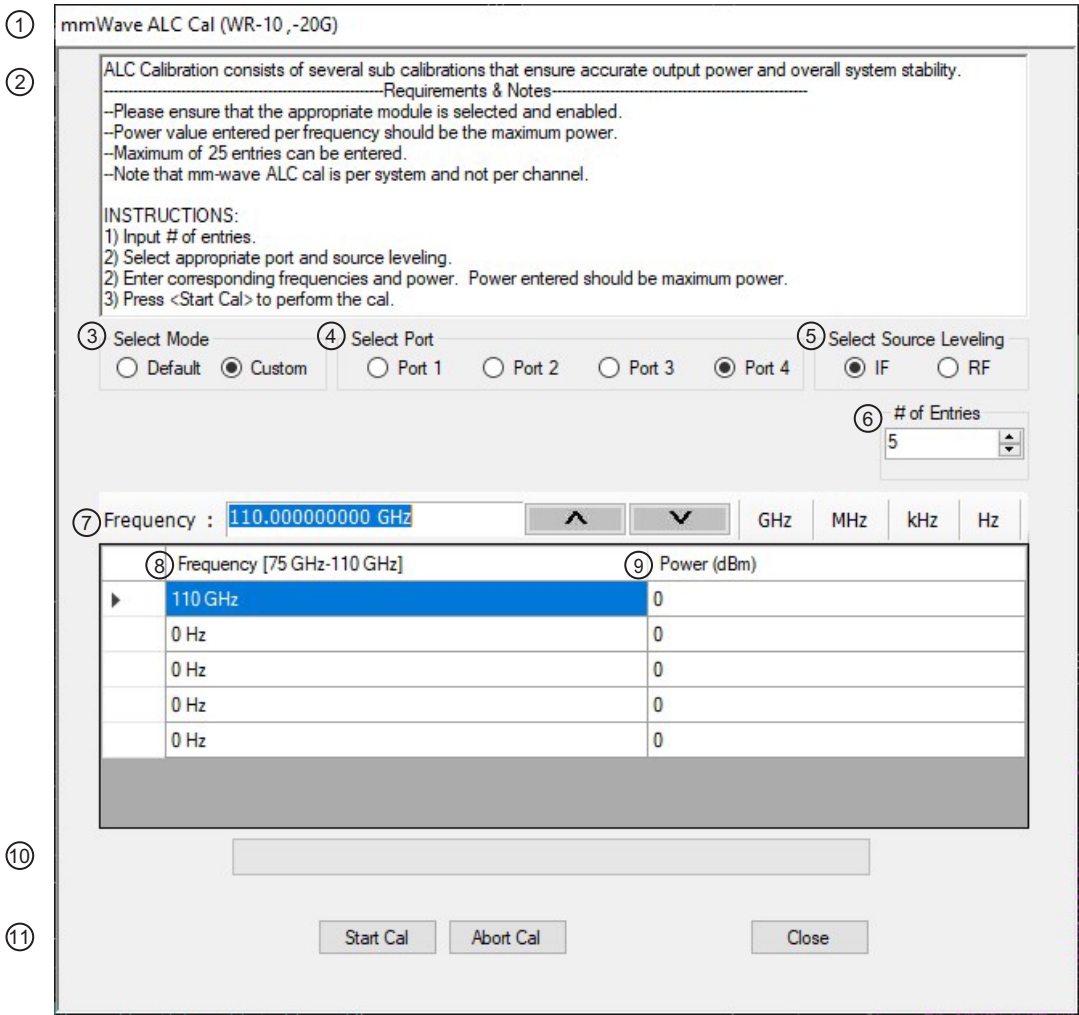
Requirements and Notes

The following requirements and notes apply:

- Please ensure that the appropriate module is selected and enabled.

Instructions (Default Mode)

1. Select Default Mode.
2. Select appropriate port.
3. Select Leveling as either IF or RF.
4. Select Start Cal to perform the calibration.
5. Select Abort Cal to stop the calibration.
6. Select Close to exit the dialog box to the mmWAVE ALC CAL menu.



1. mmWAVE ALC CAL (MODULE NAME) Dialog Box
2. General instructions. See below.
3. Select Mode Radio Buttons.
4. Select Port Radio Buttons – Select either Port 1 or Port 2.
5. Select Source Leveling as either IF or RF.
6. # of Entries (Number of Entries) input field. Up to 25 frequency/power combinations can be entered.
7. Frequency Input. When this has the focus, the Frequency Field Toolbar appears to allow value and units input for each entry row.
8. Power (dB) level for each frequency. When it has the focus, the Power (dB) field toolbar (not shown here) appears to allow value input for each entry row.
9. Power (dB) Field Toolbar.
10. Calibration Progress Bar.
11. Dialog box control buttons.

Figure 14-9. mmWAVE ALC CAL (MODULE NAME) Dialog Box (Custom Mode)

General Instructions (Custom Mode)

ALC Calibration consists of several sub calibrations that ensure accurate output power and overall system.

Requirements and Notes

The following requirements and notes apply:

- Power value entered per frequency should be the maximum power.
- Maximum of 25 entries can be entered.

Instructions

1. Input the # of entries (Number of Entries).
2. Select appropriate port.
3. Enter corresponding frequencies and power. Power entered should be maximum power.
4. Select **Start Cal** to perform the calibration.
5. Select **Abort Cal** to stop the calibration.
6. Select **Close** to exit the dialog box to the mmWAVE ALC CAL menu.

EXTERNAL MODULE SELECTION Dialog Box

Previous

There are multiple paths to this dialog box:

- “3738 SETUP Menu” on page 14-4
- “3739 SETUP Menu” on page 14-6

Navigation

There are multiple paths to this dialog box depending on the instrument model number and the equipped options:

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3738 Setup) | 3738 SETUP | External Module | EXTERNAL MODULE SELECTION dialog box
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | mmWave (3739 Setup) | 3739 SETUP | External Module | EXTERNAL MODULE SELECTION dialog box
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3738 Setup) | 3738 SETUP | External Module | EXTERNAL MODULE SELECTION dialog box
- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3739 Setup) | 3739 SETUP | External Module | EXTERNAL MODULE SELECTION dialog box

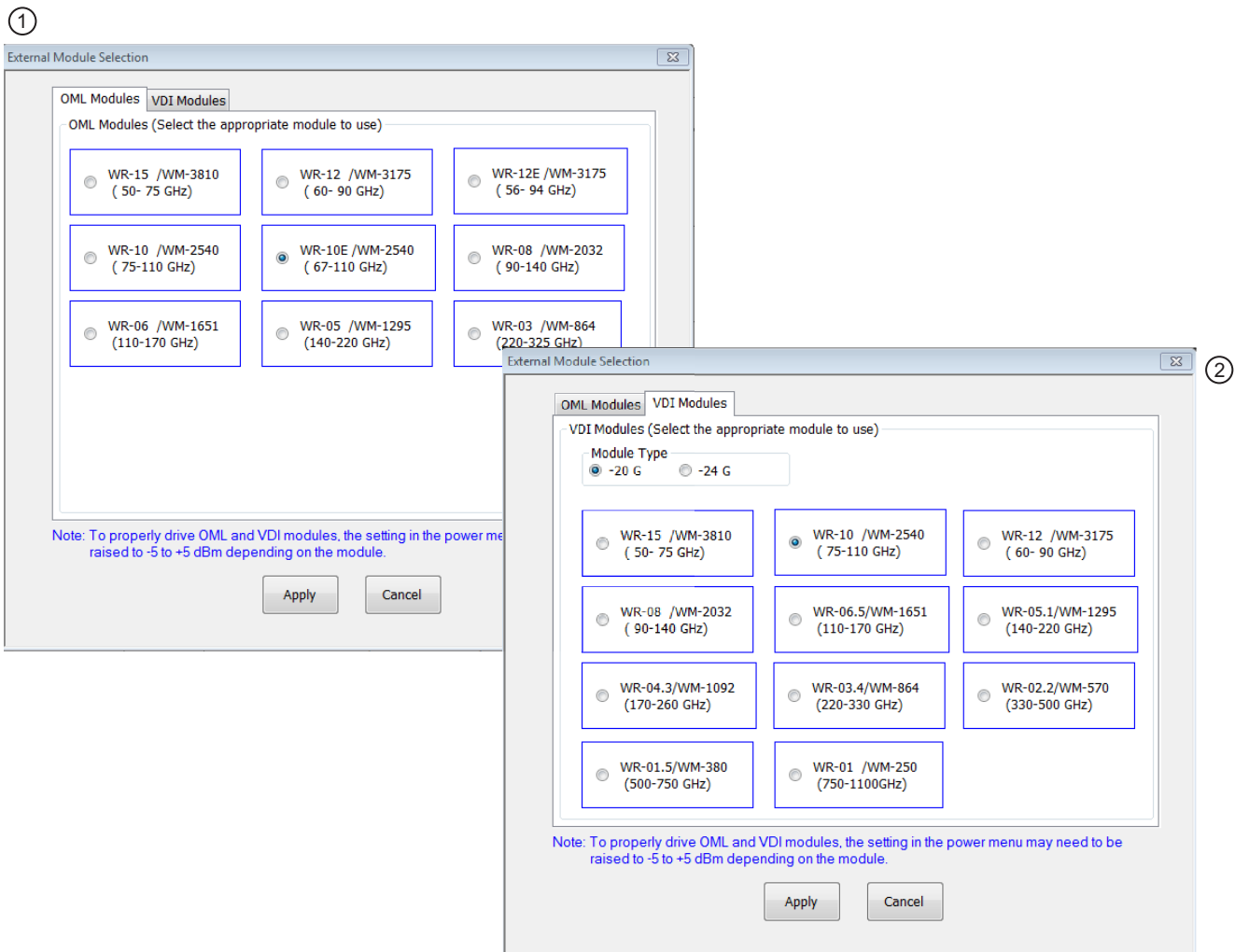


Figure 14-10. EXTERNAL MODULE SELECTION Dialog Box (1 of 2)

1. The OML tab is selected and the available OML Modules are shown. Select a module radio button to configure that module.	2. The VDI tab is selected and the available VDI Modules are shown. Select a module radio button to configure that module. Note that VDI modules have two basic types: -20 G and -24 G. The type indicates the maximum LO/RF frequency (in GHz) that the module requires. The module type selected here must match the module being used, as the two types have slightly different frequency plans.
--	---

Figure 14-10. EXTERNAL MODULE SELECTION Dialog Box (2 of 2)

External Module Summary Notes

- **WR Numbers**

The WR number abbreviation is for “rectangular waveguide” using English measurement units. The interior dimensions of waveguides have an aspect ration of 2:1, where the broad wall is twice the dimension of the narrow wall. The number following is approximately the broad wall length in mils (0.001 in) divided by 10. For example, the WR-62 waveguide has a broad wall dimension of 620 mils (0.620 in) divided by 10 which yields 62. The larger the WR Number, the lower the operating frequency range. Both OML Modules and VDI Modules reference WR and the equivalent WM Numbers.

- **WM Numbers**

WM numbers are an emerging metric specification for equivalent and new waveguides using metric measurements. The interior opening aspect ratio follows the same 2:1 ratio. The number is derived from the broadwall dimension in micrometers (μm or 0.0001 m). For example, the WM-570 has a broadwall dimension of 570 μm . The larger the WM Number, the lower the operating frequency range. Both OML Modules and VDI Modules reference both WR and the equivalent WM Numbers.

- **Anritsu Numbers**

Anritsu has the following Broadband/mmWave module models:

- MA25300A mmWave Module, 54 to 145 GHz – Requires a MS4647B VNA with Broadband/mmWave Option 8x and a 3739B/C Test Set.
- MA25400A mmWave Module, 54 to 220 GHz – Requires a MS4647B VNA with Broadband/mmWave Option 8x and a 3739B/C Test Set.
- 3743A mmWave Module, 54 to 125 GHz – Requires a MS4647B VNA with Broadband/mmWave Option 8x and a 3739x Test Set.
- 3743AX mmWave Module, 54 to 125 GHz – Requires a MS4647B VNA with Broadband/mmWave Option 8x and a 3739x Test Set.
- 3743E mmWave Module, 54 to 110 GHz – Requires a MS4647B VNA with Broadband/mmWave Option 8x and a 3739x Test Set.
- 3743EX mmWave Module, 54 to 110 GHz – Requires a MS4647B VNA with Broadband/mmWave Option 8x and a 3739x Test Set.
- 3744A-EW/SM6597 mmWave Module, W-Band, 65 to 110 GHz – Requires any MS464xB Series VNA equipped with mmWave Option 8x and a mmWave Test Set.
- 3744E-EW mmWave Module, W-Band, 65 to 110 GHz – Requires any MS464xB Series VNA equipped with mmWave Option 8x and a mmWave Test Set.
- 3744A-EE/SM6499 mmWave Module, E-Band, 56 to 95 GHz – Requires any MS464xB Series VNA equipped with mmWave Option 8x and a mmWave Test Set.
- 3744E-EE mmWave Module, E-Band, 56 to 95 GHz – Requires any MS464xB Series VNA equipped with mmWave Option 8x and a mmWave Test Set.
- 3743A-Rx; This module is typically ordered as an accessory to the ME7838 system. When ordering this module, the base VectorStar VNA must have Noise Figure Option 41
- 3743E Rx; This module is typically ordered as an accessory to the ME7838 system. When ordering this module, the base VectorStar VNA must have Noise Figure Option 41.

14-5 Broadband/mmWave Control

EXTERNAL MODULE CTRL Dialog Box Overview

Full Name

External Module Control

Previous

- [“MULTIPLE SOURCE Menu” on page 13-3](#)

Navigation

- MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | Multiple Source | MULTIPLE SOURCE | Ext. Mod. Ctrl. | EXTERNAL MODULE CTRL Dialog Box

Description

The EXTERNAL MODULE CTRL dialog box controls the configuration of attached broadband modules and systems.

For Modular Broadband (Modular BB), an MS4647B VNA with Option 8x is required with a connected 3739C Broadband/mmWave Test Set and MA25x00A or 3743x mmWave Modules.

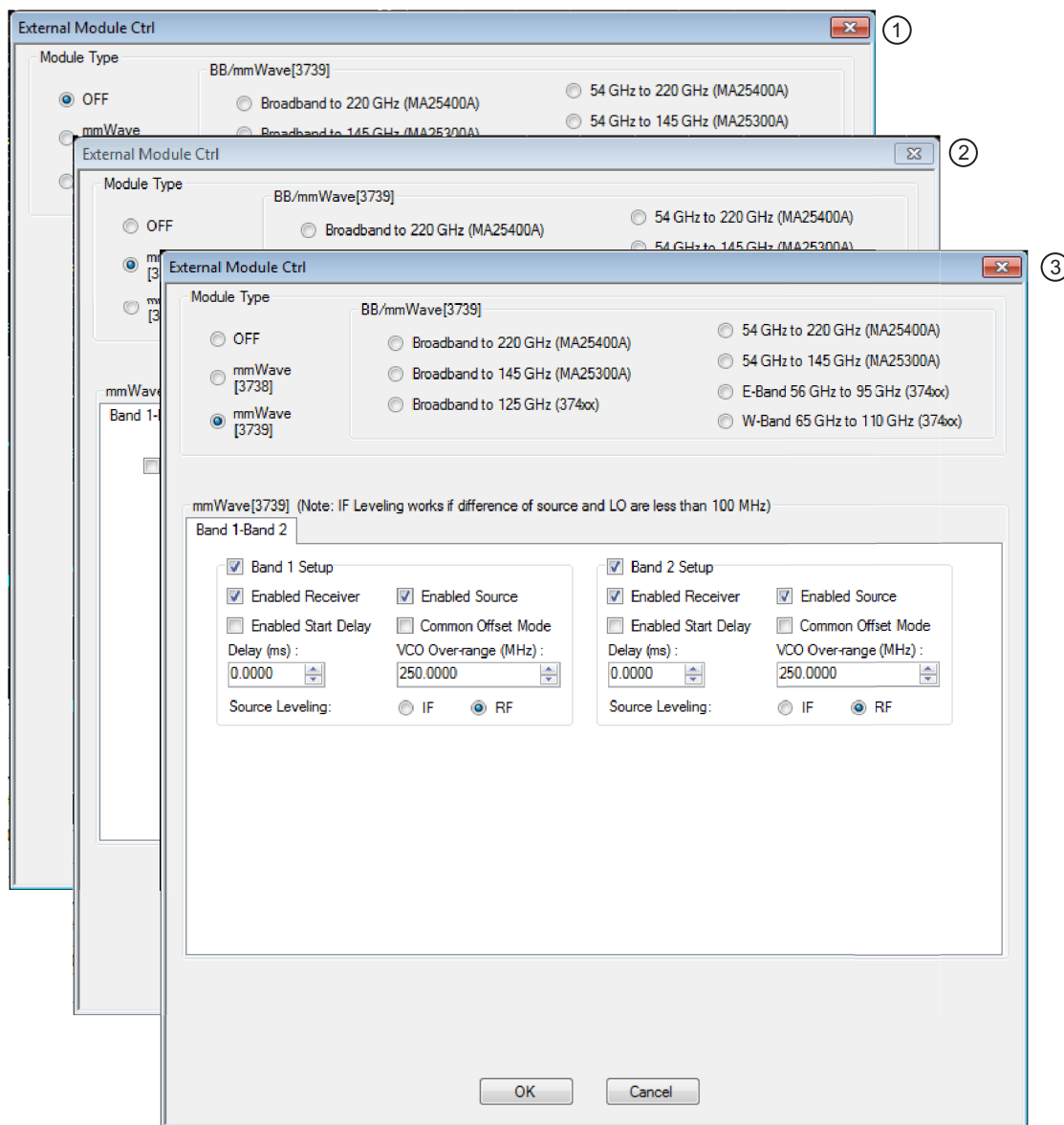
For Standard BB, an MS464xB Series VNA is required with a connected 3738A Broadband/mmWave Test Set and related modules and signal generators.

[Figure 14-11 on page 14-23](#) shows the EXTERNAL MODULE CTRL dialog box variants for OFF, mmWave 3738, and mmWave 3739.

[Figure 14-12 on page 14-24](#) shows the variants for Broadband to 220 GHz, 145 GHz, and 125 GHz; and 54 GHz to 220 GHz and 145 GHz.

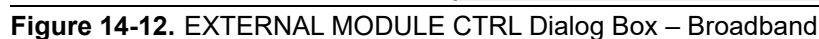
[Figure 14-13 on page 14-26](#) shows the variants for E-Band 56 GHz to 95 GHz and W-Band 65 GHz to 110 GHz.

[Figure 14-18 on page 14-34](#) shows the dialog box for systems with Option 84, 85, 86, 87, 88, or 89. These selections are 110 GHz, E-Band 56 GHz to 95 GHz, and W-Band 65 GHz to 110 GHz



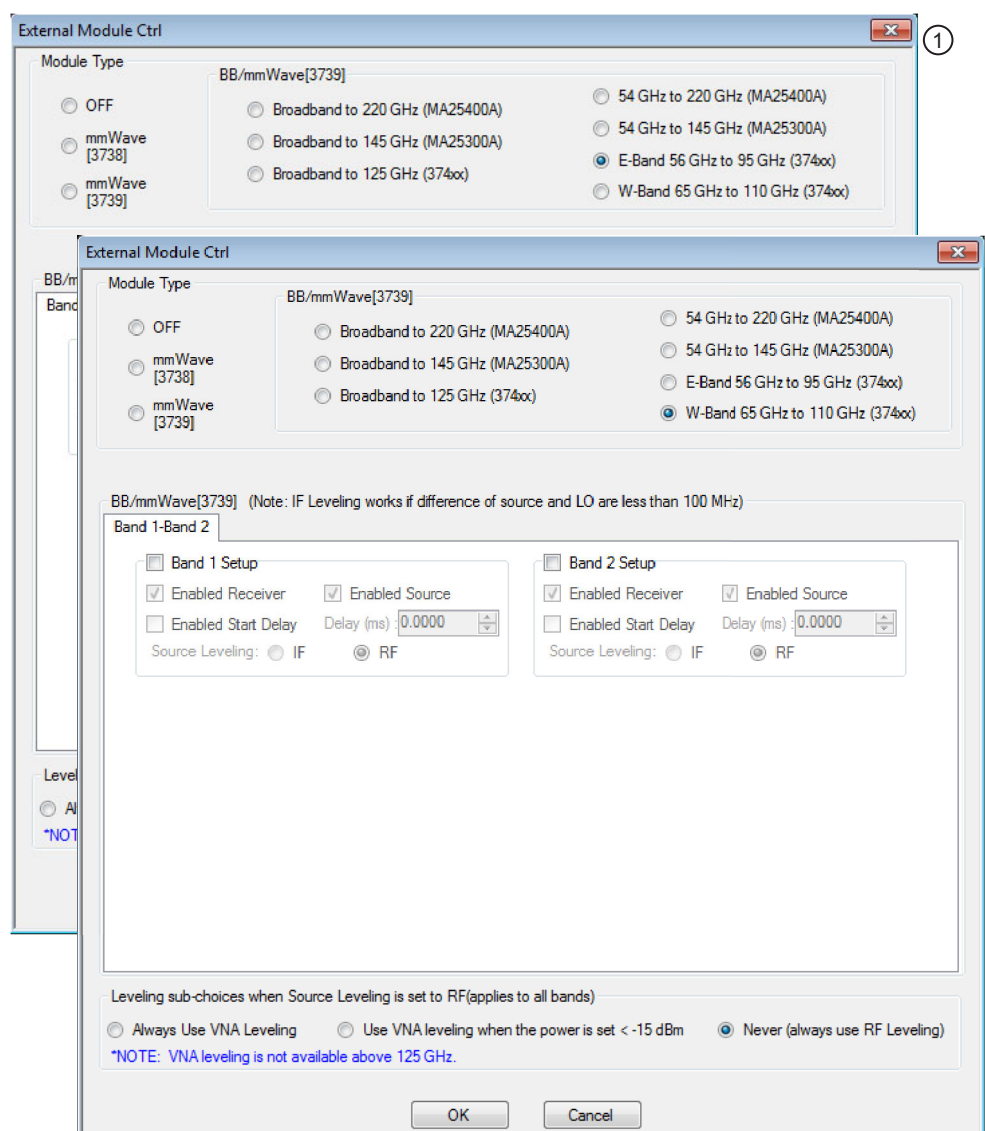
- | | |
|--|--|
| <p>1. Dialog box with Module Type OFF selected.</p> <p>2. Dialog box with Module Type mmWave (3738) selected. Selection boxes enable Band 1 and/or Band 2.</p> | <p>3. Dialog box with Module Type mmWave (3739) selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2.</p> |
|--|--|

Figure 14-11. EXTERNAL MODULE CTRL Dialog Box Variants – OFF, mmWave 3738, and mmWave 3739



- | | |
|---|---|
| <p>1. Dialog box with Module Type Broadband to 220 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4647B VNAs equipped with Option 8x.</p> <p>2. Dialog box with Module Type Broadband to 145 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4647B VNAs equipped with Option 8x.</p> <p>3. Dialog box with Module Type Broadband to 125 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4647B VNAs equipped with Option 8x.</p> | <p>4. Dialog box with Module Type 54 GHz to 220 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4647B VNAs equipped with Option 8x.</p> <p>5. Dialog box with Module Type 54 GHz to 220 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4647B VNAs equipped with Option 8x.</p> |
|---|---|

Figure 14-12. EXTERNAL MODULE CTRL Dialog Box – Broadband



1. Dialog box with Module Type E-Band 56 GHz to 95 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4644B, MS4645B, or MS4647B VNAs equipped with Options 08x.
2. Dialog box with Module Type W-Band 65 GHz to 110 GHz selected. Selection boxes and control fields enable configuration control of Band 1 and/or Band 2. This module type and mode only available with MS4644B, MS4645B, or MS4647B VNAs equipped with Option 8x.

Figure 14-13. EXTERNAL MODULE CTRL Dialog Box – E-Band, and W-Band

EXTERNAL MODULE CTRL Dialog Box – Module Type = OFF

External mmWave or broadband test sets are not being used. The dialog in this state is shown in [Figure 14-14](#) below. The 3739 test set does not require external synthesizers so these non-OFF choices will always be available assuming Option 8x is present. The 3738 test set does not require additional options but does require the presence of external synthesizers 1 and 2 on the GPIB bus.

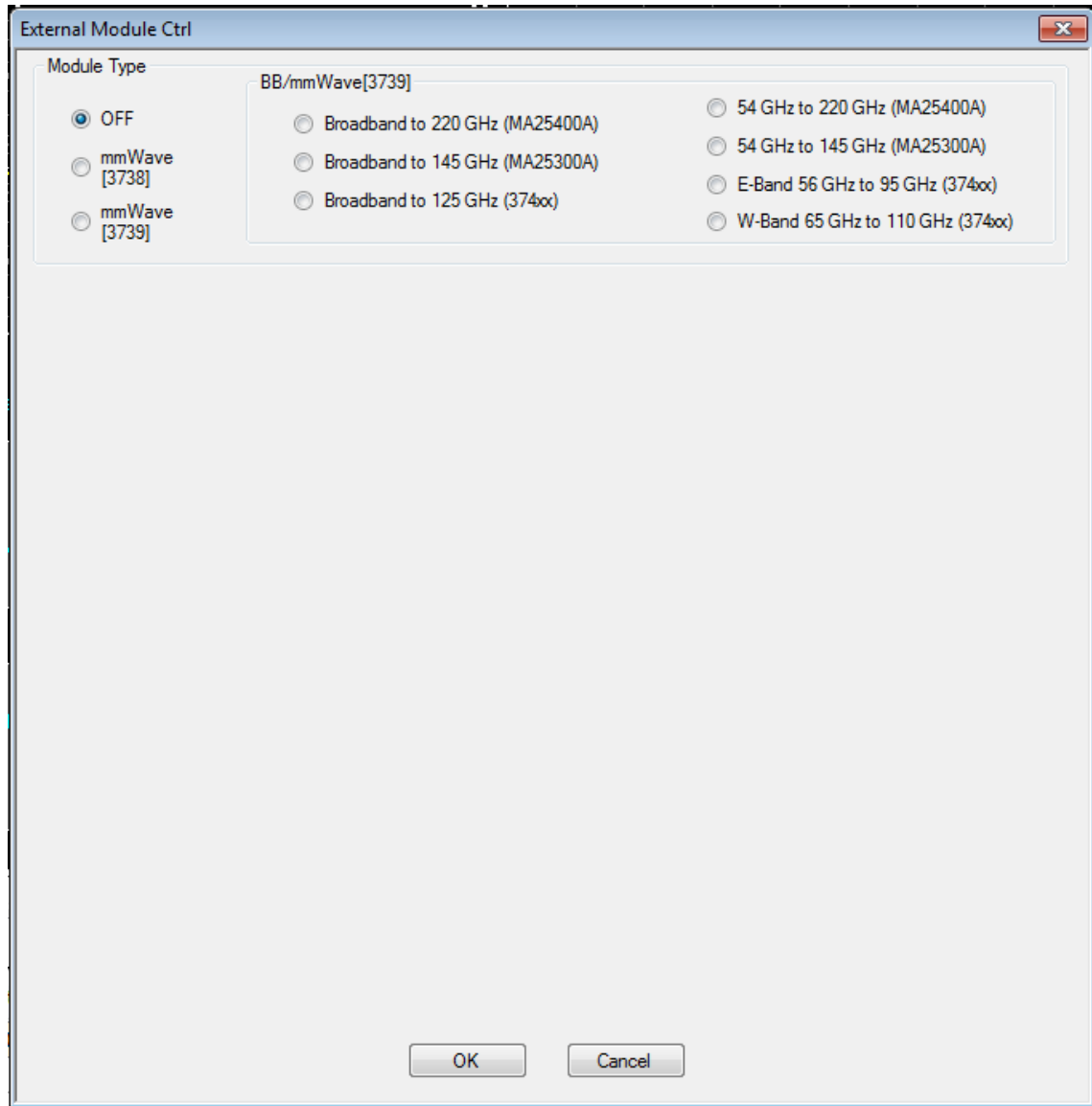


Figure 14-14. EXTERNAL MODULE CTRL Dialog Box – Set for OFF

EXTERNAL MODULE CTRL Dialog Box – Module Type = mmWave (3738)

The 3738X Test set is being used with conventional OEM mmWave modules (the ME7828 family of systems). In this case, a check box will be available per-defined band to allow activation of the test set in that band. This option is only available if External Sources 1 and 2 are connected and active. There are no other parameters to select other than to activate or de-activate on a band-by-band basis.

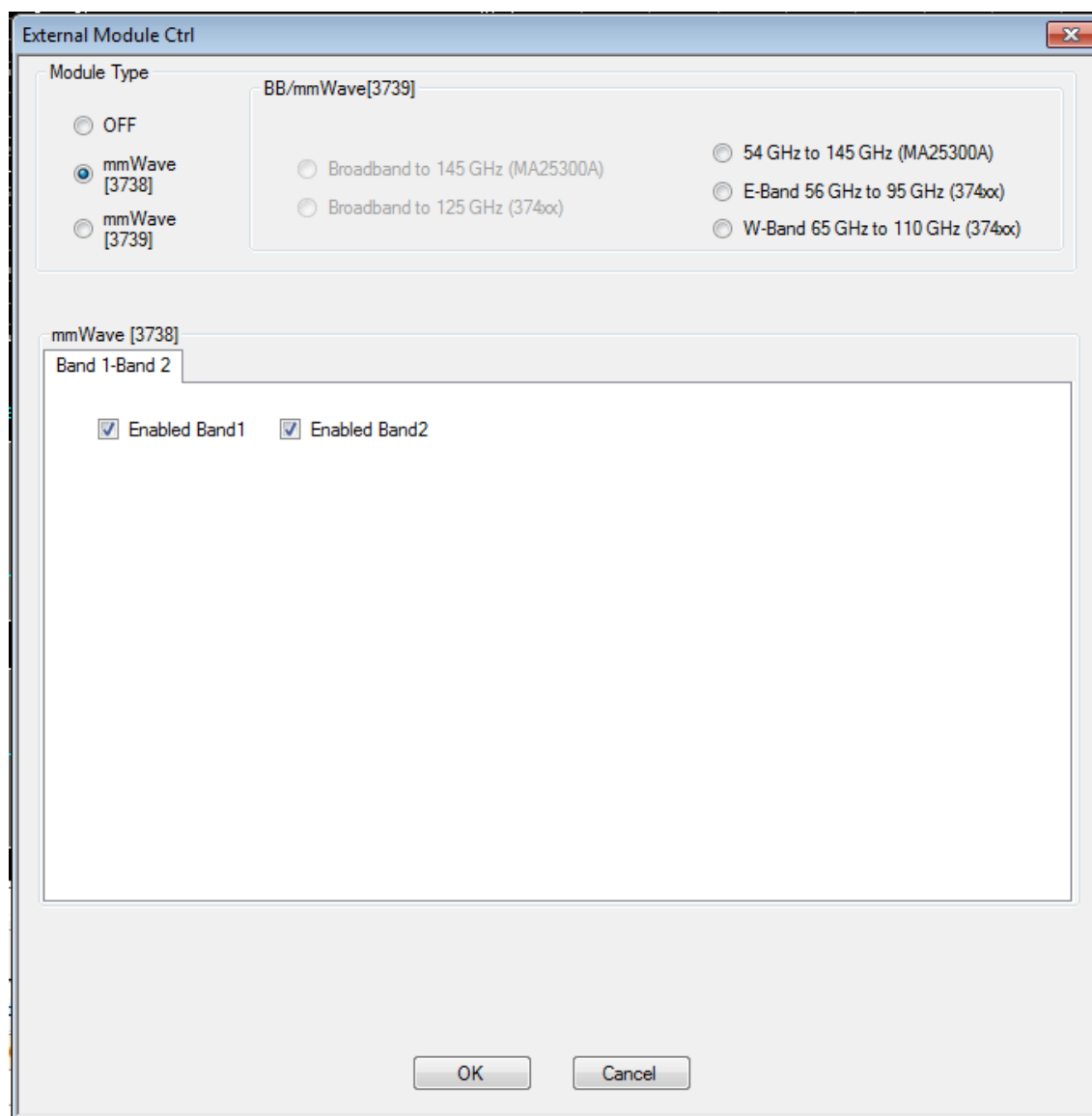


Figure 14-15. EXTERNAL MODULE CTRL Dialog Box – Set for mmWave (3738)

As an example to show how this selection might be used, consider a DUT that is a downconverter taking 250 to 300 GHz down to a fixed IF of 1 GHz. The LO is sub-harmonically driven with an effective multiplier of 18 and will be driven from External Source 3 (EXT. SRC 3). The RF is supplied by an external mmWave module (WR-03 waveguide in this case) which also has an effective source multiplier of 18 and this will be driven from EXT. SRC. 1. This external module also has an LO input (x20 effective multiplier) that will be driven from EXT SRC 2. It is desired to measure both return loss (at the RF) of the DUT as well as its conversion loss. This will require two different multiple source setups since the conversion paths in the VNA are different. The example measurement is described below:

Return Loss Measurement

Connect all external synthesizers and make sure the GPIB addresses match and 10 MHz clocks are synchronized (or higher frequency references if those are being used). It is desired that the DUT LO port be driven since that can affect return loss. Since the IF outputs of the mmWave module will be used (and routed to the VNA rear panel), the Ext Module Ctrl for BB/mmWave must be enabled.

- Band 1: 250-300 GHz
- Int Src (Internal Source) = $1/1(\text{CW } 3 \text{ GHz})$
 - We are not using the internal source so it is just parked.
- Ext Src1 (External Source) = $1/18(f + 0)$
- Ext Src2 = $1/20(f + 12.35 \text{ MHz})$
 - The system IF (rear panel) is 12.35 MHz.
- Ext Src3 = $1/18(f + 1 \text{ GHz})$
- Rcvr (Receiver) = $1/1(\text{CW } 2 \text{ GHz})$
 - We are not using the internal LO so this is just parked.

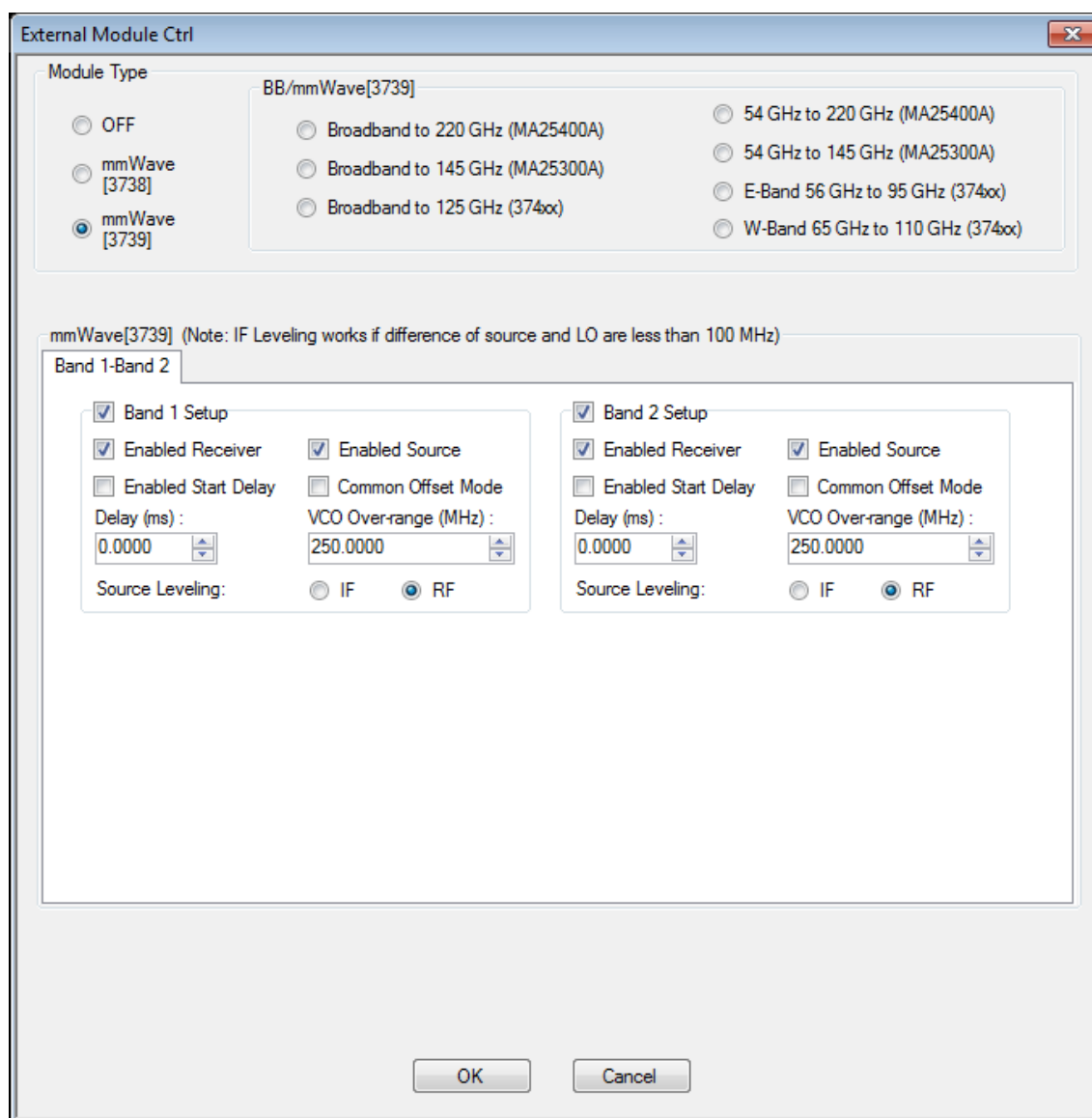
Conversion Loss Measurement

In this case, Ext Module Ctrl must be OFF since we will not be using the rear panel IFs. Note that this also disables the test set, so some care is required with RF signal cabling.

- Band 1: 250 to 300 GHz
- Int Src = $1/1(\text{CW } 3 \text{ GHz})$
 - We are not using the internal source so it is just parked.
- Ext Src1 = $1/18(f + 0)$
- Ext Src2 = $1/1(\text{CW } 2 \text{ GHz})$
 - The external mmWave module LO is not being used.
- Ext Src3 = $1/18(f + 1 \text{ GHz})$
- Rcvr = $1/1(\text{CW } 1 \text{ GHz})$
 - The DUT IF is routed to a port or receiver loop so it can be converted.

EXTERNAL MODULE CTRL Dialog Box – Module Type = mmWave (3739)

The mmWave (3739) selection also assumes the use of OEM mmWave modules but with the 3739 Test Set. Details on some applicable modules, from a hardware perspective, are discussed below and in [Chapter 13, “Multiple Source”](#). Any multiplied transceivers can be used here as long as the frequency and power plans are consistent with the VectorStar system with the 3739X test set. The Test Set offers additional power control options and assumes the use of the internal VNA sources so there are some additional selection options as suggested by [Figure 14-16](#) below.



The external module control dialog is shown as configured for a single active band of mmWave (3739).

Figure 14-16. EXTERNAL MODULE CTRL Dialog Box – Set for mmWave (3739)

The selection choices per band are described below:

- **Enabled Receiver**

Use the receiver in the remote modules. Above this breakpoint, the VNA system LO will be set appropriately in terms of frequency and power, the test set configured, and the VNA rear panel IFs will be activated.

- **Enabled Source**

Use the source multipliers in the remote modules. When enabled the VNA synthesizers will be set appropriately, the test set configured as needed, and ALC leveling prepared (see below).

- **Enabled Start Delay**

This enables a fixed delay at the beginning of the band. This could be useful for certain slow settling DUT measurements or for very low power levels.

- **Common Offset mode**

At higher multiples (generally for modules running over 300 GHz), it may be desired to improve source correlation to reduce trace noise. This can be done with the Common Offset mode bit (and it automatically done in the 3739 mmWave modes discussed in chapter 16). If the source and receiver frequencies (when reduced to the 2.5-5 GHz range by division) differ by more than about 50 MHz with this bit selected, phase lock errors may occur so this selection is not appropriate for millimeter wave mixer measurements but is useful for IMD and other related measurements.

- **VCO Overrange**

Normally, the internal VNA multipliers switch at 5, 10, 20, and 40 GHz. In some mmWave modules operating with high multipliers, it may be desirable to push those switch points out further (up to 5.5, 11, 22, and 44 GHz typical but not guaranteed). This overrange (expressed in MHz relative to the 5 GHz breakpoint) sets the new breakpoints.

- **Source Leveling**

The leveling choice determines which detection path is used (RF implies the VNA detection on the RF drive path, IF uses the test set detection on a reference IFs). Additional cals using the mmWave ALC subsystem may be required. Generally IF leveling is only valid if the IF coming from the mmWave modules is under 100 MHz.

EXTERNAL MODULE CTRL Dialog Box – Module Type = BB/mmWave (3739)

This right side of the radio button array is for the broadband operation (with the 3739x test set and the MA25300A, MA25400A, and 3743x modules) and for banded operation (using the 3739x test set and the 3743x or 3744x modules). The selection for BB/mmWave is straightforward. When checked in a given band, the test set will be activated, the VNA internal transfer switch will be shut down, and the rear panel IF ports on the VNA will be activated.

There are seven choices for use with the MA25300A, MA25400A, 3743X, and 3744X modular heads:

- Broadband to 220 GHz (MA25400A)
 - **High Stability:** Provides increased stability in the face of temperature changes. Dynamic range will be reduced. Toggles the High Stability mode on and off.
- 54 GHz to 220 GHz (MA25400A)
- Broadband to 145 GHz (MA25300A)
- 54 GHz to 145 GHz (MA25300A)
- Broadband to 125 GHz (374xx)
- E-Band (374xx)
- W-Band (374xx)

The distinction between these selections is based on the imposed frequency range limits when activated.

- Broadband to 220 GHz allows from the lower instrument limit up to 220 GHz (using MA25400A modules).
- 54 GHz to 220 GHz allows from 54 GHz to 220 GHz. (using MA25400A modules)
- Broadband to 145 GHz allows from the lower instrument limit up to 145 GHz (using MA25300A modules).
- 54 GHz to 145 GHz allows from 54 GHz to 145 GHz. (using MA25300A modules)
- Broadband to 125 GHz allows from the lower instrument limit up to 125 GHz (using (374xx modules).
- E-Band allows 56-95 GHz (under range to 54.000000001 GHz allowed).
- W-Band allows 65-110 GHz.

Otherwise the selections and instrument operation are the same. The dialog in the case of broadband set for two bands is shown in [Figure 14-17](#).

The MA25300A, MA25400A, 3743x and 3744x modules have independent source and receiver paths that can be selected from the dialog. The selections can be interpreted as follows:

Enabled Receiver

Use the receiver in the remote modules above the receiver breakpoint (30 GHz). Above this breakpoint, the VNA system LO will be set appropriately in terms of frequency and power, the test set configured, and the VNA rear panel IFs will be activated.

Enabled Source

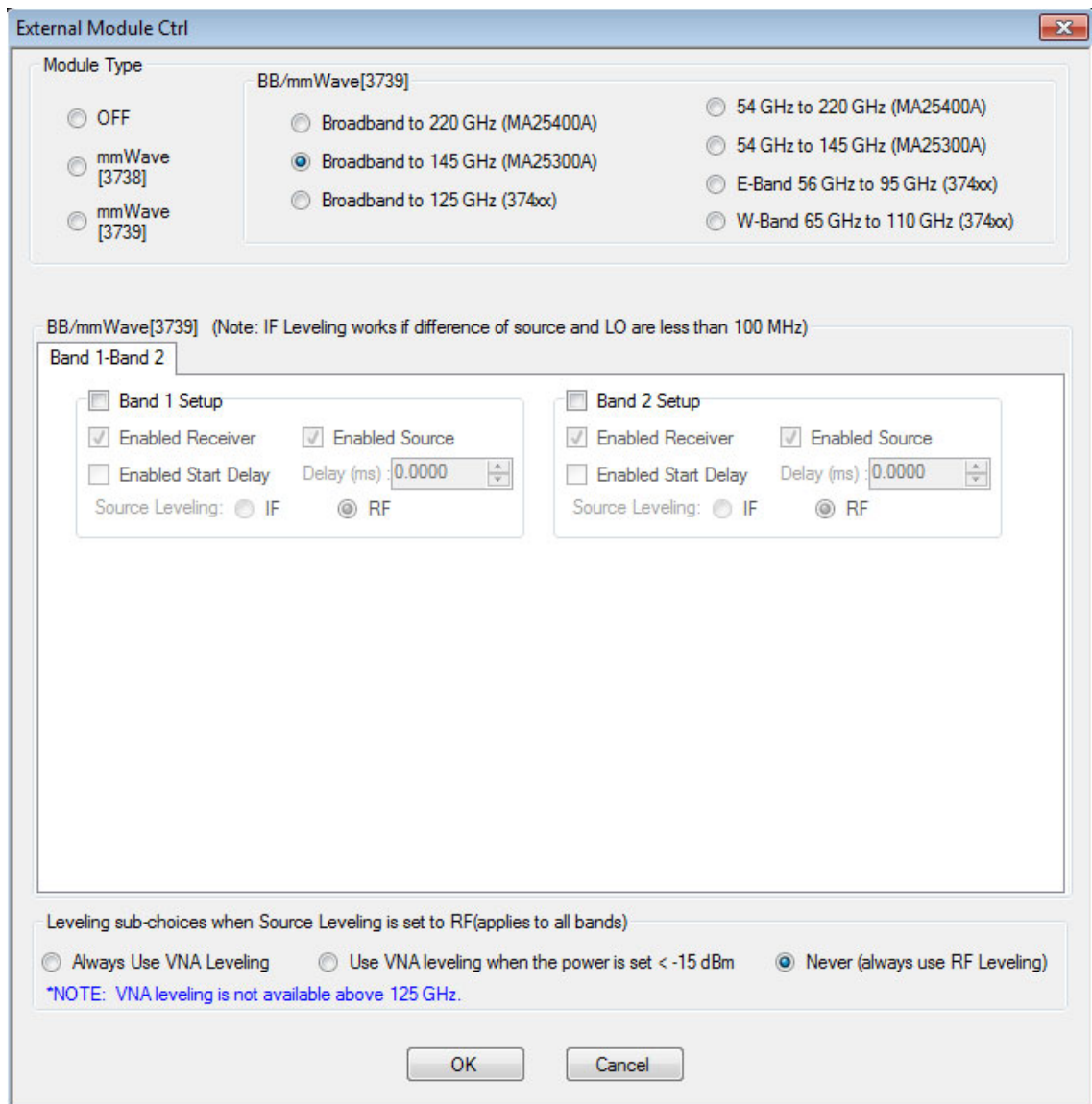
Use the source multipliers in the remote modules above the source breakpoints (54 GHz). Above the first breakpoint, the VNA synthesizers will be set appropriately, the test set configured as needed, and ALC leveling prepared (see below). Note that the above and below 54 GHz power control setting apply when this source feature is enabled (more details earlier in this chapter).

Enabled Start Delay

This enables a fixed delay at the beginning of the band. This could be useful for certain slow settling DUT measurements or for very low power levels.

Source Leveling

The default operation of the 3739-based modes (when not in multiple source) is to use IF leveling in order to get wide power ranges but if the source and receiver frequencies are not close enough (or the receiver is not enabled), then an IF is not available for leveling. The leveling defaults to RF in multiple source 3739-based modes with broadband/mmWave and this is recommended unless one knows the IF will be available (up to about 100 MHz) in the module for leveling. Separate ALC calibrations are available for RF and IF leveling and the system will automatically index the correct calibration table.



The external module control set for broadband/mmWave (3739X-based) mode is shown with 2 bands configured.

Figure 14-17. EXTERNAL MODULE CTRL Dialog Box – Set for Broadband to 145 GHz

EXTERNAL MODULE CTRL Dialog Box – Options 086, 087, 088, or 089

This right side of the radio button array is for the broadband operation (with the 3739X test set and 3743X modules), and for banded operation (using the 3739X test set and the 3743X or 3744X modules). The selection for BB/mmWave is straightforward. When checked in a given band, the test set will be activated, the VNA internal transfer switch will be shut down, and the rear panel IF ports on the VNA will be activated.

There are three choices for use with the 3743X and 3744X modular heads:

- Broadband to 110 GHz
- E-Band
- W-Band

The distinction between these selections is based on the imposed frequency range limits when activated.

- Broadband allows from the lower instrument limit up to 110 GHz.
- E-Band allows 56 GHz to 95 GHz (under range to 54.000000001 GHz allowed).
- W-Band allows 65GHz to 110 GHz.

External Module Ctrl

Module Type

☐ OFF

☐ mmWave [3738]

☒ mmWave [3739]

BB/mmWave[3739]

☐ Broadband to 220 GHz (MA25400A)

☐ Broadband to 145 GHz (MA25300A)

☒ Broadband to 110 GHz (374xx)

☐ 54 GHz to 220 GHz (MA25400A)

☐ 54 GHz to 145 GHz (MA25300A)

☐ E-Band 56 GHz to 95 GHz (374xx)

☐ W-Band 65 GHz to 110 GHz (374xx)

BB/mmWave[3739] (Note: IF Leveling works if difference of source and LO are less than 100 MHz)

Band 1-Band 2

☐ Band 1 Setup

☒ Enabled Receiver

☒ Enabled Source

☐ Enabled Start Delay

Delay (ms): 0.0000

Source Leveling: ☐ IF ☒ RF

☐ Band 2 Setup

☒ Enabled Receiver

☒ Enabled Source

☐ Enabled Start Delay

Delay (ms): 0.0000

Source Leveling: ☐ IF ☒ RF

Leveling sub-choices when Source Leveling is set to RF(applys to all bands)

☐ Always Use VNA Leveling

☐ Use VNA leveling when the power is set < -15 dBm

☒ Never (always use RF Leveling)

*NOTE: VNA leveling is not available above 125 GHz.

OK Cancel

Figure 14-18. EXTERNAL MODULE CTRL Dialog Box with Broadband to 110 GHz selected (1 of 2)

The external module control set for broadband (3739X-based) mode is shown here with available selections. This dialog box appears when the MS464xB has Options 086, 087, 088, or 089.

Figure 14-18. EXTERNAL MODULE CTRL Dialog Box with Broadband to 110 GHz selected (2 of 2)

These 3743x and 3744x modules have independent source and receiver paths that can be selected from the above dialog. The selections can be interpreted as follows:

Enabled Receiver

Use the receiver in the remote modules above the receiver breakpoint (30 GHz). Above this breakpoint, the VNA system LO will be set appropriately in terms of frequency and power, the test set configured, and the VNA rear panel IFs will be activated.

Enabled Source

Use the source multipliers in the remote modules above the source breakpoints (54 GHz). Above the first breakpoint, the VNA synthesizers will be set appropriately, the test set configured as needed, and ALC leveling prepared (see below). Note that the above and below 54 GHz power control setting apply when this source feature is enabled (more details in Chapter 16).

Enabled Start Delay

This enables a fixed delay at the beginning of the band. This could be useful for certain slow settling DUT measurements or for very low power levels.

Source Leveling

The default operation of the 3739-based modes (when not in multiple source) is to use IF leveling in order to get wide power ranges but if the source and receiver frequencies are not close enough (or the receiver is not enabled), then an IF is not available for leveling. The leveling defaults to RF in multiple source 3739-based modes with broadband/mmWave and this is recommended unless one knows the IF will be available (up to about 100 MHz) in the module for leveling. Separate ALC calibrations are available for RF and IF leveling and the system will automatically index the correct calibration table.

EXTERNAL MODULE CTRL Dialog Box – with Low Power Leveling and RF/VNA Leveling

When any of the five choices under BB/mmWave [3739] are selected and there is a valid VNA leveling cal in effect, the selections for VNA leveling the sub-choices (highlighted below) will be visible. For all other cases, it will not be visible. Note that the leveling sub choices is per-channel but the source leveling is per-band. See [Figure 14-17](#) below.

The choices for use with the MA25x00A, 3743X and 3744X modular heads are:

- Broadband to 220 GHz (MA25400A)
- 54 GHz to 220 GHz (MA25400A)
- Broadband to 145 GHz (MA25300A)
- 54 GHz to 145 GHz (MA25300A)
- Broadband to 125 GHz (374xx)
- E-Band (374xx)
- W-Band (374xx).

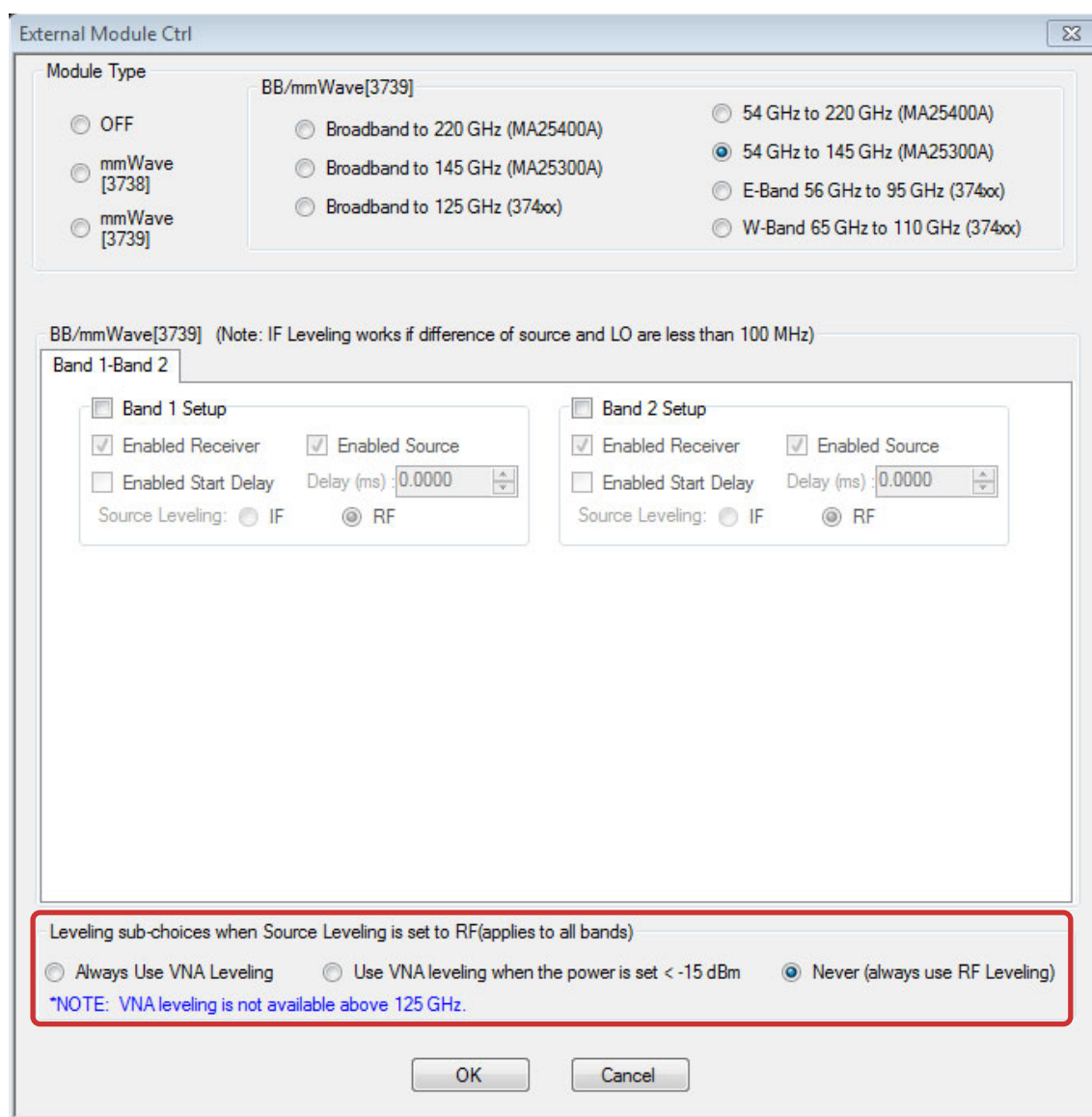


Figure 14-19. EXTERNAL MODULE CTRL Dialog Box – Low Power Leveling and RF/VNA Leveling Enabled

The MA25300A, MA25400A, 3743x and 3744x modules have independent source and receiver paths that can be selected from the above dialog. The selections are defined as follows:

Enabled Receiver

Use the receiver in the remote modules above the receiver breakpoint (30 GHz). Above this breakpoint, the VNA system LO will be set appropriately in terms of frequency and power, the test set configured, and the VNA rear panel IFs will be activated.

Enabled Source

Use the source multipliers in the remote modules above the source breakpoints (54 GHz). Above the first breakpoint, the VNA synthesizers will be set appropriately, the test set configured as needed, and ALC leveling prepared (see below). Note that the above and below 54 GHz power control setting apply when this source feature is enabled (more details earlier in this chapter).

Enabled Start Delay

This enables a fixed delay at the beginning of the band. This could be useful for certain slow settling DUT measurements or for very low power levels.

Source Leveling

The default operation of the 3739-based modes (when not in multiple source) is to use IF leveling in order to get wide power ranges but if the source and receiver frequencies are not close enough (or the receiver is not enabled), then an IF is not available for leveling. The leveling defaults to RF in multiple source 3739-based modes with broadband/mmWave and this is recommended unless one knows the IF will be available (up to about 100 MHz) in the module for leveling. Separate ALC calibrations are available for RF and IF leveling and the system will automatically index the correct calibration table.

Leveling Sub-choices

This feature allows the user to select three different leveling sub-choices when the Source Leveling type selected is RF.

Note	VNA leveling is not available above 125 GHz.
-------------	--

- Always Use VNA Leveling
 - Uses the leveling detector in the base VNA (which is better for control range but less so for stability).
- Use VNA leveling when the power is set < -15 dBm
 - Uses VNA leveling for requested power levels < -15 dBm and RF leveling otherwise.
- Never (always use RF Leveling)
 - Uses the level detector inside the BB module (best for stability but not for control range)

Chapter 15 — Noise Figure (Option 41)

15-1 Chapter Overview

This chapter provides information on the APPLICATION menu and Noise Figure Measurement configuration, when the VNA is equipped with Option 41. The configuration process starts when the VNA application mode is changed to Noise Figure, which enables the noise figure measurement configuration and operation menus and dialogs.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

15-2 Application Menus and Dialog Boxes for Noise Figure

The NF SETUP menu set for configuration and control of noise figure contains the following menus and dialogs:

- [“Primary Application Menus and Noise Figure Dialogs and Menus” on page 15-4](#)
 - [Figure 15-1, “APPLICATION Menu and NF SETUP Menu and Dialog Set” on page 15-4](#)
- [“Noise Figure Menus and Dialogs” on page 15-6](#)
 - [Figure 15-2, “Noise Figure Measurement Menu Set” on page 15-6](#)
- [“NF SETUP Menu” on page 15-8](#)
 - [Figure 15-3, “NF SETUP Menu” on page 15-8](#)
- [“NF CONFIG Menu” on page 15-12](#)
 - [Figure 15-5, “NF CONFIG Menu and Related Field Toolbars” on page 15-12](#)
- [“NF ADVANCED Menu” on page 15-14](#)
 - [Figure 15-7, “NF ADVANCED Menu: NF RCVR CAL OFFSET Menu – Option 41” on page 15-15](#)

15-3 Noise Figure Overview

Noise Figure Measurement is Option 41 for the MS464xB Series VNAs which requires front panel access loops from Option 51, 61, or 62. The option is compatible with the ME7838 Broadband/mmWave Systems. Option 41 is also compatible with the MN469xB/C Multiport System as long as the noise figure measurements are limited to Port 1 and Port b2.

Noise figure is a fundamental indicator of performance for non-frequency converting devices, such as amplifiers, during the design stage and production compliance testing. Option 41 uses the cold source method of noise figure measurements.

If neither Option 41 nor Option 48 not installed, the Noise Figure button and menu controls are not present in the UI display. If Option 41 is installed, the primary instrument mode can be quickly changed to Noise Figure mode from the default Transmission/Reflection mode to access the menu and dialog box controls. Option 48 also enables the noise figure button, but the submenus are different (see [Chapter 16](#)).

15-4 Noise Figure Procedure

The typical procedure for a noise figure measurement is listed below.

1. It is assumed that the user has already acquired non-compressed DUT gain data and has it available in an S2P file.
2. It is assumed the user has performed a composite receiver calibration.
Refer to the **VectorStar MS464xB Measurement and Calibration Guide – 10410-00318** for more information about a noise figure measurement composite receiver.

Change the Instrument Mode to Noise Figure

3. On the APPLICATION menu, select the Noise Figure button.
 - A notice dialog box advises about saving the current instrument setup so it can be recalled at a later time.
 - When Continue is selected, the instrument changes application modes to Noise Figure.
 - The instrument resets the default settings for noise figure trace condition to a single trace and Noise Figure (LogMag) response.
4. On the NF SETUP menu, select Noise Figure Configuration.
 - The NF CONFIG (Noise Figure Configuration) menu appears.

Set the Noise Figure Measurement Configuration

5. On the NF CONFIG menu, select the configuration parameters for the noise figure measurement:
 - Frequency Start
 - Frequency Stop
 - Number of Sweep Points
 - CW ON/OFF
 - CW Frequency
 - Number of RMS Points
 - Intermediate Frequency Bandwidth

Get the DUT S-Parameter Data

6. Go back and get the DUT S-Parameter data.
7. Return to the NF SETUP menu by selecting the back icon at the bottom of the menu.
 - The NF SETUP menu appears.
8. On the NF SETUP menu, select Get DUT S-Param Data.
 - The DUT S-PARAM DATA dialog box appears. The default file type to load is an .s2p file. For frequency converting devices, a .txt file (of the format saved by the MS464X) is also allowed. That file should be saved from the conversion gain/loss measurement where conversion gain/loss is in trace 1. In both cases, interpolation and extrapolation is used.
 - Navigate to the stored data and open the file.

Get the Receiver Calibration Data

9. Go back and recall the Receiver Calibration file.
10. On the NF SETUP menu, select **Receiver Cal | Recall Cal.** (A receiver calibration can also be performed from within the noise figure application.)
 - The RECALL RECEIVER CALIBRATION dialog box appears.
 - Navigate to the stored data and open the file.

Perform the Noise Calibration

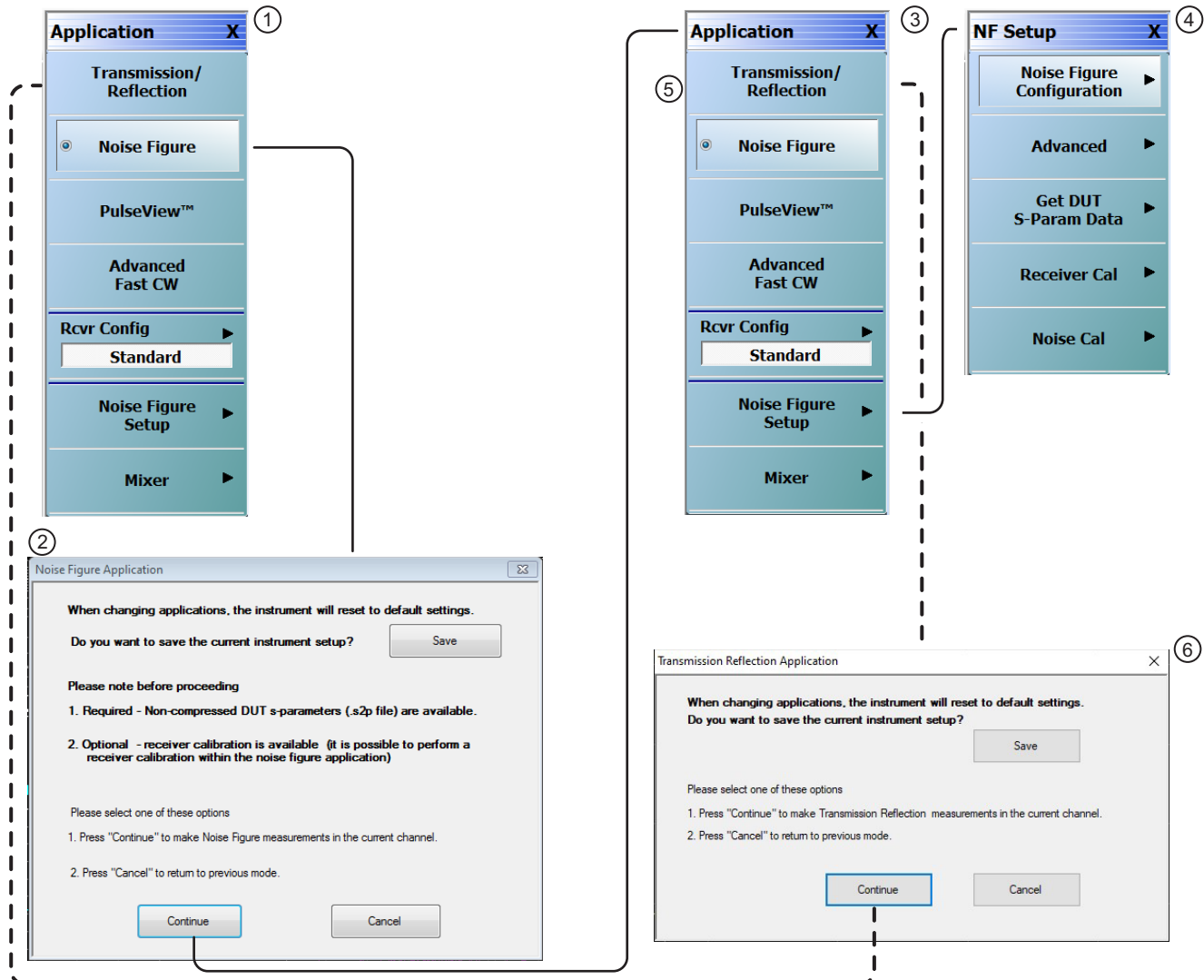
11. Insert the DUT with the cold source on input.
12. Perform Noise Calibration by selecting **NF Setup -> Noise Cal -> Perform Calibration**
13. The trace display shows Log magnitude noise figure versus frequency.

Exiting the Noise Figure Application

14. When all noise figure measurements are complete, on the APPLICATION menu, select the **Transmission/Reflection** button.
 - A notice dialog box advises about saving the current instrument setup so it can be recalled at a later time.
 - When **Continue** is selected, the instrument changes application modes to Transmission/Reflection and the Noise Figure Setup button becomes unavailable.
 - The instrument resets the factory as-shipped default settings for transmission/reflection which are four traces as:
 - S11 response on a Smith Chart trace display
 - S12 response on dual LogMag + Phase trace display
 - S21 response on dual LogMag + Phase trace display
 - S22 response on a Smith Chart trace display
15. If a prior preset was in effect, it can be recalled using the **RECALL SETUP** dialog box located at **MENU BAR | File | Recall Setup | RECALL SETUP** dialog box.

15-5 Primary Application Menus and Noise Figure Dialogs and Menus

The primary menu and dialog set for noise figure measurement on the APPLICATION menu, the NF SETUP menu, and the related dialog boxes is shown below. After clearing the entry NOISE FIGURE APPLICATION dialog box, the NF SETUP menu appears. When changing from Noise Figure to another application, a similar exit dialog box appears, and when cleared, resolves into the APPLICATION menu in new application mode.



- | | |
|---|--|
| 1. APPLICATION Menu – Typical APPLICATION menu variant with Option 41 equipped on VNA. | 4. NF SETUP Menu – After APPLICATION menu Noise Figure Setup button is selected. |
| 2. NOISE FIGURE APPLICATION Mode Change Dialog Box – Provides options for canceling or saving setup and proceeding by selecting Continue. | 5. To exit Noise Figure Mode, select another application on the top of the APPLICATION menu. |
| 3. APPLICATION Menu – Noise Figure mode selected. | 6. New Application Dialog Box. |

Figure 15-1. APPLICATION Menu and NF SETUP Menu and Dialog Set

Changing to Noise Figure Mode

When the APPLICATION menu is set to a non-Noise Figure application mode and Noise Figure mode is selected, the NOISE FIGURE APPLICATION dialog box appears. The dialog provides opportunities to:

- Save the current instrument setup as an Active Channel Setup and Calibration .CHX file and then either Cancel or Continue.
- Cancel out of the change to Noise Figure application mode, and remain in the current application mode.
- Continue into Noise Figure application mode.

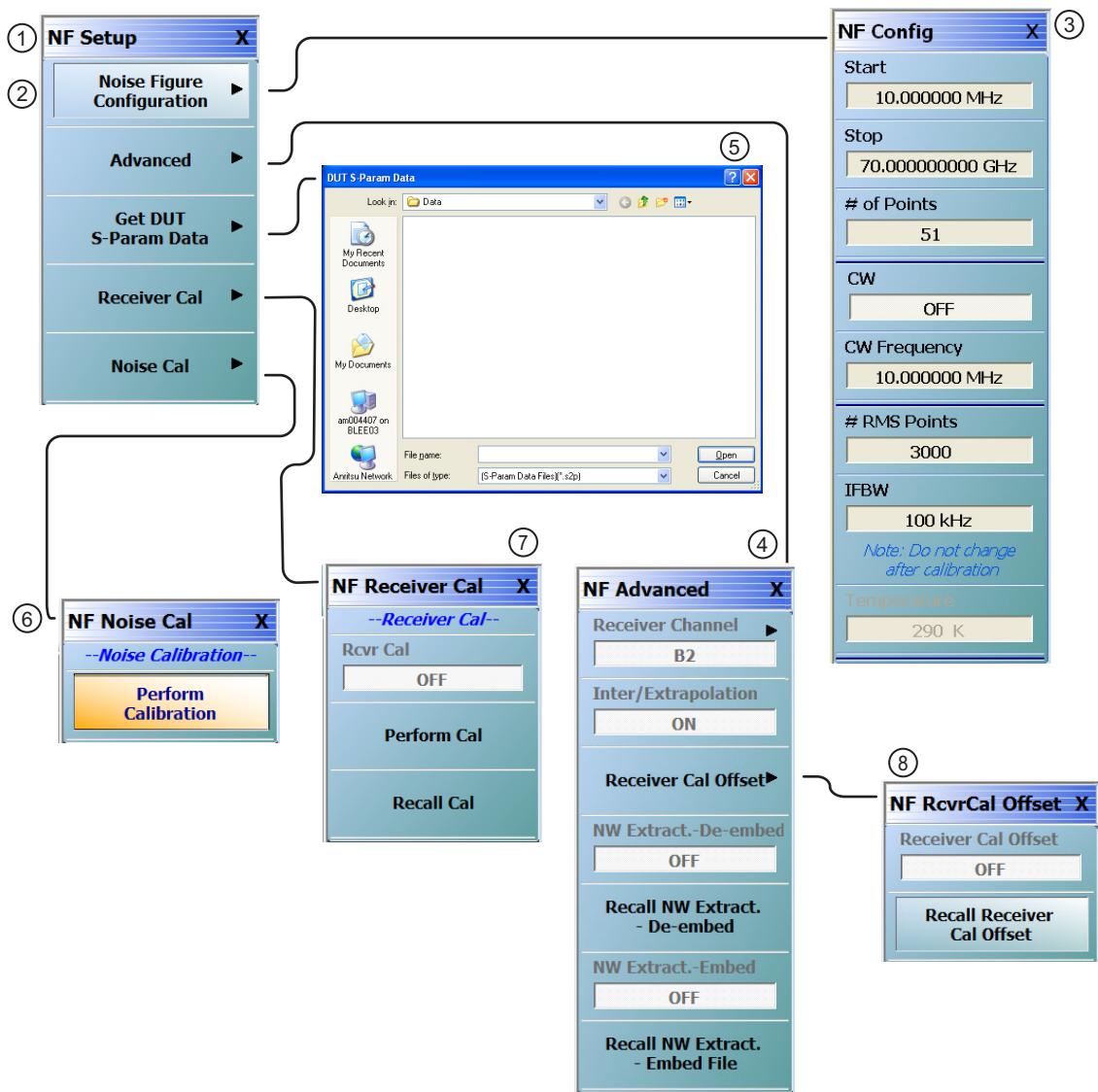
Changing From Noise Figure Mode to Another Application Mode

Similarly, when the APPLICATION menu is set Noise Figure application mode, and another application mode is selected, the new application dialog box appears. The dialog provides the opportunities to:

- Save the current instrument setup as an Active Channel Setup and Calibration .CHX file and then either Cancel or Continue.
- Cancel out of the change to the new application mode and remain in Noise Figure application mode.
- Continue into the new application mode.

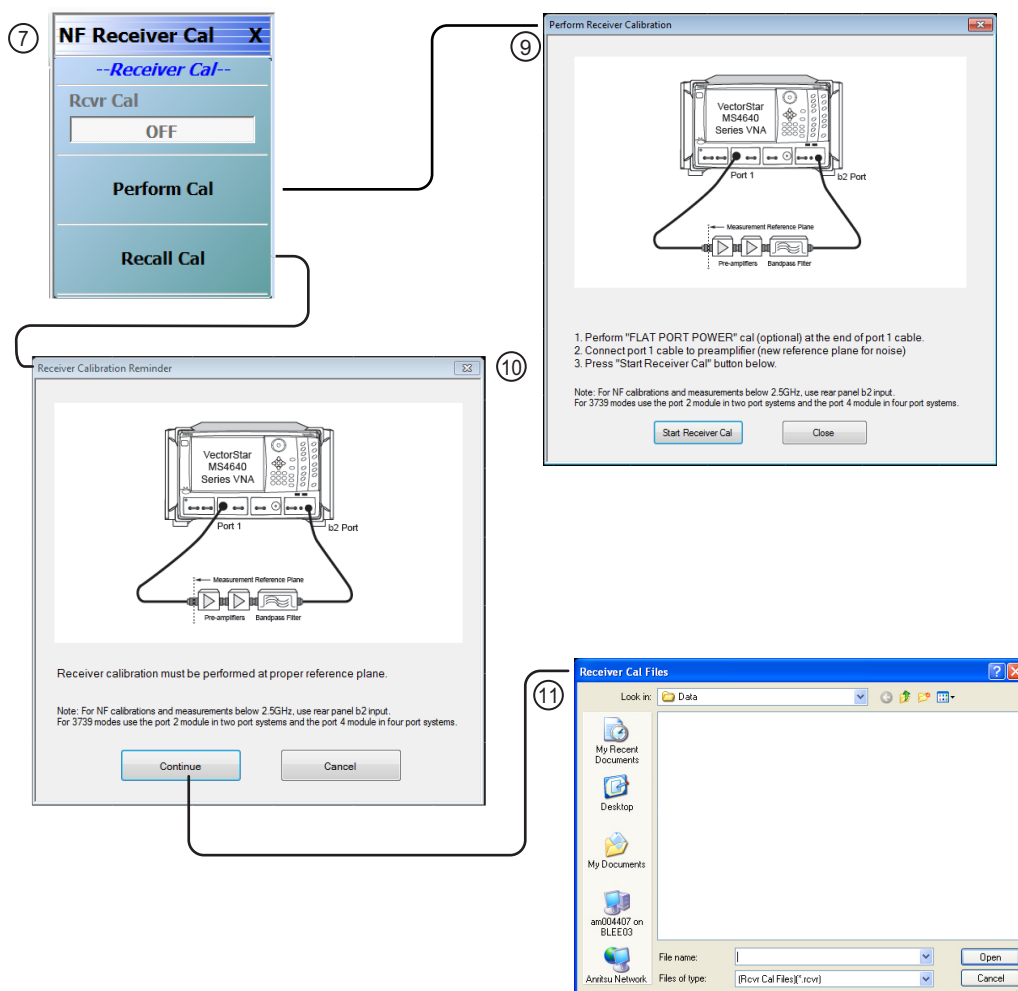
15-6 Noise Figure Menus and Dialogs

The Noise Figure Measurement menu set and related dialogs are shown in the figure below.



- | | |
|--|--|
| 1. NF SETUP menu. | 5. DUT S-PARAM (S-Parameter) dialog box. |
| 2. Noise Figure Configuration button selected. | 6. NF NOISE CAL (Calibration) menu |
| 3. NF CONFIG (NF Configuration) menu. | 7. NF RECEIVER CAL (Calibration) menu. |
| 4. NF ADVANCED menu. | 8. NF RCVRCAL OFFSET menu |

Figure 15-2. Noise Figure Measurement Menu Set



9. PERFORM RECEIVER CALIBRATION Dialog Box
 10. NF RECEIVER CAL Dialog Box

11. PERFORM RECEIVER CAL dialog box. Provides access to previously saved receiver calibration RCVR files.

Figure 15-2. Noise Figure Measurement Menu Set

If Perform Cal is selected, the user is instructed how to connect the port 1 driving source to the composite receiver.

NF SETUP Menu

Full Name

Noise Figure Setup

Previous

- “APPLICATION Menu” on page 12-2

Prerequisites

- Option 41 is installed on the VNA.
- The DUT S-Parameter Data file has been stored and is available on the VNA as an S2P or TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Noise Figure (selected) | Noise Figure Setup | NF SETUP

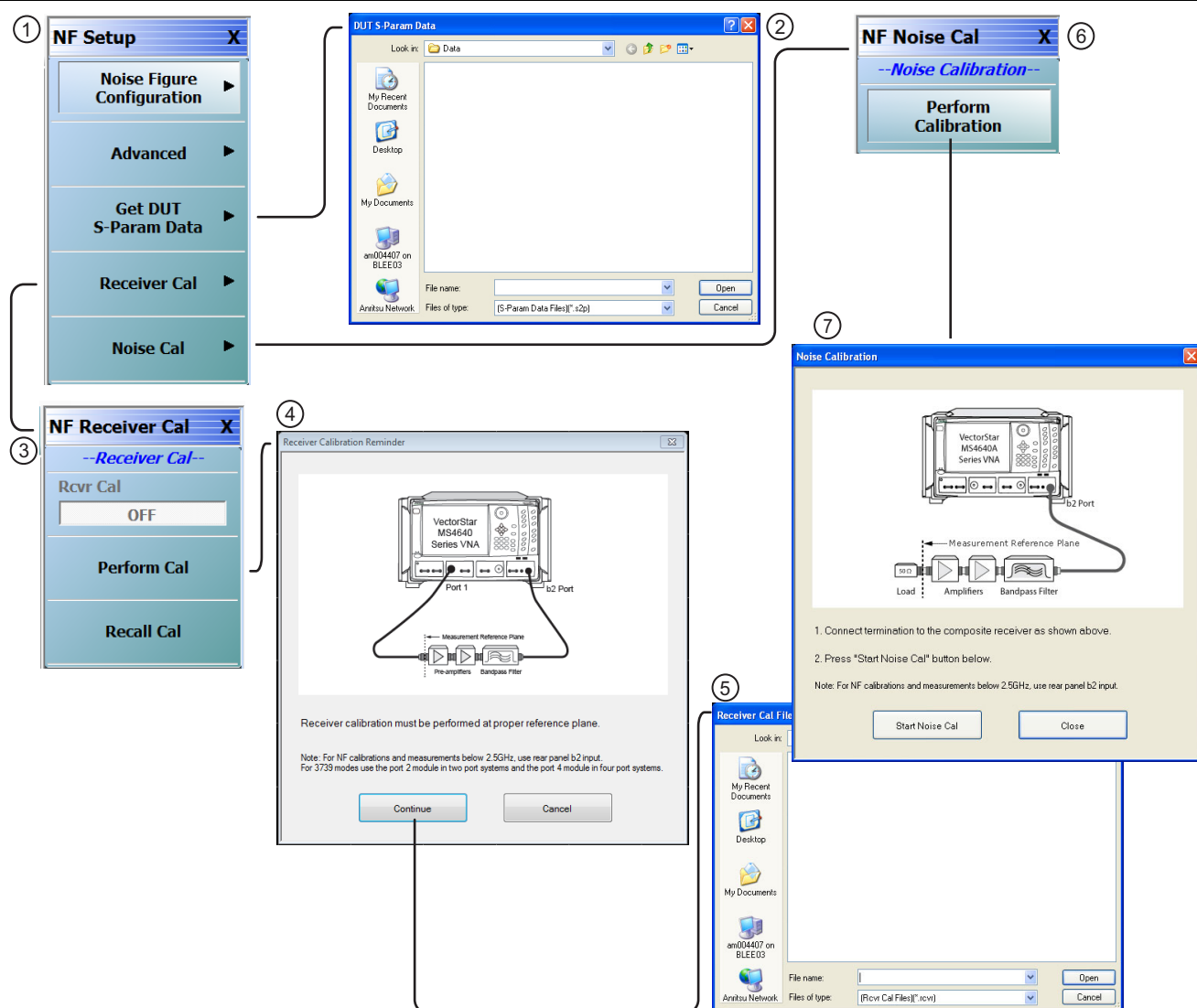


Figure 15-3. NF SETUP Menu

1. NF SETUP Menu 2. DUT S-PARAM DATA Dialog Box 3. NF RECEIVER CAL Menu 4. RECEIVER CALIBRATION REMINDER Dialog Box 5. RECALL RECEIVER CAL FILES Dialog Box 6. NOISE CALIBRATION Dialog Box	7. CALIBRATION Menu – Appearance and button availability changes for Noise Figure operation. Button provides direct access to the NOISE CALIBRATION Dialog Box described above. When in Noise Figure mode, path via CALIBRATION menu is: MAIN Calibration CALIBRATION Perform Noise Calibration.
--	---

Figure 15-3. NF SETUP Menu**Noise Figure Configuration**

Select displays the NF CONFIG menu.

- “NF CONFIG Menu” on page 15-12
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Noise Figure Configuration | NF CONFIG

Advanced

Select displays the NF ADVANCED menu.

- “NF ADVANCED Menu” on page 15-14
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED

Get DUT S-Param Data

Select displays the DUT S-PARAM DATA dialog box. Once opened, navigate to the location of the stored DUT S-Parameter Data file. Once found, select the Open button to retrieve the file. The DUT data file must be stored and available before starting noise figure measurements.

NF Receiver Calibration

Select displays the NF RECEIVER CAL menu (see “NF SETUP Menu – Receiver Cal”). Once open, select RECALL CAL and follow the steps below. (One can also perform a receiver calibration at this point instead of recalling it by selecting the PERFORM button and connecting port 1 to the input of the composite receiver).

Recall Calibration

Select displays the RECEIVER CALIBRATION REMINDER dialog box with the reminders below. Select Continue to proceed. Select Cancel to return to the NF SETUP menu.

- Receiver calibration must be performed at proper reference plane.
 - For noise figure calibrations and measurement below 2.5 GHz, use the rear panel b2 input.
1. Select Continue to proceed.
 2. The RECEIVER CAL FILES recall dialog box appears.
 3. Navigate to the location of the previously stored receiver calibration RCVR file.
 4. Select Open.
 5. Return to the NF SETUP menu.

NF Noise Calibration

Select displays the NF NOISE CAL menu. Once open, select PERFORM CALIBRATION and follow the steps below.

Perform Calibration

Select displays the NOISE CALIBRATION dialog box. Once open, follow the procedure below to calibrate the noise:

1. Connect the termination to the preamplifier at the reference plane of the noise figure measurement. The dialog box figure shows the placement of the required components.

2. Select the Start Noise Cal button on the dialog box to start the calibration.

NF SETUP Menu – Receiver Cal

Full Name

Noise Figure Receiver Calibration

Previous

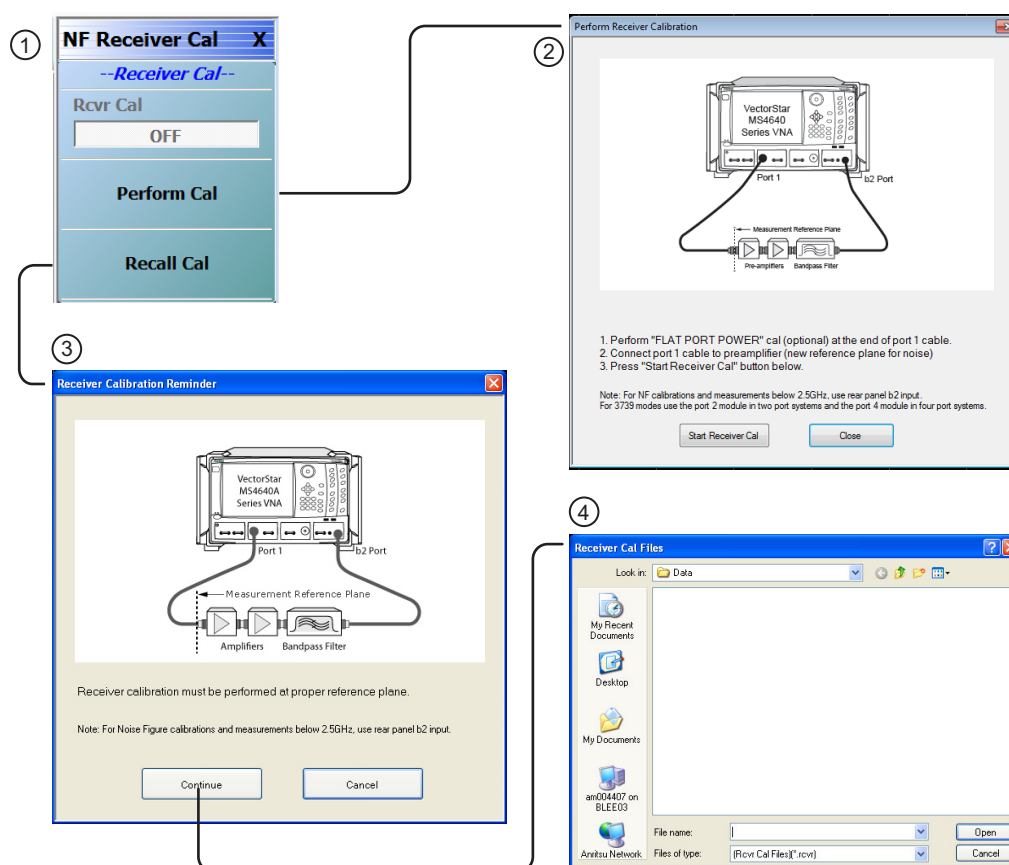
- “APPLICATION Menu” on page 12-2

Prerequisites

- Option 41 is installed on the VNA.
- The DUT S-Parameter Data file has been stored and is available on the VNA as an S2P or TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Noise Figure (selected) | Noise Figure Setup | NF SETUP | Receiver Cal



1. NF RECEIVER CAL Menu

2. RECEIVER CALIBRATION REMINDER Dialog Box

3. RECEIVER CAL FILES Dialog Box

4. RECALL RECEIVER CAL FILES Dialog Box

Figure 15-4. NF SETUP Menu

NF CONFIG Menu

Full Name

Noise Figure Configuration

Previous

- “NF SETUP Menu” on page 15-8

Prerequisites

- Option 41 is installed on the VNA.
- The non-compressed DUT S-Parameter Data file has been stored and is available on the VNA as an S2P or TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Noise Figure Configuration | NF CONFIG

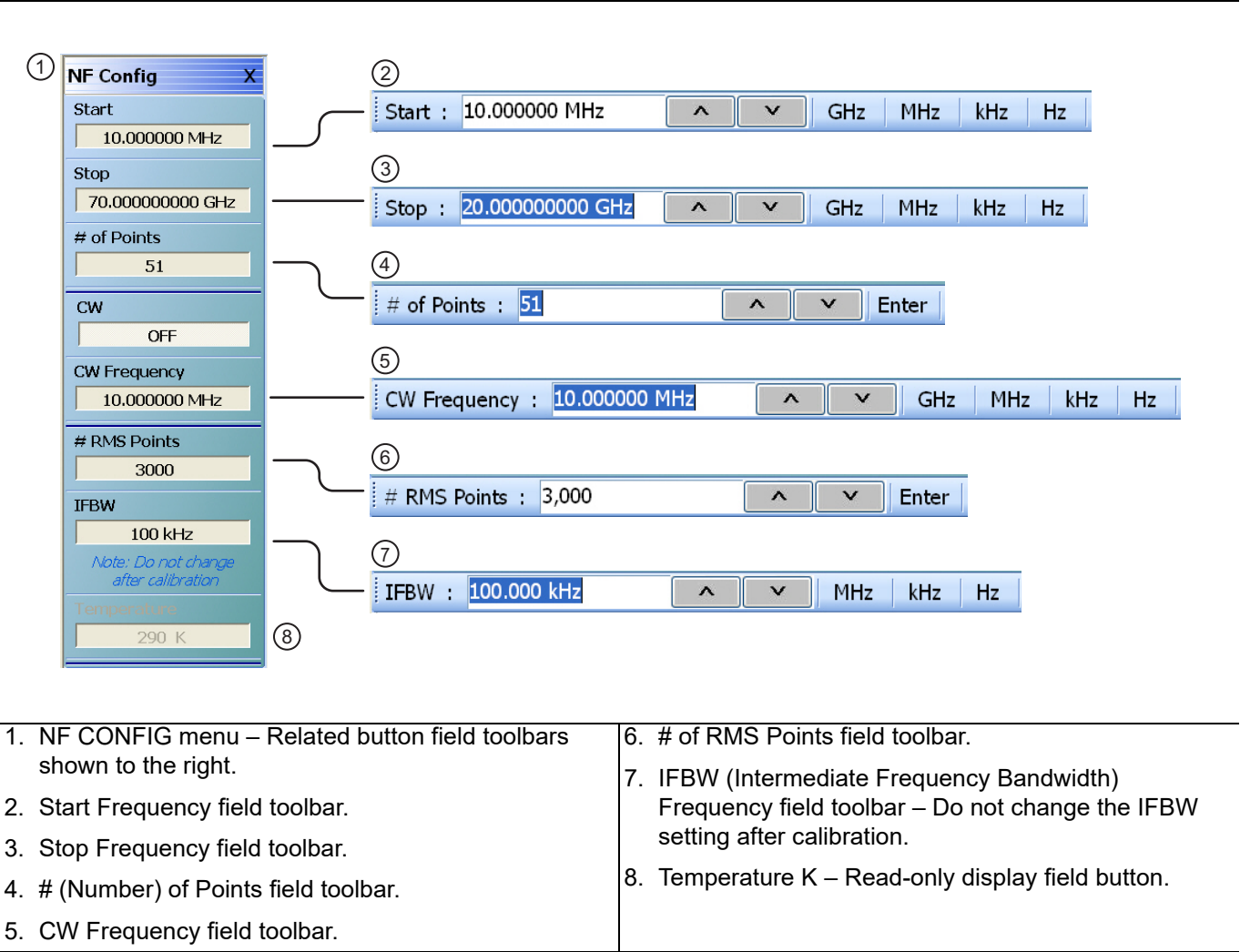


Figure 15-5. NF CONFIG Menu and Related Field Toolbars

Start

Select displays the **Start** frequency field toolbar to provide input for the start frequency in GHz, MHz, kHz, or Hz.

Stop

Select displays the **Stop** frequency field toolbar to provide input for the stop frequency in GHz, MHz, kHz, or Hz.

of Points

Number of Points. Select displays the **# of Points** field toolbar to provide input for the number of sweep points.

CW

Continuous Wave Frequency. Select displays the **CW** field toolbar to provide input for the CW frequency in GHz, MHz, kHz, or Hz.

RMS Points

Number of Root Mean Square Points. Select displays the **# RMS Points** field toolbar to provide input for the number of RMS measurement points per sweep point set above. For example, if the sweep points are set to 51, and the RMS points are set to 3,000, the total measurement points are $51 \times 3,000 = 153,000$.

IFBW

Intermediate Frequency Bandwidth. Select displays the **IFBW** field toolbar to provide input for the IFBW frequency in MHz, kHz, or Hz.

Note Do not change the IFBW setting after calibration.

Temperature K

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

NF ADVANCED Menu

Full Name

Noise Figure Advanced Configuration

Previous

- “NF SETUP Menu” on page 15-8

Prerequisites

- Option 41 is installed on the VNA.
- The non-compressed DUT S-Parameter Data file has been stored and is available on the VNA as a .S2P or .TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED

1. **Receiver Channel:** Read-only field display. Shows the receiver channel as B2.
2. **Inter/Extrapolation:** Calibration Interpolation and Extrapolation Mode. Read-only display. This display indicates that the VNA calibration interpolation and extrapolation mode is ON.
3. **Receiver Cal Offset:** Opens the NF RCVRCALOFFSET menu. After loading the receiver cal offset file (.txt), a CheckBox (as checked) will be shown to indicate the successful file load. Also, the menu item “Receiver Cal Offset” toggle will be enabled and the status will be changed to ON.
4. **NW Extract.–De-embed:** Read-only field display. Shows the NW Extract–De-embed status.
5. **Recall NW Extract.–De-embed File:** Opens Select S2P File for Network DeEmbedding dialog box, which is used to select an s2p file.
6. **NW Extract.–Embed:** Shows the NW Extract–Embed status. When ON, the user is able to toggle the Network Extraction status to ON/OFF by clicking this menu item.
7. **Recall NW Extract.–Embed File:** Opens Select S2P File for Network Embedding dialog box, which is used to select an s2p file. The selected s2p file is validated and if found valid, the embedding operation will be performed with respect to the selected s2p file. A CheckBox (as checked) will be shown to indicate the file loaded successfully. Also the menu item “NW Extraction. Embed” will be enabled and the status will be changed to ON.

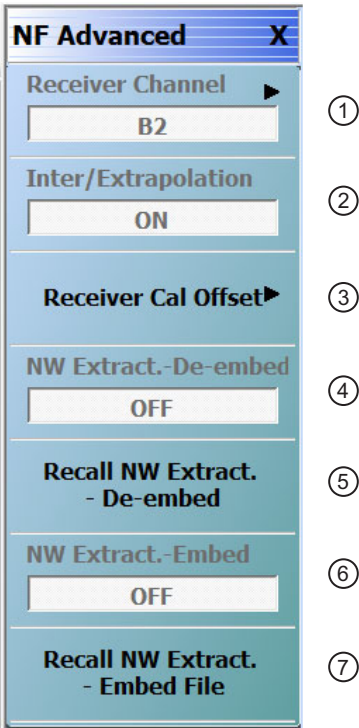


Figure 15-6. NF ADVANCED Menu – Option 41

NF ADVANCED Menu – Receiver Cal Offset

Full Name

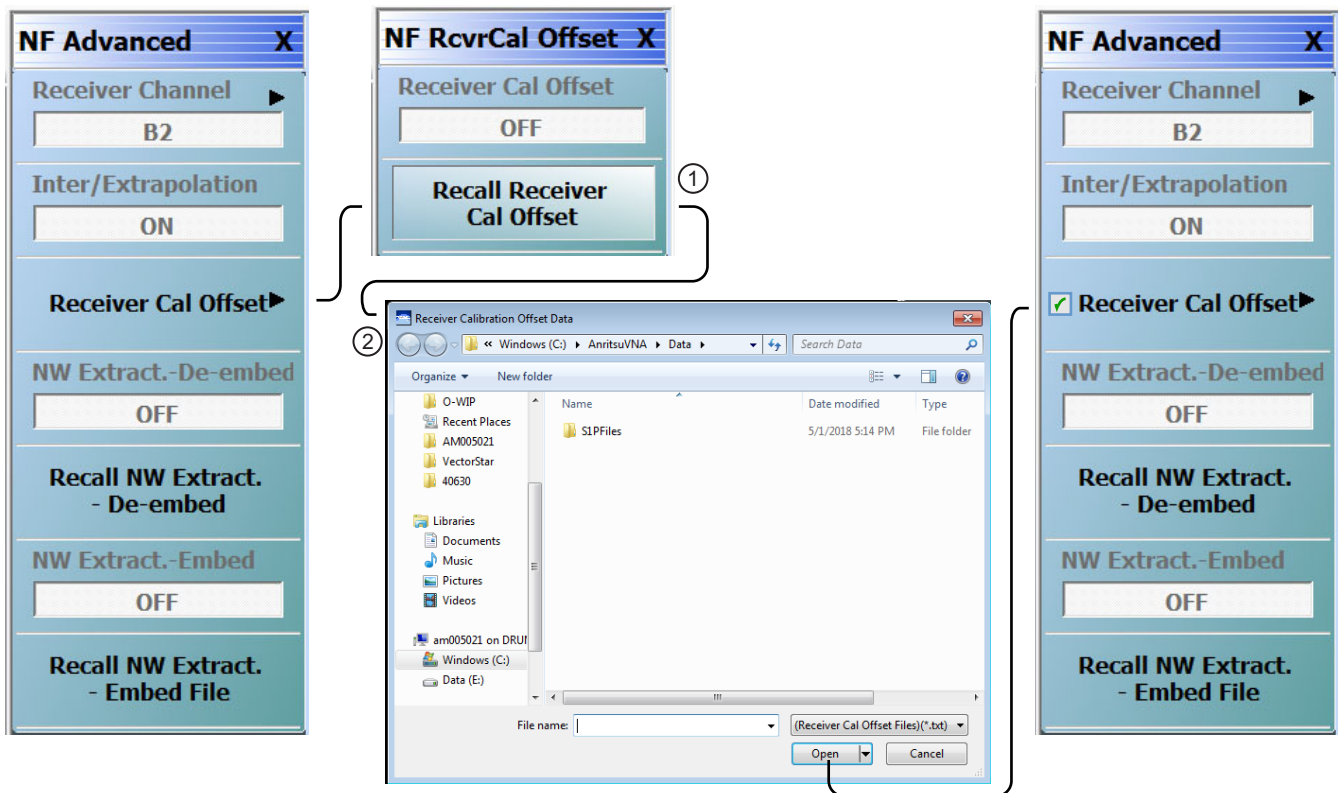
Noise Figure Advanced Configuration Menu Receiver Cal Offset

Prerequisites

- Option 41 is installed on the VNA.
- The non-compressed DUT S-Parameter Data file has been stored and is available on the VNA with the filename extension .sp2 or .txt.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED



1. **Recall Receiver Cal Offset:** Opens Receiver Calibration Offset Data dialog box. After loading the receiver cal offset file (.txt), a CheckBox (as checked) will be shown to indicate the successful file load. Also, the menu item "Receiver Cal Offset" will be enabled and the status will be changed to ON.

2. **RECEIVER CALIBRATION OFFSET DATA** dialog box.

Figure 15-7. NF ADVANCED Menu: NF RCVR CAL OFFSET Menu – Option 41

Chapter 16 — Differential Noise Figure (Option 48)

16-1 Chapter Overview

This chapter provides information on the APPLICATION menu and Differential Noise Figure Measurement configuration, when the VNA is equipped with Option 48. The configuration process starts when the VNA application mode is changed to Noise Figure, which enables the noise figure measurement configuration and operation menus and dialogs.

Although this option is entitled Differential Noise Figure, single-ended noise figure measurements are still available and all of the functionality of Option 41 (covered in [Chapter 15, “Noise Figure \(Option 41\)”](#)) is included within Option 48. Hence, these options are mutually exclusive.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

16-2 Application Menus and Dialog Boxes for Differential Noise Figure

The NF SETUP menu set for configuration and control of noise figure contains the following menus and dialogs:

- [“Primary Application Menus and Differential Noise Figure Dialogs and Menus” on page 16-4](#)
 - [Figure 16-1, “APPLICATION Menu and DNF SETUP Menu and Dialog Set” on page 16-4](#)
- [“Differential Noise Figure Menus and Dialogs” on page 16-6](#)
 - [Figure 16-2, “Differential Noise Figure Measurement Menu Set” on page 16-6](#)
- [“DIFF. NF SETUP Menu \(2-Port DUT\)” on page 16-8](#)
 - [Figure 16-3, “NF SETUP Menu \(2-Port DUT\)” on page 16-8](#)
- [“NF CONFIG Menu” on page 16-12](#)
 - [Figure 16-5, “NF CONFIG Menu and Related Field Toolbars” on page 16-12](#)
- [“NF ADVANCED Menu” on page 16-14](#)
 - [Figure 16-9, “NF ADVANCED Menu – 4-port DUT” on page 16-17](#)

16-3 Differential Noise Figure Overview

Differential Noise Figure Measurement is Option 48 for the MS464xB Series VNAs which requires front panel access loops from Option 51, 61, or 62. The option is compatible with the ME7838 Broadband/mmWave Systems. Option 48 is also compatible with the MN469xB/C Multiport System.

Noise figure is a fundamental indicator of performance for devices, such as amplifiers, during the design stage and production compliance testing. Option 48 (like Option 41) uses the cold source method of noise figure measurements. Option 48 brings in the capability of differential (and common-mode) noise figure measurements using a variety of sub-methods.

If neither Option 48 nor Option 41 is installed, the Noise Figure button and menu controls are not present in the UI display. If Option 48 is installed, the primary instrument mode can be quickly changed to Noise Figure mode from the default Transmission/Reflection mode to access the menu and dialog box controls. Option 41 also enables the Noise Figure button, but the submenus are different in that case.

16-4 Differential Noise Figure Procedure

The typical procedure for a differential noise figure measurement is listed below.

1. It is assumed that the user has already acquired non-compressed DUT gain data and has it available in an SnP file.
2. A composite receiver calibration must be performed in advance of entering noise figure (and the receiver calibration saved) or it can be performed while within the noise figure application. This procedure assumes a receiver calibration was performed in advance. Refer to the **VectorStar MS464xB Measurement and Calibration Guide – 10410-00318** for more information about a noise figure measurement composite receiver.

Change the Instrument Mode to Noise Figure

3. On the APPLICATION menu, select the Noise Figure button.
 - A notice dialog box advises about saving the current instrument setup so it can be recalled at a later time.
 - When Continue is selected, the instrument changes application modes to Noise Figure.
 - The instrument resets the default settings for noise figure trace condition to a single trace and Noise Figure (LogMag) response.
4. On the NF SETUP menu, set DUT Configuration to 4 Port.
 - The DIFF. NF SETUP (Differential Noise Figure Setup) menu appears.
5. On the DIFF. NF SETUP menu, select Noise Figure Configuration.
 - The NF CONFIG (Noise Figure Configuration) menu appears.

Set the Noise Figure Measurement Configuration

6. On the NF CONFIG menu, select the configuration parameters for the noise figure measurement:
 - Frequency Start
 - Frequency Stop
 - Number of Sweep Points
 - CW ON/OFF
 - CW Frequency
 - Number of RMS Points
 - Intermediate Frequency Bandwidth

Get the DUT S-Parameter Data

7. Go back and get the DUT S-Parameter data.

8. Return to the NF SETUP menu by selecting the back icon at the bottom of the menu.
 - The NF SETUP menu appears.
9. On the NF SETUP menu, select Get DUT S-Param Data.
 - The DUT S-PARAM DATA dialog box appears.
 - Navigate to the stored data and open the file.

Get the Receiver Calibration Data

10. Go back and recall the Receiver Calibration file.
11. On the DIFF. NF SETUP menu, select Receiver Cal | Recall VNA B2 Cal.
 - The RECEIVER CALIBRATION REMINDER dialog box appears.
 - Click Continue and navigate to the stored data and open the file.

Perform the Noise Calibration

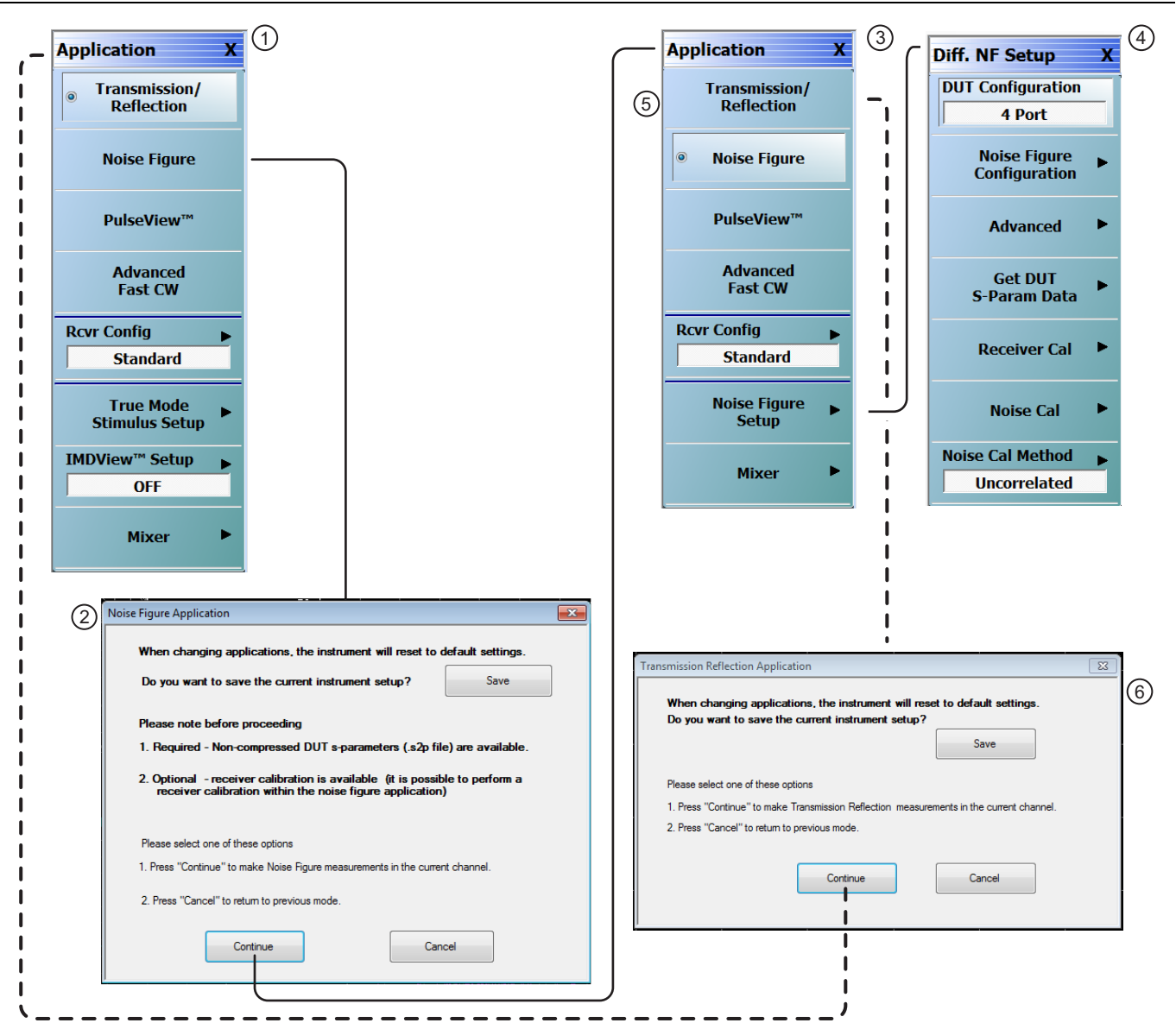
12. Insert the DUT with the cold source on input.
13. Return to DIFF. NF SETUP menu, select NOISE CAL and then select PERFORM VNA Bx CAL
14. The trace display shows Log magnitude noise figure versus frequency.

Exiting the Noise Figure Application

15. When all noise figure measurements are complete, on the APPLICATION menu, select the Transmission/Reflection button.
 - A notice dialog box advises about saving the current instrument setup so it can be recalled at a later time.
 - When Continue is selected, the instrument changes application modes to Transmission/Reflection and the Noise Figure Setup button becomes unavailable.
 - The instrument resets the factory as-shipped default settings for transmission/reflection which are four traces as:
 - S11 response on a Smith Chart trace display
 - S12 response on dual LogMag + Phase trace display
 - S21 response on dual LogMag + Phase trace display
 - S22 response on a Smith Chart trace display
16. If a prior preset was in effect, it can be recalled using the RECALL SETUP dialog box located at MENU BAR | File | Recall Setup | RECALL SETUP dialog box.

16-5 Primary Application Menus and Differential Noise Figure Dialogs and Menus

The primary menu and dialog set for noise figure measurement on the APPLICATION menu, the NF SETUP menu, and the related dialog boxes is shown below. After clearing the entry NOISE FIGURE APPLICATION dialog box, the NF SETUP menu appears. When changing from Noise Figure to another application, a similar exit dialog box appears, and when cleared, resolves into the APPLICATION menu in new application mode.



- | | |
|---|---|
| 1. APPLICATION Menu –Typical APPLICATION menu variant with Option 48 equipped on VNA. | 4. DIFF. NF SETUP Menu – After APPLICATION menu Noise Figure Setup button is selected and 4-port DUT Configuration is selected. |
| 2. NOISE FIGURE APPLICATION Mode Change Dialog Box – Provides options for canceling or saving setup and proceeding by selecting Continue. | 5. To exit Differential Noise Figure Mode, select another application on the top of the APPLICATION menu. |
| 3. APPLICATION Menu – Noise Figure mode selected. | 6. New Application Dialog Box. |

Figure 16-1. APPLICATION Menu and DNF SETUP Menu and Dialog Set

Changing to Differential Noise Figure Mode

When the APPLICATION menu is set to a non-Differential Noise Figure application mode and Noise Figure mode is selected, the NOISE FIGURE APPLICATION dialog box appears. The dialog provides opportunities to:

- Cancel out of the change to Noise Figure application mode, and remain in the current application mode.
- Save the current instrument setup as an Active Channel Setup and Calibration CHX file and then either Cancel (above) or proceed (below).
- Continue into Noise Figure application mode.

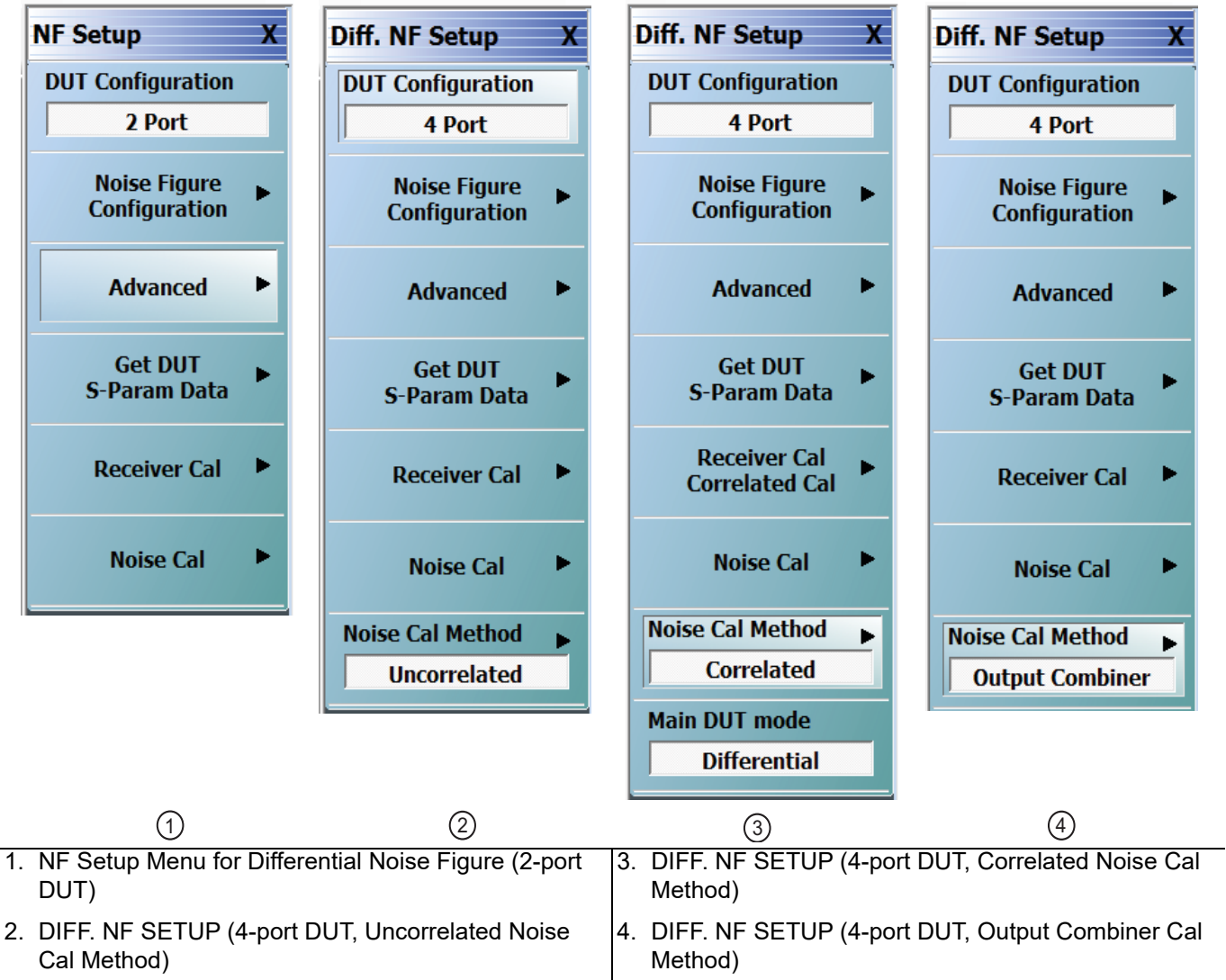
Changing From Noise Figure Mode to Another Application Mode

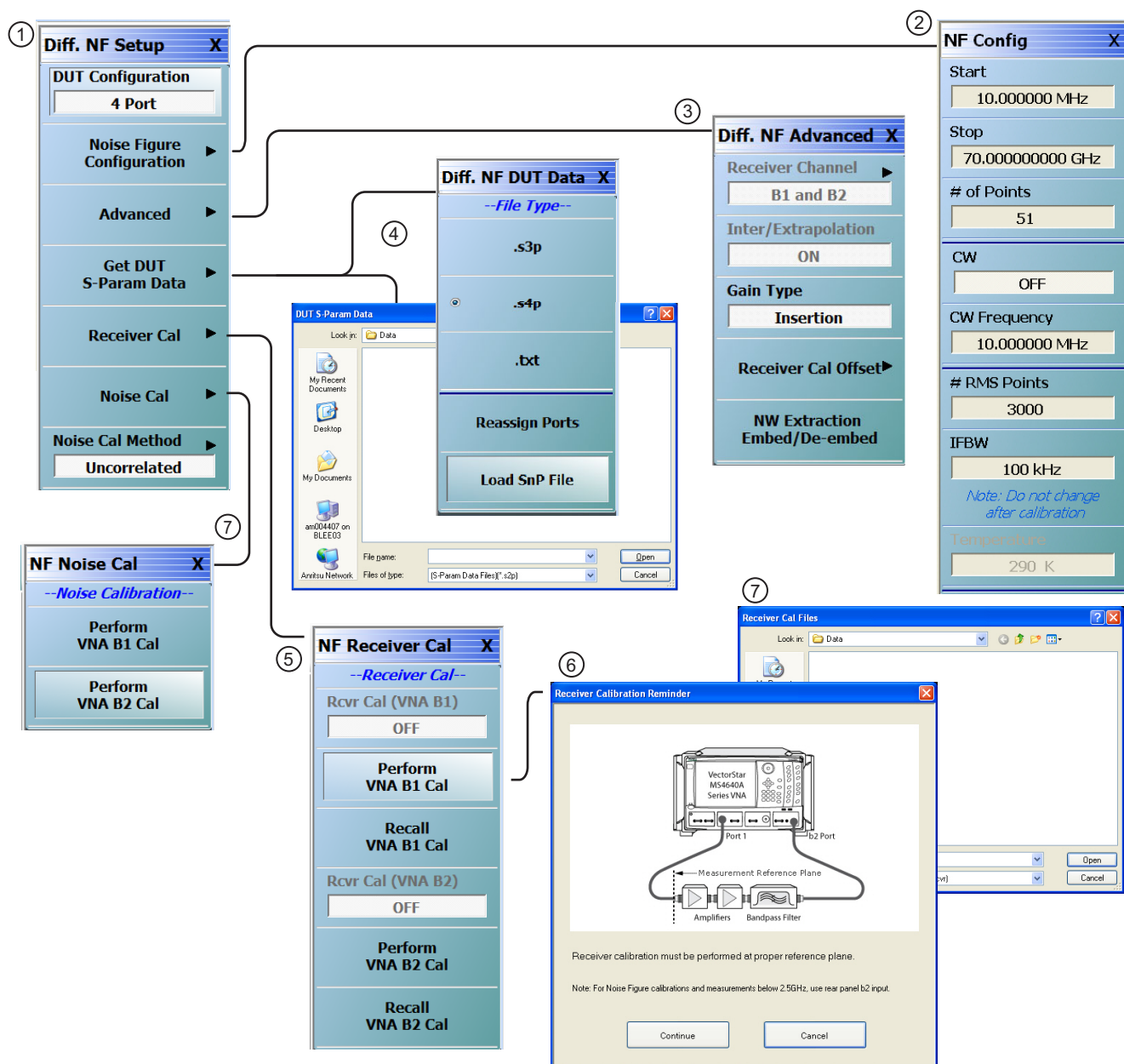
Similarly, when the APPLICATION menu is set to Noise Figure application mode, and another application mode is selected, the new application dialog box appears. The dialog provides the opportunities to:

- Save the current instrument setup as an Active Channel Setup and Calibration CHX file and then either Cancel (above) or proceed (below).
- Cancel out of the change to the new application mode and remain in Noise Figure application mode.
- Continue into the new application mode.

16-6 Differential Noise Figure Menus and Dialogs

The Differential Noise Figure Measurement menu set and related dialogs are shown in the figures below.





- | | |
|--|---|
| 1. DIFF. NF SETUP menu (4-port DUT). | 6. RECEIVER CALIBRATION REMINDER dialog box. |
| 2. NF CONFIG (NF Configuration) menu. | 7. RECALL RECEIVER CAL FILES dialog box. Provides access to previously saved receiver calibration RCVR files. |
| 3. NF ADVANCED menu. | 8. NF NOISE CAL menu. Performs VNA B1 or B2 calibration sequence. |
| 4. DUT S-PARAM (S-Parameter) dialog box (2-port DUT) or menu (4-port DUT). | |
| 5. NF RECEIVER CAL Menu | |

Figure 16-2. Differential Noise Figure Measurement Menu Set (2 of 2)

DIFF. NF SETUP Menu (2-Port DUT)

Full Name

Differential Noise Figure Setup

Previous

- “APPLICATION Menu” on page 12-2

Prerequisites

- Option 48 is installed on the VNA.
- The DUT S-Parameter Data file has been stored and is available on the VNA as an SnP or TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Noise Figure (selected) | Noise Figure Setup | NF SETUP | DUT CONFIGURATION | 2 PORT

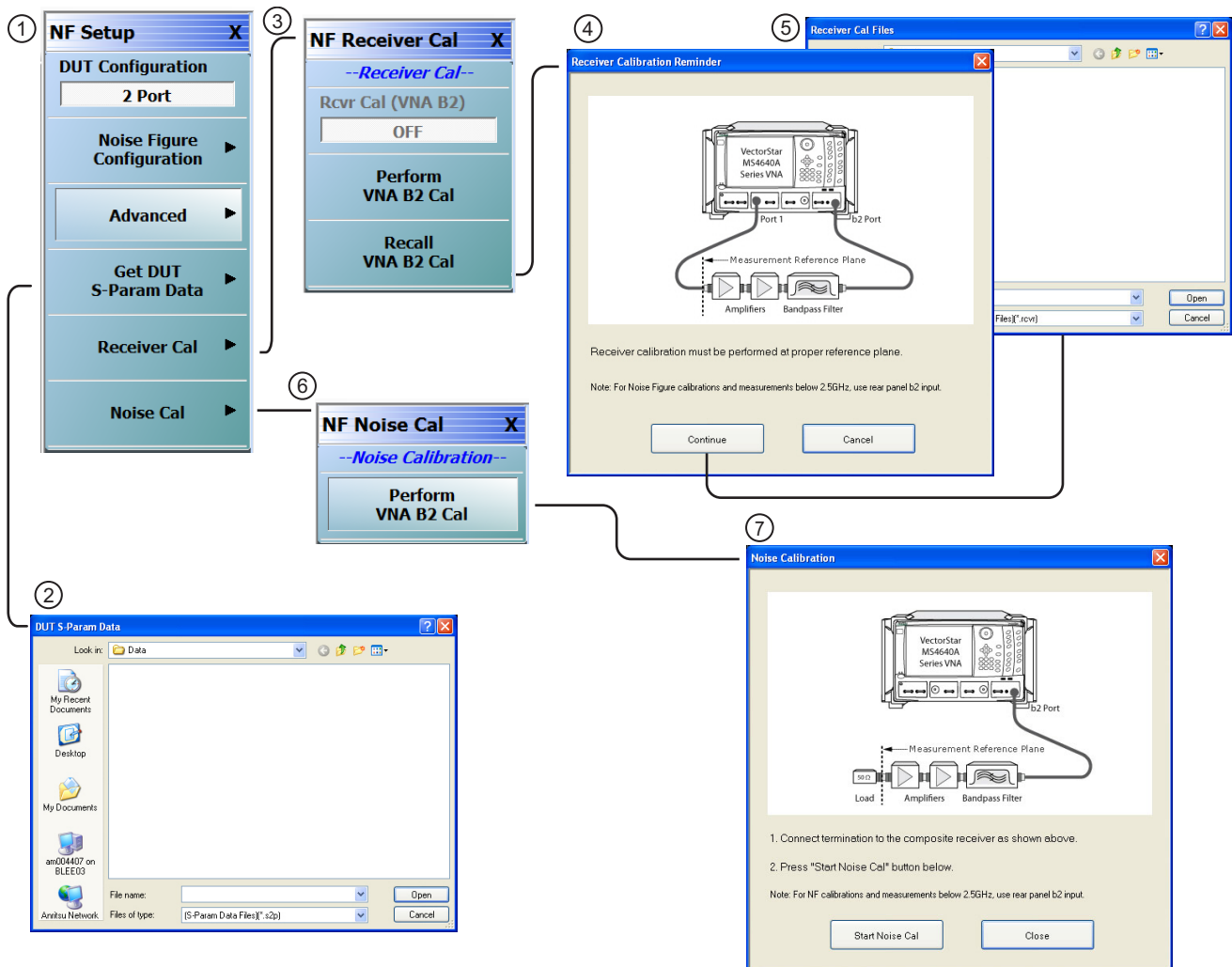


Figure 16-3. NF SETUP Menu (2-Port DUT) (1 of 2)

1. NF SETUP Menu	5. RECALL RECEIVER CAL FILES Dialog Box
2. DUT S-PARAM DATA Dialog Box	6. NF NOISE CALIBRATION Menu
3. NF RECEIVER CAL Menu	7. NOISE CALIBRATION Dialog Box
4. RECEIVER CALIBRATION REMINDER Dialog Box	

Figure 16-3. NF SETUP Menu (2-Port DUT) (2 of 2)**Noise Figure Configuration**

Select displays the NF CONFIG menu.

- [“NF CONFIG Menu” on page 16-12](#)
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Noise Figure Configuration | NF CONFIG

Advanced

Select displays the NF ADVANCED menu.

- [“NF ADVANCED Menu” on page 16-14](#)
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED

Get DUT S-Param Data

Select displays the DUT S-PARAM DATA dialog box. Once opened, navigate to the location of the stored DUT S-Parameter Data SnP file type. Once found, select the Open button to retrieve the file. The S-Parameter data file must be stored and available before starting noise figure measurements.

Receiver Calibration

Select displays the NF RECEIVER CAL menu (see [“NF RECEIVER CAL Menu” on page 16-22](#)).

Noise Calibration

Select displays the NF NOISE CAL menu (see [“NF NOISE CAL Menu” on page 16-25](#)).

DIFF. NF SETUP Menu (4-Port DUT)

Full Name

Differential Noise Figure Setup

Previous

- “APPLICATION Menu” on page 12-2

Prerequisites

- Option 48 is installed on the VNA.
- The DUT S-Parameter Data file has been stored and is available on the VNA as an SnP or TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Noise Figure (selected) | Noise Figure Setup | NF SETUP | DUT CONFIGURATION set to 4 PORT

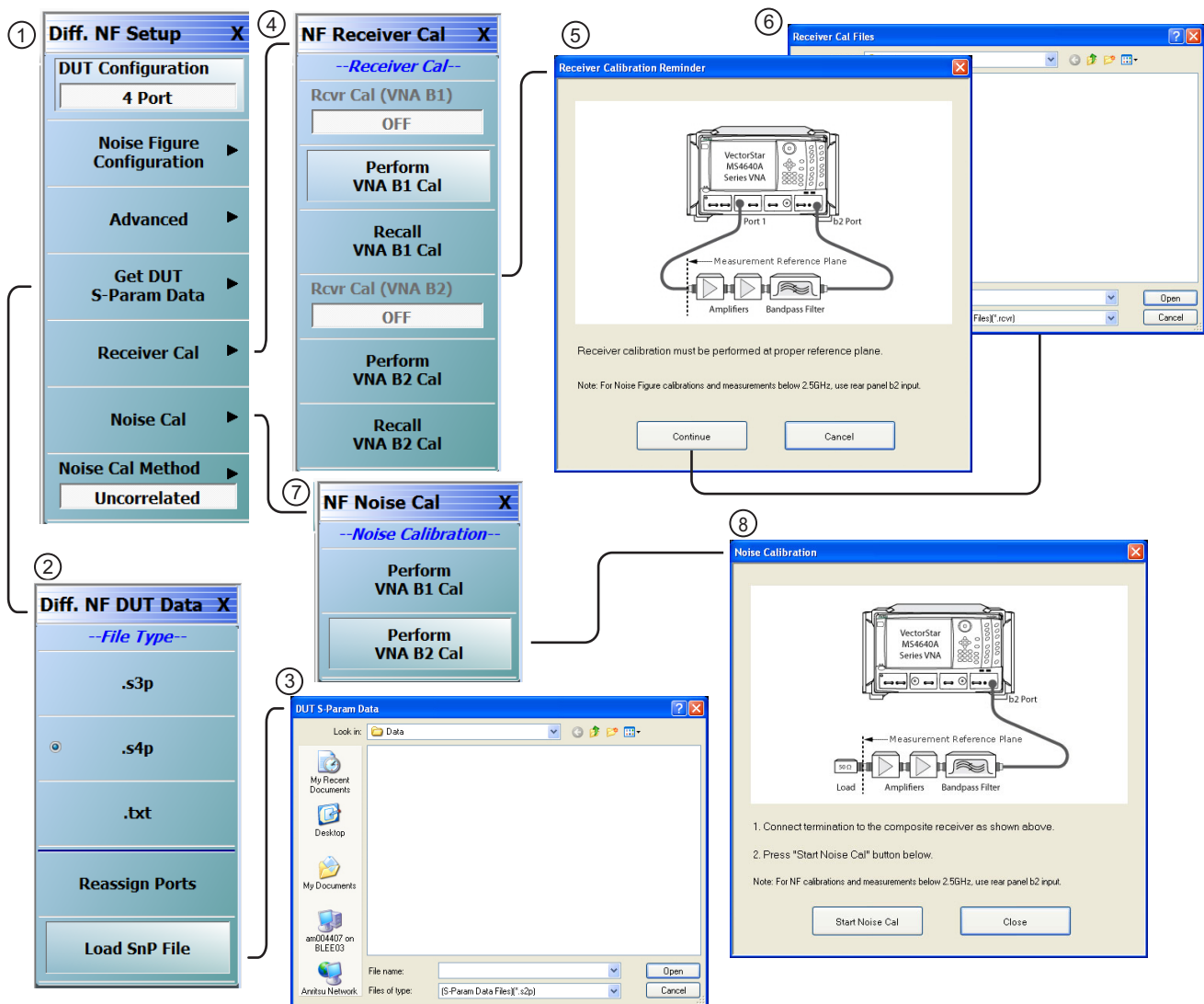


Figure 16-4. NF SETUP Menu (4-Port DUT) (1 of 2)

1. NF SETUP Menu	5. RECEIVER CALIBRATION REMINDER Dialog Box
2. DUT S-PARAM DATA Dialog Box	6. RECALL RECEIVER CAL FILES Dialog Box
3. DIFF NF DUT DATA Menu	7. NOISE CALIBRATION Menu
4. NF RECEIVER CAL Menu	8. NOISE CALIBRATION Dialog Box (Only available for 4-Port DUTs)

Figure 16-4. NF SETUP Menu (4-Port DUT) (2 of 2)

Noise Figure Configuration

Select displays the NF CONFIG menu.

- “NF CONFIG Menu” on page 16-12
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Noise Figure Configuration | NF CONFIG

Advanced

Select displays the NF ADVANCED menu.

- “NF ADVANCED Menu” on page 16-14
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED

Get DUT S-Param Data

Select displays the DUT S-PARAM DATA dialog box. Once opened, navigate to the location of the stored DUT S-Parameter Data SnP file type. Once found, select the Open button to retrieve the file. The S-Parameter data file must be stored and available before starting noise figure measurements.

NF Receiver Calibration

Select displays the NF RECEIVER CAL menu.

NF Noise Calibration

Select displays the NF NOISE CAL menu.

Noise Calibration Method (Only available for 4-Port DUTs)

Select displays the DIFF. NF METHODS menu. Choose between UNCORRELATED, CORRELATED, and OUTPUT COMBINER.

In the 4-port DUT configuration case, there are three methods for analyzing differential (and common-mode) noise figure: uncorrelated, correlated and output combiner. More details are in the Calibration and Measurement Guide but, briefly,

- Uncorrelated: Ignores correlation between noise waveforms from the DUT outputs. Differential and common-mode noise powers will be equal.
- Correlated: Uses direct correlation between VNA receivers to measure correlation directly. In this method there is also a choice if the DUT output mode is dominantly differential or common-mode. This is used to help in cases where there is a sign ambiguity (narrow sweep widths).
- Output combiner: Assumes the use of a balun/combiner at the DUT output and the .s3p file for the combiner is available. This uses single-ended noise measurements of both DUT outputs and the combined measurement to compute DUT differential noise figure.

NF CONFIG Menu

Full Name

Noise Figure Configuration

Previous

- “DIFF. NF SETUP Menu (2-Port DUT)” on page 16-8

Prerequisites

- Option 48 is installed on the VNA.
- The non-compressed DUT S-Parameter Data file has been stored and is available on the VNA as an SnP or TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Noise Figure Configuration | NF CONFIG

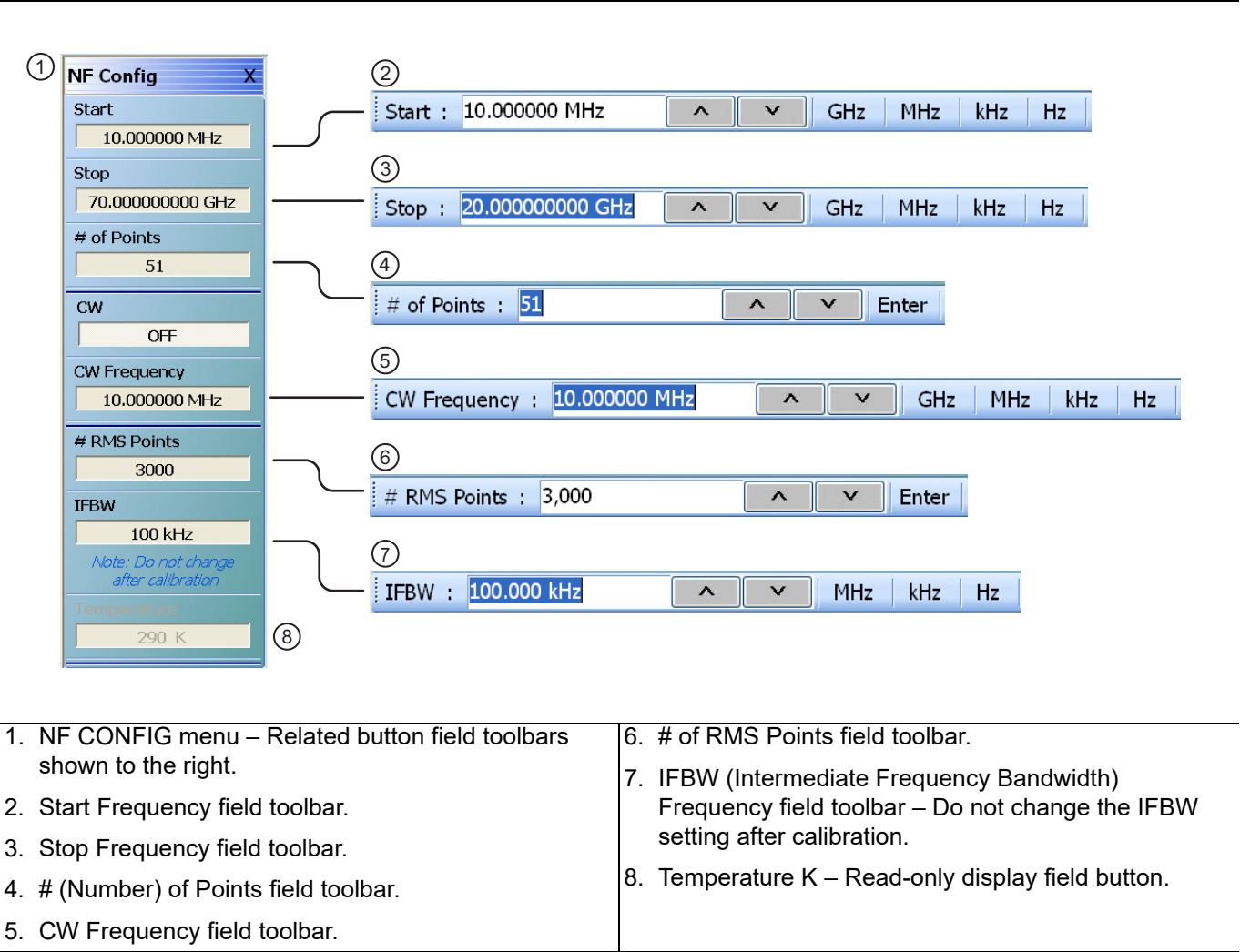


Figure 16-5. NF CONFIG Menu and Related Field Toolbars

Start

Select displays the **Start** frequency field toolbar to provide input for the start frequency in GHz, MHz, kHz, or Hz.

Stop

Select displays the **Stop** frequency field toolbar to provide input for the stop frequency in GHz, MHz, kHz, or Hz.

of Points

Number of Points. Select displays the **# of Points** field toolbar to provide input for the number of sweep points.

CW

Continuous Wave Frequency. Select displays the **CW** field toolbar to provide input for the CW frequency in GHz, MHz, kHz, or Hz.

RMS Points

Number of Root Mean Square Points. Select displays the **# RMS Points** field toolbar to provide input for the number of RMS measurement points per sweep point set above. For example, if the sweep points are set to 51, and the RMS points are set to 3,000, the total measurement points are $51 \times 3,000 = 153,000$.

IFBW

Intermediate Frequency Bandwidth. Select displays the **IFBW** field toolbar to provide input for the IFBW frequency in MHz, kHz, or Hz.

Note Do not change the IFBW setting after calibration.

Temperature K

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

NF ADVANCED Menu

Full Name

Noise Figure Advanced Configuration

Previous

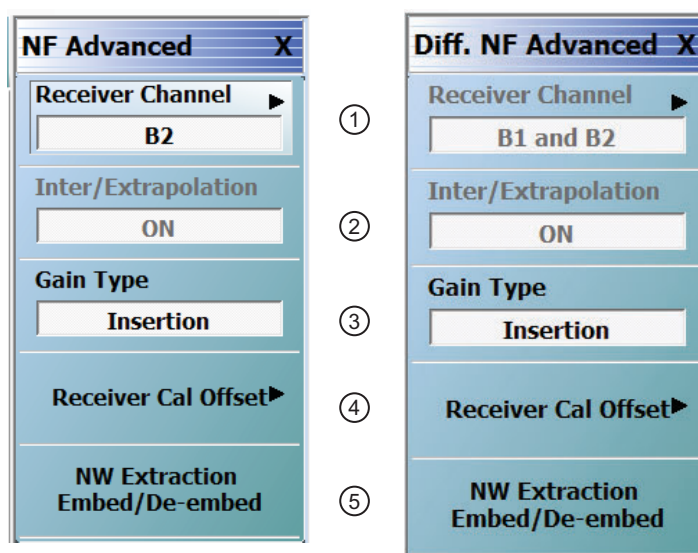
- [“DIFF. NF SETUP Menu \(2-Port DUT\)” on page 16-8](#)

Prerequisites

- Option 48 is installed on the VNA.
- The non-compressed DUT S-Parameter Data file has been stored and is available on the VNA as a .SnP or .TXT file.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | DIFF. NF SETUP | Advanced | NF ADVANCED (2-port) or DIFF. NF ADVANCED (4-port)



1. **Receiver Channel:** NF RECEIVER menu shows and allows setting of the receiver channel for 2-port VNA or displays receiver channels for 4-port VNA.
2. **Inter/Extrapolation:** Calibration Interpolation and Extrapolation Mode. Read-only display. This display indicates that the VNA calibration interpolation and extrapolation mode is ON.
3. **Gain Type:** Toggles between INSERTION and AVAILABLE. The default (Insertion) ignores DUT match effects (can be less accurate but is commonly used). Available gain includes the effects of DUT output match.
4. **Receiver Cal Offset:** Opens NF RCVR CAL OFFSET menu.
See [“NF ADVANCED Menu – Receiver Cal Offset” on page 16-16](#).
5. **NW Extraction Embed/De-embed:** Opens the NETWORK EXTRACTION EMBEDDING/DE-EMBEDDING dialog box.
• See [“NF ADVANCED Menu – NW Extraction Embed/De-embed” on page 16-18](#).

Figure 16-6. DIFFERENTIAL NF ADVANCED Menu

NF ADVANCED Menu – Receiver

Full Name

Noise Figure Advanced Configuration Receiver

Prerequisites

- Available in 2-port VNAs.
- Option 48 is installed on the VNA.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED | Receiver Channel | NF RECEIVER

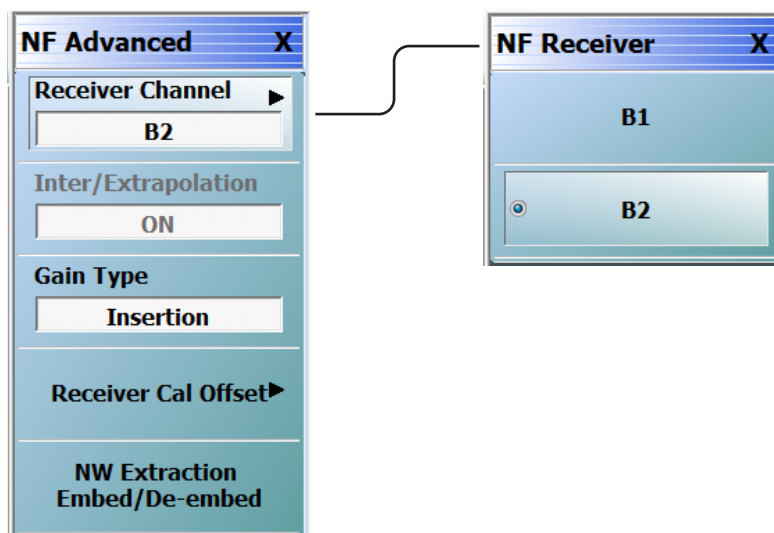


Figure 16-7. NF ADVANCED Menu – Receiver (2-port VNAs)

NF ADVANCED Menu – Receiver Cal Offset

Full Name

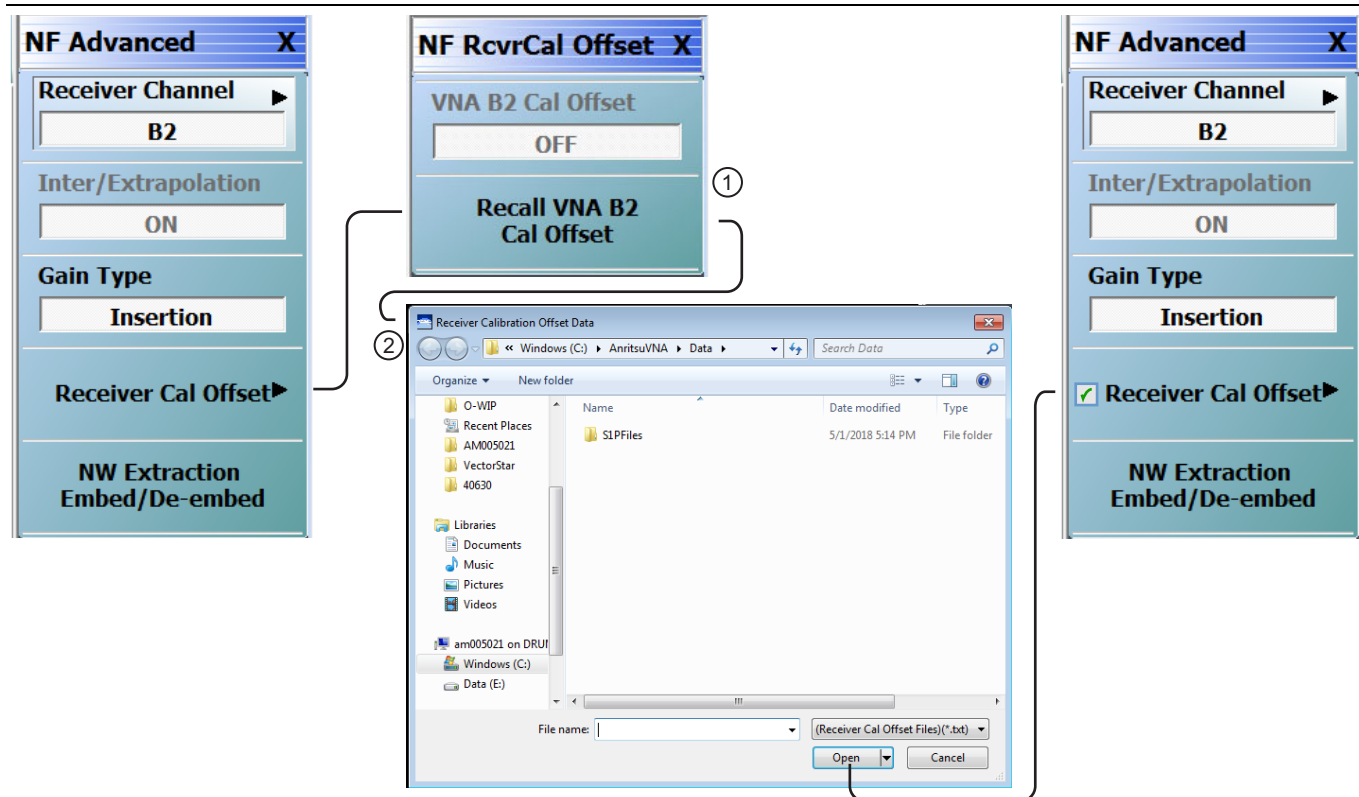
Noise Figure Advanced Configuration Receiver Calibration Offset

Prerequisites

- Option 48 is installed on the VNA.
- The non-compressed DUT S-Parameter Data file has been stored and is available on the VNA with the filename extension .snp or .txt.
- The APPLICATION menu mode is set to Noise Figure mode.

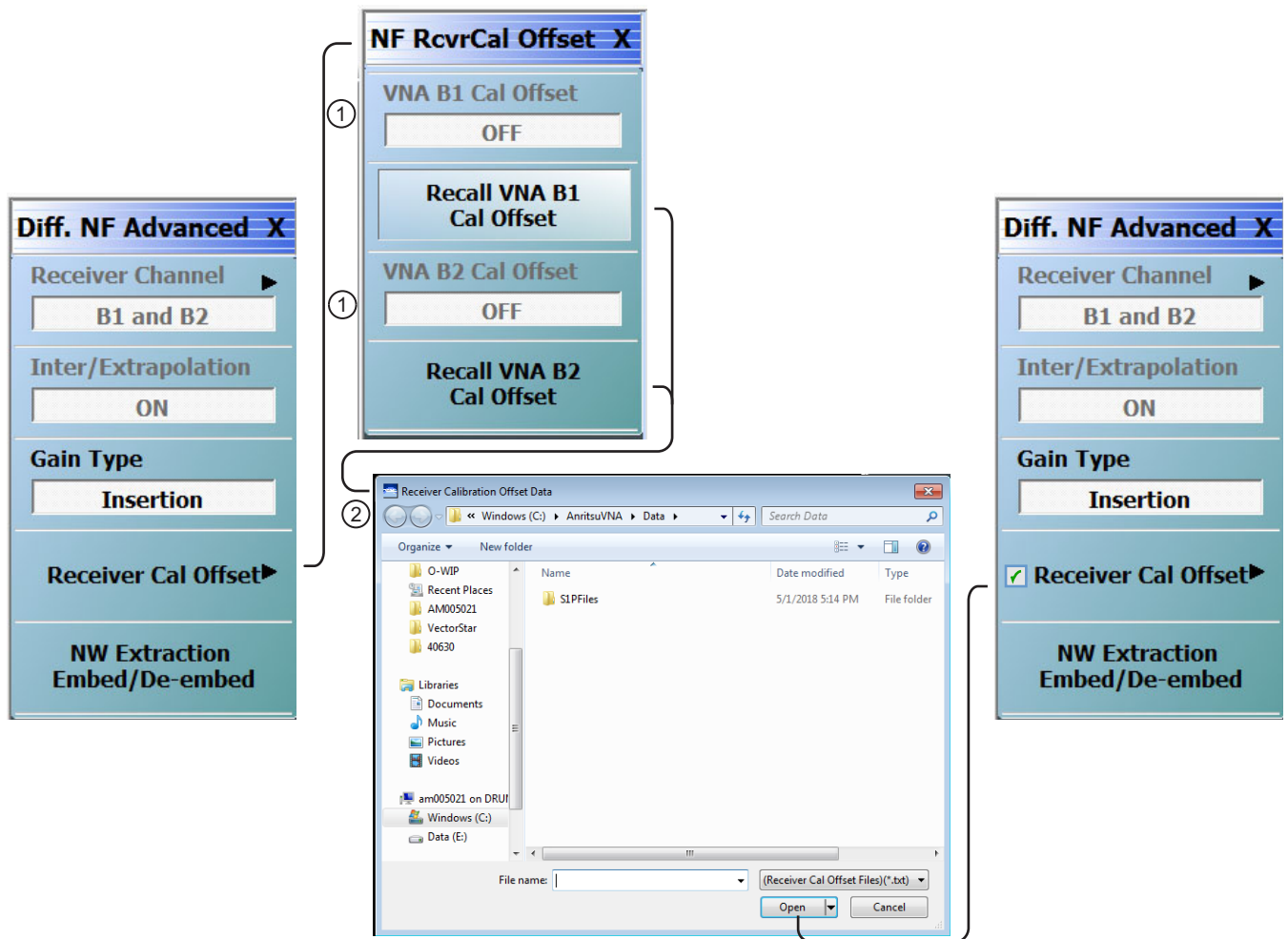
Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED



- Receiver Cal Offset:** Read-only field display and toggle. Shows the Receiver Cal Offset status. After loading the receiver cal offset file (.txt), this field becomes an ON/OFF toggle for the Receiver Cal Offset function.
- Recall Receiver Cal Offset:** Opens RECEIVER CALIBRATION OFFSET dialog box. After loading the receiver cal offset file (.txt), a CheckBox (as checked) will be shown to indicate the successful file load. Also, the menu item for "Cal Offset" will be enabled and the status will be changed to ON.

Figure 16-8. NF ADVANCED Menu – 2-port DUT



1. **Receiver Cal Offset:** Read-only field display and toggle. Shows the Receiver Cal Offset status. After loading the receiver cal offset file (.txt), this field becomes an ON/OFF toggle for the Receiver Cal Offset function.
2. **Recall VNABx Cal Offset:** Opens RECEIVER CALIBRATION OFFSET Data dialog box. After loading the receiver cal offset file (.txt), a CheckBox (as checked) will be shown to indicate the successful file load. Also, the menu item for "Cal Offset" will be enabled and the status will be changed to ON.

Figure 16-9. NF ADVANCED Menu – 4-port DUT

NF ADVANCED Menu – NW Extraction Embed/De-embed

Full Name

Network Extraction embed/De-embed

Prerequisites

- Option 48 is installed on the VNA.
- The non-compressed DUT S-Parameter Data file has been stored and is available on the VNA with the filename extension .snp or .txt.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | NF SETUP | Advanced | NF ADVANCED

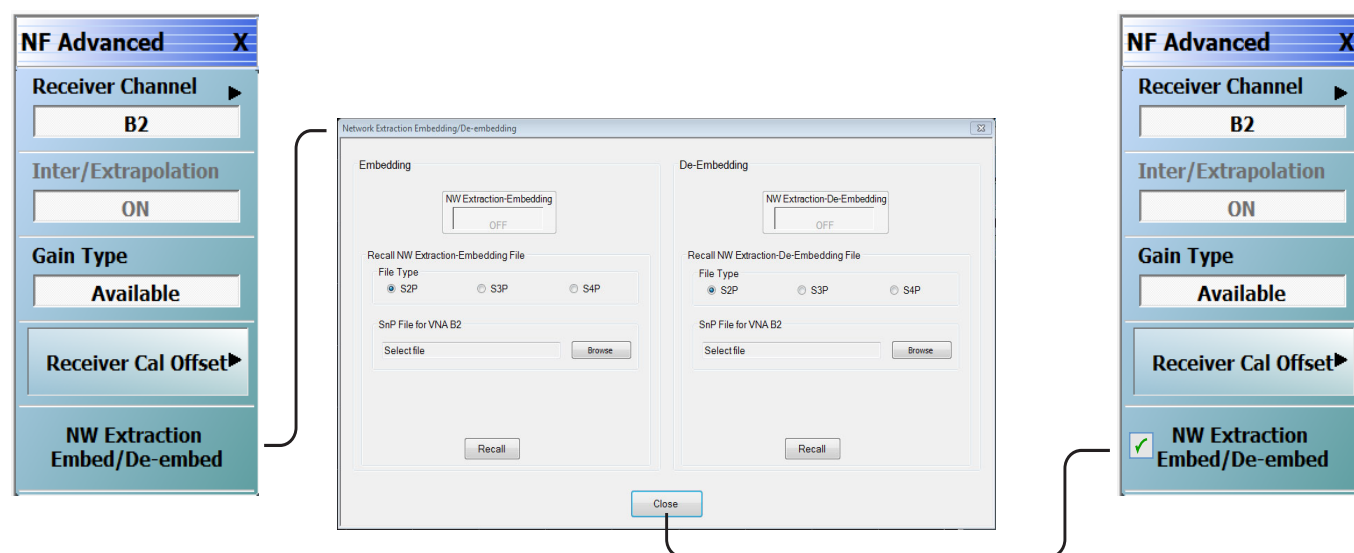


Figure 16-10. NF ADVANCED Menu – 2-port DUT

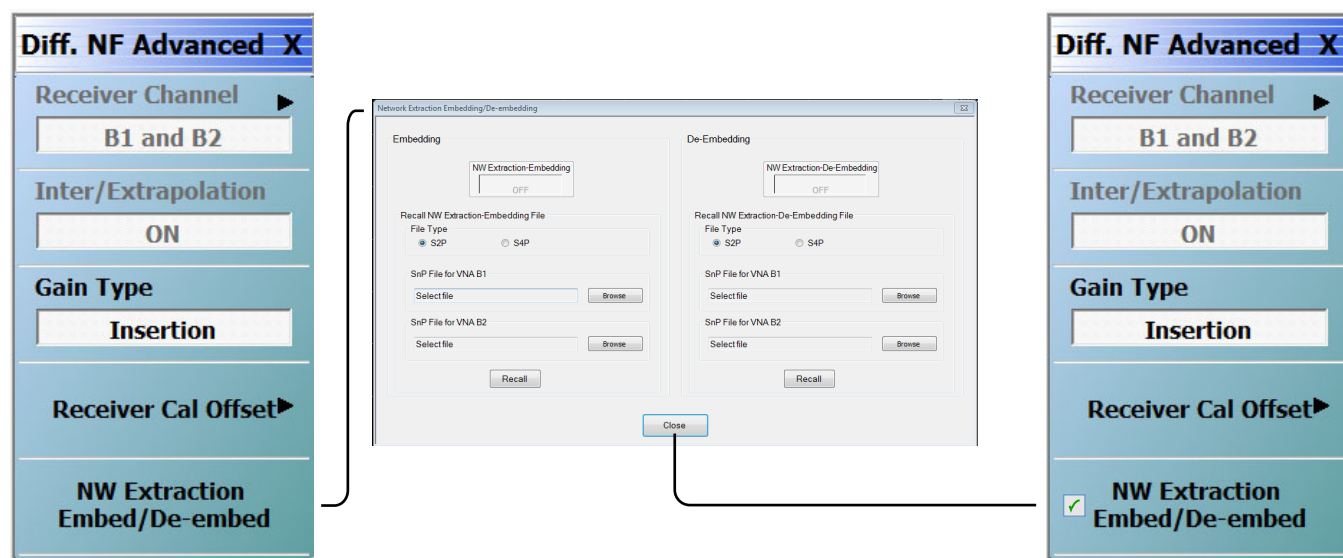


Figure 16-11. NF ADVANCED Menu – 4-port DUT (1 of 2)

The S-parameters to be de-embedded are sourced from .snp files. For a 2-port DUT and $N > 2$, the path within the file that is to be used must be specified.

For a 4-port DUT, either two .s2p files (one for the b1 and b2 receiver paths) must be specified, or a higher-count file can be used (in which case, the path belonging to the b1 receiver path must be specified and the disjoint path will be used for the b2 receiver path).

Figure 16-11. NF ADVANCED Menu – 4-port DUT (2 of 2)

DIFFERENTIAL NF DUT Data Dialog Box and Menu

Full Name

Differential Noise Figure DUT Data

Previous

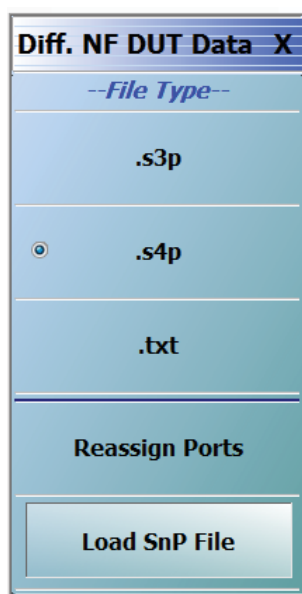
- “DIFF. NF SETUP Menu (2-Port DUT)” on page 16-8

Prerequisites

- Option 48 is installed on the VNA.
- The non-compressed DUT S-Parameter Data .sNp (N=3 or 4 for 4-port DUT selections) or .txt (for frequency converting DUTs).
- The APPLICATION menu mode is set to Noise Figure mode.
- The DUT Configuration is set to 4 Port.

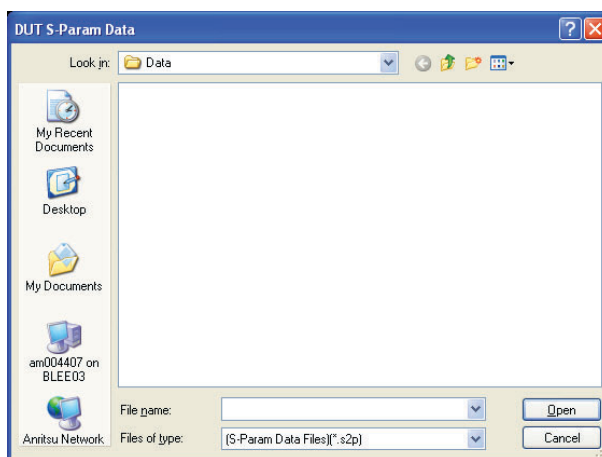
Navigation

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | DIFF. NF SETUP
DUT Configuration = 4 PORT | Get DUT S-Param Data



For a 4-port DUT, a .s3p, .s4p or .txt file can be used. The .txt format is that of the MS464XX .txt save process and assumes the gain path is in trace 1. The Reassign Ports tool is used to reconfigure a file if the ports used therein do not match what the system expects (1->2 and 1->3 as the gain paths for .s3p and 1->3 and 2->4 as the gain paths for .s4p).

Figure 16-12. DIFFERENTIAL NF DUT Data Menu – 4-port DUT



The DUT S-parameters/gain information for a 2-port DUT can either be entered as a .s2p file (S21 is assumed to be the gain direction) or as a .txt file (the format of the MS464XX .txt file save process). The .txt file is used for frequency conversion devices, and it is assumed the gain variable is in trace 1.

Figure 16-13. DIFFERENTIAL NF DUT Data Dialog Box – 2-port DUT

NF RECEIVER CAL Menu

Full Name

Noise Figure Receiver Calibration

Previous

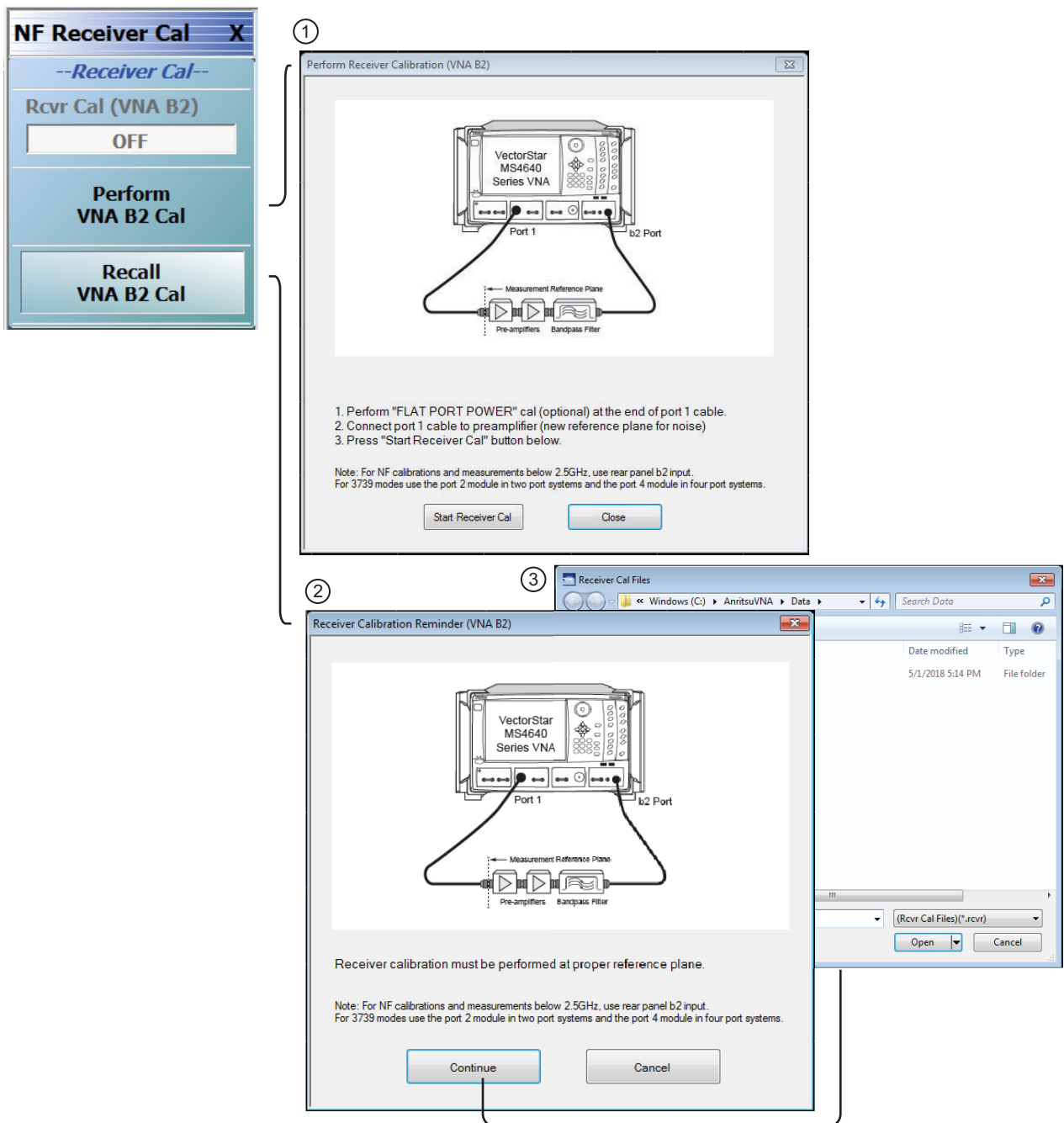
- [“DIFF. NF SETUP Menu \(2-Port DUT\)” on page 16-8](#)

Prerequisites

- Option 48 is installed on the VNA.
- The non-compressed DUT S-Parameter Data .sNp or .txt file has been stored and is available on the VNA.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

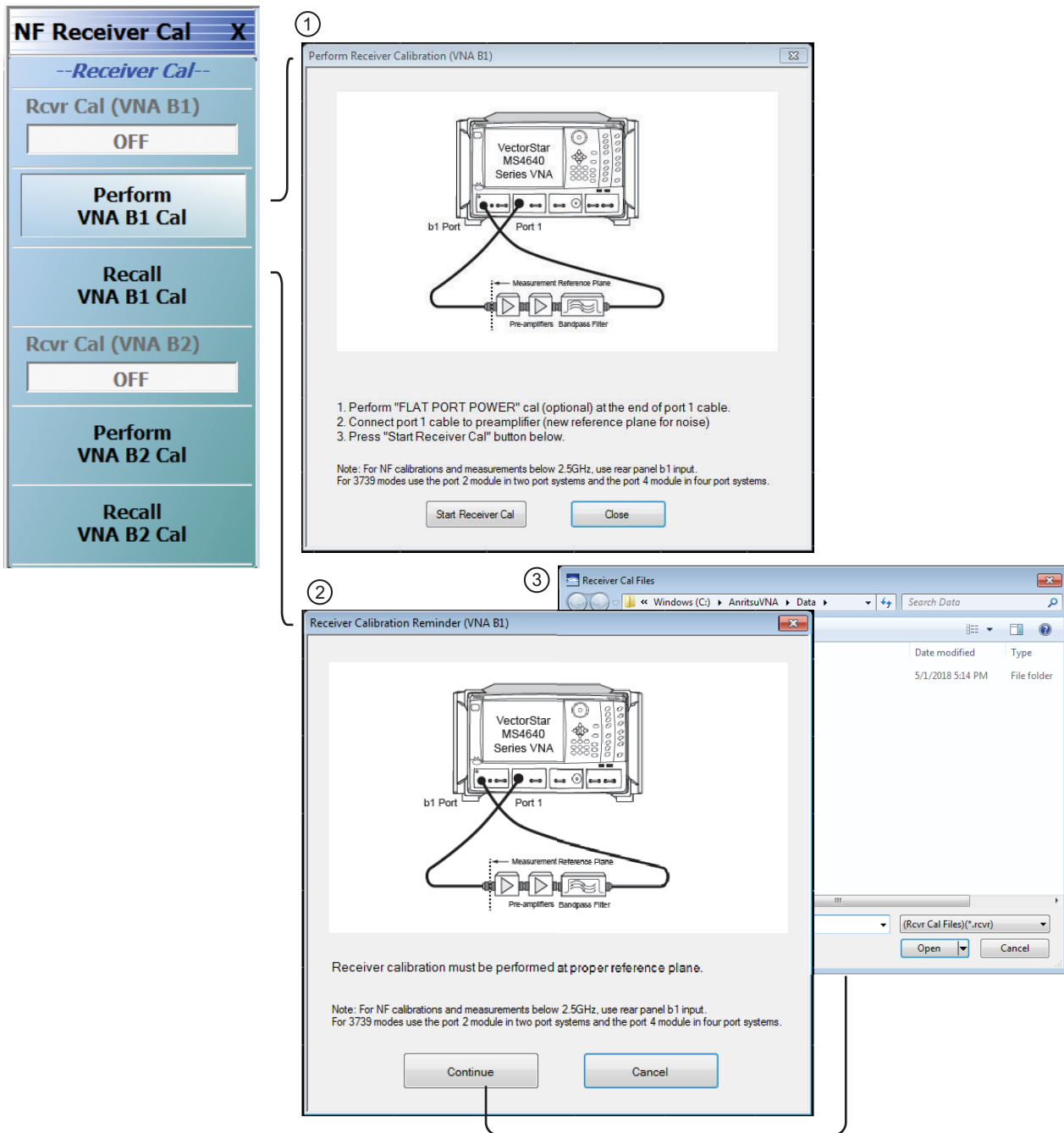
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | DIFF. NF SETUP
DUT Configuration = 2 PORT | Receiver Cal



An existing receiver cal for the b2 path can be recalled (2, 3) or one can be performed now (1). Either way, it is expected that port 1 (power cal at the end of that cable optional) is connected to the input of the composite receiver with a drive level low enough to avoid compression of the composite receiver.

Figure 16-14. NF Receiver Cal Menu – 2-port DUT

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | DIFF. NF SETUP
DUT Configuration = 4 PORT | Receiver Cal



An existing receiver cal for the b1 path can be recalled (2,3) or one can be performed now (1). Either way, it is expected that port 1 (power cal at the end of that cable optional) is connected to the input of the composite receiver with a drive level low enough to avoid compression of the composite receiver.

Figure 16-15. NF Receiver Cal Menu – 4-port DUT

NF NOISE CAL Menu

Full Name

Noise Figure Noise Calibration

Previous

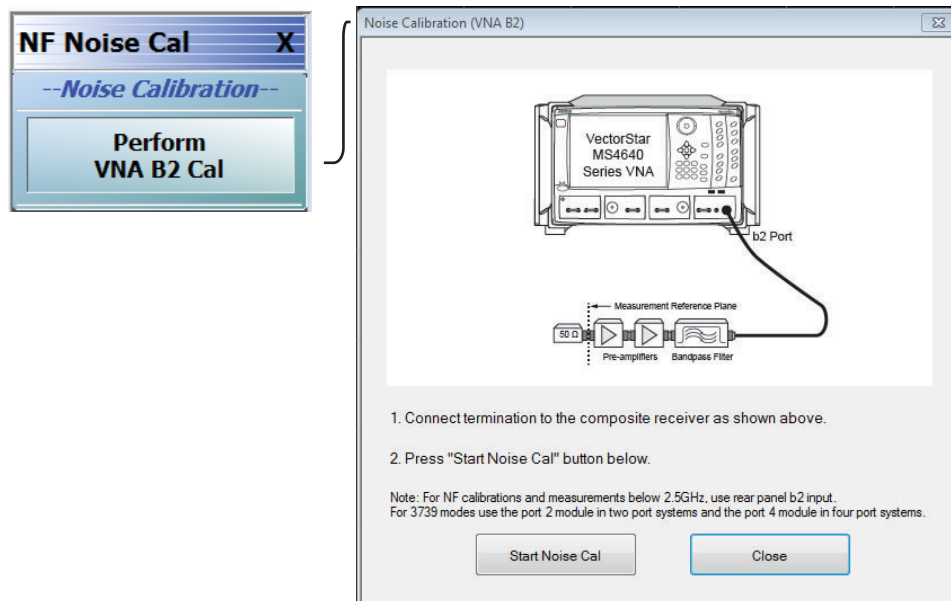
- “DIFF. NF SETUP Menu (2-Port DUT)” on page 16-8

Prerequisites

- Option 48 is installed on the VNA.
- The non-compressed DUT S-Parameter Data .sNp or .txt file has been stored and is available on the VNA.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

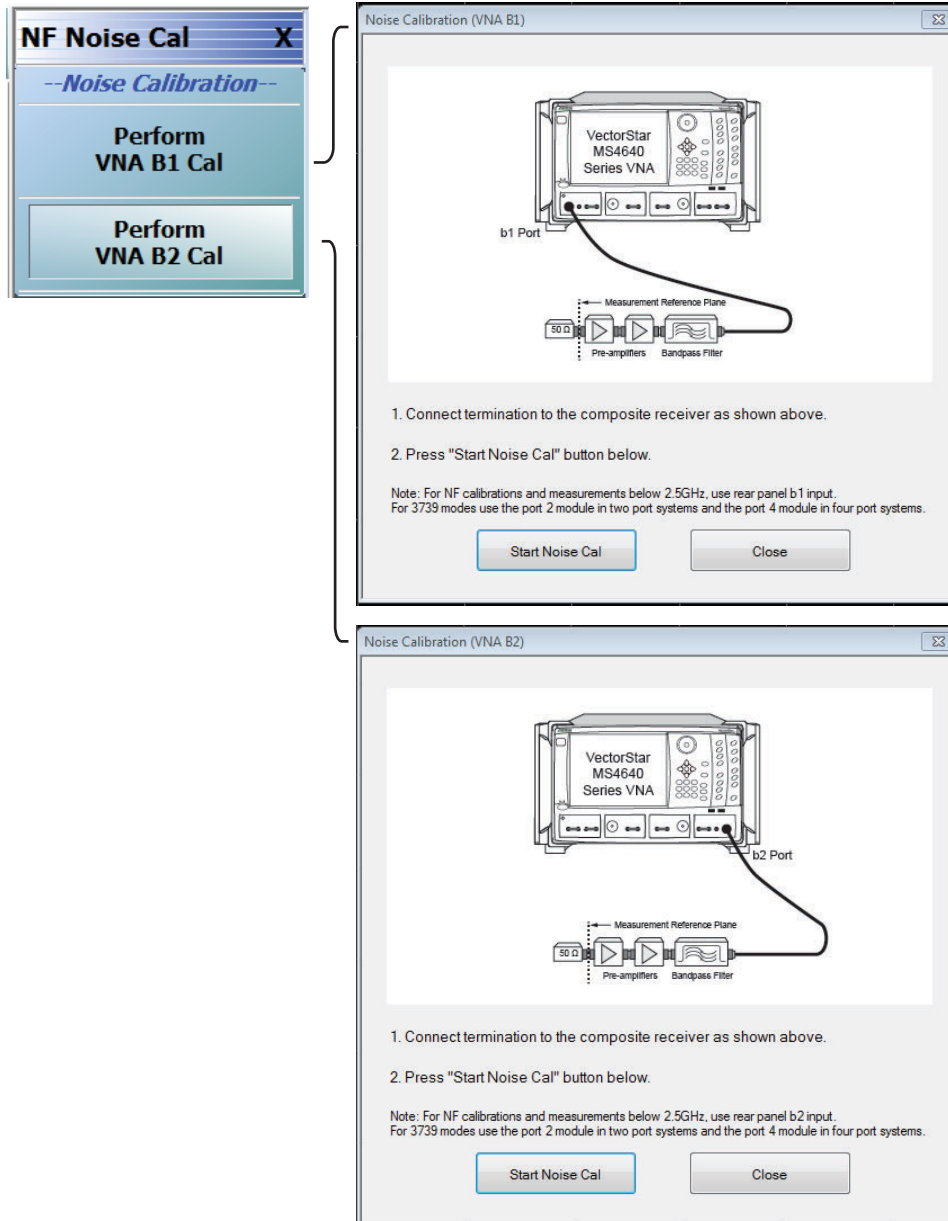
- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | DIFF. NF SETUP
DUT Configuration = 2 PORT | Noise Cal



This corrects for noise power from the composite receiver on b2. Connect a termination to the input of the composite receiver and press Perform VNA B2 Cal.

Figure 16-16. NF Noise Cal Menu – 2-port DUT

- MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | DIFF. NF SETUP
| DUT Configuration = 4 PORT | Noise Cal



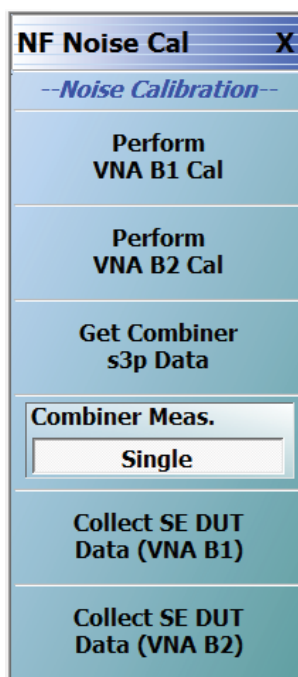
This corrects for noise power from the composite receivers. Connect a termination to the input of the composite receiver and press the appropriate Perform VNA Bn Cal button.

In the uncorrelated or correlated method,

1. Select displays the NF NOISE CALIBRATION menu. Select Perform VNA Bn Cal, which opens the NOISE CALIBRATION (VNA Bn) dialog box. Once open, follow the procedure below to calibrate the noise:
2. Connect the termination to the preamplifier at the reference plane of the noise figure measurement. The dialog box figure shows the placement of the required components.
3. Select the Start Noise Cal button on the dialog box to start the calibration.

Figure 16-17. NF Noise Cal Menu – 4-port DUT, Correlated or Uncorrelated Noise Cal Methods

NF Noise Cal Menu – 4-port DUT, Single Combiner Measurement

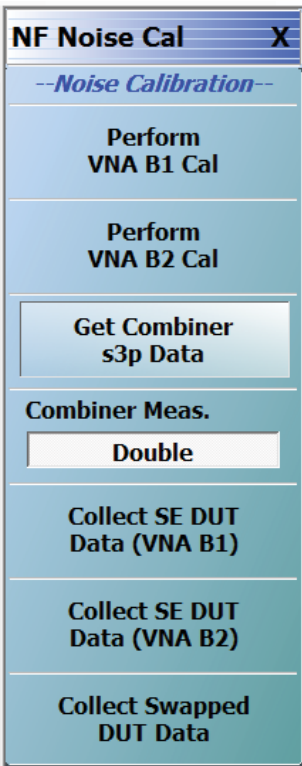


In the 'single' combiner method, three calibration-like steps are required:

1. Perform the noise cal on both b1 and b2 receiver paths, as with the other methods for 4-port DUTs.
2. Load .s3p data for the combiner (port 3 is assumed to be the combined port)
3. Collect single-ended noise power data for the DUT (combiner not present).

Figure 16-18. NF Noise Cal Menu – 4-port DUT, Single Combiner Measurement

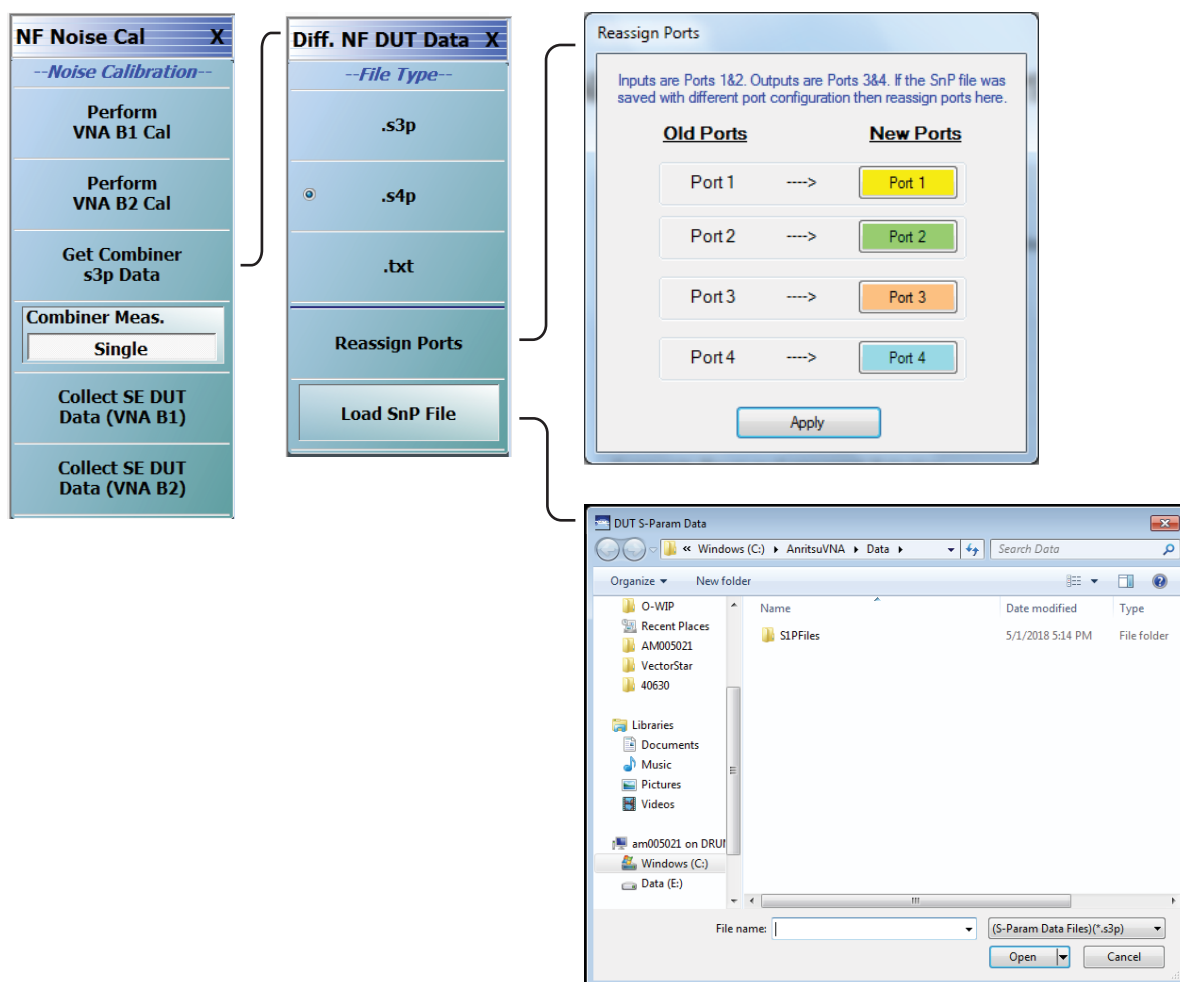
NF Noise Cal Menu – 4-port DUT, Double Combiner Measurement



- In the 'double' combiner method, four calibration-like steps are required:
1. Perform the noise cal on both b1 and b2 receiver paths as with the other methods for 4-port DUTs.
 2. Load .s3p data for the combiner (port 3 is assumed to be the combined port).
 3. Collect single-ended noise power data for the DUT (combiner not present).
 4. Collect combined noise power data in the swapped configuration (i.e., the interconnects between the DUT and combiner are swapped).

Figure 16-19. NF Noise Cal Menu – 4-port DUT, Double Combiner Measurement

NF Noise Cal Menu – 4-port DUT, Get Combiner s3p Data Dialog Boxes



When loading the combiner .s3p data file, it is expected that port 3 represents the common port. If this was not the case when the .s3p data was acquired, use the 're-assign ports' dialog to remap the ports.

Figure 16-20. NF Noise Cal Menu – 4-port DUT, Get Combiner s3p Data Dialog Boxes

Diff. NF Method Menu

Full Name

Differential Noise Figure Methods

Previous

- “DIFF. NF SETUP Menu (2-Port DUT)” on page 16-8

Prerequisites

- Option 48 is installed on the VNA.
- The APPLICATION menu mode is set to Noise Figure mode.

Navigation

MAIN | Application | APPLICATION | Mode = Noise Figure | Noise Figure Setup | DIFF. NF SETUP | DUT Configuration = 4 PORT | Noise Cal Method

The Noise Cal Method options and DIFF. NF METHOD menu are shown in the figure below.

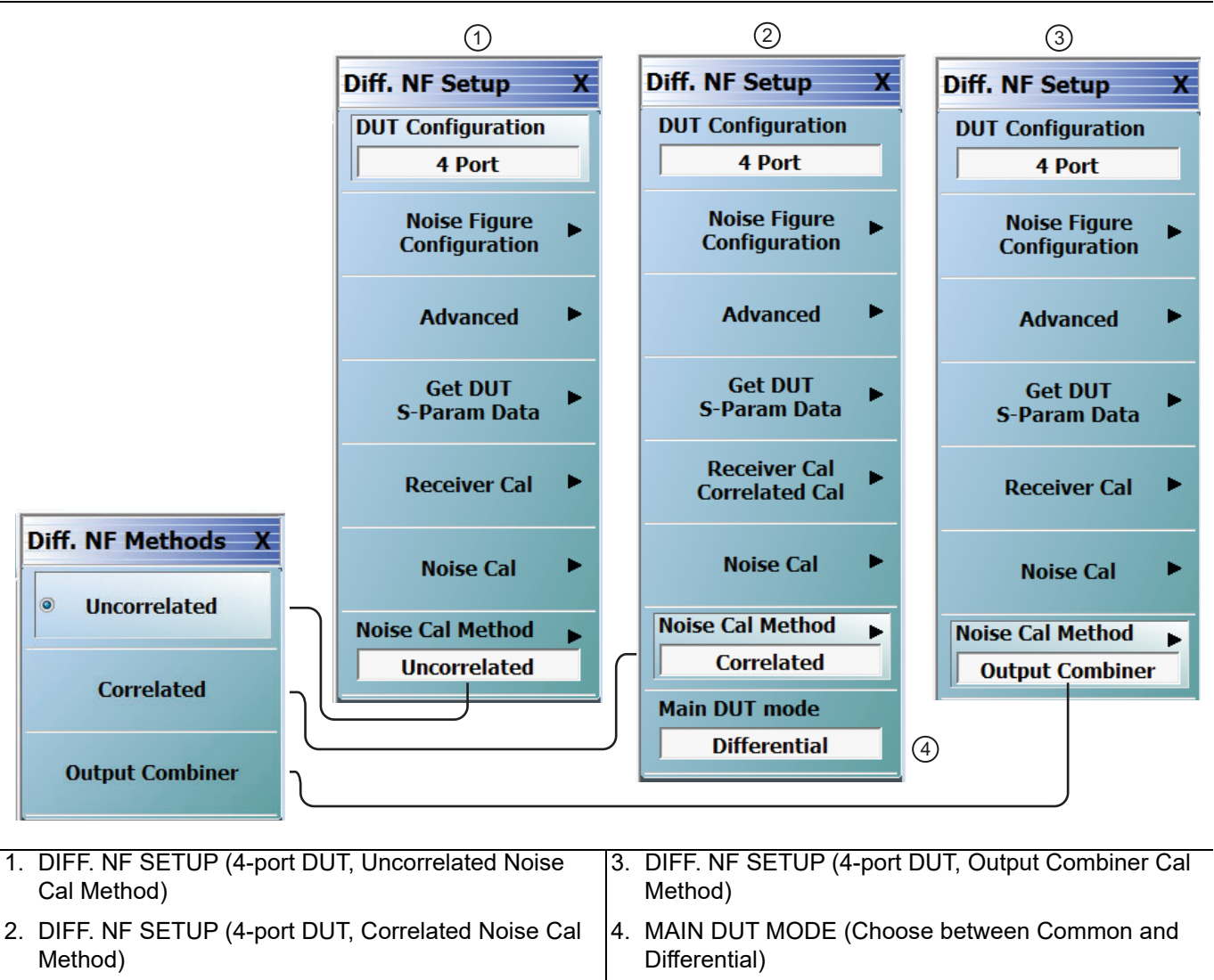


Figure 16-21. Differential Noise Figure Measurement Menu Set

Chapter 17 — Mixer Setup

17-1 Chapter Overview

This chapter provides information for the APPLICATION menu and its configuration controls for Mixer setup.

Other Application Menu Chapters

The other chapters in this manual on APPLICATION menus with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

17-2 Application Menus and Mixer Dialog Boxes

Note	The Mixer Setup buttons are not present when the VNA is in 4-Port mode.
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- [“Mixer Menu” on page 17-2](#)
- [“Mixer Setup Dialog Overview” on page 17-3](#)
 - [“MIXER SETUP – ACTIVE CHANNEL Dialog Box Variants” on page 17-4](#)
 - [“ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep” on page 17-5](#)
 - [“ACTIVE CHANNEL Dialog Box – Power-Based Sweep” on page 17-17](#)
 - [“MIXER SETUP – MULTI-CHANNEL Dialog Box Variants” on page 17-28](#)
 - [“MULTI-CHANNEL – Frequency-Based Sweep” on page 17-31](#)
 - [“MULTI-CHANNEL – Power-Based Sweep” on page 17-44](#)

Mixer Menu

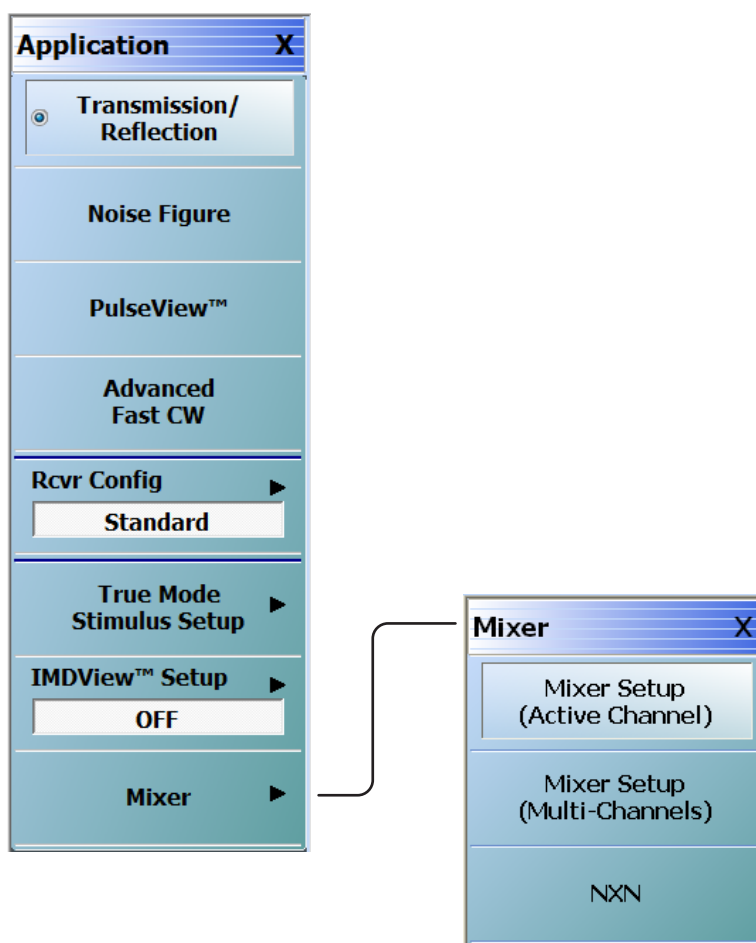


Figure 17-1. Mixer Menu

See the other APPLICATION menu chapters for descriptions of other menu button selections.

Mixer Setup (Active Channel)

Select displays the single channel version of the mixer setup, the MIXER SETUP [SWEEP TYPE] dialog boxes. The setup allows setting the sweep type, the port correspondence to RF and IF, and the signal source for the LO. There are separate setup configurations for frequency-based sweep and power-based sweep.

- [“MIXER SETUP – ACTIVE CHANNEL Dialog Box Variants” on page 17-4](#)

Mixer Setup (Multi-Channel)

Select displays the MIXER SETUP CONFIGURATION dialog boxes. The mixer setup dialogs provide setup guidance for different mixer types, and supports measurement of various parameters on different channels. Once the mixer configuration and measurement requirements are input, the system responds with the necessary calibrations required. The mixer measurement configuration can be saved and recalled.

- [“MIXER SETUP – MULTI-CHANNEL Dialog Box Variants” on page 17-28](#)

17-3 Mixer Setup Dialog Overview

There are two different mixer setup dialog sets available on the APPLICATION menu shown as two buttons near the bottom of the menu. The first button, provides support for configuring the active channel. The second button provides support for configuring multiple channels as required for the measurements selected. The mixer setup dialog box controls and basic operation are the same on both dialog sets.

Mixer Setup Procedure Variants

The mixer setup dialogs are available on the APPLICATION menu. From a procedure point of view, it is convenient to divide the configuration procedures into four types:

- Single channel mixer setup for linear frequency or log frequency sweep.
 - [“ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep” on page 17-5](#)
- Single channel mixer setup for power sweep with CW frequency.
 - [“ACTIVE CHANNEL Dialog Box – Power-Based Sweep” on page 17-17](#)
- Multi-channel mixer setup for frequency-based sweep.
 - [“MULTI-CHANNEL – Frequency-Based Sweep” on page 17-31](#)
- Multi-channel mixer setup for power sweep.
 - [“MULTI-CHANNEL – Power-Based Sweep” on page 17-44](#)

MIXER SETUP – ACTIVE CHANNEL Dialog Box Variants

Full Name

The full name of the mixer setup dialog box varies depending on the type of sweep and active channel. The channel number is taken from the currently active channel. See [Figure 17-2](#) for comparison examples. The frequency sweep version is the same as the log sweep version.

- Mixer Setup [Frequency Sweep] (Ch1)
- Mixer Setup [Log Sweep] (Ch1)
- Mixer Setup [Power Sweep] (Ch1)

Previous

- [“Mixer Menu” on page 17-2](#)

Navigation

- MAIN | Application | APPLICATION | Mixer | MIXER | Mixer Setup (Active Channel) | MIXER SETUP Dialog Box

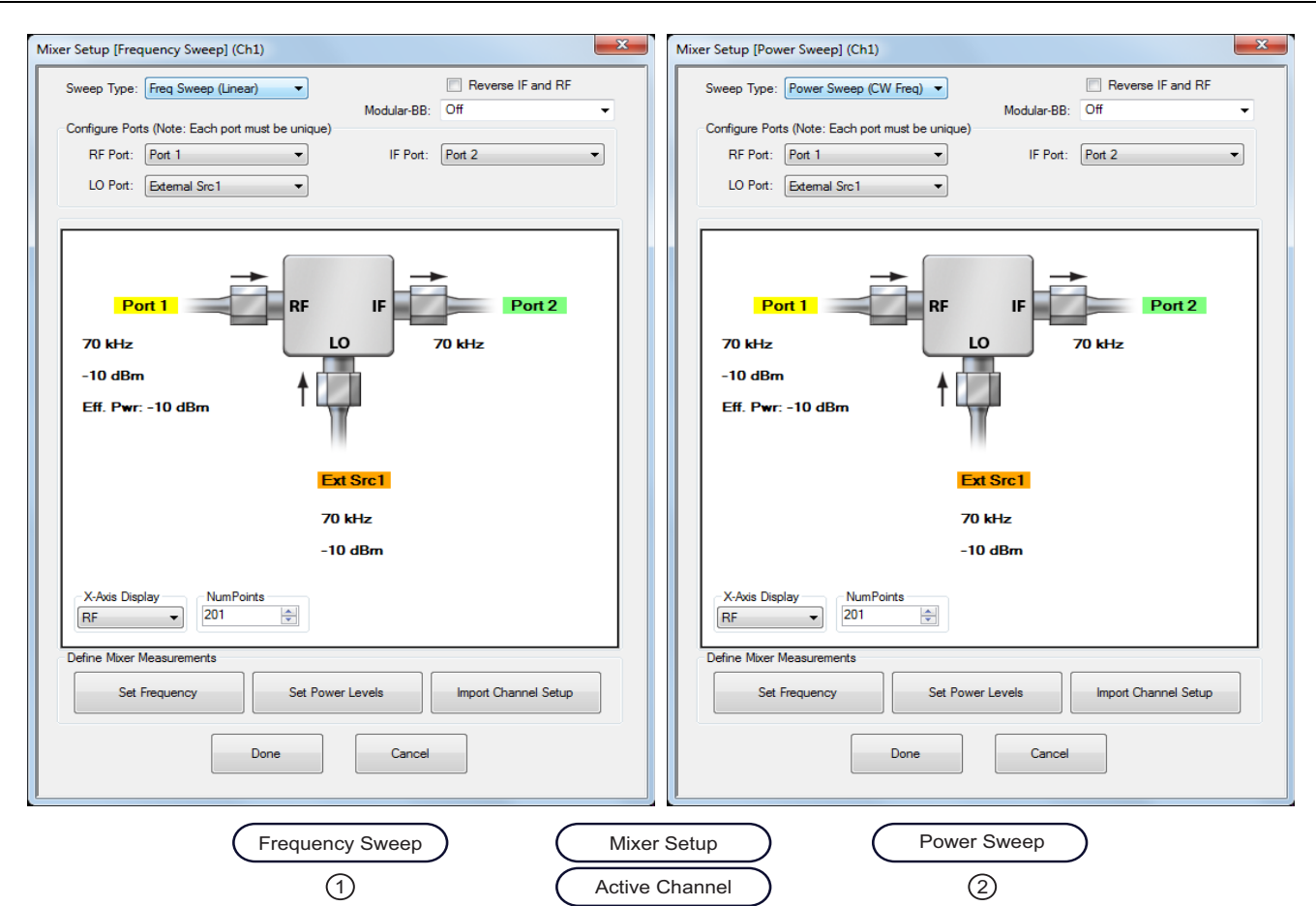


Figure 17-2. MIXER SETUP – ACTIVE CHANNEL Main Dialog Variants

17-4 ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep

Previous

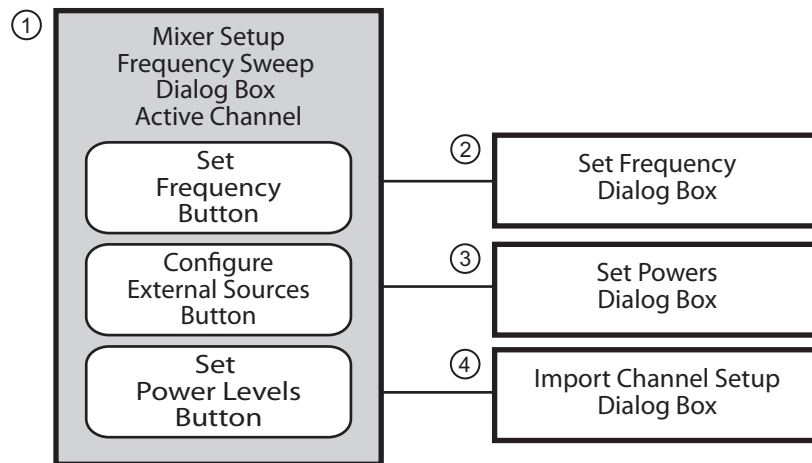
- “MIXER Menu” on page 12-20.

Navigation

- MAIN | Application | APPLICATION | Mixer | MIXER | Mixer Setup (Active Channel) | MIXER SETUP dialog box | Sweep Type = Freq Sweep (Linear) or Freq Sweep (Log)

Mixer Setup – Active Channel – Linear/Log Frequency Sweep – Menu Set

The flowchart below shows the dialogs that are completed using the active channel.



1. MIXER SETUP FREQUENCY SWEEP Dialog	3. SET POWERS (FREQUENCY SWEEP) Dialog
2. SET FREQUENCY (FREQUENCY SWEEP) Dialog	4. ACTIVE CHANNEL SETUP IMPORTED Dialog

Figure 17-3. Mixer Setup Dialog Set – Active Channel – Frequency Sweep

Mixer Setup – Active Channel – Information Required

Before starting the mixer setup dialogs, have the following information available:

- Channel number of the active channel
- Type of sweep
- Port and external source assignments for RF, IF, and LO.
- RF as input or RF as output.
- Frequency range or CW setting for RF, IF, and LO.
- If RF is input, conversion to be used for IF:
 - $IF = RF - LO$ which is down conversion with Upper Sideband (USB).
 - $IF = LO - RF$ which is down conversion with Lower Sideband (LSB).
 - $IF = RF + LO$ which is up conversion.
- If RF is output, conversion to be used for IF:
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Sideband (LSB).
 - $RF = IF - RF$ which is down conversion with Upper Sideband (USB).

- If RF is input, power setting for:
 - Power for Port 1 RF in dBm.
 - Power for External Source LO in dBm.
- If RF is output, power setting for:
 - Power for Port 1 IF in dBm.
 - Power for External Source LO in dBm.

Mixer Setup – Active Channel – Frequency Sweep – Procedure

1. Navigate to the APPLICATION menu and select the Mixer Setup (Single-Channel) button.
 - MAIN | Application | APPLICATION | Mixer | MIXER | Mixer Setup (Single Channel)
2. The MIXER SETUP dialog appears as shown below.

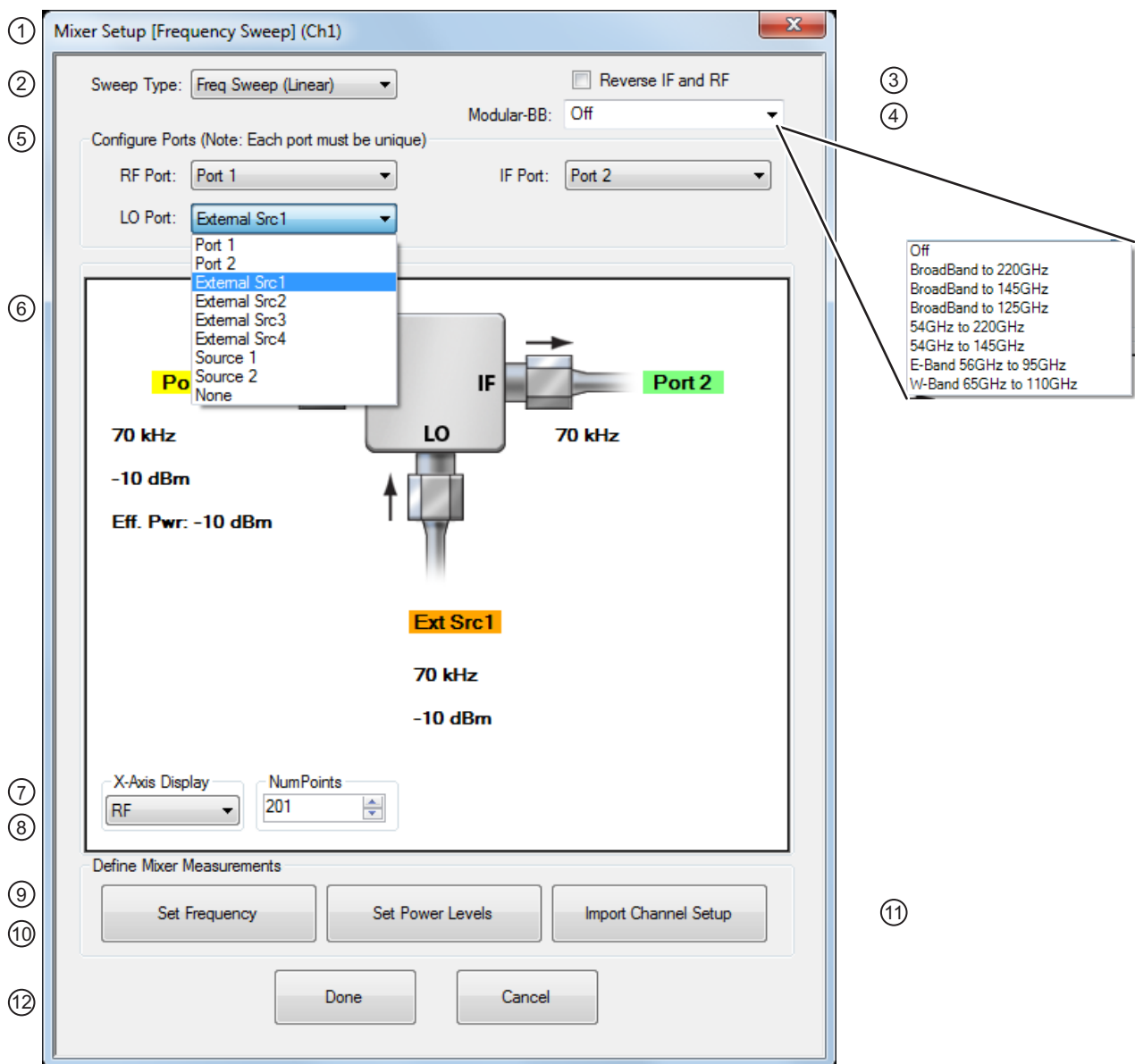


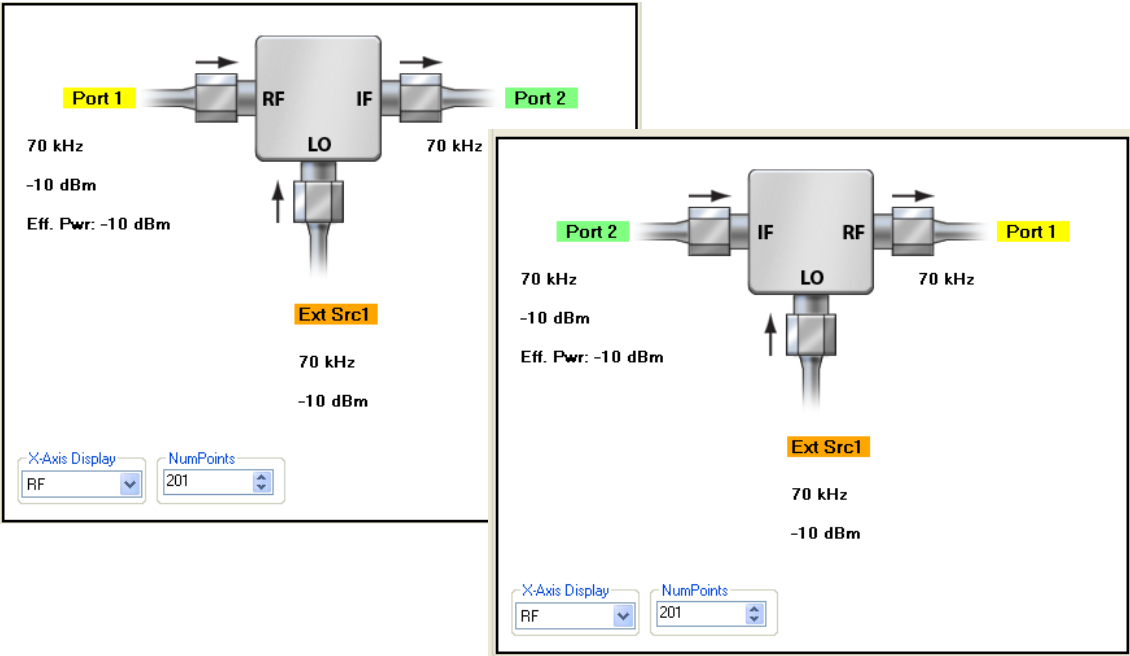
Figure 17-4. MIXER SETUP ACTIVE CHANNEL Dialog Box – 2-Port Frequency Sweep – Control Locations (1 of 2)

1. MIXER SETUP ACTIVE CHANNEL (FREQUENCY SWEEP) Dialog Box.	7. X-Axis Display Options – Select from RF, IF, or LO.
2. Sweep Type Setting – Freq Sweep (Linear), Freq (Log), or Power Sweep (CW Freq).	8. Num Point (Number of Sweep Points) – Sets the number of sweep points. Shows this setting on the FREQUENCY menu.
3. Reverse IF and RF – Default is RF as input, and IF as output. Reverse sets IF as input and RF as output.	9. Set Frequency Button – Select displays the SET FREQUENCY (FREQUENCY SWEEP) dialog.
4. Modular BB Selections – Only for MS4647B VNAs with Option 8x and ME7838 Series peripheral equipment. Note: All selections are dependent on installed options and model number.	10. Set Power Levels Button – Select displays the SET POWERS (FREQUENCY SWEEP) dialog.
5. Configure Port Assignments – Each must be unique selecting from None, Port 1, Port 2, (and Port 3 or Port 4 for 4-port VNA), External Sources 1 through 4 (<i>LO Port also has Source 1 or Source 2 available when Option 31 Dual Source Architecture is present</i>).	11. Import Channel Setup Button – Select imports the active channel settings into the dialogs.
6. Mixer Schematic – Updates automatically with port assignments, frequency settings, and power levels.	12. Dialog Completion Buttons

Figure 17-4. MIXER SETUP ACTIVE CHANNEL Dialog Box – 2-Port Frequency Sweep – Control Locations (2 of 2)

Active Channel – Frequency Sweep – Initial Configuration

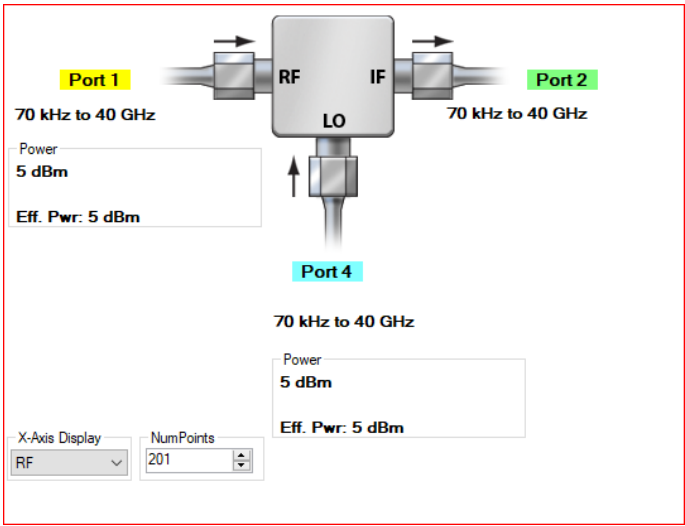
3. In the Sweep Type area at the left top of the dialog, set the sweep type for Freq Sweep (Linear) or Freq Sweep (Log).
 - If the Sweep Type is set to Power Sweep (CW Freq), the dialog changes.
 - See [“ACTIVE CHANNEL Dialog Box – Power-Based Sweep”](#) on page 17-17.
4. At the top right of the dialog, make a selection from the Modular BB drop down list.
 - Modular BB: Select opens drop down list for selecting various broadband types. This requires using the VectorStar ME7838 Series Broadband/mmWave system with the 3739x BB/mmWave Test Set and two 3743x or MA25x00A mmWave Modules. This is only used on MS4647B VNAs equipped with Option 8x.
5. At the top right of the dialog, select Reverse IF and RF check boxes (if required). The Reverse IF and RF check box changes the input/output assignments for the RF and IF mixer ports.
 - The default non-selected check box is RF as input on Port 1 and IF as output on Port 2.
 - If selected, the RF is set as output on Port 1 and IF as input on Port 2.
 - In [Figure 17-5](#) below, the standard and reversed RF/IF port assignments are shown.



At top left, the standard port assignments of RF on Port 1 as input and IF on Port 2 as output. At bottom right, reversed port assignments of IF on Port 2 and input and RF on Port 1 as output.

Figure 17-5. Standard and Reversed IF and RF Ports

Figure 17-6 illustrates the mixer settings for a 4-port VNA: Port 1 and 4 being used as RF and LO respectively, with port 2 as IF.



Port 1 and 4 being used as RF and LO respectively, with port 2 as IF.

Figure 17-6. Mixer Settings – 4-port for mixer measurements

Active Channel – Frequency Sweep – Configure Ports

6. In the Configure Ports area, set the port assignment for the RF, IF, and LO.
 - The default assignments are Port 1 = RF, Port 2 = IF, and an External Source 1 = LO.
 - The port and external source assignments must be unique.
 - The assignment options for RF, IF, and LO are:
 - Port 1
 - Port 2
 - Port 3 (4-port VNA)
 - Port 4 (4-port VNA)
 - External Source (Src) 1
 - External Src 2
 - External Src 3
 - External Src 4
 - Source 1 (with Option 31 Dual Source Architecture installed)
 - Source 2 (with Option 31 Dual Source Architecture installed)
 - None
 - The changes above are shown in the mixer schematic in the center of the dialog. Active Channel – Frequency Sweep – Configure X-Axis Display and Number of Points
7. Set the X-Axis display to the required parameter as required. The default is RF.
 - Options are RF, IF, or LO.
8. Set the Number of Points (Num Points) for the X-Axis display.
 - The initial value is taken from the setting on the FREQUENCY menu and the # of Points button.
 - The FREQUENCY menu and MIXER dialog settings are coupled. A change on one affects the other.

Active Channel – Frequency Sweep – Set Frequency for RF, IF, and LO

9. In the Define Mixer Measurements area at the bottom of the dialog box, select the Set Frequency button. The SET FREQUENCY [FREQUENCY SWEEP] or [LOG FREQUENCY SWEEP] dialog appears as shown below in [Figure 17-7](#).

10. The mixer schematic drawing shows the current settings for the RF, IF, and LO ports.

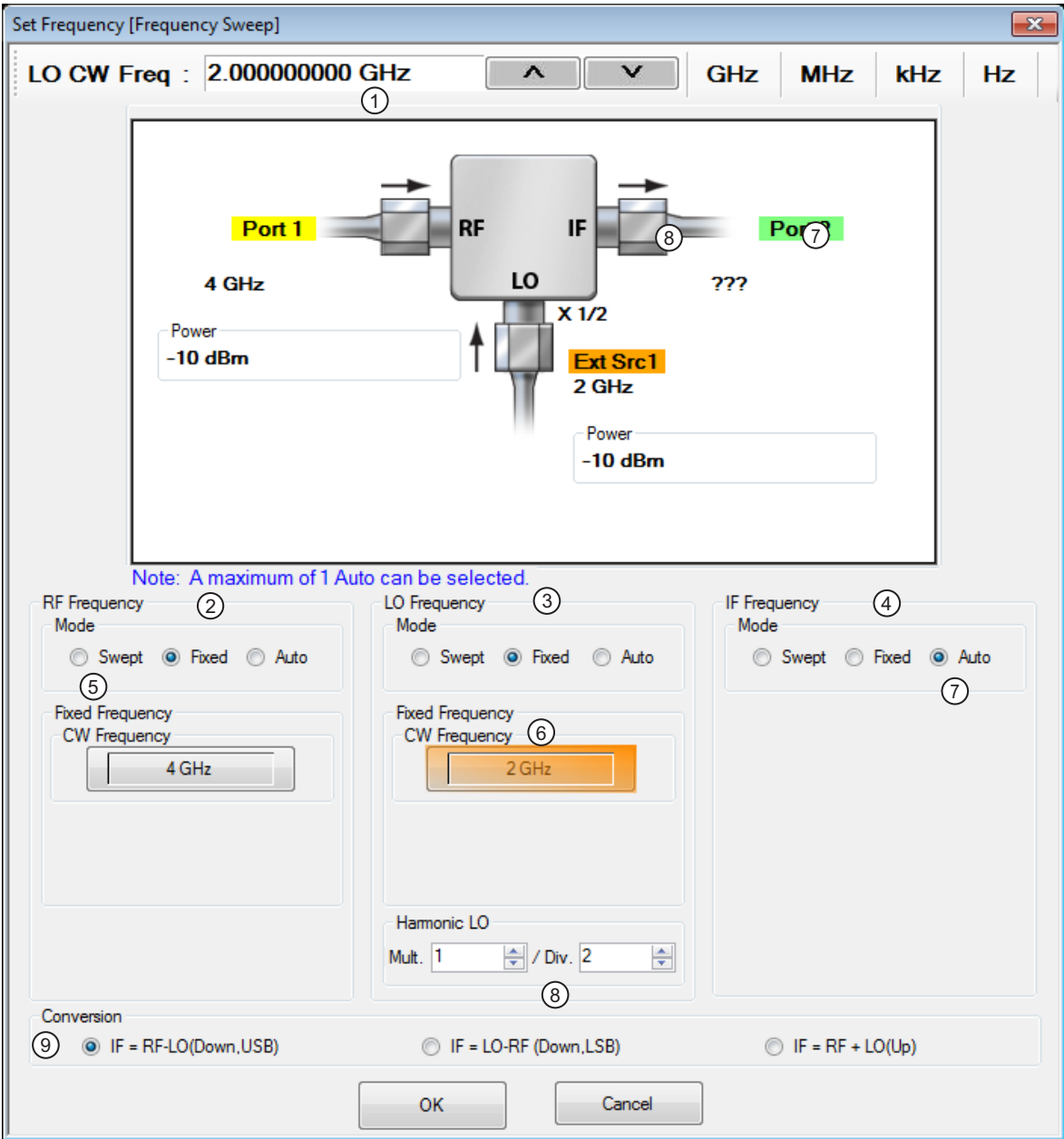


Figure 17-7. SET FREQUENCY (FREQUENCY SWEEP) Dialog Box – Control Areas (1 of 2)

<ol style="list-style-type: none"> 1. Frequency input field toolbar. The label changes depending whether RF, IF, or LO are selected. 2. RF Frequency mode and value area. 3. LO Frequency mode and value area. 4. IF Frequency mode and value area. 5. Mode set as Swept. Any combination of the RF, IF, and LO ports can be set as Swept. When selected, Start and Stop Frequency fields appear. 6. Mode set as Fixed. Any combination of the RF, IF, and LO ports can be set as Fixed. When selected, a CW Frequency field appears. 7. Mode set as Auto. Only one of the three ports can be set as Auto. If selected, the instrument determines the frequency settings based on the other two values and the Conversion type setting and is displayed in the mixer schematic absent of a frequency label (as shown in the illustration above). 	<ol style="list-style-type: none"> 8. Harmonic LO: The harmonic LO entry allows one to describe any frequency multiplication and/or division that may be present between the synthesizer providing the LO signal and the DUT's fundamental frequency converter. This entry can also be used when the DUT is a harmonic mixer or sampler that has implicit frequency multiplication in the LO path. Note: A label showing the Harmonic LO ratio is displayed at the mixer schematic LO port when multiplier/divisor (M/N) ratio is <i>not</i> equal to 1. 9. Conversion setting. Changes based on whether RF is input or output.
---	--

Figure 17-7. SET FREQUENCY (FREQUENCY SWEEP) Dialog Box – Control Areas (2 of 2)

Active Channel – Frequency Sweep – Set RF, LO, and IF Frequency Mode and Value

11. In the middle of the dialog box are separate control areas for RF Frequency, LO Frequency, and IF Frequency.
12. For each control area, set the frequency mode.
 - The frequency options are Swept, Fixed, or Auto.
 - Any combination of Swept or Fixed can be assigned to the RF, IF, and LO ports.
 - Only one port can be configured as Auto. In this configuration, the instrument calculates the required frequency based on the conversion setting selected in the Conversion area at the bottom of the dialog box and the settings on the other two ports.
 - Each Frequency Mode selection provides different control immediately below in the next area.
 - In the figure above, RF Frequency is set as Swept, LO Frequency is set as Fixed, and IF Frequency is set as Auto.
13. If the RF, IF, and/or LO Frequency Mode is set as Swept:
 - The Swept Frequency area appears with controls for Start Frequency and Stop Frequency.
 - Select the Start Frequency field, and at the top of the dialog in the field toolbar, enter the required starting frequency and required units from GHz, MHz, kHz, or Hz.
 - Note that the field toolbar name changes depending on whether RF, IF, or LO is selected.
14. If the RF, IF, and/or LO Frequency Mode is set as Fixed:
 - The Fixed Frequency area appears with a single control for CW Frequency.
 - Select the CW field and enter the required CW frequency and required units.
15. If the RF, IF, or LO Frequency Mode is set as Auto:
 - No frequency assignment fields are available.
 - The frequency is calculated based on the settings for the other two mixer ports and the settings in the Conversion area described below.
 - Only one mixer port can be assigned as Auto.

Mixer Setup – Active Channel – Frequency Sweep – Set Frequency – Harmonic LO

The harmonic LO entry allows one to describe any frequency multiplication and/or division that may be present between the synthesizer providing the LO signal and the DUT's fundamental frequency converter. This entry can also be used when the DUT is a harmonic mixer or sampler that has implicit frequency multiplication in the LO path.

16. Set the Harmonic LO multiplier/divisor ratio. A label showing the Harmonic LO ratio is displayed at the mixer schematic LO port when multiplier/divisor (M/N) ratio is not equal to 1.

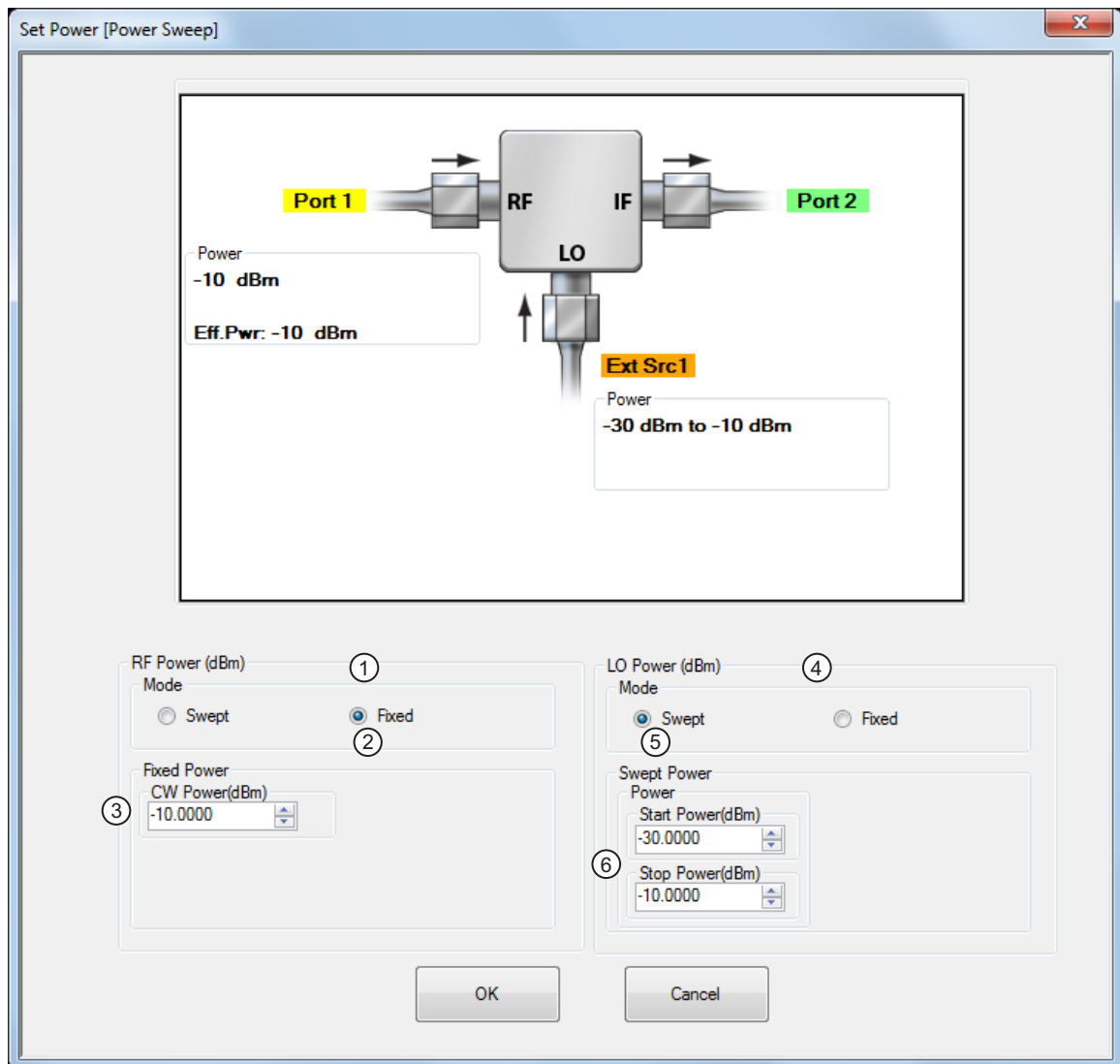
Mixer Setup – Active Channel – Frequency Sweep – Set the Conversion Required

17. Near the bottom of the dialog is the Conversion area.
18. Select button for the conversion type required from available options:
 - If RF is input:
 - $IF = RF - LO$ which is down conversion with Upper SideBand (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
 - If RF is output:
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF - LO$ which is down conversion with Upper Side Band (USB).
19. When all settings are complete, select the OK button to return to the mixer setup central control dialog.
 - The MIXER SETUP [FREQUENCY SWEEP] OR [LOG SWEEP] dialog reappears as shown in [Figure 17-4, "MIXER SETUP ACTIVE CHANNEL Dialog Box – 2-Port Frequency Sweep – Control Locations"](#) on page 17-6.
 - If any setting is out of range, a warning dialog appears with an error message such as Invalid Frequency Range or Equation Out of Range. Correct the problem as required.

Mixer Setup – Active Channel – Frequency Sweep – Set the Power Levels

20. Select the Set Power Levels button in the bottom center of the dialog box.

- The SET POWERS [FREQUENCY SWEEP] or [LOG SWEEP] dialog appears as shown below in [Figure 17-8](#).



- | | |
|--|---|
| <p>1. SET POWERS (FREQUENCY SWEEP) Dialog Box – The LOG SWEEP version is identical.</p> <p>2. Mixer Schematic – Port assignments and power levels are updated automatically.</p> | <p>3. RF Power (dBm) input field.</p> <p>4. LO Power (dBm) input field.</p> <p>5. Dialog box control buttons.</p> |
|--|---|

Figure 17-8. SET POWERS (FREQUENCY SWEEP) Dialog Box – Control Areas

21. Enter the required RF Power level in dBm in the provided field.

- Note that the power setting appears on the Mixer Schematic and also in the VNA POWER menu.

22. Enter the required LO Power level in dBm.

23. When all settings are complete, select the OK button to return to the main mixer control dialog box.

- The MIXER SETUP (FREQUENCY SWEEP) or (LOG SWEEP) dialog reappears.

Mixer Setup – Active Channel – Frequency Sweep – Import Channel Setup

24. The final single channel setup is to import the current channel settings.
25. Select the Import Channel Setup button as shown above in [Figure 17-4 on page 17-6](#). The ACTIVE CHANNEL SETUP IMPORTED dialog appears and confirms in configuration import as shown below in [Figure 17-9](#).

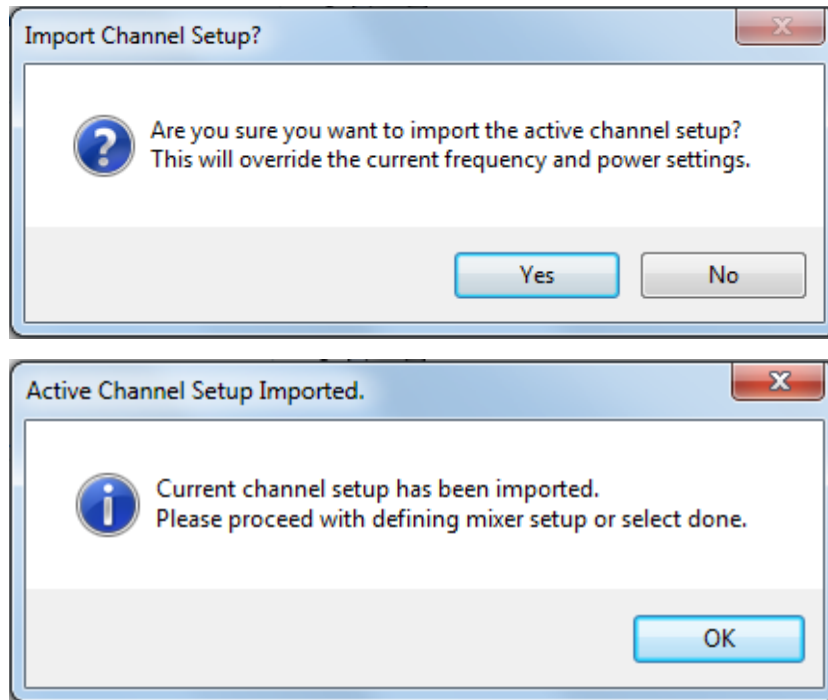


Figure 17-9. ACTIVE CHANNEL SETUP IMPORTED Dialog Box

26. With all settings correct and as required, select the Done button on the MIXER SETUP dialog.
27. A dialog report appears as shown below. If a power cal is started, the window in [Figure 17-11 on page 17-15](#) appears.

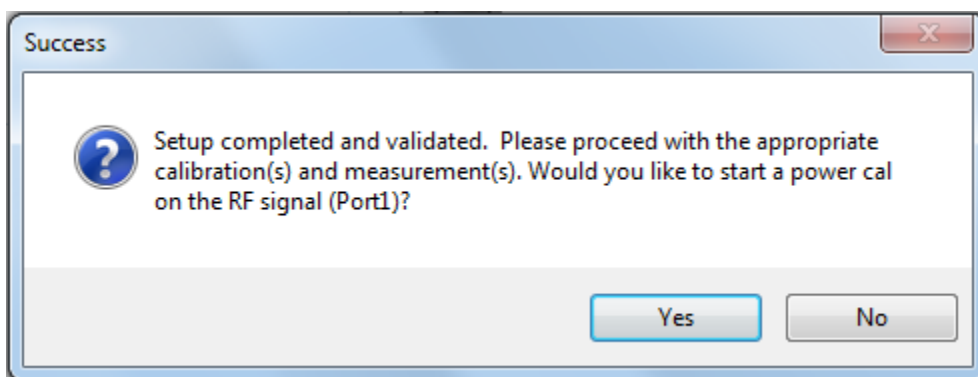


Figure 17-10. SUCCESS Message with Required Calibration

28. Follow the instructions provided in the dialog to complete the Power Calibration. On completion of this cal, the message shown in [Figure 17-12 on page 17-15](#) appears.

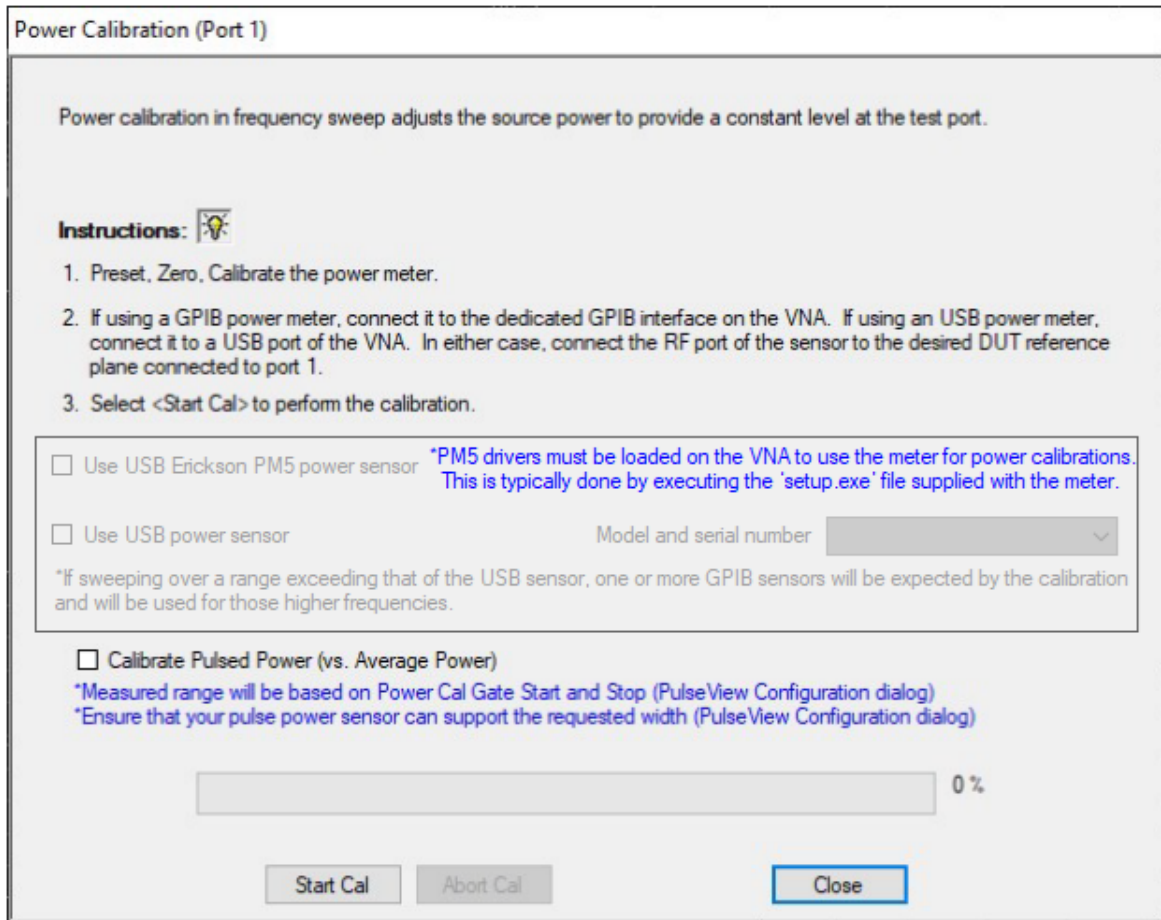


Figure 17-11. POWER CALIBRATION (PORT 1) Dialog

29. Clicking OK on the Power Cal Completed message takes the user to the Manual Cal menu (see [“MANUAL CAL Menu – 2-Port VNAs”](#) on page 9-76), where Receiver Cal Normalization and Enhanced Match selections are made available.

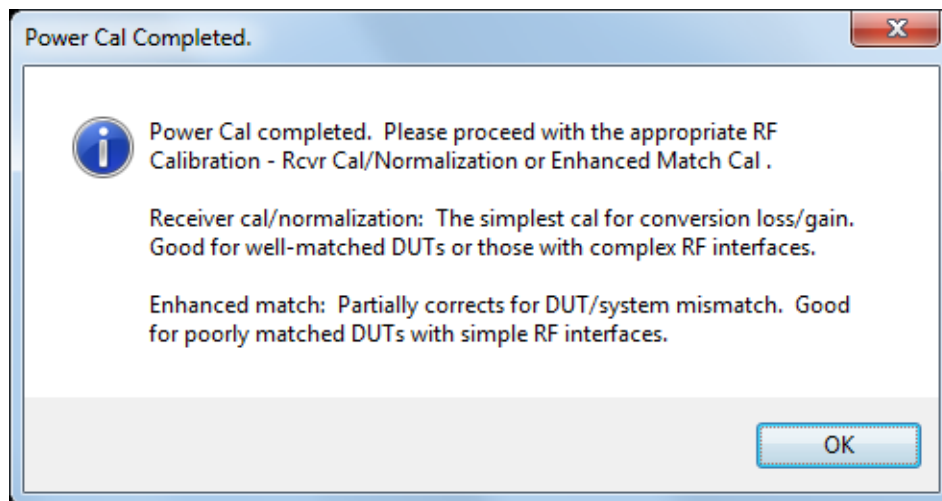


Figure 17-12. POWER CAL Completed Message

30. The mixer configuration process is complete.

17-5 ACTIVE CHANNEL Dialog Box – Power-Based Sweep

Previous

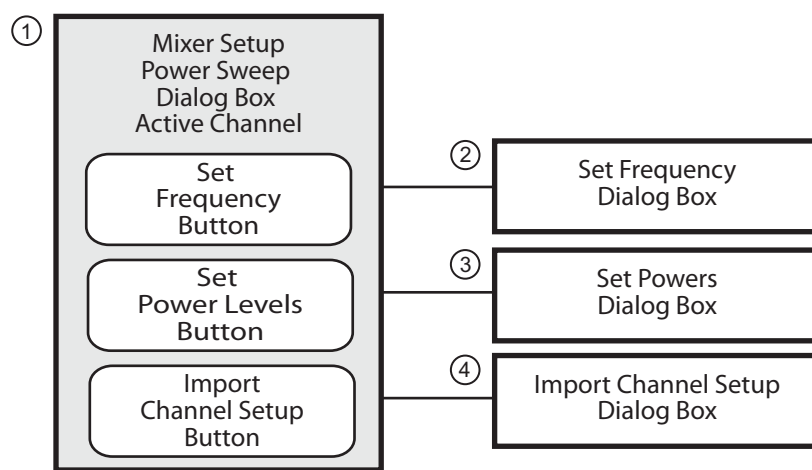
- “MIXER Menu” on page 12-20.

Navigation

- MAIN | Application | APPLICATION | Mixer | MIXER | Mixer Setup (Active Channel) | MIXER SETUP dialog box | Sweep Type = Power Sweep (CW Frequency)

Mixer Setup – Active Channel – Power Sweep – Menu Set

The chart below shows the dialogs that are completed using an active channel. The numbered procedure below follows the steps in the diagram.



1. MIXER SETUP POWER SWEEP Dialog

2. SET FREQUENCY (POWER SWEEP) Dialog

3. SET POWERS (POWER SWEEP) Dialog

4. ACTIVE CHANNEL SETUP IMPORTED Dialog

Figure 17-13. Mixer Setup Dialog – Active Channel – Power Sweep

Mixer Setup – Active Channel – Power Sweep – Information Required

Before starting the mixer, have the following information available:

- Channel number of the active channel
- Type of sweep
- Port and external source assignments for RF, IF, and LO.
- RF as input or RF as output.
- Frequency range or CW setting for RF, IF, and LO.
- If RF is input, conversion to be used for IF:
 - $IF = RF - LO$ which is down conversion with Upper SideBand (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
- If RF is output, conversion to be used for IF:
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF - RF$ which is down conversion with Upper Side Band (USB).

- If RF is input, power setting for:
 - Power for Port 1 RF in dBm.
 - Power for External Source LO in dBm.
- If RF is output, power setting for:
 - Power for Port 1 IF in dBm.
 - Power for External Source LO in dBm.

Mixer Setup – Active Channel – Power Sweep – Procedure

The procedure here is very similar to the operation of the frequency sweep mixer dialogs described in the section above. See [Figure 17-14 on page 17-19](#).

1. Navigate to the APPLICATION menu and select the Mixer Setup (Single-Channel) button.
 - MAIN | Application | APPLICATION | Mixer | MIXER | Mixer Setup (Single Channel)
2. The MIXER SETUP dialog appears.
3. In the Sweep Type area at the left top of the dialog, set the sweep type for Power Sweep (CW Freq).
 - If the Sweep Type is set to Freq Sweep (Linear) or Freq Sweep (Log), the dialog appearance changes.
 - The dialog appearance changes to the MIXER SETUP (POWER SWEEP) shown in the figure below.
 - If a frequency-based sweep is required, see [“ACTIVE CHANNEL Dialog Box – Frequency-Based Sweep” on page 17-5](#) above.

Mixer Setup – Active Channel – Power Sweep – Initial Configuration

4. At the top right of the dialog, make a selection from the Modular BB drop down list.
 - Modular BB: Select opens drop down list for selecting various broadband types. This requires using the VectorStar ME7838 Series Broadband/mmWave system with the 3739x BB/mmWave Test Set and two 3743x or MA25x00A mmWave Modules. This is only used on MS4647B VNAs equipped with Option 8x.
5. At the top right of the dialog, select Reverse IF and RF check boxes (if required). The Reverse IF and RF check box changes the input/output assignments for the RF and IF mixer ports.
 - The default non-selected check box is RF as input on Port 1 and IF as output on Port 2.
 - If selected, the RF is set as output on Port 1 and IF as input on Port 2.
 - See [Figure 17-5, “Standard and Reversed IF and RF Ports” on page 17-8](#) above for examples of standard and reversed RF/IF mixer port assignments.

Mixer Setup – Active Channel – Power Sweep – Configure Ports

6. In the Configure Ports area, set the port assignments for the RF, IF, and LO.
 - The default assignments are Port 1 = RF, Port 2 = IF, and External Source 1 = LO.
 - The port and external source assignments must be unique.
 - The assignment options for RF, IF, and LO are:
 - Port 1
 - Port 2
 - Port 3 (4-port VNA)
 - Port 4 (4-port VNA)
 - External Source (Src) 1
 - External Src 2
 - External Src 3
 - External Src 4

- None
- The changes above are shown in the mixer schematic in the center of the dialog.

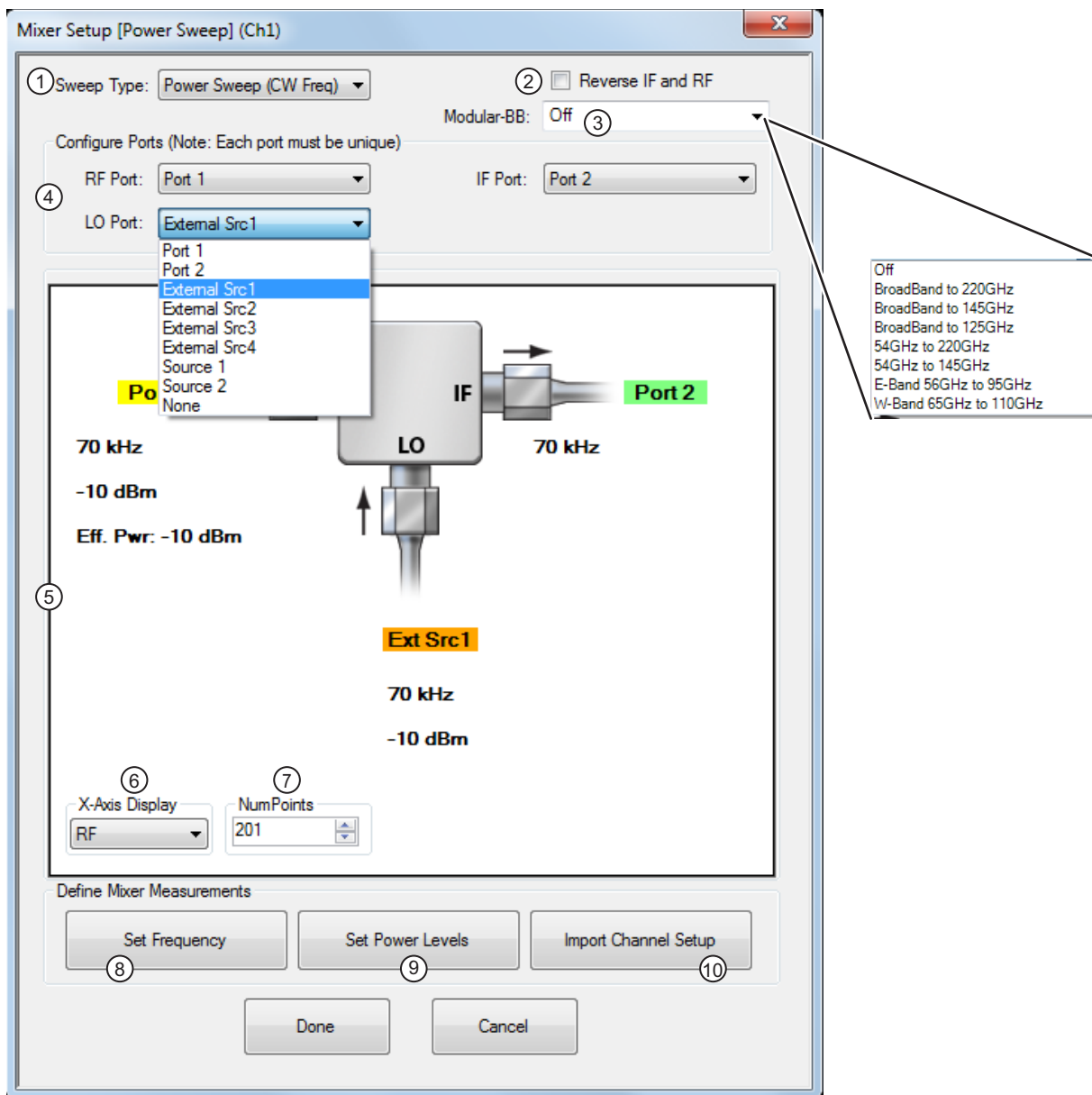


Figure 17-14. MIXER SETUP Dialog Box – 2-port Power Sweep – Control Locations (1 of 2)

1. Sweep Type Setting – Power Sweep (CW Freq) is set. Options are Freq Sweep (Linear) or Freq (Log).	5. Mixer Schematic – Updates automatically with port assignments, frequency settings, and power levels.
2. Reverse IF and RF – Default is RF as input, and IF as output. Reverse sets IF as input and RF as output.	6. X-Axis Display Options – Select from RF, IF, or LO.
3. Modular BB Selections – Only for MS4647B VNAs with Option 8x and ME7838 Series peripheral equipment. Note: All selections are dependent on installed options and model number.	7. Num Points (Number of Sweep Points) – Sets the number of sweep points. Shows this setting on the FREQUENCY menu.
4. Configure Port Assignments – Each must be unique selecting from None, Port 1, Port 2, (and Port 3 or Port 4 for 4-port VNA) or External Sources 1 through 4 (<i>LO Port also has Source 1 or Source 2 available when Option 31 Dual Source Architecture is present</i>).	8. Set Frequency Button – Select displays the SET FREQUENCY (POWER SWEEP) dialog.
	9. Set Power Levels Button – Select displays the SET POWERS (POWER SWEEP) dialog.
	10. Import Channel Setup Button – Select imports the active channel settings into the dialogs.

Figure 17-14. MIXER SETUP Dialog Box – 2-port Power Sweep – Control Locations (2 of 2)

Mixer Setup – Active Channel – Power Sweep – Configure X-Axis Display and Number of Points

7. Set the X-Axis display to the required parameter. The default is RF. Options are RF, IF, or LO.
8. Set the Number of Points (Num Points) for the X-Axis display.
 - The initial value is taken from the setting on the FREQUENCY menu and the # of Points button.
 - A change on the FREQUENCY menu also changes the setting on the MIXER dialog and a MIXER change changes the FREQUENCY menu setting.

Mixer Setup – Active Channel – Power Sweep – Set RF, LO, and IF Frequency Mode and Value

9. In the Define Mixer Measurements area at the bottom of the dialog box, select the Set Frequency button. The SET FREQUENCY (POWER SWEEP) dialog appears as shown in [Figure 17-7](#).

The mixer schematic drawing shows the current settings for the RF, IF, and LO ports.

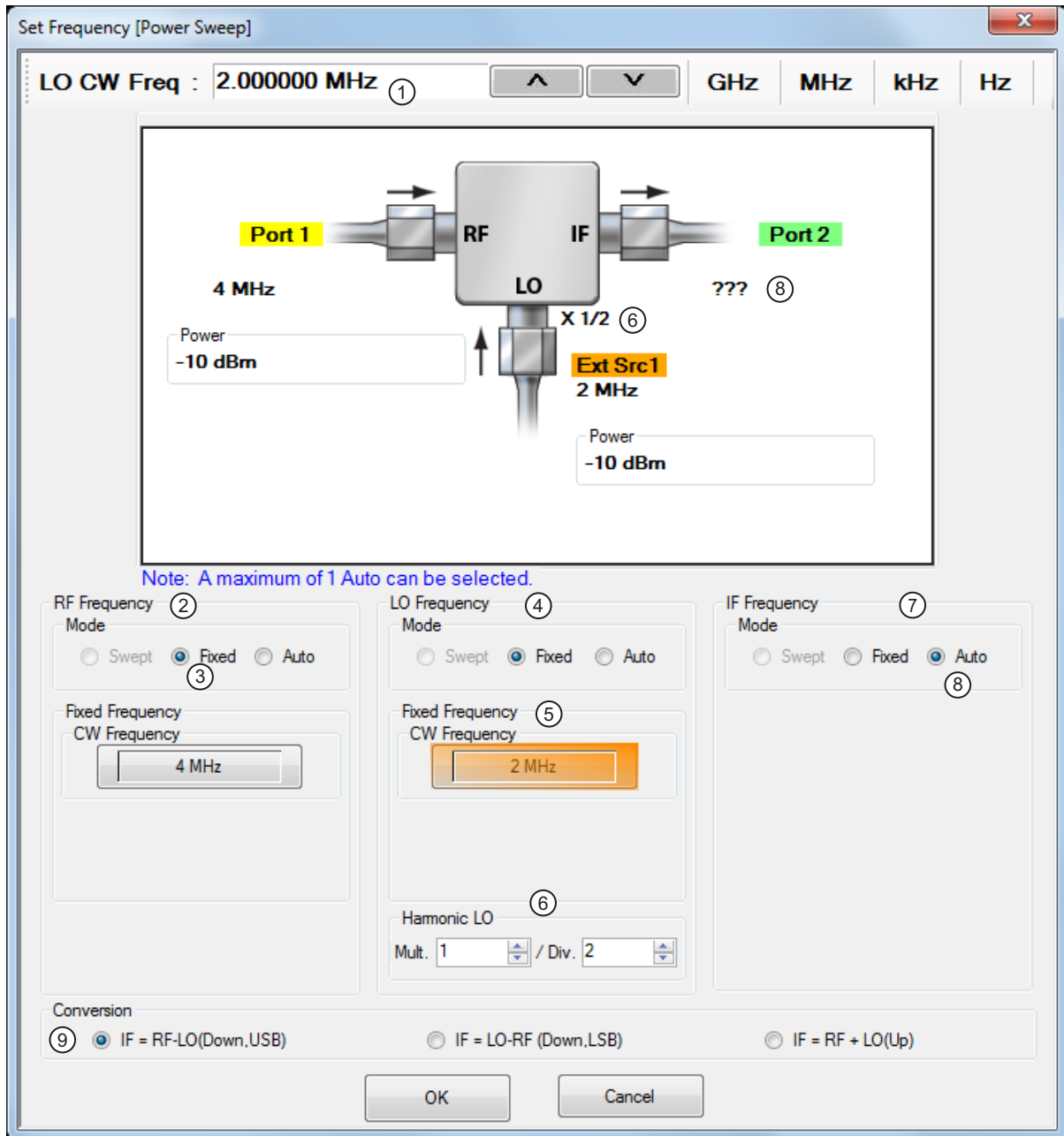


Figure 17-15. SET FREQUENCY (POWER SWEEP) Dialog Box – Control Areas

<ol style="list-style-type: none"> 1. Frequency input field toolbar. The label changes depending whether RF, IF, or LO are selected. 2. RF Frequency mode and value area. 3. Mode set as Fixed. Any combination of the RF, IF, and LO ports can be set as Fixed. When selected, a CW Frequency field appears. 4. LO Frequency mode and value area. 5. Mode set as Fixed. Any combination of the RF, IF, and LO ports can be set as Fixed. When selected, a CW Frequency field appears. 6. Harmonic LO: The harmonic LO entry allows one to describe any frequency multiplication and/or division that may be present between the synthesizer providing the LO signal and the DUT's fundamental frequency converter. This entry can also be used when the DUT is a harmonic mixer or sampler that has implicit frequency multiplication in the LO path. Note: A label showing the Harmonic LO ratio is displayed at the mixer schematic LO port when multiplier/divisor (M/N) ratio is <i>not</i> equal to 1. 	<ol style="list-style-type: none"> 7. IF Frequency mode and value area. 8. Mode set as Auto. Only one of the three ports can be set as Auto. If selected, the instrument determines the frequency settings based on the other two values and the Conversion type setting and is displayed in the mixer schematic absent of a frequency label (as shown in the illustration above). 9. Conversion setting. Changes based on whether RF is input or output. If RF is input, equations show conversion calculations for IF. If IF is input, equations show conversion calculations for RF.
--	--

Figure 17-15. SET FREQUENCY (POWER SWEEP) Dialog Box – Control Areas**Mixer Setup – Active Channel – Power Sweep – RF, LO, and IF Frequency Mode and Value Area**

10. In the middle of the dialog box are separate control areas for RF Frequency, LO Frequency, and IF Frequency. Depending on the settings, there is a Mode area and a Frequency area for each port.
11. For each control area, set the frequency mode.
 - The frequency options are Fixed or Auto. Swept is not available for Power Sweeps.
 - Only one port can be configured as Auto. In this configuration, the instrument calculates the required frequency based on the conversion setting selected in the Conversion area at the bottom of the dialog box and the settings on the other two ports.
 - Each Frequency Mode selection provides different input field control immediately below in the next area.
 - In the figure above, RF Frequency is set as Swept, LO Frequency is set as Fixed, and IF Frequency is set as Auto.
12. If the RF, IF, and/or LO Frequency Mode is set as Fixed:
 - The Fixed Frequency area appears with a single control for CW Frequency.
 - Select the CW field and enter the required CW frequency and required units in the field toolbar at the top of the dialog box.
13. If the RF, IF, or LO Frequency Mode is set as Auto:
 - No frequency assignment fields are available.
 - The frequency is calculated based on the settings for the other two mixer ports and the settings in the Conversion area described below.

Mixer Setup – Active Channel – Power Sweep – Set Frequency – Harmonic LO

The harmonic LO entry allows one to describe any frequency multiplication and/or division that may be present between the synthesizer providing the LO signal and the DUT's fundamental frequency converter. This entry can also be used when the DUT is a harmonic mixer or sampler that has implicit frequency multiplication in the LO path.

14. Set the Harmonic LO multiplier/divisor ratio. A label showing the Harmonic LO ratio is displayed at the mixer schematic LO port when multiplier/divisor (M/N) ratio is not equal to 1.

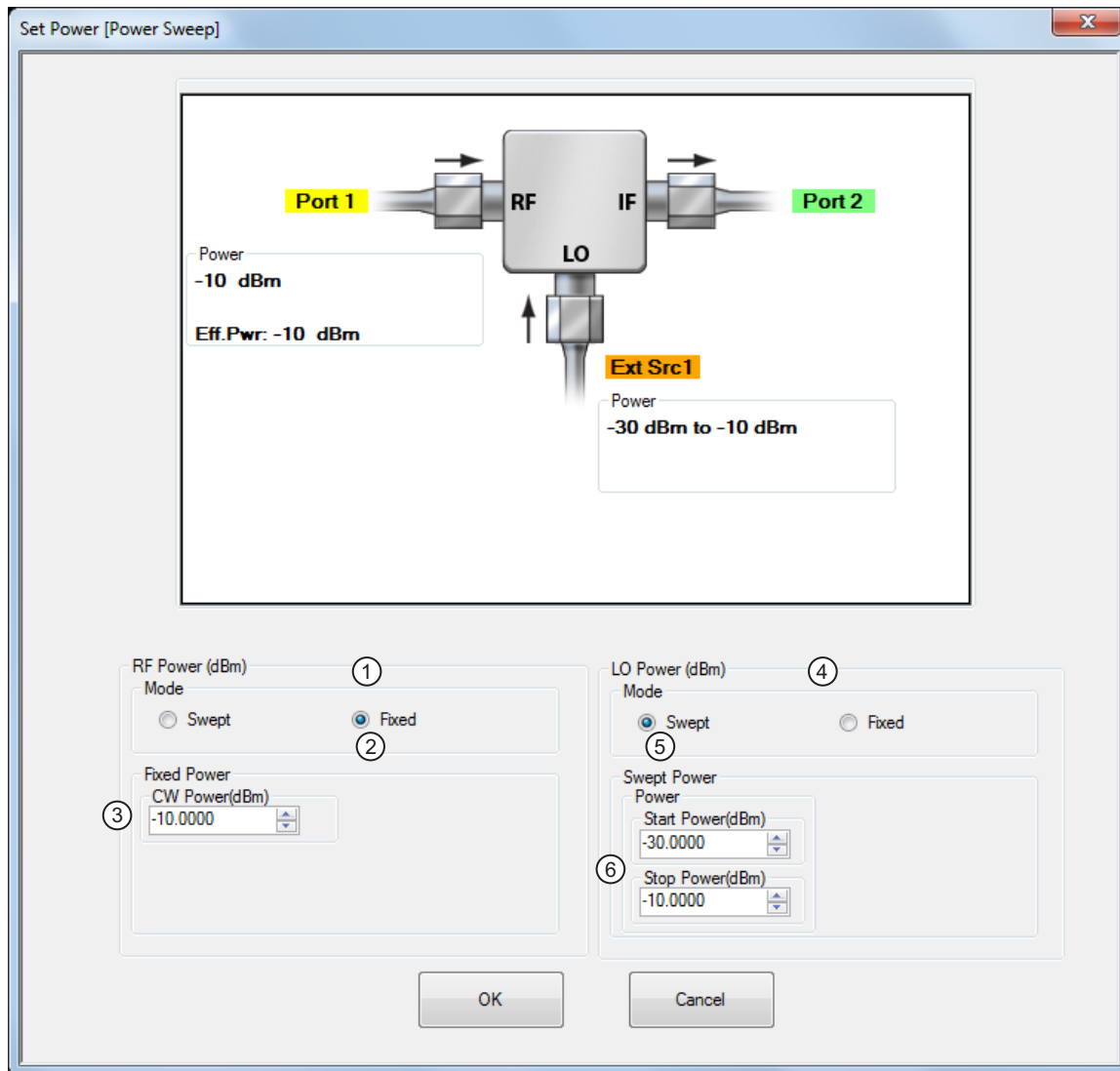
Mixer Setup – Active Channel – Power Sweep – Set the Conversion Required

15. Near the bottom of the dialog is the Conversion area.
16. Select the button for the conversion type required from options of:
 - If RF is input and IF is output (the default):
 - $IF = RF - LO$ which is down conversion with Upper Side Band (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
 - If RF is output and IF is input (optional):
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF - LO$ which is down conversion with Upper Side Band (USB).
17. When all settings are complete, select the OK button to return to the central control dialog.
 - The MIXER SETUP (POWER SWEEP) dialog reappears.
 - See [Figure 17-14, “MIXER SETUP Dialog Box – 2-port Power Sweep – Control Locations” on page 17-19](#) above.
 - If any setting is out of range, a warning dialog appears with an error message such as Invalid Frequency Range or Equation Out of Range. Correct the problem as required.

Mixer Setup – Active Channel – Power Sweep – Set the Power Levels

18. Select the Set Power Levels button in the bottom center of the dialog box.

- The SET POWERS (POWER SWEEP) dialog appears as shown below in [Figure 17-8 on page 17-13](#).



- | | |
|---|---|
| 1. RF Power (dBm) controls. | 4. LO Power controls |
| 2. RF Power Mode set as Fixed with option of Swept. | 5. Mode set as Swept with option of Fixed. |
| 3. RF Power CW Power input field | 6. Swept Start and Stop power input fields. |

Figure 17-16. SET POWERS (POWER SWEEP) Dialog Box – Control Areas

Mixer Setup – Active Channel – Power Sweep – Configuring the RF, IF, and LO Power Settings

19. Separate control areas for Mode and Power are provided for RF Power, IF Power, and LO Power.

- If RF is input and IF is output (the default), power level controls are available for RF and LO Power:
 - RF Power can be Swept or Fixed. If Swept is set, the Swept Power Start Power and Stop Power input fields are present. If Fixed is set, the Fixed Power input field is present.
 - LO Power can be Swept or Fixed. If Swept is set, the Swept Power Start Power and Stop Power input fields are present. If Fixed is set, the Fixed Power input field is present.

- If RF is output and IF is input (optional by selecting the Reverse IF and RF check box):
 - IF Power can be Swept or Fixed. If Swept is set, the Swept Power Start Power and Stop Power input fields are present. If Fixed is set, the Fixed Power input field is present.
 - LO Power can be Swept or Fixed. If Swept is set, the Swept Power Start Power and Stop Power input fields are present. If Fixed is set, the Fixed Power input field is present.
20. For each displayed mixer port, select the mode as Swept or Fixed.
21. If Swept is set, enter the Start and Stop Power levels.
22. If Fixed is set, enter the CW Power level.
23. Repeat the two steps above for the remaining mixer port.
24. When all settings are complete, select the OK button to return to the main control dialog box.
- The MIXER SETUP (POWER SWEEP) setup dialog reappears.
 - See [Figure 17-14 on page 17-19](#) above.

Mixer Setup – Active Channel – Power Sweep – Import Channel Setup

25. The final single channel setup is to import the current channel settings.
26. Select the Import Channel Setup button. The IMPORT CHANNEL SETUP? dialog appears as shown below in [Figure 17-17](#)
27. Upon completion, the ACTIVE CHANNEL SETUP IMPORTED dialog appears and confirms in configuration import.

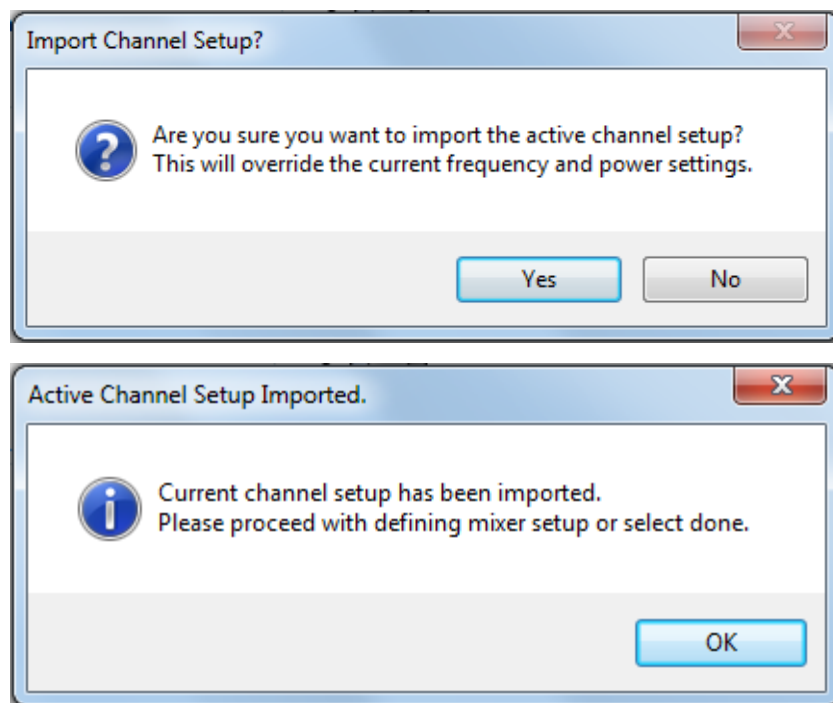


Figure 17-17. ACTIVE CHANNEL SETUP IMPORTED Dialog Box

28. With all settings correct and as required, select the Done button on the MIXER SETUP dialog.

29. A completion message appears as shown below. If a power cal is started, the Power Calibration window shown in Figure 17-19 appears.

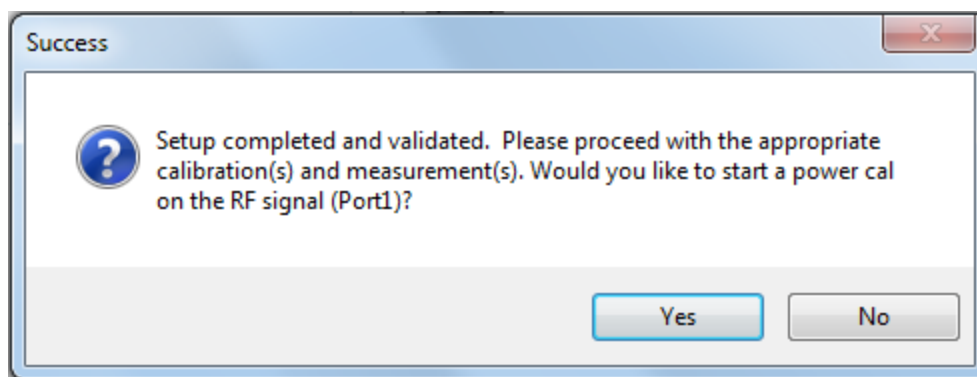


Figure 17-18. SUCCESS Dialog with Required Calibrations

30. Follow the instructions provided in the dialog to complete the Power Calibration. On completion of this cal, the message shown in Figure 17-20 on page 17-27 appears.

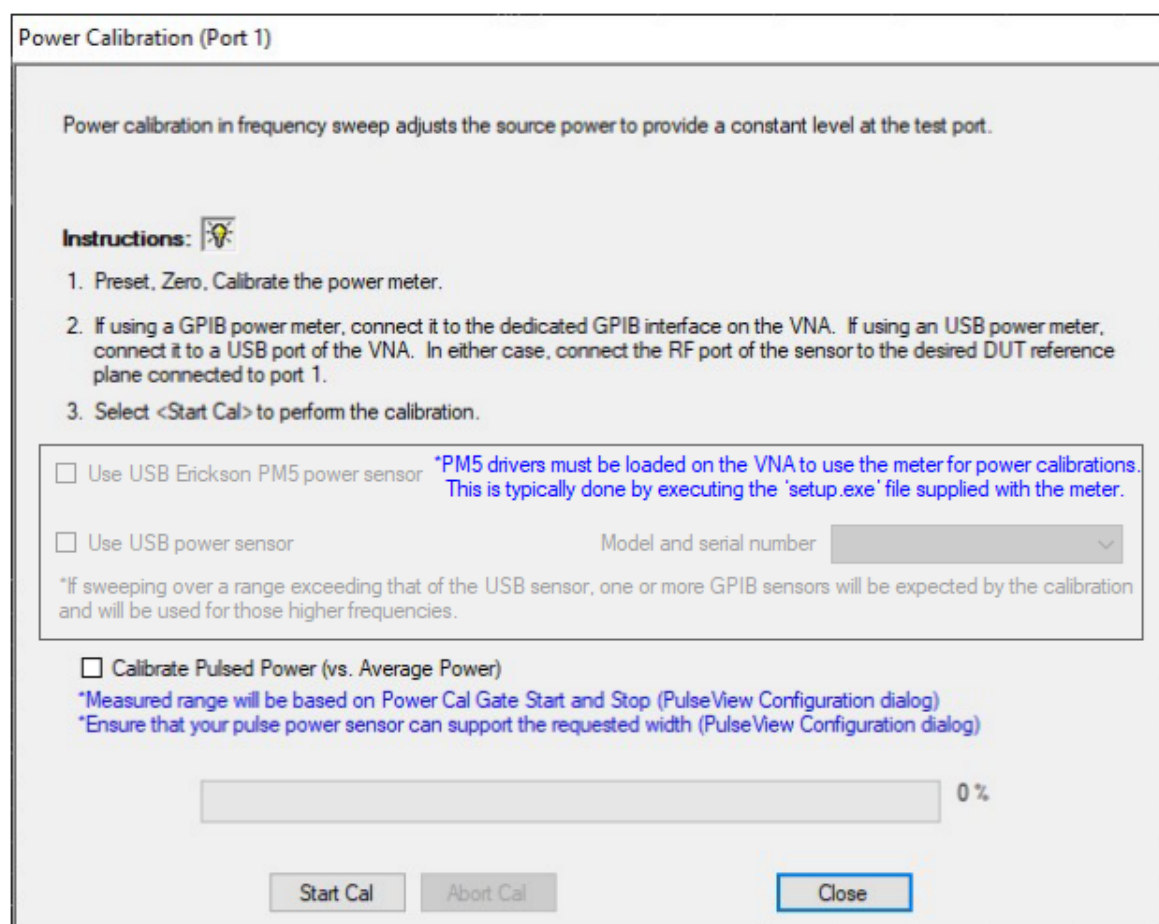


Figure 17-19. POWER CALIBRATION (PORT 1) Dialog

31. Clicking OK on the Power Cal Completed message takes the user to the Manual Cal menu (see [“MANUAL CAL Menu – 2-Port VNAs” on page 9-76](#)), where Receiver Cal Normalization and Enhanced Match selections are made available.

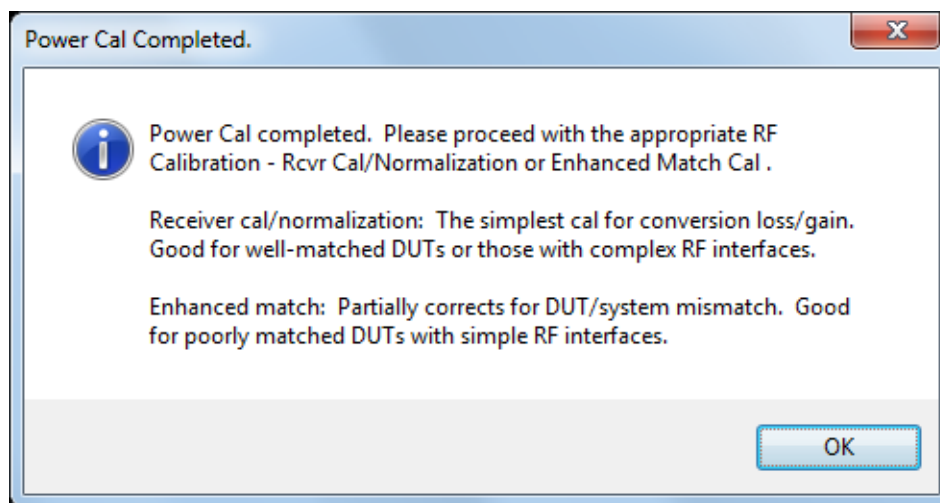


Figure 17-20. POWER CAL Completed Message

32. The mixer configuration process is complete.

MIXER SETUP – MULTI-CHANNEL Dialog Box Variants

Full Name

The full name of the mixer setup dialog box varies depending on the type of sweep. See [Figure 17-21](#) and [Figure 17-22](#) for comparison examples. In the procedure sections following, two multi-channel mixer setup example procedures are shown:

- “MULTI-CHANNEL – Frequency-Based Sweep” on page 17-31
- “MULTI-CHANNEL – Power-Based Sweep” on page 17-44

Previous

- “Mixer Menu” on page 17-2.

Navigation

- MAIN | Application | APPLICATION | Mixer | MIXER | Mixer Setup (Multi-Channel) | MIXER SETUP CONFIGURATION Dialog Box

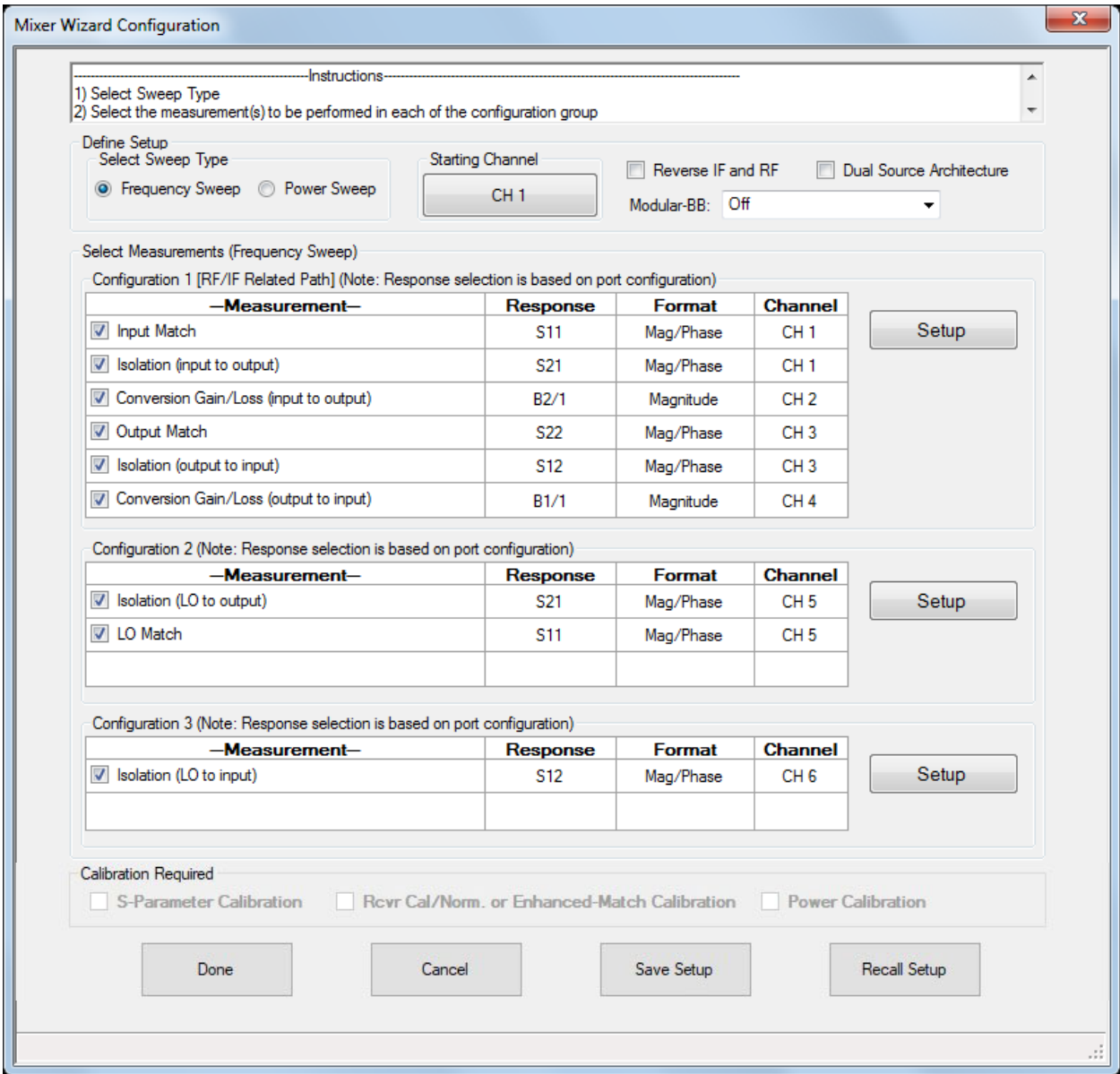


Figure 17-21. MULTI-CHANNEL MIXER SETUP Dialog Box – Frequency Based Sweep (1 of 2)

Mixer Wizard Configuration

Instructions:

- 1) Select Sweep Type
- 2) Select the measurement(s) to be performed in each of the configuration group

Define Setup

Select Sweep Type: ☒ Frequency Sweep ☐ Power Sweep

Starting Channel:

☐ Reverse IF and RF ☒ Dual Source Architecture

Modular-BB:

Select Measurements (Frequency Sweep)

Configuration 1 [RF/IF Related Path] (Note: Response selection is based on port configuration)

Measurement	Response	Format	Channel
☐ Input Match	S11	Mag/Phase	CH 1
☐ Isolation (input to output)	S21	Mag/Phase	CH 1
☐ Conversion Gain/Loss (input to output)	B2/1	Magnitude	CH 2
☐ Isolation (LO to input)	B1/A2	Mag/Phase	CH 3

Configuration 2 (Note: Response selection is based on port configuration)

Measurement	Response	Format	Channel
☐ Isolation (output to input)	S21	Mag/Phase	CH 4
☐ Output Match	S11	Mag/Phase	CH 4
☐ Conversion Gain/Loss (output to input)	B2/1	Magnitude	CH 5

Configuration 3 (Note: Response selection is based on port configuration)

Measurement	Response	Format	Channel
☐ LO Match	S22	Mag/Phase	CH 6
☐ Isolation (LO to output)	S12	Mag/Phase	CH 6

Calibration Required

☐ S-Parameter Calibration ☐ Rcvr Cal/Norm. or Enhanced-Match Calibration ☐ Power Calibration

This figure shows the Mixer Wizard Configuration dialog when Option 31, Dual Source Architecture is present and the check box shown is selected. Save Setup stores the mixer wizard configuration as a .mwzd file so that it can be recalled at a later time using Recall Setup.

Figure 17-21. MULTI-CHANNEL MIXER SETUP Dialog Box – Frequency Based Sweep (2 of 2)

Mixer Wizard Configuration

Instructions

- 1) Select Sweep Type
- 2) Select the measurement(s) to be performed in each of the configuration group

Define Setup

Select Sweep Type

☐ Frequency Sweep ☒ Power Sweep

Starting Channel: CH 1

☐ Reverse IF and RF ☐ Dual Source Architecture

Modular-BB: Off

Select Measurements (Power Sweep)

Configuration 1 (Note: Response selection is based on port configuration)

Measurement	Response	Format	Channel
☒ Conversion Gain/Loss (swept LO)	B2/1	Magnitude	CH 1

Setup

Configuration 2 (Note: Response selection is based on port configuration)

Measurement	Response	Format	Channel
☒ Compression (Pout versus Pin, Swept RF)	B2/1	Magnitude	CH 2

Setup

Calibration Required

☒ Power Calibration

☒ Rcvr Cal/Norm. or Enhanced-Match Calibration

Done Cancel Save Setup Recall Setup

The Mixer Wizard Configuration dialog with Power Sweep selected is the same when Dual Source Architecture is either selected or not selected. Save Setup stores the mixer wizard configuration as a .mwzd file so that it can be recalled at a later time using Recall Setup.

Figure 17-22. MULTI-CHANNEL MIXER SETUP Dialog Box – Power Sweep

17-6 MULTI-CHANNEL – Frequency-Based Sweep

Mixer Setup – Multi-Channel – Frequency Sweep – Menu Set

The multi-channel mixer setup provides additional measurement capability over multiple channels and consists of one central control dialog box with multiple supporting dialog boxes. The multi-channel mixer setup for frequency-based sweeps is similar to the controls for the active channel version described above. Additional parameters can be measured, requiring addition dialogs to configure the mixer. In [Figure 17-23](#), “MULTI-CHANNEL MIXER SETUP Dialog Boxes – Frequency-Based Sweep” below, the illustration shows the relationship between the main and supporting dialog boxes.

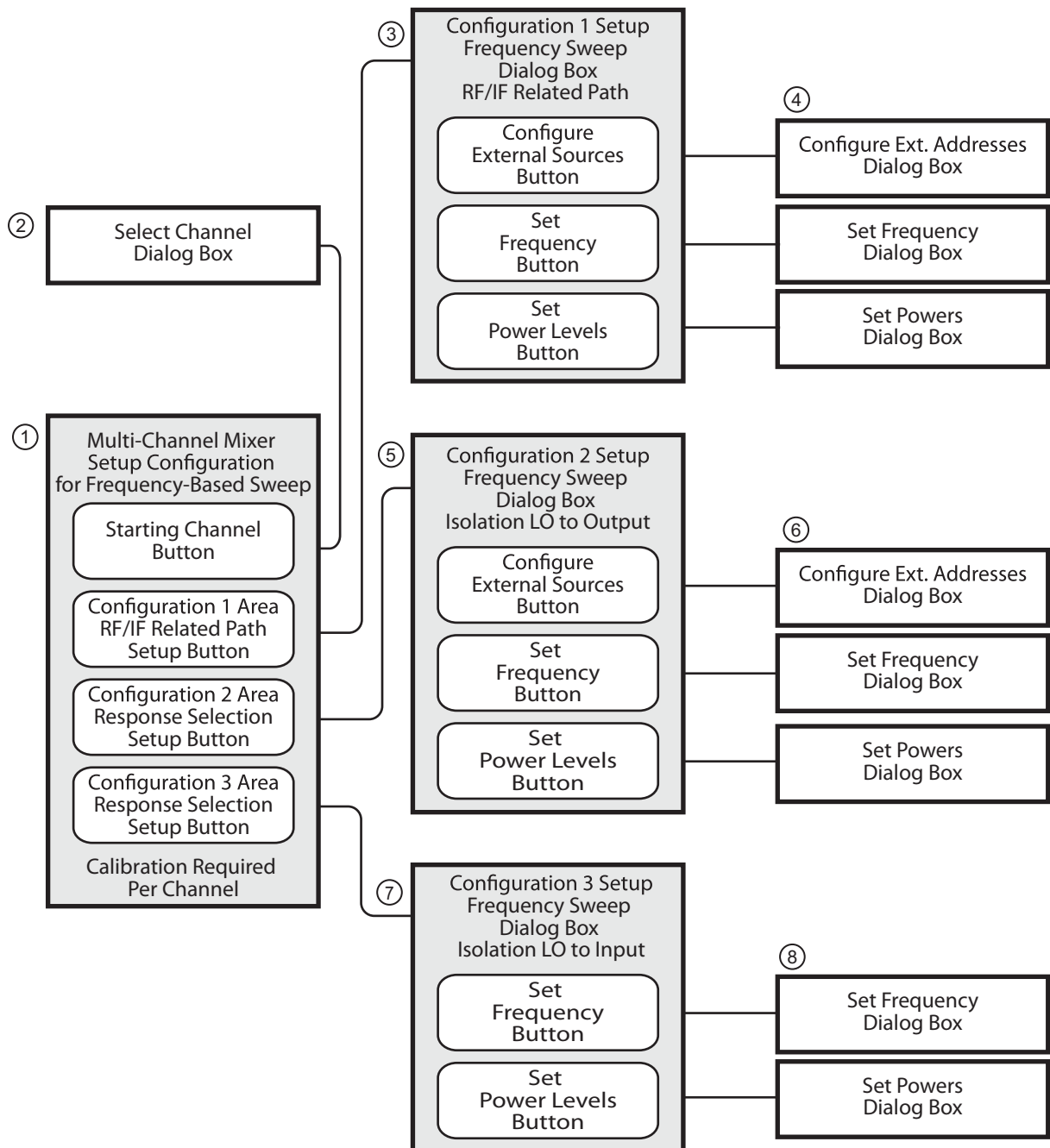


Figure 17-23. MULTI-CHANNEL MIXER SETUP Dialog Boxes – Frequency-Based Sweep (1 of 2)

1. MIXER SETUP CONFIGURATION [Frequency-Based Sweep] Dialog Box	5. CONFIGURATON 2 SETUP Dialog Box for Isolation LO to Output NOTE: When Dual Source Architecture is selected on the Mlrx Wizard Configuration screen, the Configure External Sources Button is disabled.
2. SELECT CHANNEL Dialog Box	
3. CONFIGURATON 1 SETUP Dialog Box for RF/IF Related Paths NOTE: When Dual Source Architecture is selected on the Mlrx Wizard Configuration screen, the Configure External Sources Button is disabled.	6. Configuration 2 Dialog Boxes for External Source Address, Frequency, and Power.
4. Configuration 1 Dialog Boxes for External Source Address, Frequency, and Power.	7. CONFIGURATON 3 SETUP Dialog Box for Isolation LO to Input
	8. Configuration 3 Dialog Boxes for Frequency and Power.

Figure 17-23. MULTI-CHANNEL MIXER SETUP Dialog Boxes – Frequency-Based Sweep (2 of 2)

Mixer Setup – Multi-Channel – Frequency Sweep – Available Measurements

The table below lists the available frequency-based mixer measurements. On the main dialog box, check boxes allow individual measurement selections. For each configuration area (Configuration 1, Configuration 2, and Configuration 3), the Setup button for that area displays the setup dialogs for that configuration.

Table 17-1. Available Measurements for Frequency-Based Sweep

Measurement	Response	Display Format	Channel
Configuration 1 – RF/IF Related Path – Response selection is based on port configuration.			
Input match	S11	Mag/Phase	Channel 1
Isolation, input to output	S21	Mag/Phase	Channel 1
Conversion gain/loss, input to output	B2/1	Magnitude	Channel 2
Output match	S22	Mag/Phase	Channel 3
Isolation, output to input	S12	Mag/Phase	Channel 3
Conversion gain/loss, output to input	B1/1	Magnitude	Channel 4
Setup button – Links to the CONFIGURATION 1 SETUP Dialog Box for RF/IF Related Paths.			
Configuration 2 – Isolation LO to Output – Response selection is based on port configuration.			
Isolation, LO to output	S21	Mag/Phase	Channel 5
LO Match	S11	Mag/Phase	Channel 5
Setup button – Links to the CONFIGURATION 2 SETUP dialog box for Isolation LO to Output.			
Configuration 3 – Isolation LO to Input – Response selection is based on port configuration.			
Isolation, LO to Input	S12	Mag/Phase	Channel 6
Setup button – Links to the CONFIGURATION 3 SETUP dialog box for Isolation LO to Input.			

Mixer Setup – Multi-Channel – Frequency Sweep – Channel Assignments

Six channels are required to support all measurements. See [Table 17-1, “Available Measurements for Frequency-Based Sweep” on page 17-32](#) above for the default channel assignments. Skipped measurements do not change the channel assignment. For example, if Input Match and Output Match are required in Configuration 1, the default channel assignment will be Channel 1 and Channel 3. The starting channel can be changed to any of the 16 channels. If Channel 16 is assigned, and another channel is required, the Channel assignment rolls over to Channel 1.

Mixer Setup – Multi-Channel – Frequency Sweep – Procedure

1. Navigate to the APPLICATION menu and select the Mixer Setup (Multi-Channel) button.
 - MAIN | Application | APPLICATION | Mixer | MIXER | Mixer Setup (Multi-Channel)
2. The MIXER SETUP CONFIGURATION dialog appears. See [Figure 17-24](#) below for the initial appearance and its control areas.

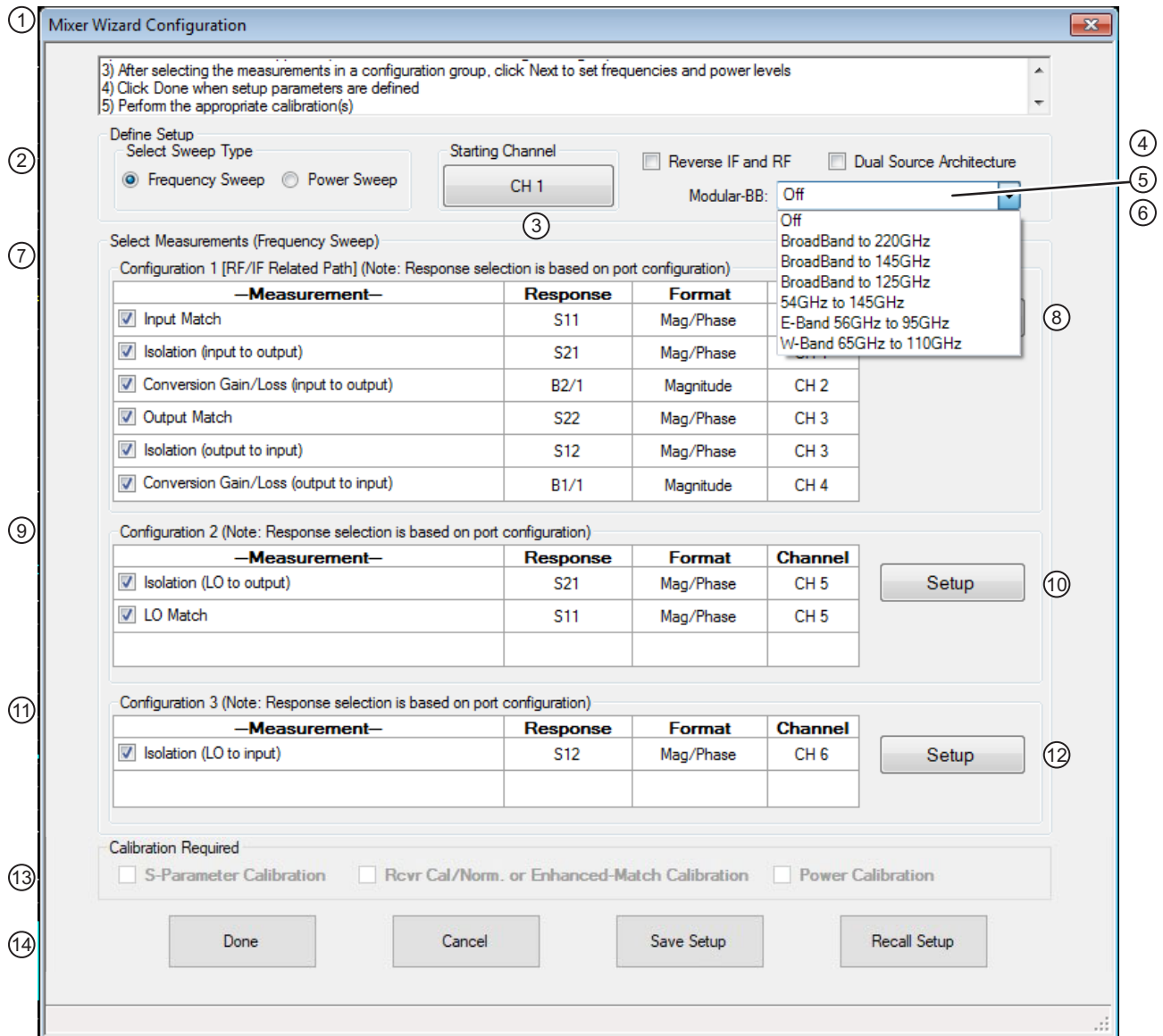
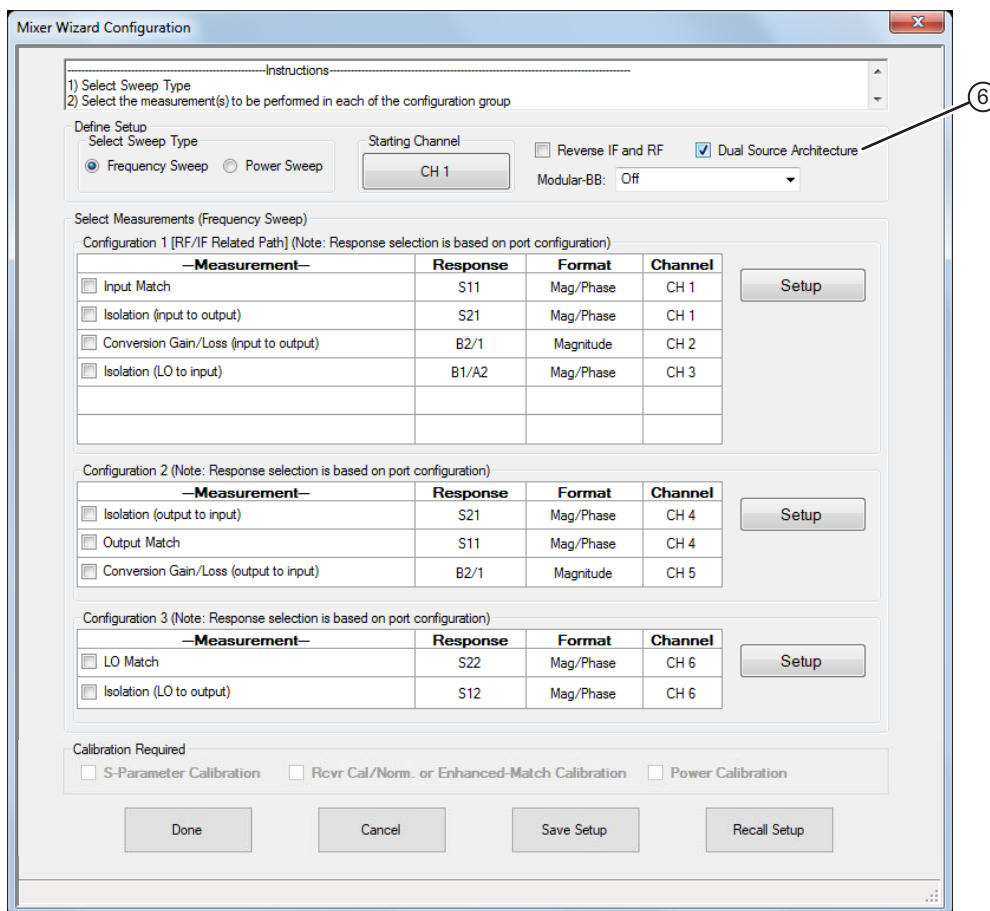


Figure 17-24. MIXER SETUP CONFIGURATION (FREQUENCY SWEEP) Dialog Box – Control Areas (1 of 2)

1. Dialog Box
2. Select Sweep Type (Frequency or Power Sweep).
3. Channel Start Selection
4. Reverse IF and RF – Default is RF as input and IF as output. Toggles to RF as output and IF as input.
5. Modular BB Selections – Only for MS4647B VNAs with Option 8x and ME7838 Series peripheral equipment. **Note:** All selections are dependent on installed options and model number.
6. Dual Source Architecture (Only for MS464xB VNAs with Option 31) Note that when this feature is selected, the measurement selections change as shown in the figure below.
7. Configuration 1 – Conversion Gain/Loss Swept LO – RF/IF Related Path – Select any combination of measurements. Channels are automatically assigned based on Starting Channel.
8. Setup Button – Links to Configuration 1 Dialogs to configure mixer and VNA ports, external sources, frequency, and power levels.
9. Configuration 2 – Compression Pout versus Pin Swept RF – Select any combination of measurements. Channels are automatically assigned.
10. Setup Button – Links to Configuration 2 Dialogs to configure mixer and VNA ports, external sources, frequency, and power levels.
11. Configuration 3 – Isolation – LO to Input Available Measurement
12. Setup Button – Links to Configuration 3 Dialogs to configure mixer and VNA ports, frequency, and power.
13. Calibration Required Area
14. Dialog Controls
Save Setup stores the mixer wizard configuration as a .mwzd file so that it can be recalled at a later time using Recall Setup.



6. Mixer Wizard above shown with Dual Source Architecture feature selected. Note that when this is selected, the measurement selections change.

Figure 17-24. MIXER SETUP CONFIGURATION (FREQUENCY SWEEP) Dialog Box – Control Areas (2 of 2)

Mixer Setup – Multi-Channel – Frequency Sweep – Define the Mixer Setup

3. Use the steps below to set the sweep type, the starting channel, reverse ports, and enable modular broadband.
4. In the Define Setup Select Sweep Type area at the top of the dialog, set the Sweep Type as Frequency Sweep.
 - If Power Sweep is selected, the dialog box appearance changes.
 - See “[MULTI-CHANNEL – Power-Based Sweep](#)” on page 17-44 below for the setup procedure for power-based sweeps.

Mixer Setup – Multi-Channel – Frequency Sweep – Set the Starting Channel

5. The default starting channel is Channel 1. To change the default, select the Starting Channel button.
 - The SELECT CHANNEL dialog box appears as shown below in [Figure 17-25](#).



The SELECT CHANNEL dialog box. Select any starting channel.

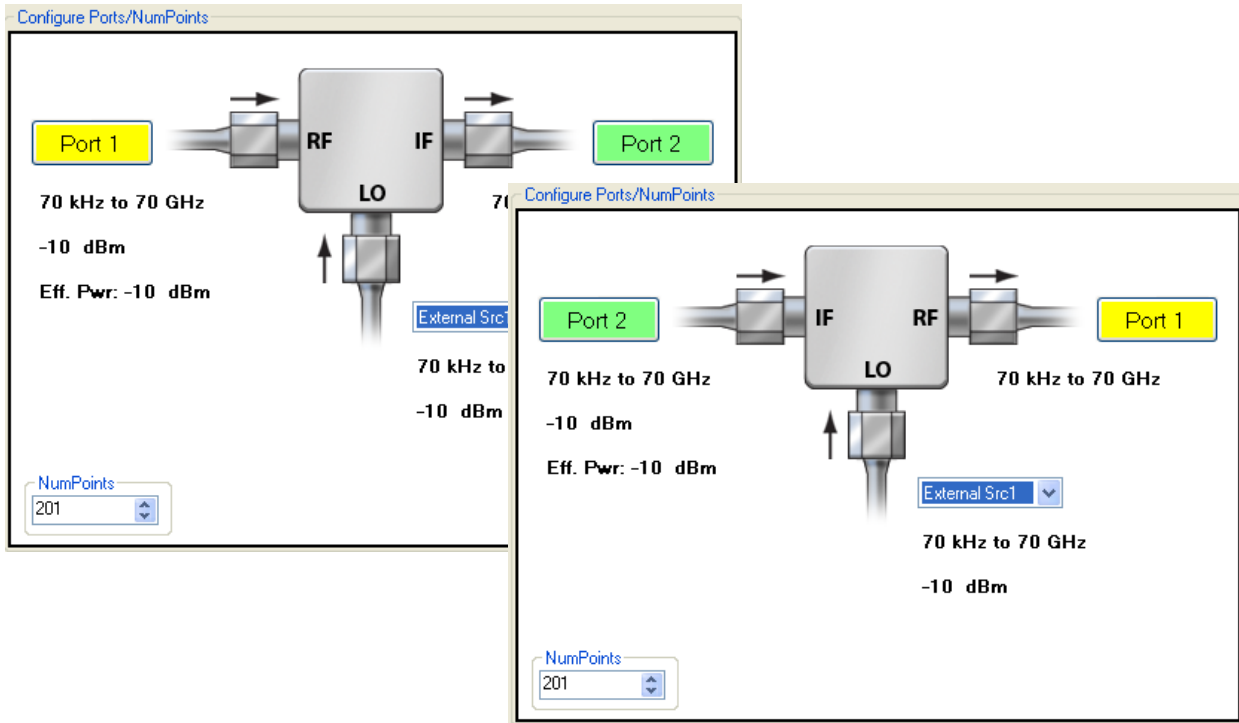
If necessary, Channel Number rolls over from Channel 16 to Channel 1.

Figure 17-25. SELECT CHANNEL Dialog Box

6. Select the required starting channel. The focus autoreturns to the MIXER SETUP CONFIGURATION (FREQUENCY SWEEP) dialog box.

Mixer Setup – Multi-Channel – Frequency Sweep – Reverse IF and RF

7. If required, on the right side of the dialog box, select the check box for Reverse the IF and RF.
- The default non-selected check box provides RF as input on Port 1 and IF as output on Port 2.
 - If selected, the RF is set as output on Port 1 and IF as input on Port 2.
 - [Figure 17-26](#) below shows the standard and reversed RF/IF port assignments.



At top, the standard port assignments of RF on Port 1 as input and IF on Port 2 as output.

At bottom, reversed port assignments of IF on Port 2 and input and RF on Port 1 as output.

Figure 17-26. Two-port Standard and Reversed IF and RF Ports

Mixer Setup – Multi-Channel – Frequency Sweep – Make Modular BB Selection

8. At the top right of the dialog, make a selection from the Modular BB drop down list.
- **Modular BB:** Select opens drop down list for selecting various broadband types. This requires using the VectorStar ME7838 Series Broadband/mmWave system with the 3739x BB/mmWave Test Set and two 3743x or MA25x00A mmWave Modules. This is only used on MS4647B VNAs equipped with Option 8x.

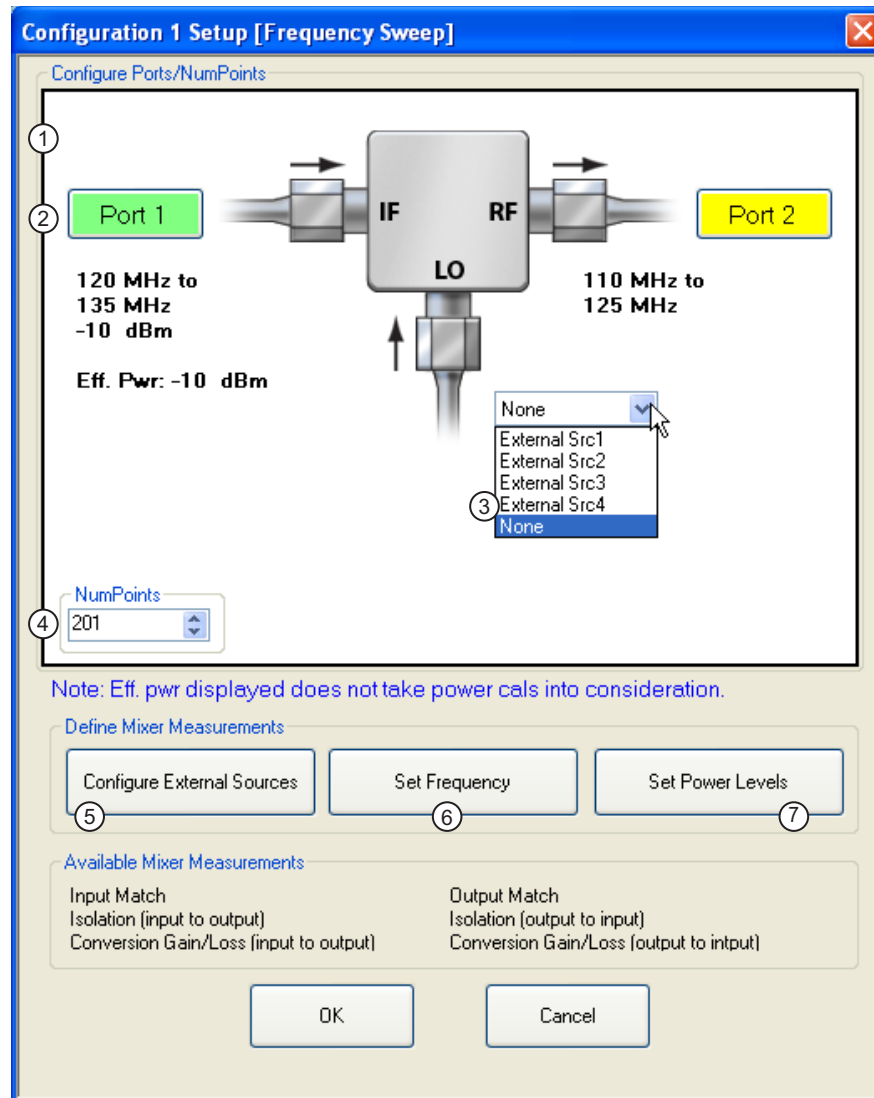
Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Initial Settings

9. Select the desired measurements in the Configuration 1 RF/IF Related Path area. See [Table 17-1 on page 17-32](#) above for more information on measurements.
- The available measurements are:
 - Input match
 - Isolation, input to output
 - Conversion gain/loss, input to output
 - Output match
 - Isolation, output to input
 - Conversion gain/loss, output to input

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency

10. When all selections have been made, select the Set Frequency button.

- The CONFIGURATION 1 SETUP (FREQUENCY SWEEP) dialog box appears.



- | | |
|---|---|
| 1. Mixer Schematic with port, frequency, and power assignments. | 5. Configure External Sources – Links to CONFIGURE EXT. SOURCE ADDRESSES dialog box to configure GPIB addresses. |
| 2. Port Assignments – Select assigns Port 1 or Port 2 (or Ports 1-4 for 4-port) to IF or RF mixer ports. | 6. Set Frequency Button – Links to the SET FREQUENCY (FREQUENCY SWEEP) setup dialog to set frequency mode and value for RF, IF, and LO. |
| 3. LO Port Source Assignment pull down field – LO source selections from None or External Source 1 through External Source 4. | 7. Set Power Levels Button – Links to the SET POWERS (FREQUENCY SWEEP) setup dialog. |
| 4. NumPoints – Number of measurement points. | |

Figure 17-27. Two-port CONFIGURATION 1 SETUP (FREQUENCY SWEEP) – Controls

11. Use the controls on the dialog box to set the following parameters:

- Select the Port 1 or Port 2 button to change port assignments.
- Select the LO field to select the source for LO as External Src (Source) 1, External Src 2, External Src 3, External Src 4, or None.
- Change the NumPoints (Number of Points) field to the required measurement points. The initial value is taken from the setting on the FREQUENCY menu.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Configure External Sources

12. When ready, select the Configure External Sources button. The CONFIGURE EXT. SOURCE ADDRESSES dialog box appears.

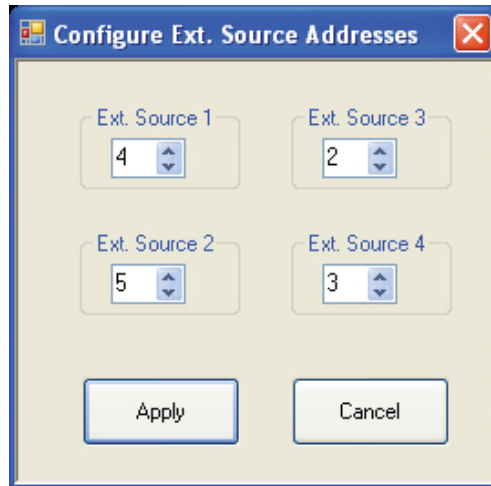


Figure 17-28. CONFIGURE EXT. SOURCE ADDRESSES Dialog Box

13. Change the address settings as required.

- The mixer dialog uses the settings made on the REMOTE INTER. menu.
 - MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
- Changes made in the mixer dialog are applied to the REMOTE INTER. men.

14. When all changes are complete, select the Apply button. The CONFIGURATION 1 SETUP dialog box reappears.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency

15. When ready, select the Set Frequency button. The SET FREQUENCY (FREQUENCY SWEEP) dialog box appears as shown in Figure 17-29 below.

The mixer schematic drawing shows the current settings for the RF, IF, and LO ports.

Set Frequency [Frequency Sweep]

LO CW Freq : 10.000000 MHz

Port 1: 110 GHz to 125 GHz, Power: -10 dBm

Port 2: ??? to ???

Ext Src1: 10 MHz, Power: -10 dBm

Note: A maximum of 1 Auto can be selected.

RF Frequency Mode
☒ Swept ☐ Fixed ☐ Auto
 Swept Frequency Start Frequency: 110 GHz
 Stop Frequency: 125 GHz

LO Frequency Mode
☐ Swept ☒ Fixed ☐ Auto
 Fixed Frequency CW Frequency: 10 MHz
 Harmonic LO: Mult. 1 / Div. 2

IF Frequency Mode
☐ Swept ☐ Fixed ☒ Auto

Conversion
☒ IF = RF-LO(Down,USB) ☐ IF = LO-RF(Down,LSB) ☐ IF = RF + LO(Up)

OK Cancel

Figure 17-29. Multi-Channel – SET FREQUENCY (FREQUENCY SWEEP) Setup Dialog Box (1 of 2)

<ol style="list-style-type: none"> 1. Mixer schematic showing mixer and VNA port assignments, frequency values, and power values. 2. Frequency input field toolbar. The label changes depending whether RF, IF, or LO are selected. 3. RF Frequency Mode and Value Settings 4. RF Mode set as Swept with Swept Frequency Start and Stop input field. For all ports, mode can be any combination of Swept and Fixed. Only one port can be set as Auto. 5. LO Frequency Mode and Value Setting 6. LO Mode set as Fixed with CW Frequency input field. 7. LO CW Frequency field tool bar with value and units. Appears for RF, IF, and LO input as required. 	<ol style="list-style-type: none"> 8. Harmonic LO: The harmonic LO entry allows one to describe any frequency multiplication and/or division that may be present between the synthesizer providing the LO signal and the DUT's fundamental frequency converter. This entry can also be used when the DUT is a harmonic mixer or sampler that has implicit frequency multiplication in the LO path. Note: A label showing the Harmonic LO ratio is displayed at the mixer schematic LO port when multiplier/divisor (M/N) ratio is <i>not</i> equal to 1. 9. IF Frequency Mode and Value Settings 10. IF Frequency Mode set as Auto. Only one of the three ports can be set as Auto. If selected, the instrument determines the frequency settings based on the other two values and the Conversion type setting and is displayed in the mixer schematic absent of a frequency label (as shown in the illustration above). 11. Conversion setting radio buttons.
--	--

Figure 17-29. Multi-Channel – SET FREQUENCY (FREQUENCY SWEEP) Setup Dialog Box (2 of 2)

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency – Set RF, LO, and IF Mode and Values

16. In the middle of the dialog box are separate control areas for RF Frequency, LO Frequency, and IF Frequency.
17. For each control area, set the frequency mode.
 - The frequency options are Swept, Fixed, or Auto.
 - Any combination of Swept or Fixed can be assigned to the RF, IF, and LO ports.
 - Only one port can be configured as Auto. In this configuration, the instrument calculates the required frequency based on the conversion setting selected (described below) in the Conversion area at the bottom of the dialog box and the settings on the other two ports.
 - Each Frequency Mode selection provides different control immediately below in the next area.
 - In the figure above, RF Frequency is set as Swept, LO Frequency is set as Swept, and IF Frequency is set as Fixed.
18. If the RF, IF, and/or LO Frequency Mode is set as Swept:
 - The Swept Frequency area appears with controls for Start Frequency and Stop Frequency.
 - Select the Start Frequency field, and at the top of the dialog in the field toolbar, enter the required starting frequency and required units from GHz, MHz, kHz, or Hz.
 - Note that the field toolbar name changes depending on whether RF, IF, or LO is selected.
19. If the RF, IF, and/or LO Frequency Mode is set as Fixed:
 - The Fixed Frequency area appears with a single control for CW Frequency.
 - Select the CW field and enter the required CW frequency and required units.
20. If the RF, IF, or LO Frequency Mode is set as Auto:
 - No frequency assignment fields are available.
 - The frequency is calculated based on the settings for the other two mixer ports and the settings in the Conversion area described below.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency – Harmonic LO

The harmonic LO entry allows one to describe any frequency multiplication and/or division that may be present between the synthesizer providing the LO signal and the DUT's fundamental frequency converter. This entry can also be used when the DUT is a harmonic mixer or sampler that has implicit frequency multiplication in the LO path.

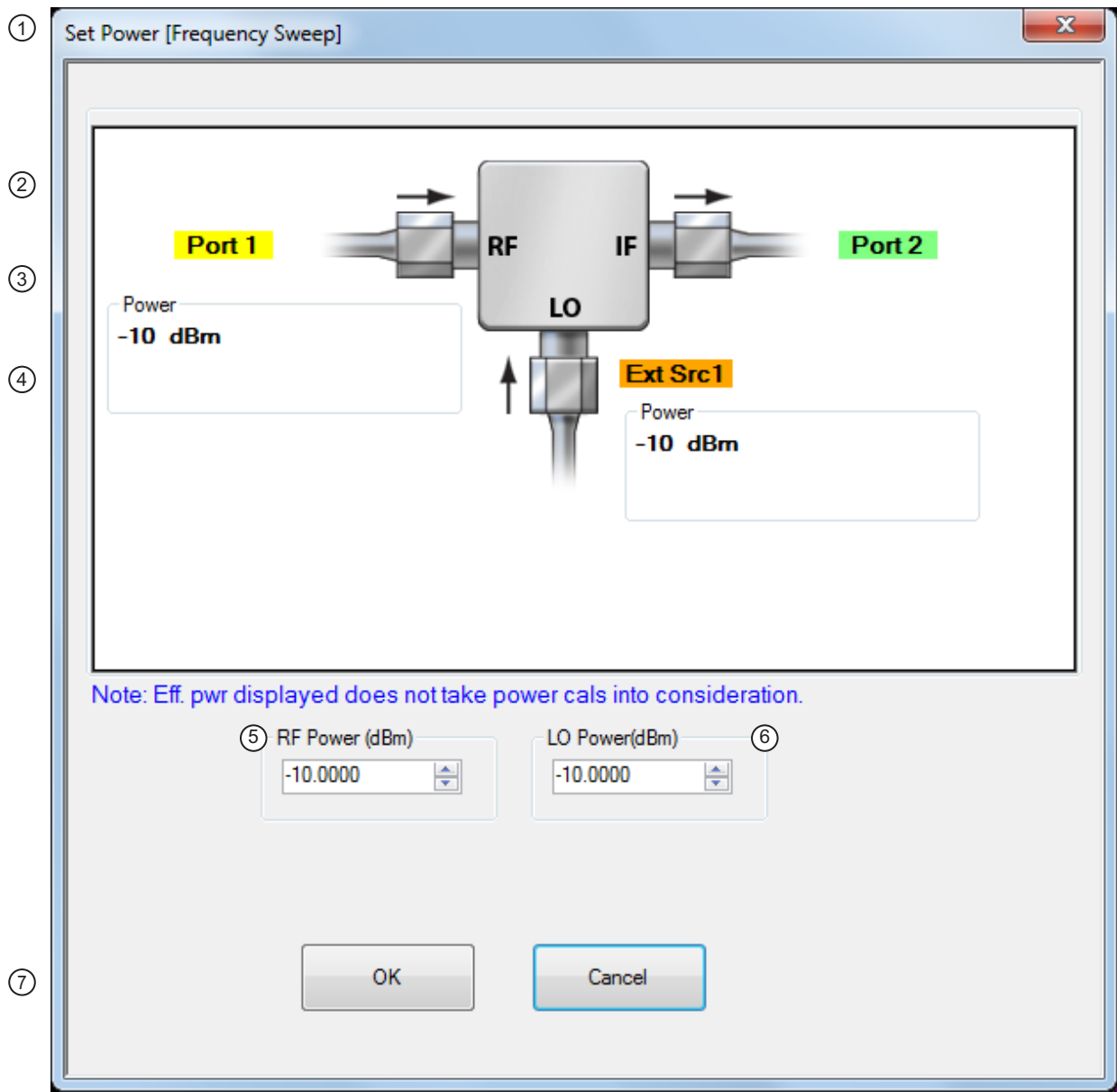
21. Set the Harmonic LO multiplier/divisor ratio. A label showing the Harmonic LO ratio is displayed at the mixer schematic LO port when multiplier/divisor (M/N) ratio is not equal to 1.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Frequency – Set the Conversion Required

22. Near the bottom of the dialog is the Conversion area.
23. Select button for the conversion type required from options of:
 - IF = RF - LO which is down conversion with Upper SideBand (USB).
 - IF = LO - RF which is down conversion with Lower Side Band (LSB).
 - IF = RF + LO which is up conversion.
24. When all settings are complete, select the OK button to return to the setup central control dialog.
 - The CONFIGURATION 1 SETUP [FREQUENCY SWEEP] setup dialog reappears.
 - See [Figure 17-27, “Two-port CONFIGURATION 1 SETUP \(FREQUENCY SWEEP\) – Controls” on page 17-37](#) above.
 - If any setting is out of range, a warning dialog appears with an error message such as Invalid Frequency Range or Equation Out of Range. Correct the problem as required.

Mixer Setup – Multi-Channel – Frequency Sweep – Configuration 1 – Set Power Levels

25. On the CONFIGURATION 1 SETUP [FREQUENCY SWEEP] setup dialog box, select the Set Power Levels button.
- The SET POWERS (FREQUENCY SWEEP) setup dialog box appears as shown below in [Figure 17-15](#).



- | | |
|---|---|
| <ul style="list-style-type: none">1. Multi-Channel – Configuration 1 – SET POWERS (FREQUENCY SWEEP) Dialog Box2. Mixer Schematic with mixer and VNA port assignments and power settings.3. Port Assignments | <ul style="list-style-type: none">4. Power Settings – Note that only the driving ports have assigned power settings. The port and naming assignments depend on the user configuration.5. RF Power (dBm) input field.6. LO Power (dBm) input field.7. Dialog Control buttons. |
|---|---|

Figure 17-30. Multi-Channel – Configuration 1 – SET POWERS (FREQUENCY SWEEP) Dialog Box

26. Enter the required RF Power level in dBm in the provided field.
 - Note that the power setting appears on the Mixer Schematic and also in the POWER menu.
27. Enter the required LO Power level in dBm.
28. When all settings are complete, select the OK button to return to the main setup control dialog box.
 - See [Figure 17-24, “MIXER SETUP CONFIGURATION \(FREQUENCY SWEEP\) Dialog Box – Control Areas” on page 17-33](#)] setup dialog reappears.
29. A dialog report appears with a listing of the required calibrations to support the input mixer configuration. A typical example is shown below.

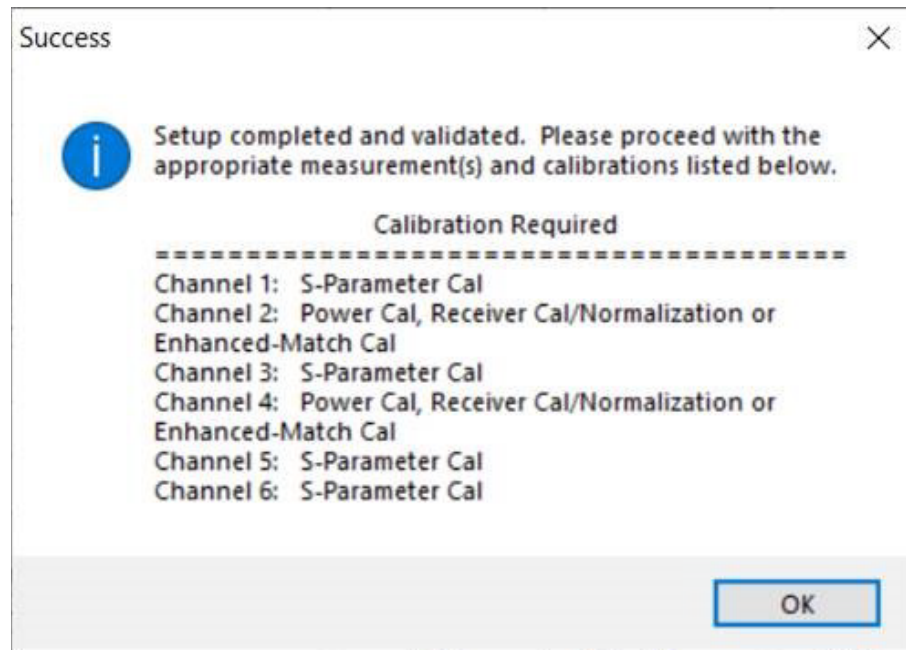


Figure 17-31. SUCCESS Dialog with Required Calibrations

30. The mixer configuration process is complete.

17-7 MULTI-CHANNEL – Power-Based Sweep

Previous

- “MIXER Menu” on page 12-20.

Navigation

- MAIN | Application | APPLICATION | Mixer | MIXER | Mixer Setup (Active Channel) | MIXER SETUP Dialog Box | MIXER SETUP CONFIGURATION Dialog Box | Sweep Type = Power Sweep

Mixer Setup – Multi-Channel – Power Sweep – Menu Set

The multi-channel mixer setup provides additional measurement capability over multiple channels and consists of one central control dialog box with multiple supporting dialog boxes. The multi-channel mixer setup dialog for power-based sweeps is similar to the controls for the active channel version described above. Additional parameters can be measured, which require addition dialogs to configure the mixer. The relationships between the main and supporting dialog boxes is shown in [Figure 17-32](#) below.

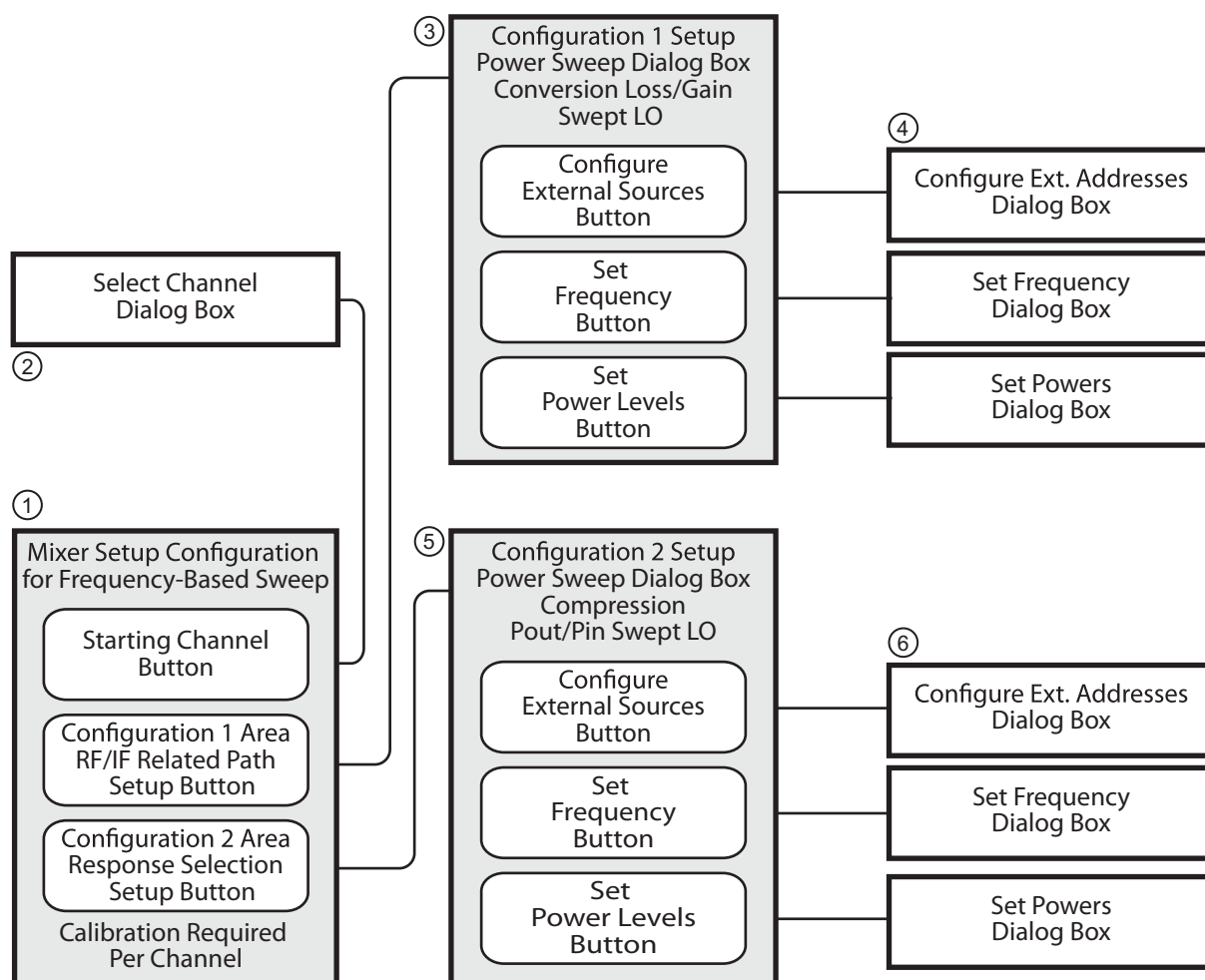


Figure 17-32. MULTI-CHANNEL MIXER SETUP Dialog Boxes – Power-Based Sweep (1 of 2)

1. MIXER SETUP CONFIGURATION [Frequency-Based Sweep] Dialog Box	5. CONFIGURATON 2 SETUP Dialog Box for Isolation LO to Output NOTE: When Dual Source Architecture is selected on the Mixer Wizard Configuration screen, the Configure External Sources Button is disabled.
2. SELECT CHANNEL Dialog Box	6. Configuration 2 Dialog Boxes for External Source Address, Frequency, and Power.
3. CONFIGURATON 1 SETUP Dialog Box for RF/IF related Paths NOTE: When Dual Source Architecture is selected on the Mixer Wizard Configuration screen, the Configure External Sources Button is disabled.	7. CONFIGURATON 3 SETUP Dialog Box for Isolation LO to Input
4. Configuration 1 Dialog Boxes for External Source Address, Frequency, and Power.	8. Configuration 3 Dialog Boxes for Frequency and Power.

Figure 17-32. MULTI-CHANNEL MIXER SETUP Dialog Boxes – Power-Based Sweep (2 of 2)

Mixer Setup – Multi-Channel – Power Sweep – Available Measurements

The table below lists the available power-based mixer measurements. On the main dialog box, check boxes allow individual measurement selections. For each configuration area (Configuration 1, Configuration 2, and Configuration 3), the Setup button for that area displays the setup dialogs for that configuration.

Table 17-2. Available Measurements for Power-Based Sweep

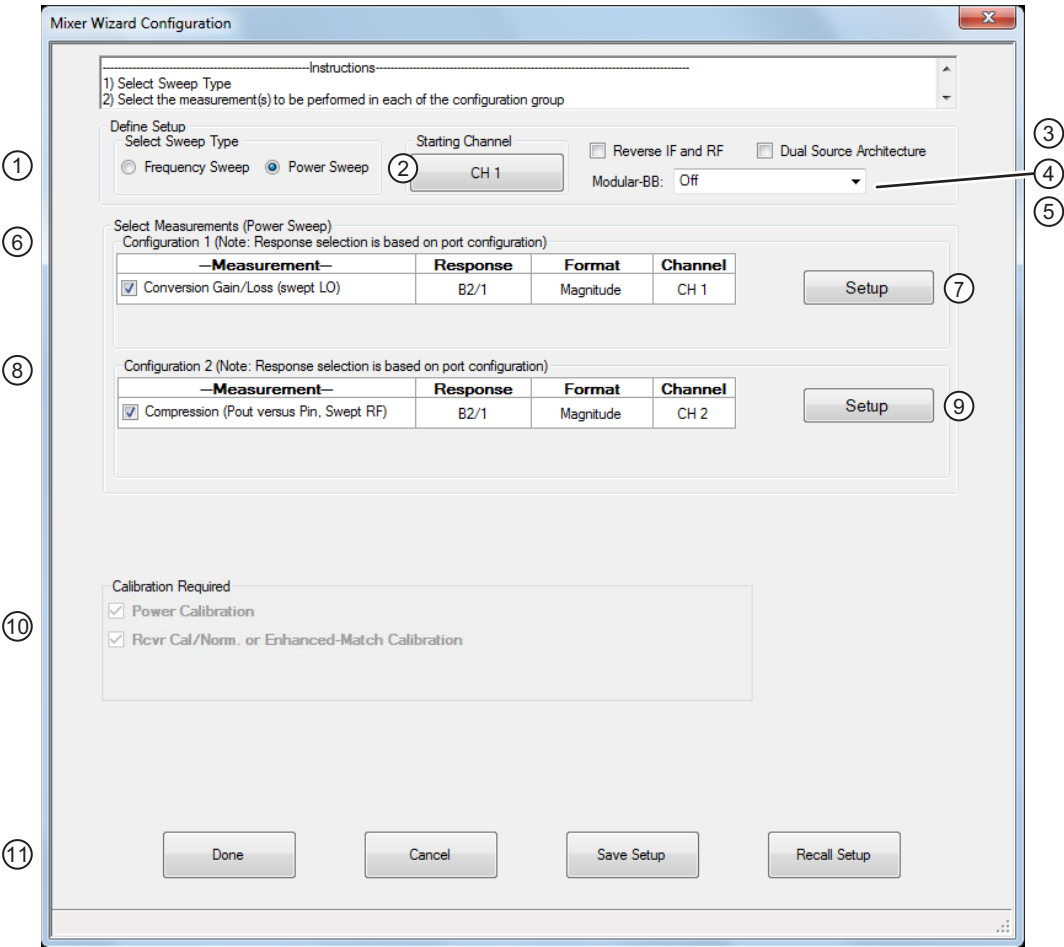
Measurement	Response	Display Format	Channel
Configuration 1 – Conversion Gain/Loss – Swept LO Response selection is based on port configuration.			
Conversion Gain/Loss, Swept LO	B2/1	Magnitude	Channel 1
Setup button – Links to the CONFIGURATION 1 SETUP Dialog Box for Conversion Gain/Loss, Swept LO.			
Configuration 2 – Pout versus Pin – Swept RF – Response selection is based on port configuration.			
Compression, Pout versus Pin, Swept RF	B2/1	Magnitude	Channel 2
Setup button – Links to the CONFIGURATION 2 SETUP dialog box for Isolation LO to Output.			

Mixer Setup – Multi-Channel – Power Sweep – Channel Assignments

Two channels are required to support all measurements. See [Table 17-2, “Available Measurements for Power-Based Sweep” on page 17-45](#) above for the default channel assignments. Skipped measurements do not change the channel assignment. For example, if the default channel settings are used and the Conversion Gain/Loss, Swept LO measurement is not used, the remaining Compression, Pout versus Pin, Swept RF measurement is set to Channel 2. The starting channel can be changed to any of the 16 channels. If Channel 16 is assigned, and another channel is required, the Channel assignment rolls over to Channel 1.

Mixer Setup – Multi-Channel – Power Sweep – Procedure

- 1. On the APPLICATION menu, select the Mixer Setup (Multi-Channel) button. The MIXER SETUP CONFIGURATION dialog box appears.
- 2. In the Define Setup area at the top of the box, select the Power Sweep radio button. The appearance and controls change for power sweep as shown in the figure below. See [Figure 17-33](#) 6



- | | |
|---|--|
| <ul style="list-style-type: none">1. Select Sweep Type2. Select Starting Channel3. Reverse RF and IF – Standard is RF is input and IF output. Reverse is RF as output and IF as input.4. Modular BB Selections – Only for MS4647B VNAs with Option 8x and ME7838 Series peripheral equipment.
Note: All selections are dependent on installed options and model number.5. Dual Source Architecture (Only for MS464xB VNAs with Option 31) When this feature is selected in Power Sweep mode, the measurement selections do not change. | <ul style="list-style-type: none">6. Configuration 1 Measurements for Conversion Gain/Loss Swept LO.7. Setup button to Configuration 1 dialogs8. Configuration 2 Measurements for Compression Pout versus Pin Swept RF.9. Setup button to Configuration 2 dialogs.10. Calibration Required Area display.11. Dialog control buttons.
Save Setup stores the mixer wizard configuration as a .mwzd file so that it can be recalled at a later time using Recall Setup. |
|---|--|

Figure 17-33. MIXER SETUP CONFIGURATION Dialog Box – Power Sweep

- 3. For Frequency Sweeps, see [“Previous” on page 17-28](#) above.

4. If a power-based mixer setup has been previously saved, select the Recall Setup button near the bottom of the dialog box. A RECALL MIXER CONFIGURATION SETUP dialog box appears. Navigate as required and select the appropriate MWZD file. Once open, proceed with the procedure below to modify it as required.

Mixer Setup – Multi-Channel – Power Sweep – Set the Starting Channel

5. The default starting channel is Channel 1. To change the default, select the Starting Channel button.
 - The SELECT CHANNEL dialog box appears (see [Figure 17-4, “MIXER SETUP ACTIVE CHANNEL Dialog Box – 2-Port Frequency Sweep – Control Locations”](#) on page 17-6 above).
 - If Channel 16 is selected, and another channel is required, the setup automatically rolls over to assign Channel 1 to the next channel.
6. Select the required starting channel. The focus autoreturns to the MIXER SETUP CONFIGURATION (POWER SWEEP) dialog box.

Mixer Setup – Multi-Channel – Power Sweep – Reverse IF and RF

7. If required, on the right side of the dialog box, select the check box for Reverse the IF and RF.
 - The default non-selected check box provides RF as input on Port 1 and IF as output on Port 2.
 - If selected, the RF is set as output on Port 1 and IF as input on Port 2.
 - See [Figure 17-5, “Standard and Reversed IF and RF Ports”](#) on page 17-8 above for examples of default and reversed RF/IF port assignments.

Mixer Setup – Multi-Channel – Power Sweep – Make Modular BB Selection

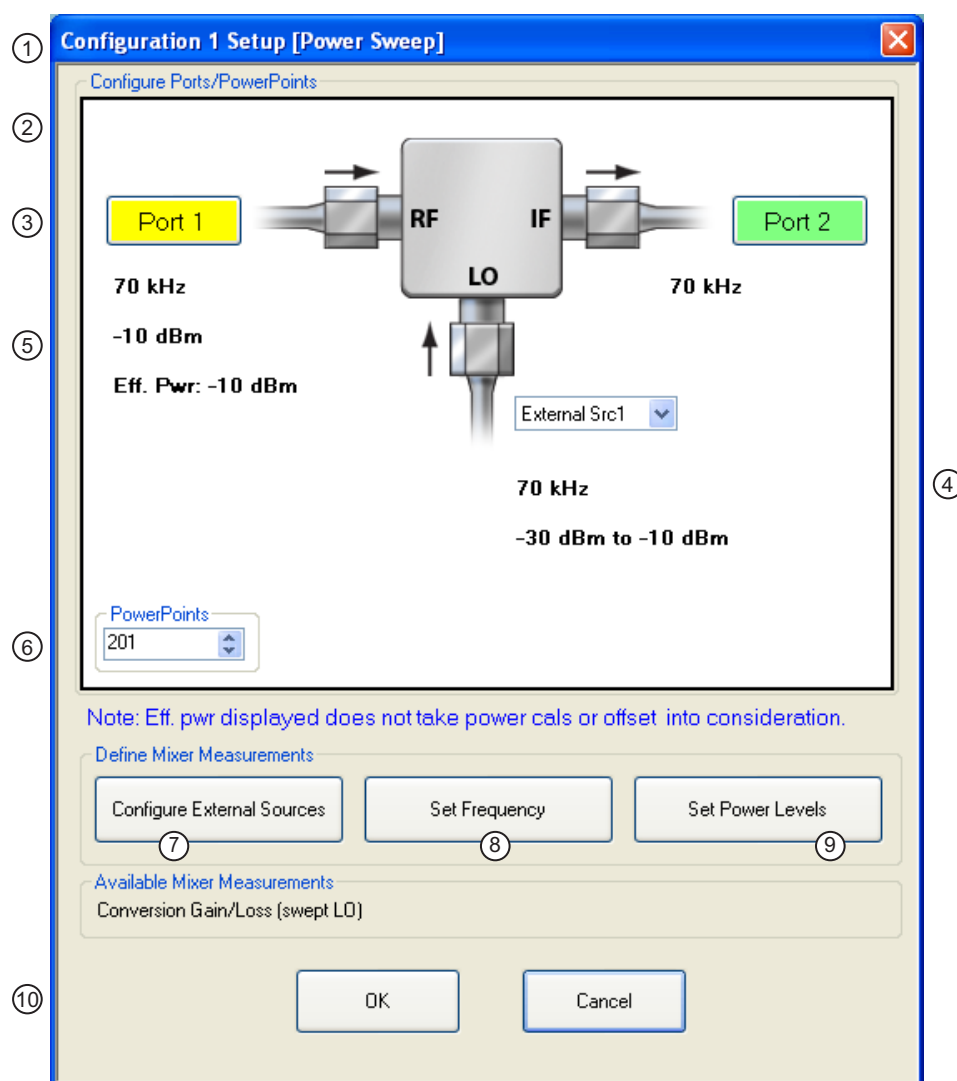
8. At the top right of the dialog, make a selection from the Modular BB drop down list.
 - Modular BB: Select opens drop down list for selecting various broadband types. This requires using the VectorStar ME7838 Series Broadband/mmWave system with the 3739x BB/mmWave Test Set and two 3743x or MA25x00A mmWave Modules. This is only used on MS4647B VNAs equipped with Option 8x.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Initial Settings

9. Select the required measurements in the Configuration 1 Conversion Gain/Loss area.
 - The available measurement is Conversion Gain/Loss (Swept LO).
 - See [Table 17-2, “Available Measurements for Power-Based Sweep”](#) on page 17-45 above for more information on measurements.
 - At least one measurement must be selected to make the Next button available.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency

10. When all selections have been made, select the Next button.
 - The CONFIGURATION 1 SETUP (FREQUENCY SWEEP) dialog box appears.



- | | |
|--|---|
| 1. CONFIGURATION 1 SETUP (POWER SWEEP) Setup Dialog Box. | 7. Configure External Sources – Links to CONFIGURE EXT. SOURCE ADDRESSES dialog box to configure GPIB addresses. |
| 2. Mixer Schematic with port, frequency, and power assignments. | 8. Set Frequency Button – Links to the SET FREQUENCY (POWER SWEEP) setup dialog to set frequency mode and value for RF, IF, and LO. |
| 3. Port Assignments – Each must be unique selecting from None, Port 1, Port 2 (or Port 1-4 for 4-Port), or External Sources 1 through 4. | 9. Set Power Levels Button – Links to the SET POWERS (POWER SWEEP) setup dialog. |
| 4. Port Assignment pull down field | 10. Dialog Completion Buttons |
| 5. Power Assignments | |
| 6. PowerPoints – Number of power measurement points. | |

Figure 17-34. 2-port CONFIGURATION 1 SETUP (POWER SWEEP) – Controls

11. Use the controls on the dialog box to set the following parameters:

- Select the Port 1 or Port 2 button to change port assignments.
- Select the LO field to select the source for LO as External Src (Source) 1, External Src 2, External Src 3, External Src 4, or None.
- Change the PowerPoints (Number of Power Points) field to the required measurement points. The initial value is taken from the setting on the FREQUENCY menu.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set External Source Addresses

12. When ready, select the Configure External Sources button. The CONFIGURE EXT. SOURCE ADDRESSES dialog box appears.

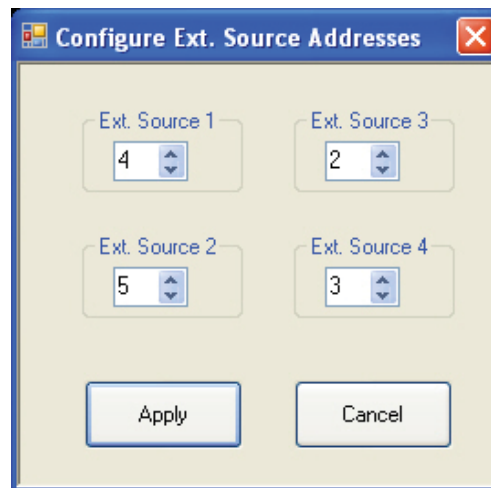


Figure 17-35. Configuration 1 – CONFIGURE EXT. SOURCE ADDRESSES Dialog Box

13. Change the address settings as required.

- The mixer dialog uses the settings made on the REMOTE INTER. menu.
 - MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
- Changes made in the mixer dialog are applied to the REMOTE INTER. men.

14. When all changes are complete, select the Apply button. The CONFIGURATION 1 SETUP dialog box reappears.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency

15. When ready, select the Set Frequency button. The SET FREQUENCY (POWER SWEEP) dialog box appears as shown in Figure 17-36 below.

The mixer schematic drawing shows the current settings for the RF, IF, and LO ports.

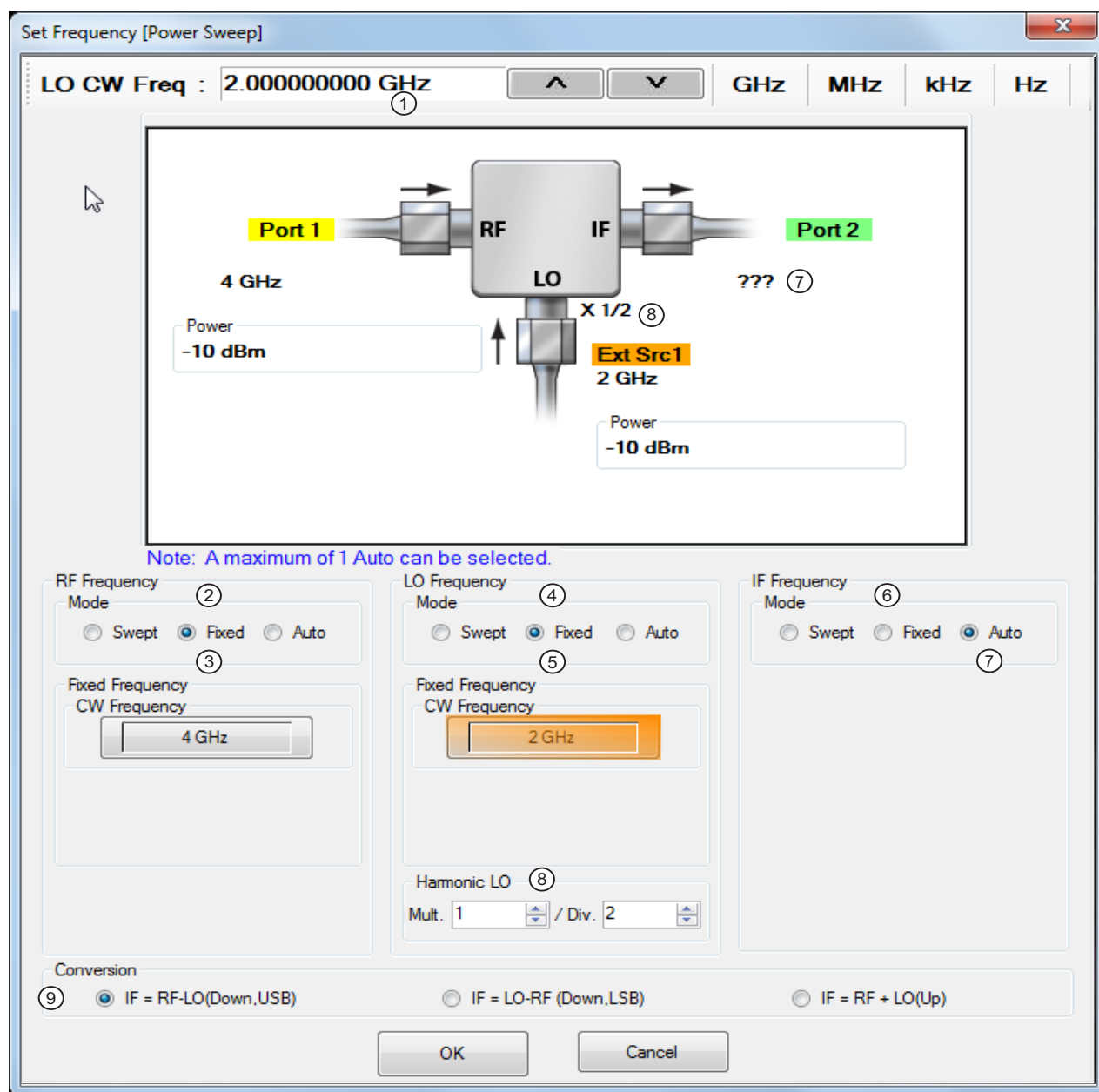


Figure 17-36. Configuration 1 – SET FREQUENCY (POWER SWEEP) Setup Dialog Box (1 of 2)

<ol style="list-style-type: none"> 1. Frequency input field toolbar. The label changes depending whether RF, IF, or LO are selected. 2. RF Frequency mode and value area. 3. Mode set as Fixed. Any combination of the RF, IF, and LO ports can be set as Fixed. When selected, a CW Frequency field appears. 4. LO Frequency mode and value area. 5. Mode set as Fixed. Any combination of the RF, IF, and LO ports can be set as Fixed. When selected, a CW Frequency field appears. 6. IF Frequency mode and value area. 7. Mode set as Auto. Only one of the three ports can be set as Auto. If selected, the instrument determines the frequency settings based on the other two values and the Conversion type setting and is displayed in the mixer schematic absent of a frequency label (as shown in the illustration above). 	<ol style="list-style-type: none"> 8. Harmonic LO: The harmonic LO entry allows one to describe any frequency multiplication and/or division that may be present between the synthesizer providing the LO signal and the DUT's fundamental frequency converter. This entry can also be used when the DUT is a harmonic mixer or sampler that has implicit frequency multiplication in the LO path. Note: A label showing the Harmonic LO ratio is displayed at the mixer schematic LO port when multiplier/divisor (M/N) ratio is <i>not</i> equal to 1. 9. Conversion setting. Changes based on whether RF is input or output. If RF is input, equations show conversion calculations for IF. If IF is input, equations show conversion calculations for RF.
---	--

Figure 17-36. Configuration 1 – SET FREQUENCY (POWER SWEEP) Setup Dialog Box (2 of 2)

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency – Set RF, LO, and IF Mode and Values

16. In the middle of the dialog box are separate control areas for RF Frequency, LO Frequency, and IF Frequency.
17. For each control area, set the frequency mode.
 - The frequency options are Fixed or Auto. Swept is unavailable.
 - Only one port can be configured as Auto. In this configuration, the instrument calculates the required frequency based on the conversion setting selected (described below) in the Conversion area at the bottom of the dialog box and the settings on the other two ports.
18. If the RF, IF, and/or LO Frequency Mode is set as Fixed:
 - The Fixed Frequency area appears with a single control for CW Frequency.
 - Select the CW field and enter the required CW frequency and required units.
 - At the top of the dialog in the field toolbar, enter the required starting frequency and required units from GHz, MHz, kHz, or Hz.
 - Note that the field toolbar name changes depending on whether RF, IF, or LO is selected.
19. If the RF, IF, or LO Frequency Mode is set as Auto:
 - No frequency assignment fields are available.
 - The frequency is calculated based on the settings for the other two mixer ports and the settings in the Conversion area described below.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency – Harmonic LO

The harmonic LO entry allows one to describe any frequency multiplication and/or division that may be present between the synthesizer providing the LO signal and the DUT's fundamental frequency converter. This entry can also be used when the DUT is a harmonic mixer or sampler that has implicit frequency multiplication in the LO path.

20. Set the Harmonic LO multiplier/divisor ratio. A label showing the Harmonic LO ratio is displayed at the mixer schematic LO port when multiplier/divisor (M/N) ratio is not equal to 1.

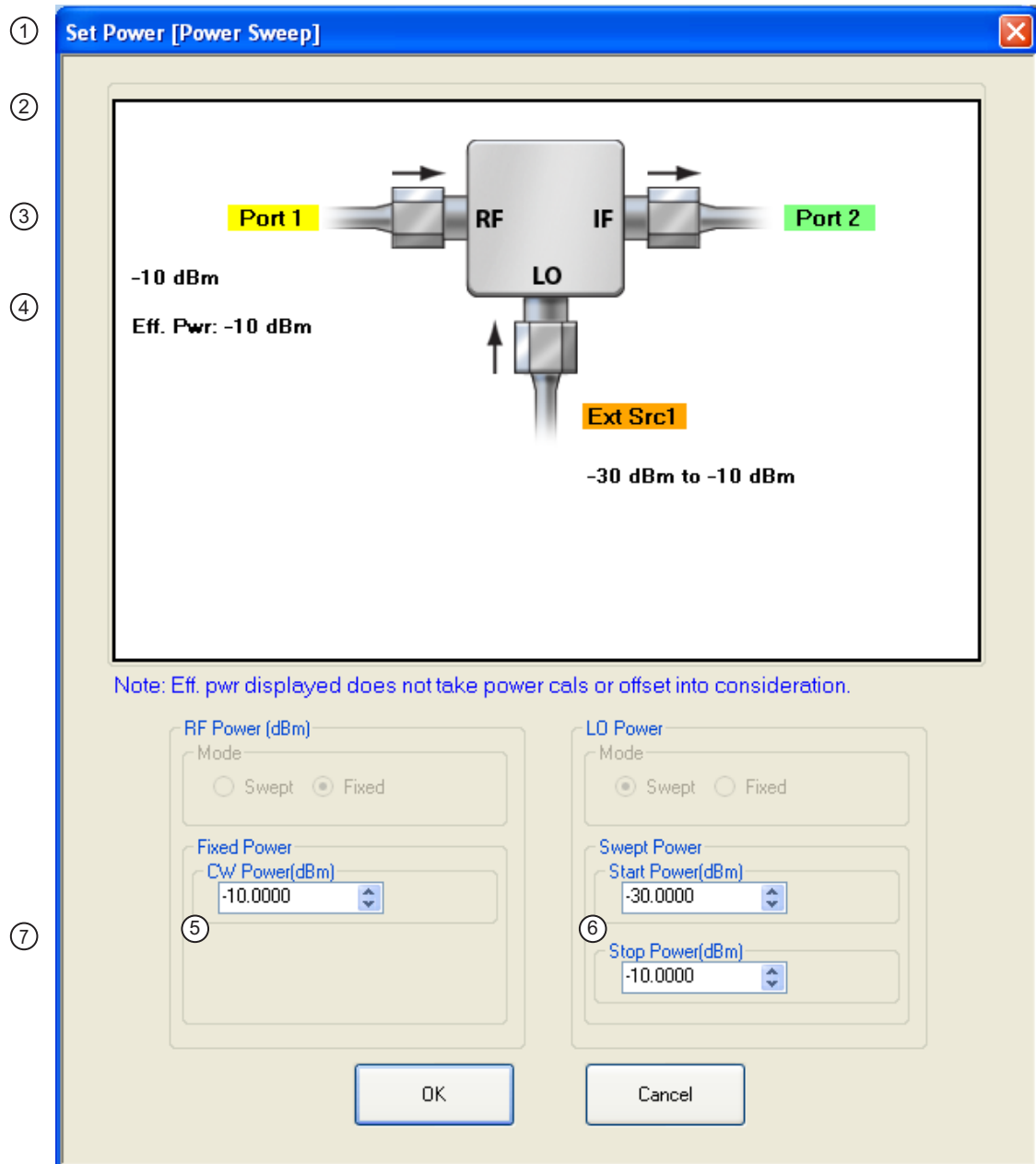
Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency – Set the Conversion Required

21. Near the bottom of the dialog is the Conversion area.
22. Select button for the conversion type required from options provided which depend on whether IF and RF were reversed.
 - If the default RF as input and IF as output was selected above:
 - $IF = RF - LO$ which is down conversion with Upper SideBand (USB).
 - $IF = LO - RF$ which is down conversion with Lower Side Band (LSB).
 - $IF = RF + LO$ which is up conversion.
 - If reverse was selected above with IF as input and RF as output:
 - $RF = IF + LO$ which is up conversion.
 - $RF = LO - IF$ which is down conversion with Lower Side Band (LSB).
 - $RF = IF + LO$ which is down conversion with Upper Side Band (USB).
23. When all settings are complete, select the OK button to return to the setup central control dialog.
 - The CONFIGURATION 1 SETUP (POWER SWEEP) setup dialog reappears.
 - See [Figure 17-34, “2-port CONFIGURATION 1 SETUP \(POWER SWEEP\) – Controls” on page 17-48](#) above.
 - If any setting is out of range, a warning dialog appears with an error message such as Invalid Frequency Range or Equation Out of Range. Correct the problem as required.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Power Levels

24. On the CONFIGURATION 1 SETUP (POWER SWEEP) setup dialog box, select the Set Power Levels button.

- The SET POWERS (FREQUENCY SWEEP) dialog box appears as shown below in [Figure 17-15](#).



1. Multi-Channel – Configuration 1 – SET POWERS (POWER SWEEP) Dialog Box

2. Mixer Schematic with mixer and VNA port assignments and power settings.

3. Port Assignments

4. Power Settings – Note that only the driving ports have assigned power settings. The port and naming assignments depend on the user configuration.

5. RF Power (dBm) input field for CW Power.

6. LO Power (dBm) input fields for Swept Power.

7. Dialog Control buttons.

Figure 17-37. Configuration 1 – SET POWERS (POWER SWEEP) Setup Dialog Box

25. Depending on the configuration enter the required power levels for RF, LO and/or IF in the provided fields.
 - Note that the power setting appears on the Mixer Schematic and also in the POWER menu.
26. When all settings are complete, select the OK button to return to the Configuration 1 setup control dialog box.
 - The CONFIGURATION 1 SETUP (POWER SWEEP, CONVERSION GAIN/LOSS, Swept LO) setup dialog box reappears.
 - See [Figure 17-34, “2-port CONFIGURATION 1 SETUP \(POWER SWEEP\) – Controls” on page 17-48](#) above.
27. Inspect all settings in Configuration 1 and make any final changes as required.
28. When all settings are complete, select the OK button to return to the MIXER SETUP CONFIGURATION (POWER SWEEP) main control dialog box.
 - The MIXER SETUP CONFIGURATION (POWER SWEEP) reappears.
 - See [Figure 17-33, “MIXER SETUP CONFIGURATION Dialog Box – Power Sweep” on page 17-46](#) above.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 2 – Initial Settings

29. If required, in the Configuration 2 area, select the Compression (Pout versus Pin) measurement.
 - At least one measurement must be selected to make the Next button available.
 - See [Table 17-2, “Available Measurements for Power-Based Sweep” on page 17-45](#) above for more information on measurements.
30. Select the Next button in the Configuration 2 area.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 1 – Set Frequency

31. When all selections have been made, select the Next button.
 - The CONFIGURATION 2 SETUP (FREQUENCY SWEEP) dialog box appears.
 - See [Figure 17-34, “2-port CONFIGURATION 1 SETUP \(POWER SWEEP\) – Controls” on page 17-48](#) above for a dialog box example.
32. Set parameters as required:
 - VNA Port Assignment
 - External Source Assignment
 - Number of Power Measurement Points
33. When all selections have been made, select the Configure External Sources button.
 - The CONFIGURE EXT. SOURCE ADDRESSES dialog box appears.
 - See [Figure 17-35, “Configuration 1 – CONFIGURE EXT. SOURCE ADDRESSES Dialog Box” on page 17-49](#) above for a dialog box example.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 2 – Set External Source Addresses

34. Use the controls on the dialog box to set the GPIB addresses for External Source 1 through External Source 2.
 - The mixer dialog uses the settings made on the REMOTE INTER. menu.
 - MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.
 - Changes made in the mixer dialog are applied to the REMOTE INTER. menu.
35. When all changes are complete, select the Apply button. The CONFIGURATION 2 SETUP mixer setup dialog box reappears.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 2 – Set Frequency

36. When ready, select the Set Frequency button. The SET FREQUENCY (POWER SWEEP) dialog box appears.
 - See [Figure 17-36, “Configuration 1 – SET FREQUENCY \(POWER SWEEP\) Setup Dialog Box” on page 17-50](#) above for a dialog box example.
37. The available mixer ports to configure for frequency depend on the settings.
38. For each mixer port, set the mode as Swept or Fixed as required. In some cases, some options may be unavailable.
39. For each mixer port, set the Start/Stop Frequency or CW Frequency as required. All settings are presented in the mixer schematic.
40. When all changes are complete, select the OK button. The CONFIGURATION 2 SETUP mixer setup dialog box reappears.

Mixer Setup – Multi-Channel – Power Sweep – Configuration 2 – Set Power Levels

41. When ready, select the Set Power Levels button. The SET POWERS (POWER SWEEP) dialog box appears.
 - See [Figure 17-37, “Configuration 1 – SET POWERS \(POWER SWEEP\) Setup Dialog Box” on page 17-53](#) above for a dialog box example.
42. The available mixer ports to configure for power depend on the settings. Some settings and/or some ports may be unavailable.
43. For each mixer port, set the mode as required.
44. If Swept is set, enter the Swept Power Start and Swept Power Stop power settings.
45. If CW is set, enter the CW Power setting.
46. When ready, select the OK button. The CONFIGURATION 2 SETUP mixer setup dialog box reappears.
 - See [Figure 17-37, “Configuration 1 – SET POWERS \(POWER SWEEP\) Setup Dialog Box” on page 17-53](#) above for a dialog box example.
47. Check all settings and when ready, select the OK button. The MIXER SETUP CONFIGURATION (POWER SWEEP) dialog box appears.
 - See [Figure 17-33, “MIXER SETUP CONFIGURATION Dialog Box – Power Sweep” on page 17-46](#) above.

Mixer Setup – Multi-Channel – Power Sweep – Completing the Configuration

48. The Calibration Required area on the dialog box becomes available. Make a note of the required calibrations. A dialog report appears with a listing of the required calibrations to support the input mixer configuration. A typical example is shown below.

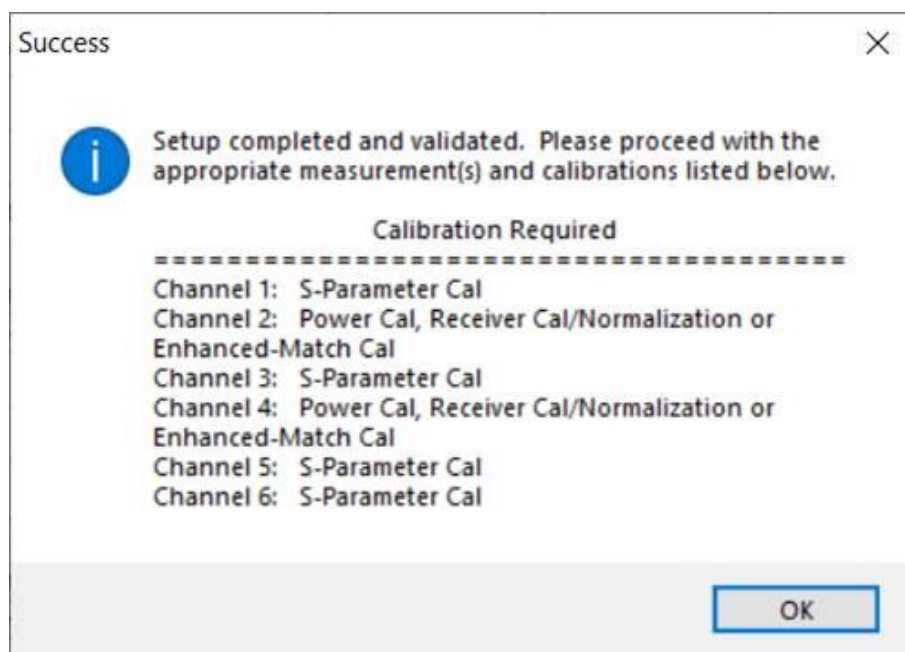


Figure 17-38. SUCCESS Dialog with Required Calibrations

49. The mixer configuration process is complete.
50. To save the setup, select the **Save Setup** button.
- A standard Windows Save dialog box appears to save the setup as a MWZD file.
 - Navigate to the required folder, and select **Save**.

Chapter 18 — NxN

18-1 Chapter Overview

This chapter provides information for the single APPLICATION menu which sets the instrument measurement mode, and whether broadband or multiple sources are used. The menu also provides access to NxN setup.

Other Application Menu Chapters

Other APPLICATION menu chapters with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

18-2 Application Menus and Dialog Boxes for NxN

The APPLICATION menu set for NxN contains the following menu and dialog box:

- MIXER Menu (see [Figure 18-1, “APPLICATION Menu and NxN Function – Typical Variant Examples”](#) on page 18-2 below.)
- [“NXN SOLUTION USING S2P FILES Dialog Box”](#) on page 18-3

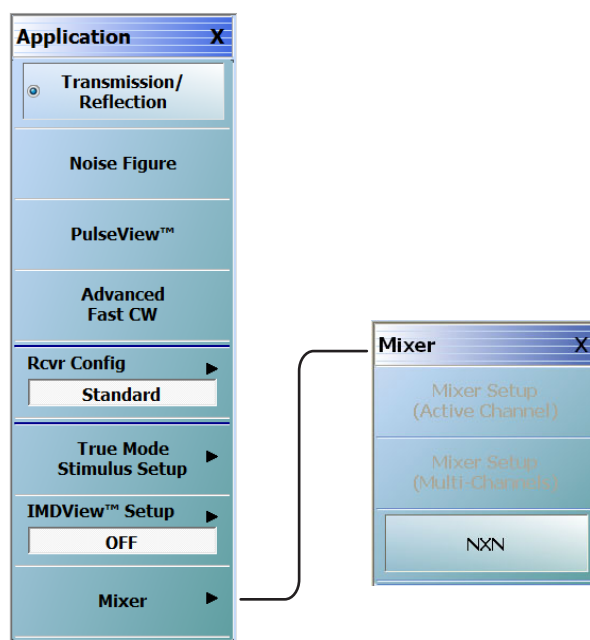


Figure 18-1. APPLICATION Menu and NxN Function – Typical Variant Examples

See the other APPLICATION menu chapters for descriptions of other menu button selections.

NxN

Selecting the NxN button displays the NXN SOLUTION USING S2P Files dialog box.

- [“NXN SOLUTION USING S2P FILES Dialog Box”](#) on page 18-3

18-3 NXN S2P Configuration

NXN SOLUTION USING S2P FILES Dialog Box

Previous

- “MIXER Menu” on page 12-20

Navigation

- MAIN | Application | APPLICATION | Mixer | MIXER | NxN | NXN SOLUTION USING S2P FILES Dialog Box

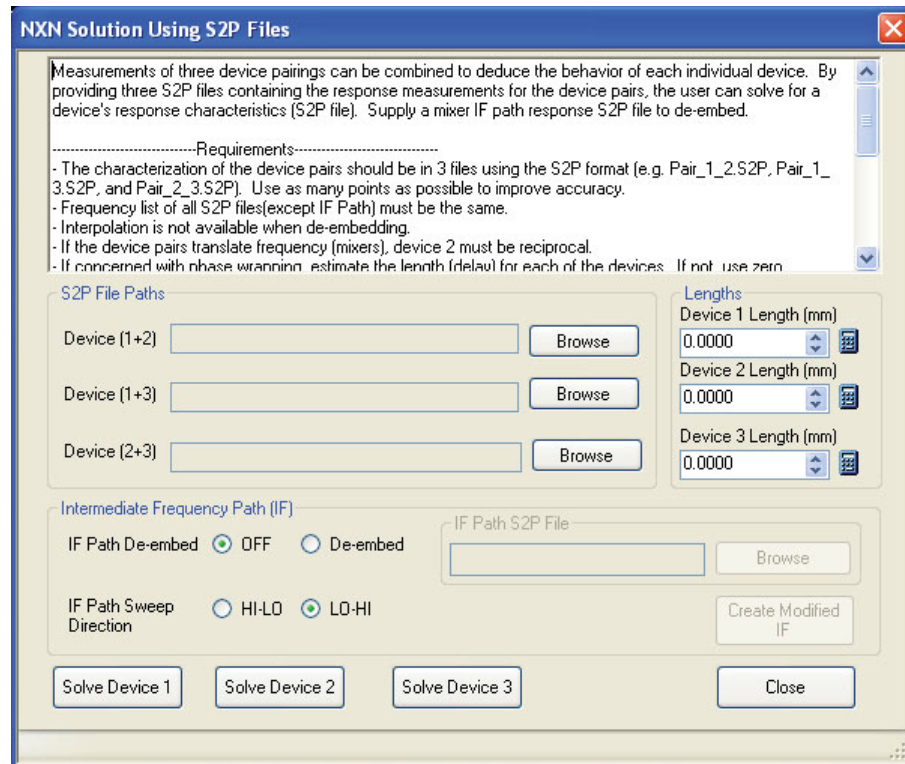


Figure 18-2. NXN SOLUTION USING S2P FILES Dialog Box

Description

Measurements of three device pairings can be combined to deduce the behavior of each individual device. By providing three S2P files containing the response measurements for the device pairs, the user can solve for a device's response characteristics (S2P file). Supply a mixer IF path response S2P file to de-embed.

Requirements

The characterization of the device pairs should be in three (3) files using the S2P format, such as:

- Pair_1_2.s2p
- Pair_1_3.s2p
- Pair_2_3.s2p

Use as many points as possible to improve accuracy. The following requirements apply:

- The frequency list of all.s2p files (except the IF Path) must be the same. Interpolation is not available in the NxN extraction process but it is available when de-embedding the resultant file.
- If the device pairs translate frequency (mixers), device 2 must be reciprocal.
- If concerned with phase wrapping, estimate the length (delay) for each of the devices. If not, use zero (0).

Instructions

1. Select the location and filenames of the input device pairs by selecting the **Browse** button.
 - Each button displays a separate file open dialog box named **Select S2P File for Device (#+#)** where **#+#** is either 1+2, 1+3, or 2+3.
2. Input the estimated length (delay) for each device.
 - Use the **Calculator** icon to convert from time to distance.
3. Select the appropriate IF Path.
 - Note that if the IF Path **De-embed** selection is **De-embed**, an IF Path S2P file is needed.
 - IF path de-embedding is used when it is desired to remove the effects of any pad/filter assembly that might be used between devices (particularly when they are mixers). Note that the frequency list in the file must be the VNA frequency range (even if physically it is not) so some S2P editing may be needed.
4. Select the appropriate IF Path Sweep Direction as either **HI-LO** or **LO-HI**.
 - If the devices are frequency converting and the IF is sweeping the opposite direction from the VNA (that is, if the port 1 frequency increases, the IF decreases because of the LO frequency being used), then select the IF Path Sweep Direction as **LO-HI**.
 - If using **LO-HI**, an internally swapped list for the IF S2P file will be created. If desired, this can be saved to a file using the **Create Modified IF** button.
 - Otherwise, select **HI-LO**.
5. Select the **Solve** button to solve for the desired device, saving as a S2P file. This will prompt for a location of where to save the S2P files.

Chapter 19 — PulseView™

19-1 Chapter Overview

This chapter provides information for the APPLICATION menu with controls for the PulseView™ application. Use of this feature requires installation of Option 42 (PulseView) and Option 35 (IF Digitizer).

Other Application Menu Chapters

The other chapters in this manual on the APPLICATION menu with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

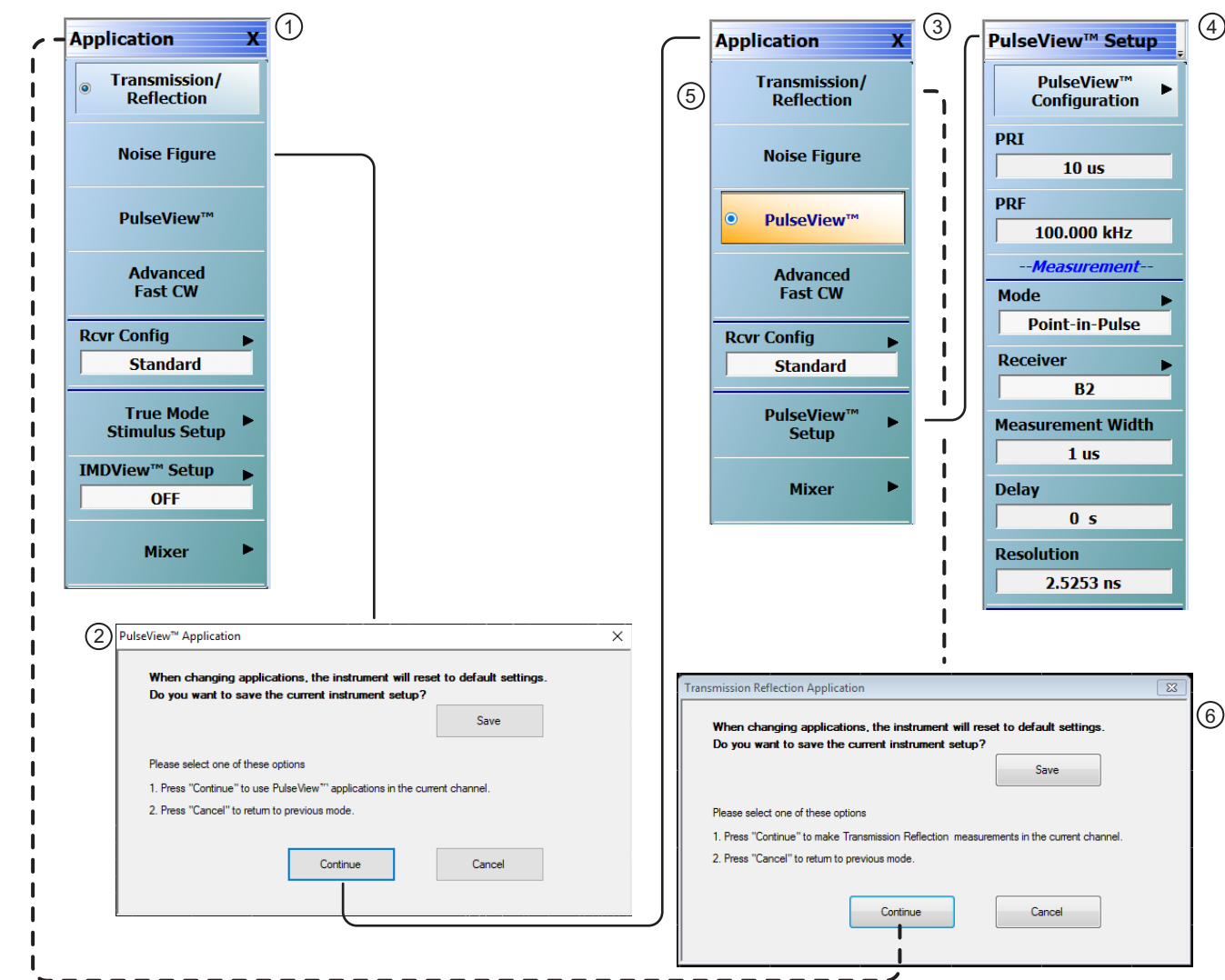
19-2 Application Menus and Dialog Boxes for PulseView

The APPLICATION menu set for configuration and control of pulse features contains the following menus and dialogs:

- [“PULSEVIEW SETUP Menu” on page 19-5](#)
 - [“PulseView Setup Menu – Profile Mode” on page 19-6](#)
 - [“PulseView Setup Menu – Point in Pulse Mode” on page 19-7](#)
 - [“PulseView Setup Menu – Pulse to Pulse Mode” on page 19-8](#)
 - [“PulseView Setup Menu – Continuous Point in Pulse Mode” on page 19-9](#)
 - [“PulseView Setup Menu – Continuous Profiling Mode” on page 19-10](#)
- [“PULSE MODE Menu” on page 19-11](#)
- [“PULSE RECEIVER Menu” on page 19-12](#)
- [“ADVANCED SETUP Menu” on page 19-13](#)
- [“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14](#)
 - [“Pulse Generator Configuration” on page 19-19](#)
 - [“Pulse Measurement Setup” on page 19-22](#)
 - [“Pulse Power Calibration Setup” on page 19-29](#)

19-3 Primary Application Menus and PulseView Dialogs and Menus

The primary menu and dialog set for PulseView measurement on the APPLICATION menu, the PULSEVIEW SETUP menu, and the related dialog boxes is shown below. After clearing the entry PULSEVIEW APPLICATION dialog box, the PULSEVIEW SETUP menu appears. When changing from PulseView to another application, a similar exit dialog box appears, and when cleared, resolves into the APPLICATION menu in new application mode.



- | | |
|--|---|
| 1. APPLICATION Menu –Typical APPLICATION menu variant with Option 42 equipped on VNA. | 4. PULSEVIEW SETUP Menu – After APPLICATION menu PulseView Setup button is selected. |
| 2. PULSEVIEW APPLICATION Mode Change Dialog Box – Provides options for canceling or saving setup and proceeding by selecting Continue. | 5. To exit PulseView Mode, select another application on the top of the APPLICATION menu. |
| 3. APPLICATION Menu – PulseView mode selected. | 6. New Application Dialog Box. |

Figure 19-1. APPLICATION Menu and PULSEVIEW Menu and Dialog Set

Changing to Mode to PulseView Mode

When the APPLICATION menu is set to a non-PulseView application mode and PulseView mode is selected, the PULSEVIEW MEASUREMENT dialog box appears. The dialog provides opportunities to:

- Save the current instrument setup as an Active Channel Setup and Calibration .CHX file and then either Cancel or Continue.
- Cancel out of the change to PulseView application mode, and remain in the current application mode.
- Continue into PulseView application mode.

Changing From Noise Figure Mode to Another Application Mode

Similarly, when the APPLICATION menu is set to PulseView application mode, and another application mode is selected, the new application dialog box appears. The dialog provides the opportunities to:

- Save the current instrument setup as an Active Channel Setup and Calibration .CHX file and then either Cancel or Continue.
- Cancel out of the change to another application mode and remain in PulseView application mode.
- Continue into the new application mode.

19-4 Application Menu for PulseView and IF Digitizer

Previous

- [“MAIN Menu” on page 2-1](#)

Prerequisites

- Option 35 and Option 42 Installed.
- 2-Port VNA

Navigation

- MAIN | Application | APPLICATION

The APPLICATION menu set for PulseView contains one menu with five variations depending on Pulse Mode, three sub-menus, and one dialog box:

- PulseView APPLICATION menu: [Figure 19-3 on page 19-5](#)
- PulseView CONFIGURATION dialog, [Figure 19-13 on page 19-14](#)

Typical APPLICATION menu with related PulseView button is shown in the figure below.

See the other APPLICATION menu chapters for descriptions of other menu button selections.

1. Click the Application button in the VectorStar software menu bar to view the APPLICATION menu.
2. Click the PulseView button to select the pulse measurement application.
3. Click PulseView Setup to access the pulse configuration and measurement parameters.

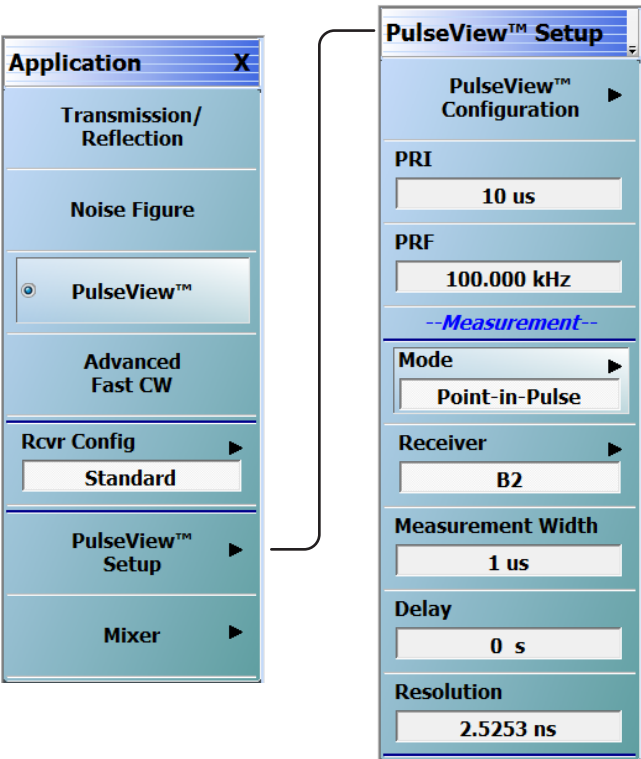


Figure 19-2. APPLICATION Menu – PulseView (Option 42) shown; IF Digitizer (Option 35) is required.

19-5 PulseView Setup and Configuration

PULSEVIEW SETUP Menu

Previous

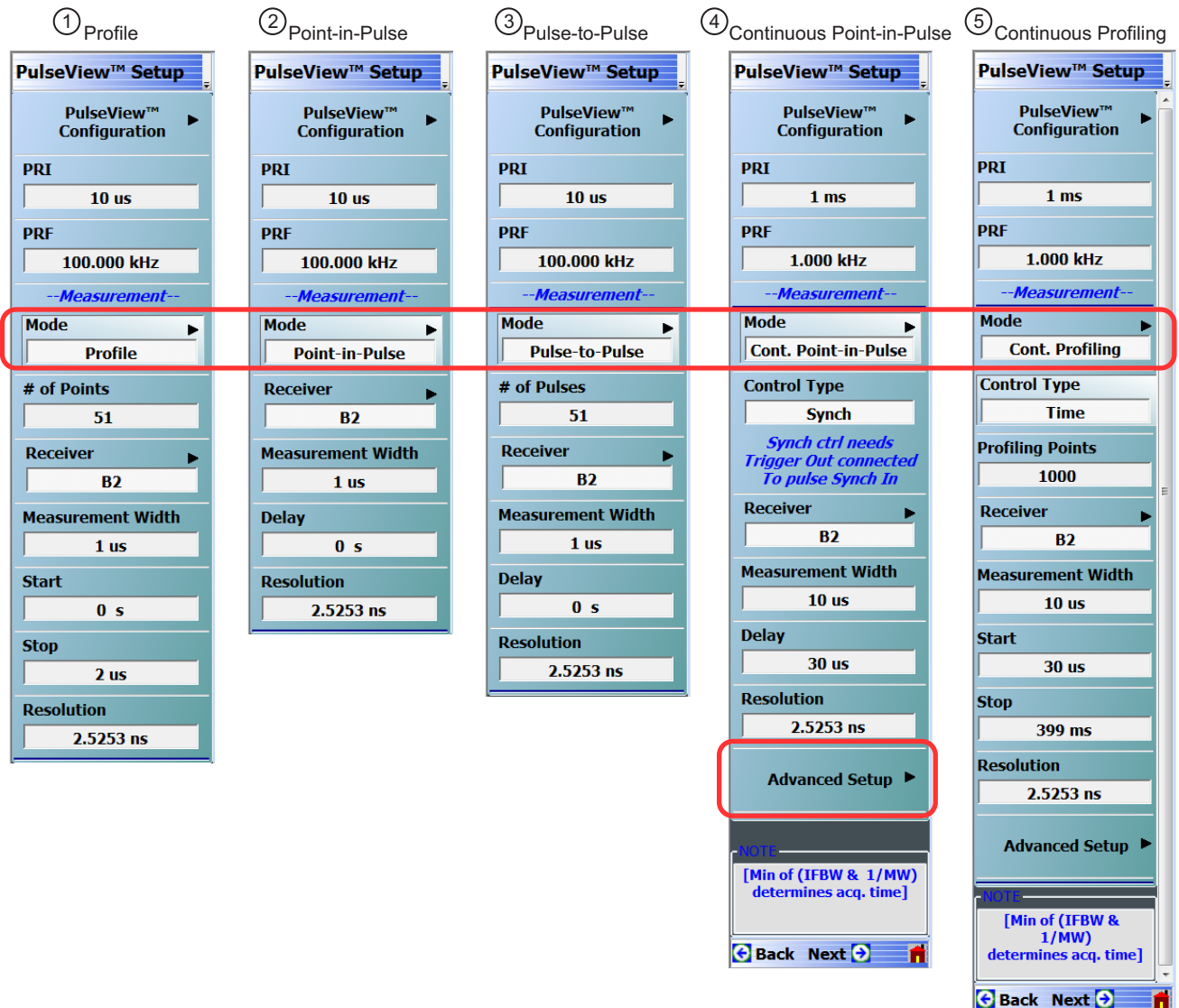
- “Application Menu for PulseView and IF Digitizer” on page 19-4

Prerequisites

- Option 35 and Option 42 Installed.
- 2-Port VNA

Navigation

- MAIN | Application | APPLICATION | PulseView Setup | PULSEVIEW SETUP



- | | |
|---|--|
| 1. “PulseView Setup Menu – Profile Mode” | 4. “PulseView Setup Menu – Continuous Point in Pulse Mode” |
| 2. “PulseView Setup Menu – Point in Pulse Mode” | 5. “PulseView Setup Menu – Continuous Profiling Mode” |
| 3. “PulseView Setup Menu – Pulse to Pulse Mode” | |

Figure 19-3. PulseView Setup Menu Variants in Different Pulse Modes

PulseView Setup Menu – Profile Mode

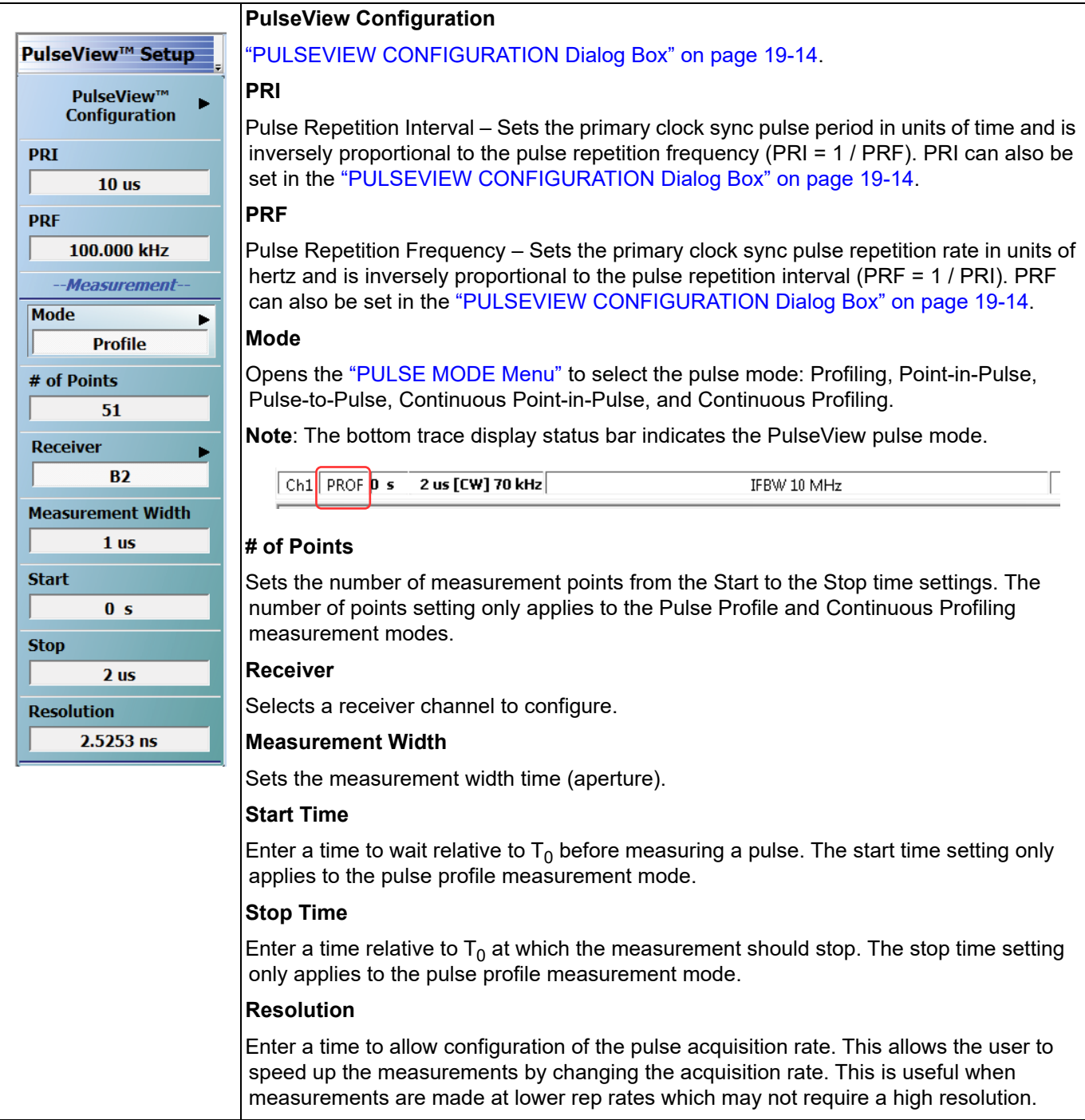
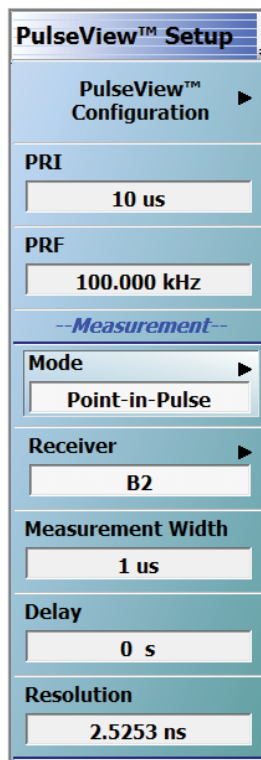


Figure 19-4. PULSEVIEW SETUP Menu – Profile Mode

Note

T_0 marks the beginning of each primary clock period. All Delay, Width, and the PRI parameter resolutions are limited to increments of 2.5 ns.

PulseView Setup Menu – Point in Pulse Mode



PulseView Configuration

[“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

PRI

Pulse Repetition Interval – Sets the primary clock sync pulse period in units of time and is inversely proportional to the pulse repetition frequency ($PRI = 1 / PRF$). PRI can also be set in the [“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

PRF

Pulse Repetition Frequency – Sets the primary clock sync pulse repetition rate in units of hertz and is inversely proportional to the pulse repetition interval ($PRF = 1 / PRI$). PRF can also be set in the [“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

Mode

Opens the [“PULSE MODE Menu”](#) to select the pulse mode: Profiling, Point-in-Pulse, Pulse-to-Pulse, Continuous Point-in-Pulse, and Continuous Profiling.

Note: the bottom trace display status bar indicates the PulseView pulse mode.



Receiver

Selects a receiver channel to configure.

Measurement Width

Sets the measurement width time (aperture).

Delay

Enter a time relative to T_0 before starting the measurement. The delay time setting applies to point-in-pulse and pulse-to-pulse measurement modes only.

Resolution

Enter a time to allow configuration of the pulse acquisition rate. This allows the user to speed up the measurements by changing the acquisition rate. This is useful when measurements are made at lower rep rates which may not require a high resolution.

Figure 19-5. PULSEVIEW SETUP Menu – Point in Pulse Mode

Note

T_0 marks the beginning of each primary clock period. All Delay, Width, and the PRI parameter resolutions are limited to increments of 2.5 ns.

PulseView Setup Menu – Pulse to Pulse Mode

PulseView™ Setup

PulseView™ Configuration ▶

PRI10 us

PRF100.000 kHz

--Measurement--

Mode▶Pulse-to-Pulse

of Pulses51

Receiver▶B2

Measurement Width1 us

Delay0 s

Resolution2.5253 ns

PulseView Configuration

"PULSEVIEW CONFIGURATION Dialog Box" on page 19-14.

PRI

Pulse Repetition Interval – Sets the primary clock sync pulse period in units of time and is inversely proportional to the pulse repetition frequency ($PRI = 1 / PRF$). PRI can also be set in the "PULSEVIEW CONFIGURATION Dialog Box" on page 19-14.

PRF

Pulse Repetition Frequency – Sets the primary clock sync pulse repetition rate in units of hertz and is inversely proportional to the pulse repetition interval ($PRF = 1 / PRI$). PRF can also be set in the "PULSEVIEW CONFIGURATION Dialog Box" on page 19-14.

Mode

Opens the "PULSE MODE Menu" to select the pulse mode: Profiling, Point-in-Pulse, Pulse-to-Pulse, Continuous Point-in-Pulse, and Continuous Profiling.

Note: The bottom trace display status bar indicates the PulseView pulse mode

Ch1 P2P 0 s 500 us [CW] 70 kHzIFBW 10 MHz

of Pulses

Sets the number of pulse measurements to acquire. The number of pulses setting only applies to the pulse-to-pulse measurement mode.

Receiver

Selects a receiver channel to configure.

Measurement Width

Sets the measurement width time (aperture).

Delay

Enter a time relative to T_0 before starting the measurement. The delay time setting applies to point-in-pulse and pulse-to-pulse measurement modes only.

Resolution

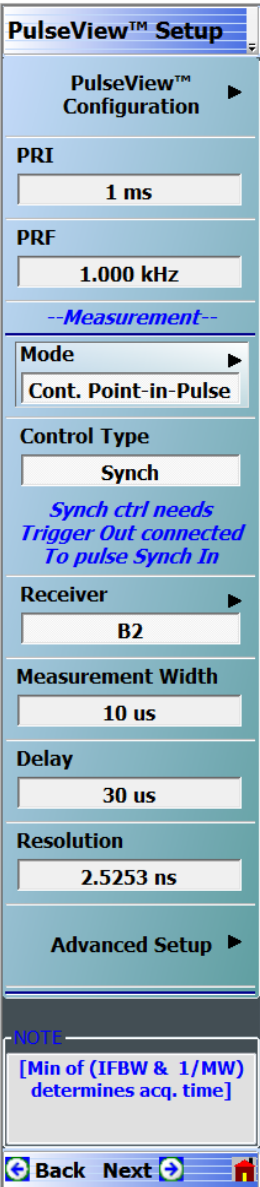
Enter a time to allow configuration of the pulse acquisition rate. This allows the user to speed up the measurements by changing the acquisition rate. This is useful when measurements are made at lower rep rates which may not require a high resolution.

Figure 19-6. PULSEVIEW SETUP Menu – Pulse to Pulse Mode

Note

T_0 marks the beginning of each primary clock period. All Delay, Width, and the PRI parameter resolutions are limited to increments of 2.5 ns.

PulseView Setup Menu – Continuous Point in Pulse Mode



The screenshot shows the PulseView Setup menu with the following settings: PRI is 1 ms, PRF is 1.000 kHz, Mode is Cont. Point-in-Pulse, Control Type is Synch, Receiver is B2, Measurement Width is 10 us, Delay is 30 us, and Resolution is 2.5253 ns. A note at the bottom states: [Min of (IFBW & 1/MW) determines acq. time]. Navigation buttons for Back, Next, and Home are at the bottom.

PulseView Configuration

[“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

PRI

Pulse Repetition Interval – Sets the primary clock sync pulse period in units of time and is inversely proportional to the pulse repetition frequency ($PRI = 1 / PRF$). PRI can also be set in the [“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

Note: PRI is limited to a minimum of 100 μ s for Synch mode and 1 ms for Time mode Control Types

PRF

Pulse Repetition Frequency – Sets the primary clock sync pulse repetition rate in units of hertz and is inversely proportional to the pulse repetition interval ($PRF = 1 / PRI$). PRF can also be set in the [“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

Mode

Opens the [“PULSE MODE Menu”](#) to select the pulse mode: Profiling, Point-in-Pulse, Pulse-to-Pulse, Continuous Point-in-Pulse, and Continuous Profiling.

Note: The bottom trace display status bar indicates the PulseView pulse mode.

Ch1 CPIP CW Frequency 120 MHz IFBW 10 MHz

Control Type

Enabled only in CPIP or CProf modes. Choices are Sync and Time. Synch control requires that **Trigger Out** be connected to **Pulse Synch In**. This is noted with a tool tip that appears when the pointer is over the Control Type button as well as over the Pulse Configuration dialog button.

Receiver

Selects a receiver channel to configure.

Measurement Width

Sets the measurement width time (aperture).

Delay

Enter a time relative to T_0 before starting the measurement. The delay time setting applies to point-in-pulse and pulse-to-pulse measurement modes only.

Note: In CPIP mode, minimum delay is 10 μ s

Resolution

Enter a time to allow configuration of the pulse acquisition rate. This allows the user to speed up the measurements by changing the acquisition rate. This is useful when measurements are made at lower rep rates which may not require a high resolution.

Advanced Setup

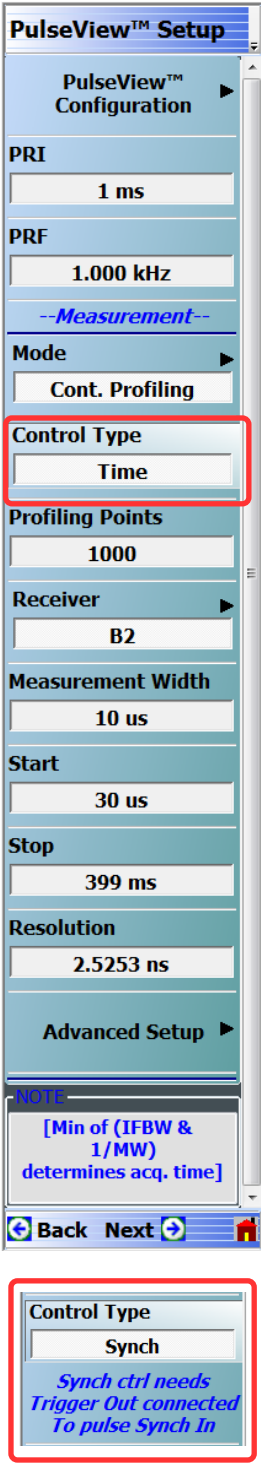
Allows user to override the calculated capture duration. See [“ADVANCED SETUP Menu”](#)

Figure 19-7. PULSEVIEW SETUP Menu – Continuous Point in Pulse Mode

Note

T_0 marks the beginning of each primary clock period. All Delay, Width, and the PRI parameter resolutions are limited to increments of 2.5 ns.

PulseView Setup Menu – Continuous Profiling Mode



PulseView Configuration

See [“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

PRI
Pulse Repetition Interval – Sets the primary clock sync pulse period in units of time and is inversely proportional to the pulse repetition frequency ($PRI = 1 / PRF$). PRI can also be set in the [“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

Note: PRI is limited to a minimum of 100 μ s for Synch mode and 1 ms for Time mode Control Types

PRF
Pulse Repetition Frequency – Sets the primary clock sync pulse repetition rate in units of hertz and is inversely proportional to the pulse repetition interval ($PRF = 1 / PRI$). PRF can also be set in the [“PULSEVIEW CONFIGURATION Dialog Box” on page 19-14.](#)

Mode
Opens the [“PULSE MODE Menu”](#) to select the pulse mode: Profiling, Point-in-Pulse, Pulse-to-Pulse, Continuous Point-in-Pulse, and Continuous Profiling. The bottom trace display status bar indicates the PulseView pulse mode:

Ch1 CProf 0 s 2 us IFBW 10 MHz

Control Type
Appears only in CPIP or CProf mode. Selecting Control Type toggles between **Time** and **Synch**. When Synch is toggled, a notification appears saying “Synch ctrl needs Trigger Out connected to Pulse Synch In” See encircled images at left.

Profiling Points
Sets the number of displayed analysis points from the Start to the Stop time settings. This can be greater or less than the # of sweep points. Applies only to CProf mode.

Receiver – Selects a receiver channel to configure.

Measurement Width – Sets the measurement width time (aperture).

Start Time
Enter a time to wait relative to T_0 before measuring a pulse. The start time setting only applies to the pulse profile measurement mode.

Stop Time
Enter a time relative to T_0 at which the measurement should stop. The stop time setting only applies to the pulse profile measurement mode.

(Note: T_0 marks the beginning of each primary clock period. All Delay, Width, and the PRI parameter resolutions are limited to increments of 2.5 ns.)

Resolution
Enter a time to allow configuration of the pulse acquisition rate. This allows the user to speed up the measurements by changing the acquisition rate and is useful when measurements are made at lower rep rates which may not require a high resolution. Increasing the resolution increases the maximum acquisition depth proportionately. Default is 2.5253 ns resolution and 0.5 secs of depth. Minimum resolution is 2.5 ns.

Advanced Setup
Allows user to override the calculated capture duration. See [“ADVANCED SETUP Menu”](#).

Figure 19-8. PULSEVIEW SETUP Menu – Continuous Profiling Mode

PULSE MODE Menu

Previous

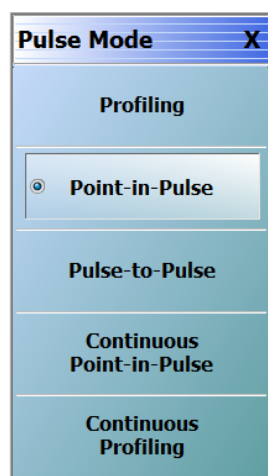
- [“PULSEVIEW SETUP Menu” on page 19-5](#)

Prerequisites

- Option 35 and Option 042 Installed.
- 2-Port VNA (PulseView menus are disabled when a 4-port test set is connected).

Navigation

- MAIN | Application | APPLICATION | PulseView Setup | PULSEVIEW SETUP | Mode | PULSE MODE



Pulse Profiling (PROF)

A measurement mode where there is an incoming pulse and it is desired to acquire S-parameters at sub-intervals within that pulse. These values are mapped versus position (time) within the pulse. This can be visualized as a profiling pulse (the sub-interval segment/measurement width) that steps through the DUT output pulse in time increments and makes a measurement at each step. This measurement is often used to check the evolution of DUT behavior over the duration of the pulse due to thermal, trapping, or other effects.

Point-in-Pulse (PIP)

A measurement mode where an S-parameter is only to be acquired at one time point within a pulse (or more precisely, within a small time window/measurement width). This is usually somewhere in the middle of the pulse and is selected when transient effects associated with pulse edges are not a concern, but the DUT must operate in pulsed mode (for example, to minimize device heating). It is desired to see how the behavior at the point within the pulse changes over frequency or power ranges.

Pulse-to-Pulse (P2P)

A measurement mode similar to pulse profiling except the time interval is between multiple pulses rather than within a pulse. Longer time-scale transient effects (such as thermal or memory related effects) are of interest. This is usually a triggered measurement since the DUT often needs to be in a long-time-scale-equilibrium before the excitation starts.

Continuous Point-in-Pulse (CPIP)

A measurement mode similar to Point-in-Pulse which is adequate for many swept pulse measurements. However, there are cases, particularly related to DUT transient response, where more detailed control of the VNA sweep operation relative to the pulses and the measurements is required. This is the purpose of the Continuous Point-in-Pulse mode (CPIP) where the entire sweep of frequency or power is done during one acquisition.

Continuous Profiling

As in CPIP, Continuous Profiling (CProf) measurement also uses a single acquisition for an entire frequency or power sweep but is a generalization in data analysis relative to CPIP. In CProf, one is not restricted to a measurement window associated with each sweep point but one can have up to 25000 measurement windows dispersed over the entire sweep time or located in some subset of that range. The number of displayed points is equal to the number of profiling points.

Figure 19-9. PULSEVIEW PULSE MODE Menu

PULSE RECEIVER Menu

Previous

- [“PULSEVIEW SETUP Menu” on page 19-5](#)

Prerequisites

- Option 35 and Option 042 Installed.

Navigation

- MAIN | Application | APPLICATION | PulseView Setup | PULSEVIEW SETUP | Receiver | RECEIVER

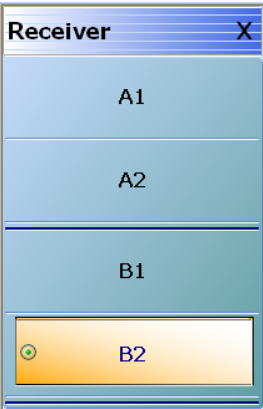
	<p>A1 Receiver Selects the A1 receiver.</p> <p>A2 Receiver Selects the A2 receiver.</p> <p>B1 Receiver Selects the B1 receiver.</p> <p>B2 Receiver Selects the B2 receiver.</p>
--	---

Figure 19-10. PULSEVIEW RECEIVER Menu (2-Port Systems)

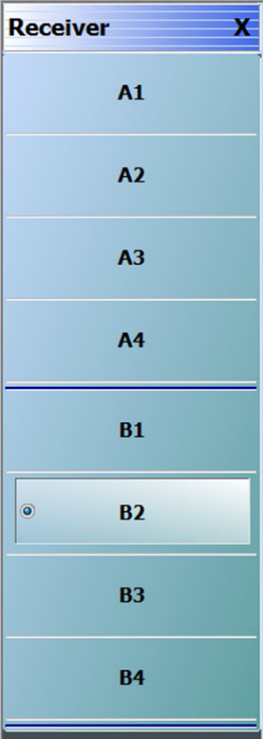
	<p>A1 Receiver Selects the A1 receiver.</p> <p>A2 Receiver Selects the A2 receiver.</p> <p>A3 Receiver Selects the A3 receiver.</p> <p>A4 Receiver Selects the A4 receiver.</p> <p>B1 Receiver Selects the B1 receiver.</p> <p>B2 Receiver Selects the B2 receiver.</p> <p>B3 Receiver Selects the B3 receiver.</p> <p>B4 Receiver Selects the B4 receiver.</p>
--	---

Figure 19-11. PULSEVIEW RECEIVER Menu (4-Port Systems)

ADVANCED SETUP Menu

Previous

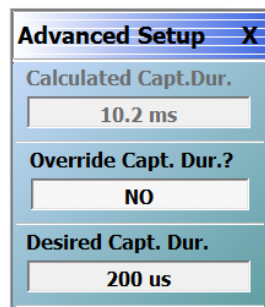
- [“PulseView Setup Menu – Continuous Point in Pulse Mode” on page 19-9](#) or [“PulseView Setup Menu – Continuous Profiling Mode” on page 19-10](#)

Prerequisites

- Option 35 and Option 042 Installed.
- 2-Port VNA (PulseView menus are disabled when a 4-port test set is connected).
- PulseView pulse mode must be in Continuous Point in Pulse or Continuous Profiling mode.

Navigation

- MAIN | Application | APPLICATION | PulseView Setup | PULSEVIEW SETUP | Advanced Setup | ADVANCED SETUP



When Advanced Setup is selected this menu is displayed allowing the user to override the calculated capture duration.

Calculated Capt. Dur.

Not active. Simply displays current capture duration.

Override Capt. Dur.?

Select toggles override on and off

Desired Capt. Dur.

The desired capture duration maximum is dependent on the PULSEVIEW menu Resolution field entry, which can have a maximum of 14 seconds.

Figure 19-12. PULSEVIEW MODE Menu

PULSEVIEW CONFIGURATION Dialog Box

When the PULSEVIEW SETUP menu is active, the PULSEVIEW CONFIGURATION dialog is available.

Previous

- [“PULSEVIEW SETUP Menu” on page 19-5](#)

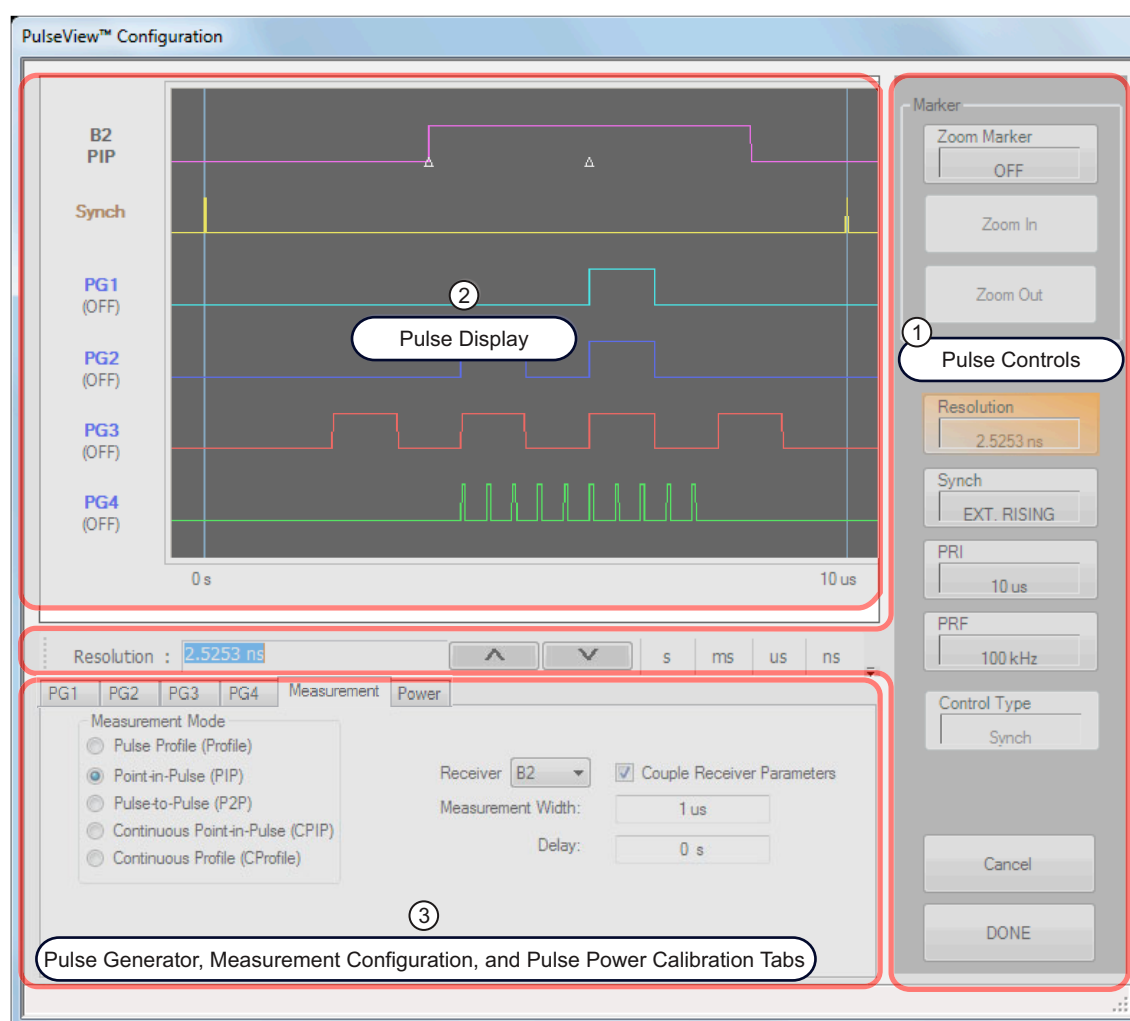
Prerequisites

- Option 35 and Option 042 Installed.
- 2-Port VNA (PulseView menus are disabled when a 4-port test set is connected).

Navigation

- MAIN | Application | APPLICATION | PulseView Setup | PULSEVIEW SETUP | PulseView Configuration | PULSEVIEW CONFIGURATION

The pulse configuration dialog box configures individual pulse channels, measurement mode, and other options.



1. Items in the Pulse Control area are explained in [“Pulse Controls” on page 19-15](#).
2. Items in the Pulse Display area are detailed in [“Pulse Display” on page 19-17](#).
3. Items in the Pulse Generator, Measurement Configuration, and Pulse Power Calibration tabs are detailed in [“Pulse Generator Configuration” on page 19-19](#), [“Pulse Measurement Setup” on page 19-22](#), and [“Pulse Power Calibration Setup” on page 19-29](#).

Figure 19-13. PULSEVIEW CONFIGURATION Dialog Box

Pulse Controls

Marker

The pulse Marker feature allows up to two markers to be set on the pulse display. The marker window can then zoomed in and back out. The feature is described further in [“Zoom Marker” on page 19-18](#)

Resolution

Opens a field to change the pulse acquisition rate. This allows the user to speed up the measurements by changing the acquisition rate. This is useful when measurements are made at lower rep rates which may not require a high resolution. As resolution changes, the maximum values of most other PulseView settings changes (maximum acquisition length increases proportionately with resolution; default is 2.5253 ns resolution and 0.5 s maximum acquisition length).

Synch

Toggles the pulse Synch source:

- INTERNAL synchronizes the primary clock to the leading edge of an internally provided synch pulse.
- CONTINUOUS provides continuous, unsynchronized full-speed data acquisition.
- EXT. RISING/EXT FALLING synchronizes the primary clock to the leading edge of an externally provided synch pulse. The synch event can be triggered to either the rising or falling edge of the synch pulse (EXT. RISING or EXT. FALLING).

When the Synch type selected is EXT. RISING or EXT. FALLING, an “Ext. Synch Marking” check box is made available on the PulseView Configuration | Measurement tab. This feature allows the use of the external Pulse Synch In signal to mark the data stream in lieu of using the internally generated T_0 pulsed signal. When enabled, the internal pulse generators are disabled

PRI

Pulse Repetition Interval – Sets the primary clock synch pulse period in units of time and is inversely proportional to the pulse repetition frequency ($PRI = 1 / PRF$). When a PRI value is entered, the PRF is computed automatically. PRI can also be set in the [“PULSEVIEW SETUP Menu” on page 19-5](#).

PRF

Pulse Repetition Frequency – Sets the primary clock synch pulse repetition rate in units of hertz and is inversely proportional to the pulse repetition interval ($PRF = 1 / PRI$). When a PRF value is entered, the PRI is computed automatically. PRF can also be set in the [“PULSEVIEW SETUP Menu” on page 19-5](#).

Control Type

Enabled only in CPIP or CProf modes. Choices are Sync and Time. Synch control requires that **Trigger Out** be connected to **Pulse Synch In**. This is noted with a tool tip that appears when a pointer is over the button, as well as on the PULSEVIEW SETUP menu.

Figure 19-14. PULSE Control Area (1 of 2)

	<p>Cancel</p> <p>Cancels all settings and closes the PULSEVIEW CONFIGURATION dialog box.</p> <p>Done</p> <p>Applies all settings and closes the PULSEVIEW CONFIGURATION dialog box. Done must be clicked to apply any setting changes made.</p>
--	--

Figure 19-14. PULSE Control Area (2 of 2)

Pulse Display

The pulse display shows a profile of each pulse channel, the synch signal, and the receiver measurement acquisition profile on a relative time scale. Pulse generators (PG1 through PG4) can be renamed by clicking the channel name in the pulse generator configuration tab.

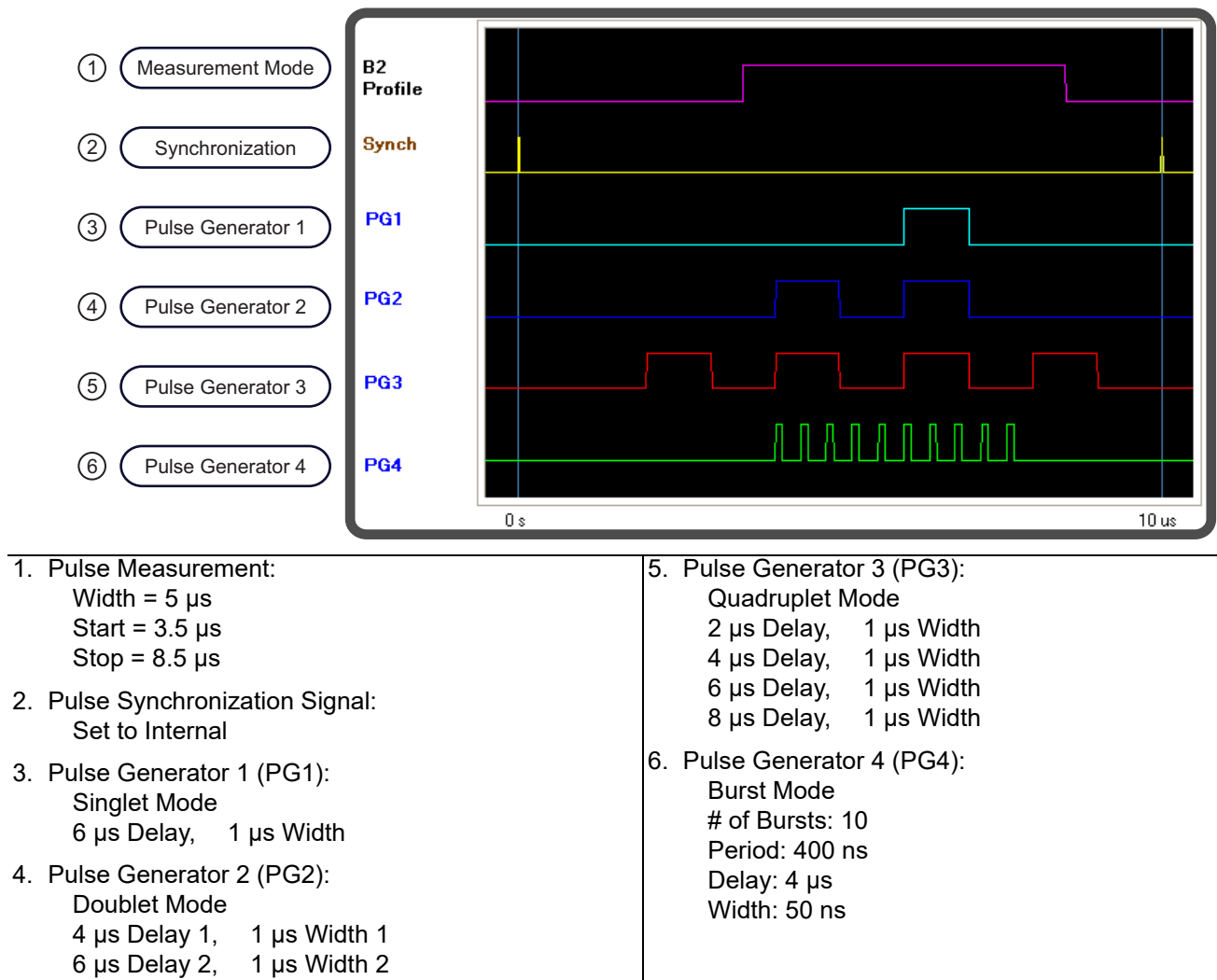


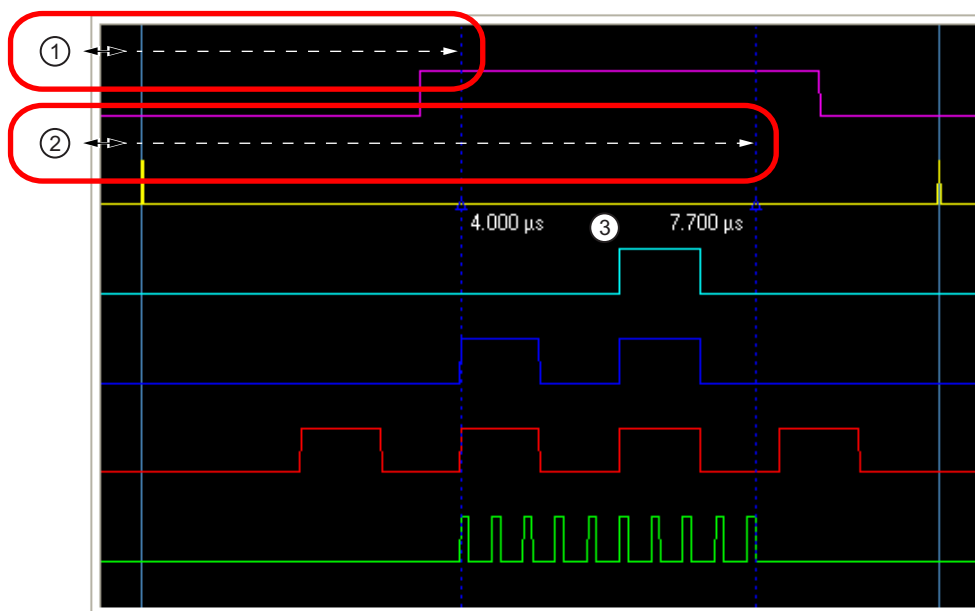
Figure 19-15. PulseView Configuration Dialog – Pulse Display (with example settings)

Refer to the following sections for more information on configuring the individual pulse generators, measurement acquisition and pulse power calibration setup:

- [“Pulse Generator Configuration” on page 19-19](#)
- [“Pulse Measurement Setup” on page 19-22](#)
- [“Pulse Power Calibration Setup” on page 19-29](#)

Zoom Marker

The Zoom Marker feature allows the visible resolution of the pulse display to be increased. Click **Zoom Marker ON** to enable the feature.



1. With the Zoom Marker toggled ON, click and drag the left edge of the display to reveal a marker.
2. Click and drag the left edge of the display to reveal a second marker.
3. Marker values change dynamically when the marker is dragged along the time axis.

Figure 19-16. Pulse Markers

To increase the visible resolution of a pulse, click **Zoom In**. The time scale changes to the range between the markers. The above zoom area is shown below.

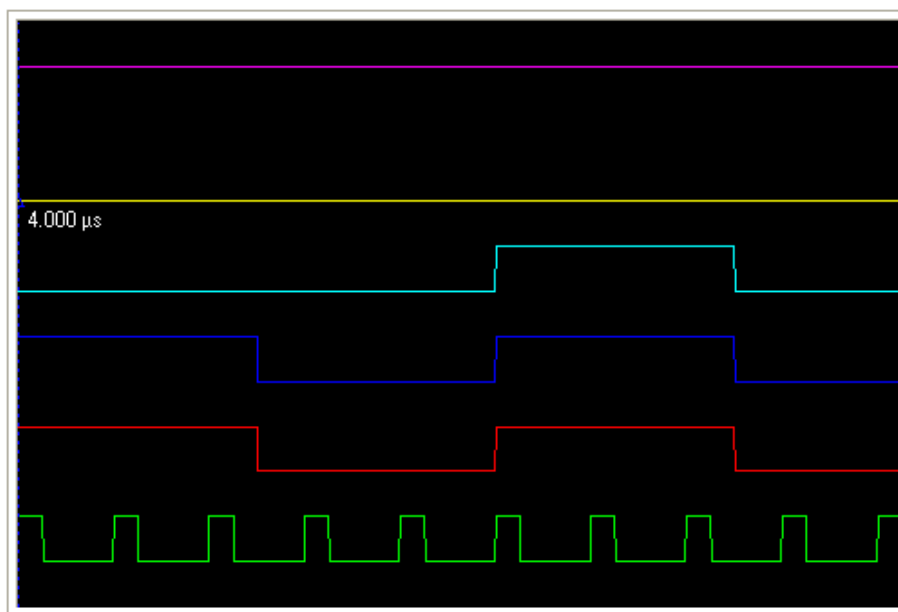


Figure 19-17. Pulse Markers – Zoomed

Click **Zoom Out** to return to the original time scale.

Pulse Generator Configuration

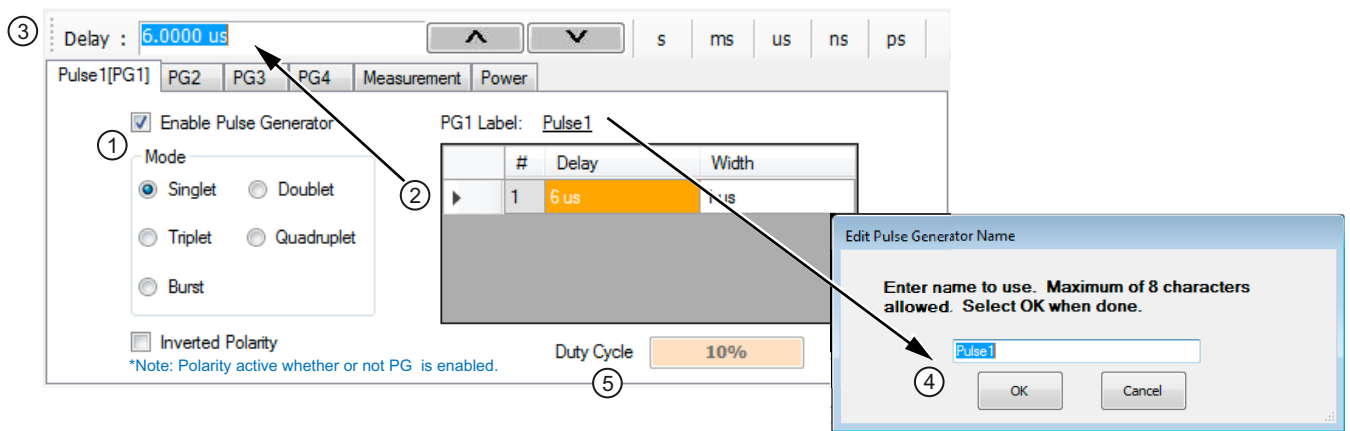
To configure the pulse generators, open the PULSEVIEW CONFIGURATION dialog box and enter the information into the tabbed pulse generator configuration areas (see [Figure 19-20](#) through [Figure 19-23](#)).

Each pulse generator tab allows full configuration of an MS464xB Series pulse generator channel, including:

- Pulse Generator Mode (Singlet, Doublet, Triplet, Quadruplet, or Burst) and Enable/Disable Toggle
- Pulse Delay
- Pulse Width
- Pulse Polarity (note that rear panel signals are always active whether or not the PG is enabled)

To define a pulse width, establish a start and stop time. The minimum pulse width is often twice the minimum settable resolution; for example, with a minimum measurement resolution of 2.5 ns, the minimum measurement pulse width is 5 ns. The usefulness of a given width setting is dependent on the rise/fall times of the pulse generator and the bandwidth of the DUT.

Example of singlet pulse setup:



1. Select the pulse Mode and Enable the Pulse Generator.
2. Select the Delay and Width field to edit.
3. Enter the value in the field toolbar and terminate with the desired units.
4. Click the PG1 Label field and enter the desired pulse generator name (optional).
5. Duty Cycle (display only, appears with Singlet pulse mode).

Figure 19-18. Pulse Configuration Tab

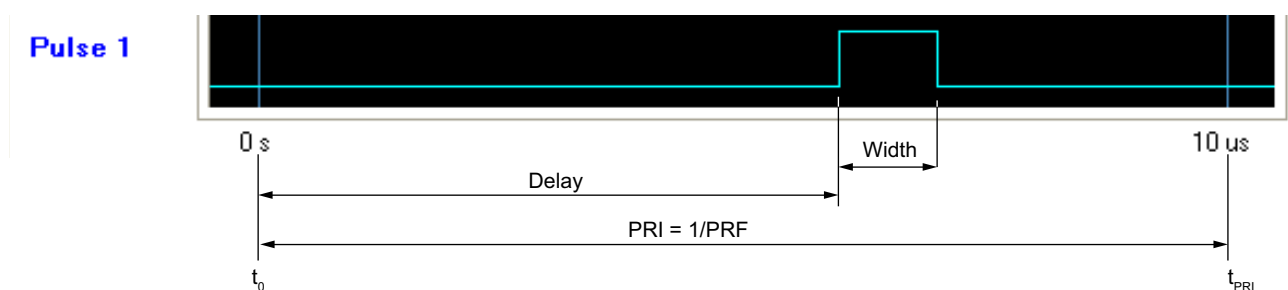
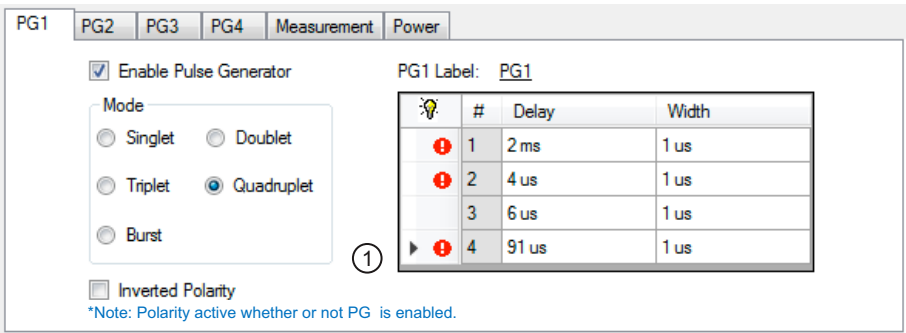


Figure 19-19. Singlet Pulse Profile

Note Delay + Width $\leq$ PRI

Example of quadruplet pulse setup:



1. Invalid settings are indicated with a warning symbol as shown above.

Figure 19-20. Pulse Configuration Tab

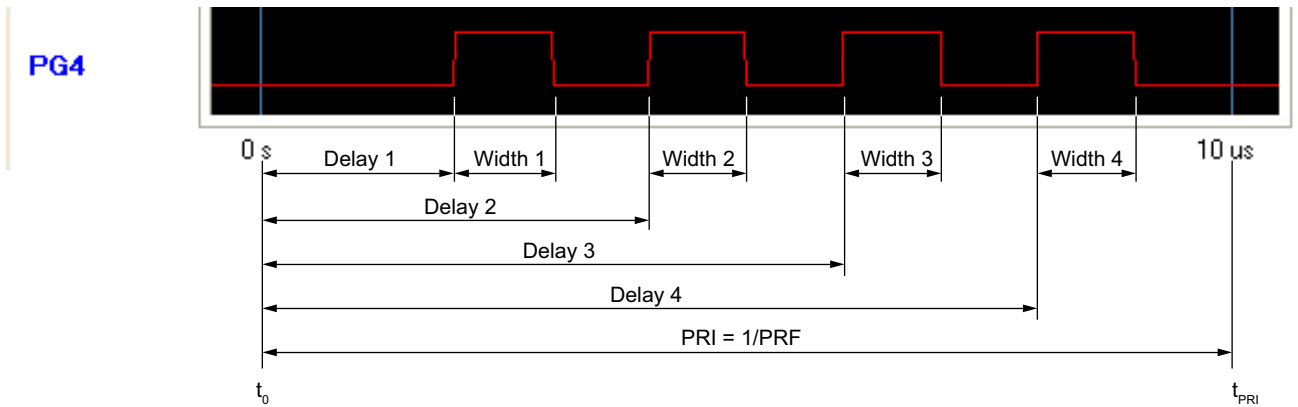


Figure 19-21. Quadruplet Pulse Profile (with Delay 4 corrected to 8 μs)

Note

Delay 2 > Delay 1 + Width 1

Delay 3 > Delay 2 + Width 2

Delay 4 > Delay 3 + Width 3

Delay 4 + Width 4 ≤ PRI

When Burst pulse type is selected, the Burst Setup area allows configuration of:

- # of Bursts
- Burst Period
- Burst Delay
- Burst Width

Example of burst pulse setup:

PG1 PG2 PG3 PG4 Measurement Power

☒ Enable Pulse Generator

Mode

☐ Singlet ☐ Doublet

☐ Triplet ☐ Quadruplet

☒ Burst

☐ Inverted Polarity

*Note: Polarity active whether or not PG is enabled.

PG1 Label: PG1

Burst Setup

of Bursts: 10

Period: 400 ns

Delay: 4 us

Width: 100 ns

Figure 19-22. Pulse Configuration Tab

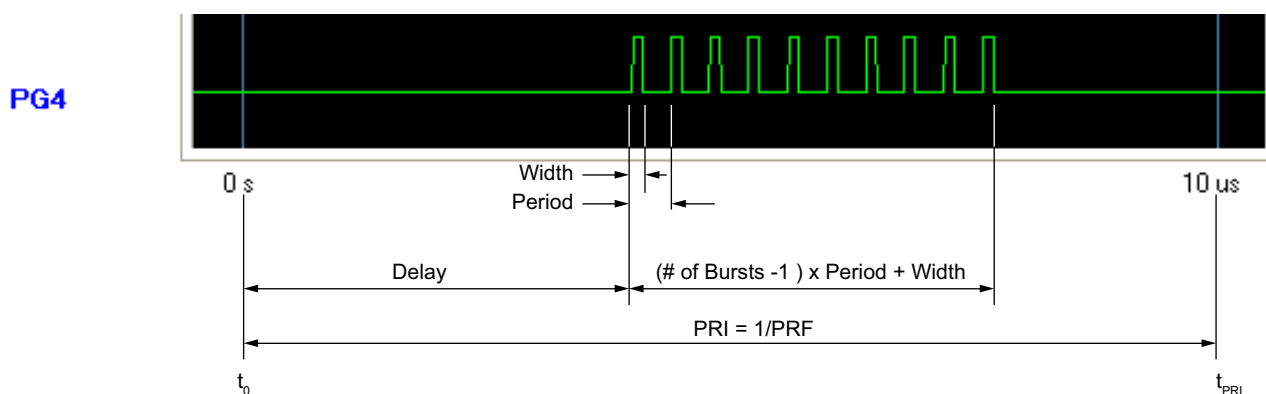


Figure 19-23. Burst Pulse Profile

Note Delay + (# of Bursts – 1) x Period + Width ≤ PRI
Width ≤ Period

Pulse Measurement Setup

To configure the pulse measurement acquisition, open the PulseView Configuration dialog box and enter the information into the tabbed measurement configuration areas (see [Figure 19-24](#) through [Figure 19-34](#)).

The measurement mode is a per-channel global setting that applies to all receivers. Each receiver can be set for independent acquisition parameters or coupled to the same parameters.

Note

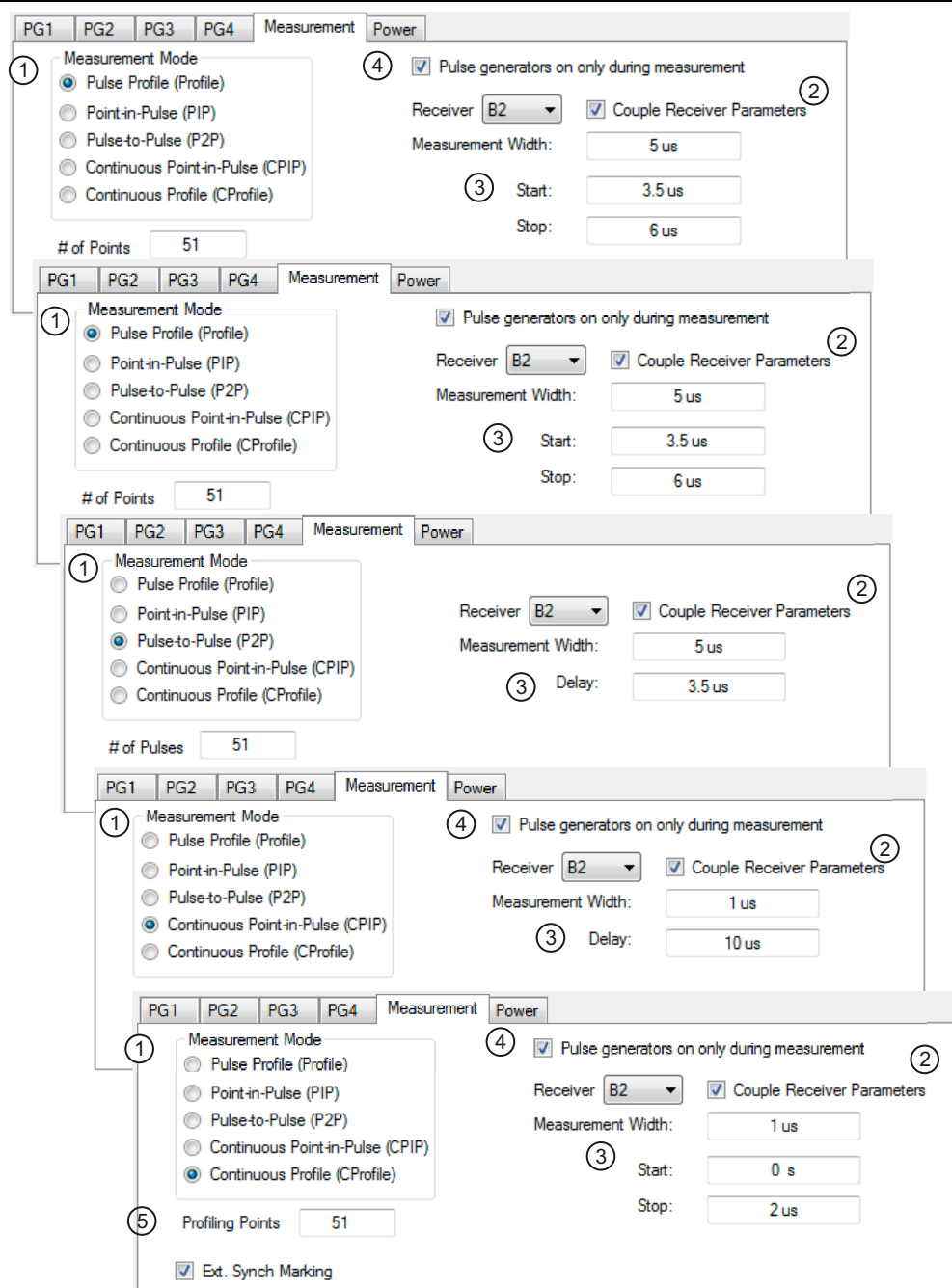
All receivers are set to the same mode, but the pulse acquisition parameters can be set differently between each of the receivers.

Acquisition parameters include:

- Pulse Measurement Mode (Pulse Profile, Point-in-Pulse, Pulse-to-Pulse, Continuous Point-in-Pulse, and Continuous Profiling)
- Number of measurement Points (Pulse Profile mode only)
- Number of measurement Pulses (Pulse-to-Pulse mode only)
- Pulse generators on only during measurement selection (Pulse Profile, Continuous Point-in-Pulse, and Continuous Profiling modes only)
- Receiver channel (A1, A2, B1, B2 – 2-Port Systems)
- Receiver channel (A1, A2, A3, A4, B1, B2, B3, B4 – 4-Port Systems)
- Couple Receiver Parameters
- Measurement Width
- Pulse Start and Stop time (Pulse Profile and Continuous Profiling modes only)
- Delay time (Point-in-Pulse, Pulse-to-Pulse and Continuous Point-in-Pulse modes only)

Note

In profile mode, overlapping measurements are permitted when the measurement width is set larger than the duration between measurement points, determined by:
 $(\text{Stop} - \text{Start}) / \# \text{ of Points}$



1. Set the measurement mode (the measurement mode is a per-channel setting that applies to all receivers).
2. Select the receiver and check if the measurement parameters are to be applied equally to all receivers.
3. Set the measurement parameters on a per-receiver or coupled basis.
4. When the **Measurement** tab is selected the **Pulse generators on only during measurement** toggle selection is only visible when measurement mode is Pulse Profile or Continuous Profile. Selecting this feature allows pulse generators to start up only when a measurement is taken.
5. In Continuous Profiling mode there is a concept of profiling points which is the number of displayed analysis points. This can be greater or less than the # of sweep points.

Figure 19-24. PulseView Configuration Measurement Tab vs. Measurement Modes

Pulse Generators On Only During Measurement

Sometimes a user may want the pulse generators to start up only when a measurement is taken, thus avoiding some early device stimulation (the user may be looking at long thermal time constant effects) or some potential overshoot conditions (from level dip release). Since some users rely on a quasi-static measurement, this function can be toggled on or off.

Example of Pulse Profile Measurement:

PG1PG2PG3PG4MeasurementPower

Measurement Mode

☒ Pulse Profile (Profile)

☐ Point-in-Pulse (PIP)

☐ Pulse-to-Pulse (P2P)

☐ Continuous Point-in-Pulse (CPIP)

☐ Continuous Profile (CProfile)

of Points

51

☒ Pulse generators on only during measurement

Receiver

B2

☒ Couple Receiver Parameters

Measurement Width:

500 ns

Start:

3.5 us

Stop:

8.5 us

Figure 19-25. Pulse Profile Measurement Setup

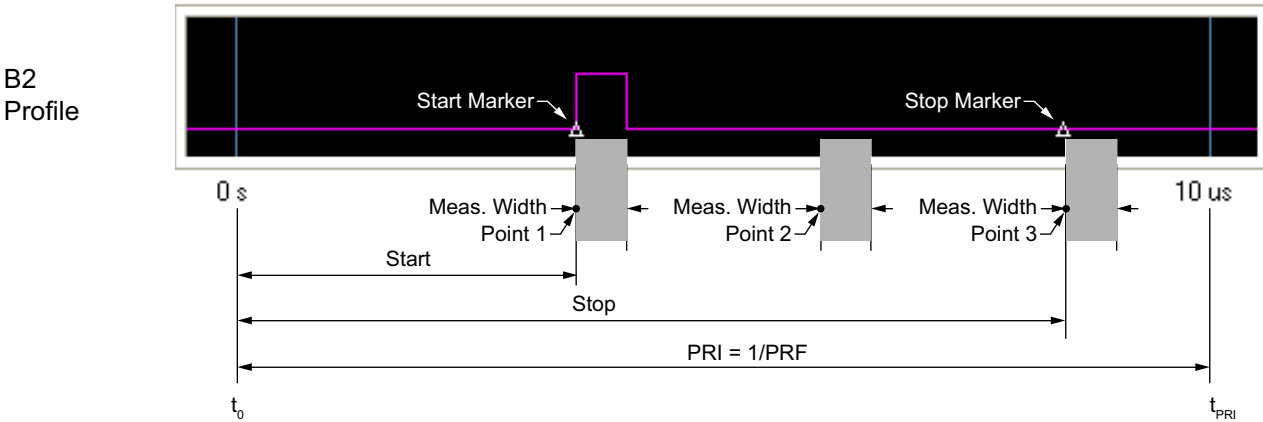


Figure 19-26. Pulse Profile Measurement

Note Stop – Start ≤ PRI
of points ≤ instrument number of points (25k or 100k)
The measurement width can overlap other measurement widths.

Example of Point-in-Pulse Measurement:

PG1 PG2 PG3 PG4 Measurement Power

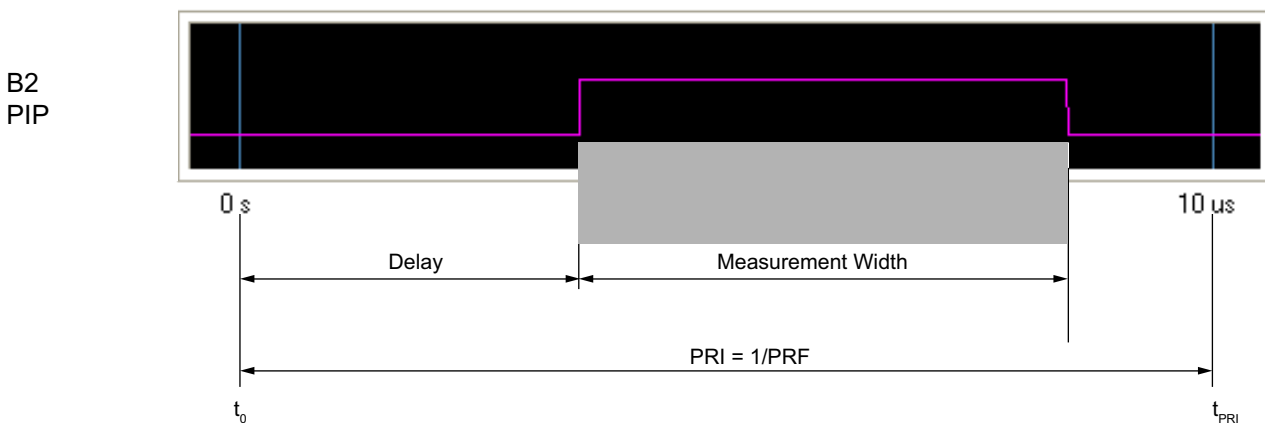
Measurement Mode

- ☐ Pulse Profile (Profile)
- ☒ Point-in-Pulse (PIP)
- ☐ Pulse-to-Pulse (P2P)
- ☐ Continuous Point-in-Pulse (CPIP)
- ☐ Continuous Profile (CProfile)

Receiver: B2 ☒ Couple Receiver Parameters

Measurement Width: 5 us

Delay: 3.5 us

Figure 19-27. Point-in-Pulse Measurement Setup**Figure 19-28.** Point-in-Pulse Measurement

Note Delay + Measurement Width $\leq$ PRI

Example of Pulse-to-Pulse Measurement:

PG1PG2PG3PG4MeasurementPower

Measurement Mode

- Pulse Profile (Profile)
- Point-in-Pulse (PIP)
- Pulse-to-Pulse (P2P)
- Continuous Point-in-Pulse (CPIP)
- Continuous Profile (CProfile)

ReceiverB2

Couple Receiver Parameters

Measurement Width:5 us

Delay:3.5 us

of Pulses51

Figure 19-29. Pulse-to-Pulse Measurement Setup

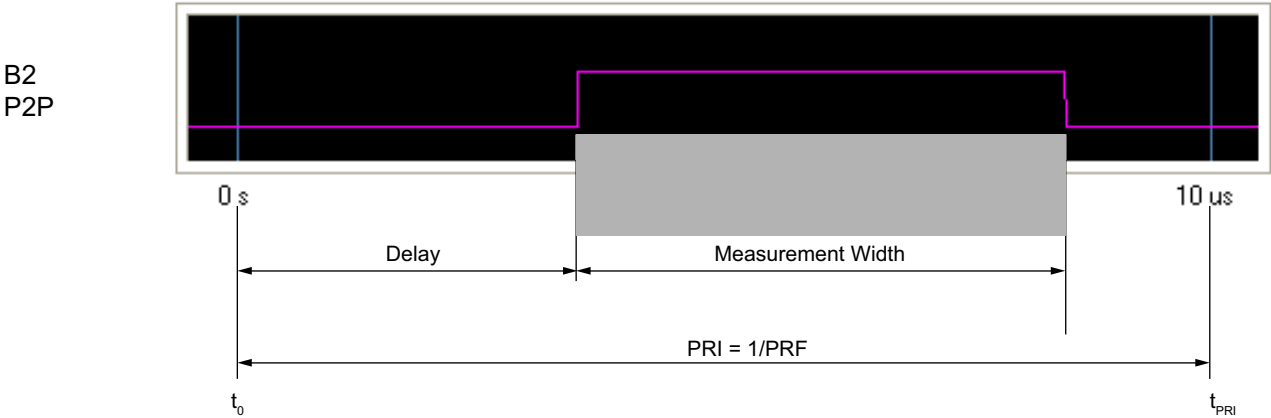


Figure 19-30. Pulse-to-Pulse Measurement

Note

Delay + Measurement Width ≤ PRI

Example of Continuous Point-in-Pulse Measurement:

PG1	PG2	PG3	PG4	Measurement	Power
<div> <div> Measurement Mode ☐ Pulse Profile (Profile) ☐ Point-in-Pulse (PIP) ☐ Pulse-to-Pulse (P2P) ☒ Continuous Point-in-Pulse (CPIP) ☐ Continuous Profile (CProfile) </div> <div> ☒ Pulse generators on only during measurement Receiver: B2 ☒ Couple Receiver Parameters Measurement Width: 1 us Delay: 10 us </div> </div>					

Figure 19-31. Continuous Point-in-Pulse Measurement Setup



Figure 19-32. Continuous Point-in-Pulse Measurement

Note Delay + Measurement Width $\leq$ PRI

Example of Continuous Profile Measurement:

PG1PG2PG3PG4MeasurementPower

Measurement Mode

Pulse Profile (Profile)

Point-in-Pulse (PIP)

Pulse-to-Pulse (P2P)

Continuous Point-in-Pulse (CPIP)

Continuous Profile (CProfile)

Profiling Points

51

Ext. Synch Marking

Pulse generators on only during measurement

Receiver

B2

Couple Receiver Parameters

Measurement Width:

1 us

Start:

0 s

Stop:

2 us

Figure 19-33. Continuous Profile Measurement Setup



Figure 19-34. Continuous Profile Measurement

Note Delay + Measurement Width ≤ PRI

Pulse Power Calibration Setup

To configure the pulse power calibration, open the PULSEVIEW CONFIGURATION dialog box and enter the information into the tabbed Power Cal and Leveling Mode configuration areas (see [Figure 19-35](#)).

When enabled, power calibrations will use a pulsed power sensor to only analyze power in a specific time gate specified in the dialog. This allows one to calibrate power in the middle of pulse, on the overshoot section, or any other specific interval on the pulsed envelope. The pulsed power meter trigger must be connected to the VNA Synch Out port for the time alignment to be established.

Leveling Mode allows the user to more precisely control power based on the signal envelope. Allows selection of:

- Real Time CW leveling mode – Level adjustments occur based upon detection of the CW non-pulsed signal. This will result in a leveling of average power, but occurs on a continuous (sub-microsecond) basis and has no impact on sweep time.
- Per Sweep leveling mode – Level adjustments occur on a per sweep basis targeting the specific portion of the pulse described by the reference measurement width and delay. The leveling adjustments only occur at the end of the sweep, so fast drift (by a pre-amplifier for example) will not be corrected. This approach has minimal impact on sweep time.
- Per Point leveling mode – Level adjustments occur on a per point basis targeting the specific portion of the pulse described by the reference measurement width and delay. The leveling adjustment is made at every point before the main measurement is made, so even fast drifts will be corrected. This approach has more impact on sweep time, but the power level at a specific point in the pulse is more precisely controlled.

Leveling Mode ([Figure 19-36](#)) can be set in this tab, or in POWER SETUP | Leveling Mode | LEVELING MODE (“LEVELING MODE Menu – 2-Port VNAs” on [page 5-44](#) or “LEVELING MODE Menu – 4-Port VNAs” on [page 6-45](#)). Tolerance (for Per Point Pulsed) can only be set in this dialog.

Figure 19-35. Pulse Power Calibration Setup

Figure 19-36. Pulse Power Calibration – Leveling Mode Setups

Chapter 20 — DifferentialView™ (True Mode Stimulus)

20-1 Chapter Overview

This chapter provides information for the APPLICATION menu with controls for the DifferentialView™ application (True Mode Stimulus).

Other Application Menu Chapters

The other chapters in this manual on the APPLICATION menu with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

20-2 Application Menus and Dialog Boxes

The APPLICATION menu set for configuration and control of pulse features contains the following menus and dialogs:

- [“True Mode Stimulus Setup and Configuration” on page 20-3](#)
- [“DifferentialView – True Mode Stimulus Configuration Dialog Box” on page 20-4](#)

20-3 Application Menus for DifferentialView

The APPLICATION menu set for DifferentialView contains one menu and one dialog box:

- APPLICATION Menu (see [Figure 20-1, “APPLICATION Menu – True Mode Stimulus \(DifferentialView\)” on page 20-2.](#))
- A dialog box: [Figure 20-3, “DifferentialView – True Mode Stimulus Configuration Dialog Box” on page 20-4](#)

Typical APPLICATION menu with True Mode Stimulus Setup menu is shown in the figure below.

See the other APPLICATION menu chapters for descriptions of other menu button selections.

1. Click the APPLICATION menu item in the VectorStar software menu bar to view the Application menu.
2. Click the **True Mode Stimulus Setup** button to select and configure the DifferentialView measurement application.

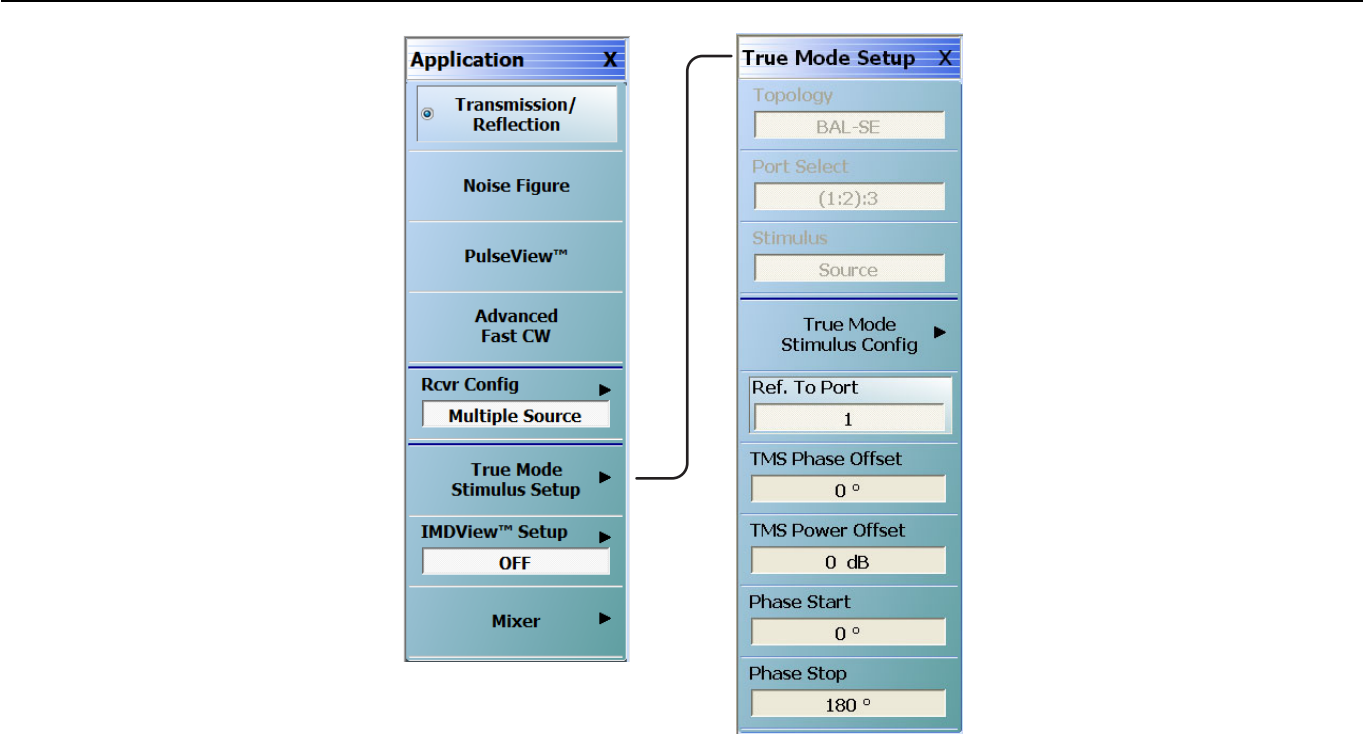


Figure 20-1. APPLICATION Menu – True Mode Stimulus (DifferentialView)

20-4 True Mode Stimulus Setup and Configuration

TRUE MODE SETUP Menu

Previous

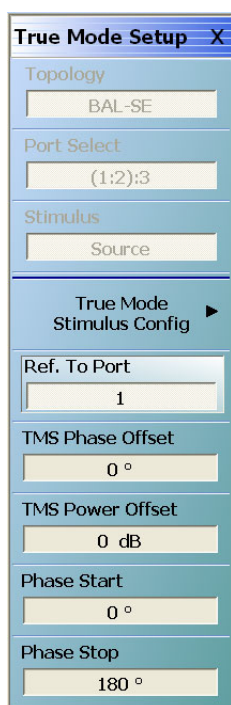
- True Mode Stimulus Setup menu (see [“Application Menus for DifferentialView”](#) on page 20-2)

Prerequisites

- Options 031 and 043

Navigation

- MAIN | Application | APPLICATION | True Mode Stimulus Setup | TRUE MODE SETUP



Topology

Identifies the stimulus configuration that is set in the True Mode Stimulus Configuration dialog box. The following topologies and port assignments are available in 4port VNAs:

- BAL-BAL: Two balanced ports (1:3):(2:4) or (2:3):(1:4).
- BAL-SE: One balanced port and one single-ended port (1:3):2, (1:3):4, (2:4):1, (2:4):3, (2:3):1, (2:3):4, (1:4):2, or (1:4):3.
- BAL-SE-SE: One balanced port and two single-ended ports (1:3):2:4, (1:4):2:3, (2:3):1:4, or (2:4):1:3.

Note: Not all port combinations (port reversals) are listed.

Port Select

Identifies the port selection that is set in the True Mode Stimulus Configuration dialog box. Differential port pair selection of (1:2) or (3:4) is not valid when in TMS mode.

Stimulus

Identifies the stimulus that is set in the True Mode Stimulus Configuration dialog box.

- Single Ended: Standard VNA mode.
- TMS Drive: Balanced stimulus in both forward and reverse directions.
- Reverse TMS: Reverses the port assignments (requires 4-port VNA).
- Source (Ref Plane): Both sources active at the same frequency.

True Mode Stimulus Config

Opens the DifferentialView – True Mode Stimulus dialog to select and configure a differential stimulus measurement. Refer to the [“TRUE MODE STIMULUS CONFIGURATION Dialog Box”](#) on page 20-4.

Ref. To Port

Opens a dialog to select the frequency and phase offset reference port (1 through 4).

TMS Phase Offset

Sets the fixed phase offset that is applied to the true differential drive for situations that require stimulus compensation.

TMS Power Offset

Sets the fixed power offset (in dB) that is applied to the true differential drive for situations that require stimulus compensation.

Phase Start

Sets the starting phase offset ($\pm 3600^\circ$) in phase sweep configuration (CW only).

Phase Stop

Sets the starting phase offset ($\pm 3600^\circ$) in phase sweep configuration (CW only).

Figure 20-2. TRUE MODE SETUP Menu

TRUE MODE STIMULUS CONFIGURATION Dialog Box

Previous

- [“TRUE MODE SETUP Menu” on page 20-3](#)

Prerequisites

- Options 031 and 043

Navigation

- MAIN | Application | APPLICATION | True Mode Stimulus Setup | TRUE MODE SETUP | True Mode Stimulus Config | DIFFERENTIALVIEW – TRUE MODE STIMULUS CONFIGURATION

Configuration settings are described in the [“TRUE MODE SETUP Menu” on page 20-3](#). TMS mode is active when any of TMS Drive, Reverse TMS, or Source (Ref Plane) is selected.

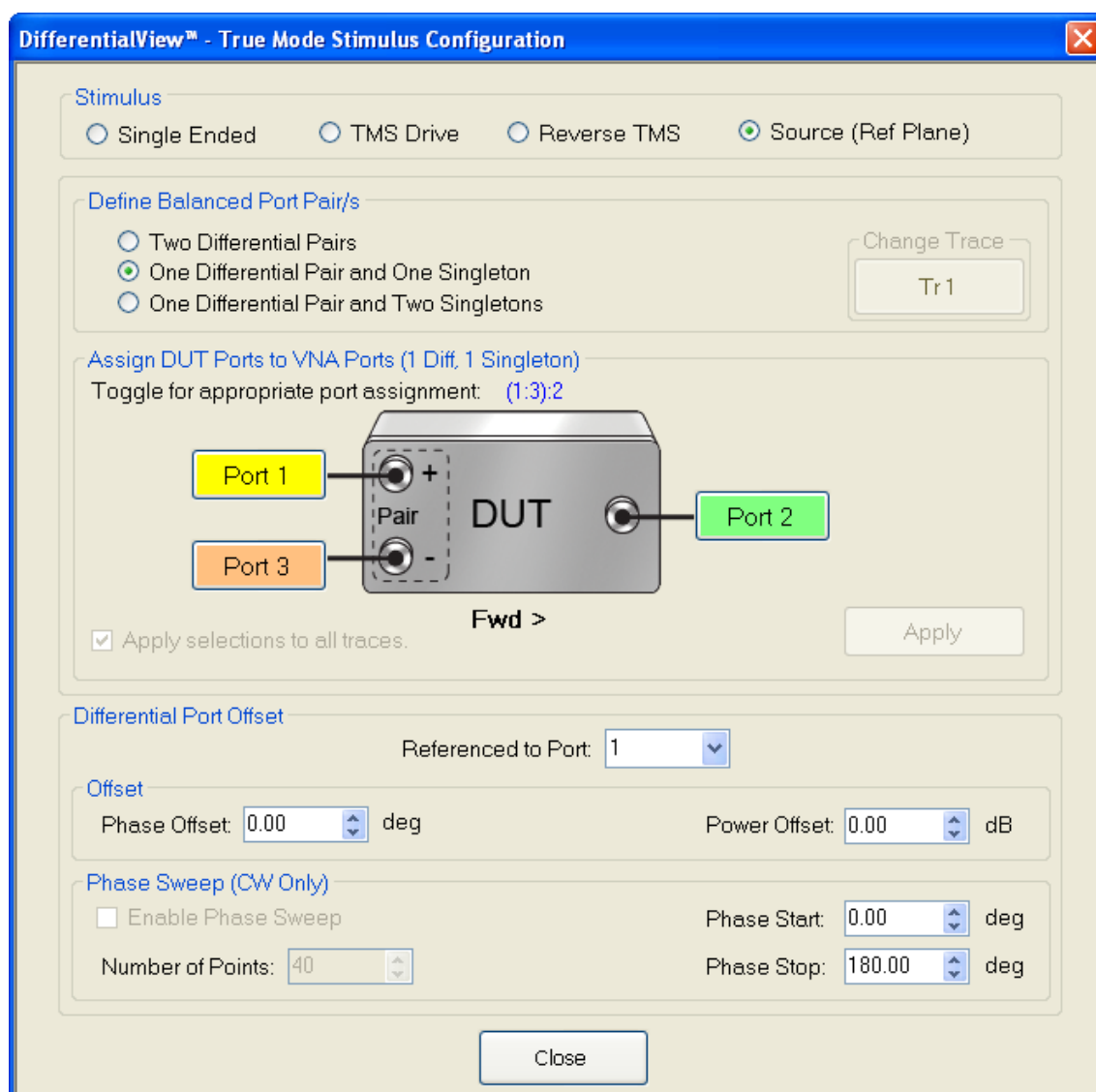


Figure 20-3. DifferentialView – True Mode Stimulus Configuration Dialog Box

Note Reverse TMS, Balanced Port Pairs, and certain port assignments require a 4-port VNA.

Chapter 21 — IMDView™

21-1 Chapter Overview

This chapter provides information for the APPLICATION menu with controls for the IMDView™ application.

Other Application Menu Chapters

The other chapters in this manual on the APPLICATION menu with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 22, “Advanced Fast CW”](#)
- [Chapter 23, “Spectrum Analysis”](#)

21-2 Application Menus and Dialog Boxes for IMDView

The APPLICATION menu set for configuration and control of pulse features contains the following menus and dialogs:

- [“IMDVIEW SETUP Menu – Swept Frequency Mode” on page 21-3](#)
- [“IMDVIEW SETUP Menu – SpectrumView Mode” on page 21-4](#)
- [“IMD MODE Menu \(Sweep Modes\)” on page 21-5](#)
- [“IMDView CONFIGURATION Dialog Box” on page 21-6](#)
- [“Dialog Box Tone Selections vs VNA Configuration” on page 21-11](#)

21-3 Application Menu Set for IMDView

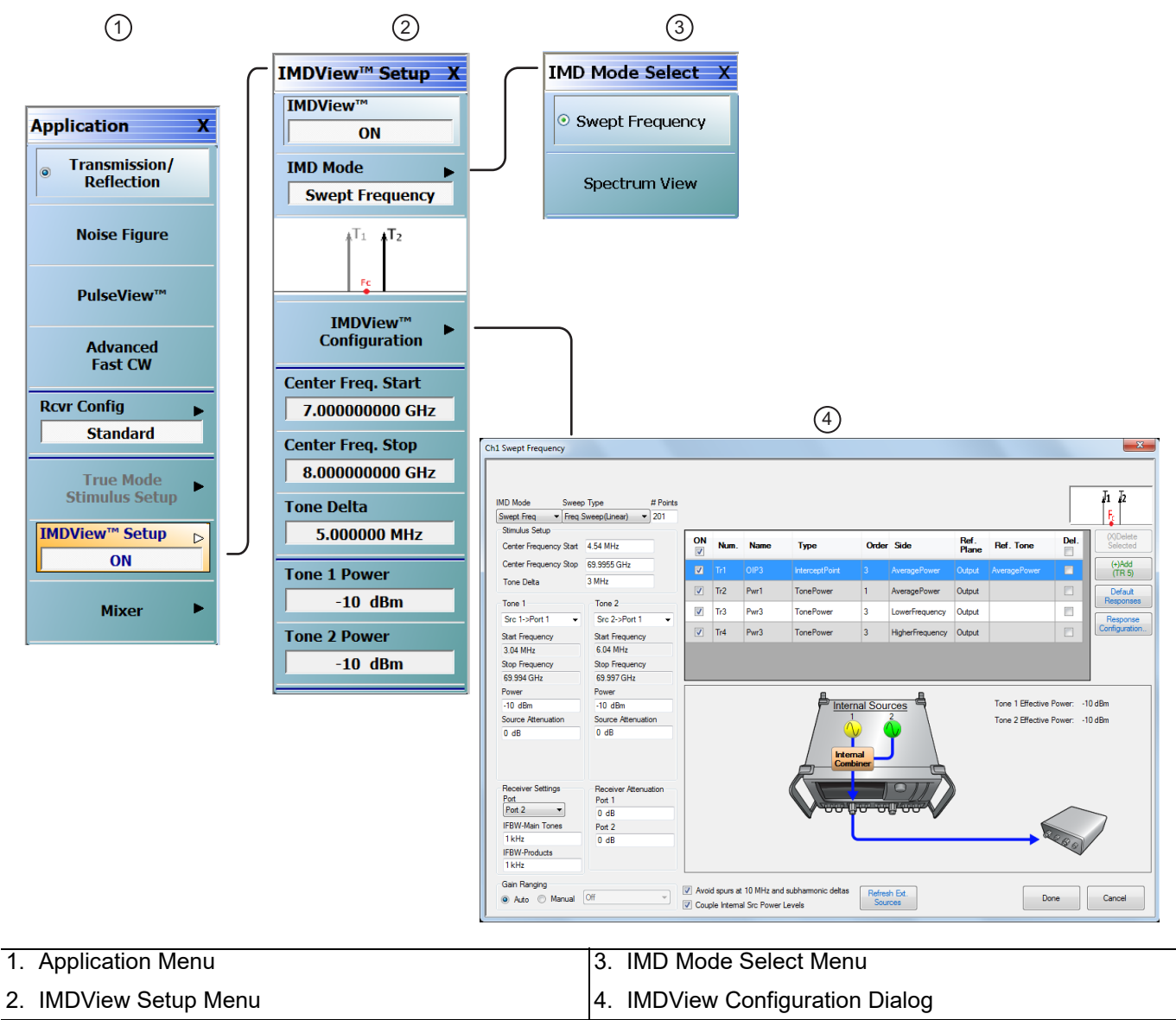
The APPLICATION menu set for the IMDView application contains two menus and one configuration dialog box as shown below in Figure 21-1.

Note

In the Application menu, the IMDView Setup button is disabled unless Option 44 is installed on the VNA, and Transmission/Reflection mode (on the Application menu) is active. IMDView is also disabled in 100K-point mode.

See the other APPLICATION menu chapters for descriptions of other application menu button selections.

- 1. Click the APPLICATION menu item in the VectorStar software menu bar to view the APPLICATION menu.
- 2. Click the **IMDView Setup** button to turn on and configure the IMDView measurement application.



1. Application Menu
2. IMDView Setup Menu
3. IMD Mode Select Menu
4. IMDView Configuration Dialog

Figure 21-1. APPLICATION Menu Set – IMDView

21-4 IMDView Setup and Configuration Menus

IMDVIEW SETUP Menu – Swept Frequency Mode

Previous

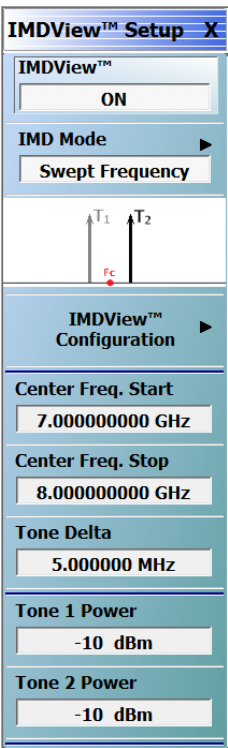
- “Application Menu Set for IMDView” on page 21-2

Prerequisites

- Option 44 installed on the VNA, and APPLICATION Menu Transmission/Reflection mode activated.

Navigation

- MAIN | Application | APPLICATION | IMDView Setup | IMDVIEW SETUP



IMDView ON/OFF

Toggles the IMDView application on or off.

IMD Mode

Opens the IMD MODE SELECT menu. Screen shot to the left shows the menu when Swept Frequency mode is selected from CURRENT MODE menu (see [Figure 21-4 on page 21-5](#)).

IMDView Configuration

Opens the IMDView CONFIGURATION dialog box.

Center Frequency Start

Sets the center frequency (f_c) start.

Center Frequency Stop

Sets the center frequency (f_c) stop.

Tone Delta

The spacing between the main tones. In other literature, it is sometimes called ‘offset’ or ‘tone spacing’.

Tone 1 Power

IMD measurement Tone 1 power level.

Tone 2 Power

IMD measurement Tone 2 power level.

Figure 21-2. IMDView Setup Menu – Swept Frequency Mode

IMDVIEW SETUP Menu – SpectrumView Mode

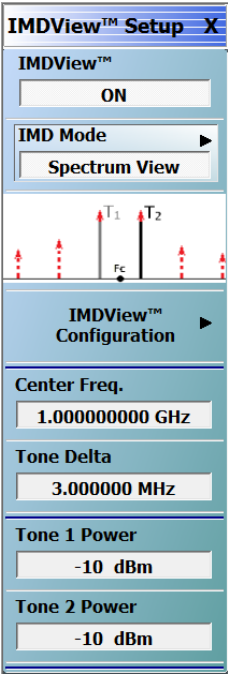
	<p>IMDView ON/OFF</p> <p>Toggles the IMDView Application on or off.</p> <p>IMD Mode</p> <p>Opens the IMD Mode Select menu. Screen shot to the left shows the menu when SpectrumView mode is selected from CURRENT MODE menu (see Figure 21-4 on page 21-5).</p> <p>IMDView Configuration</p> <p>Opens the IMDVIEW CONFIGURATION dialog box.</p> <p>Center Frequency</p> <p>f_c (Center frequency): In the IMD mode, it refers to the frequency half-way between the two main tones.</p> <p>Tone Delta</p> <p>The spacing between the main tones. In other literature, it is sometimes called ‘offset’ or ‘tone spacing’.</p> <p>Tone 1 Power</p> <p>IMD measurement Tone 1 power level.</p> <p>Tone 2 Power</p> <p>IMD measurement Tone 2 power level.</p>
---	--

Figure 21-3. IMDView Setup Menu – SpectrumView Mode

IMD MODE Menu (Sweep Modes)

Previous

- [“IMDVIEW SETUP Menu – Swept Frequency Mode” on page 21-3](#)

Prerequisites

- Option 44 installed on the VNA, and APPLICATION menu Transmission/Reflection mode activated

Navigation

- MAIN | Application | APPLICATION | IMDView Setup | IMDVIEW SETUP | IMD Mode | IMD MODE SELECT

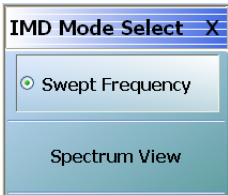
	<p>Swept Frequency</p> <p>Swept frequency IMD mode causes the center frequency f_c to sweep over the indicated range meaning the two tones from the sources are also sweeping. At each frequency ‘point’, the sources are stationary and the receiver will scan the tones and products as desired.</p> <p>SpectrumView</p> <p>In SpectrumView measurement mode the main tones are fixed and the receiver sweeps over some specified range to look at a maximum product order. There are two different SpectrumView sweep modes: Linear and Segmented.</p>
---	--

Figure 21-4. CURRENT MODE Menu

IMDView CONFIGURATION Dialog Box

Previous

- “IMDVIEW SETUP Menu – SpectrumView Mode” on page 21-4

Prerequisites

- Option 32 and Option 44 installed on the VNA, and APPLICATION menu Transmission/Reflection mode activated.

Navigation

- MAIN | Application | APPLICATION | IMDView Setup | IMDVIEW SETUP | IMDView Configuration | IMDVIEW CONFIGURATION

Figure 21-5 illustrates the Swept Frequency IMD Mode dialog when Freq Sweep (Linear) is selected as the sweep type. Selecting the Response Configuration button opens Response Configuration dialog box shown in Figure 21-6 on page 21-7.

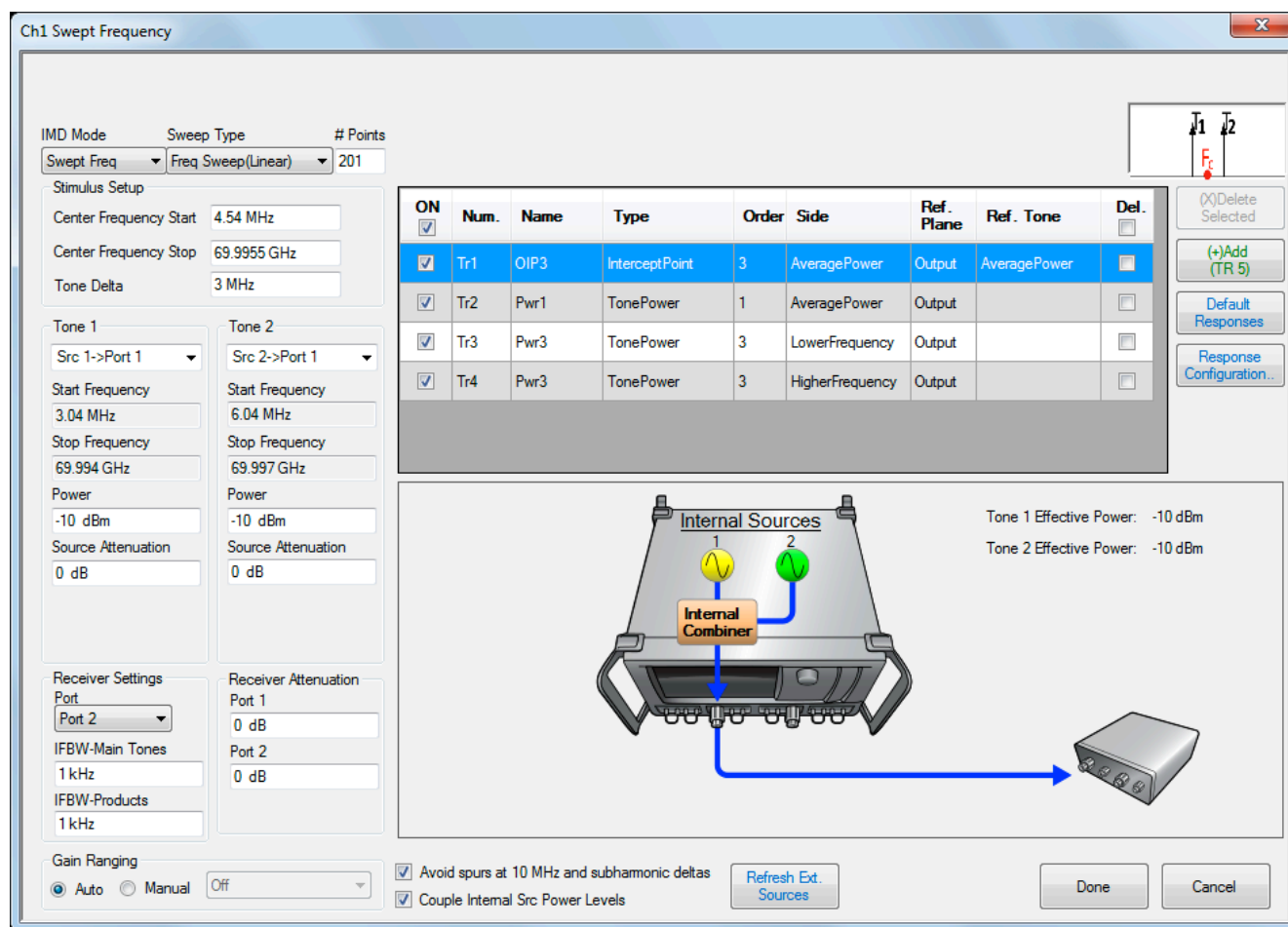


Figure 21-5. IMDView Configuration Dialog – Swept Frequency Sweep (Linear)

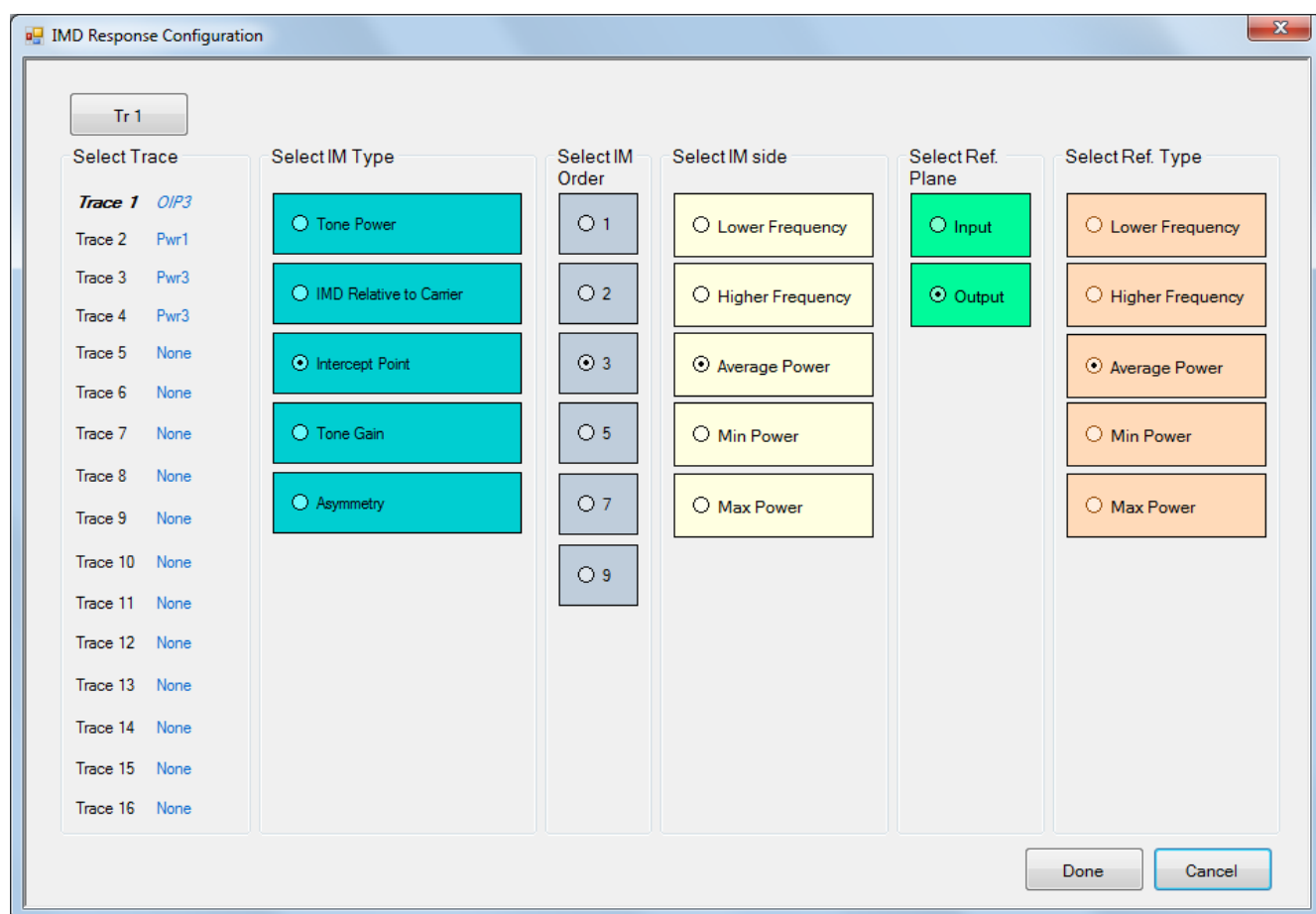


Figure 21-6. Response Configuration Dialog

Variables for IMD measurement types shown above are described in [Table 21-1](#).

Table 21-1. IMD Measurement Variables

Measurement	Valid Orders	Valid IM Side	Reference Plane Has Effect?	Reference Tone Has Effect?
Tone Power	All	All	Yes	No
IMD Relative to Carrier	All (Except order 1 will be trivial or an asymmetry measurement)	All	No	Yes
Intercept Point	All except 1	All	Yes	Yes
Tone Gain	Only 1	Only lower frequency	No	No
Asymmetry	All	All except average	No	No

Figure 21-7 illustrates the Spectrum View IMD Mode dialog when Freq Sweep (Linear) is selected as the sweep type.

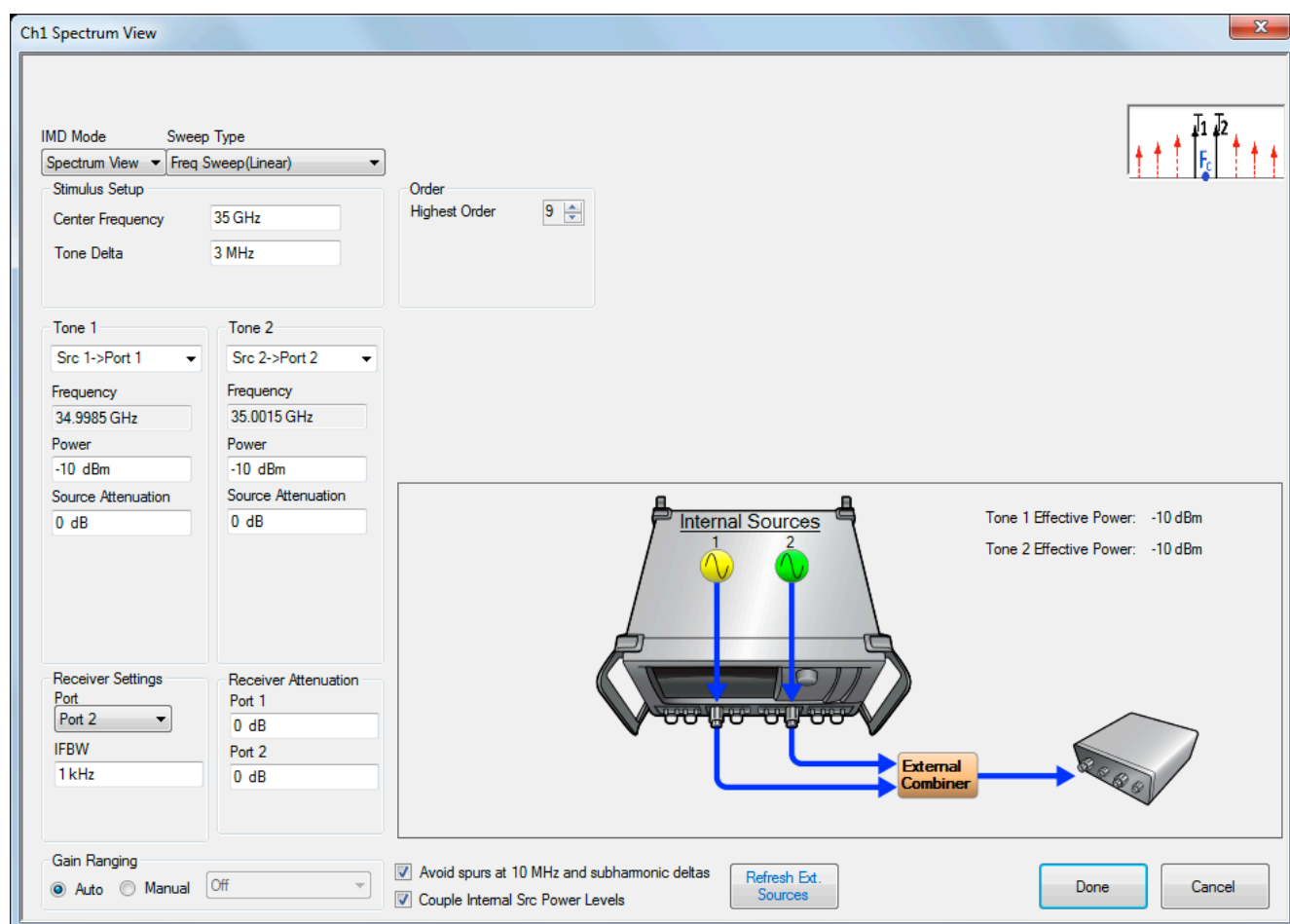


Figure 21-7. IMDView Configuration Dialog – SpectrumView Frequency Sweep (Linear)

Figure 21-8 illustrates the settings for a 4-port VNA with Dual source (opt. 31) – port 1 and port 3 as two tones.

Ch1 Swept Frequency

IMD Mode: Swept Freq Sweep Type: Freq Sweep(Linear) # Points: 201

Stimulus Setup

Center Frequency Start: 70 kHz Center Frequency Stop: 70 GHz Tone Delta: 3 MHz

Tone 1: Src 1->Port 1 Start Frequency: Out of Range Stop Frequency: Out of Range Power: -10 dBm Source Attenuation: 0 dB

Tone 2: Src 2->Port 3 Start Frequency: 1.57 MHz Stop Frequency: Out of Range Power: 0 dBm Source Attenuation: 0 dB

Receiver Settings: Port: Port 2 IFBW-Main Tones: 1 kHz IFBW-Products: 1 kHz

Gain Ranging: Auto Manual Off

☒ Avoid spurs at 10 MHz and subharmonic deltas
☒ Couple Internal Src Power Levels

ON	Num.	Name	Type	Order	Side	Ref. Plane	Ref. Tone	Del.
☒	Tr1	OIP3	InterceptPoint	3	AveragePower	Output	AveragePower	☐
☒	Tr2	Pwr1	TonePower	1	AveragePower	Output		☐
☒	Tr3	Pwr3	TonePower	3	LowerFrequency	Output		☐
☒	Tr4	Pwr3	TonePower	3	HigherFrequency	Output		☐

Internal Sources

1 2

External Combiner

Tone 1 Effective Power: -10 dBm
Tone 2 Effective Power: 0 dBm

Done Cancel

Figure 21-8. IMDView Configuration Dialog – Dual Source with Ports 1 & 3 as Two Tones

Figure 21-9 illustrates the settings for a 4-port VNA with Dual source (opt. 31) – port 2 and port 4 as two tones.

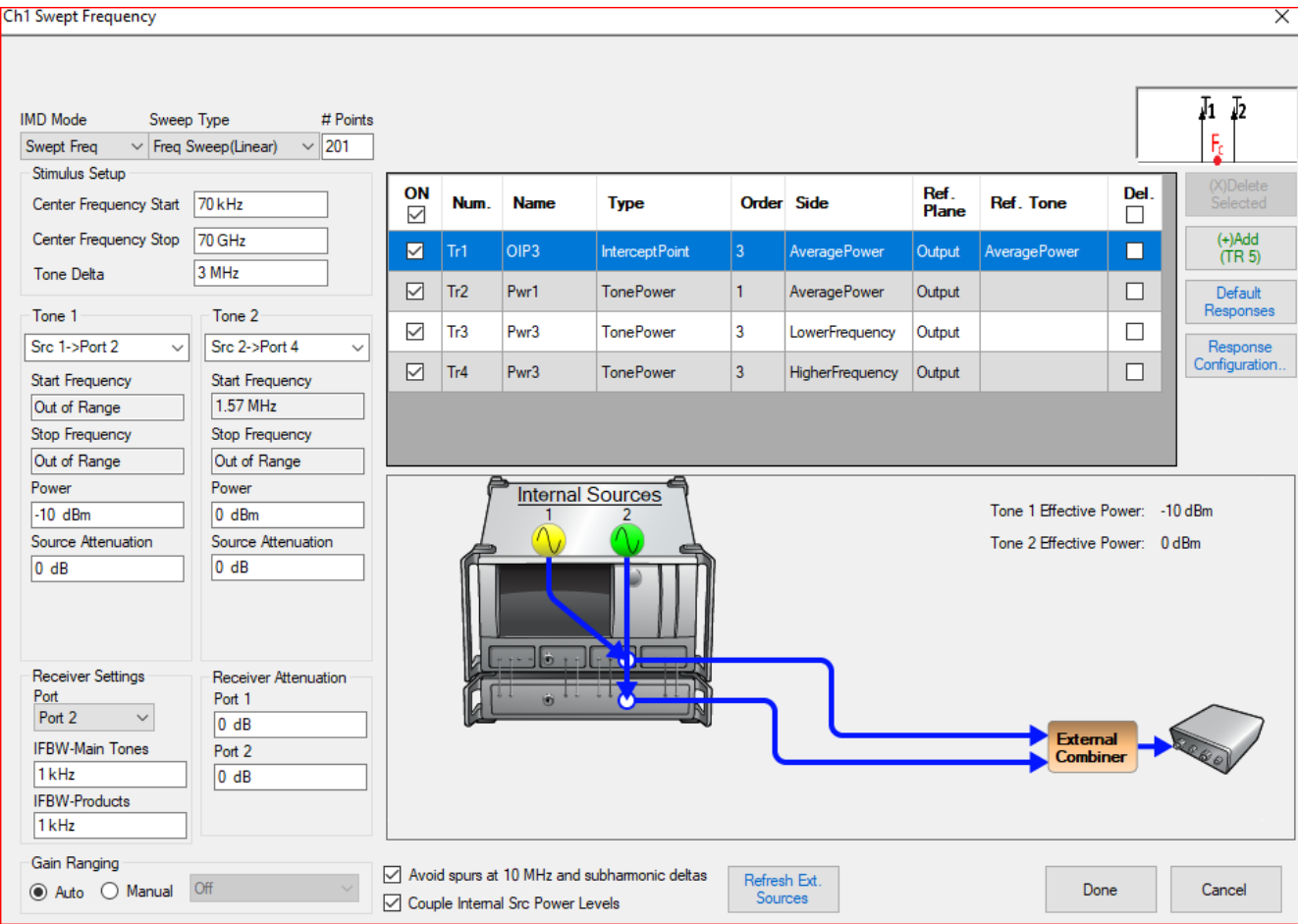


Figure 21-9. IMDView Configuration Dialog – Dual Source with Ports 2 & 4 as Two Tones

Dialog Box Tone Selections vs VNA Configuration

Figure 21-10 lists available tone selections from the Tone 1 and Tone 2 dropdown menus in the IMDVIEW CONFIGURATION dialog, based on a 2-port VNA configuration.

<div><div>Standard Mode – Single Source VectorStar (no Option 31):</div><div>Int Src->Port 1</div><div>Int Src->Port 2</div><div>Ext Source 1</div><div>Ext Source 2</div><div>Ext Source 3</div><div>Ext Source 4</div></div>	<div><div><div>Center Frequency Start40 GHz</div><div>Center Frequency Stop60 GHz</div><div>Tone Delta5 MHz</div></div><div><div>Tone 1</div><div><div>Int Src->Port 1</div><div>Int Src->Port 1</div><div>Int Src->Port 2</div><div>Ext Source 1</div><div>Ext Source 2</div><div>Ext Source 3</div><div>Ext Source 4</div><div>Power</div></div></div><div><div>Tone 2</div><div><div>Int Src->Port 2</div><div>Start Frequency40.0025 GHz</div><div>Stop Frequency60.0025 GHz</div><div>Power</div></div></div></div>
<div><div>Standard Mode – Dual Source VectorStar (with Option 31):</div><div>Src 1->Port 1</div><div>Src 2->Port 1 (Opt 32 installed)</div><div>Src 2->Port 2</div><div>Ext Source 1</div><div>Ext Source 2</div><div>Ext Source 3</div><div>Ext Source 4</div></div>	<div><div><div>Center Frequency Start40 GHz</div><div>Center Frequency Stop60 GHz</div><div>Tone Delta5 MHz</div></div><div><div>Tone 1</div><div><div>Src 1->Port 1</div><div>Src 1->Port 1</div><div>Src 2->Port 1</div><div>Src 2->Port 2</div><div>Ext Source 1</div><div>Ext Source 2</div><div>Ext Source 3</div><div>Ext Source 4</div><div>Power</div></div></div><div><div>Tone 2</div><div><div>Src 2->Port 1</div><div>Start Frequency40.0025 GHz</div><div>Stop Frequency60.0025 GHz</div><div>Power</div></div></div></div>

Figure 21-10. IMDView Tone Selections vs. VNA Configuration – 2-port (1 of 3)

**Broadband Mode – Single Source
VectorStar (no Option 31) ≤ 54 GHz:**

Int Src->Mod 1

Int Src->Mod 2

Ext Synth 1

Ext Synth 2

Ext Synth 3

Ext Synth 4

Stimulus Setup

Center Frequency Start 50 GHz

Center Frequency Stop 54 GHz

Tone Delta 3 MHz

Tone 1

Int Src->Mod1

Int Src->Mod1

Int Src->Mod2

Ext Synth 1

Ext Synth 2

Ext Synth 3

Ext Synth 4

Power

-5 dBm

Tone 2

Ext Synth 1

Start Frequency

50.0015 GHz

Stop Frequency

54.0015 GHz

Power

-5 dBm

**Broadband Mode – Dual Source
VectorStar (with Option 31) ≤ 54 GHz:**

Src 1->Mod 1

Src 2->Mod 1

Src 2->Mod 2

Ext Synth 1

Ext Synth 2

Ext Synth 3

Ext Synth 4

Stimulus Setup

Center Frequency Start 40 GHz

Center Frequency Stop 50 GHz

Tone Delta 3 MHz

Tone 1

Src 1->Mod 1

Src 1->Mod 1

Src 2->Mod 1

Src 2->Mod 2

Ext Synth 1

Ext Synth 2

Ext Synth 3

Ext Synth 4

Power

-5 dBm

Tone 2

Src 2->Mod 1

Start Frequency

40.0015 GHz

Stop Frequency

50.0015 GHz

Power

-5 dBm

Figure 21-10. IMDView Tone Selections vs. VNA Configuration – 2-port (2 of 3)

**Broadband Mode – Single Source
VectorStar (no Option 31) >54 GHz:**

Int Src->Mod 1

Int Src->Mod 2

Ext Synth 1 -> Aux Mod

Ext Synth 2 -> Aux Mod

Ext Synth 3 -> Aux Mod

Ext Synth 4 -> Aux Mod

The screenshot shows the 'Stimulus Setup' window with the following settings:

- Center Frequency Start: 60 GHz
- Center Frequency Stop: 70 GHz
- Tone Delta: 3 MHz

Below the stimulus setup, there are two sections for 'Tone 1' and 'Tone 2':

- Tone 1:** A dropdown menu is open, showing options: 'Int Src->Mod 1' (selected), 'Int Src->Mod 2', 'Ext Synth 1->Aux Mod', 'Ext Synth 2->Aux Mod', 'Ext Synth 3->Aux Mod', and 'Ext Synth 4->Aux Mod'.
- Tone 2:** A dropdown menu is open, showing the option: 'Ext Synth 1->Aux'.

Below the tone selections, there are two input fields:

- Start Frequency: 60.0015 GHz
- Stop Frequency: 70.0015 GHz

**Broadband Mode – Dual Source
VectorStar (with Option 31) >54 GHz:**

Src 1->Aux Mod

Src 2->Mod 1 (Opt 32 installed)

Src 2->Mod 2

Ext Synth 1 -> Aux Mod

Ext Synth 2 -> Aux Mod

Ext Synth 3 -> Aux Mod

Ext Synth 4 -> Aux Mod

The screenshot shows the 'Stimulus Setup' window with the following settings:

- Center Frequency Start: 60 GHz
- Center Frequency Stop: 70 GHz
- Tone Delta: 3 MHz

Below the stimulus setup, there are two sections for 'Tone 1' and 'Tone 2':

- Tone 1:** A dropdown menu is open, showing options: 'Src 1->Aux Mod' (selected), 'Src 1->Aux Mod', 'Src 2->Mod 1', 'Src 2->Mod 2', 'Ext Synth 1->Aux Mod', 'Ext Synth 2->Aux Mod', 'Ext Synth 3->Aux Mod', 'Ext Synth 4->Aux Mod', and '-5 dBm'.
- Tone 2:** A dropdown menu is open, showing options: 'Src 2->Mod 1' (selected), 'Src 1->Aux Mod', 'Src 2->Mod 1', 'Src 2->Mod 2', 'Ext Synth 1->Aux Mod', 'Ext Synth 2->Aux Mod', 'Ext Synth 3->Aux Mod', and 'Ext Synth 4->Aux Mod'.

Figure 21-10. IMDView Tone Selections vs. VNA Configuration – 2-port (3 of 3)

Figure 21-11 lists available tone selections from the Tone 1 and Tone 2 dropdown menus in the IMDVIEW CONFIGURATION dialog, based on a 4-port VNA configuration.

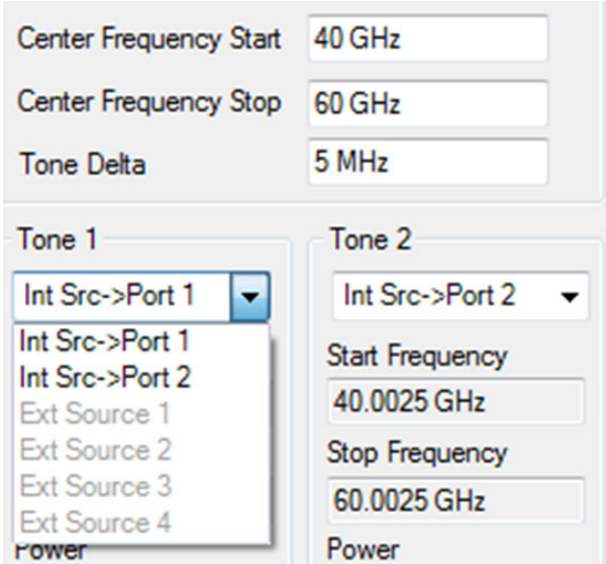
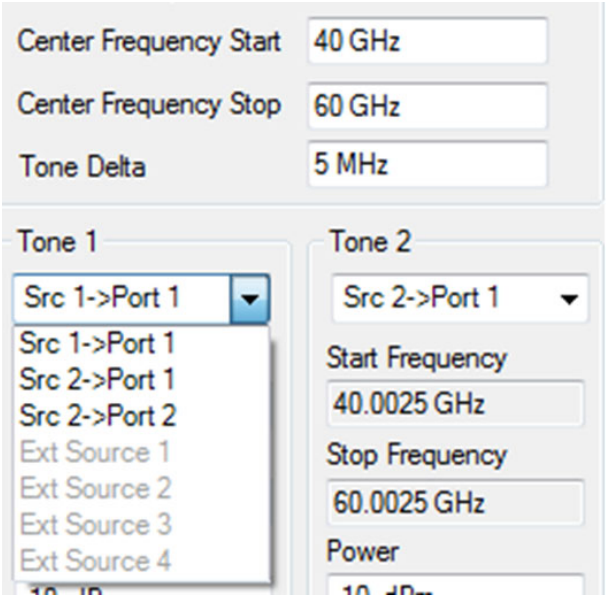
<div><div>Standard Mode – Single Source VectorStar (no Option 31):</div><div>Int Src->Port 1</div><div>Int Src->Port 2</div><div>Int Src->Port 3</div><div>Int Src->Port 4</div><div>Ext Source 1</div><div>Ext Source 2</div><div>Ext Source 3</div><div>Ext Source 4</div></div>	
<div><div>Standard Mode – Dual Source VectorStar (with Option 31):</div><div>Src 1->Port 1</div><div>Src 1->Port 2</div><div>Src 2->Port 3</div><div>Src 2->Port 4</div><div>Ext Source 1</div><div>Ext Source 2</div><div>Ext Source 3</div><div>Ext Source 4</div></div>	

Figure 21-11. IMDView Tone Selections vs. VNA Configuration – 4-port (1 of 3)

**Broadband Mode – Single Source
VectorStar (no Option 31) ≤ 54 GHz:**

Int Src->Mod 1

Int Src->Mod 2

Int Src->Mod 3

Int Src->Mod 4

Ext Source 1

Ext Source 2

Ext Source 3

Ext Source 4

Stimulus Setup

Center Frequency Start 50 GHz

Center Frequency Stop 54 GHz

Tone Delta 3 MHz

Tone 1

Int Src->Mod1

Int Src->Mod1

Int Src->Mod2

Ext Synth 1

Ext Synth 2

Ext Synth 3

Ext Synth 4

Power -5 dBm

Tone 2

Ext Synth 1

Start Frequency 50.0015 GHz

Stop Frequency 54.0015 GHz

Power -5 dBm

**Broadband Mode – Dual Source
VectorStar (with Option 31) ≤ 54 GHz:**

Src 1->Mod 1

Src 1->Mod 2

Src 2->Mod 3

Src 2->Mod 4

Ext Source 1

Ext Source 2

Ext Source 3

Ext Source 4

Stimulus Setup

Center Frequency Start 40 GHz

Center Frequency Stop 50 GHz

Tone Delta 3 MHz

Tone 1

Src 1->Mod 1

Src 1->Mod 1

Src 2->Mod 1

Src 2->Mod 2

Ext Synth 1

Ext Synth 2

Ext Synth 3

Ext Synth 4

Power -5 dBm

Tone 2

Src 2->Mod 1

Start Frequency 40.0015 GHz

Stop Frequency 50.0015 GHz

Power -5 dBm

Figure 21-11. IMDView Tone Selections vs. VNA Configuration – 4-port (2 of 3)

**Broadband Mode – Single Source
VectorStar (no Option 31) >54 GHz:**

Int Src->Mod 1

Int Src->Mod 2

Int Src->Mod 3

Int Src->Mod 4

ExtSrc1 -> AuxMod1

ExtSrc1 -> AuxMod2

ExtSrc2 -> AuxMod1

ExtSrc2 -> AuxMod2

ExtSrc3 -> AuxMod1

ExtSrc3 -> AuxMod2

ExtSrc4 -> AuxMod1

ExtSrc4 -> AuxMod2

Stimulus Setup

Center Frequency Start 60 GHz

Center Frequency Stop 70 GHz

Tone Delta 3 MHz

Tone 1

Int Src->Mod 1

Int Src->Mod 1

Int Src->Mod 2

Ext Synth 1->Aux Mod

Ext Synth 2->Aux Mod

Ext Synth 3->Aux Mod

Ext Synth 4->Aux Mod

Tone 2

Ext Synth 1->Aux

Start Frequency 60.0015 GHz

Stop Frequency 70.0015 GHz

**Broadband Mode – Dual Source
VectorStar (with Option 31) >54 GHz:**

Src 1->Mod 1

Src 1->Mod 2

Src 2->Mod 1

Src 2->Mod 2

Src 3->Mod 1

Src 3->Mod 2

Src 4->Mod 1

Src 4->Mod 2

ExtSrc1 -> AuxMod1

ExtSrc1 -> AuxMod2

ExtSrc2 -> AuxMod1

ExtSrc2 -> AuxMod2

ExtSrc3 -> AuxMod1

ExtSrc3 -> AuxMod2

ExtSrc4 -> AuxMod1

ExtSrc4 -> AuxMod2

Stimulus Setup

Center Frequency Start 60 GHz

Center Frequency Stop 70 GHz

Tone Delta 3 MHz

Tone 1

Src 1->Aux Mod

Src 1->Aux Mod

Src 1->Mod 1

Src 2->Mod 1

Src 2->Mod 2

Ext Synth 1->Aux Mod

Ext Synth 2->Aux Mod

Ext Synth 3->Aux Mod

Ext Synth 4->Aux Mod

-5 dBm

Tone 2

Src 2->Mod 1

Src 1->Aux Mod

Src 2->Mod 1

Src 2->Mod 2

Ext Synth 1->Aux Mod

Ext Synth 2->Aux Mod

Ext Synth 3->Aux Mod

Ext Synth 4->Aux Mod

Figure 21-11. IMDView Tone Selections vs. VNA Configuration – 4-port (3 of 3)

Chapter 22 — Advanced Fast CW

22-1 Chapter Overview

This chapter provides information for the APPLICATION menu with controls for the Advanced Fast CW application. Advanced Fast CW functionality requires installation of Option 35 and Option 46.

Other Application Menu Chapters

The other chapters in this manual on the APPLICATION menu with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 18, “NxN”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 23, “Spectrum Analysis”](#)

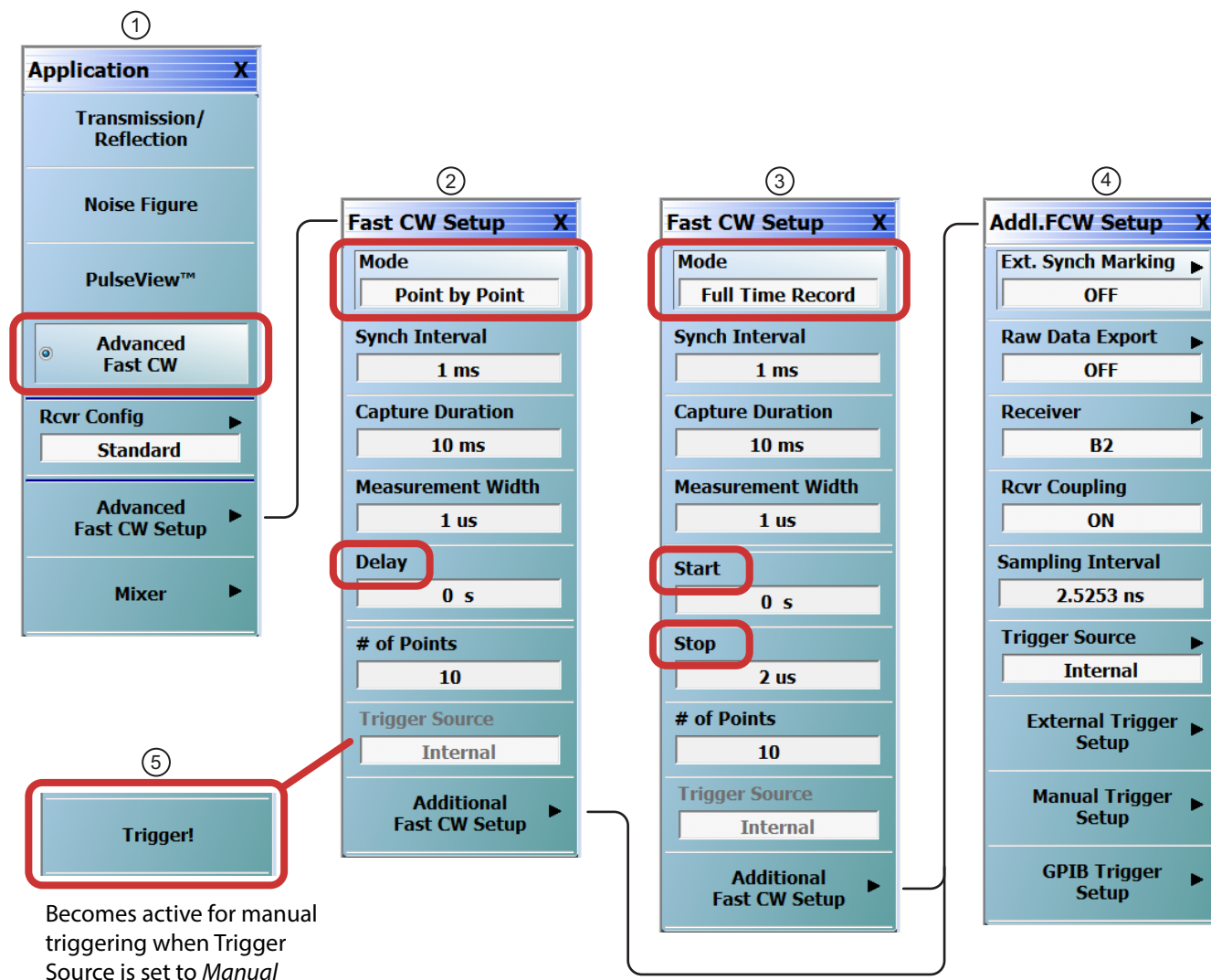
22-2 Application Menus and Dialog Boxes for Advanced Fast CW

The APPLICATION menu set for configuration and control of Fast CW features contains the following menus and dialogs:

- [“Application Menu Set for Advanced Fast CW” on page 22-2](#)
- [“Fast CW SETUP Menu” on page 22-4](#)
- [“Addl. FCW SETUP Menu” on page 22-5](#)
 - [“External Synch Marking Menu” on page 22-6](#)
 - [“Raw Data Export Menu” on page 22-7](#)
 - [“Receiver Menu” on page 22-8](#)
 - [“Receiver Menu” on page 22-8](#)
 - [“Trigger Source Menu” on page 22-9](#)
 - [“External Trigger Setup Menu” on page 22-10](#)
 - [“Manual Trigger Setup Menu” on page 22-11](#)
 - [“GPIB Trigger Setup Menu” on page 22-12](#)

22-3 Application Menu Set for Advanced Fast CW

The APPLICATION menu set for Advanced Fast CW contains the menus shown in [Figure 22-1](#). The sub-menu set for the Additional Fast CW Setup menu (Addl. FCW Setup) is shown in [Figure 22-2](#).



1. Application Menu (note that the True Mode Stimulus Setup button is replaced by the Advanced Fast CW Setup button when Fast CW is activated).
2. Fast CW Setup Menu with *Point by Point* mode selected. Note that a Delay time parameter is enabled for this mode. (see [Figure 22-3 on page 22-4](#))
3. Fast CW Setup Menu with *Full Time Record* mode selected. Note that a Start/Stop time parameter is enabled for this mode. (see [Figure 22-3 on page 22-4](#).)
4. Additional Fast CW Setup Menu (see [Figure 22-2 on page 22-3](#) and [Figure 22-4 on page 22-5](#).)
5. When Trigger Source is set to Manual, a Trigger! button appears and is active for manual triggering.

Figure 22-1. APPLICATION Menu Set – Advanced Fast CW

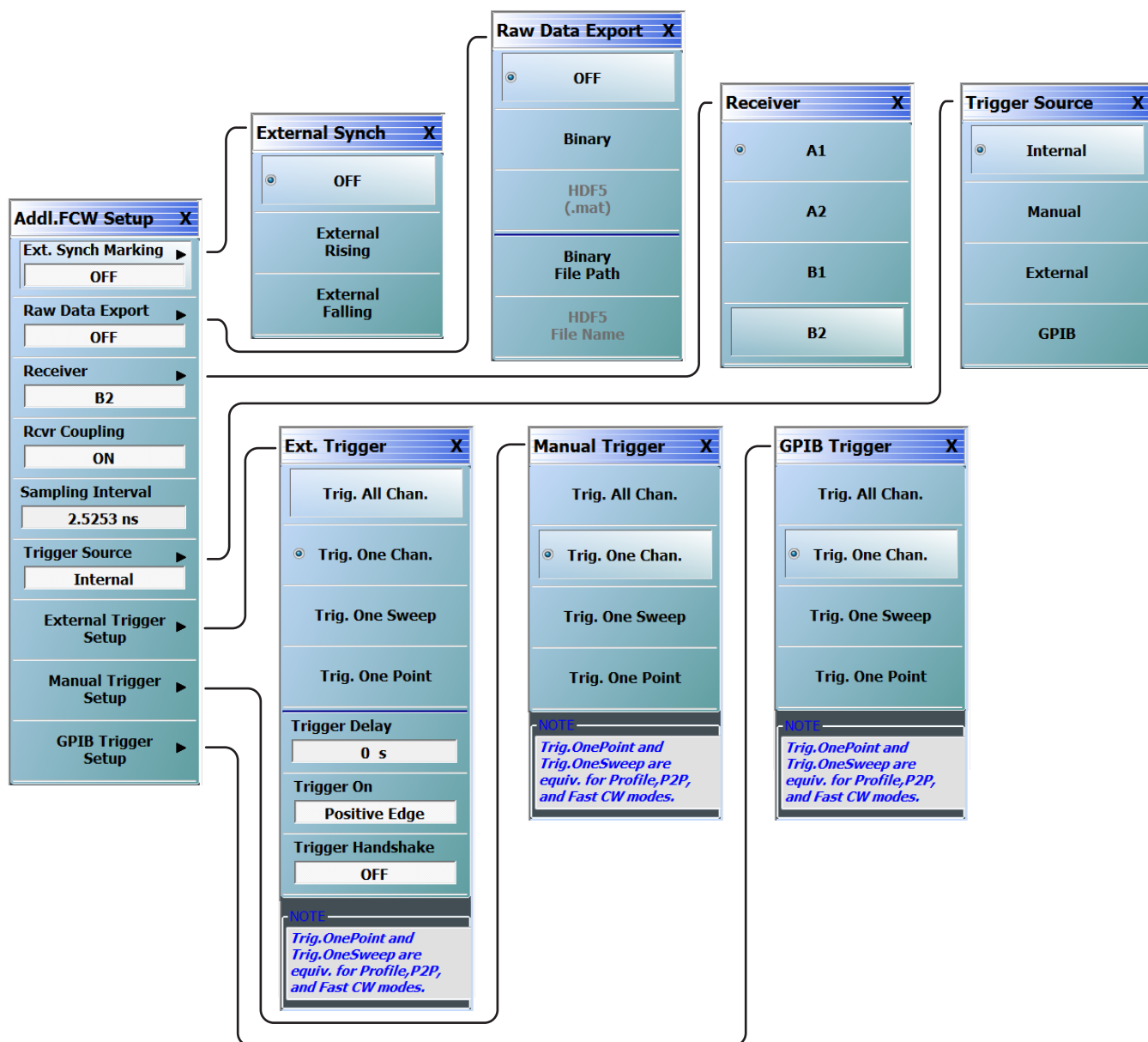


Figure 22-2. Advanced Fast CW Menu Set – Additional Fast CW Setup Menus

22-4 Advanced Fast CW Setup and Configuration Menus

Fast CW SETUP Menu

Previous

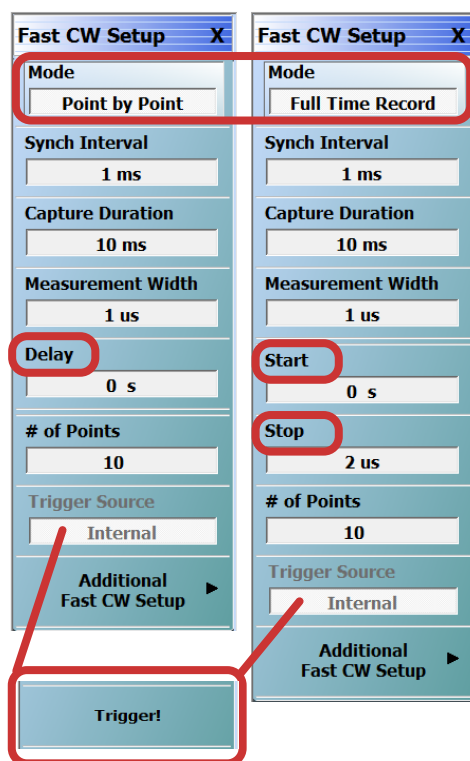
- [“Application Menu Set for Advanced Fast CW” on page 22-2](#)

Prerequisites

- Option 35 and Option 46 is installed on the VNA.
- Advanced Fast CW application selected on Application menu.

Navigation

- MAIN | Application | APPLICATION | Advanced Fast CW Setup | FAST CW SETUP



Becomes active for manual triggering when Trigger Source is set to *Manual*

Mode

Toggles the mode between Point by Point (PBP) and Full Time Record (FTR). **Notes:** Depending on the mode selected, the time parameters change from *Delay* (for PBP) to *Start/Stop* (for FTR). The bottom trace display status bar indicates the Advanced Fast CW mode (FCW-PBP or FCW-FTR):

Ch1 FCW-FTR 0 s 2 us [CW] 70 kHz IFBW 1 kHz

Synch Interval

Select activates a toolbar for setting synchronization interval.

Capture Duration

Select activates a toolbar for setting capture duration in time units.

Measurement Width

Select activates a toolbar for setting measurement width in time units.

Delay (Point by Point mode only)

Select activates a toolbar for setting delay in time units.

Start Time (Full Time Record mode only)

Select activates a toolbar for setting start time

Stop Time (Full Time Record mode only)

Select activates a toolbar for setting stop time

of Points

Select activates a toolbar for setting the number of points measured from Start to Stop time.

Trigger Source

Displays the trigger source that is selected from Other Setup (Addl.FCW Setup) menu. *Note that this becomes active as a manual trigger button when Trigger Source is set to Manual.*

Additional Fast CW Setup

Select opens the Addl.FCW Setup menu for more Fast CW setup parameters. See [“Addl. FCW SETUP Menu” on page 22-5](#).

Figure 22-3. Fast CW SETUP Menu

Addl. FCW SETUP Menu

Previous

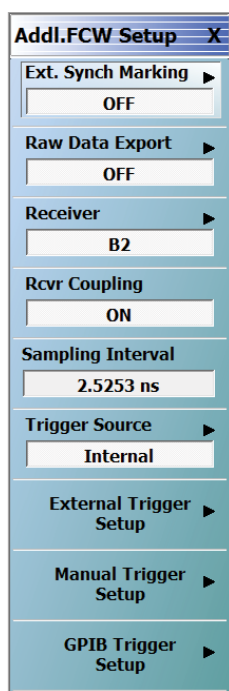
- [“Fast CW SETUP Menu” on page 22-4](#)

Prerequisites

- Option 35 and Option 46 is installed on the VNA.
- Advanced Fast CW application selected on Application menu.

Navigation

MAIN | Application | APPLICATION | Advanced CW Setup | ADVANCED CW SETUP | Additional Fast CW Setup | ADDL. FCW SETUP



Ext Synch Marking

Select opens the [“External Synch Marking Menu” on page 22-6.](#)

Raw Data Export

Select opens the [“Raw Data Export Menu” on page 22-7.](#)

Receiver

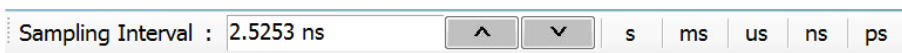
Select opens the [“Receiver Menu” on page 22-8.](#)

Rcvr Coupling

Select toggles receiver coupling ON and OFF.

Sampling Interval

Select activates a toolbar for entering desired sampling interval.



Trigger Source

Select opens the [“Trigger Source Menu” on page 22-9.](#)

External Trigger Setup

Select opens the [“External Trigger Setup Menu” on page 22-10.](#)

Manual Trigger Setup

Select opens the [“Manual Trigger Setup Menu” on page 22-11.](#)

GPIB Trigger Setup

Select opens the [“GPIB Trigger Setup Menu” on page 22-12.](#)

Figure 22-4. Additional FCW SETUP Menu

External Synch Marking Menu

Previous

- [“Addl. FCW SETUP Menu” on page 22-5](#)

Prerequisites

- Option 35 and Option 46 is installed on the VNA.
- Advanced Fast CW application selected on Application menu.

Navigation

MAIN | Application | APPLICATION | Advanced CW Setup | ADVANCED CW SETUP | Additional Fast CW Setup | ADDL. FCW SETUP | Ext. Synch Marking | EXTERNAL SYNCH

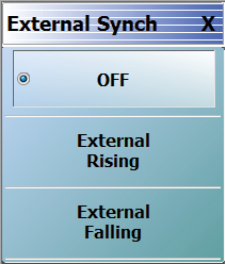
	<p>OFF</p> <p>Internal synch is active when OFF is selected.</p> <p>External Rising</p> <p>External synch based on the rising edge of the signal present at the Synch In port on the rear panel.</p> <p>External Falling</p> <p>External synch based on the falling edge of the signal present at the Synch In port on the rear panel.</p>
---	---

Figure 22-5. External Synch Marking Menu

Raw Data Export Menu

Previous

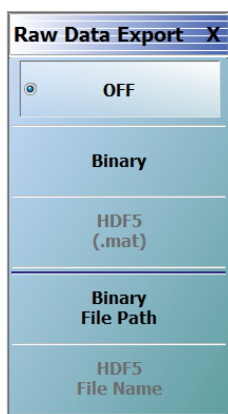
- [“Addl. FCW SETUP Menu” on page 22-5](#)

Prerequisites

- Option 35 and Option 46 is installed on the VNA.
- Advanced Fast CW application selected on Application menu.

Navigation

MAIN | Application | APPLICATION | Advanced CW Setup | ADVANCED CW SETUP | Additional Fast CW Setup | ADDL. FCW SETUP | Raw Data Export | RAW DATA EXPORT



OFF

Select disables Raw Data Export.

Binary

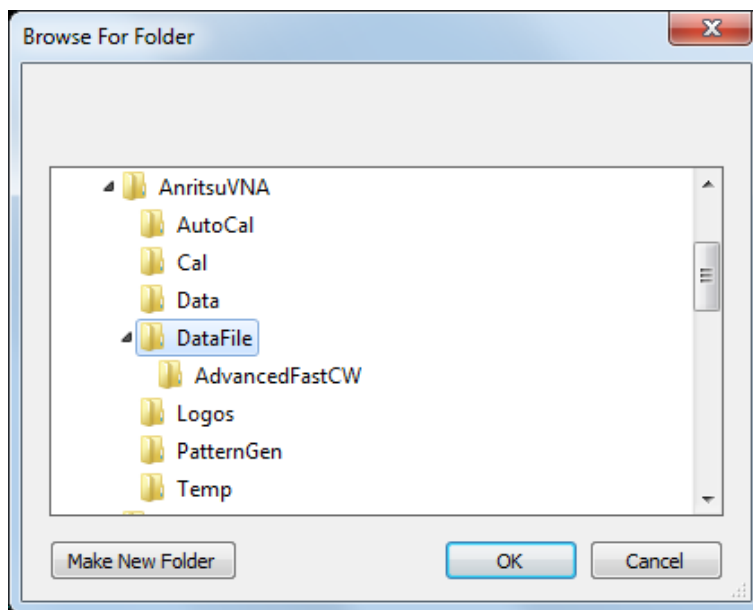
Select allows data export in binary format. See the Measurement Guide for details on this format.

HDF5 (.mat)

(HDF5 currently not supported; to be supported in later release.)

Binary File Path

Select opens a browsing dialog to designate the file path.



HDF5 File Name

(HDF5 currently not supported; to be supported in later release.)

Figure 22-6. Raw Data Export Menu

Receiver Menu

Previous

- [“Addl. FCW SETUP Menu” on page 22-5](#)

Prerequisites

- Option 35 and Option 46 is installed on the VNA.
- Advanced Fast CW application selected on Application menu.

Navigation

MAIN | Application | APPLICATION | Advanced CW Setup | ADVANCED CW SETUP | Additional Fast CW Setup | ADDL. FCW SETUP | Receiver| RECEIVER

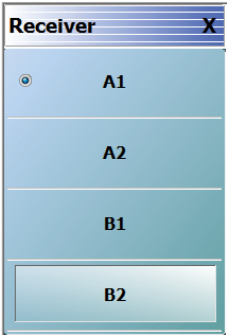
	<p>A1 Receiver Selects the A1 receiver.</p> <p>A2 Receiver Selects the A2 receiver.</p> <p>B1 Receiver Selects the B1 receiver.</p> <p>B2 Receiver Selects the B2 receiver.</p>
---	---

Figure 22-7. Fast CW – Receiver Menu (2-Port Systems)

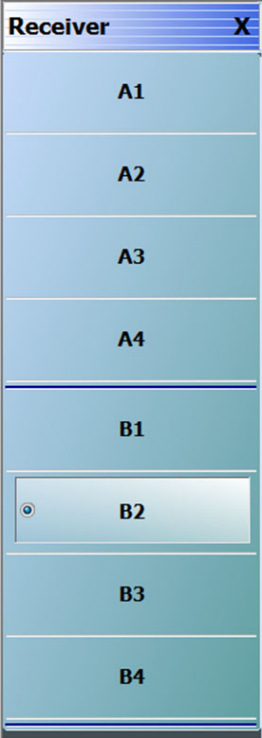
	<p>A1 Receiver Selects the A1 receiver.</p> <p>A2 Receiver Selects the A2 receiver.</p> <p>A3 Receiver Selects the A3 receiver.</p> <p>A4 Receiver Selects the A4 receiver.</p> <p>B1 Receiver Selects the B1 receiver.</p> <p>B2 Receiver Selects the B2 receiver.</p> <p>B3 Receiver Selects the B3 receiver.</p> <p>B4 Receiver Selects the B4 receiver.</p>
--	---

Figure 22-8. Fast CW – Receiver Menu (4-Port Systems)

Trigger Source Menu

Previous

- [“Addl. FCW SETUP Menu” on page 22-5](#)

Prerequisites

- None (This menu is a duplicate of that from the Sweep/Trigger menus and the entered selections transfer.)

Navigation

MAIN | Application | APPLICATION | Advanced CW Setup | ADVANCED CW SETUP | Additional Fast CW Setup | ADDL. FCW SETUP | Trigger Source | TRIGGER SOURCE

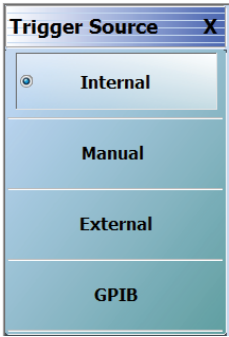
	<p>Internal</p> <p>Select sets triggering to be automatically created within the instrument. Internal triggering mode is an automatically triggered point-by-point measurement that is controlled by the instrument internal software.</p> <p>Manual</p> <p>Select sets triggering to be manually triggered by the user from the “Fast CW SETUP Menu”. The default setting is on a per-channel basis. The maximum setting is for all channels.</p> <p>External</p> <p>Select sets triggering to be created externally by another instrument and sensed through an external port/connector.</p> <p>GPIB</p> <p>Select sets triggering to be through an external GPIB device and communicated to the instrument via a GPIB network.</p>
---	---

Figure 22-9. Fast CW – Trigger Source Menu (2-Port Systems)

External Trigger Setup Menu

External trigger mode allows a rear panel input to start a measurement based per-point, per-sweep (or per-port), per-channel, or for all channels. The EXT. TRIGGER menu configuration options allow for selection of either a positive or negative signal edge, a trigger delay, and signal handshaking between the external triggering device and the instrument.

Previous

- [“Addl. FCW SETUP Menu” on page 22-5](#)

Prerequisites

- None (This menu is a duplicate of that from the Sweep/Trigger menus and the entered selections transfer.)

Navigation

MAIN | Application | APPLICATION | Advanced CW Setup | ADVANCED CW SETUP | Additional Fast CW Setup | ADDL. FCW SETUP | External Trigger Setup | EXT. TRIGGER

Ext. Trigger X

Trig. All Chan.

☒ Trig. One Chan.

Trig. One Sweep

Trig. One Point

Trigger Delay

0 s

Trigger On

Positive Edge

Trigger Handshake

OFF

NOTE

Trig.OnePoint and Trig.OneSweep are equiv. for Profile,P2P, and Fast CW modes.

Trig. All Chan.

The Trigger All Channels button sets the external trigger to measure values for all channels.

Trig. One Chan.

The Trigger One Channel button sets the external trigger to measure values for one channel only.

Trig. One Sweep

The Trigger One Sweep button sets the external trigger to measure values for one sweep only.

Trig. One Point

The Trigger One Point sets the external trigger to measure values for one point only.

Trigger Delay (Time)

Trigger delay sets the time interval between when the instrument received the trigger signal and when the triggered measurement starts.

Select displays the Trigger Delay field toolbar and allows the user to enter a trigger delay time and select units.

Trigger Delay : 0.0000 s

^

v

s

ms

us

ns

X

Trigger On (Positive Edge/Negative Edge) (External Trigger)

Select toggles the triggering point to be on either the positive edge or negative edge of the triggering signal. The default value is positive edge.

Trigger Handshake (Off/On) (External Trigger)

If triggering handshaking is on, the instrument provides a Ready for Trigger and an Output Trigger signal from the rear panel.

- The instrument sends a Ready for Trigger signal to specify if the instrument is ready or not to receive a triggering signal.
- The instrument sends an Output Trigger signal when the triggered measurement is complete.

Select toggles whether the trigger handshake is off or on. The default value is OFF.

Figure 22-10. Fast CW – External Trigger Setup Menu

22-10

PN: 10410-00319 Rev: AE

MS4640B Series VNA UIRM

Manual Trigger Setup Menu

Manual trigger mode is triggered by the user from the “Fast CW SETUP Menu” to start a measurement based on per-point, per-sweep (or port), per-channel, or for all channels.

Previous

- “Addl. FCW SETUP Menu” on page 22-5

Prerequisites

- None (This menu is a duplicate of that from the Sweep/Trigger menus and the entered selections transfer.)

Navigation

MAIN | Application | APPLICATION | Advanced CW Setup | ADVANCED CW SETUP | Additional Fast CW Setup | ADDL. FCW SETUP | Manual Trigger Setup | MANUAL TRIGGER

	<p>Trig. All Chan.</p> <p>The Trigger All Channels button sets the trigger to measure values for all channels.</p> <p>Trig. One Chan.</p> <p>The Trigger One Channel button sets the trigger to measure value for the active channel only.</p> <p>Trig. One Sweep</p> <p>The Trigger One Sweep button sets the trigger to measure values for one sweep only.</p> <p>Trig. One Point</p> <p>The Trigger One Point button sets the trigger to measure values for one point only.</p>
--	--

Figure 22-11. Fast CW – Manual Trigger Setup Menu

GPIB Trigger Setup Menu

Previous

- [“Addl. FCW SETUP Menu” on page 22-5](#)

Prerequisites

- None (This menu is a duplicate of that from the Sweep/Trigger menus and the entered selections transfer.)

Navigation

MAIN | Application | APPLICATION | Advanced CW Setup | ADVANCED CW SETUP | Additional Fast CW Setup | ADDL. FCW SETUP | GPIB Trigger Setup | GPIB TRIGGER

	<p>Trig. All Chan. The Trig. All Chan. button triggers a measurement for all channels.</p> <p>Trig. One Chan. The Trig. One Chan. button triggers a measurement for the active channel only.</p> <p>Trig. One Sweep The Trig. One Sweep button triggers a measurement for one sweep only.</p> <p>Trig. One Point The Trig. One Point button triggers a measurement for one point only.</p>
--	--

Figure 22-12. Fast CW – GPIB Trigger Setup Menu

Chapter 23 — Spectrum Analysis

23-1 Chapter Overview

This chapter provides information for the single APPLICATION menu for Spectrum Analysis setup and measurements.

Other Application Menu Chapters

Other APPLICATION menu chapters with specific application feature focus are:

- [Chapter 12, “Application Menus – Overview”](#)
- [Chapter 13, “Multiple Source”](#)
- [Chapter 14, “Broadband/mmWave”](#)
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)
- [Chapter 17, “Mixer Setup”](#)
- [Chapter 19, “PulseView™”](#)
- [Chapter 20, “DifferentialView™ \(True Mode Stimulus\)”](#)
- [Chapter 21, “IMDView™”](#)
- [Chapter 22, “Advanced Fast CW”](#)

23-2 Spectrum Analysis Overview

Spectrum analysis is option 49 for the MS464xB series VNAs and requires option 7. It is compatible with the ME7838 broadband/mm-wave systems, ME7848A optoelectronic systems and multiport systems.

Spectrum analysis uses the VNA receivers with a different processing mode to allow for the efficient display of broader spectral information and is particularly useful for observing harmonic and distortion content.

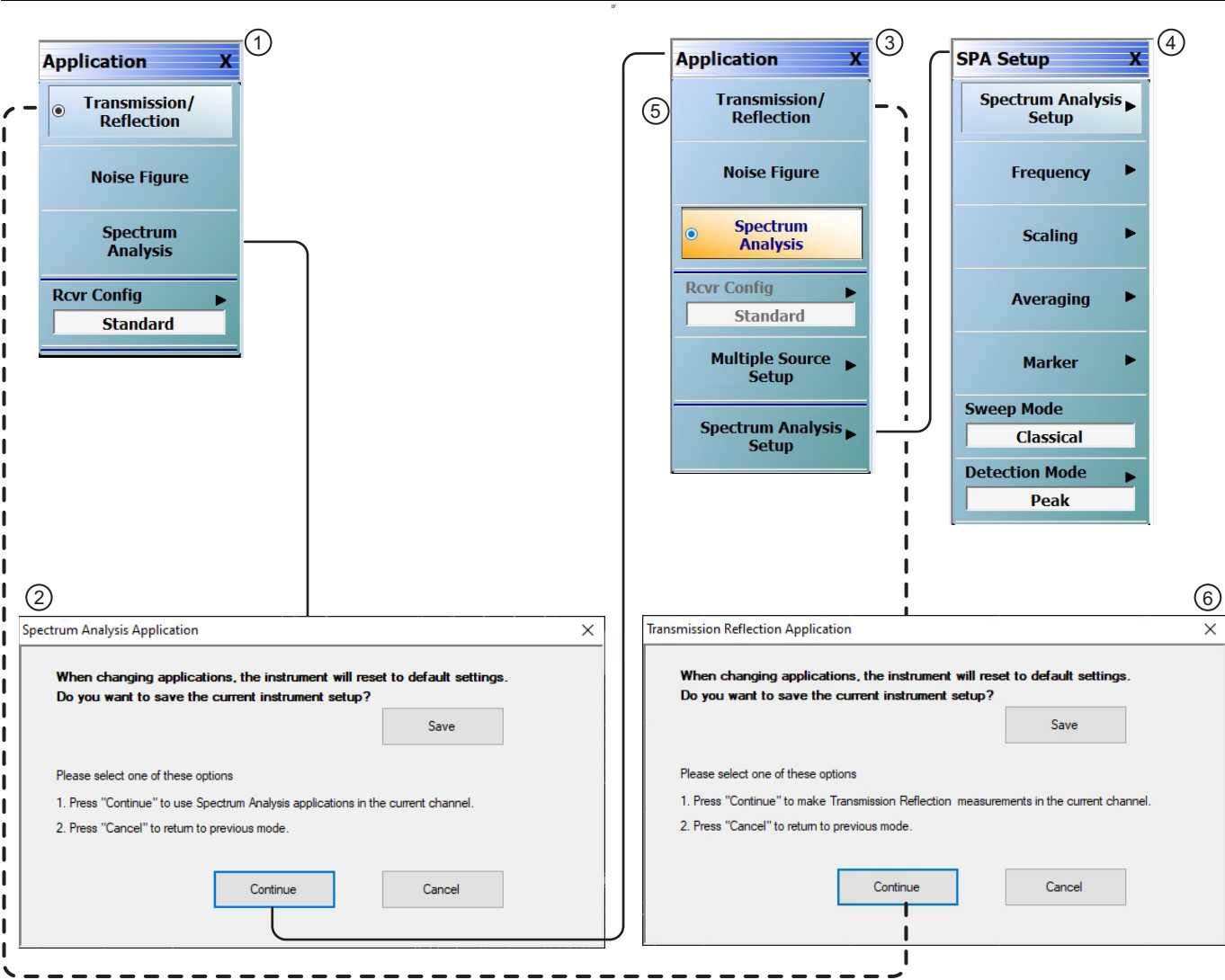
23-3 Spectrum Analysis Procedure

The typical procedure for a spectrum analysis is listed below.

1. Select a frequency range of interest, number of points, and sweep mode.
2. Select which receivers are of interest by assigning response variables to the traces (e.g., b2 for the port 2 test receiver)
3. Activate the internal source(s) if needed as a stimulus and program accordingly
4. Perform a receiver calibration if needed (unusual reference plane, using a broadband/mm-wave/multiport system...)
5. Attach signals and modify bandwidth, averaging and/or detection method to observe spectral content in the manner desired

23-4 Primary Application Menus and Spectrum Analysis Dialogs and Menus

The primary menu and dialog set for Spectrum Analysis measurement on the APPLICATION menu, the SPA SETUP menu, and the related dialog boxes is shown below. After clearing the entry SPECTRUM ANALYSIS APPLICATION dialog box, the SPA SETUP menu appears. When changing from Spectrum Analysis to another application, a similar exit dialog box appears, and when cleared, resolves into the APPLICATION menu in the new application mode.



- | | |
|--|--|
| 1. APPLICATION Menu – Typical APPLICATION menu variant with Option 49 equipped on VNA. | 4. SPA SETUP Menu – After APPLICATION menu Spectrum Analysis Setup button is selected. |
| 2. SPECTRUM ANALYSIS Mode Change Dialog Box – Provides options for canceling or saving setup and proceeding by selecting Continue. | 5. To exit Spectrum Analysis mode, select another application button on the top of the APPLICATION menu. |
| 3. APPLICATION Menu – Spectrum Analysis mode selected. | 6. New Application Dialog Box. |

Figure 23-1. APPLICATION Menu and SPA SETUP Menu and Dialog Set

Changing to Spectrum Analysis Mode

When the APPLICATION menu is set to a non-Spectrum Analysis application mode and Spectrum Analysis mode is selected, the SPECTRUM ANALYSIS dialog box appears. The dialog provides opportunities to:

- Save the current instrument setup as an Active Channel Setup and Calibration .CHX file and then either Cancel or Continue.
- Cancel out of the change to Spectrum Analysis application mode, and remain in the current application mode.
- Continue into Spectrum Analysis application mode.

Changing From Spectrum Analysis Mode to Another Application Mode

Similarly, when the APPLICATION menu is set to Spectrum Analysis application mode, and another application mode is selected, the new application dialog box appears. The dialog provides the opportunities to:

- Save the current instrument setup as an Active Channel Setup and Calibration .CHX file and then either Cancel or Continue.
- Cancel out of the change to the new application mode and remain in Spectrum Analysis application mode.
- Continue into the new application mode.

23-5 Application Menu for Spectrum Analysis

The APPLICATION menu set for Spectrum Analysis contains the following menu:

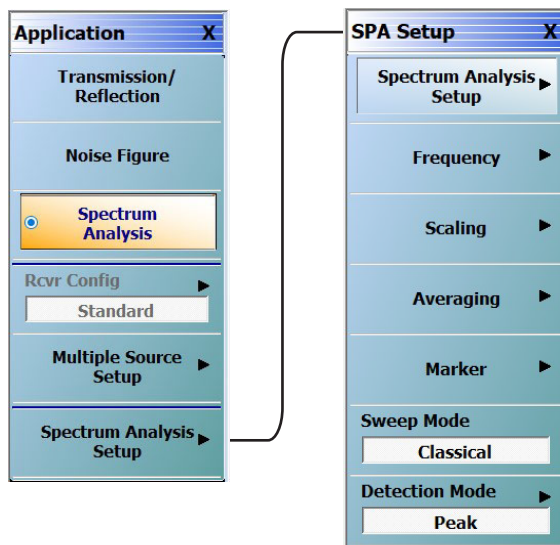


Figure 23-2. APPLICATION Menu and SPA SETUP Submenu

See the other APPLICATION menu chapters for descriptions of other menu button selections.

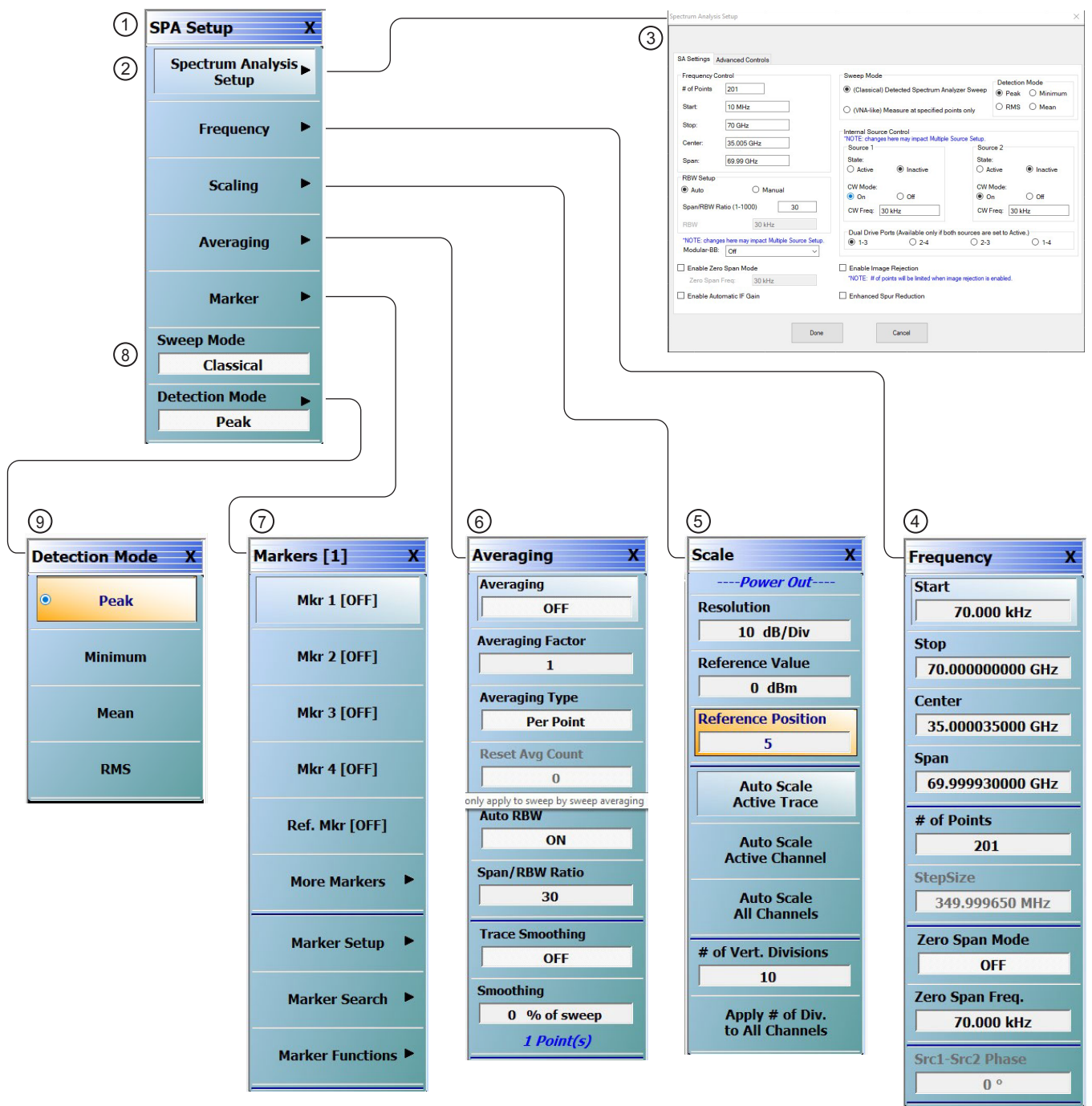
Spectrum Analysis

Selecting the Spectrum Analysis button displays the SPA SETUP menu.

- [“SPA SETUP Menu” on page 23-6](#)

23-6 Spectrum Analysis Menus and Dialogs

The Spectrum Analysis Measurement menu set and related dialogs are shown in the figure below.



- | | |
|--|-------------------------|
| 1. SPECTRUM ANALYSIS SETUP menu. | 5. SCALE menu. |
| 2. Spectrum Analysis Setup button selected. | 6. AVERAGING menu. |
| 3. SPECTRUM ANALYSIS SETUP dialog box (SA Settings tab). | 7. MARKER menu. |
| 4. FREQUENCY menu. | 8. Sweep Mode button. |
| | 9. Detection Mode menu. |

Figure 23-3. Spectrum Analysis Measurement Menu Set

SPA SETUP Menu

Previous

- [“APPLICATION Menu” on page 12-2](#)

Prerequisites

- Option 7 – Receiver Offset installed.
- Option 49 – Spectrum Analysis installed.

Navigation

- MAIN | Application | APPLICATION | Mode = Spectrum Analysis | Spectrum Analysis Setup | SPA SETUP

<div><p>VNA-like Mode</p></div> <div><p>Classical Mode</p></div>	<p>Spectrum Analysis Setup</p> <p>Select displays the SPECTRUM ANALYSIS SETUP dialog box.</p> <ul style="list-style-type: none">• “SPECTRUM ANALYSIS SETUP Dialog Box” on page 23-7 <p>Frequency</p> <p>Select displays the Frequency menu.</p> <ul style="list-style-type: none">• “FREQUENCY Menu” on page 23-11 <p>Scaling</p> <p>Select displays the SCALE menu.</p> <ul style="list-style-type: none">• Chapter 28, “Scale Menus” <p>Averaging</p> <p>Select displays the AVERAGING menu.</p> <ul style="list-style-type: none">• “AVERAGING Menu” on page 23-13 <p>Marker</p> <p>Select displays the MARKERS [1] menu.</p> <ul style="list-style-type: none">• “MARKERS [1] Menu” on page 29-4 <p>Sweep Mode</p> <p>Select switches between Classical and VNA-Like modes.</p> <p>Detection Mode</p> <p>Select displays the DETECTION MODE menu.</p> <ul style="list-style-type: none">• “DETECTION MODE Menu” on page 23-15
--	--

Figure 23-4. SPECTRUM ANALYSIS SETUP Menu

SPECTRUM ANALYSIS SETUP Dialog Box

A more detailed description of the operation of these controls is available in the *VectorStar Calibration and Measurement Guide – 10410-00318*.

Previous

- “SPA SETUP Menu” on page 23-6

Prerequisites

- Option 7 – Receiver Offset installed.
- Option 49 – Spectrum Analysis installed.

Navigation

MAIN | Application | APPLICATION | Mode = Spectrum Analysis | Spectrum Analysis Setup | SPA SETUP | Spectrum Analysis Setup | SPECTRUM ANALYSIS SETUP Dialog Box

Spectrum Analysis Setup

SA Settings | Advanced Controls

1 Frequency Control

of Points: 201

Start: 10 MHz

Stop: 70 GHz

Center: 35.005 GHz

Span: 69.99 GHz

2 RBW Setup

☒ Auto ☐ Manual

Span/RBW Ratio (1-1000): 30

RBW: 30 kHz

3 Sweep Mode

☒ (Classical) Detected Spectrum Analyzer Sweep

☐ (VNA-like) Measure at specified points only

Detection Mode

☒ Peak ☐ Minimum

☐ RMS ☐ Mean

4 Internal Source Control

*NOTE: changes here may impact Multiple Source Setup.

Source 1

State: ☐ Active ☒ Inactive

CW Mode: ☒ On ☐ Off

CW Freq: 30 kHz

Source 2

State: ☐ Active ☒ Inactive

CW Mode: ☒ On ☐ Off

CW Freq: 30 kHz

5 *NOTE: changes here may impact Multiple Source Setup.

6 Modular-BB: Off

7 ☐ Enable Zero Span Mode

Zero Span Freq: 30 kHz

8 ☐ Enable Image Rejection

*NOTE: # of points will be limited when image rejection is enabled.

9 ☐ Enhanced Spur Reduction

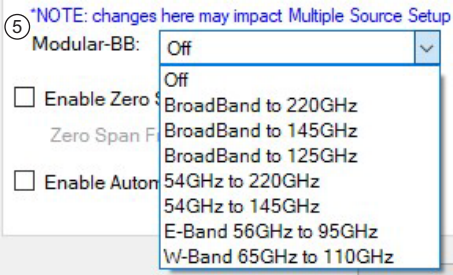
Dual Drive Ports (Available only if both sources are set to Active.)

☒ 1-3 ☐ 2-4 ☐ 2-3 ☐ 1-4

Done Cancel

Figure 23-5. SPECTRUM ANALYSIS SETUP Dialog – SA Settings Tab - Classical Mode (1 of 2)

- | | |
|--------------------------------------|---------------------------------------|
| 1. Frequency Control Pane. | 5. Modular-BB Drop-down. |
| 2. RBW Setup Pane – Auto Mode. | 6. Enable Zero Span Mode Checkbox. |
| 3. Sweep Mode Pane – Classical Mode. | 7. Enable Automatic IF Gain Checkbox. |
| 4. Internal Source Control Pane. | 8. Enable Image Rejection Checkbox. |
| | 9. Enhanced Spur Reduction Checkbox. |

	
1. RBW Setup Pane – Manual Mode	2. Modular-BB Drop-down

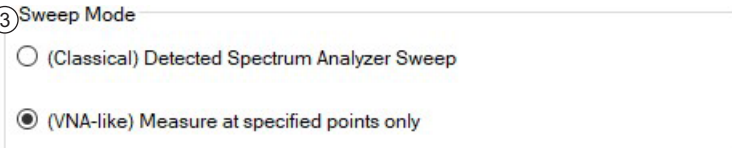
	
3. Sweep Mode Pane – VNA-like Mode	

Figure 23-5. SPECTRUM ANALYSIS SETUP Dialog – SA Settings Tab - Classical Mode (2 of 2)

Frequency Control Pane

Allows set up of the receiver sweep parameters.

RBW Setup Pane

Allows setting of the resolution BW either in Auto mode established by a Span/RBW ratio or by manual entry of the RBW value. Note that from an instrument hardware perspective, RBW is the same as IFBW referred to elsewhere in the user interface.

Modular-BB Drop-down

Available on VNAs with Option 8x. Allows selection of BB/mmWave band.

Enable Zero Span Mode Checkbox

Selection will turn on Zero Span mode (equivalent to CW mode in the transmission/reflection and other applications). If enabled, the system will be set to measure at the user entered Zero Span frequency.

Enable Automatic IF Gain Checkbox

Selection will turn on Automatic IF Gain. This is off by default, as automatic gain decisions are based on signal amplitudes only directly at the IF. Recommended to be turned on only when an internal source is being used as a tracking signal.

Sweep Mode Pane

Allows selection of either the Classical or VNA-Like mode. If Classical sweep mode is enabled, selections for detection mode (Peak, minimum, RMS, mean) are displayed.

- Classical Mode: Like a typical spectrum analyzer, it measures at all frequencies between start and stop but will display at a user-specified number of points.
- VNA-Like Mode: Measures only at the points specified by the user. Very fast, for when the user knows where the signals of interest are.

Internal Source Control Pane

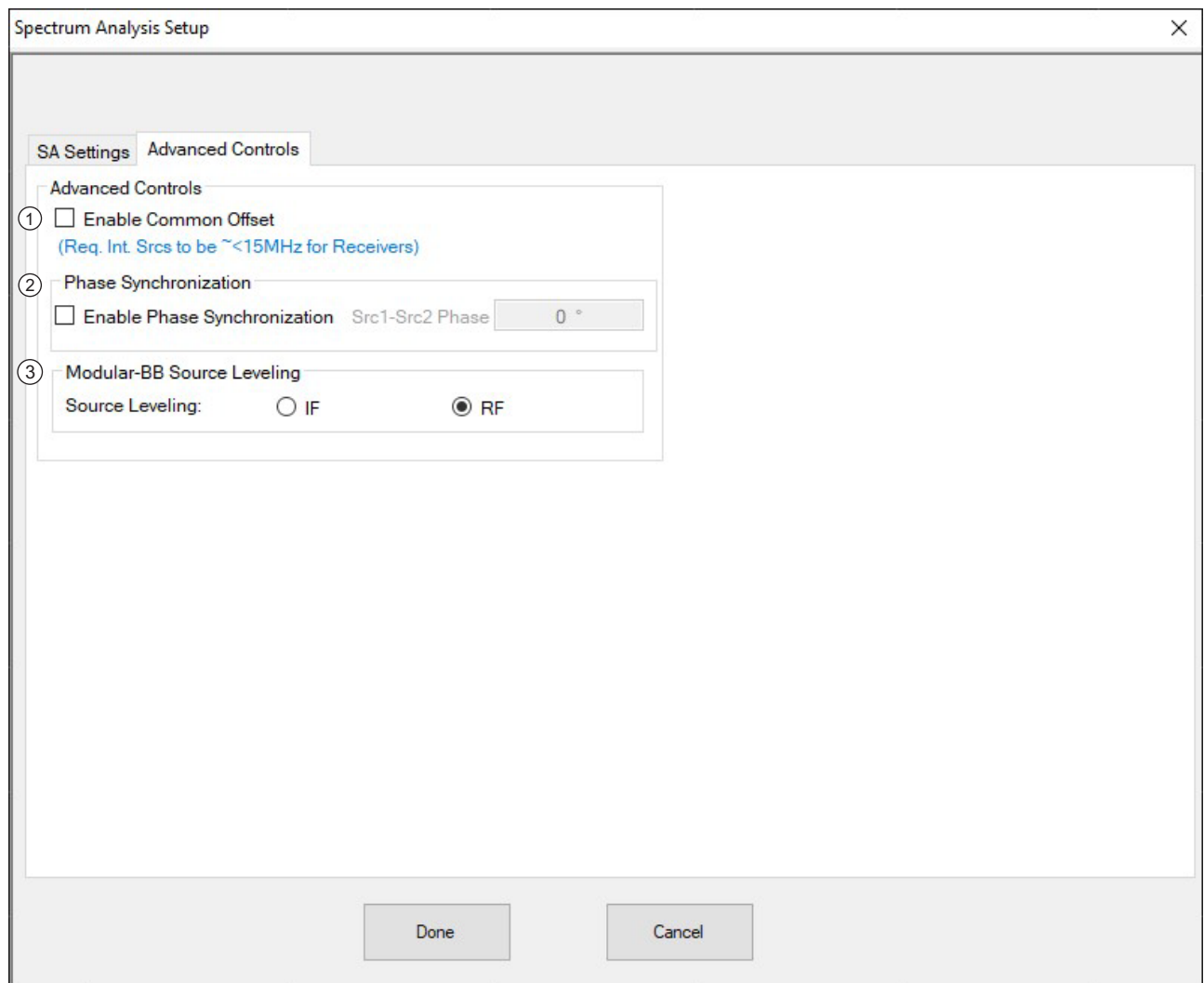
Allows setting of the internal source to the Active or Inactive state. Allows turning on of source CW mode at entered frequency.

Enable Image Rejection Checkbox

Selection will turn on Image Rejection. Number of sweep points will be limited when image rejection is enabled.

Enhanced Spur Reduction Checkbox

Selection will turn on Spur Reduction.



1. Advanced Controls: Enable Common Offset Checkbox.
2. Advanced Controls: Enable Phase Synchronization Checkbox.
3. Modular BB Source Leveling: Source Leveling Buttons.

Figure 23-6. SPECTRUM ANALYSIS SETUP Dialog – Advanced Controls Tab

Enable Common Offset Checkbox

Enables Common Offset Mode. When Common Offset Mode is ON, both the LO and Source signals are referenced to a common oscillator.

When Common Offset Mode is OFF, the LO and Source signals are referenced to independent oscillators.

Enable Phase Synchronization Checkbox

Enables phase synchronization of the internal sources. When ON, the two internal sources can be programmed phase coherently (same phase relationship sweep to sweep) at the expense of a small increase in trace noise. Phase synchronization only has effect if both internal sources are set to Active.

Source Leveling Buttons

Allows selection of the internal source leveling path. RF implies the VNA detection on the RF drive path, while IF uses the test set detection on a reference IFs.

FREQUENCY Menu

Previous

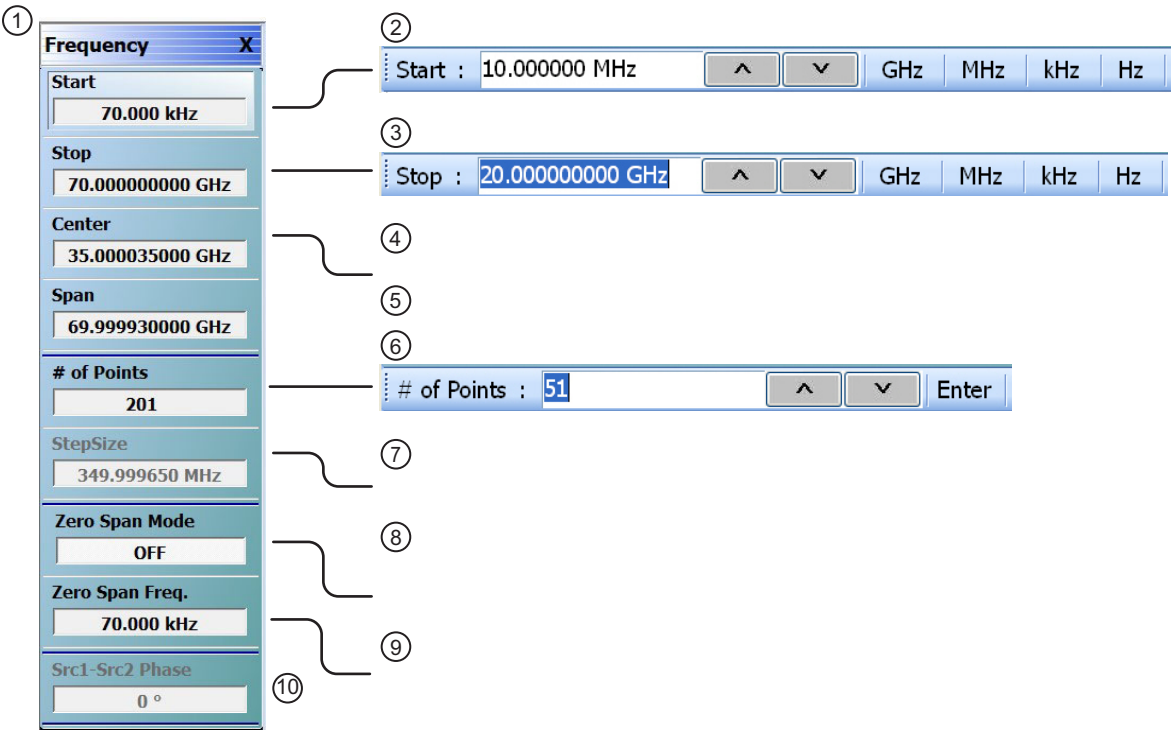
- “SPA SETUP Menu” on page 23-6

Prerequisites

- Option 49 and Option 7 are installed on the VNA.
- The APPLICATION menu mode is set to Spectrum Analysis mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Spectrum Analysis | Spectrum Analysis Setup | SPA SETUP | Frequency | FREQUENCY



1. FREQUENCY menu – Related button field toolbars shown to the right.	6. # of Points field toolbar.
2. Start Frequency field toolbar.	7. Step Size display-only button
3. Stop Frequency field toolbar.	8. Zero Span Mode button.
4. Center Frequency field toolbar.	9. Zero Span Frequency field toolbar.
5. Span Frequency field toolbar.	10. Src 1-Src 2 Phase field toolbar.

Figure 23-7. FREQUENCY Menu and Related Field Toolbars

Start (Frequency)

Select displays the Start frequency field toolbar to provide input for the start frequency in GHz, MHz, kHz, or Hz.

Stop (Frequency)

Select displays the Stop frequency field toolbar to provide input for the stop frequency in GHz, MHz, kHz, or Hz.

Center (Frequency)

Select displays the Stop frequency field toolbar to provide input for the stop frequency in GHz, MHz, kHz, or Hz.

Span (Frequency)

Select displays the Span frequency field toolbar to provide input for the span frequency in GHz, MHz, kHz, or Hz.

of Points

The Number of Points button displays the # of Points field toolbar and allows the user to enter the number of points for the frequency span, allowing separate parameter point settings for Zero Span Mode ON and Zero Span Mode OFF.

Step Size

A read-only field displays the calculated frequency step-size based on the requested frequency span and the number of points selected in the buttons above.

Zero Span Mode (Off/On)

Toggles Zero Span Mode OFF and ON.

Zero Span Frequency

Select displays the Zero Span Frequency field toolbar to provide input for the stop frequency in GHz, MHz, kHz, or Hz.

Src1-Src2 Phase

The Src1-Src2 Phase button is available when both internal sources are set to Active.

Select displays the Src1-Src2 Phase field toolbar and allows the user to set the required phase relationship between the two internal sources.

AVERAGING Menu

Previous

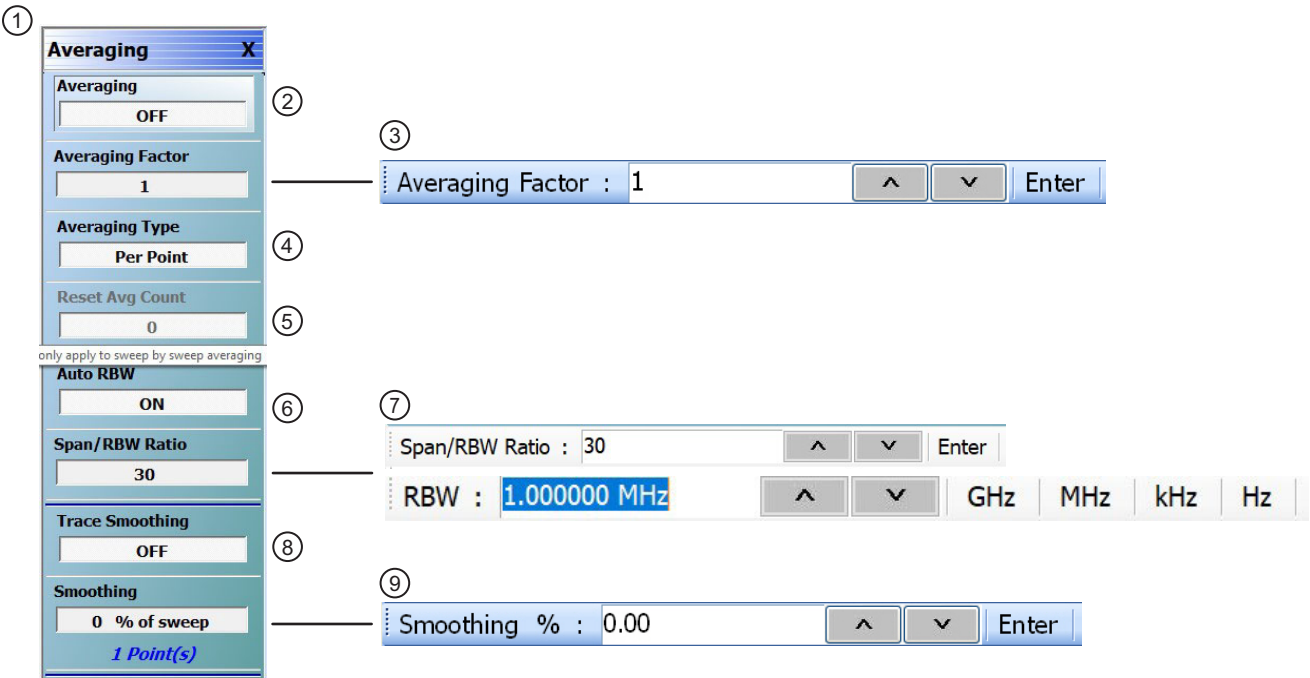
- “SPA SETUP Menu” on page 23-6

Prerequisites

- Option 49 and Option 7 are installed on the VNA.
- The APPLICATION menu mode is set to Spectrum Analysis mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Spectrum Analysis | Spectrum Analysis Setup | SPA SETUP | Averaging | AVERAGING



1. AVERAGING menu – Related button field toolbars shown to the right.	6. Auto RBW button.
2. Averaging button.	7. Span/RBW field toolbar / RBW field toolbar.
3. Averaging Factor field toolbar.	8. Trace Smoothing button.
4. Averaging Type button.	9. Smoothing field toolbar. Shows number of points below button.
5. Reset Avg. Count button.	

Figure 23-8. AVERAGING Menu and Related Field Toolbars

Averaging (Off/On)

Button present for frequency-based and power-based sweeps. Select toggles averaging off and on.

Averaging Factor

Button present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select displays the Averaging Factor field toolbar.

Averaging Type (Per Point/Per Sweep)

Button present for frequency-based and power-based sweeps. Not present for segment-based sweeps. Select toggles between averaging per point and averaging per sweep.

Reset Avg. Count (Display only)

Button present for frequency-based, power-based, and segment-based sweeps. Read only display field. Counts up to the Averaging Factory value as the averaging session proceeds. Select resets the averaging count to 0 (zero), and the averaging session starts anew.

Auto RBW (Off/On)

Toggles auto RBW OFF and ON.

Span/RBW

Visible if Auto RBW is ON.

RBW

Visible if Auto RBW is OFF. Resolution bandwidth is akin to IFBW in the other applications.

Trace Smoothing (Off/On)

On a per-trace basis, toggles trace smoothing OFF and ON.

Smoothing

On a per-trace basis, select displays the Smoothing % field toolbar. The toolbar allows the user to set the percentage of trace smoothing in use. A display below the button field shows the number of points that are smoothed.

DETECTION MODE Menu

Previous

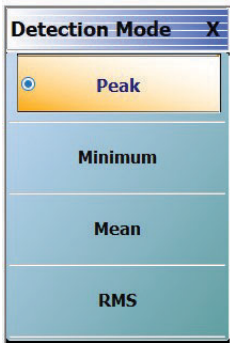
- [“SPA SETUP Menu” on page 23-6](#)

Prerequisites

- Option 49 and Option 7 are installed on the VNA.
- The APPLICATION menu mode is set to Spectrum Analysis mode.

Navigation

- MAIN | Application | APPLICATION | Mode = Spectrum Analysis | Spectrum Analysis Setup | SPA SETUP | Detection Mode | DETECTION MODE



Peak

The measurement with the maximum linear magnitude of the measurements in the subrange of the given parameter will be displayed. This is the default selection.

Minimum

The measurement with the minimum linear magnitude of the measurements in the subrange of the given parameter will be displayed. This is useful for very dense signals in the sweep range of interest.

Mean

The arithmetic mean of the linear magnitudes of the given parameter will be used as the result for the subrange. This can also be useful for noise-like or stochastic signals or those that are otherwise very dense.

RMS

The root-mean-square value of the linear magnitudes of the given parameter will be used as the result for the subrange. This can be useful for noise-like signals.

Figure 23-9. DETECTION MODE Menu

Chapter 24 — Trace Menus

24-1 Chapter Overview

This chapter provides information for the number of traces that appear for each channel and how those traces are arranged on the main display. Up to 16 traces can be defined for each channel. There are 22 available trace layouts.

24-2 Overview of Trace Menus

There are two (2) trace menus:

- [“TRACE Menu” on page 24-2](#)
- [“TRACE LAYOUT Menu” on page 24-4](#)

24-3 Trace Configuration

TRACE Menu

Previous

- “MAIN Menu” on page 2-2

Navigation

- MAIN | Trace | TRACE



Figure 24-1. TRACE Menu

1. TRACE Menu
2. # of Traces (Number of Traces) Field Toolbar
3. Trace Management Configuration – Traces 1 through 4 set to Display
4. Trace Management Configuration – Display All selected. All traces set to display
5. Trace Management Configuration – Trace 1 Selected to display.

Note: At least one trace must be selected to be in “Display” mode. If the “Configure” button is clicked in the Trace Management Configuration dialog after setting all trace displays to “Off”, the dialog will closed without error but Trace 1 display setting will be internally set to “Display” mode and hence only Trace 1 will be displayed by default for the selected channel.

Figure 24-1. TRACE Menu

Trace Max

Select displays the currently active trace and maximizes the display to fill the screen. Select again to return to the normal trace display.

Trace Next

Select activates the next higher trace number. If the highest trace was previously selected, trace 1 (one) is activated.

Trace Previous

Select activates the next lower trace number. If trace 1 (one) is was previously selected, the highest numbered trace is selected.

of Traces

Selecting the # of Traces (Number of Traces) button allows the user to define the number of traces that appear on the screen and displays the # of Traces field toolbar. On the toolbar, from 1 (one) to 16 traces per channel can be selected.

- If the number of traces is greater than the current trace display layout (described below), traces will be overlaid as required. For example, if the # of Traces selection is set to 6 (six) traces, and the trace layout is set to 4 (four) traces, 2 (two) of the trace displays will be overlaid with an additional trace.
- If the number of traces is less than the current trace display layout, trace display positions will be empty. For example, if the trace layout is for 16 traces (4 rows of 4 displays), and the # of Traces selection is set for 12 traces, the last row of three trace displays will be empty.

Trace Layout

Select displays the TRACE LAYOUT menu to change how the traces are displayed on the screen.

- [“TRACE LAYOUT Menu” on page 24-4](#)

Trace Management

Select displays the TRACE MANAGEMENT CONFIGURATION dialog to select which traces are displayed on the UI.

Traces can be left uncoupled or can be assigned to one of two coupled groups (A and B). Within a coupled group, the graph types and scales are forced to be the same. If a new member is added to a group, it is coerced to the format of the others in the group, and changing format of any member of the group will change the format of all members of the group.

The grouping process facilitates dual-Y-axis displays when multiple traces are overlaid. If members of A and B groups are overlaid and a member of either group is the active trace, both Y-axes will be displayed (with A and B annotations). If an uncoupled trace is active in such an overlay situation, only the Y-axis for that trace will be visible.

24-4 Trace Display Layout

TRACE LAYOUT Menu

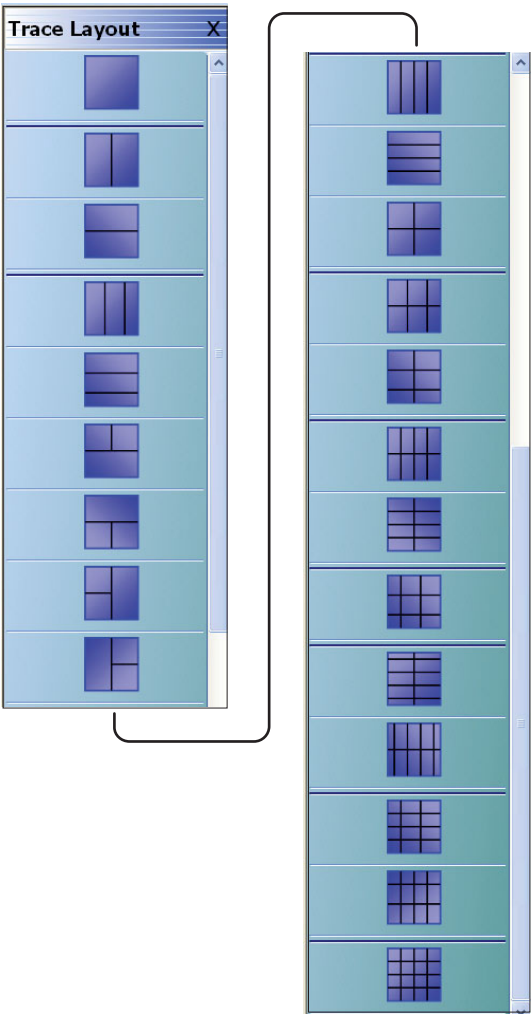
The trace view buttons are not labeled but instead provide a representation icon of the available view. Click the required view to select it. Click the **Back** button at the bottom of the TRACE LAYOUT menu to return to the TRACE menu. If more traces than trace layouts are specified, some or all of the trace layouts will show multiple overlaid trace displays. If more trace layouts than trace are specified, some trace layout positions will be empty.

Previous

- [“TRACE Menu” on page 24-2](#)

Navigation

- MAIN | Trace | TRACE | Trace Layout | TRACE LAYOUT



Single Trace View

Click **Back** to return to the Trace menu.

If SCPI programming is used to control the VNA, the command parameter for this trace view is R1C1. The command parameters for the other trace layout views are listed with each trace view type below.

Figure 24-2. TRACE LAYOUT Menu (1 of 3)

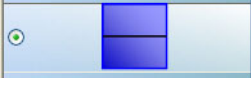
	Two Trace View – 2 Across x 1 Down Click Back to return to the Trace menu. R1C2 for SCPI programs.
	Two Trace View – 1 Across x 2 Down Click Back to return to the Trace menu. R2C1 for SCPI programs.
	Three Trace View – 3 Across Click Back to return to the Trace menu. R1C3 for SCPI programs.
	Three Trace View – 3 Down Click Back to return to the Trace menu. R3C1 for SCPI programs.
	Three Trace View – 2 on Top x 1 on Bottom Click Back to return to the Trace menu. R2C2C1 for SCPI programs.
	Three Trace View – 1 on Top x 2 on Bottom Click Back to return to the Trace menu. R2C1C2 for SCPI programs.
	Three Trace View – 2 on Left x 1 on Right Click Back to return to the Trace menu. C2R2R1 for SCPI programs.
	Three Trace View – 1 on Left x 2 on Right Click Back to return to the Trace menu. C2R1R2 for SCPI programs.
	Four Trace View – 4 Across Click Back to return to the Trace menu. R1C4 for SCPI programs.
	Four Trace View – 4 Down Click Back to return to the Trace menu. R4C1 for SCPI programs.
	Four Trace View – 2 Across x 2 Down Click Back to return to the Trace menu. R2C2 for SCPI programs.
	Six Trace View – 3 Across x 2 Down Click Back to return to the Trace menu. R2C3 for SCPI programs.

Figure 24-2. TRACE LAYOUT Menu (2 of 3)

	Six Trace View – 2 Across x 3 Down Click Back to return to the Trace menu. R3C2 for SCPI programs.
	Eight Trace View – 4 Across x 2 Down Click Back to return to the Trace menu. R2C4 for SCPI programs.
	Eight Trace View – 2 Across x 4 Down Click Back to return to the Trace menu. R4C2 for SCPI programs.
	Nine Trace View – 3 Across x 3 Down Click Back to return to the Trace menu. R3C3 for SCPI programs.
	Ten Trace View – 5 Across x 2 Down Click Back to return to the Trace menu. R5C2 for SCPI programs.
	Ten Trace View – 2 Across x 5 Down Click Back to return to the Trace menu. R2C5 for SCPI programs.
	Twelve Trace View – 3 Across x 4 Down Click Back to return to the Trace menu. R4C3 for SCPI programs.
	Twelve Trace View – 4 Across x 3 Down Click Back to return to the Trace menu. R3C4 for SCPI programs.
	Sixteen Trace View – 4 Across x 4 Down Click Back to return to the Trace menu. R4C4 for SCPI programs.

Figure 24-2. TRACE LAYOUT Menu (3 of 3)

Chapter 25 — Response Menus – 2-Port VNAs

25-1 Chapter Overview

This chapter provides information for the 2-port VNA Response menus for configuration of the required S-Parameter or user-definition of a unique parameter. This menu also controls the rear panel External Analog Input port source.

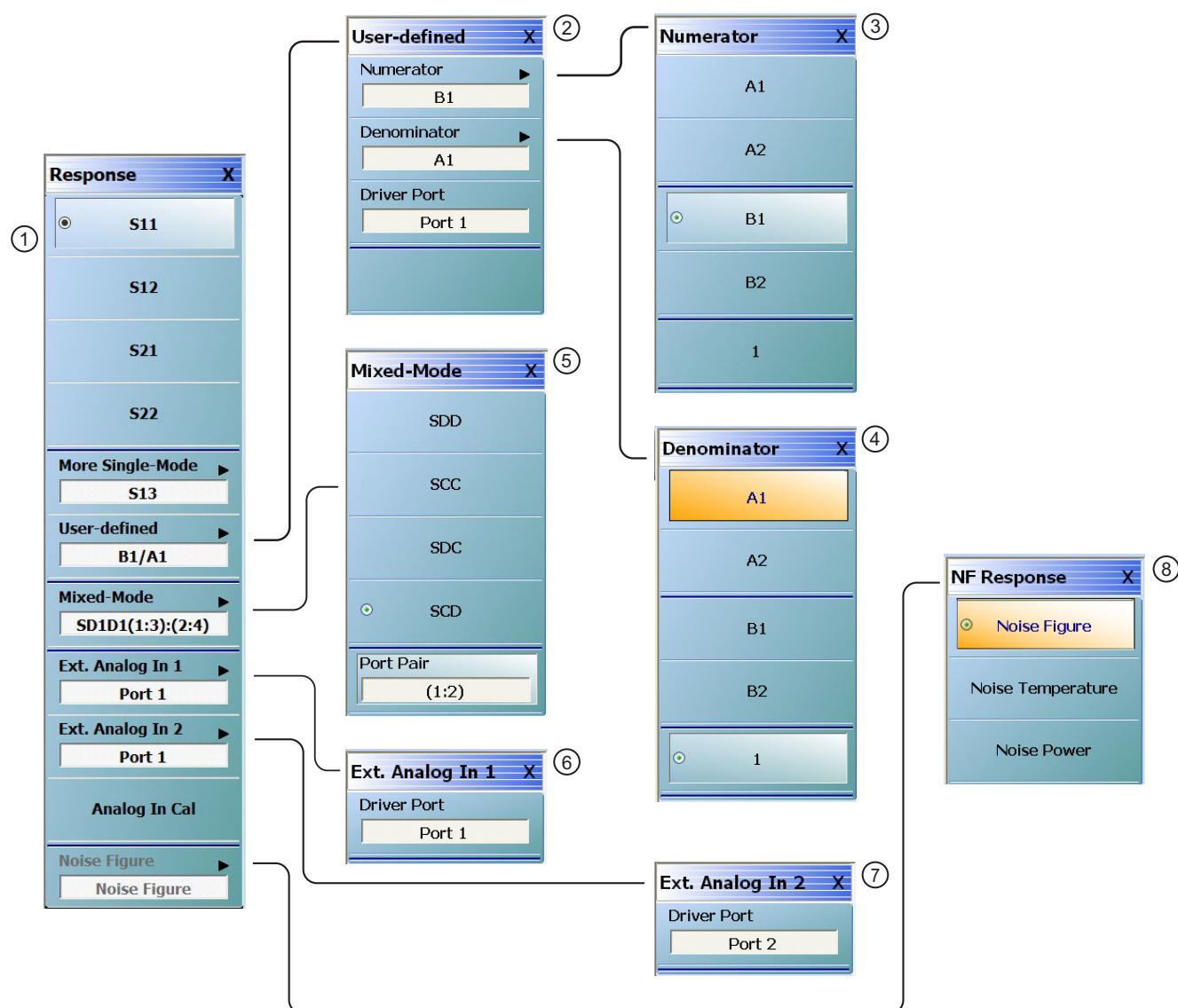
For information on the Response menu for 4-Port VNA, consult [Chapter 26 — Response Menus – 4-Port VNAs](#).

25-2 Primary Response Menus – 2-Port VNAs

The available 2-port Response menus are:

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)
- [“USER-DEFINED Menu – 2-Port VNAs” on page 25-6](#)
- [“DENOMINATOR Menu – 2-Port VNAs” on page 25-9](#)
- [“MIXED MODE Menu – 2-Port VNAs” on page 25-10](#)
- [“EXT. ANALOG IN 1 Menu – 2-Port VNAs” on page 25-11](#)
- [“EXT. ANALOG IN 2 Menu – 2-Port VNAs” on page 25-11](#)
- [“MEAN OPT. PWR. 1 Menu – 2-Port VNAs” on page 25-12](#)
- [“MEAN OPT. PWR. 2 Menu – 2-Port VNAs” on page 25-13](#)
- [“NF RESPONSE Menu – 2-Port VNAs \(Option 41\)” on page 25-15](#)
- [“NF RESPONSE Menu – 2-Port VNAs \(Option 48\)” on page 25-16](#)
- [“IMD RESPONSE Menu – 2-Port VNAs with IMDView Active” on page 25-18](#)

The figure below shows Response 2-Port Menu Set when Option 41 – Noise Figure Measurement is installed.



1. RESPONSE Menu

- The Noise Figure button is not present if Option 41/48 is not installed.
- The Noise Figure button is only available if the instrument mode on the APPLICATION menu is set as Noise Figure.

2. USER-DEFINED Menu

- If Noise Figure mode has been set on the APPLICATION menu, this button is unavailable and grayed out.

3. NUMERATOR Menu

4. DENOMINATOR Menu

5. MIXED-MODE Menu

- If Noise Figure mode has been set on the APPLICATION menu, this button is unavailable and grayed out.

6. EXT. ANALOG IN 1 Menu

7. EXT. ANALOG IN 2 Menu

8. NF RESPONSE (Noise Figure Response) Menu

Figure 25-1. Response Menu Set – 2-Port VNAs with Option 41 Noise Figure Measurement Installed

RESPONSE Menu – 2-Port VNAs

Previous

- “MAIN Menu” on page 2-2

Navigation

- MAIN | Response | RESPONSE



1. RESPONSE Menu – 2-Port VNA

Noise Figure is not equipped; No Option 41 or 48.

2. RESPONSE Menu – 2-Port VNA

- Noise Figure is equipped; Option 41 or 48.
- The VNA measurement mode at the APPLICATION menu is not set to Noise Figure.

3. RESPONSE Menu – 2-Port VNA

- Noise Figure is equipped; Option 41 or 48.
- The VNA measurement mode at the APPLICATION menu is set to Noise Figure.
- The User-Defined button is unavailable.
- The Mixed-Mode button is unavailable.

4. Response Menu – 4-Port VNA

- Option 41/48 – Noise Figure is not equipped.
- Optical Measurements is ON.

5. IMD RESPONSE Menu – 2-Port VNA

- Option 44 – IMDView active.

Figure 25-2. RESPONSE Menu – 2-Port VNAs

Button Selection Group

- All the buttons of the RESPONSE menu, except for the Analog In Cal button, form a button selection group where the selection of any one button de-selects the other buttons.

S11 (Response)

Select sets the response to the input reflection coefficient (or S11 Forward Reflection) and de-selects S12, S21, S22, User-defined, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2.

S12 (Response)

Select sets the response to the reverse transmission coefficient (or S12 Reverse Transmission) and de-selects S12, S21, S22, User-defined, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2.

S21 (Response)

Select sets the response to the forward transmission coefficient (or S21 Forward Transmission) and de-selects S12, S21, S22, User-defined, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2.

S22 (Response)

Select sets the response to the output reflection coefficient (or S22 Reverse Reflection) and de-selects S12, S21, S22, User-defined, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2.

User-defined (Response)

Select displays the USER-DEFINED menu and sets the response to a user-defined mathematical fraction by using the USER DEFINED menu to select S11, S12, S21, S22, or 1 (one) as a numerator over S11, S12, S21, S22, or 1 as the denominator. Select also de-selects S12, S21, S22, Mixed-Mode, Ext. Analog In 1, and Ext. Analog In 2. This button is unavailable if the VNA measurement mode at the APPLICATION menu is set to Noise Figure. Option 41 or Option 48 must be equipped for Noise Figure.

- [“USER-DEFINED Menu – 2-Port VNAs” on page 25-6](#)

Mixed-Mode (Response 2-Port)

Select displays the MIXED-MODE menu where mixed-mode response options of SDD, SCC, SDC, and SCD are available with a Port Pair assignment of either 1:2 or 2:1. Select also de-selects S12, S21, S22, User-Defined, Ext. Analog In 1, and Ext. Analog In 2. This button is unavailable if the VNA measurement mode at the APPLICATION menu is set to Noise Figure. Option 41 or Option 48 must be equipped for Noise Figure.

- [“MIXED MODE Menu – 2-Port VNAs” on page 25-10](#)

Ext. Analog In 1 (Response)

Select displays the EXT ANALOG 1 menu and de-selects S12, S21, S22, User-defined, and Ext. Analog In 2.

- [“EXT. ANALOG IN 1 Menu – 2-Port VNAs” on page 25-11](#)

Ext. Analog In 2 (Response)

Select displays the EXT ANALOG 2 menu and de-selects S12, S21, S22, User-defined, and Ext. Analog In 1.

- [“EXT. ANALOG IN 2 Menu – 2-Port VNAs” on page 25-11](#)

Mean Opt. Pwr. 1

Allows selection of driving port. Displays responsivity.

- [“MEAN OPT. PWR. 1 Menu – 2-Port VNAs” on page 25-12](#)

Mean Opt. Pwr. 2

Allows selection of driving port. Displays responsivity.

- [“MEAN OPT. PWR. 2 Menu – 2-Port VNAs” on page 25-13](#)

Analog In Cal

Opens the [“Analog In Cal Dialog Box” on page 25-14](#).

Noise Figure

This button is only present if Option 41 – Noise Figure or Option 48 – Differential Noise Figure is equipped on the VNA. If present, it is only available if the VNA application mode is set to Noise Figure. The application mode is set on the APPLICATION menu at:

- MAIN | Application | APPLICATION | Mode = Noise Figure
- [Chapter 15, “Noise Figure \(Option 41\)”](#)
- [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)

If present and available, select displays the NF RESPONSE menu where the noise figure response type is selected.

- [“NF RESPONSE Menu – 2-Port VNAs \(Option 41\)” on page 25-15](#)

If the Noise Figure button is available, the User-Defined and Mixed-Mode buttons are unavailable.

Response Menu: IMD Response

Select displays the IMD Response Configuration dialog.

- [“IMD Response Menu \(2-Port\)” on page 25-18](#)

25-3 User-Defined Parameter Menus – 2-Port VNAs

USER-DEFINED Menu – 2-Port VNAs

The USER DEFINED menu is used to establish various mathematical combinations of incident and reflected power values. See [Table 25-1, “User-Defined Numerator/Denominator Combinations” on page 25-7](#) below for all possible combinations and definitions of the more common parameters.

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED

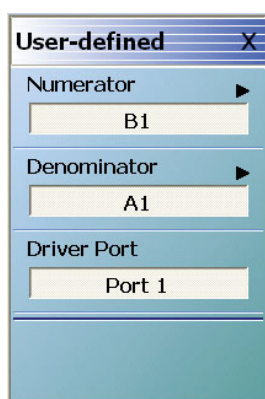


Figure 25-3. USER DEFINED Menu – 2-Port VNAs

Numerator

Select displays the NUMERATOR menu. Once a numerator value is selected, the menu auto-returns to the USER DEFINED menu.

- [“NUMERATOR Menu – 2-Port VNAs” on page 25-8](#)

Denominator

Select displays the DENOMINATOR menu. Once a denominator value is selected, the menu auto-returns to the USER DEFINED menu.

- [“DENOMINATOR Menu – 2-Port VNAs” on page 25-9](#)

Driver Port (Port 1/Port 2)

Select toggles the driving port between Port 1 and Port 2.

Table 25-1. User-Defined Numerator/Denominator Combinations

Denominator	Numerator				
	A1	A2	B1	B2	1
A1	$\frac{A1}{A1} = 1$	$\frac{A2}{A1}$	$\frac{B1}{A1}$ S11 Forward Reflection	$\frac{B2}{A1}$ S21 Forward Transmission	$\frac{1}{A1}$
A2	$\frac{A1}{A2}$	$\frac{A2}{A2} = 1$	$\frac{B1}{A2}$ S12 Reverse Transmission	$\frac{B2}{A2}$ S22 Reverse Reflection	$\frac{1}{A2}$
B1	$\frac{A1}{B1}$	$\frac{A2}{B1}$	$\frac{B1}{B1} = 1$	$\frac{B2}{B1}$	$\frac{1}{B1}$
B2	$\frac{A1}{B2}$	$\frac{A2}{B2}$	$\frac{B1}{B2}$	$\frac{B2}{B2} = 1$	$\frac{1}{B2}$
1	$\frac{A1}{1} = A1$	$\frac{A2}{1} = A2$	$\frac{B1}{1} = B1$	$\frac{B2}{1} = B2$	$\frac{1}{1} = 1$

NUMERATOR Menu – 2-Port VNAs

Previous

- [“USER-DEFINED Menu – 2-Port VNAs” on page 25-6](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED | Numerator | NUMERATOR

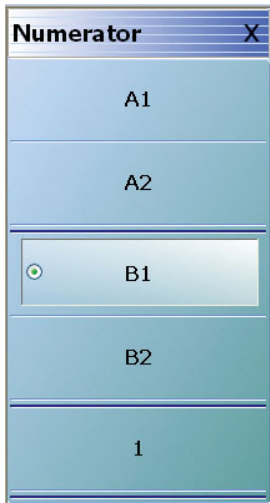


Figure 25-4. NUMERATOR Menu – 2-Port VNAs

Numerator Auto-Return Button Selection Group

- The buttons of the NUMERATOR menu form an auto-return button selection group, where the selection of any one button de-selects all other buttons and auto-returns to the USER-DEFINED menu.
- The possible combinations of the NUMERATOR and DENOMINATOR functions are summarized above in [Table 25-1, “User-Defined Numerator/Denominator Combinations” on page 25-7.](#)

A1 (Numerator)

Select specifies that A1, incident power on port 1, will be the numerator value.

A2 (Numerator)

Select specifies that A2 will be the numerator value.

B1 (Numerator)

Select specifies that B1, received power on port 1, will be the numerator value.

B2 (Numerator)

Select specifies that B2 will be the numerator value.

1 (One) (Numerator)

Select specifies that 1 (one) will be the numerator value.

DENOMINATOR Menu – 2-Port VNAs

Previous

- [“USER-DEFINED Menu – 2-Port VNAs” on page 25-6](#)

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED | Denominator | DENOMINATOR
-

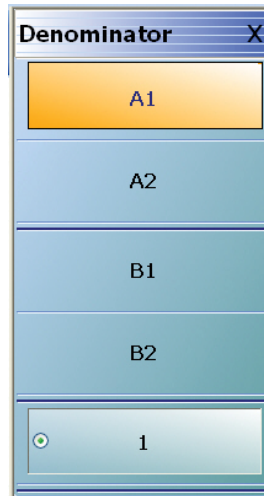


Figure 25-5. DENOMINATOR Menu – 2-Port VNAs

Denominator Auto-Return Button Selection Group

- The buttons of the DENOMINATOR menu form an auto-return button selection group, where the selection of any one button de-selects all other buttons and auto-returns to the USER DEFINED menu.
- The possible combinations of the NUMERATOR and DENOMINATOR functions are summarized in [Table 25-1, “User-Defined Numerator/Denominator Combinations” on page 25-7](#) above.

A1 (Denominator)

Select sets A1 as the denominator value.

A2 (Denominator)

Select sets A2 as the denominator value.

B1 (Denominator)

Select sets B1 as the denominator value.

B2 (Denominator)

Select sets B2 as the denominator value.

1 (One) (Denominator)

Select sets 1 (one) as the denominator value.

25-4 Mixed Mode Setup Menus – 2-Port VNAs

MIXED MODE Menu – 2-Port VNAs

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Navigation

- MAIN | Response | RESPONSE | Mixed-Mode | MIXED-MODE

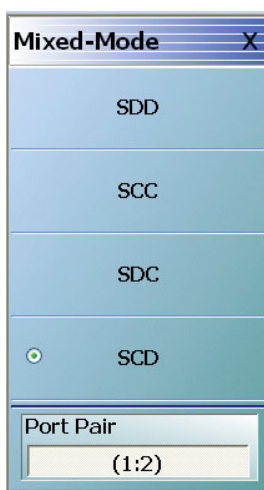


Figure 25-6. MIXED MODE Menu – 2-Port VNAs

SDD

Select sets the S-Parameter to differential reception with differential drive where the reception/driver ports are determined by the Port Pair button below.

SCC

Select sets the S-Parameter to common-mode reception with common-mode drive where the reception/driver ports are determined by the Port Pair button below.

SDC

Select sets the S-Parameter to differential reception with common-mode drive where the reception/driver ports are determined by the Port Pair button below.

SCD

Select sets the S-Parameter to common-mode reception with differential drive where the reception/driver ports are determined by the Port Pair button below.

Port Pair

Toggles the reception/driver port pair between 1:2 and 2:1.

25-5 External Analog Input Menus

EXT. ANALOG IN 1 Menu – 2-Port VNAs

Full Name

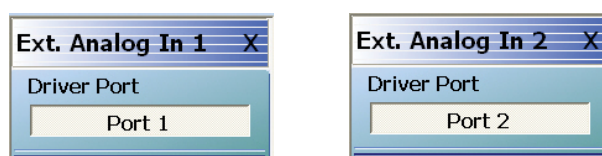
External Analog Input 1

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Navigation

- MAIN | Response | RESPONSE | Ext Analog In 1 | EXT ANALOG IN 1



EXT. ANALOG IN 1 menu on left and EXT. ANALOG IN 2 menu on right.

Figure 25-7. EXT. ANALOG IN (External Analog Input) Menus – 2-Port VNAs

Driver Port

Click to select the driver port.

EXT. ANALOG IN 2 Menu – 2-Port VNAs

Full Name

External Analog Input 2

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Navigation

- MAIN | Response | RESPONSE | Ext. Analog In 2 | EXT.ANALOG IN 2

Figure

- See [Figure 25-7](#) above.

Driver Port

Click to select the driver port.

25-6 Mean Opt. Pwr. Menu

MEAN OPT. PWR. 1 Menu – 2-Port VNAs

Full Name

Mean Optical Power 1 – 2-Port VNAs

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Prerequisites

- Optical Measurements must be ON.

Navigation

- MAIN | Response | RESPONSE | Mean Opt. Pwr. 1 | MEAN OPT. PWR. 1

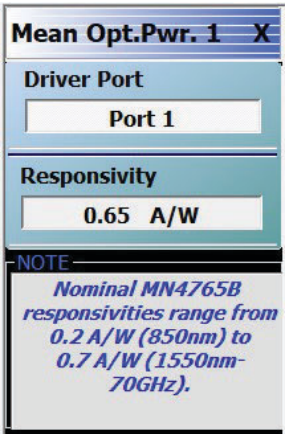


Figure 25-8. Mean Opt. Pwr. 1 Menu

Driver Port

Click to select the driver port.

Responsivity

Click to set responsivity. Nominal MN4765B responsivities range from 0.2 A/W (850nm) to 0.7 A/W (1550nm-70GHz).

MEAN OPT. PWR. 2 Menu – 2-Port VNAs

This assumes the photodiode output is connected (usually via a bias tee, whether that be internal or external) to Ext. Analog In. This selection then uses the responsivity entry to convert the DC value to optical power.

Full Name

Mean Optical Power 2

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Prerequisites

- Optical Measurements must be ON.

Navigation

- MAIN | Response | RESPONSE | Mean Opt. Pwr. 2 | MEAN OPT. PWR. 2

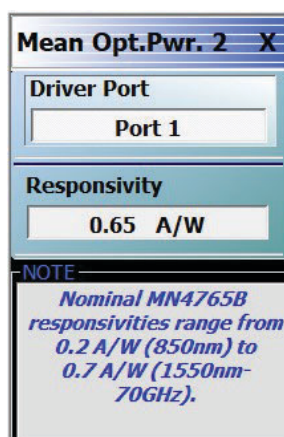


Figure 25-9. Mean Opt. Pwr. 2 Menu

Driver Port

Allows selection of the driving port.

Responsivity

Click to set responsivity. Nominal MN4765B responsivities range from 0.2 A/W (850nm) to 0.7 A/W (1550nm-70GHz).

25-7 Analog In Cal Dialog Box

This assumes the photodiode output is connected (usually via a bias tee, whether that be internal or external) to Ext. Analog In. This selection then uses the responsivity entry to convert the DC value to optical power.

Full Name

Analog In Calibration – 4-Port VNAs

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Navigation

- MAIN | Response | RESPONSE | Analog In Cal | ANALOG IN CALIBRATION

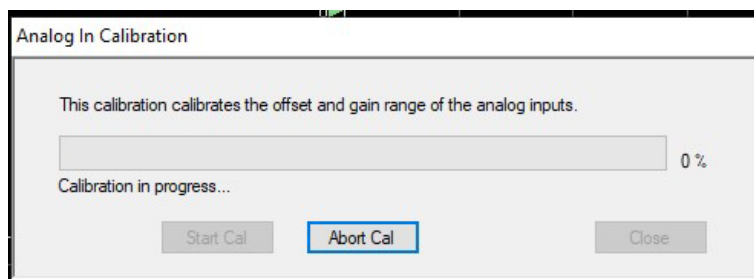


Figure 25-10. Analog In Cal Dialog Box

Performs an analog input calibration.

25-8 Noise Figure Response Menu

NF RESPONSE Menu – 2-Port VNAs (Option 41)

Full Name

Noise Figure Response

Prerequisites

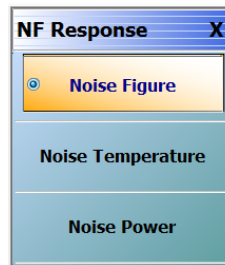
- The VNA must be equipped with Option 41 – Noise Figure Measurement
- The application mode must be set to Noise Figure on the APPLICATION menu.
 - MAIN | Application | APPLICATION
 - [Chapter 15, “Noise Figure \(Option 41\)”](#)

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Navigation

- MAIN | Response | RESPONSE | Noise Figure | NF RESPONSE



1. NF Response Menu, Option 41

Figure 25-11. NF RESPONSE (Noise Figure Response) Menu

Note	All of the noise figure response types are real only. Keep this in mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.
-------------	--

Button Selection Group

- The buttons on the NF RESPONSE menu form a button selection group where selection of any one button de-selects all other buttons.

Noise Figure

Select sets the noise figure measurement to Noise Figure. The noise figure is measured on a cold source basis. The units are set by the graph type.

Noise Temperature

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. The noise temperature is calculated from the noise figure. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

Noise Power

Select sets the noise figure measurement to Noise Power trace response. The measurement units are set by the graph type. The units will be in absolute power when a receiver calibration is applied.

NF RESPONSE Menu – 2-Port VNAs (Option 48)

Full Name

Noise Figure Response

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Prerequisites

- The VNA must be equipped with Option 48 – Differential Noise Figure
- The application mode must be set to Noise Figure on the APPLICATION menu.
 - MAIN | Application | APPLICATION
 - [Chapter 16, “Differential Noise Figure \(Option 48\)”](#)

Navigation

- MAIN | Response | RESPONSE | Noise Figure | NF RESPONSE

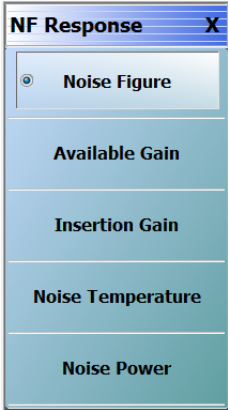
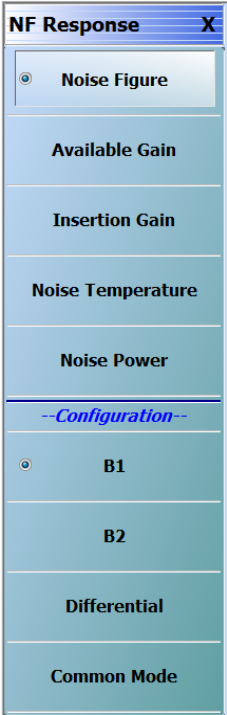
	
1. NF Response Menu, Option 48, 2-port DUT	2. NF Response Menu, Option 48, 4-port DUT

Figure 25-12. NF RESPONSE (Noise Figure Response) Menu

Note

All of the noise figure response types are real only. Keep this in mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.

Button Selection Group

- The buttons on the NF RESPONSE menu form a button selection group where selection of any one button de-selects all other buttons.

Noise Figure

Select sets the noise figure measurement to Noise Figure. The noise figure is measured on a cold source basis. The units are set by the graph type.

Available Gain

Displays the available gain (in a static display, as it is based on loaded DUT S-parameters) of the DUT. This describes the gain if the output saw a conjugate match.

Insertion Gain

Displays the insertion gain (in a static display, as it is based on loaded DUT S-parameters) of the DUT. This does not include match effects.

Noise Temperature

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. The noise temperature is calculated from the noise figure. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

Noise Power

Select sets the noise figure measurement to Noise Power trace response. The measurement units are set by the graph type. The units will be in absolute power when a receiver calibration is applied.

When the DUT type is selected as 2-port, the response can be allocated to either the b1 or b2 receiver on the VNA (e.g., noise power for VNA b1 fully describes the response).

When the DUT type is selected as 4-port, the response can be allocated to the b1 or b2 receiver path or to the differential or common modes.

Configuration (Only available for 4-port DUT)

Each of the above parameters requires a port/receiver definition (with a 4-port DUT) and these selections are either single-ended (into VNA b1 or b2 receivers), differential, or common-mode. If the DUT type is 2-port, the response variable will be assigned to the current receiver path.

25-9 IMD Response Menu (2-Port)

IMD RESPONSE Menu – 2-Port VNAs with IMDView Active

Previous

- [“RESPONSE Menu – 2-Port VNAs” on page 25-3](#)

Prerequisites

- VNA equipped with Option 44 – IMDView
- The application mode must be set to IMDView ON on the APPLICATION menu.
 - MAIN | Application | APPLICATION
 - [Chapter 21, “IMDView™”](#)

Navigation

- MAIN | Response | IMD Response | IMD Config | IMD RESPONSE CONFIGURATION

The IMD RESPONSE menu is also accessible from the IMD CONFIGURATION Dialog.

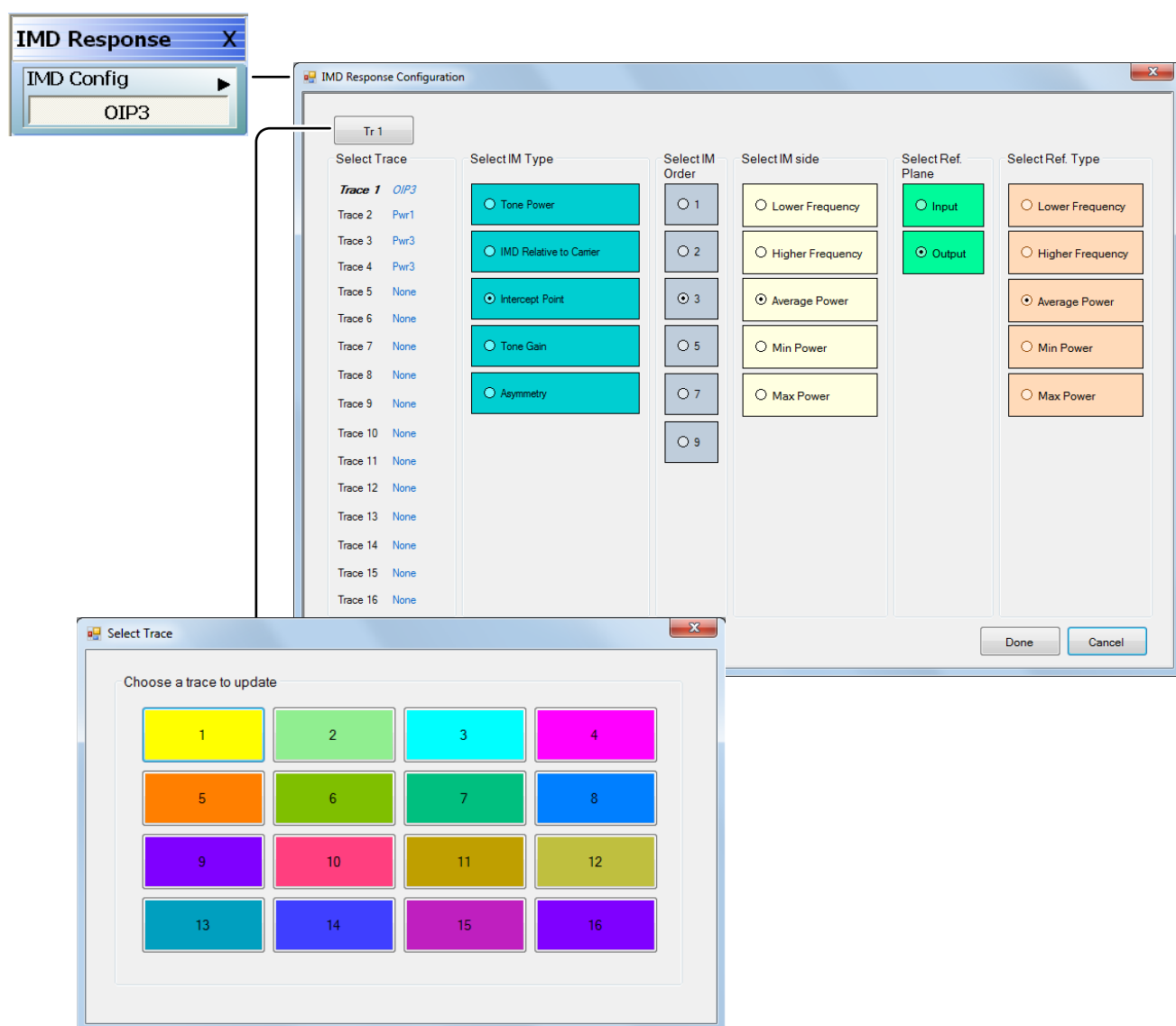


Figure 25-13. IMD RESPONSE Menu, IMD Response Configuration, and Select Trace Dialogs

Chapter 26 — Response Menus – 4-Port VNAs

26-1 Chapter Overview

This chapter provides information for the 4-port VNA Response menus for configuration of the required S-Parameter or user-definition of a unique parameter. The MIXED-MODE dialog boxes described herein allow mixed-mode response setup on a trace-by-trace basis with multiple response options for each trace. This menu also controls the rear panel External Analog Input port source.

For information on the Response menus for 2-port VNAs, consult [Chapter 25, “Response Menus – 2-Port VNAs”](#)

26-2 Overview of 4-Port Response Menus and Dialog Boxes

The available 4-port Response menus and dialog boxes are:

- [“RESPONSE Menu – 4-Port VNAs” on page 26-7](#)
 - [“MIXED MODE Setup Dialog Box – Two Diff. Pairs – 4-Port VNAs” on page 26-19](#)
 - [“MIXED MODE Setup Dialog Box – One Diff. Pair – One Singleton – 4-Port VNAs” on page 26-22](#)
 - [“MIXED MODE Setup Dialog Box – One Diff. Pair – Two Singletons – 4-Port VNAs” on page 26-24](#)
 - [“SELECT TRACE Dialog Box – 4-Port VNAs” on page 26-26](#)
- [“SINGLE-MODE Menu – 4-Port VNAs” on page 26-10](#)
- [“USER-DEFINED Menu – 4-Port VNAs” on page 26-12](#)
- [“NUMERATOR Menu – 4-Port VNAs” on page 26-14](#)
- [“DENOMINATOR Menu – 4-Port VNAs” on page 26-16](#)
- [“EXT. ANALOG IN 1 Menu – 4-Port VNAs” on page 26-27](#)
- [“EXT. ANALOG IN 2 Menu – 4-Port VNAs” on page 26-28](#)
- [“MEAN OPT. PWR. 1 Menu – 4-Port VNAs” on page 26-29](#)
- [“MEAN OPT. PWR. 2 Menu – 4-Port VNAs” on page 26-30](#)
- [“NF RESPONSE Menu – 4-Port VNAs \(Option 41\)” on page 26-32](#)
- [“NF RESPONSE Menu – 4-Port VNAs \(Option 48\)” on page 26-33](#)

26-3 Display Response Mixed-Mode Control Menu

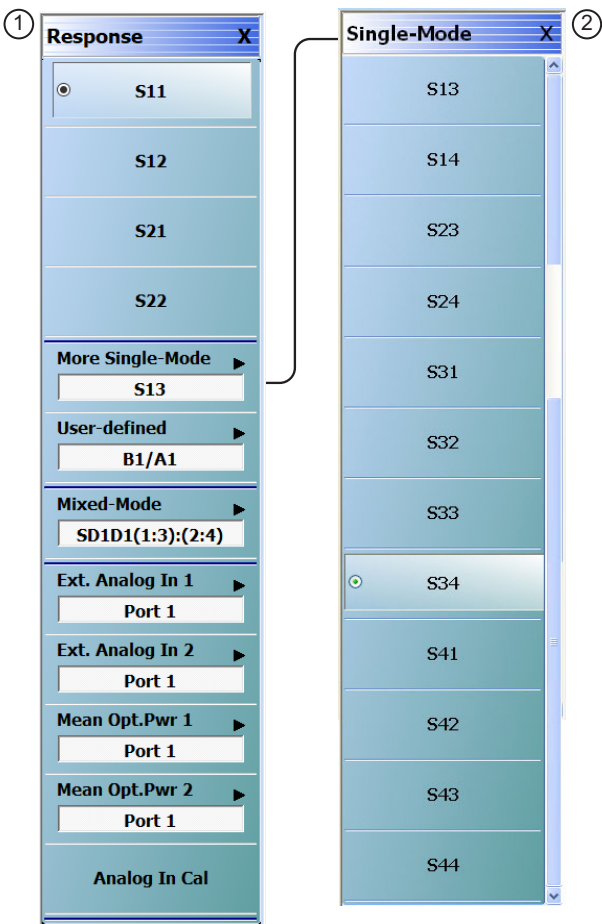
A related 4-port response mixed-mode control menu is available in the DISPLAY menus. The menu provides a faster change between the mixed-mode types of two differential pairs, one differential pair and one singleton, or one differential pair and two singletons but the change can only be applied to all traces with no selection of the response type.

- [Chapter 27, “Display Menus”](#)
- [“RESPONSES SETUP Menu – 4-Port VNAs” on page 27-93](#)
- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Responses Setup | RESPONSES SETUP

26-4 Response Menus Set – 4-Port VNAs

RESPONSE and SINGLE-MODE Menus

The primary RESPONSE menu provides direct access to S-Parameters from S11 to S22 and via the More Single-Mode button to additional parameters on the SINGLE-MODE selection menu which provides access to other S-Parameters from S13 to S44. Both menus are shown below in [Figure 26-1](#).



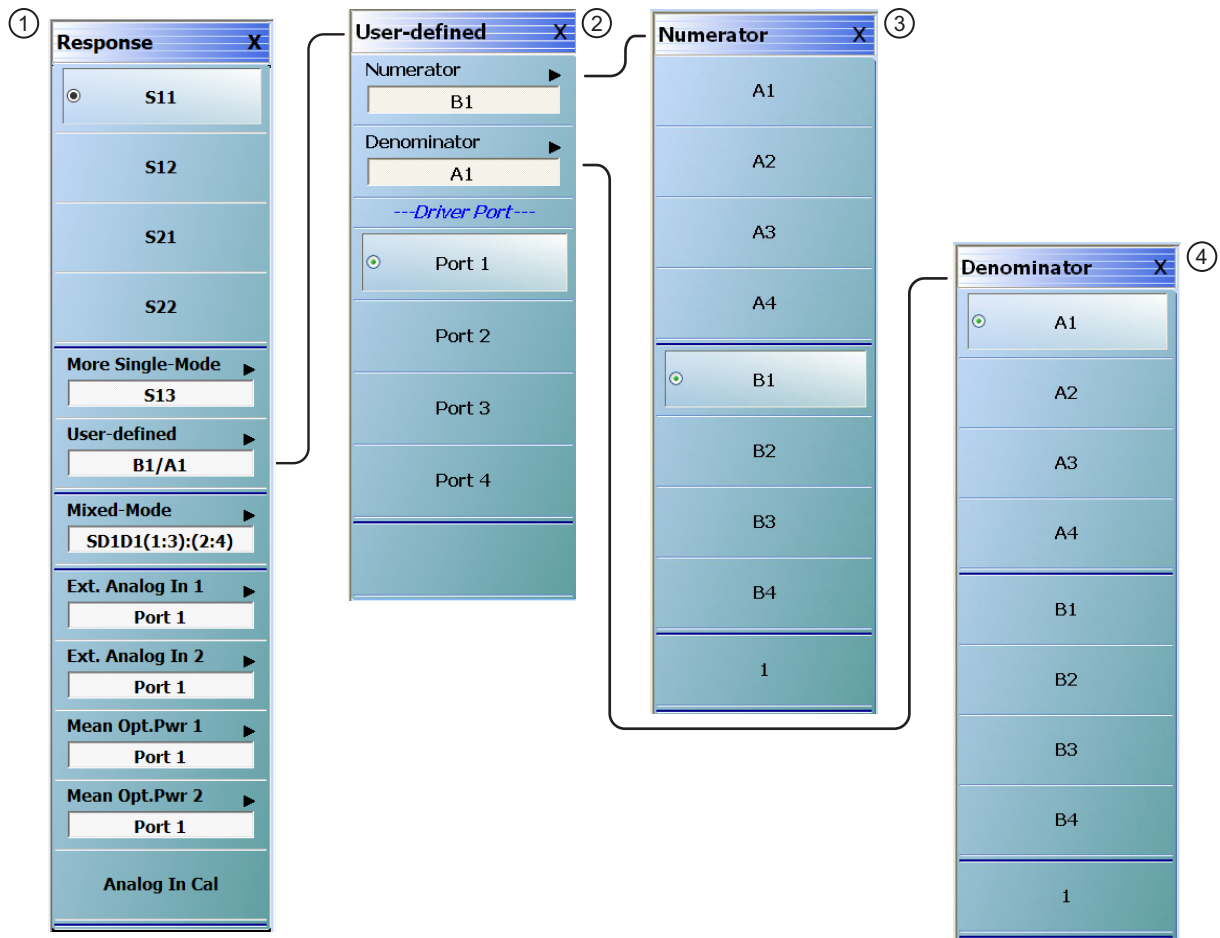
1. RESPONSE Menu – 4-Port VNAs	2. SINGLE-MODE Menu – 4-Port VNAs
--------------------------------	-----------------------------------

Figure 26-1. RESPONSE and SINGLE-MODE Menus – 4-Port VNAs

The top-level four-port version of the RESPONSE menu is shown above in [Figure 26-1](#) where single purpose buttons provide access to S-Parameters for S11, S12, S21, and S22. The More Single-Mode button displays the SINGLE-MODE sublevel menu which provides S-Parameter selection from S13 to S44. The menu representation here is elongated; on an actual system, there is a scroll bar and not all parameters are visible at once.

RESPONSE and USER-DEFINED Menus

The 4-Port VNA provides for expanded user-defined parameters as shown below in parameters are shown in Figure 26-2. All of the parameters are available regardless the calibration in place so that some parameters may be uncorrected.



1. RESPONSE Menu – 4-Port VNAs	3. NUMERATOR Menu – 4-Port VNAs
2. USER-DEFINED Menu – 4-Port VNAs	4. DENOMINATOR Menu – 4-Port VNAs

Figure 26-2. Response Menu Set – 4-Port VNAs

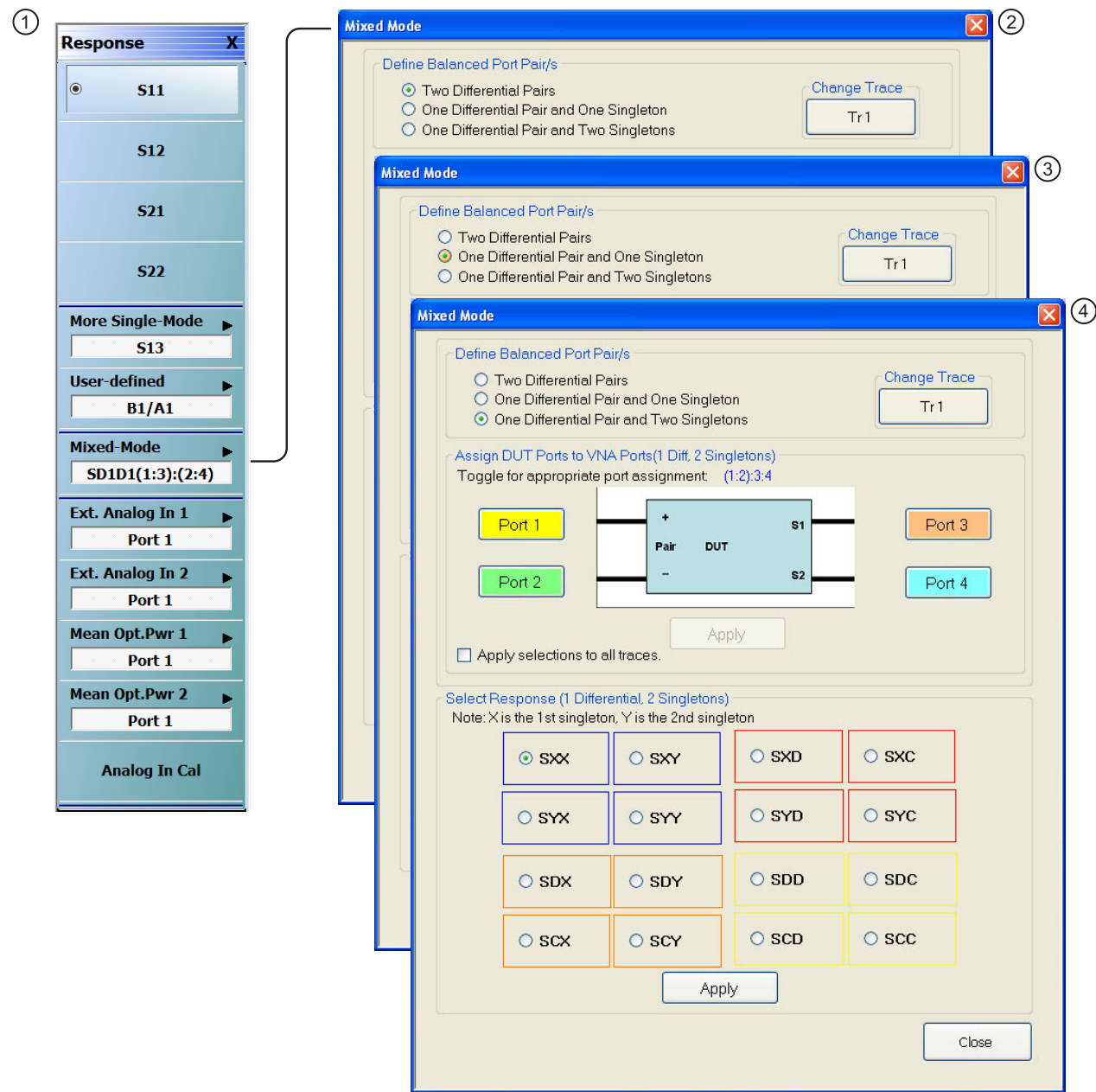
The four-port version of the RESPONSE menu and the submenus linking from the **User-Defined** response submenu are shown above in Figure 26-2. On the lower level of the USER-DEFINED response submenu, any one of the four ports may be sourcing RF power as the “driver” port. On the upper level of the USER-DEFINED menu, selections are made for the numerator and denominator values of user-defined parameter. The NUMERATOR and DENOMINATOR menus provide user-defined parameters. After a selection is made, both menus autoreturn to the USER-DEFINED menu.

RESPONSE Menu and MIXED MODE Dialog Box

The MIXED MODE dialog box provides configuration for three major types of mixed-mode configurations:

- Two differential pairs
- One differential pair and one singleton
- One differential pair and two singletons

Each mixed-mode configuration dialog box provides control of all response measurement parameters.



- | | |
|--|--|
| 1. RESPONSE Menu and Mixed Mode button. | 3. MIXED MODE Dialog Box for One Differential Pair and One Singleton. |
| 2. MIXED MODE Dialog Box for Two Differential Pairs. | 4. MIXED MODE Dialog Box for One Differential Pair and Two Singletons. |

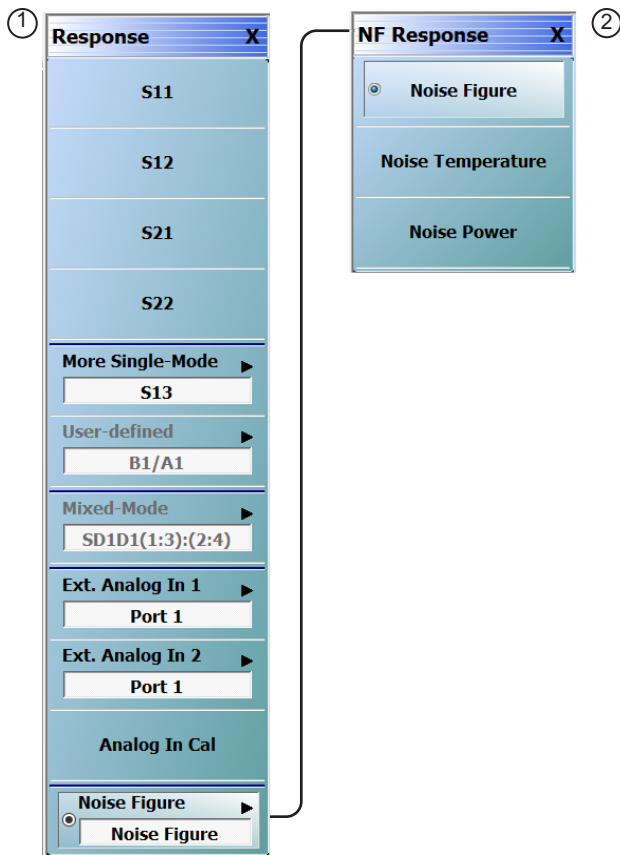
Figure 26-3. RESPONSE Menu and MIXED MODE Dialog Box Variants – 4-Port VNA

RESPONSE Menu and NF RESPONSE Menu (Option 41)

The NF RESPONSE menu provides configuration for available noise figure response measurement types:

- Noise Figure
- Noise Temperature
- Noise Power

The instrument must be equipped with Option 41 – Noise Figure Measurement and the application mode must be set to Noise Figure at MAIN | Application | APPLICATION.



1. RESPONSE Menu – 4-Port VNAs <ul style="list-style-type: none">• Option 41 – Noise Figure is equipped.• Noise Figure measurement mode is set on the APPLICATION menu.• User-Defined button is unavailable.• Mixed-Mode button is unavailable.	2. NF RESPONSE Menu – Available measurements: <ul style="list-style-type: none">• Noise Figure• Noise Temperature• Noise Power
--	--

Figure 26-4. RESPONSE and NF RESPONSE Menus – Option 41 on 4-Port VNAs

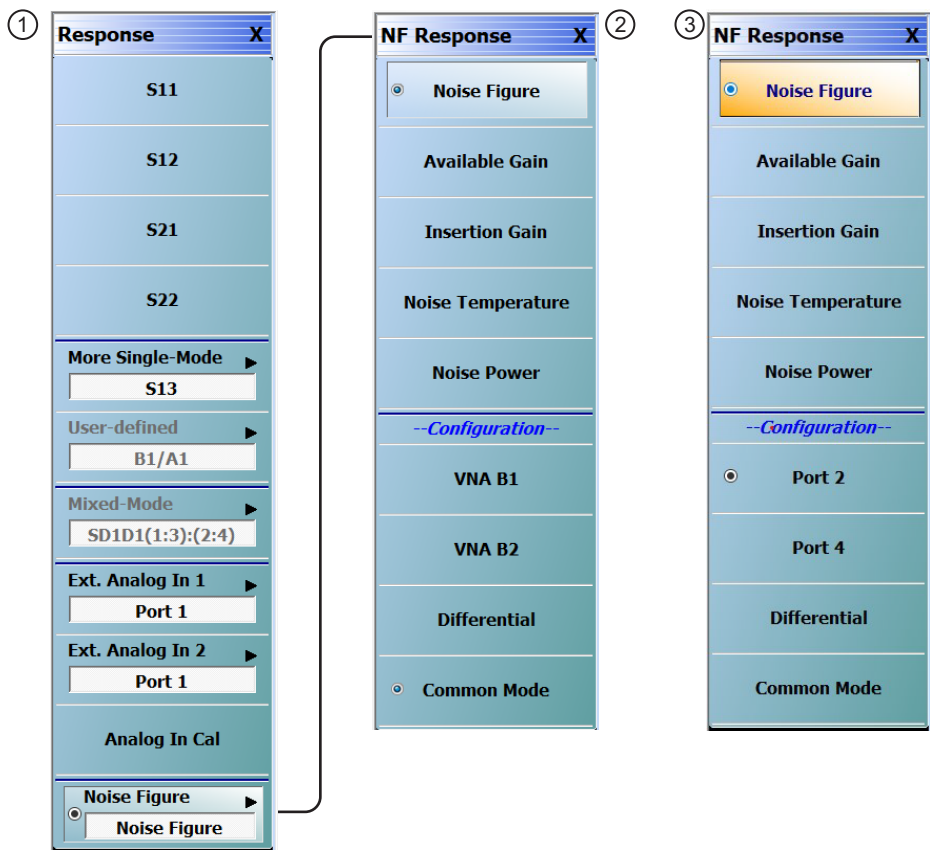
Note All of the noise figure response types are real only. Keep this is mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.

RESPONSE Menu and NF RESPONSE Menu (Option 48)

The NF RESPONSE menu provides configuration for available noise figure response measurement types:

- Noise Figure
- Available Gain
- Insertion Gain
- Noise Temperature
- Noise Power

The instrument must be equipped with Option 48 – Differential Noise Figure and the application mode must be set to Noise Figure at MAIN | Application | APPLICATION.



- | | |
|--|--|
| 1. RESPONSE Menu – 4-Port VNAs, 4-port DUT <ul style="list-style-type: none">• Option 48 – Noise Figure is equipped.• Noise Figure measurement mode is set on the APPLICATION menu.• User-Defined button is unavailable.• Mixed-Mode button is unavailable. | 2. NF RESPONSE Menu – Available measurements: <ul style="list-style-type: none">• Noise Figure• Available Gain• Insertion Gain• Noise Temperature• Noise Power |
| 3. NF RESPONSE Menu – 3739 Receiver Mode | |

Figure 26-5. RESPONSE and NF RESPONSE Menus – Option 48 on 4-Port VNAs 4-port DUT

If the DUT type is set to 2-port, the 'configuration' section of the response menu is not present and the response variable will be assigned to the selected receiver path.

Note	All of the noise figure response types are real only. Keep this in mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.
-------------	--

26-5 Primary Response Menus – 4-Port VNAs

RESPONSE Menu – 4-Port VNAs

Previous

- “MAIN Menu” on page 2-2

Prerequisites

- The VNA must be in 4-Port Mode

Navigation

- MAIN | Response | RESPONSE



1. RESPONSE Menu – 4-Port VNA <ul style="list-style-type: none">• Option 41/48 – Noise Figure is not equipped.• Optical Measurements is OFF.	3. RESPONSE Menu – 4-Port VNA <ul style="list-style-type: none">• Option 41/48 – Noise Figure is equipped.• The VNA measurement mode at the APPLICATION menu is set to Noise Figure.• The User-Defined button is unavailable.• The Mixed-Mode button is unavailable.
2. RESPONSE Menu – 4-Port VNA <ul style="list-style-type: none">• Option 41/48 – Noise Figure is equipped.• The VNA measurement mode at the APPLICATION menu is not set to Noise Figure.	4. Response Menu – 4-Port VNA <ul style="list-style-type: none">• Option 41/48 – Noise Figure is not equipped.• Optical Measurements is ON.

Figure 26-6. RESPONSE Menu – 4-Port VNAs – Menu Variants

Button Selection Group

- All the buttons of the RESPONSE menu form a button selection group where the selection of any one button de-selects the other buttons.

S11

Select sets the response to the input reflection coefficient (or S11 Forward Reflection) and de-selects all other buttons.

S12

Select sets the response to the reverse transmission coefficient (or S12 Reverse Transmission) and de-selects all other buttons.

S21

Select sets the response to the forward transmission coefficient (or S21 Forward Transmission) and de-selects all other buttons.

S22

Select sets the response to the output reflection coefficient (or S22 Reverse Reflection) and de-selects all other buttons.

More Single-Mode

Select de-selects other buttons and displays the SINGLE-MODE menu where 4-Port S-Parameters are selected from the following selections: S13, S14, S23, S24, S31, S32, S33, S34, S41, S42, S43, S44.

- [“SINGLE-MODE Menu – 4-Port VNAs” on page 26-10](#)

User-Defined

Select sets the response to a user-defined mathematical fraction, and displays the USER DEFINED menu to select S11, S12, S21, S22, or 1 (one) as a numerator over S11, S12, S21, S22, or 1 as the denominator. Select also de-selects all other buttons. This button is unavailable if the VNA measurement mode at the APPLICATION menu is set to Noise Figure. Option 41 or Option 48 must be equipped for Noise Figure.

- [“User-Defined Parameter Menus” on page 26-12](#)

Mixed-Mode

Select de-selects all other menu buttons and displays the MIXED MODE dialog box for three general mixed-mode configurations of:

- Two differential pairs
- One differential pair and one singleton
- One differential pair and two singletons

The button field displays the currently selected mixed-mode settings where the SXXXX is the selected response type and numbers are the assigned port number.

- [“MIXED MODE Setup Dialog Box – Two Diff. Pairs – 4-Port VNAs” on page 26-19](#)
- [“MIXED MODE Setup Dialog Box – One Diff. Pair – One Singleton – 4-Port VNAs” on page 26-22](#)
- [“MIXED MODE Setup Dialog Box – One Diff. Pair – Two Singletons – 4-Port VNAs” on page 26-24](#)

This button is unavailable if the VNA measurement mode at the APPLICATION menu is set to Noise Figure. Option 41 or Option 48 must be equipped for Noise Figure.

Ext. Analog In 1

Select displays the EXT ANALOG 1 menu and de-selects all other buttons.

- [“EXT. ANALOG IN 1 Menu – 4-Port VNAs” on page 26-27](#)

Ext. Analog In 2

Select displays the EXT ANALOG 2 menu and de-selects all other buttons.

- [“EXT. ANALOG IN 2 Menu – 4-Port VNAs” on page 26-28](#)

Analog In Cal

Opens the [“Analog In Cal Dialog Box”](#) on page 26-31.

Mean Opt. Pwr. 1

Allows selection of driving port. Displays responsivity.

- [“MEAN OPT. PWR. 1 Menu – 4-Port VNAs”](#) on page 26-29

Mean Opt. Pwr. 2

Allows selection of driving port. Displays responsivity.

- [“MEAN OPT. PWR. 2 Menu – 4-Port VNAs”](#) on page 26-30

Noise Figure

This button is only present if Option 41 – Noise Figure or Option 48 – Differential Noise Figure is equipped on the VNA. If present, it is only available if the VNA application mode is set to Noise Figure. The application mode is set on the APPLICATION menu at:

- MAIN | Application | APPLICATION
- [Chapter 15 — Noise Figure \(Option 41\)](#)
- [Chapter 16 — Differential Noise Figure \(Option 48\)](#)

If present and available, select de-selects all other response types and displays the NF RESPONSE menu, where the noise figure response type is selected.

- [“NF RESPONSE Menu – 4-Port VNAs \(Option 41\)”](#) on page 26-32
- [“NF RESPONSE Menu – 4-Port VNAs \(Option 48\)”](#) on page 26-33

If the Noise Figure button is available, the User-Defined and Mixed-Mode buttons are unavailable.

SINGLE-MODE Menu – 4-Port VNAs

Previous

- [“RESPONSE Menu – 4-Port VNAs” on page 26-7](#)

Prerequisites

- The VNA must be in 4-Port Mode

Navigation

- MAIN | Response | RESPONSE | Single-Mode | SINGLE-MODE



Figure 26-7. SINGLE-MODE Menu – 4-Port VNAs

S13

Select sets S-Parameter to S13.

S14

Select sets S-Parameter to S14.

S23

Select sets S-Parameter to S23.

S24

Select sets S-Parameter to S24.

S31

Select sets S-Parameter to S31.

S32

Select sets S-Parameter to S32.

S33

Select sets S-Parameter to S33.

S34

Select sets S-Parameter to S34.

S41

Select sets S-Parameter to S41.

S42

Select sets S-Parameter to S42.

S43

Select sets S-Parameter to S43.

S44

Select sets S-Parameter to S44.

26-6 User-Defined Parameter Menus

USER-DEFINED Menu – 4-Port VNAs

The USER-DEFINED menu is used to establish various mathematical combinations of incident and reflected power values. See [Table 26-1 on page 26-13](#) below for a listing of all possible parameter combinations.

Previous

- [“Primary Response Menu – 4-Port VNAs” on page 26-7](#)

Prerequisites

- The VNA must be in 4-Port Mode

Navigation

- MAIN | Response | RESPONSE | User-Defined | USER-DEFINED



Figure 26-8. USER DEFINED Menu – 4-Port VNAs

Numerator

Select displays the NUMERATOR menu. Once a numerator value is selected, the menu auto-returns to the USER-DEFINED menu.

- [“NUMERATOR Menu – 4-Port VNAs” on page 26-14](#)

Denominator

Select displays the DENOMINATOR menu. Once a denominator value is selected, the menu auto-returns to the USER-DEFINED menu.

- [“DENOMINATOR Menu – 4-Port VNAs” on page 26-16](#)

Driver Port Button Selection Group

The four Driver Port buttons form a selection group where the selection of any button de-selects the other buttons.

Port 1 (Driver Port)

Select sets the driving port to Port 1.

Port 2 (Driver Port)

Select sets the driving port to Port 2.

Port 3 (Driver Port)

Select sets the driving port to Port 3.

Port 4 (Driver Port)

Select sets the driving port to Port 4.

Table 26-1. User-Defined 4-Port Mathematical Combinations

	Numerator								
Denominator	A1	A2	A3	A4	B1	B2	B3	B4	1
A1	$\frac{A1}{A1} = 1$ Unity	$\frac{A2}{A1}$	$\frac{A3}{A1}$	$\frac{A4}{A1}$	$\frac{B1}{A1}$ S11	$\frac{B2}{A1}$ S21	$\frac{B3}{A1}$ S31	$\frac{B4}{A1}$ S41	$\frac{1}{A1}$
A2	$\frac{A1}{A2}$	$\frac{A2}{A2} = 1$ Unity	$\frac{A3}{A2}$	$\frac{A4}{A2}$	$\frac{B1}{A2}$ S12	$\frac{B2}{A2}$ S22	$\frac{B3}{A2}$ S32	$\frac{B4}{A2}$ S42	$\frac{1}{A2}$
A3	$\frac{A1}{A3}$	$\frac{A2}{A3}$	$\frac{A3}{A3} = 1$ Unity	$\frac{A4}{A3}$	$\frac{B1}{A3}$ S13	$\frac{B2}{A3}$ S23	$\frac{B3}{A3}$ S33	$\frac{B4}{A3}$ S43	$\frac{1}{A3}$
A4	$\frac{A1}{A4}$	$\frac{A2}{A4}$	$\frac{A3}{A4}$	$\frac{A4}{A4} = 1$ Unity	$\frac{B1}{A4}$ S14	$\frac{B2}{A4}$ S24	$\frac{B3}{A4}$ S34	$\frac{B4}{A4}$ S44	$\frac{1}{A4}$
B1	$\frac{A1}{B1}$	$\frac{A2}{B1}$	$\frac{A3}{B1}$	$\frac{A4}{B1}$	$\frac{B1}{B1} = 1$ Unity	$\frac{B2}{B1}$	$\frac{B3}{B1}$	$\frac{B4}{B1}$	$\frac{1}{B1}$
B2	$\frac{A1}{B2}$	$\frac{A2}{B2}$	$\frac{A3}{B2}$	$\frac{A4}{B2}$	$\frac{B1}{B2}$	$\frac{B2}{B2} = 1$ Unity	$\frac{B3}{B2}$	$\frac{B4}{B2}$	$\frac{1}{B2}$
B3	$\frac{A1}{B3}$	$\frac{A2}{B3}$	$\frac{A3}{B3}$	$\frac{A4}{B3}$	$\frac{B1}{B3}$	$\frac{B2}{B3}$	$\frac{B3}{B3} = 1$ Unity	$\frac{B4}{B3}$	$\frac{1}{B3}$
B4	$\frac{A1}{B4}$	$\frac{A2}{B4}$	$\frac{A3}{B4}$	$\frac{A4}{B4}$	$\frac{B1}{B4}$	$\frac{B2}{B4}$	$\frac{B3}{B4}$	$\frac{B4}{B4} = 1$ Unity	$\frac{1}{B4}$
1	$\frac{A1}{1} = A1$ A1	$\frac{A2}{1} = A2$ A2	$\frac{A3}{1} = A3$ A3	$\frac{A4}{1} = A4$ A4	$\frac{B1}{1} = B1$ B1	$\frac{B2}{1} = B2$ B2	$\frac{B3}{1} = B3$ B3	$\frac{B4}{1} = B4$ B4	$\frac{1}{1} = 1$ Unity

NUMERATOR Menu – 4-Port VNAs

Previous

- [“User-Defined Parameter Menus” on page 26-12](#)

Prerequisites

- The VNA must be in 4-Port Mode

Navigation

- MAIN | Response | RESPONSE | User-Defined | USER-DEFINED | Numerator | NUMERATOR

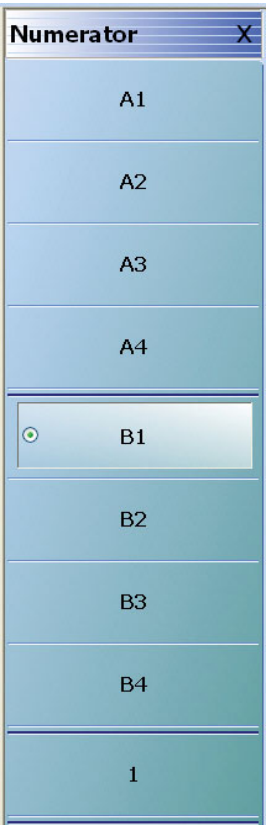


Figure 26-9. NUMERATOR Menu – 4-Port VNAs

Numerator Auto-Return Button Selection Group

- The buttons of the NUMERATOR menu form an auto-return button selection group, where the selection of any one button de-selects all other buttons and auto-returns to the USER DEFINED menu.
- The possible combinations of the NUMERATOR and DENOMINATOR functions are summarized above in [Table 26-1, “User-Defined 4-Port Mathematical Combinations” on page 26-13.](#)

A1 (Numerator)

Select specifies that A1, incident power on port 1, will be the numerator value.

A2 (Numerator)

Select specifies that A2 will be the numerator value.

A3 (Numerator)

Select specifies that A3, incident power on port 1, will be the numerator value.

A4 (Numerator)

Select specifies that A4 will be the numerator value.

B1 (Numerator)

Select specifies that B1, received power on port 1, will be the numerator value.

B2 (Numerator)

Select specifies that B2 will be the numerator value.

B3 (Numerator)

Select specifies that B3, incident power on port 1, will be the numerator value.

B4 (Numerator)

Select specifies that B4 will be the numerator value.

1 (One) (Numerator)

Select specifies that 1 (one) will be the numerator value.

DENOMINATOR Menu – 4-Port VNAs

Previous

- [“User-Defined Parameter Menus” on page 26-12](#)

Prerequisites

- The VNA must be in 4-Port Mode

Navigation

- MAIN | Response | RESPONSE | User Defined | USER DEFINED | Denominator | DENOMINATOR

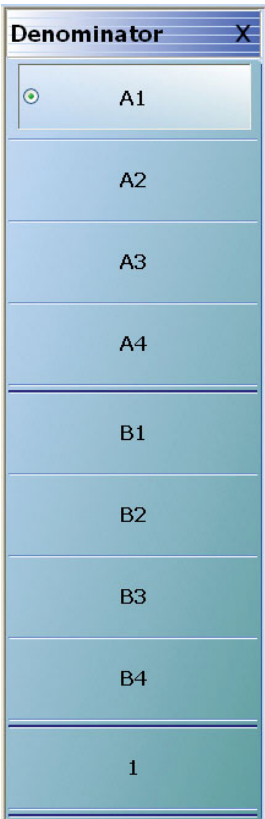


Figure 26-10. DENOMINATOR Menu – 4-Port VNAs

Denominator Auto-Return Button Selection Group

- The buttons of the DENOMINATOR menu form an auto-return button selection group, where the selection of any one button de-selects all other buttons and auto-returns to the USER DEFINED menu.
- The possible combinations of the NUMERATOR and DENOMINATOR functions are summarized in [Table 26-1, “User-Defined 4-Port Mathematical Combinations” on page 26-13](#) above.

A1 (Denominator)

Select sets A1 as the denominator value.

A2 (Denominator)

Select sets A2 as the denominator value.

A3 (Denominator)

Select sets A3 as the denominator value.

A4 (Denominator)

Select sets A4 as the denominator value.

B1 (Denominator)

Select sets B1 as the denominator value.

B2 (Denominator)

Select sets B2 as the denominator value.

B3 (Denominator)

Select sets B3 as the denominator value.

B4 (Denominator)

Select sets B4 as the denominator value.

1 (One) (Denominator)

Select sets 1 (one) as the denominator value.

26-7 Mixed Mode Setup Dialog Boxes

Dialog Boxes

The contents and controls in the dialog box change depending how the user-defined balanced port is selected as:

- Two differential pairs
- One differential pair and one singleton
- One differential pair and two singletons

Each balanced port selection is described in the sections below.

Alternate Mixed Mode Configuration Control

There is a separate mixed-mode response control located on the RESPONSES SETUP menu located within the DISPLAY menus that provides a rapid assignment of one of the three options above. The response type assignment is limited to all traces on the active channel. The menu is described in:

- [Chapter 27, “Display Menus”](#)
- [“RESPONSES SETUP Menu – 4-Port VNAs” on page 27-93](#)
- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Responses Setup | RESPONSES SETUP

MIXED MODE Setup Dialog Box – Two Diff. Pairs – 4-Port VNAs

Previous

- [“RESPONSE Menu – 4-Port VNAs” on page 26-7](#)

Prerequisites

- Balanced Port Pair Setting = Two Differential Pairs

Navigation

- MAIN | Response | RESPONSE | Mixed Mode | MIXED MODE Dialog Box | Two Differential Pairs

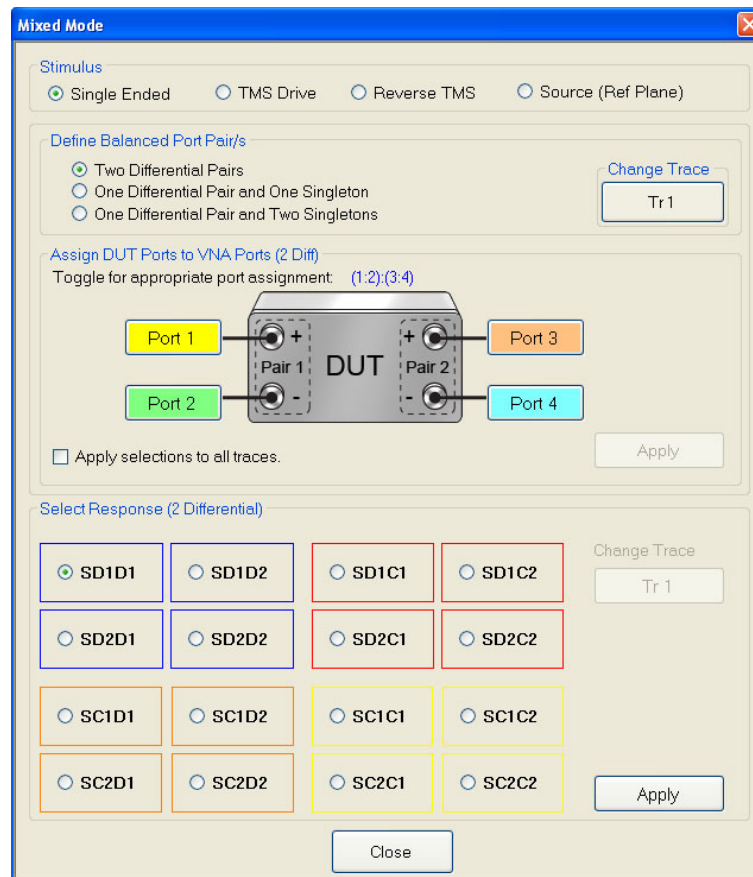


Figure 26-11. MIXED MODE Dialog Box – Two Differential Pairs – 4-Port VNAs

Stimulus

Select the option required:

- Single Ended
- TMS Drive
- Reverse TMS
- Source (Ref Plane)

Note

Selecting any option other than Single Ended will place the VNA in DifferentialView mode. Refer to [Chapter 20](#) for more information on configuring DifferentialView.

Define Balanced Port Pair(s)

Select the option required:

- Two Differential Pairs

The DUT Ports diagram appears with a four-port DUT and is ready for port assignment.

Change Trace

The Change Trace button displays the currently active trace number. Select displays the SELECT TRACE dialog box where another trace can be selected.

- [“SELECT TRACE Dialog Box – 4-Port VNAs” on page 26-26](#)

Assign DUT Ports to VNA Ports (2 Diff)

For each DUT connection, toggle the Port button to select the appropriate VNA Port Number.

- DUT Port Pair 1
 - Pair 1 +: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has positive polarity.
 - Pair 1 -: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has negative polarity.
- DUT Port Pair 2:
 - Pair +: Select from VNA Port 1, Port 2, Port 3, or Port 4
 - Pair -: Select from VNA Port 1, Port 2, Port 3, or Port 4

Note that all port assignments must be unique and have different color coding. When all port assignments are completed, select the Apply button. If the assignment is invalid, a warning dialog appears. If the port assignments are valid, the title of the DUT Ports diagram is annotated with the port assignment in the format (A:B):(C:D). For example:

- (1:2):(3:4) = The first port pair is measured from 1 to 2 and the second port pair is measured from 3 to 4.
- (4:1):(2:3) = The first port pair is measured from 4 to 1 and the second port pair is measured from 2 to 3.

Assign Port Assignments to All Traces

The actions above only apply to the active trace on the active channel. If required, select the Apply Selections check box to apply the port pair selections to all traces on the active channel.

Select Responses (2 Differential)

Select the required 2-differential response characteristic from the available 16 combinations of pure differential (D) and common-mode (C) parameters. Only one response may be selected:

- Differential Reception with Differential Drive S-Parameters
 - SD1D1 – S-parameter for differential reception at Pair 1 and differential drive at Pair 1.
 - SD1D2 – S-parameter for differential reception at Pair 1 and differential drive at Pair 2.
 - SD2D1 – S-parameter for differential reception at Pair 2 and differential drive at Pair 1.
 - SD2D2 – S-parameter for differential reception at Pair 2 and differential drive at Pair 2.
- Common-Mode Reception with Differential Drive S-Parameters
 - SC1D1 – S-parameter for common-mode reception at Pair 1 and differential drive at Pair 1.
 - SC1D2 – S-parameter for common-mode reception at Pair 1 and differential drive at Pair 2.
 - SC2D1 – S-parameter for common-mode reception at Pair 2 and differential drive at Pair 1.
 - SC2D2 – S-parameter for common-mode reception at Pair 2 and differential drive at Pair 2.
- Differential Reception with Common-Mode Drive S-Parameters
 - SD1C1 – S-parameter for differential reception at Pair 1 and common-mode drive at Pair 1.
 - SD1C2 – S-parameter for differential reception at Pair 1 and common-mode drive at Pair 2.
 - SD2C1 – S-parameter for differential reception at Pair 2 and common-mode drive at Pair 1.
 - SD2C2 – S-parameter for differential reception at Pair 2 and common-mode drive at Pair 2.

- Common-Mode Reception with Common-Mode Drive S-Parameters
 - SC1C1 – S-parameter for common-mode reception at Pair 1 and common-mode drive at Pair 1.
 - SC1C2 – S-parameter for common-mode reception at Pair 1 and common-mode drive at Pair 2.
 - SC2C1 – S-parameter for common-mode reception at Pair 2 and common-mode drive at Pair 1.
 - SC2C2 – S-parameter for common-mode reception at Pair 2 and common-mode drive at Pair 2.

Apply

When the selection is complete, select the **Apply** button to apply the setting to the active trace.

MIXED MODE Setup Dialog Box – One Diff. Pair – One Singleton – 4-Port VNAs

Previous

- [“RESPONSE Menu – 4-Port VNAs” on page 26-7](#)

Prerequisites

- Balanced Port Pair Setting = One Differential Pair and One Singleton

Navigation

- MAIN | Response | RESPONSE | Mixed Mode | MIXED MODE Dialog Box | One Differential Pair and One Singleton

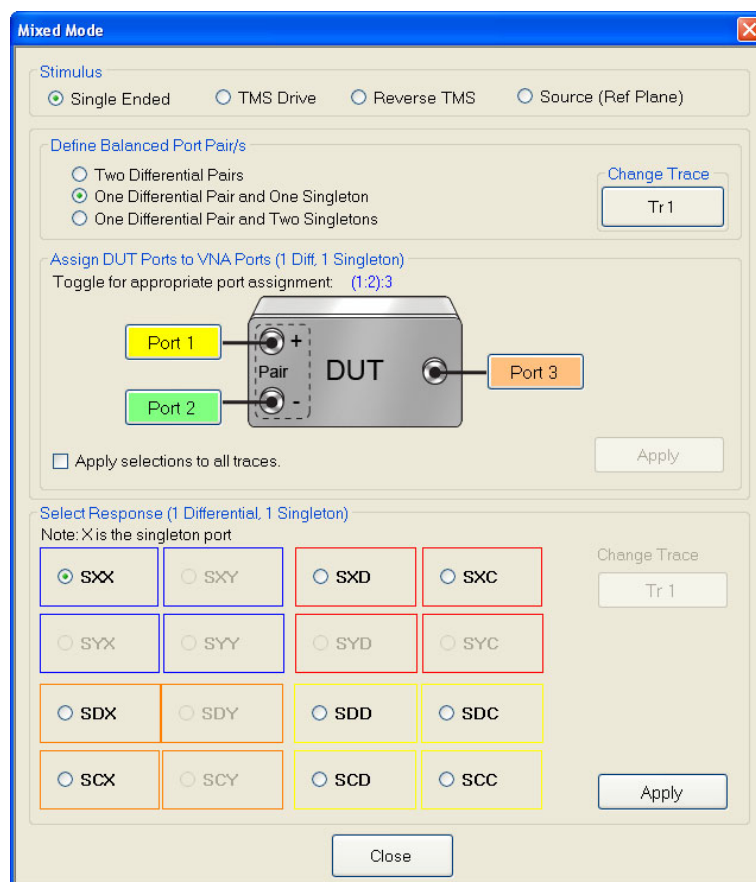


Figure 26-12. MIXED MODE Dialog Box – One Differential Pair and One Singleton – 4-Port VNAs

Stimulus

Select the option required:

- Single Ended
- TMS Drive
- Reverse TMS
- Source (Ref Plane)

Note

Selecting any option other than Single Ended will place the VNA in DifferentialView mode. Refer to [Chapter 20](#) for more information on configuring DifferentialView.

Define Balanced Port Pair(s)

Select the option required:

- One Differential Pair and One Singleton

The DUT Ports diagram appears with a DUT having one port pair and one singleton connection.

Change Trace

Displays the currently active trace number. Select displays the SELECT TRACE dialog box where another trace can be selected.

- [“SELECT TRACE Dialog Box – 4-Port VNAs” on page 26-26](#)

Assign DUT Ports to VNA Ports (1 Diff, 1 Singleton)

For each DUT connection, toggle the Port button to select the appropriate VNA Port Number.

- DUT Port Pair 1
 - Pair 1 +: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has positive polarity.
 - Pair 1 -: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has negative polarity.
- DUT S1 Singleton:
 - S1: Select from VNA Port 1, Port 2, Port 3, or Port 4

Note that all port assignments must be unique and have different color coding. When all port assignments are completed, select the Apply button. If the assignment is invalid, a warning dialog appears. If the port assignments are valid, the title of the DUT Ports diagram is annotated with the port assignment in the format (A:B):C). For example:

- (1:2):3 = The DUT port differential is measured from 1 to 2 and 3 is the singleton.
- (4:2):1 = The DUT port differential is measured from 4 to 2 and 1 is the singleton.

Assign Port Assignments to All Traces

The actions above only apply to the active trace on the active channel. If required, select the Apply Selections check box to apply the port pair selections to all traces on the active channel.

Select Response

Select the required differential or common-mode response characteristic from the available 9 combinations of pure differential (D), common-mode (C), or singleton (X) parameters. Only one response may be selected:

- Reception at Singleton and Drive at Singleton
 - SXX – S-Parameter for singleton reception and singleton drive.
- Reception at Singleton and Drive at Pair 1
 - SXD – S-Parameter for singleton reception and differential drive at Pair 1
 - SXC – S-Parameter for singleton reception and common-mode drive at Pair 1
- Reception at Pair 1 and Drive at Singleton
 - SDX – S-Parameter for differential reception at Pair 1 and singleton drive
 - SCX – S-Parameter for common-mode reception at Pair 1 and singleton drive
- Reception at Pair 1 and Drive at Pair 1
 - SDD – S-Parameter for differential reception at the Pair 1 and differential drive at the port pair.
 - SDC – S-Parameter for differential reception at Pair 1 and common-mode drive at the port pair
 - SCD – S-Parameter for common-mode reception at Pair 1 and differential drive at the port pair.
 - SCC – S-Parameter for common-mode reception at Pair 1 and common-mode drive at the port pair.

Apply

When the selection is complete, select the Apply button to apply the setting to the active trace.

MIXED MODE Setup Dialog Box – One Diff. Pair – Two Singletons – 4-Port VNAs

Previous

- [“RESPONSE Menu – 4-Port VNAs” on page 26-7](#)

Prerequisites

- Balanced Port Pair Setting = One Differential Pair and Two Singletons

Navigation

- MAIN | Response | RESPONSE | Mixed Mode | MIXED MODE Dialog Box | One Differential Pair and Two Singletons

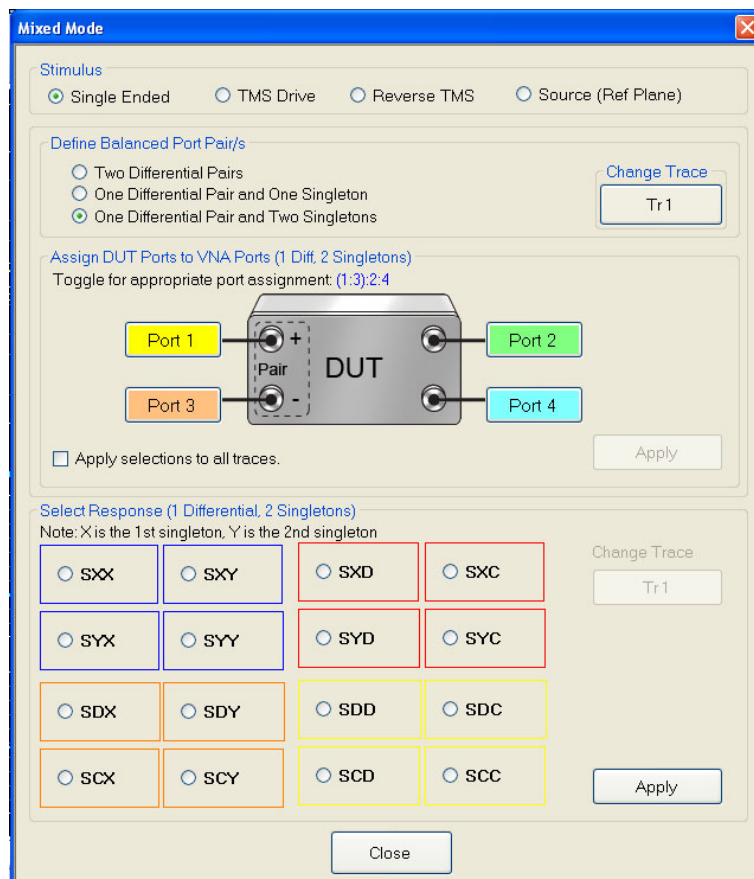


Figure 26-13. MIXED MODE Dialog Box – One Differential Pair and Two Singletons – 4-Port VNAs

Define Balanced Port Pair(s)

Select the option required:

- One Differential Pair and Two Singletons

The DUT Ports diagram appears with a DUT having one port pair and two singletons connection.

Change Trace

Displays the currently active trace number. Select displays the SELECT TRACE dialog box where another trace can be selected.

- [“SELECT TRACE Dialog Box – 4-Port VNAs” on page 26-26](#)

Assign DUT Ports to VNA Ports (1 Diff, 1 Singleton)

For each DUT connection, toggle the Port button to select the appropriate VNA Port Number:

- DUT Port Pair 1
 - Pair 1 +: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has positive polarity.
 - Pair 1 -: Select from VNA Port 1, Port 2, Port 3, or Port 4. This port has negative polarity.
- DUT S1 Singleton:
 - S1: Select from VNA Port 1, Port 2, Port 3, or Port 4
- DUT S2 Singleton:
 - S2: Select from VNA Port 1, Port 2, Port 3, or Port 4

Note that all port assignments must be unique and have different color coding. When all port assignments are completed, select the **Apply** button. If the assignment is invalid, a warning dialog appears. If the port assignments are valid, the title of the DUT Ports diagram is annotated with the port assignment in the format (A:B):C). For example:

- (1:2):3:4 = The DUT port differential is measured from 1 to 2 while 3 and 4 are the singletons.
- (4:2):1:3 = The DUT port differential is measured from 4 to 2 while 1 and 3 are the singletons.

Assign Port Assignments to All Traces

The actions above only apply to the active trace on the active channel. If required, select the **Apply Selections** check box to apply the port pair selections to all traces on the active channel.

Select Response

Select the required differential or common-mode response characteristic from the available 16 combinations of pure differential (D), common-mode (C), first singleton (X), or second singleton (Y) parameters. Only one response may be selected:

- Reception at Singleton and Drive at Singleton
 - SXX – S-Parameter for first singleton reception and first singleton drive
 - SXY – S-Parameter for first singleton reception and second singleton drive
 - SYX – S-Parameter for second singleton reception and first singleton drive
 - SYY – S-Parameter for second singleton reception and second singleton drive
- Reception at Singleton and Drive at Pair 1
 - SXD – S-Parameter for first singleton reception and differential drive at Pair 1
 - SXC – S-Parameter for first singleton reception and common-mode drive at Pair 1
 - SYD – S-Parameter for second singleton reception and differential drive at Pair 1
 - SYC – S-Parameter for second singleton reception and common-mode drive at Pair 1
- Reception at Pair 1 and Drive at Singleton
 - SDX – S-Parameter for differential reception at Pair 1 and first singleton drive
 - SDY – S-Parameter for differential reception at Pair 1 and second singleton drive
 - SCX – S-Parameter for common-mode reception at Pair 1 and first singleton drive
 - SCY – S-Parameter for common-mode reception at Pair 1 and second singleton drive
- Reception at Pair 1 and Drive at Pair 1
 - SDD – S-Parameter for differential reception at Pair 1 and differential drive at the port pair.
 - SDC – S-Parameter for differential reception at Pair 1 and common-mode drive at the port pair.
 - SCD – S-Parameter for common-mode reception at Pair 1 and differential drive at the port pair.
 - SCC – S-Parameter for common-mode reception at Pair 1 and common-mode drive at the port pair.

Apply

When the selection is complete, select the **Apply** button to apply the setting to the active trace.

SELECT TRACE Dialog Box – 4-Port VNAs

Previous

- “MIXED MODE Setup Dialog Box – Two Diff. Pairs – 4-Port VNAs” on page 26-19
 - Figure 26-11, “MIXED MODE Dialog Box – Two Differential Pairs – 4-Port VNAs” on page 26-19
- “MIXED MODE Setup Dialog Box – One Diff. Pair – One Singleton – 4-Port VNAs” on page 26-22
 - Figure 26-12, “MIXED MODE Dialog Box – One Differential Pair and One Singleton – 4-Port VNAs” on page 26-22
- “MIXED MODE Setup Dialog Box – One Diff. Pair – Two Singletons – 4-Port VNAs” on page 26-24
 - Figure 26-13, “MIXED MODE Dialog Box – One Differential Pair and Two Singletons – 4-Port VNAs” on page 26-24

Prerequisites

- One of the three available configurations on the MIXED MODE dialog box must be selected.

Navigation

- MAIN | Response | RESPONSE | Mixed Mode | MIXED MODE Dialog Box | Change Trace | SELECT TRACE Dialog Box



Figure 26-14. SELECT TRACE Dialog Box – For Mixed-Mode Trace Assignment – 4-Port VNAs

Instructions

Select the trace number button to apply the current mixed-mode settings. After a Trace Number button is selected, the focus auto returns to the MIXED MODE dialog box.

26-8 External Analog Input Menus

EXT. ANALOG IN 1 Menu – 4-Port VNAs

Full Name

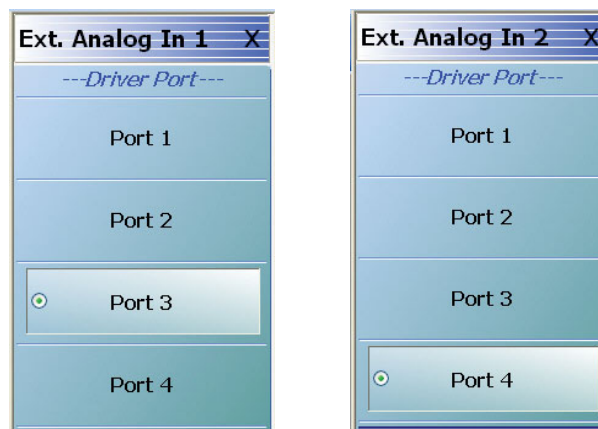
External Analog Input 1

Previous

- [“RESPONSE Menu – 4-Port VNAs” on page 26-7](#)

Navigation

- MAIN | Response | RESPONSE | Ext Analog In 1 | EXT ANALOG IN 1



EXT. ANALOG IN 1 menu on left and EXT. ANALOG IN 2 menu on right.

Figure 26-15. EXT. ANALOG IN (External Analog Input) Menus – 4-Port VNAs

Button Selection Group

- The Port 1, Port 2, Port 3, and Port 4 buttons form a button selection group where the selection of any one button de-selects the other buttons.

Port 1 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 1.

Port 2 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 2.

Port 3 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 3.

Port 4 (Ext Analog In 1 Driver Port)

Select sets the External Analog Input 1 source to Port 4

EXT. ANALOG IN 2 Menu – 4-Port VNAs

Full Name

External Analog Input 2

Previous

- [“RESPONSE Menu – 4-Port VNAs” on page 26-7](#)

Navigation

- MAIN | Response | RESPONSE | Ext. Analog In 2 | EXT.ANALOG IN 2

Figure

- See [Figure 26-15](#) above.

Button Selection Group

- The Port 1, Port 2, Port 3, and Port 4 buttons form a button selection group where the selection of any one button de-selects the other buttons.

Port 1 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 1.

Port 2 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 2.

Port 3 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 3.

Port 4 (Ext Analog In 2 Driver Port)

Select sets the External Analog Input 2 source to Port 4.

26-9 Mean Opt. Pwr. Menu

MEAN OPT. PWR. 1 Menu – 4-Port VNAs

This assumes the photodiode output is connected (usually via a bias tee, whether that be internal or external) to Ext. Analog In. This selection then uses the responsivity entry to convert the DC value to optical power.

Full Name

Mean Optical Power 1 – 4-Port VNAs

Previous

- [“Primary Response Menus – 4-Port VNAs” on page 26-7](#)

Prerequisites

- Optical Measurements must be ON.

Navigation

- MAIN | Response | RESPONSE | Mean Opt. Pwr. 1 | MEAN OPT. PWR. 1

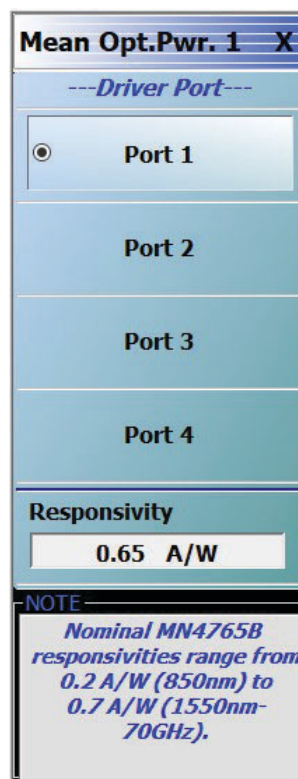


Figure 26-16. Mean Opt. Pwr. 1 Menu

Driver Port Button Group

Allows selection of the driving port.

Responsivity

Click to set responsivity. Nominal MN4765B responsivities range from 0.2 A/W (850nm) to 0.7 A/W (1550nm-70GHz).

MEAN OPT. PWR. 2 Menu – 4-Port VNAs

This assumes the photodiode output is connected (usually via a bias tee, whether that be internal or external) to Ext. Analog In. This selection then uses the responsivity entry to convert the DC value to optical power.

Full Name

Mean Optical Power 1

Previous

- [“Primary Response Menus – 4-Port VNAs” on page 26-7](#)

Prerequisites

- Optical Measurements must be ON.

Navigation

- MAIN | Response | RESPONSE | Mean Opt. Pwr. 2 | MEAN OPT. PWR. 2

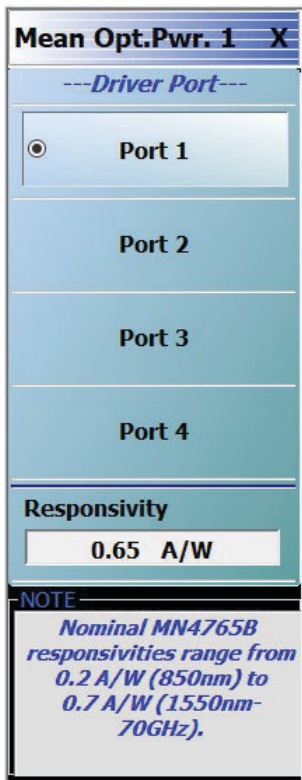


Figure 26-17. Mean Opt. Pwr. 2 Menu

Driver Port Button Group

Allows selection of the driving port.

Responsivity

Click to set responsivity. Nominal MN4765B responsivities range from 0.2 A/W (850nm) to 0.7 A/W (1550nm-70GHz).

26-10 Analog In Cal Dialog Box

Full Name

Analog In Calibration – 4-Port VNAs

Previous

- [“Primary Response Menus – 4-Port VNAs” on page 26-7](#)

Navigation

- MAIN | Response | RESPONSE | Analog In Cal | ANALOG IN CALIBRATION

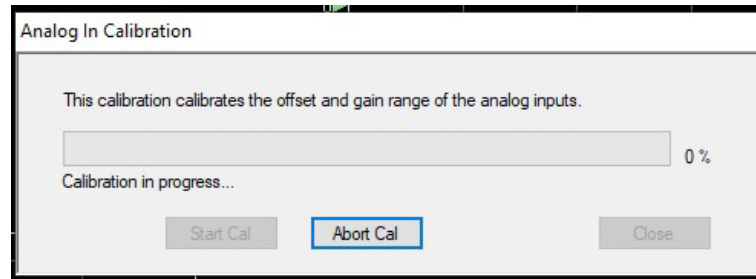


Figure 26-18. Analog In Cal Dialog Box

Performs an analog input calibration.

26-11 Noise Figure Response Menu (Option 41)

NF RESPONSE Menu – 4-Port VNAs (Option 41)

Full Name

Noise Figure Response – 4-Port VNAs

Previous

- [“Primary Response Menus – 4-Port VNAs” on page 26-7](#)

Prerequisites

- The VNA must be equipped with Option 41 – Noise Figure.
- The application mode must be set to Noise Figure on the APPLICATION menu.
 - MAIN | Application | APPLICATION
 - [Chapter 15 — Noise Figure \(Option 41\)](#)

Navigation

- MAIN | Response | RESPONSE | Noise Figure | NF RESPONSE

Button Selection Group

- The top three buttons on the NF RESPONSE menu form a button selection group where selection of any one button de-selects all other buttons.

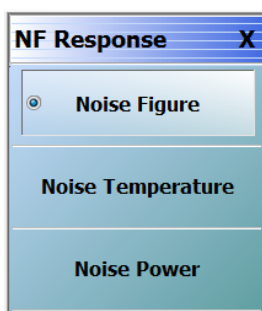


Figure 26-19. NF RESPONSE (Noise Figure Response) Menu

Note

All of the noise figure response types are real only. Keep this in mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.

Noise Figure

Select sets the noise figure measurement to Noise Figure. Noise figure is measured using the “cold source” technique. The units are set by the graph type.

Noise Temperature

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. The noise temperature is calculated from the noise figure. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

Noise Power

Select sets the noise figure measurement to Noise Power trace response. The measurement units are set by the display graph type. The units will be in absolute power when a receiver calibration is applied.

26-12 Noise Figure Response Menu (Option 48)

NF RESPONSE Menu – 4-Port VNAs (Option 48)

Full Name

Differential Noise Figure Response

Previous

- [“Primary Response Menus – 4-Port VNAs” on page 26-7](#)

Prerequisites

- The VNA must be equipped with Option 48 – Differential Noise Figure.
- The application mode must be set to Noise Figure on the APPLICATION menu.
 - MAIN | Application | APPLICATION
 - [Chapter 16 — Differential Noise Figure \(Option 48\)](#)

Navigation

- MAIN | Response | RESPONSE | Noise Figure | NF RESPONSE



Figure 26-20. NF RESPONSE (Noise Figure Response) Menu (4-port DUT)

Note

All of the noise figure response types are real only. Keep this in mind when selecting graph types. Noise figure and noise power quantities are computed using a $10 \times \log_{10}$ convention when a log mag graph type is selected.

Button Selection Groups

- The top five buttons on the NF RESPONSE menu form a button selection group where selection of any one button de-selects all other buttons.
- The Configuration buttons on the NF RESPONSE menu form a button selection group where selection of any one button de-selects all other buttons. These buttons are only present if the DUT type is 4-port.

Noise Figure

Select sets the noise figure measurement to Noise Figure. Noise figure is measured using the “cold source” technique. The units are set by the graph type.

Available Gain

Displays the available gain (in a static display, as it is based on loaded DUT S-parameters) of the DUT. This does include match effects.

Insertion Gain

Displays the insertion gain (in a static display, as it is based on loaded DUT S-parameters) of the DUT. This does not include match effects.

Noise Temperature

Temperature Kelvin. Read-only display of the IEEE default temperature of 290 K. The noise temperature is calculated from the noise figure. For reference:

- 290 K = 17 °C (62.6 °F)
- 0 K = -273.15 °C (-459.67 °F)

Noise Power

Select sets the noise figure measurement to Noise Power trace response. The measurement units are set by the display graph type. The units will be in absolute power when a receiver calibration is applied.

Configuration (Only available for 4-port DUT)

Each of the above parameters requires a port/receiver definition (with a 4-port DUT) and these selections are either single-ended (into VNA b1 or b2 receivers), differential, or common-mode. If the DUT type is 2-port, the response variable will be assigned to the current receiver path.

Chapter 27 — Display Menus

27-1 Chapter Overview

This chapter provides information for setup and configuration for the main instrument display. Selections provide control over the trace format with over 17 different major displays. Each display type can be further modified with parameters applicable to that format. The control also provides control for trace memory and trace math modifications. The trace limit functions allow maximum/minimum parameters to be set for each trace and provide visual and/or programmatic indications of pass/fail. Four major time domain settings are available for no time domain, frequency with time gate, time low pass, and time band pass. Gain compression configurations are available for CW Swept Frequency and Power Swept Frequency. Other menus and dialogs are available for range setup, DC term, extrapolation, gate setup, and window shape functions.

27-2 Overview of Display Menus and Dialog Boxes

The available display menus and dialog boxes are:

- “DISPLAY Menu” on page 27-3
- “TRACE FORMAT Menu” on page 27-6
 - “IMPEDANCE Menu” on page 27-8
 - “SMITH (IMPEDANCE) Menu” on page 27-10
 - “SMITH (ADMITTANCE) Menu” on page 27-12
 - “LINEAR POLAR Menu” on page 27-13
 - “LOG POLAR Menu” on page 27-14
- “VIEW TRACE Menu” on page 27-15
 - “DATA-MEM. OP. Menu” on page 27-18
- “LIMIT Menu” on page 27-21
 - “Polar Chart Circular Limit Lines” on page 27-22
- “Trace Limit Line Control Menus and Dialog Boxes” on page 27-21
 - “LIMIT Menu” on page 27-21
 - “Polar Chart Circular Limit Lines” on page 27-22
 - “Smith Chart Circular Limit Lines” on page 27-23
 - “Eye Diagram Display with Polygon Limit Lines” on page 27-24
- “EDIT LIMIT LINE Menu” on page 27-25
 - “Limit Line Type Setup Table” on page 27-27
 - “SAVE AS (LIMIT LINE LMT FILE) Dialog Box” on page 27-31
 - “OPEN (LIMIT LINE LMT FILE) Dialog Box” on page 27-32
- “DOMAIN Menu” on page 27-33
 - “Frequency, with No Time Gate” on page 27-34
 - “Frequency, with Time Gate” on page 27-34
 - “Time, Low Pass” on page 27-35
 - “Time, Band Pass” on page 27-35
 - “Time, Eye Diagram” on page 27-37
 - “TIME DEFINITION Menu” on page 27-55

- “RANGE SETUP Frequency with Time Gate Menu” on page 27-58
- “RANGE SETUP Time Band Pass Menu” on page 27-60
- “RANGE SETUP Time Low Pass Menu” on page 27-62
- “DC TERM Menu” on page 27-64
- “EXTRAPOLATION Menu” on page 27-66
- “WINDOW SHAPE Menu” on page 27-67
 - “ADVANCED WINDOW SHAPE SETUP Dialog Box” on page 27-69
- “GATE SETUP Menu” on page 27-71
- “GATE FUNCTION Menu” on page 27-73
 - “ADVANCED GATE SHAPE SETUP Dialog Box” on page 27-75
- “GAIN COMPRESS. Self Normalization Menu” on page 27-43
 - “GAIN COMPRESS. Compression Param Menu” on page 27-45
 - “COMP. PARAM Menu” on page 27-47
 - “VIEW COMPRESSION RESULT Dialog Box” on page 27-54
 - “SINGLE-MODE Menu – 4-Port VNAs” on page 27-49
- “INTER-TRACE MATH Menu” on page 27-79
 - “INTRA TRACE OP. Menu” on page 27-81
 - “EQUATION EDITOR Dialog Box” on page 27-82
- “CONVERSION Menu” on page 27-88
- “DISPLAY SETUP Menu” on page 27-89
 - “RESPONSES SETUP Menu – 4-Port VNAs” on page 27-93
 - “X-AXIS DISPLAY Menu” on page 27-95
 - “X-AXIS LABELS Menu” on page 27-96
 - “EDIT CHANNEL TITLE Dialog Box” on page 27-97

27-3 Display Main Menu

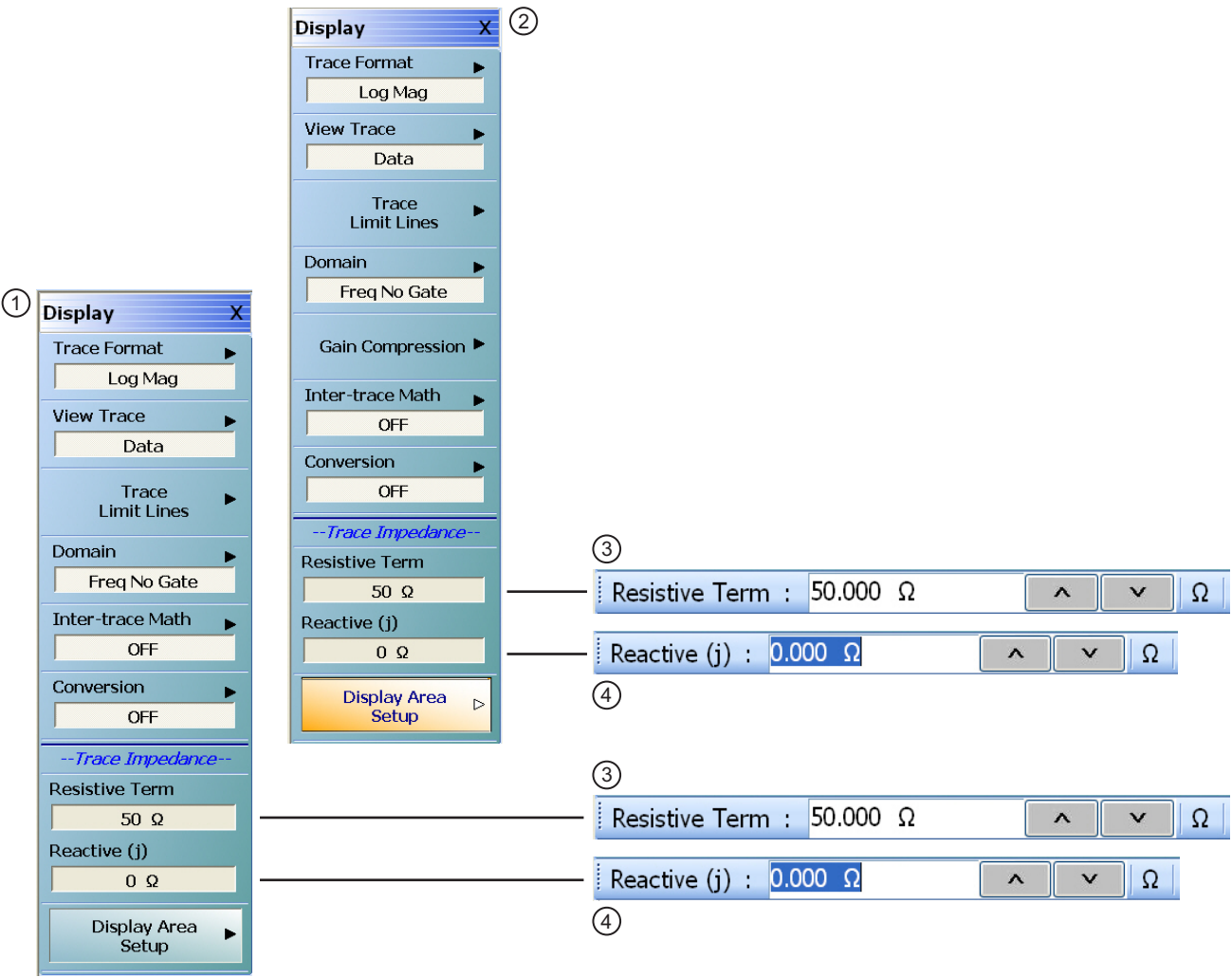
DISPLAY Menu

Previous

- “MAIN Menu” on page 2-2

Navigation

- MAIN | Display | DISPLAY



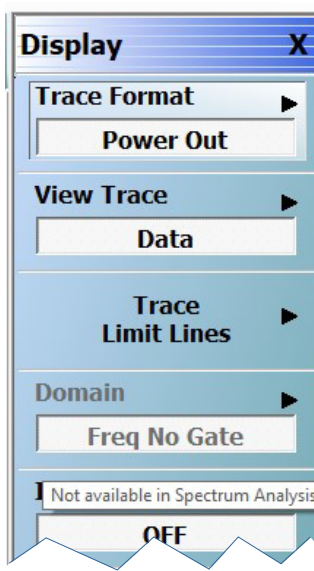
- | | |
|--|---|
| 1. DISPLAY menu with frequency-based sweeps at left. | 3. Resistive Term Field Toolbar in Ohms. |
| 2. DISPLAY menu with power-based sweeps at right. | 4. Reactive Term (j) Field Toolbar in Ohms. |

Figure 27-1. DISPLAY Menu

Display Menu Note (when Spectrum Analysis is active)

When the Spectrum Analysis application is active, the following DISPLAY menu buttons are disabled: Domain, Conversion, Resistive Term, and Reactive.

When the pointer is placed over a menu item, a tool tip noting “Not available in Spectrum Analysis” will appear.

**Trace Format**

Displays the current trace format setting. Select displays the TRACE FORMAT menu.

- [“TRACE FORMAT Menu” on page 27-6](#)

View Trace

Select displays the VIEW TRACE menu.

- [“VIEW TRACE Menu” on page 27-15](#)

Trace Limit Lines

Select displays the LIMIT menu.

- [“LIMIT Menu” on page 27-21](#)

Domain

Select displays the DOMAIN menu. The appearance and button availability of the DOMAIN menu depends on settings on other menus.

- [“DOMAIN Menu” on page 27-33](#)

Note	Domain button functionality is disabled when IMDView or Spectrum Analysis are enabled.
-------------	--

Gain Compression

The Gain Compression button is available if the SWEEP TYPES menu is set to Power (CW Freq) or Power (Swept Freq). Different menus are presented depending on which power sweep mode is used. If available, select displays the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Self Normalization Menu” on page 27-43](#)
- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

The Gain Compression button is unavailable if the SWEEP TYPES menu is set to:

- Freq Sweep (Linear)
- Freq Sweep (Log)

- Segmented Sweep (Freq-Based)
- Segmented Sweep (Index-based)
 - [“SWEEP SETUP Menu” on page 7-2](#)
 - MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Inter-trace Math

Select displays the INTERTRACE MATH menu.

- [“INTER-TRACE MATH Menu” on page 27-79](#)

Conversion

Select displays the CONVERSION menu.

- [“CONVERSION Menu” on page 27-88](#)

Resistive Term (Ohms)

Select allows the user to enter the trace impedance in Ohms and displays the Resistive Term toolbar. Use the toolbar to enter the required impedance for the currently active trace. The default value is 50.000 Ohms.

Reactive (j) (Ohms)

Select allows the user to enter trace reactive term in Ohms and displays the Reactive (j) toolbar.

Display Area Setup

Select displays the menu.

- [“DISPLAY SETUP Menu” on page 27-89](#)

27-4 Trace Format and Parameter Menus

TRACE FORMAT Menu

Active Trace on Active Channel

- The trace format selections below only apply to the currently active trace on the active channel.

Previous

- [“DISPLAY Menu” on page 27-3](#)

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT

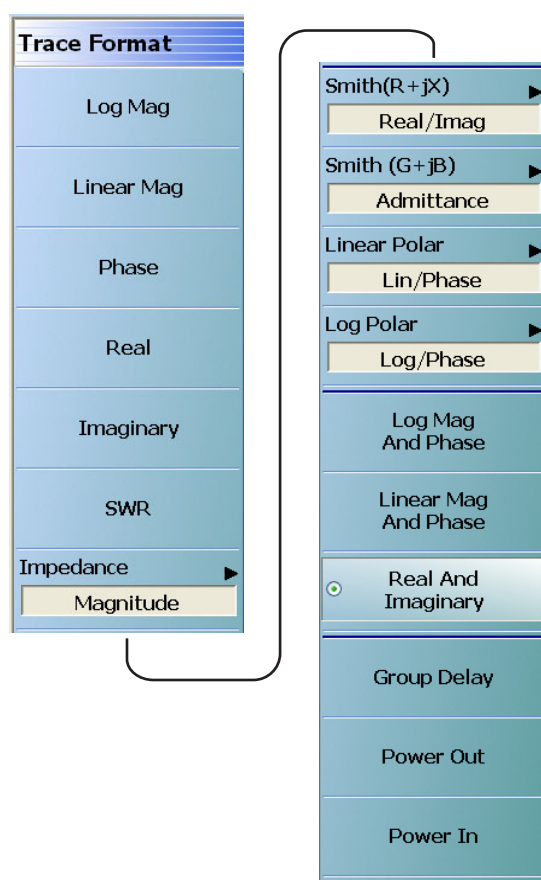


Figure 27-2. TRACE FORMAT Menu

Button Selection Group

- The buttons on the TRACE FORMAT menu form a button selection group, where the selection of any one button de-selects the other 16 buttons.

Log Mag (Trace Format)

Select sets a single rectilinear display. All other trace display graph types are deselected.

Linear Mag (Trace Format)

Select sets a single rectilinear display.

Phase (Trace Format)

Select sets a single rectilinear display.

Real (Trace Format)

Select sets a single rectilinear display.

Imaginary (Trace Format)

Select sets a single rectilinear display.

SWR (Trace Format)

Select sets a single rectilinear display.

Impedance (Trace Format)

Select displays the Impedance submenu.

- [“IMPEDANCE Menu” on page 27-8](#)

Smith (R+jX) (Impedance)

Select displays the SMITH (with Impedance) submenu to configure the display of Smith Impedance charts.

- [“SMITH \(IMPEDANCE\) Menu” on page 27-10](#)

Smith (G+jB) (Admittance)

Select displays the SMITH (with Admittance) menu to configure the display of Smith Admittance charts.

- [“SMITH \(ADMITTANCE\) Menu” on page 27-12](#)

Linear Polar (Trace Format)

Select displays the LINEAR POLAR menu to configure the display of polar graphs.

- [“LINEAR POLAR Menu” on page 27-13](#)

Log Polar (Trace Format)

Select displays the Log Polar menu to configure the display of polar graphs.

- [“LOG POLAR Menu” on page 27-14](#)

Log Mag and Phase (Trace Format)

Select sets a dual rectilinear display with Log Magnitude data in the upper graph and Phase data in the lower graph.

Linear Mag and Phase (Trace Format)

Select sets a dual rectilinear display with Linear Magnitude data in the upper graph and Phase data in the lower graph.

Real and Imaginary (Trace Format)

Select sets a dual rectilinear display with Real data in the upper graph and Imaginary data in the lower graph.

Group Delay (Trace Format)

Group delay graphs display phase-related distortion as a function of frequency such as for the flatness of the group delay of a filter over its passband. Select sets a single rectilinear display.

Power Out (Trace Format)

Select sets a single rectilinear display measuring power output of the DUT.

Power In (Trace Format)

Select sets a single rectilinear display measuring power input to the DUT.

IMPEDANCE Menu

With the Impedance menu item selected as the trace format, the selected trace display is redrawn according to the selected impedance type. The trace annotation and scaling changes accordingly.

Trace Annotation Example

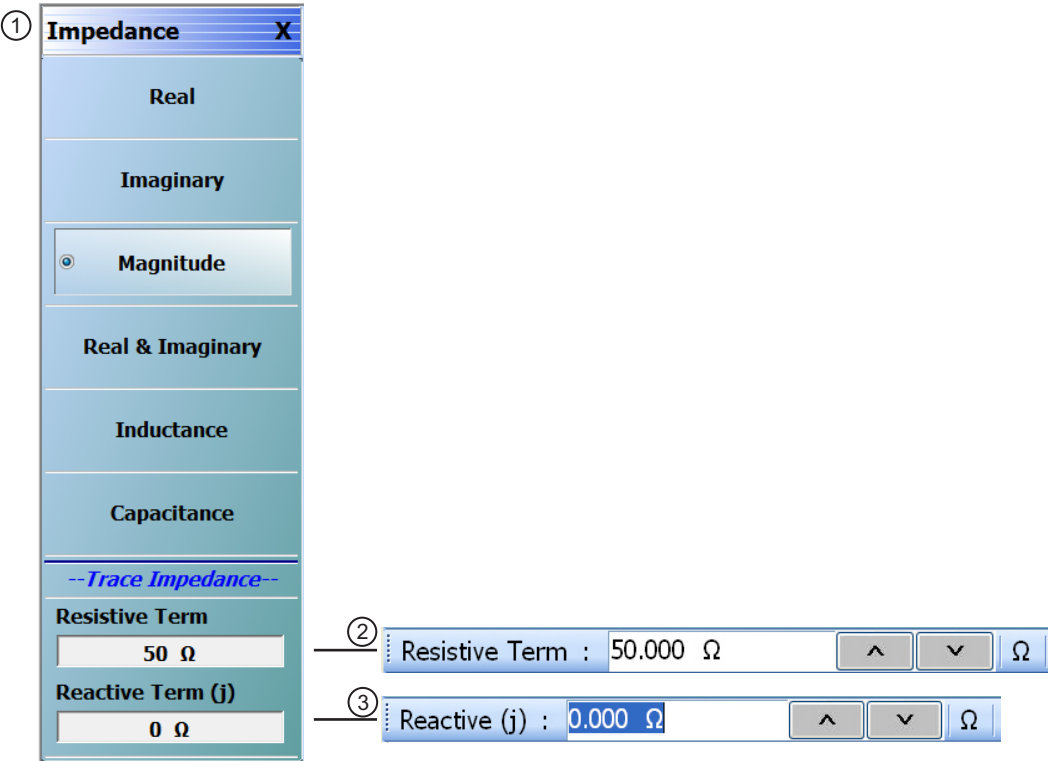


Previous

- [“TRACE FORMAT Menu” on page 27-6](#)

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Impedance | IMPEDANCE



1. IMPEDANCE Menu	2. Resistive Term Field Toolbar in Ohms.
	3. Reactive (j) Term Field Toolbar in Ohms.

Figure 27-3. IMPEDANCE Menu

Auto-Return Button Selection Group

- The first six (6) buttons (Real, Imaginary, Magnitude, Real & Imaginary, Inductance, and Capacitance) on the IMPEDANCE menu are configured as a button selection group with an auto-return function, where selection of any one button de-selects the other five (5) buttons, and then auto-returns to the [“TRACE FORMAT Menu”](#), which then displays the currently selected impedance. The selected impedance is also displayed on the Trace Format button of the [“DISPLAY Menu”](#).

Real (Impedance)

Select sets a rectilinear display, de-selects the previously selected impedance type, then auto-returns to TRACE FORMAT menu.

Imaginary (Impedance)

Select sets a rectilinear display, de-selects the previously selected impedance type, then auto-returns to TRACE FORMAT menu.

Magnitude (Impedance)

Select sets a rectilinear display, de-selects the previously selected impedance type, then auto-returns to TRACE FORMAT menu.

Real & Imaginary (Impedance)

Select sets a dual rectilinear display with Real data in the upper graph and Imaginary data in the lower graph. Select also de-selects the previously selected impedance type, then auto-returns to TRACE FORMAT menu.

Inductance (Impedance)

Select sets a rectilinear display, de-selects the previously selected impedance type, then auto-returns to TRACE FORMAT menu.

Capacitance (Impedance)

Select sets a rectilinear display, de-selects the previously selected impedance type, then auto-returns to TRACE FORMAT menu.

Resistive Term (Ohms)

Select allows the user to enter the trace impedance in Ohms and displays the Resistive Term toolbar. Use the toolbar to enter the required impedance for the currently active trace. The default value is 50.000 Ohms.

Reactive (j) (Ohms)

Select allows the user to enter trace reactive term in Ohms and displays the Reactive (j) toolbar.

SMITH (IMPEDANCE) Menu

Previous

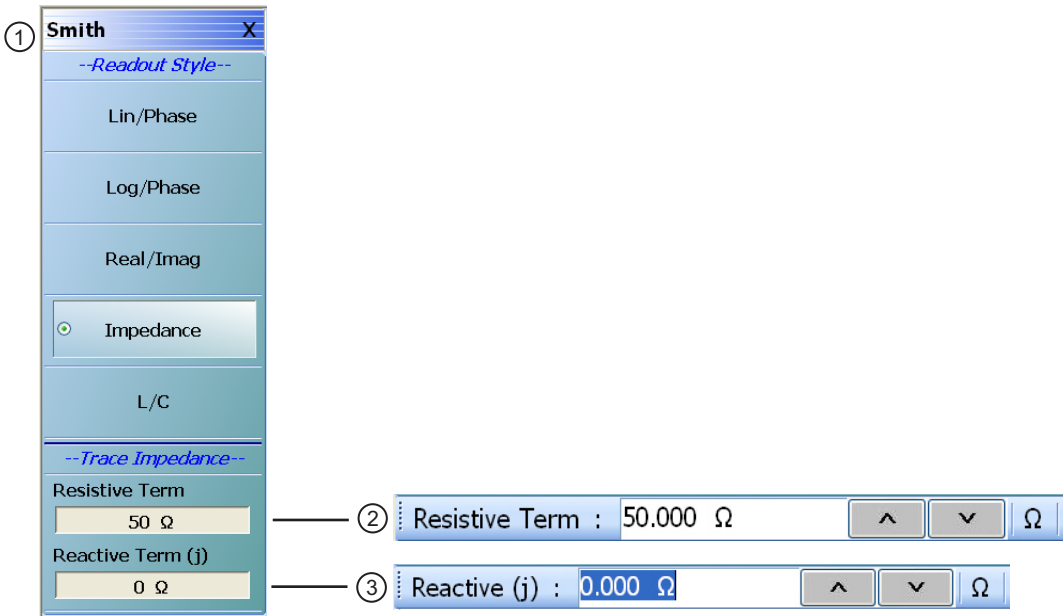
- [“TRACE FORMAT Menu” on page 27-6](#)

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (R+jX) | SMITH (IMPEDANCE)

Scaling

- Once the Smith Impedance or Smith Admittance display is selected, the scale of the display can be adjusted by using the SCALE menu.
- [“SCALE Smith Chart Impedance Menu” on page 28-17](#)
- MAIN | Scale | SCALE | Scale Selection | SMITH SCALING



1. SMITH (IMPEDANCE) Menu	2. Resistive Term Field Toolbar in Ohms.
	3. Reactive (j) Term Field Toolbar in Ohms.

Figure 27-4. SMITH (IMPEDANCE) Menu

Auto-Return Button Selection Group

- The Lin/Phase, Log/Phase, Real/Imag, and Impedance buttons form a button selection group with an auto-return function, where the selection of any one button de-selects the other three buttons and auto-returns to the TRACE FORMAT menu.

Lin/Phase (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots with linear values and phase.

Log/Phase (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots with log values and phase.

Real/Imag (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots with real and imaginary values.

Impedance (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots only impedance.

L/C (Smith Impedance)

Select creates a Smith Chart (Impedance) that plots with inductance and capacitance.

Resistive Term (Smith Impedance)

Select displays the Resistive Term (Ohms) toolbar and allows the user to select the impedance for the selected active trace.

Reactive Term (j) (Smith Impedance)

Select displays the Reactive Term (j) Field Toolbar (Smith Impedance). The appearance and operation is the same as the Resistive Term field toolbar above.

SMITH (ADMITTANCE) Menu

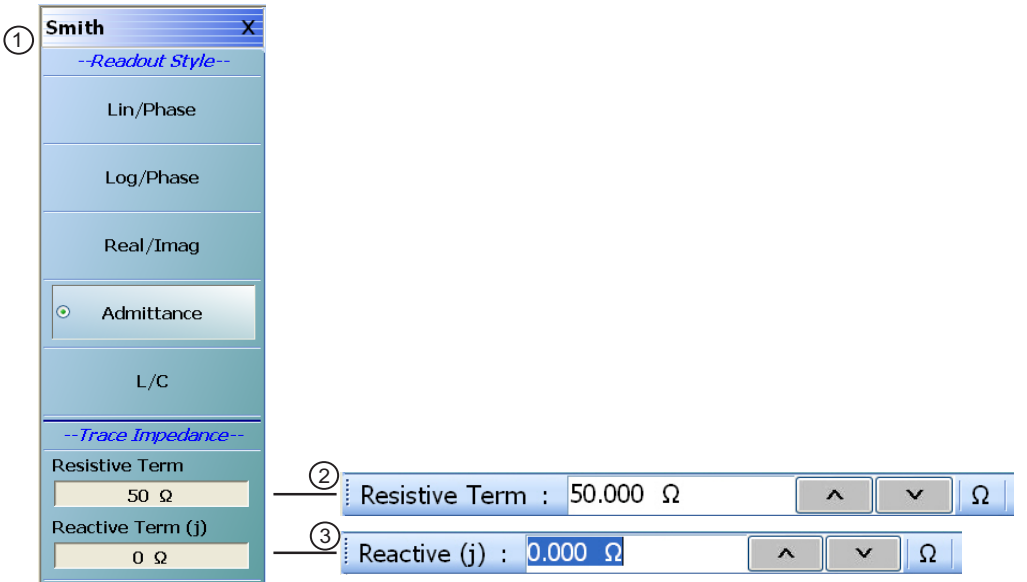
The Lin/Phase, Log/Phase, Real/Imag, and Admittance buttons form an **auto-return button selection group** where the selection of any one button de-selects the other three buttons and auto-returns to the TRACE FORMAT menu.

Previous

- [“TRACE FORMAT Menu” on page 27-6](#)

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (G+jB) | SMITH (ADMITTANCE)



- | | |
|----------------------------|---|
| 1. SMITH (ADMITTANCE) Menu | 2. Resistive Term Field Toolbar in Ohms. |
| | 3. Reactive (j) Term Field Toolbar in Ohms. |

Figure 27-5. SMITH (ADMITTANCE) Menu

Lin/Phase (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots with linear values and phase.

Log/Phase (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots with log values and phase.

Real/Imag (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots with real and imaginary values.

Admittance (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots only admittance.

L/C (Smith Admittance)

Select creates a Smith Chart (Admittance) that plots with inductance and capacitance values.

Resistive Term (Smith Admittance)

Select displays the Resistive Term (Ohms) toolbar and allows the user to select the impedance for the trace.

Reactive Term (j) (Smith Admittance)

Select displays the Reactive Term (j) Field Toolbar (Smith Impedance). The appearance and operation is the same as the Resistive Term field toolbar above.

LINEAR POLAR Menu

Previous

- [“TRACE FORMAT Menu” on page 27-6](#)

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Linear Polar | LINEAR POLAR

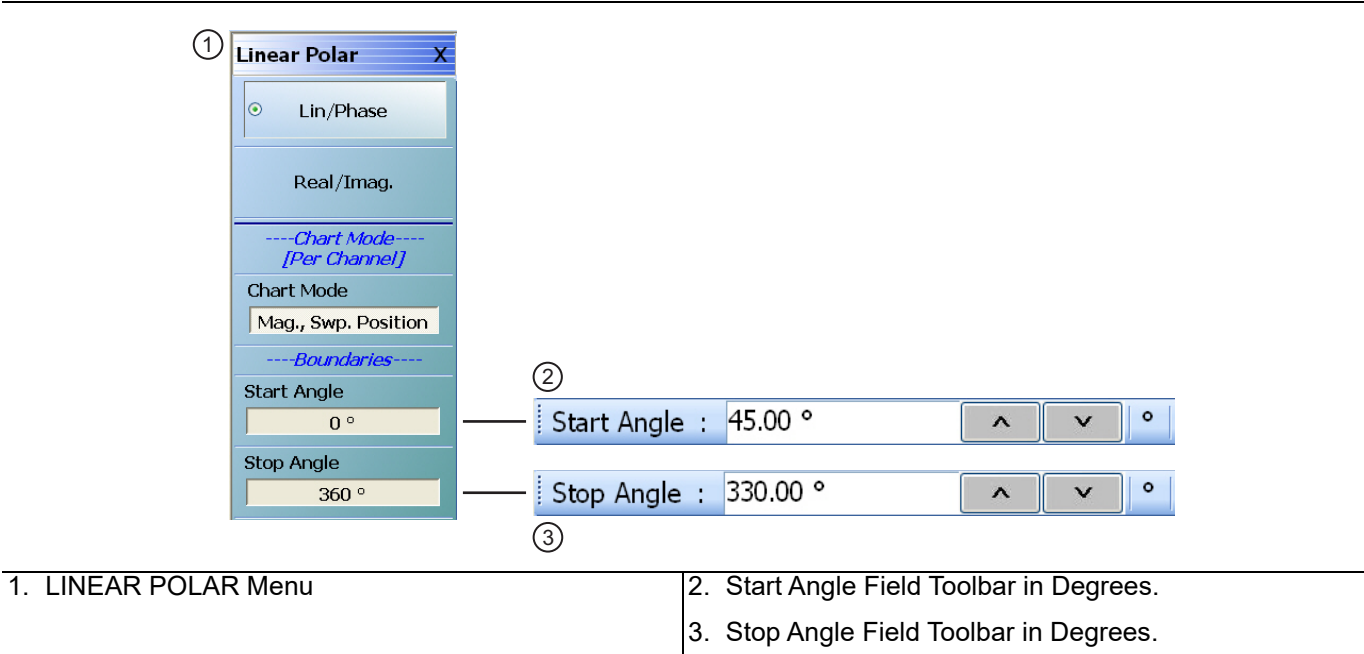


Figure 27-6. LINEAR POLAR Menu

Liner Polar Button Selection Group

- The Lin/Phase and Real/Imag. buttons form a button selection group where the selection of one button de-selects the other button.

Lin/Phase (Linear Polar)

Sets the linear polar display graph to linear and phase.

Real/Imag (Linear Polar)

Sets the linear polar display graph to real and imaginary.

Chart Mode (Mag/Phase & Mag/Swp. Position) (Linear Polar)

On a per-channel basis, select toggles between values of Mag/Phase and Mag/Swp. Position. If Mag/Phase is selected, the Start Angle and Stop Angle buttons below are unavailable. If Mag/Swp. Position is selected, the Start Angle and Stop Angle buttons are become available.

Start Angle (Linear Polar)

The Chart Mode toggle button must be set to Mag/Phase for this button to be available. Select displays the Start Angle (Degrees) toolbar. Enter a starting angle between 0.00 degrees and 360 degrees.

Stop Angle (Linear Polar)

The Chart Mode toggle button must be set to Mag/Phase for this button to be available. Select displays the Stop Angle (Degrees) toolbar. Enter a stop angle from between 0.00 degrees and 360 degrees.

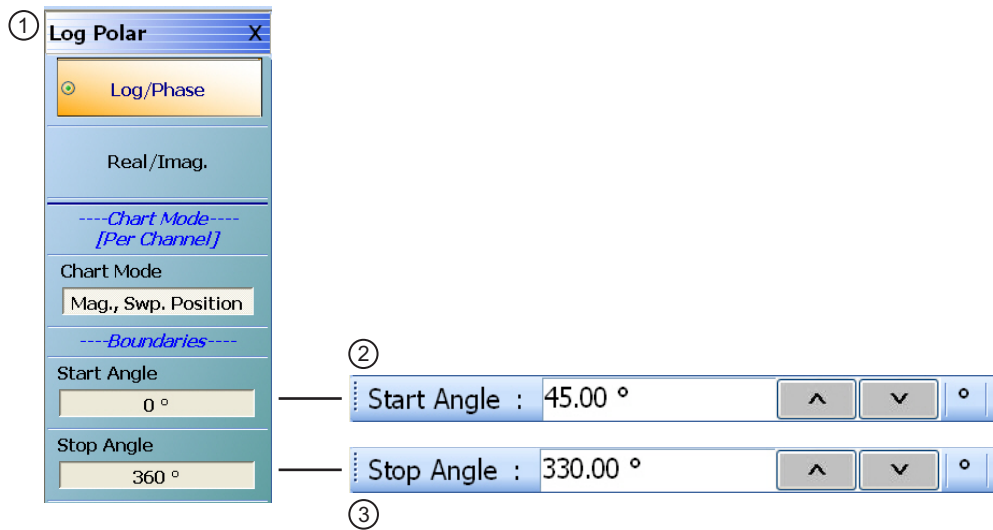
LOG POLAR Menu

Previous

- [“TRACE FORMAT Menu” on page 27-6](#)

Navigation

- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Log Polar | LOG POLAR



1. LOG POLAR Menu	2. Start Angle Field Toolbar in Degrees.
	3. Stop Angle Field Toolbar in Degrees.

Figure 27-7. LOG POLAR Menu

Log Polar Button Selection Group

The Lin/Phase and Real/Imag. buttons form a button selection group where the selection of one button de-selects the other button.

Lin/Phase (Log Polar)

Sets the log polar display graph to linear and phase.

Real/Imag. (Log Polar)

Sets the log polar display graph to real and imaginary.

Chart Mode (Mag., Phase & Mag., Swp. Position) (Log Polar)

On a per-channel basis, select toggles between values of Mag/Phase and Mag/Swp. Position. If Mag/Phase is selected, the Start Angle and Stop Angle buttons below are unavailable. If Mag/Swp. Position is selected, the Start Angle and Stop Angle buttons are become available.

Start Angle (Deg) (Log Polar)

The Chart Mode toggle button must be set to Mag/Phase for this button to be available. Select displays the Start Angle (Degrees) toolbar. Enter a starting angle between 0.00 degrees and 360 degrees.

Stop Angle (Log Polar)

The Chart Mode toggle button must be set to Mag/Phase for this button to be available. Select displays the Stop Angle (Degrees) toolbar. Enter a stop angle from between 0.00 degrees and 360 degrees.

VIEW TRACE Menu

Previous

- “TRACE FORMAT Menu” on page 27-6

Navigation

- MAIN | Display | DISPLAY | View Trace | VIEW TRACE

Button Availability

- If trace data has not previously been stored to memory, only the Data, Off, Store Data to Memory, and Data Mem Op buttons (all described below) are available as shown left side of Figure 27-8 below.
- The Memory, Data & Memory, Data Memory Math, and Store Data Mem Math to Memory buttons are unavailable.
- After one or more sweeps, select the Store Data to Memory button to enable the Memory, Data & Memory, Data Memory Math buttons.
- See the section below for availability of the Store Data Mem Math to Memory button functions.

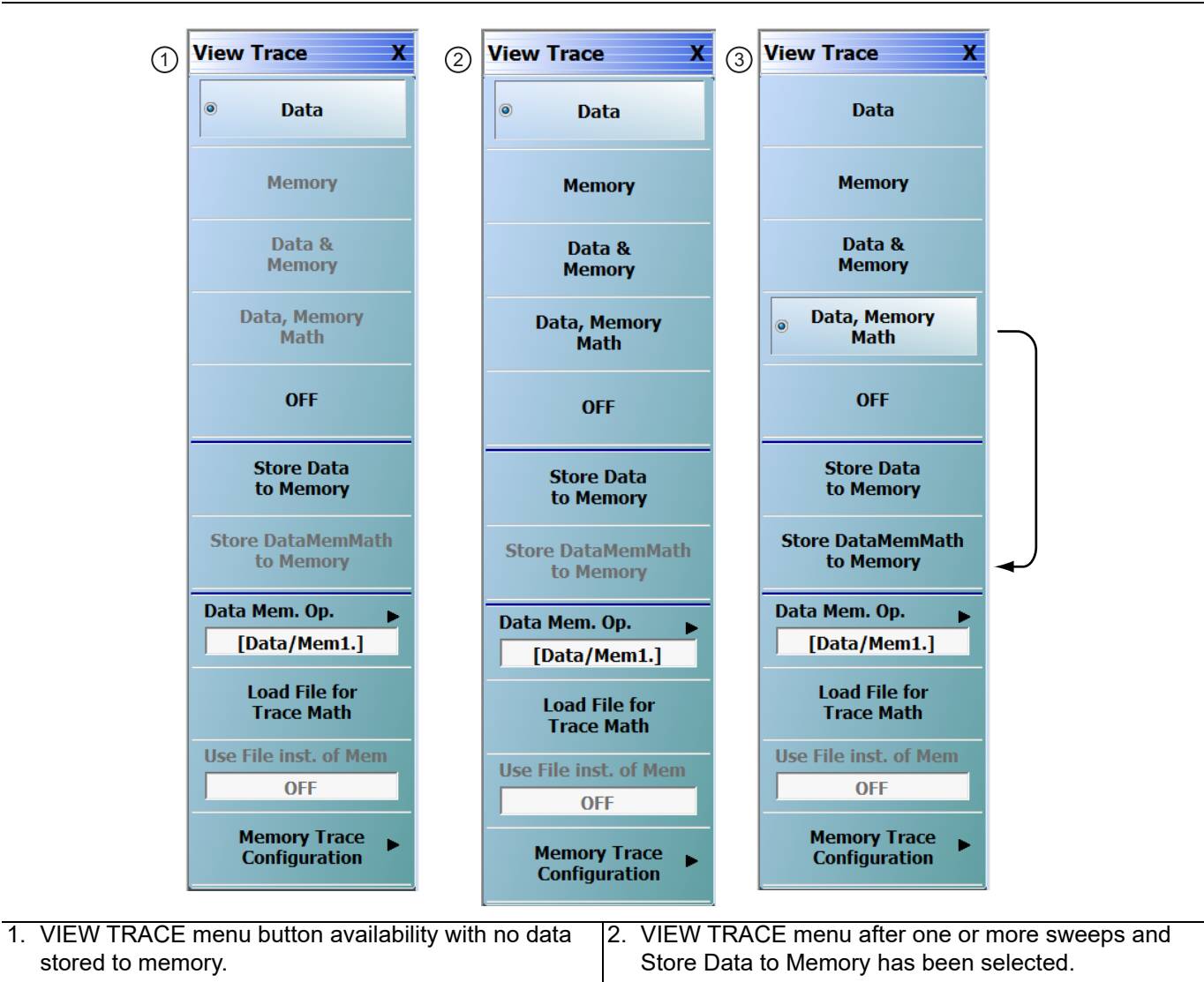


Figure 27-8. VIEW TRACE Menu

Button Selection Group

- If trace data has been stored to memory, the Data, Memory, Data and Memory, Data Mem. Math, and OFF buttons become available and form a button selection group where selection of any one button de-selects the other four buttons, as shown in the right side of [Figure 27-8](#).

View Trace Button Availability

If trace data has not previously been stored to memory, only the Data, Off, Store Data to Memory, and Data Mem Op buttons are available.

Data

The button is available but has no function until data has been stored as described below.

OFF (View Trace)

If OFF (View Trace) is selected, the active trace on the active channel is removed from the trace graph display.

Store Data to Memory

Select causes data to be stored to memory and the Store Data MemMath to Memory button is (below) becomes available.

Data Mem. Op.

Select displays the Data Mem Op menu.

- [“DATA-MEM. OP. Menu” on page 27-18](#)

After one or more sweeps, select the Store Data to Memory button to enable the Memory, Data & Memory, Data Memory Math buttons described below.

View Trace Menu Button Selection Group

If data has been saved to memory, the Data, Memory, Data and Memory, Data Mem. Math, and OFF buttons become available and form a button selection group where selection of any one button de-selects the other four buttons.

Data

Select records data to memory where it can be stored or further manipulated. The Store Data MemMath to Memory button (below) is unavailable.

Memory

Memory recalls data from memory where it is displayed or further manipulated. The Store Data MemMath to Memory button (below) is unavailable. Saved memory location information will be displayed along with the trace annotation when Memory is selected as the View Trace mode.

Data & Memory

Data & Memory recalls data and uses the active memory for display and/or further manipulation. The Store Data MemMath to Memory button (below) is unavailable.

Data Memory Math

The Data Memory Math button enabled the Store Data MemMath to Memory button (below) is available where the selected math operation is applied to the stored data.

OFF (View Trace)

If OFF (View Trace) is selected, the active trace on the active channel is removed from the trace graph display. The Store Data MemMath to Memory button (below) is unavailable.

Store Data to Memory

Select causes data to be stored to memory and the Store Data MemMath to Memory button is (below) is available.

Store Data MemMath to Memory

The Data Memory Math button (above) must be selected to make this button available. If selected, this stored the active trace data/math information to a file.

Data Mem. Op.

Select displays the Data Mem Op menu.

- [“DATA-MEM. OP. Menu” on page 27-18](#)

Memory Trace Configuration

Select displays the Memory Trace Configuration dialog box.

- [“MEMORY TRACE CONFIGURATION Dialog Box” on page 27-19](#)

DATA-MEM. OP. Menu

Full Name

Data-Memory Operations Setup

Previous

- [“VIEW TRACE Menu” on page 27-15](#)

Navigation

- MAIN | Display | DISPLAY | View Trace | VIEW TRACE | Data Mem Op | DATA MEM OP

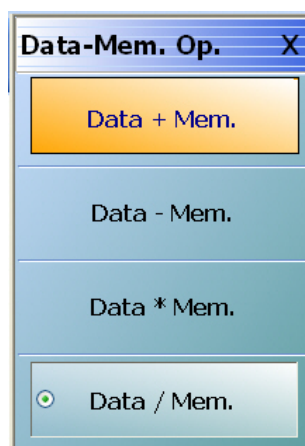


Figure 27-9. DATA-MEM. OP. (DATA-MEMORY OPERATIONS) Menu

Button Selection Group

- The menu buttons form button selection group where the selection of any one button de-select the other three buttons.

Data + Mem. (Plus)

Selecting Data + Mem button de-selects the Data – Mem, Data Mem, and Data / Mem buttons. The data value is added to the memory value. Click **Back** to return to the View Trace menu.

Data – Mem. (Minus)

Selecting the Data – Mem button de-selects the Data + Mem, Data Mem, and Data / Mem buttons. The memory value is subtracted from the data value. Click **Back** to return to the View Trace menu.

Data * Mem. (Multiplication)

Selecting Data * Mem button de-selects the Data + Mem, Data – Mem, and Data / Mem buttons. The data value is multiplied times the memory value. Click **Back** to return to the View Trace menu.

Data / Mem. (Division)

Selecting Data / Mem button de-selects the Data + Mem, Data – Mem, and Data Mem buttons. The data value is divided by the memory value. Click **Back** to return to the View Trace menu.

MEMORY TRACE CONFIGURATION Dialog Box

Previous

- “VIEW TRACE Menu” on page 27-15

Navigation

- MAIN | Display | DISPLAY | View Trace | VIEW TRACE | Memory Trace Configuration | MEMORY TRACE CONFIGURATION

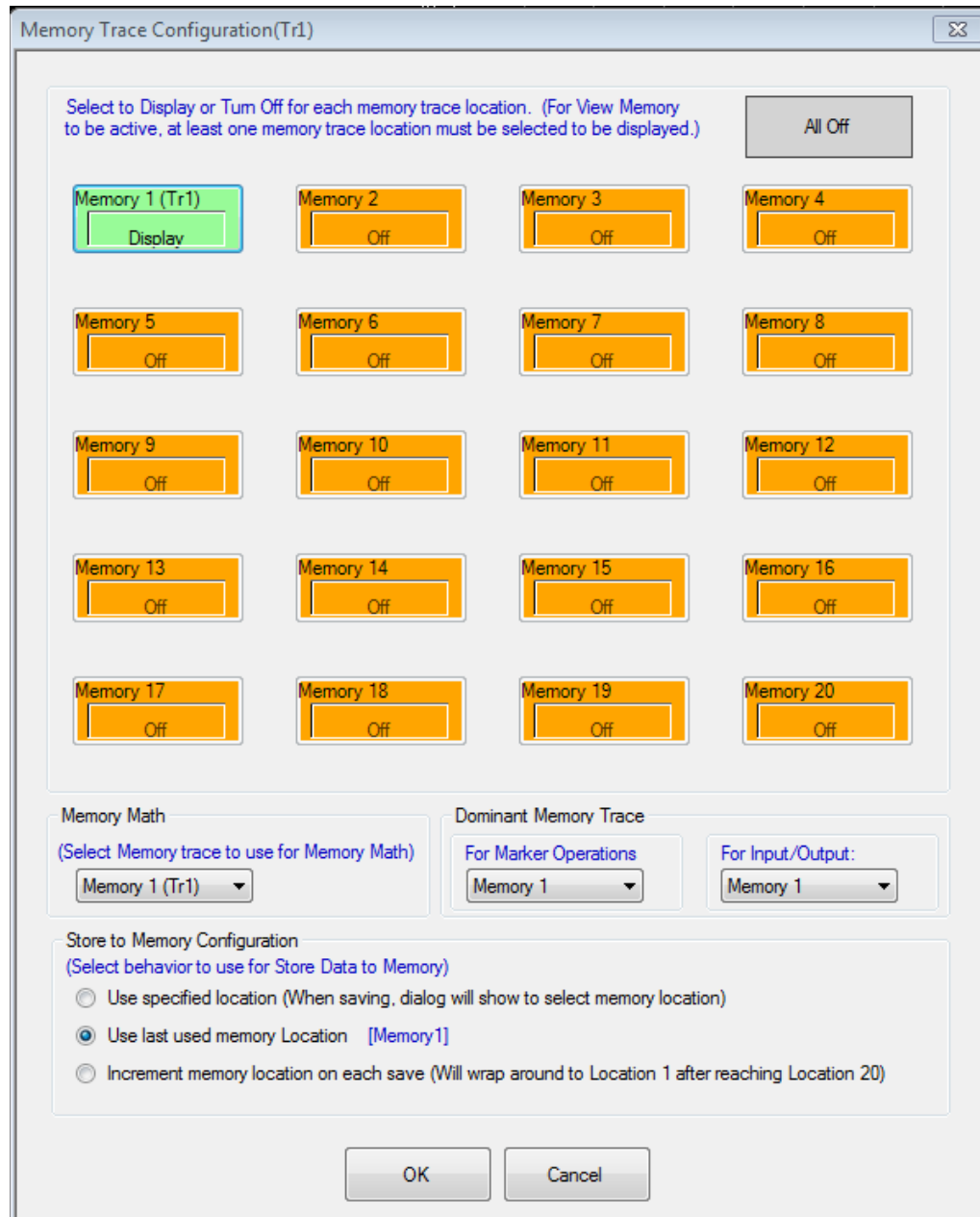


Figure 27-10. MEMORY TRACE CONFIGURATION Dialog Box

The matrix in the upper portion of the dialog controls which memories are visible in the current trace (current trace denoted in the title of the dialog) when the display selection is either Memory or Data and Memory.

Tr# represents the selected trace number. The memory buttons in the MEMORY TRACE CONFIGURATION dialog are enabled when the user saves data of a particular trace to the corresponding memory location.

All Off

Selecting the All Off button turns off all memory trace locations. For View Memory to be active, at least one memory trace location must be selected to be displayed.

Memory 1 ... Memory 20

Select a Memory # button to enable/disable display of stored trace data from that memory location. Each box is a toggle button to display or not display the memory, and a given button will only be active if something has been stored in that location. The trace where that stored data originally came from will be shown in parentheses.

Memory Math

Selects which memory will be used for a math operation of the form DataMemMath. The various locations will only be available if something has been stored in that location.

Dominant Memory Trace

Select dominant memory trace for marker operations and for input/output.

If only memory is displayed, the markers will traverse on the Memory selected in “For Marker Operations”. The Memory selected in “For Input/Output” will be used for when saving memory data.

- Active Trace Memory 1 [Formatted](*.tdf)
- Active Trace Memory 1 [UnFormatted](*.tdu)

Store to Memory Configuration

Select behavior to use for Store Data to Memory operations:

- Use specified location – Allows user to select a particular memory location to which the data is to be stored. A dialog box will displayed every time “Stored Data to Memory” is selected.
- Use last used memory location (default) – Saves the data to the last saved memory location (the location with the same number as the active trace).
- Increment memory location on each save – Saves the data in the next available memory location in an incremental order, beginning with the last used location for that trace. Note that when the 20 locations have been used, the oldest stored information will be overwritten and the saving will continue cyclically.

27-5 Trace Limit Line Control Menus and Dialog Boxes

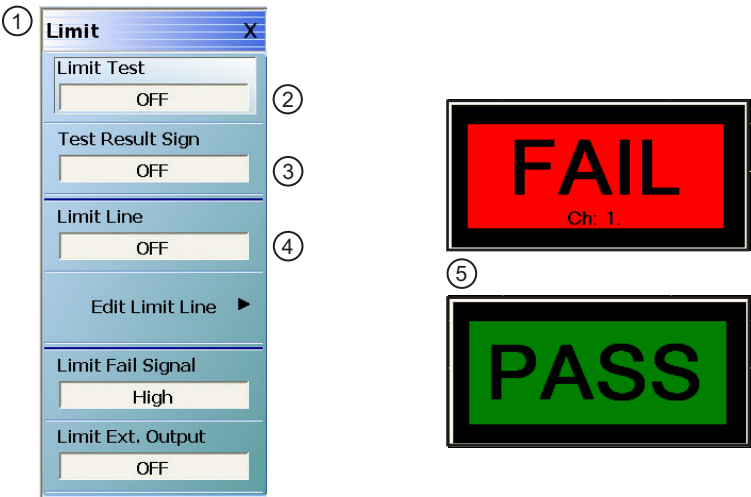
LIMIT Menu

Previous

- [“DISPLAY Menu” on page 27-3](#)

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT



1. LIMIT Menu	4. Limit Line Toggle Button – Toggles existing limit lines ON or OFF.
2. Limit Test Toggle Button – Toggles limit tests ON or OFF.	5. Pass/Fail screen dialogs showing results of test.button function descriptions.
3. Limit Test Results Sign Button – Toggles limit test results as screen message as shown in #5 ON and OFF.	

Figure 27-11. LIMIT Menu

Limit Test (Off/On)

On a per-system basis, select toggles Limit Test on and off.

Test Result Sign (Off/On)

On a per-system basis, toggles the Test Result Sign on and off. If the Test Result Sign is enabled, a failed test icon appears. If the Test Result Sign is enabled, a passed test icon appears.

Limit Line

On a per-trace basis, toggles Limit Lines off and on.

Edit Limit Line

On a per-trace basis, displays the Edit Limit Line menu.

- [“EDIT LIMIT LINE Menu” on page 27-25](#)

Limit Fail Signal (High/Low)

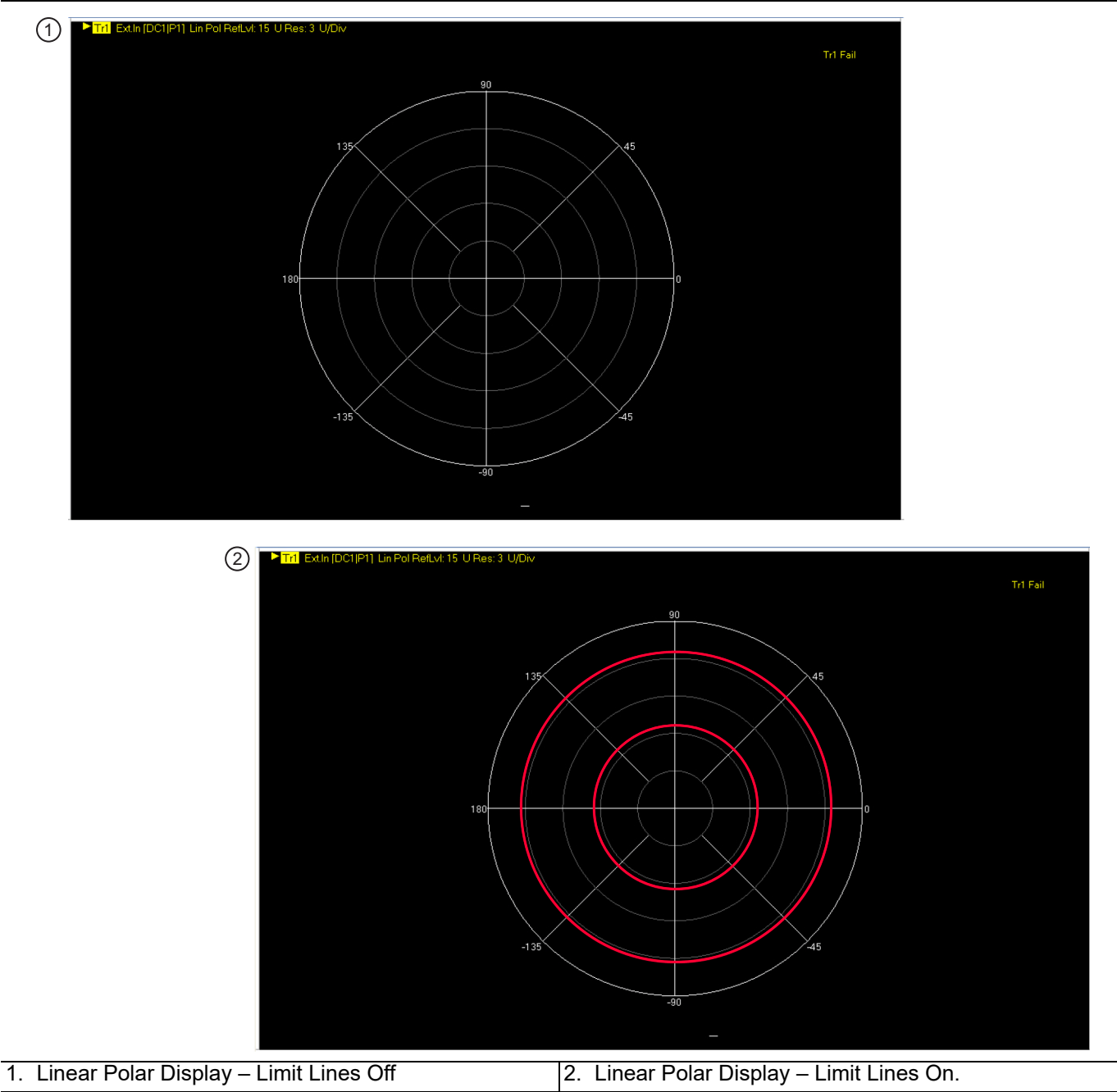
On a per-trace basis, toggles the Limit Fail Signal between high and low.

Limit Ext. Output (Off/On)

Select toggles the Limit Ext. Output between off and on.

Polar Chart Circular Limit Lines

For Linear Polar Chart displays and Log Polar Chart displays, only upper and lower limit lines are supported. For example, in [Figure 27-12](#), a Linear Polar display at left has the limit lines turned off, and at right, the limit lines are turned on.

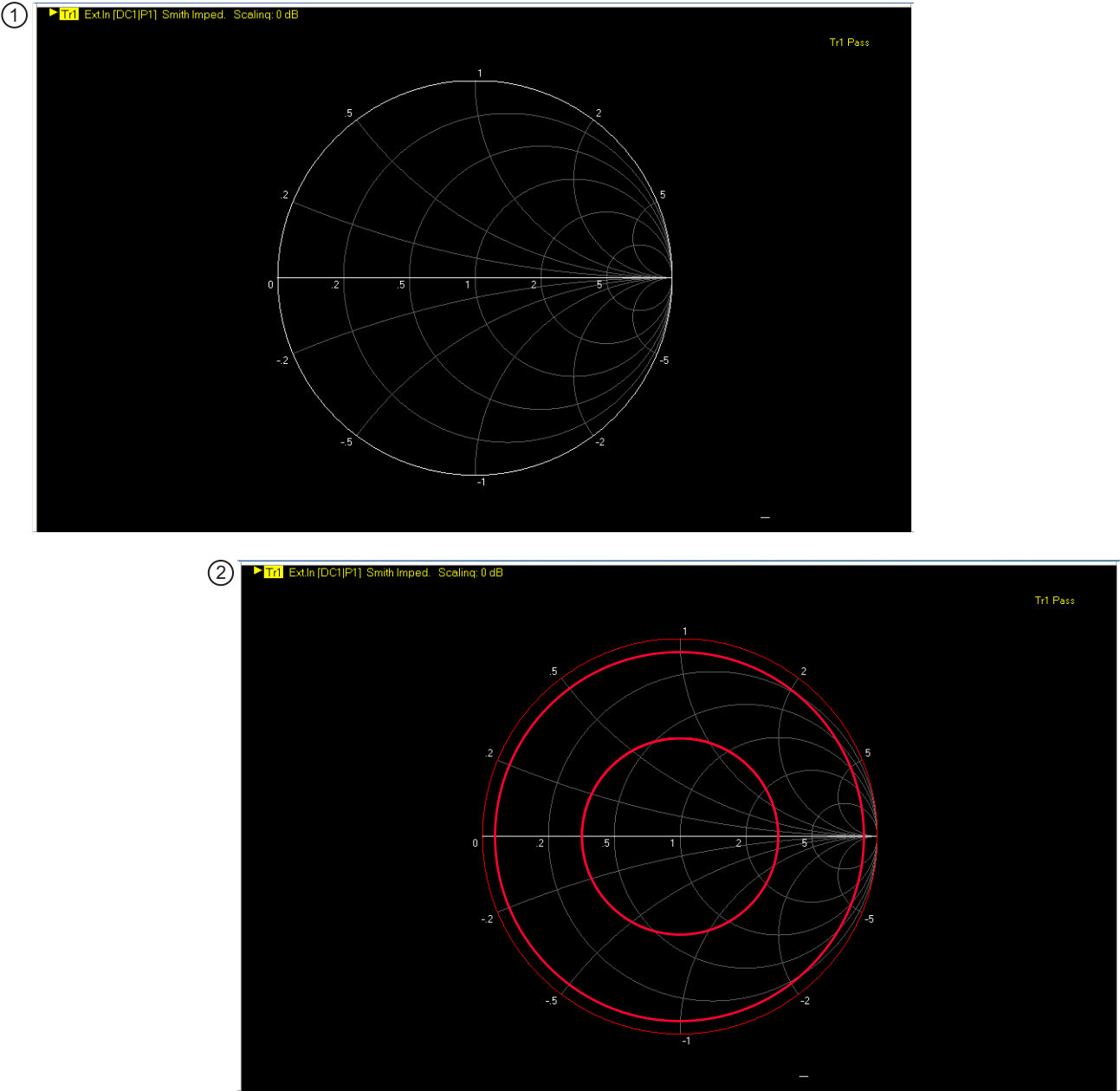


1. Linear Polar Display – Limit Lines Off	2. Linear Polar Display – Limit Lines On.
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Figure 27-12. Linear Polar Display – Limit Lines – Off/On

Smith Chart Circular Limit Lines

For Smith Charts, again only upper and lower limits are supported. In [Figure 27-13](#), a Smith Chart with the limit lines turned off is shown on the left, and with the limit lines turned on at the left.



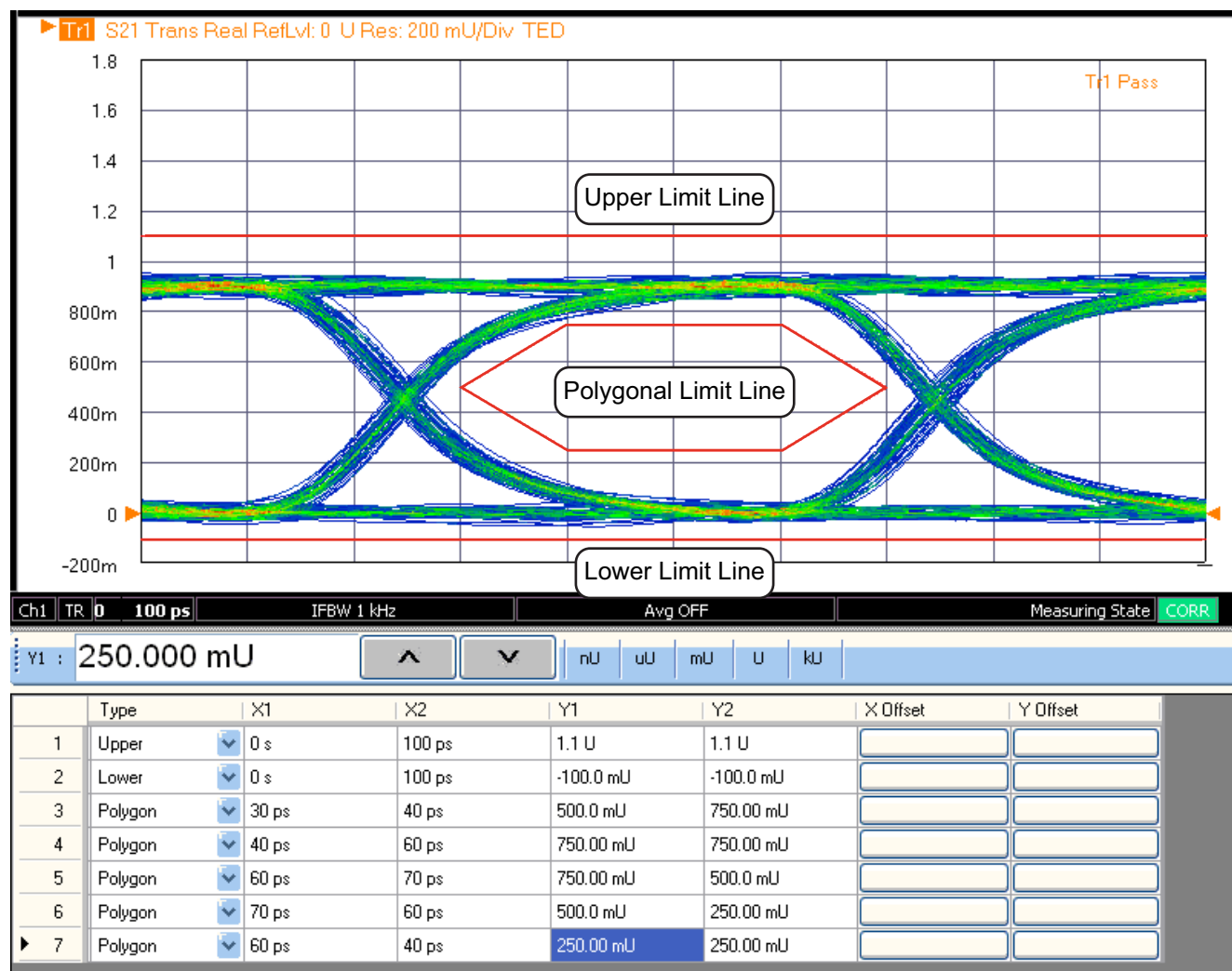
1. Smith Chart Limit Lines – Limit Lines OFF	2. Smith Chart Limit Lines – Upper and Lower Limit Lines ON.
--	--

Figure 27-13. Smith Chart Limit Lines – Off at left – On at right

Eye Diagram Display with Polygon Limit Lines

When Option 47 is installed and the selected trace is Time, Eye Diagram (TED), the limit line table is modified to include the selection Polygon as a limit line type.

Performance limit lines applied for Domain | Time, Eye Diagram displays are known as “Masks”. The user must enter a minimum of three entries corresponding to Polygon type in the limit line table in order to consider it as a mask. Only then will limit checking be done for polygon mask. The polygon must be closed and simple (no lines crossing). The segments of the polygon should be entered sequentially (clockwise or counterclockwise) so the system can figure out which region to enclose.



Polygon Mask Limit Definitions:

Upper Limit Line: All eye data should fall below the upper red line. The upper red line denotes the maximum expected value. Voltages exceeding this value are considered a fail.

Lower Limit Line: All eye data should fall above the lower red line. The lower red line denotes the minimum expected value. Voltages below this value are considered a fail.

Polygon Limit Line: Here the limit line entries are considered vertices of a polygon. In order to pass the mask compliance test, the output must not have any samples fall within the “keep-out” regions (the polygon area defined by the mask). That is, failures fall inside of the polygon.

Figure 27-14. Eye Diagram Limit Lines

EDIT LIMIT LINE Menu

When this menu is selected, the bottom of the display moves up and the [“Limit Line Type Setup Table”](#) is displayed. The number of limit lines that can be added depend on the type of display:

- Single rectangular trace displays can have up to 50 limit line segments per trace.
- Dual rectangular trace displays can have up to 50 limit line segments where each segment is the same on both trace displays.
- Smith Chart and Polar Graph circular displays are can only have an upper and lower limit.

Previous

- [“LIMIT Menu” on page 27-21](#)

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT | Edit Limit Line | EDIT LIMIT LINE

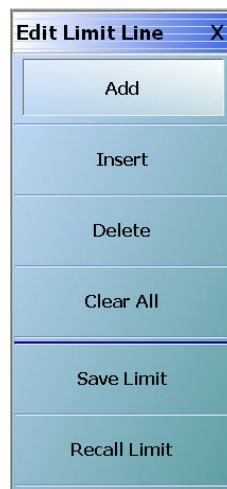


Figure 27-15. EDIT LIMIT LINE Menu

EDIT LIMIT LINE Menu Button Availability

The six (6) buttons of the EDIT LIMIT LINE menu are available to all rectangular, Smith Chart, and Polar Graph Chart displays.

Rectangular displays can have up to 50 limit line segments per trace. Smith Chart and Polar Graph circular displays can have an upper and lower limit only.

Add (Limit Line)

Select adds a new row of limit line information to the [“Limit Line Type Setup Table”](#) at the bottom of the display. For example, if four (4) limit lines are displayed, selecting Add creates a new limit line at position five (5).

- [“Limit Line Type Setup Table” on page 27-27](#)

Insert (Limit Line)

Inserts a new limit line ABOVE the currently selected limit line.

- If no limit lines are currently defined, the button does not function.
- If one (1) or more limit lines are defined, select and highlight the limit line where you want to insert a new line. A selected line is indicated by the right-facing triangle will all line fields in a reversed display.
- For example, if four (4) lines are currently defined, and a fifth line is required between Limit Line 1 and Limit Line 2, select Limit Line 2 so that the right arrow selection triangle appears to the left of the line number.

- Click the Insert button and a new limit line appears at position two with the default values from the active trace display. The cursor moves to the row above the inserted line. The previous line 2 and its values are moved to the row 3 position; the previous line 3 and its values are moved to the row 4 position.
- See the detailed tableau operations description in the sections below.
- [“Limit Line Type Setup Table” on page 27-27](#)

Delete (Limit Line)

After selecting a limit line row in the EDIT LIMIT LINE TABLEAU dialog, selecting the Delete button removes the limit line.

- [“Limit Line Type Setup Table” on page 27-27](#)

Clear All (Limit Lines)

Select deletes all recorded limit lint rows in the EDIT LIMIT LINE TABLEAU dialog.

- [“Limit Line Type Setup Table” on page 27-27](#)

Save Limit

Select displays the SAVE AS (LIMIT LINE LMT FILE) dialog box.

- [“SAVE AS \(LIMIT LINE LMT FILE\) Dialog Box” on page 27-31](#)

Recall Limit

Select displays the OPEN (LIMIT LINE LMT FILE) dialog box.

- [“OPEN \(LIMIT LINE LMT FILE\) Dialog Box” on page 27-32](#)

Limit Line Type Setup Table

When the EDIT LIMIT LINE menu is selected, the [LIMIT LINE TYPE SETUP Tableau Dialog](#) appears at the bottom of the display allowing creation of limit lines for each trace display. Both upper- and lower-segmented limits can be created by using the buttons in the EDIT LIMIT LINE menu and the segment controls in the tableau dialog.

Previous

- [“EDIT LIMIT LINE Menu” on page 27-25](#)

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT | Edit Limit Line | EDIT LIMIT LINE

Limit Line Parameters

The following eight parameters are used to define each limit line:

- Limit line segment number
- Limit line type. Each segment can be defined as an Upper limit, a Lower limit, or turned off.
- X1 = The X-axis segment start frequency.
- X2 = The X-axis segment stop frequency.
- Y1 = The Y-axis starting constraint for the segment. The units for Y1 change depending on the trace display type. For example, if the display is set Log Magnitude, the Y1 units are in dB. If the display is set to Power Out, the Y1 units are in dBm.
- Y2 = The Y-axis stopping constraint for the segment. As above, the Y2 units change depending on the trace display type.
- X Offset = The offset from the X1 value. This is useful if copying existing limit line segments where an incremental offset can be applied to a fundamental X1 value. Any offset is applied to both the X1 and X2 values.
- Y Offset = The offset from the Y1 value. As above, the offset is applied to both the Y1 and Y2 values.

Adding the First Limit Line

Assuming that no limit lines have been added during the current session, the dialog area appears as just a title bar. If unwanted limit lines from a previous configuration appear, on the EDIT LIMIT LINE menu, click the Clear All button.

X Offset : 0 Hz		^	v	GHz	MHz	kHz	Hz
Type	X1	X2	Y1	Y2	X Offset	Y Offset	

Adding a Limit Line Row

On the EDIT LIMIT LINE menu, click Add. A default limit line appears in the tableau at row 1.

X Offset : 0 Hz		^	v	GHz	MHz	kHz	Hz
	Type	X1	X2	Y1	Y2	X Offset	Y Offset
▶ 1	Upper	1 GHz	20 GHz	9.8 dB	9.8 dB		

Type Selection Field

In the **Type** field, click the down button icon to select whether the limit will be an **Upper**, **Lower**, or **Polygon** limit line or if it will be **OFF**. The **Polygon** limit line is used when the display **Domain** mode is **Time**, **Eye Diagram**. This is active when Option 47, **Eye Diagram** is installed. The segments of the polygon should be entered sequentially (clockwise or counterclockwise) so the system can figure out which region to enclose.

		Type	X1	X2	Y1	Y2	X Offset	Y Offset
Y1 :		250.000 mU						
		<div> <div>^</div> <div>v</div> <div>nU</div> <div>uU</div> <div>mU</div> <div>U</div> <div>kU</div> </div>						
1	Upper	0 s	100 ps	1.1 U	1.1 U			
2	Lower	0 s	100 ps	-100.0 mU	-100.0 mU			
3	Polygon	30 ps	40 ps	500.0 mU	750.00 mU			
4	Polygon	40 ps	60 ps	750.00 mU	750.00 mU			
5	Polygon	60 ps	70 ps	750.00 mU	500.0 mU			
6	Polygon	70 ps	60 ps	500.0 mU	250.00 mU			
7	Polygon	60 ps	40 ps	250.00 mU	250.00 mU			

The **OFF** function is useful if you use a saved limit line file and want to temporarily disable some limits.

X1 Field

In **X1** column, click the **X1** field which constrains the start point for the X-axis segment. Usually this will be frequency for linear, log, or segmented frequency-based sweeps. Alternatively, the units can be time (time domain) or power (CW power sweeps).

		Type	X1	X2	Y1	Y2	X Offset	Y Offset
X1 :		70.000 kHz						
		<div> <div>^</div> <div>v</div> <div>GHz</div> <div>MHz</div> <div>kHz</div> <div>Hz</div> </div>						
1	Upper	70 kHz	10 GHz	9.8	9.8			

X1 Field Toolbar

As shown above, the **X1** field toolbar appears immediately above the tableau header row. If the units are frequency, enter the required **X1** frequency, using the field toolbar buttons to select the required units of GHz, MHz, kHz, or Hz. If the units are time or power, the general operation is the same.

X2 Field

In the **X2** column, click the **X2** field which constrains the end point for the X-axis segment. As above, the **X2** field toolbar appears immediately above the tableau header row with units of frequency, time, or power.

		Type	X1	X2	Y1	Y2	X Offset	Y Offset
X2 :		30.0000 dBm						
		<div> <div>^</div> <div>v</div> <div>dBm</div> </div>						
1	Upper	-30 dBm	30 dBm	9.8 dB	9.8 dB			

X2 Field Toolbar

As shown above, use the toolbar to enter the required **X2** value and units.

Y1 Field

The **Y1** and **Y2** fields constrain the limit segment in the trace display Y-axis. The units used will match those of the selected trace display. In the **Y1** column, click the **Y1** field. The **Y1** field toolbar appears immediately above the header row.

		Type	X1	X2	Y1	Y2	X Offset	Y Offset
Y1 :		9.8000 dB						
		<div> <div>^</div> <div>v</div> <div>dB</div> </div>						
1	Upper	69.999995 MHz	299.995 kHz	19.8 dB	9.8 dB			
2	Upper	50.000051083 G...	70.000000129 G...	9.8 dB	9.8 dB			

Y1 Field Toolbar

As shown above, use the toolbar to enter the **Y1** value and units.

Y2 Field

In the Y2 column, click the Y2 field. As above in the Y1 field, the Y2 field toolbar appears immediately above the header row.

Type	X1	X2	Y1	Y2	X Offset	Y Offset
1 Upper	69.999995 MHz	299.995 kHz	19.8 dB	9.8 dB		
2 Upper	50.000051083 G...	70.000000129 G...	9.8 dB	9.8 dB		

Y2 Field Toolbar

As shown above, use the field toolbar to enter the required Y2 value and units.

X Offset Button

On a per-row basis, the X Offset and Y Offset buttons allow the user to offset indices by a constant amount. This is useful for copying multiple rows and incrementing by a fixed frequency offset. In the X Offset column, click the X Offset button for the appropriate row. The X Offset field toolbar appears immediately above the tableau header row. Use the toolbar to enter the required value and units. When the units button is selected, the offset is applied to the X1 and X2 values. In the example in row 2 below, a lower limit line has already been established for X1 = 2.0 GHz and X2 = 2.99 GHz. To offset these by the same amount, select row 2, and then click the X Offset button. In the example, the offset required is -0.5 GHz. With row 2 selected, click the X Offset button and the X Offset field toolbar appears. Enter the required value and units.

Type	X1	X2	Y1	Y2	X Offset	Y Offset
1 Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
2 Lower	2 GHz	2.99 GHz	-12 dB	-13 dB		

X Offset Field Toolbar

As shown above, use the field toolbar to enter the required X Offset value and units. Once the toolbar units button has been selected, the new X values in row 2 are X1 = 1.5 GHz and X2 = 2.99 GHz as shown below.

Type	X1	X2	Y1	Y2	X Offset	Y Offset
1 Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
2 Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		

Y Offset Button

The Y Offset button and field toolbar function the same as the X Offset button described above. Under the Y Offset column heading, click the Y Offset button. The Y Offset field toolbar appears immediately above the tableau header row. In the example below, in the example in row 1 below, a lower limit line has already been established with Y1 = -10 dB and Y2 = -11 dB. To offset these by the same amount, select row 1, and then click the Y Offset button. In the example below, the offset required is -0.75 dB. With row 1 selected, click the Y Offset button and the Y Offset field toolbar appears. Enter the required value and units.

Type	X1	X2	Y1	Y2	X Offset	Y Offset
1 Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
2 Lower	2.49 GHz	2.49 GHz	-12 dB	-13 dB		

Y Offset Field Toolbar

As shown above, use the field toolbar to enter the required Y Offset value and units. Once the units button has been selected, the Y1 and Y2 fields for row 1 are changed as shown below.

Type	X1	X2	Y1	Y2	X Offset	Y Offset
1 Upper	1 GHz	1.99 GHz	-10.75 dB	-11.75 dB		
2 Lower	2.49 GHz	2.49 GHz	-12 dB	-13 dB		

Adding a Limit Line Row

To add more rows to the bottom of the “Limit Line Type Setup Table” area, use the Add button on the EDIT LIMIT LINE menu and then complete the X1, X2, Y1, Y2, and offset parameters as described above.

If no rows are present, Add creates a new row 1 at the top of the tableau using the trace settings for X1 start and X2 stop values.

- If one or more rows are present, the Add button places each new row at the bottom of the tableau.
- If no rows are present or the field of an existing row is selected, the Insert does not function.
- If one or more rows are present and the entire row is selected by selecting the row number, Insert adds a row at the cursor position and pushes the current row and all those below down.

Inserting a Limit Line Row

To insert a limit line row, at least two limit lines must be present. If multiple limit lines are present, select the limit line row number where the new limit line is to be inserted. In the example below, a new limit line is needed above row 2. Row 2 is selected indicated by the highlighting and the right arrow.

Y2 : -15.0000 dB

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
▶ 2	Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		
3	Upper	4 GHz	4.99 GHz	-14 dB	-15 dB		

On the EDIT LIMIT LINE menu, click the Insert button. A new row is added as row 2 and the previous rows are pushed down as shown below.

X1 : 1.000000000 GHz

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
▶ 2	Upper	1 GHz	20 GHz	9.8 dB	9.8 dB		
3	Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		
4	Upper	4 GHz	4.99 GHz	-14 dB	-15 dB		

After the row is inserted, use the procedures above to complete the X1, X2, Y1, Y2, and offset parameters.

Deleting a Limit Line

To delete a limit line, select it as above, and then on the EDIT LIMIT LINE menu, select the Delete button on the EDIT LIMIT LINE menu. In the example below, row 1 is selected and ready to be deleted.

X1 : 1.000000000 GHz

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
▶ 1	Upper	1 GHz	1.99 GHz	-10 dB	-11 dB		
2	Upper	1 GHz	20 GHz	9.8 dB	9.8 dB		
3	Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		
4	Upper	4 GHz	4.99 GHz	-14 dB	-15 dB		

After the Delete button is selected, the row is removed and all rows below move up as shown below.

X Offset : 0 Hz

	Type	X1	X2	Y1	Y2	X Offset	Y Offset
1	Upper	1 GHz	20 GHz	9.8 dB	9.8 dB		
2	Upper	1.5 GHz	2.49 GHz	-12 dB	-13 dB		
▶ 3	Upper	4 GHz	4.99 GHz	-14 dB	-15 dB		

SAVE AS (LIMIT LINE LMT FILE) Dialog Box

Previous

- [“EDIT LIMIT LINE Menu” on page 27-25](#)

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT | Edit Limit Line | EDIT LIMIT LINE | Save Limit | SAVE AS (LIMIT LINE LMT FILE) Dialog Box

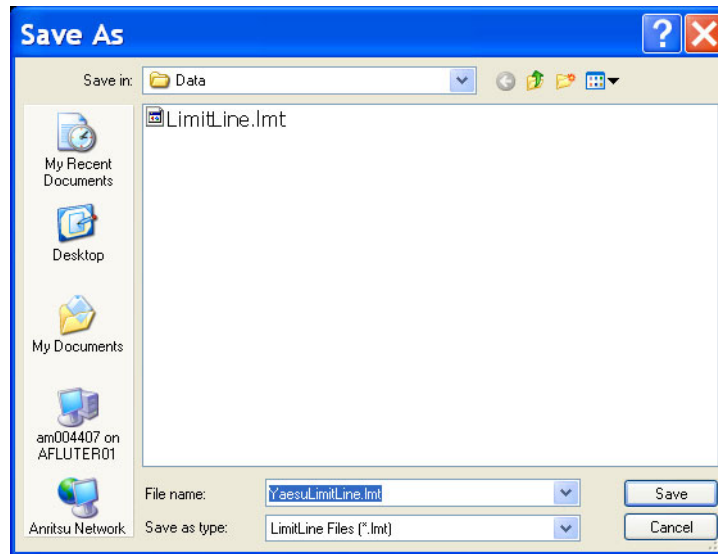


Figure 27-16. SAVE AS (LIMIT LINE LMT FILE) Dialog Box

Instructions

Use the Save As dialog box to save the limit line settings as a Limit Line (LMT) file.

OPEN (LIMIT LINE LMT FILE) Dialog Box

Previous

- [“EDIT LIMIT LINE Menu” on page 27-25](#)

Navigation

- MAIN | Display | DISPLAY | Trace Limit Lines | LIMIT | Edit Limit Line | EDIT LIMIT LINE | Recall Limit | OPEN (LIMIT LINE LMT FILE) Dialog Box

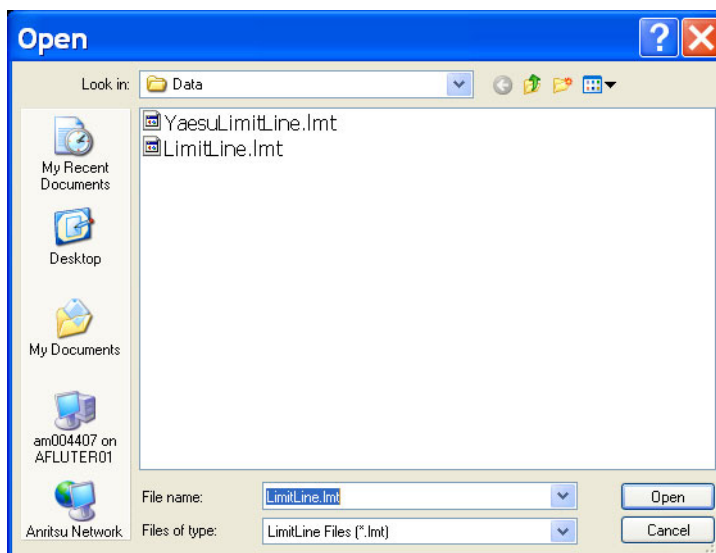


Figure 27-17. OPEN (LIMIT LINE LMT FILE) Dialog Box

Instructions

Select the required LMT file and then click Open.

27-6 DOMAIN Menu

Descriptions, prerequisites, and variations of each Domain menu item are described later in this section.

Previous

- “DISPLAY Menu” on page 27-3

Navigation

MAIN | Display | DISPLAY | Domain | DOMAIN



The top five buttons on the DOMAIN menu form a button selection group where the selection of one button de-selects the other four buttons. Descriptions, prerequisites, and variations of each menu item are described later in this section.

The presence and availability of some DOMAIN menu selections depend on installed options, the domain mode selected on the DOMAIN menu, as well as on the SWEEP TYPES and FREQUENCY menus.

Figure 27-18. Domain Menu Variations Based on Domain Selection

Domain Menu Variations: 1. Frequency, with No Time Gate selected 2. Frequency, with Time Gate selected	 3. Time, Low Pass selected. Note: When the shown menu is for when in Time, Low pass and the Response is set to Step in the Range Setup. If the Response is set to Impulse that menu button reads as Impulse Width[3dB] 4. Time, Band Pass selected 5. Time, Eye Diagram (TED) selected
---	--

Figure 27-18. Domain Menu Variations Based on Domain Selection

Note

Since the presence and availability of some DOMAIN menu selections depend on the selections made on the SWEEP TYPES and FREQUENCY menus, refer to:

- [“SWEEP TYPES Menu” on page 7-4](#)
Navigation: MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES |
- [“Frequency Menus” on page 4-1.](#)
Navigation: MAIN | Frequency | FREQUENCY

Frequency, with No Time Gate

Prerequisites

- SWEEP TYPES = Power (Swept Freq) or Power (CW Freq).

Menu Option Availability

With Frequency with No Time Gate menu selected, no other menu options are available as shown on Item 1 in [Figure 27-18, “Domain Menu Variations Based on Domain Selection” on page 27-33.](#)

Frequency, with Time Gate

Prerequisites

- SWEEP TYPES = Freq Sweep (Linear), Freq Sweep (Log), or Segmented Sweep (Freq-based)

Menu Option Availability

With Frequency with Time Gate selected, the following menu options are available on the domain menu shown on Item 2 in [Figure 27-18, “Domain Menu Variations Based on Domain Selection” on page 27-33:](#)

- **Display Unit (Time/Distance):** Select toggles the display units between time and distance.
- **Time Definition:** Select displays the TIME DEFINITION menu. (See [“TIME DEFINITION Menu” on page 27-55](#)).
- **Range Setup:** Select displays the RANGE SETUP menu. (See [“RANGE SETUP Frequency with Time Gate Menu” on page 27-58](#)).
- **Gate Setup:** Select displays the GATE SETUP menu.(See[“GATE SETUP Menu” on page 27-71](#)).

Time, Low Pass

Prerequisites

Only available as a selection under certain conditions when a harmonic sweep condition is established. Sweep must be set to a frequency-based sweep:

- SWEEP TYPES Menu = Freq Sweep (Linear), Freq Sweep (Log), or Segmented Sweep (Freq-based)

For example, at the FREQUENCY menu, set the following values:

- Start point of 1 GHz
- Stop point of 10 GHz
- # of Points set to 10
- The Time, Low Pass button becomes available.

Selection Unavailable

- The Time, Low Pass button is unavailable if:
 - A power-based sweep of Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is set.
 - A Segmented Sweep (Index-Based) is set.

Menu Option Availability

With Time, Low Pass selected, the following menu options are available on the DOMAIN menu shown in Item 3 in [Figure 27-18, “Domain Menu Variations Based on Domain Selection” on page 27-33](#).

- **Rise Time%:** Appears when the Time, Low Pass button has been selected and response type is Step. The Rise Time% units display change to match the setting on the Display Unit button.
- **Impulse Width [3dB] Display Button:** Appears when the Time, Low Pass button has been selected and the response type is Impulse. The units in the Impulse Width display change to match the setting on the Display Unit button.
- The units in the Impulse Width display change to match the setting on the Display Unit button
- **Display Unit (Time/Distance):** Select toggles the display units between time and distance.
- **Time Definition:** Select displays the TIME DEFINITION menu. (See [“TIME DEFINITION Menu” on page 27-55](#)).
- **Range Setup:** Select displays the RANGE SETUP menu. (See [“RANGE SETUP Time Low Pass Menu” on page 27-62](#)).
- **Gate Setup:** Select displays the GATE SETUP menu. (See [“GATE SETUP Menu” on page 27-71](#)).

Time, Band Pass

Prerequisites

Only available as a selection when one of the following frequency-based sweeps are used:

- SWEEP TYPES Menu = Freq Sweep (Linear), Freq Sweep (Log), or Segmented Sweep (Freq-based)

Selection Unavailable

- The Time, Band Pass button is unavailable if:
 - A power-based sweep of Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is set.
 - A Segmented Sweep (Index-Based) is set.

Menu Option Availability

With Time, Band Pass selected, the following menu options are available on the DOMAIN menu shown in Item 4 in [Figure 27-18, “Domain Menu Variations Based on Domain Selection” on page 27-33](#).

- **Impulse Width [3dB] Display Button:** Appears when the Time, Band Pass button has been selected. The units in the Impulse Width display change to match the setting on the Display Unit button.
- **Display Unit (Time/Distance):** Select toggles the display units between time and distance.

- **Time Definition:** Select displays the TIME DEFINITION menu. (See [“TIME DEFINITION Menu” on page 27-55](#)).
- **Range Setup:** Select displays the RANGE SETUP menu. (See [“RANGE SETUP Time Band Pass Menu” on page 27-60](#)).
- **Gate Setup:** Select displays the GATE SETUP menu.(See[“GATE SETUP Menu” on page 27-71](#)).

Time, Eye Diagram

Prerequisites

Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) must be installed.

The Time Eye Diagram (TED) selection is only available when a harmonic sweep condition is established. Sweep must be set to a frequency-based sweep:

- SWEEP TYPES Menu = Freq Sweep (Linear), Freq Sweep (Log), or Segmented Sweep (Freq-based)

For example, at the FREQUENCY menu, set the following values:

- Start point of 1 GHz
- Stop point of 10 GHz
- # of Points set to 10

The Time, Eye Diagram button then becomes available.

Eye Diagram Statistics

With a trace set up for TED, selecting MAIN | Marker opens the [“EYE STATISTICS Menu” on page 29-12](#), which provides options for toggling various eye diagram measurements on or off.

Selection and Other Function Availabilities

- The Time, Eye Diagram button is unavailable if:
 - A power-based sweep of Power Sweep (CW Frequency) or Power Sweep (Swept Frequency) is set.
 - A Segmented Sweep (Index-Based) is set.
- When a trace is set to TED the following additional restrictions apply:
 - **Data Mem Math** is not available for eye diagram trace and is disabled if the trace is set to Time Eye Diagram.
 - **Group Delay** graph type and Circular graph types is not supported for eye diagram. If group delay or any circular graph type is selected for the current trace before TED is selected, the graph type is changed to Log Mag.
 - **Inter-trace Math** is not available for eye diagram trace and cannot be turned on. Inter-trace Math cannot be turned ON for TED.
 - **Conversions** are not available on eye diagram traces. Conversion cannot be turned ON for TED.
 - **Trace Smoothing** on the Averaging menu is not available on eye diagram traces. Trace smoothing cannot be turned on for TED.

Menu Option Availability

With Time, Eye Diagram selected, the following menu options are available on the DOMAIN menu shown in Item 5 in [Figure 27-18, “Domain Menu Variations Based on Domain Selection” on page 27-33](#):

- **Impulse Width [3dB] Display Button:** Appears when the Time, Low Pass button has been selected. The units in the Impulse Width display change to match the setting on the Display Unit button.
- **Display Unit (Time/Distance):** Select toggles the display units between time and distance.
- **Time Definition:** Select displays the TIME DEFINITION menu. See [“TIME DEFINITION Menu” on page 27-55](#).
- **Range Setup:** Select displays the RANGE SETUP menu. See [“RANGE SETUP Time Low Pass Menu” on page 27-62](#).
- **Gate Setup:** Not enabled in Eye Diagram mode.
- **Eye Diagram Setup:** Select opens the EYE DIAGRAM CALCULATIONS dialog box where eye diagram parameters can be set up. See [“EYE DIAGRAM CALCULATIONS Dialog” on page 27-38](#).



Figure 27-19. Time, Eye Diagram Display Example – Note that when in Time, Eye Diagram mode, the display trace annotation displays “TED”.

EYE DIAGRAM CALCULATIONS Dialog

Prerequisites

The Eye Diagram Setup selection, which opens the EYE DIAGRAM CALCULATIONS dialog, is available only when Time, Eye Diagram mode is selected in the DOMAIN menu.

Previous

- [“DOMAIN Menu” on page 27-33](#)

Navigation

MAIN | Display | DISPLAY | Domain | DOMAIN | Time, Eye Diagram (selected) |

Eye Diagram Setup | EYE DIAGRAM CALCULATIONS

The EYE DIAGRAM CALCULATIONS dialog box ([Figure 27-20](#)) provides an area to set parameters for data stream and signaling format selection, data rate, rise/fall time, high level/low level, pattern length, horizontal shift, jitter, noise (AWGN), and persistence.

Eye diagram calculations

This enables the computation of eye diagram based on the current trace parameter for desired data stream configuration.

Data Stream

Select the signaling format

☒ NRZ ☐ PAM-4

☒ PRBS ☐ K28.5 ☐ User fixed pattern

Pattern length ($2^n - 1$) **511**
Selected length is $2^9 - 1$

Data rate (GBPS) **1**

Rise time (ps) **0**

Fall time (ps) **0**

Horizontal shift (Fraction of a Bit Period) **0**

High Level (SE mV) **1000**

Low Level (SE mV) **0**

Jitter

☐ Random RMS (ps) **0**

☐ Sinusoidal1 amplitude (ps) **0**

☐ Sinusoidal1 frequency (Hz) **1000000**

☐ Sinusoidal2 amplitude (ps) **0**

☐ Sinusoidal2 frequency (Hz) **1000000**

☐ Dirac1 offset (ps) **0**

☐ Dirac1 probability **0.1**

☐ Dirac2 offset (ps) **0**

☐ Dirac2 probability **0.1**

Noise (AWGN)

☐ RMS amplitude (mV) **0**

Persistence

Persistence (number of cycles) **200**

Number of frequency points should be $> 1000 \cdot \text{DataRate (GBPS)} / \text{Bandwidth (GHz)}$

Done **Cancel**

Figure 27-20. EYE DIAGRAM CALCULATIONS Dialog Box

EYE DIAGRAM CALCULATIONS Dialog Parameters

Data Stream Settings

- Select the signaling format:
 - NRZ
 - PAM-4
- Select one type:
 - PRBS
 - K28.5 (available for NRZ signaling format only)
 - User Fixed Pattern: If the user chooses the data stream to be User fixed pattern, the text box becomes available for entering the desired pattern (a string with 1s and 0s only, e.g., 00111110101100000101). The maximum length allowed is 64 bit).
- Data rate: units in GBPS
- Rise Time: units in ps

- Fall time: units in ps
- Horizontal Shift: While the eye centering scheme correctly places the eye for analysis most of the time, sometimes there are cases where it cannot such as with heavy skew on a differential pair. For this reason, a manual horizontal shift (expressed in fraction of a bit period) is provided. Internally, the data stream would be advanced by a number of samples = $\text{samplesPerSymb} \times (\text{user entered fractional shift})$.
- Pattern Length: Can be selected from the combo (drop-down box)
- High Level: units in SE mV (NRZ signaling format only)
- Low Level: units in SE mV (NRZ signaling format only)
- Level 3: units in SE mV, where $\text{Level 0} < \text{Level 1} < \text{Level 2} < \text{Level 3}$ (PAM-4 signaling format only)
- Level 2: units in SE mV (PAM-4 signaling format only)
- Level 1: units in SE mV (PAM-4 signaling format only)
- Level 0: units in SE mV (PAM-4 signaling format only)

Jitter Settings

- Random RMS: units in ps
- Sinusoidal1 Amplitude: units in ps
- Sinusoidal1 Frequency: units in Hz
- Sinusoidal2 Amplitude: units in ps
- Sinusoidal2 Frequency: units in Hz
- Dirac1 Offset: units in ps
- Dirac1 Probability
- Dirac2 Offset: units in ps
- Dirac2 Probability

Noise (AWGN) Setting

- RMS Amplitude: units in mV

Persistence Setting

- Persistence: Number of cycles

Click Done on the dialog after entering the required parameters.

- In case of valid values, the time domain mode switches to eye diagram and eye diagram data corresponding to the user-entered parameters will start plotting (dot display) for the current active trace.
- If the validation is not successful, an error message is displayed to the user.

Cancel button: Cancels the eye diagram computation.

Note

While selecting the **Time, Eye Diagram** from the DOMAIN menu, the eye diagram calculations are done using the default values and the corresponding eye diagram is plotted for the current trace. Then the user will be able to invoke the EYE DIAGRAM CALCULATION dialog and modify the parameter values, which will update the eye diagram plot.

When in Time, Eye Diagram mode, the display trace annotation displays “TED” as shown in [Figure 27-19 on page 27-38](#)

27-7 Gain Compression Menus and Dialog Boxes

The Gain Compression button availability and access to the underlying GAIN COMPRESS menu depends on the Sweep Type set as described below. In addition, there are two GAIN COMPRESS menu variants described here as the GAIN COMPRESS Self Normalization menu and the GAIN COMPRESS Compress Param menu. The conditions for each is described immediately below.

Types of Gain Compression

The GAIN COMPRESS. (GAIN COMPRESSION) menu provides control of all gain compression parameters. Two menu variants are available depending on the power sweep type selected.

- **CW Frequency Gain Compression** – The CW Frequency gain compression is a trace function in power sweep CW mode and separate compression points can be set for each trace display. The trace labels are changed with an @CP notation after the measured S-Parameter. Typical trace labels are shown below:
 - Without Gain Compression: Tr1 S21 Trans LogM
 - With Gain Compression: Tr1 S21@CP Trans LogM
- **Swept Frequency Gain Compression** – The Swept Frequency gain compression is also a trace function in power sweep swept-frequency mode, and by default, the displays shows the output power verses frequency at the gain compression point. The compression parameter is set to S21 and the plotting parameter set to B2/1 (B2 divided by 1). The trace labels also change with the @CP notation as described above

Gain Compression Button Not Available

If the Gain Compression button on the DISPLAY menu is not available, Sweep Types is set to one of the following:

- Freq Sweep (Linear)
- Freq Sweep (Log)
- Segmented Sweep (Freq-based)
- Segmented Sweep (Index-based)

The sweep type is set on the SWEEP TYPES menu:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Gain Compression Button Available

To make the Gain Compression button on the DISPLAY menu and GAIN COMPRESS menu available, Sweep Types on the SWEEP SETUP menu must be set to Power (CW Freq) or Power (Swept Freq). Each setting enables a different menu variant which are described in the sections below.

GAIN COMPRESS Self Normalization Menu

If Sweep Type is set to Power (CW Freq), the GAIN COMPRESS. menu is termed the GAIN COMPRESS. Self Normalization) menu, has six (6) buttons, and the top button is Self Normalization.

Menu Description

- [“GAIN COMPRESS. Self Normalization Menu” on page 27-43](#)

Prerequisites

- The sweep type is set on the SWEEP TYPES menu:
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

GAIN COMPRESS Compress Param Menu

If Sweep Type is set to Power (Swept Freq), the GAIN COMPRESS. menu is termed the GAIN COMPRESS. Compress Param menu, has six (6) buttons, and the top button is Compression Param.

Menu Description

- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

Prerequisites

- The sweep type is set on the SWEEP TYPES menu:
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Cross References to Related Menus

Use the links and navigation below to change the prerequisites for the GAIN COMPRESS menus.

Sweep Setup References:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP

Sweep Types References:

- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Display References:

- [“DISPLAY Menu” on page 27-3](#)
- MAIN | Display | DISPLAY

GAIN COMPRESS. Self Normalization Menu

Full Name

Gain Compression Self Normalization

The appearance and button availability of the GAIN COMPRESS menu depends on settings on the SWEEP TYPES menu. Consult the See: [“Gain Compression Menus and Dialog Boxes” on page 27-41](#) section above for menu identification and prerequisites.

Previous

- [“DISPLAY Menu” on page 27-3](#)

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (CW Freq).
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. Self Normalization



Compression Indicator Example

For an example display, see [Figure 27-23 on page 27-46](#) below.

Self Normalization (Off/On)

Select toggles the self normalization function OFF and ON. If ON, self normalization normalizes the trace display reference to the first data point of each sweep.

Compression Indicator (Off/On)

Select toggles the screen trace display compression indicators between OFF and ON. If the Compression Indicator is toggled ON, and the instrument finds the compression points, the general display is R and C where:

- The reference point indicator is labeled R
- The gain compression indicator is labeled C with parametric data displayed at the top of the trace window
- The Trace Label is identified with the @CP label after the Measurement Type such as Tr3 S21@CP Trans LogM.

Reference (R) Indicator

If the instrument cannot find the reference points, the R and C labels will not be displayed and will instead display the following messages:

- C:Not Found in the graph display area
- Invalid Reference Value in the display status bar

Compression Reference Point

If the compression reference is set to maximum gain, the instrument will always find the reference point. The instrument may not be able to find the reference point if:

- The compression points are outside the range setting
- The Hold Power setting is outside of the X-axis range on the trace display graph
- The P-in setting is outside of the X-axis range on the trace display graph

Compression (C) Indicator

If the instrument cannot find the compression points, the C label will not be displayed but instead display the message C:Not Found in the graph display area.

Figure 27-21. GAIN COMPRESS. Self Normalization Menu (1 of 2)

	<div><div>DUT or Compression Point Value</div><div>The instrument may not be able to find the compression point because of the characteristics of the DUT or because of compression point value.</div><div>Compression Reference Button Selection Group</div><div>The Max P Out, Hold Power, and P in buttons of the Compression Reference area form a three-button selection group where the selection of one button de-selects the other two (2) buttons.</div><div>Max P Out</div><div>Select sets the maximum power output available to the instrument.</div><div>Hold Power (-XX dBm)</div><div>Read-only display. Shows the hold power level on a per-system basis. It defaults to the lowest port source power of -20 dBm. The Hold Power Level is set on the HOLD CONDITIONS menu.</div><div><ul style="list-style-type: none">• “HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18• MAIN Sweep Setup SWEEP SETUP Hold Functions HOLD FUNCTIONS Hold Conditions HOLD CONDITIONS</div><div>P in</div><div>Select displays the P In field toolbar and sets the power in level in dBm as a function of frequency.</div><div><div><div>P in :</div><div>1.0000</div><div>dBm</div><div>^</div><div>v</div><div></div><div>X</div></div></div><div>Compression Point</div><div>Select displays the Compression Point (dB) field toolbar and allows the user to enter a compression point in dB.</div><div><div><div>Compression Point :</div><div>1.0000</div><div>dB</div><div>^</div><div>v</div><div></div><div>X</div></div></div><div>View Result</div><div>Select displays the VIEW COMPRESSION RESULT dialog box. The data can be printed and/or saved as a text file.</div><div><ul style="list-style-type: none">• “VIEW COMPRESSION RESULT Dialog Box” on page 27-54</div></div>
--	--

Figure 27-21. GAIN COMPRESS. Self Normalization Menu (2 of 2)

GAIN COMPRESS. Compression Param Menu

Full Name

Gain Compression Parameters

Menu Appearance and Availability

- The appearance and button availability of the GAIN COMPRESS menu depends on settings on the SWEEP TYPES menu. Consult the section above for menu identification and prerequisites.
- [“Gain Compression Menus and Dialog Boxes” on page 27-41](#)

Previous

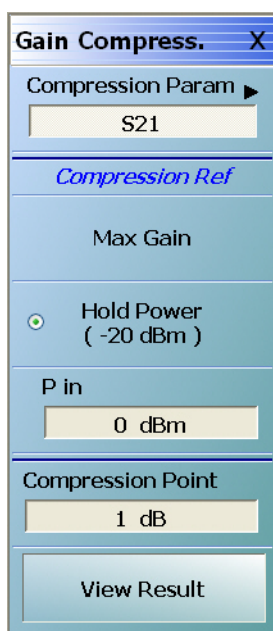
- [“DISPLAY Menu” on page 27-3](#)

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (Swept Freq).
 - [“SWEEP TYPES Menu” on page 7-4](#)
 - MAIN | Sweep Setup | SWEEP SETUP

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. Compression Param.



Display Example

For a sample display, see [Figure 27-23](#) below. When Gain Compression is on, the Trace Label is identified with the @CP label after the Measurement Type such as Tr3 S21@CP Trans LogM.

Compression Param

Select displays the COMP PARAM (Compression Parameter) menu which allows the user to select which S-Parameter (S11, S12, S21, S22) is to be used.

- [“COMP. PARAM Menu” on page 27-47](#)

Compression Reference Button Selection Group

The three (3) buttons of the Compression Reference area form a button selection group where the selection of any one button de-selects the other two (2) buttons.

Max Gain

Select sets the maximum gain output available to the instrument.

Hold Power (-XX dBm)

Read-only display. Shows the hold power level on a per-system basis. It defaults to the lowest port source power of -20 dBm. The hold power level is set on the Hold Conditions menu.

- [“HOLD CONDITIONS Power-Based Sweep Menu” on page 7-18](#)
- MAIN | Sweep Setup | SWEEP SETUP | Hold Functions | HOLD FUNCTIONS | Hold Conditions | HOLD CONDITIONS

P in

Select displays the P in (dBm) field toolbar. Allows the user to set the power-in level in dBm as a function of frequency.



Figure 27-22. GAIN COMPRESS. Compression Param. Menu (1 of 2)

Compression Point

Select displays the Compression Point (dB) field toolbar and allows the user to enter a compression point in dB.

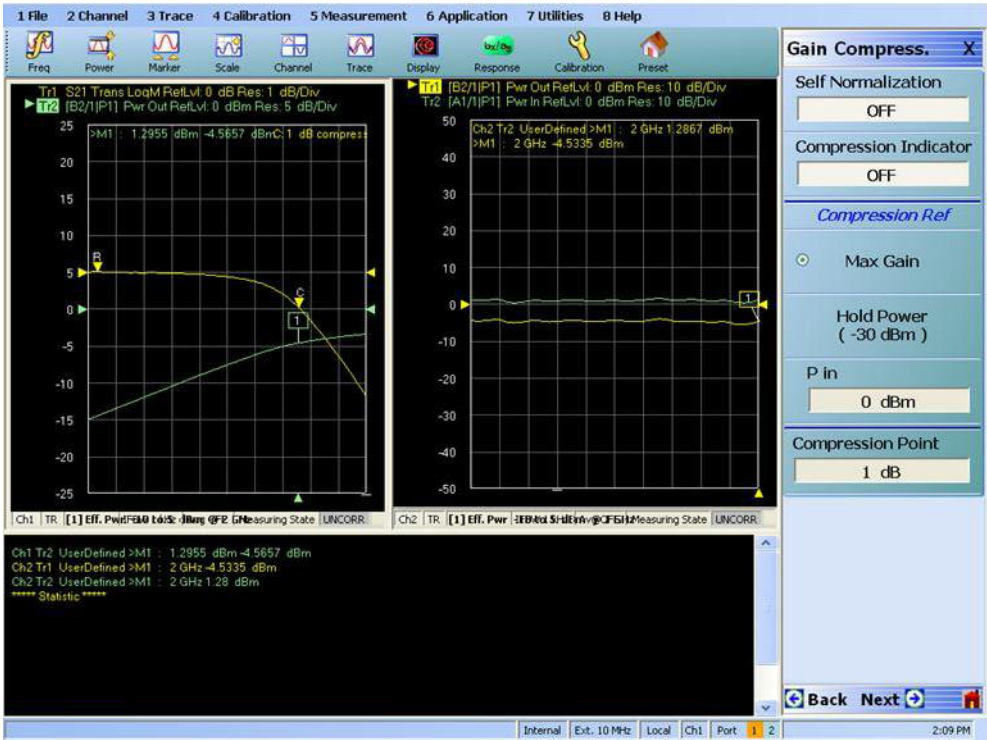
Compression Point : 1.0000 dB ^ v dB X

View Result

Select displays the VIEW COMPRESSION RESULT dialog box. The data can be printed and/or saved as a text file.

- [“VIEW COMPRESSION RESULT Dialog Box” on page 27-54](#)

Figure 27-22. GAIN COMPRESS. Compression Param. Menu (2 of 2)



1. CW Freq (at left) and Power Sweep.
2. Swept Freq (at right).

Figure 27-23. Gain Compression Display with Power Sweep

COMP. PARAM Menu

The COMPRESSION PARAMETER menu allows selection of an S-parameter for the compression reference.

Previous

- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (Swept Freq).
 - [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. Compression Param | Compression Param | COMP. PARAM

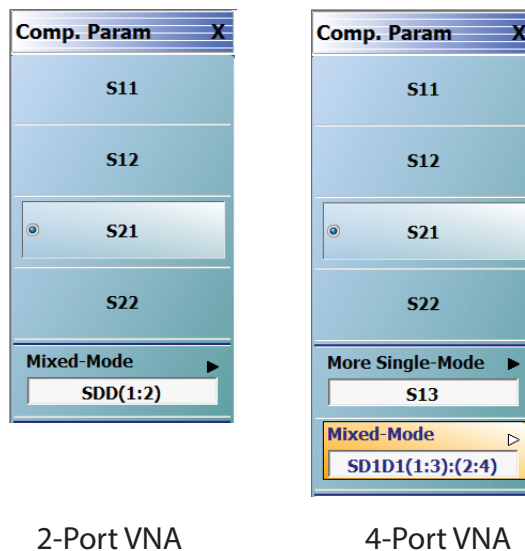


Figure 27-24. COMP. PARAM (COMPRESSION PARAMETER) Menu

Auto-Return Button Selection Group

The COMP. PARAM menu buttons form an auto-return button selection group where selection of one button de-selects all other buttons and then auto-returns to the GAIN COMPRESS menu.

S11 (Comp Param)

Select sets the compression parameter to S11 – Forward Reflection and auto-returns to the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

S12 (Comp Param)

Select sets the compression parameter to S12 – Reverse Transmission and auto-returns to the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

S21 (Comp Param)

Select sets the compression parameter to S21 – Forward Transmission and auto-returns to the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

S22 (Comp Param)

Select sets the compression parameter to S22 – Reverse Reflection and auto-returns to the GAIN COMPRESS. menu.

- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

More Single Mode (Comp Param) (4-Port VNAs)

Select opens the SINGLE-MODE menu, which allows setting of additional compression parameters (S13, S23, S32, S33, S14, S24, S34, S41, S42, S43, S44) and auto-returns to the GAIN COMPRESS. menu.

- [“SINGLE-MODE Menu – 4-Port VNAs” on page 27-49](#)

Mixed Mode (Comp Param)

Opens the COMPRESSION PARAM MIXED MODE dialog box.

- [“COMPRESSION PARAM MIXED MODE Dialog Box” on page 27-50](#)

SINGLE-MODE Menu – 4-Port VNAs

Previous

- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

Prerequisites

- The VNA must be in 4-Port Mode

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. Compression Param | Single-Mode | SINGLE-MODE

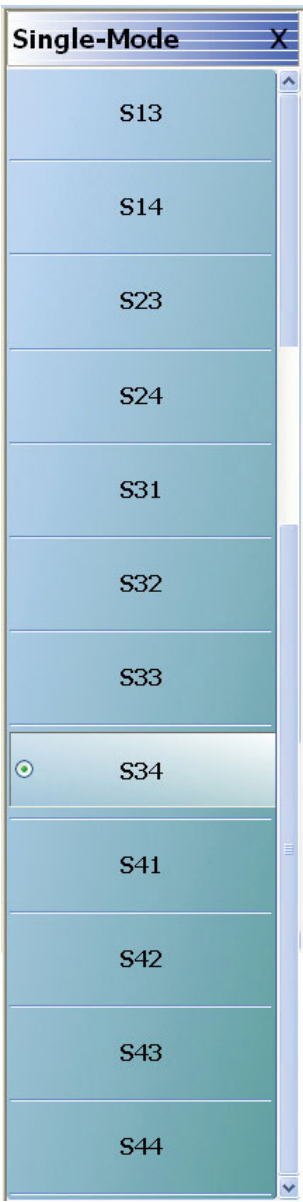
	<p>S13 Select sets the compression parameter to S13.</p> <p>S14 Select sets the compression parameter to S14.</p> <p>S23 Select sets the compression parameter to S23.</p> <p>S24 Select sets the compression parameter to S24.</p> <p>S31 Select sets the compression parameter to S31.</p> <p>S32 Select sets the compression parameter to S32.</p> <p>S33 Select sets the compression parameter to S33.</p> <p>S34 Select sets the compression parameter to S34.</p> <p>S41 Select sets the compression parameter to S41.</p> <p>S42 Select sets the compression parameter to S42.</p> <p>S43 Select sets the compression parameter to S43.</p> <p>S44 Select sets the compression parameter to S44.</p>
--	---

Figure 27-25. SINGLE-MODE Menu – 4-Port VNAs

COMPRESSION PARAM MIXED MODE Dialog Box

The COMPRESSION PARAM MIXED MODE dialog box set the mixed-mode power sweep response parameter.

Previous

- [“COMP. PARAM Menu” on page 27-47](#)

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (Swept Freq).
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. | Compression Param | COMP. PARAM | Mixed-Mode | COMPRESSION PARAM MIXED MODE Dialog Box

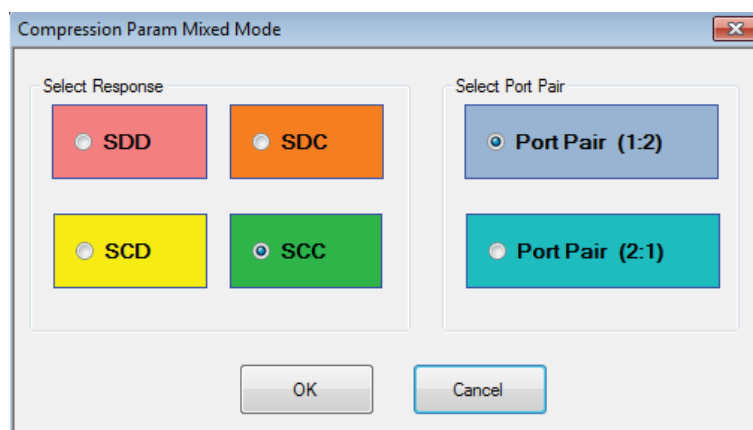


Figure 27-26. Mixed-mode Compression Parameter Selection–2-Port VNA

The Compression Parameter Mixed Mode dialog allows selection of mixed mode to be used as the compression parameter.

Select Response Area

- SDD
- SDC
- SCD
- SCC

Select Port Pair Area

- Port Pair (1:2)
- Port Pair (2:1)

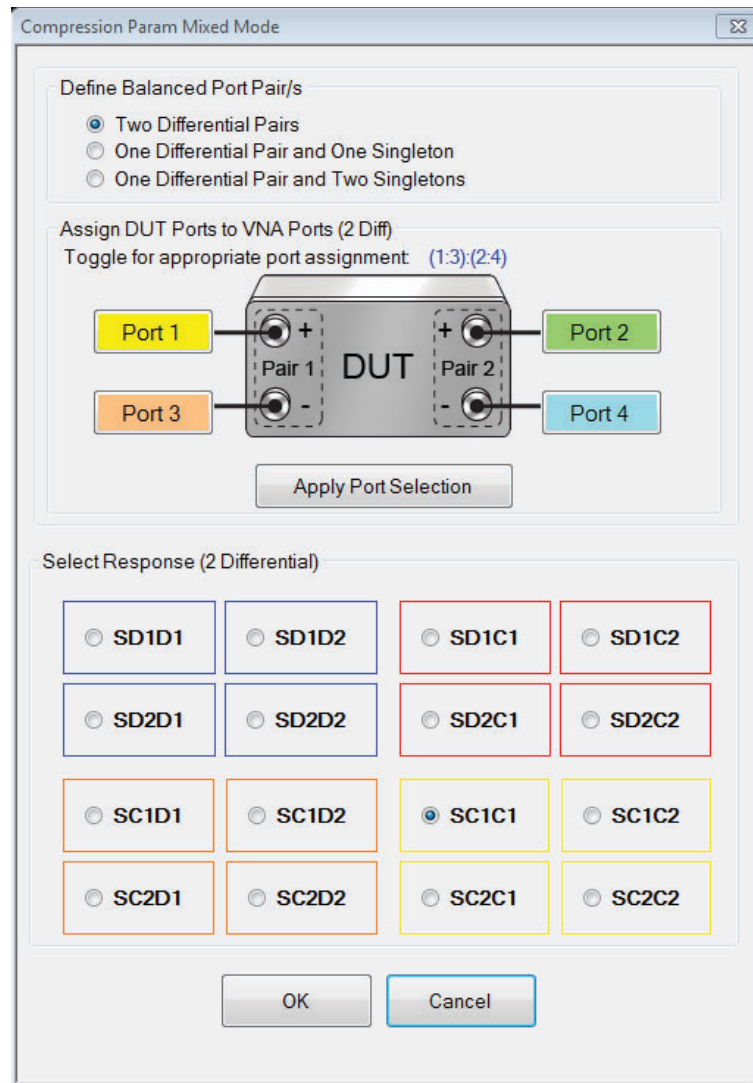


Figure 27-27. Mixed-mode Compression Parameter Selection–4-Port VNA

The Compression Parameter Mixed Mode dialog allows selection of mixed mode to be used as the compression parameter.

Define Balanced Port Pair/s Area

Select de-selects all other menu buttons for three general mixed-mode configurations of:

- Two differential pairs
- One differential pair and one singleton
- One differential pair and two singletons

Assign DUT Ports to VNA Ports Area

Toggle the port numbers and click the Apply Port Selection button.

Select Response Area (2 Differential)

Select the appropriate response. Response options will vary according to Balanced Port Pair/s selection.

Select the required 2-differential response characteristic from the available 16 combinations of pure differential (D) and common-mode (C) parameters. Only one compression parameter response may be selected:

- Differential Reception with Differential Drive S-Parameters
 - SD1D1 – S-parameter for differential reception at Pair 1 and differential drive at Pair 1.
 - SD1D2 – S-parameter for differential reception at Pair 1 and differential drive at Pair 2.
 - SD2D1 – S-parameter for differential reception at Pair 2 and differential drive at Pair 1.
 - SD2D2 – S-parameter for differential reception at Pair 2 and differential drive at Pair 2.
- Common-Mode Reception with Differential Drive S-Parameters
 - SC1D1 – S-parameter for common-mode reception at Pair 1 and differential drive at Pair 1.
 - SC1D2 – S-parameter for common-mode reception at Pair 1 and differential drive at Pair 2.
 - SC2D1 – S-parameter for common-mode reception at Pair 2 and differential drive at Pair 1.
 - SC2D2 – S-parameter for common-mode reception at Pair 2 and differential drive at Pair 2.
- Differential Reception with Common-Mode Drive S-Parameters
 - SD1C1 – S-parameter for differential reception at Pair 1 and common-mode drive at Pair 1.
 - SD1C2 – S-parameter for differential reception at Pair 1 and common-mode drive at Pair 2.
 - SD2C1 – S-parameter for differential reception at Pair 2 and common-mode drive at Pair 1.
 - SD2C2 – S-parameter for differential reception at Pair 2 and common-mode drive at Pair 2.
- Common-Mode Reception with Common-Mode Drive S-Parameters
 - SC1C1 – S-parameter for common-mode reception at Pair 1 and common-mode drive at Pair 1.
 - SC1C2 – S-parameter for common-mode reception at Pair 1 and common-mode drive at Pair 2.
 - SC2C1 – S-parameter for common-mode reception at Pair 2 and common-mode drive at Pair 1.
 - SC2C2 – S-parameter for common-mode reception at Pair 2 and common-mode drive at Pair 2.

Select Response Area (1 Differential, 1 Singleton)

Select the appropriate response. Response options will vary according to Balanced Port Pair/s selection.

Select the required differential or common-mode response characteristic from the available 9 combinations of pure differential (D), common-mode (C), or singleton (X) parameters. Only one compression parameter response may be selected:

- Reception at Singleton and Drive at Singleton
 - SXX – S-Parameter for singleton reception and singleton drive.
- Reception at Singleton and Drive at Pair 1
 - SXD – S-Parameter for singleton reception and differential drive at Pair 1
 - SXC – S-Parameter for singleton reception and common-mode drive at Pair 1
- Reception at Pair 1 and Drive at Singleton
 - SDX – S-Parameter for differential reception at Pair 1 and singleton drive
 - SCX – S-Parameter for common-mode reception at Pair 1 and singleton drive
- Reception at Pair 1 and Drive at Pair 1
 - SDD – S-Parameter for differential reception at the Pair 1 and differential drive at the port pair.
 - SDC – S-Parameter for differential reception at Pair 1 and common-mode drive at the port pair
 - SCD – S-Parameter for common-mode reception at Pair 1 and differential drive at the port pair.
 - SCC – S-Parameter for common-mode reception at Pair 1 and common-mode drive at the port pair.

Select Response Area (1 Differential, 2 Singletons)

Select the appropriate response. Response options will vary according to Balanced Port Pair/s selection.

Select the required differential or common-mode response characteristic from the available 16 combinations of pure differential (D), common-mode (C), first singleton (X), or second singleton (Y) parameters. Only one compression parameter response may be selected:

- Reception at Singleton and Drive at Singleton
 - SXX – S-Parameter for first singleton reception and first singleton drive
 - SXY – S-Parameter for first singleton reception and second singleton drive
 - SYX – S-Parameter for second singleton reception and first singleton drive
 - SYX – S-Parameter for second singleton reception and second singleton drive
- Reception at Singleton and Drive at Pair 1
 - SXD – S-Parameter for first singleton reception and differential drive at Pair 1
 - SXC – S-Parameter for first singleton reception and common-mode drive at Pair 1
 - SYD – S-Parameter for second singleton reception and differential drive at Pair 1
 - SYC – S-Parameter for second singleton reception and common-mode drive at Pair 1
- Reception at Pair 1 and Drive at Singleton
 - SDX – S-Parameter for differential reception at Pair 1 and first singleton drive
 - SDY – S-Parameter for differential reception at Pair 1 and second singleton drive
 - SCX – S-Parameter for common-mode reception at Pair 1 and first singleton drive
 - SCY – S-Parameter for common-mode reception at Pair 1 and second singleton drive
- Reception at Pair 1 and Drive at Pair 1
 - SDD – S-Parameter for differential reception at Pair 1 and differential drive at the port pair.
 - SDC – S-Parameter for differential reception at Pair 1 and common-mode drive at the port pair.
 - SCD – S-Parameter for common-mode reception at Pair 1 and differential drive at the port pair.
 - SCC – S-Parameter for common-mode reception at Pair 1 and common-mode drive at the port pair.

VIEW COMPRESSION RESULT Dialog Box

The VIEW COMPRESSION RESULT dialog box allows review of the compression results.

Previous

- [“GAIN COMPRESS. Compression Param Menu” on page 27-45](#)

Prerequisites

- On the SWEEP TYPES menu, Sweep Type is set to Power (Swept Freq).
- [“SWEEP TYPES Menu” on page 7-4](#)
- MAIN | Sweep Setup | SWEEP SETUP | Sweep Types | SWEEP TYPES

Navigation

- MAIN | Display | DISPLAY | Gain Compression | GAIN COMPRESS. | View Result | VIEW COMPRESSION RESULT Dialog Box

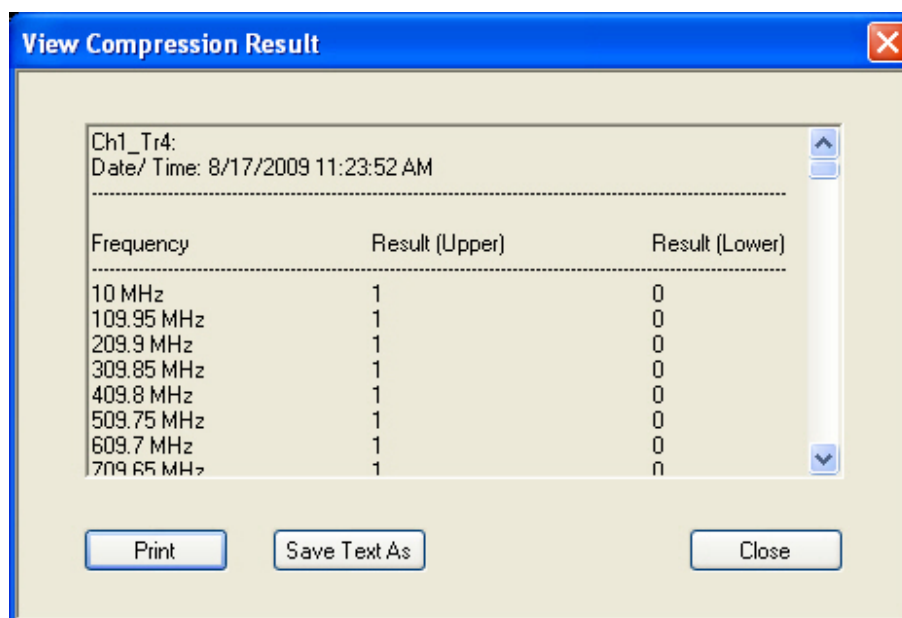


Figure 27-28. VIEW COMPRESSION RESULT Dialog Box

Instructions

1. Use the right-side slider bar to scroll through the results.
2. Click Print to print to the local attached printer.
3. Click Save Text As to save the data to a user-defined location.
4. Click Close to return to the GAIN COMPRESS menu.

27-8 Domain Time Definition Menu

TIME DEFINITION Menu

Previous

- “Frequency, with Time Gate” on page 27-34
- “Time, Low Pass” on page 27-35
- “Time, Band Pass” on page 27-35
- “Time, Eye Diagram” on page 27-37

Prerequisites

- The DOMAIN menu must be set to one of the following: Frequency, with Time Gate; Time, Low Pass; Time, Band Pass.

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Time Definition | TIME DEFINITION
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Time Definition | TIME DEFINITION
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Time Definition | TIME DEFINITION

Menu Button Selection Auto-Return Group

The three (3) buttons of the TIME DEFINITION menu form an auto-return button selection group. Selection of any one button de-selects the other two buttons, and auto-returns to the prior DOMAIN menu variant.

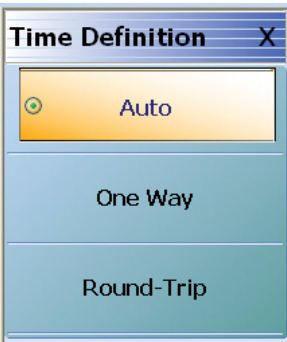
	<p>Auto (Time Definition)</p> <p>Selecting the Auto (Time Definition) button de-selects the One Way and the Round-Trip buttons and auto-returns to the DOMAIN menu.</p> <p>One Way (Time Definition)</p> <p>Selecting the One Way button de-selects the Auto and the Round-Trip buttons and auto-returns to the DOMAIN menu.</p> <p>Round-Trip (Time Definition)</p> <p>Selecting the Round-Trip button de-selects the Auto and the One Way buttons and auto-returns to the DOMAIN menu.</p>
---	---

Figure 27-29. TIME DEFINITION Menu

27-9 Range Setup Menus and Dialog Boxes

Range Setup Button Unavailable

If the Domain Type on the DOMAIN menu is set to Frequency, with No Time Gate, the Range Setup button and the underlying RANGE SETUP menu are unavailable.

- [“Frequency, with No Time Gate” on page 27-34](#)
- MAIN | Display | DISPLAY | Domain | DOMAIN

RANGE SETUP Menu Availability

In order to view the RANGE SETUP menu, the Domain Type on the DOMAIN menu must be set to one of the following: Frequency, with Time Gate; Time, Low Pass; Time, Band Pass.

The Time, Low Pass button on the DOMAIN menu is only available if a harmonic sweep is set on the FREQUENCY menu such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points.

- [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
- [“FREQUENCY Freq.-Based Segmented Sweep Menu” on page 4-8](#)
- MAIN | Frequency | FREQUENCY

RANGE SETUP Menu Variants

The RANGE SETUP menu has seven (7), eight (8), nine (9), or eleven (11) buttons depending on the Time Domain type set in the DOMAIN menu.

RANGE SETUP 7-Button Menu – Frequency with Time Gate

If the Domain Type is set to Frequency, with Time Gate, the RANGE SETUP menu has seven (7) buttons as: Display Unit, Start, Stop, Center, Span, Window Shape, and Alias Free Range.

Menu Description

- [“RANGE SETUP Frequency with Time Gate Menu” on page 27-58](#)

Prerequisites

- Domain Type = Frequency with Time Gate

RANGE SETUP 8-Button Menu – Time Band Pass

If the Domain Type is set to Time, Band Pass, the RANGE SETUP menu has eight (8) buttons as Display Unit, Start, Stop, Center, Span, Phasor Impulse, Window Shape, and Alias Free Range.

Menu Description

- [“RANGE SETUP Time Band Pass Menu” on page 27-60](#)

Prerequisites

- Domain Type = Time Band Pass

RANGE SETUP 9-Button Menu – Time Low Pass, Impulse Response

If the Domain Type is set to Impulse Response, the RANGE SETUP menu has eleven (9) buttons for time Response Low Pass as Display Unit, Start, Stop, Center, Span, Response, Start Step At 0, DC Term, Window Shape, Rise Time %, and Alias Free Range.

Menu Description

- [“RANGE SETUP Time Low Pass Menu” on page 27-62](#)

Prerequisites

Domain Type = Time Low Pass

RANGE SETUP 11-Button Menu – Time Low Pass, Step Response

If the Domain Type is set to Time, Low Pass and the RESPONSE is set to STEP, the RANGE SETUP menu has eleven (11) buttons for time Response Low Pass as Display Unit, Start, Stop, Center, Span, Response, Start Step At 0, DC Term, Window Shape, Rise Time %, and Alias Free Range.

Menu Description

- [“RANGE SETUP Time Low Pass Menu” on page 27-62](#)

Prerequisites

Domain Type = Time Low Pass

RANGE SETUP Button Units

The units of the RANGE SETUP menu and its Start, Stop, Center, and Span buttons change between Distance or Time, depending on the setting of the Display Unit toggle button on each RANGE SETUP menu. The RANGE SETUP (DISTANCE) menu is shown in the next section below.

- See the GATE SETUP menu below for an example of time setup values in a menu.
- [“GATE SETUP Menu” on page 27-71](#)
- MAIN | Display | DISPLAY | Domain | DOMAIN | Gate Setup | GATE SETUP

RANGE SETUP Frequency with Time Gate Menu

Menu Identification and Variants

- The appearance and button availability of the RANGE SETUP (Frequency with Time Gate) menu depends on settings on DOMAIN menu.
- The RANGE SETUP Frequency with Time Gate menu has seven (7) buttons.
- [“Range Setup Menus and Dialog Boxes” on page 27-56](#)

Previous

- [“Frequency, with Time Gate” on page 27-34](#)

Prerequisites

- On the DOMAIN menu, Domain Type is set to Frequency, with Time Gate

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Range Setup | RANGE SETUP Frequency with Time Gate

Range Setup

Display Unit

Time

Start

-1000 ps

Stop

4 ns

Center

1.5 ns

Span

5 ns

Window Shape

Nominal

Alias Free Range

1.4286 ns

Display Unit (Distance/Time) (Range)

The RANGE SETUP and the GATE SETUP menus use the same Display Unit toggle button setting. Changing the Display Unit setting on one menu changes the other menu setting to an identical setting.

Select toggles between distance and time.

- When toggled to Distance, the Start, Stop, Center, and Span button fields show distance values as described in the buttons below.
- When toggled to Time, the Start, Stop, Center, and Span button fields show time values as described in the buttons below.

Start (Distance/Time) (Range)

If the Display Unit toggle button is set to distance, select displays the Start (Distance) toolbar.

Start : 9.0391 cm

km

m

cm

mm

um

X

If the Display Unit toggle button is set to time, select displays the Start (Time) toolbar.

Start : 1.0000 ns

s

ms

us

ns

ps

X

Stop (Distance/Time) (Range)

As above, select either displays the Stop (Distance) or Stop (Time) toolbar.

Stop : 1.1988 m

km

m

cm

mm

um

X

Stop : 4.0000 ns

s

ms

us

ns

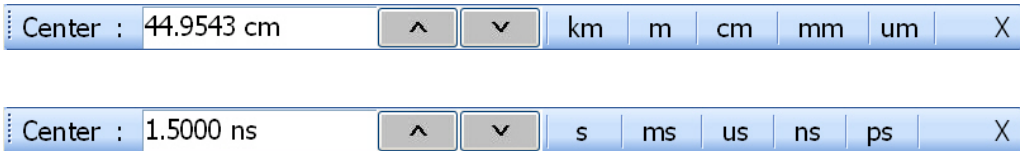
ps

X

Figure 27-30. RANGE SETUP Frequency with Time Gate Menu (1 of 2)

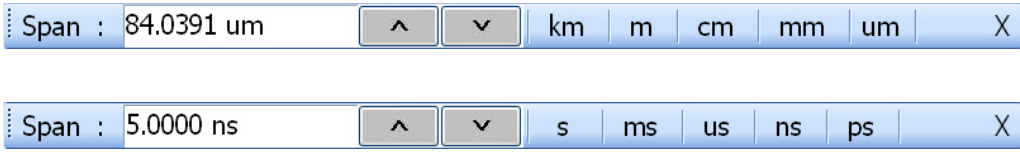
Center (Distance/Time) (Range)

As above, select either displays the Center (Distance) or Center (Time) toolbar.



Span (Distance/Time) (Range)

As above, select either displays the Span (Distance) or Span (Time) toolbar.



Window Shape

Select displays the WINDOW SHAPE menu where four (4) standard shapes of Rectangular, Nominal, Low Side Lobe, and Min Side Lobe can be selected. A fifth advanced selection provides an additional menu where configurable Kaiser-Bessel or Dolph-Chebyshev window types are available.

- [“WINDOW SHAPE Menu” on page 27-67](#)

Alias Free Range

Read-only display button. The units are the same as those set by the Display Unit button above. Displays the length or time period that can be measured without repeating a discontinuity response. This is a function of the inverse of the frequency sweep step size.

Figure 27-30. RANGE SETUP Frequency with Time Gate Menu (2 of 2)

RANGE SETUP Time Band Pass Menu

Menu Identification and Variants

- The appearance and button availability of the RANGE SETUP (Time Band Pass) menu depends on settings on DOMAIN menu.
- This RANGE SETUP (Time Band Pass) menu has eight (8) buttons.
- “Range Setup Menus and Dialog Boxes” on page 27-56

Previous

- “Time, Band Pass” on page 27-35

Prerequisites

- On the DOMAIN menu, Domain Type is set to Time, Band Pass

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time, Band Pass | Range Setup | RANGE SETUP Time Band Pass

Range Setup

Display Unit

Time

Start

-1000 ps

Stop

4 ns

Center

1.5 ns

Span

5 ns

Phasor Impulse

OFF

Window Shape

Nominal

Alias Free Range

50 ns

Display Unit (Distance/Time) (Range)

The RANGE SETUP and the GATE SETUP menus use the same Display Unit toggle button setting. Changing the Display Unit setting on one menu changes the other menu setting to an identical setting.

Select toggles between distance and time.

When toggled to Distance, the Start, Stop, Center, and Span button fields show distance values as described in the buttons below.

When toggled to Time, the Start, Stop, Center, and Span button fields show time values as described in the buttons below.

Start (Distance/Time) (Range)

If the Display Unit toggle button is set to distance, select displays the Start (Distance) toolbar.

Start : 9.0391 cm

km

m

cm

mm

um

If the Display Unit toggle button is set to time, select displays the Start (Time) toolbar.

Start : 1.0000 ns

s

ms

us

ns

ps

Figure 27-31. RANGE SETUP Time Band Pass Menu – 8 Buttons (1 of 2)

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PN: 10410-00319 Rev: AE

MS4640B Series VNA UIRM

Stop (Distance/Time) (Range)

As above, select either displays the Stop (Distance) or Stop (Time) toolbar.

Stop : 1.1988 m ^ v km m cm mm um X

Stop : 4.0000 ns ^ v s ms us ns ps X

Center (Distance/Time) (Range)

As above, select either displays the Center (Distance) or Center (Time) toolbar.

Center : 44.9543 cm ^ v km m cm mm um X

Center : 1.5000 ns ^ v s ms us ns ps X

Span (Distance/Time) (Range)

As above, select either displays the Span (Distance) or Span (Time) toolbar.

Span : 84.0391 um ^ v km m cm mm um X

Span : 5.0000 ns ^ v s ms us ns ps X

Phasor Impulse (Off/On) (Range)

Select toggles the phasor impulse off or on.

Window Shape

Select displays the WINDOW SHAPE menu to allow changing the window shape between rectangular, nominal, low side lobe, minimum side load, or addition advanced selections.

- [“WINDOW SHAPE Menu” on page 27-67](#)

Alias Free Range

Read-only display button. The units are the same as those set by the Display Unit button above. Displays the length or time period that can be measured without repeating a discontinuity response. This is a function of the inverse of the frequency sweep step size

Figure 27-31. RANGE SETUP Time Band Pass Menu – 8 Buttons (2 of 2)

RANGE SETUP Time Low Pass Menu

Menu Identification and Variants

- The appearance and button availability of the RANGE SETUP (Time Low Pass) menu depends on settings on DOMAIN menu.
- This RANGE SETUP (Time Low Pass) menu has eleven (11) buttons.
- [“Range Setup Menus and Dialog Boxes” on page 27-56](#)

Previous

- [“Time, Low Pass” on page 27-35](#)

Prerequisites

- On the FREQUENCY menu, a harmonic sweep must be set such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points
 - [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
 - [“FREQUENCY Freq.-Based Segmented Sweep Menu” on page 4-8](#)
 - MAIN | Frequency | FREQUENCY
- On the DOMAIN menu, Domain Type is set to Time, Low Pass

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time, Low Pass | Range Setup | RANGE SETUP Time Low Pass

	<h3>Display Unit (Distance/Time) (Range)</h3> <p>The RANGE SETUP and the GATE SETUP menus use the same Display Unit toggle button setting. Changing the Display Unit setting on one menu changes the other menu setting to an identical setting.</p> <p>Select toggles between distance and time.</p> <ul style="list-style-type: none"> • When toggled to Distance, the Start, Stop, Center, and Span button fields show distance values as described in the buttons below. • When toggled to Time, the Start, Stop, Center, and Span button fields show time values as described in the buttons below. <h3>Start (Distance/Time) (Range)</h3> <p>If the Display Unit toggle button is set to distance, select displays the Start (Distance) toolbar.</p> <p>Start : 9.0391 cm ^ v km m cm mm um X</p> <p>If the Display Unit toggle button is set to time, select displays the Start (Time) toolbar.</p> <p>Start : 1.0000 ns ^ v s ms us ns ps X</p> <h3>Stop (Distance/Time) (Range)</h3> <p>As above, select either displays the Stop (Distance) or Stop (Time) toolbar.</p> <p>Stop : 1.1988 m ^ v km m cm mm um X</p> <p>Stop : 4.0000 ns ^ v s ms us ns ps X</p>
--	--

Figure 27-32. RANGE SETUP Time Gate Low Pass Menu – Eleven Buttons – (1 of 2)

Center (Distance/Time) (Range)

As above, select either displays the Center (Distance) or Center (Time) toolbar.

Center : 44.9543 cm ^ v km m cm mm um X

Center : 1.5000 ns ^ v s ms us ns ps X

Span (Distance/Time) (Range)

As above, select either displays the Span (Distance) or Span (Time) toolbar.

Span : 84.0391 um ^ v km m cm mm um X

Span : 5.0000 ns ^ v s ms us ns ps X

Response (Impulse/Step) (Range)

Select toggles the response between Impulse and Step.

Start Step at 0

Note: Start Step at 0 appears only if the Response button is toggled to **Step**.

When toggled ON, starts the Step calculation at Time = 0 seconds rather than at the current start of the range.

DC Term

Select displays the DC TERM menu where Auto-Extrapolate or other extrapolation methods can be selected.

- [“DC TERM Menu” on page 27-64](#)

Window Shape

Select displays the WINDOW SHAPE menu to allow changing the window shape between rectangular, nominal, low side lobe, minimum side load, or addition advanced selections.

- [“WINDOW SHAPE Menu” on page 27-67](#)

Rise Time%

Rise Time% appears when the Response button is toggled to Step. Set Rise Time% to 10-90% or 20-80%.

Impulse Width [3dB] Display Button:

Impulse Width [3dB] appears when the Time, Low Pass button has been selected and the Response type is set to Impulse. The units in the Impulse Width display change to match the setting on the Display Unit button.

Alias Free Range

Read-only display button. The units are the same as those set by the Display Unit button above. Displays the length or time period that can be measured without repeating a discontinuity response. This is a function of the inverse of the frequency sweep step size.

Figure 27-32. RANGE SETUP Time Gate Low Pass Menu – Eleven Buttons – (2 of 2)

DC TERM Menu

Previous

- [“RANGE SETUP Time Low Pass Menu” on page 27-62](#)

Prerequisites

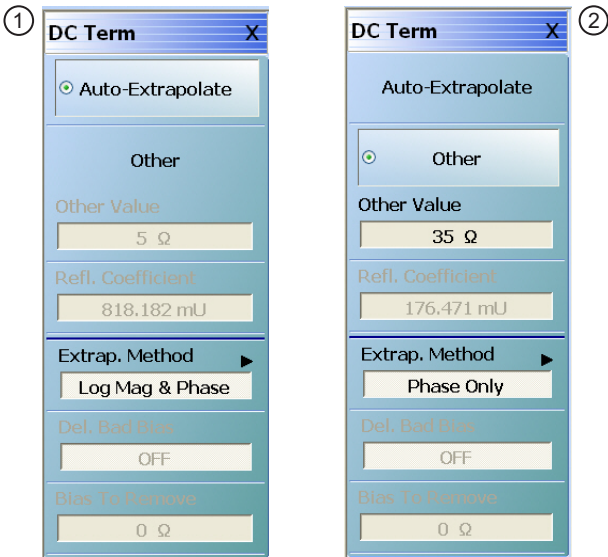
- On the FREQUENCY menu, a harmonic sweep must be set such as:
 - Start Frequency = 10 MHz
 - Stop Frequency = 50 MHz
 - # of Points = 5 points
- FREQUENCY Menus
 - [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
 - [“FREQUENCY Freq.-Based Segmented Sweep Menu” on page 4-8](#)
 - MAIN | Frequency | FREQUENCY
- On the DOMAIN menu, Domain Type is set to Time, Low Pass

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time, Low Pass | Range Setup | RANGE SETUP Time Low Pass | DC Term | DC TERM

Menu Button Availability

The availability of buttons on the DC TERM menu change based on the setting on the Auto-Extrapolate and Other buttons. These two buttons also form a button selection group where the selection of one button de-selects the other button.



1. DC TERM menu with Auto-Extrapolate option selected. See below for button function descriptions.	2. DC TERM menu with Other option selected and Other Value field button now available. See below for button function descriptions.
--	--

Figure 27-33. DC TERM Menu

Auto-Extrapolate (DC Term)

Selection of the Auto-Extrapolate button de-selects the Other button (below) and sets the DC Term extrapolation to the method currently set in the Extrap Method button (described below).

Other (DC Term)

Selection of the Other button de-selects the Auto-Extrapolate button and enables the Other Value button below for input of a user-defined DC Term.

Other Value (DC Term)

This button is only available if the Other (DC Term) button above is selected. Displays the currently user-defined Other Value DC Term in Ohms. Select displays the Other Value (Ohms) field toolbar which allows user input of a custom user-defined DC Term in Ohms.

**Refl. Coefficient**

Reflection Coefficient button. Read-only display. The Reflection Coefficient display shows the calculated coefficient in Units.

Extrap Method

Extrapolation Method button. The Extrapolation Method button displays the currently selection DC term extrapolation method. Available options on the displayed EXTRAPOLATION menu are Log Mag & Phase, Phase Only, and User Defined.

- [“EXTRAPOLATION Menu” on page 27-66](#)

Del. Bad Bias (Off/On)

The Delete Bad Bias toggle button is not available.

Bias To Remove (Ohms)

The Bias to Remove button and the related Bias to Remove (Ohms) field toolbar are not available.

EXTRAPOLATION Menu

Previous

- [“DC TERM Menu” on page 27-64](#)

Prerequisites

- On the FREQUENCY menu, a harmonic sweep must be set such as:
 - Start Frequency = 10 MHz
 - Stop Frequency = 50 MHz
 - # of Points = 5 points
- FREQUENCY Menus
 - [“FREQUENCY Freq.-Based Linear Sweep Menu” on page 4-4](#)
 - [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
 - MAIN | Frequency | FREQUENCY
- On the DOMAIN menu, Domain Type is set to Time, Low Pass

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Time, Low Pass | Range Setup | RANGE SETUP Time Low Pass | DC Term | DC TERM | Extrap Method | EXTRAPOLATION



EXTRAPOLATION Menu Auto-Return Button Selection Group

The three buttons of the EXTRAPOLATION menu form an auto-return button selection group where the selection of any button de-selects the other two buttons and auto-returns to the DC TERM menu.

Log Mag & Phase (Extrapolation)

Sets the DC term extrapolation method to log magnitude and phase. Selection sets the method as Log Mag & Phase and auto-returns to the DC TERM menu.

Phase Only (Extrapolation)

Sets the DC term extrapolation method to Phase Only. Selection sets the method as phase and auto-returns to the DC TERM menu.

User Defined (Extrapolation)

The option is unavailable.

Figure 27-34. EXTRAPOLATION Menu

27-10 Time Domain Window Shape and Gate Setup Menus

WINDOW SHAPE Menu

Previous

- [“RANGE SETUP Frequency with Time Gate Menu” on page 27-58](#)
- [“RANGE SETUP Time Band Pass Menu” on page 27-60](#)
- [“RANGE SETUP Time Low Pass Menu” on page 27-62](#)

Prerequisites

- On the DOMAIN menu, Domain Type is set to one of the following: Frequency, with Time Gate; Time, Band Pass; Time, Low Pass.
- Time Low Pass requires on the FREQUENCY menu, a harmonic sweep such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points
 - [“FREQUENCY Freq.-Based Linear Sweep Menu” on page 4-4](#)
 - [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
- MAIN | Frequency | FREQUENCY

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Range Setup | RANGE SETUP Frequency with Time Gate | Window Shape | WINDOW SHAPE
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Range Setup | RANGE SETUP Time Band Pass | Window Shape | WINDOW SHAPE

- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Range Setup | RANGE SETUP Time Low Pass | Window Shape | WINDOW SHAPE

Window Shape X

Rectangular

Nominal

Low Side Lobe

Min Side Lobe

Advanced Selection

Dolph-Chebyshev

Impulse Width[3dB]

1.9967 cm

WINDOW SHAPE Menu Button Selection Group

The Rectangular, Nominal, Low Side Lobe, Min Side Lobe, and Advanced Selection buttons form a five (5) button selection group where selection of any one button de-selects the other three buttons.

Rectangular (Window)

Sets the window shape to rectangular.

Nominal (Window)

Sets the window shape to nominal.

Low Side Lobe (Window)

Sets the window shape to low side lobe.

Min Side Lobe (Window)

Sets the window shape to the minimum side lobe.

Advanced Selection

Selects displays the [“ADVANCED WINDOW SHAPE SETUP Dialog Box”](#) on page 27-69 that allows selection of configurable Kaiser-Bessel or Dolph-Chebyshev window types.

Impulse Width [3dB]

Read-only display. Shows the calculated width of the window at **3 dB**. Note: This button shows when Response is set to Impulse.

Rise Time %

This is a read only button. Available when Domain is set to Time, Low Pass and Range Setup, Response is set to Step. Set Rise Time% to 10-90% or 20-80%. Note: This button shows when Response is set to Step.

Figure 27-35. WINDOW SHAPE Menu

ADVANCED WINDOW SHAPE SETUP Dialog Box

Previous

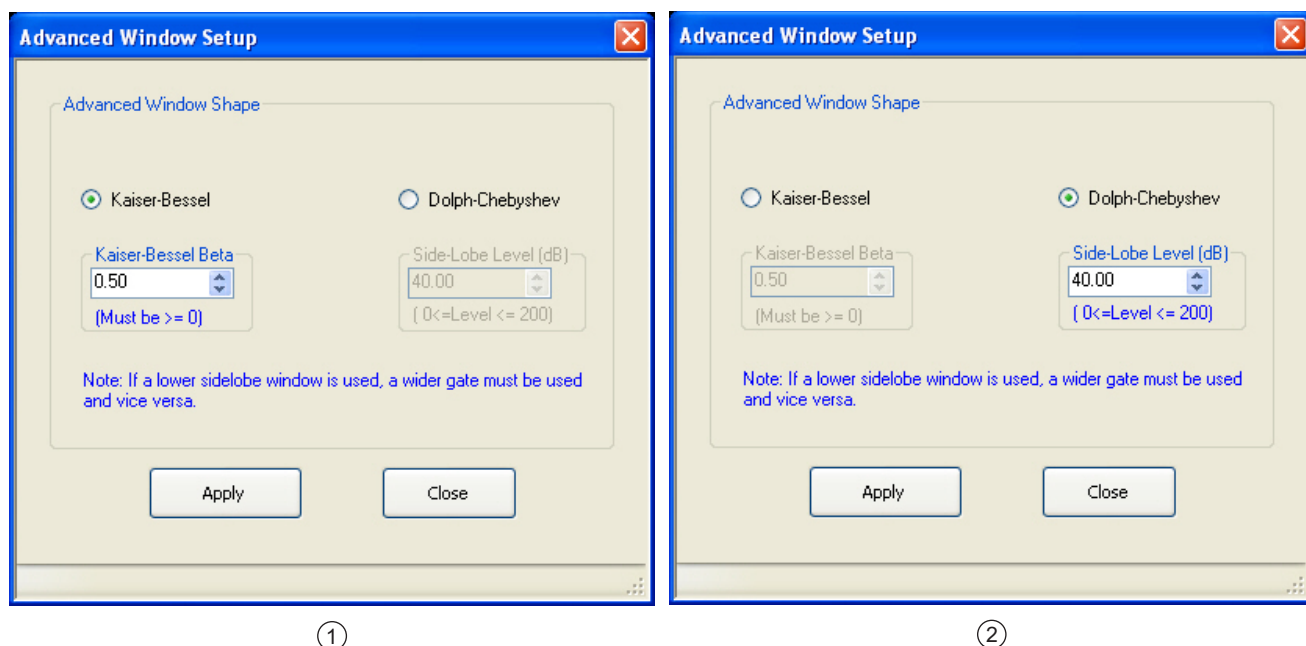
- “WINDOW SHAPE Menu” on page 27-67

Prerequisites

- On the DOMAIN menu, Domain Type is set to one of the following: Frequency, with Time Gate; Time, Band Pass; Time, Low Pass
- Time Low Pass requires on the FREQUENCY menu, a harmonic sweep set such as: Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points
 - “FREQUENCY Freq.-Based Linear Sweep Menu” on page 4-4
 - “FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6
- MAIN | Frequency | FREQUENCY

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Range Setup | RANGE SETUP Frequency with Time Gate | Window Shape | WINDOW SHAPE | Advanced Selection | ADVANCED WINDOW SHAPE SETUP Dialog Box
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Range Setup | RANGE SETUP Time Band Pass | Window Shape | WINDOW SHAPE | Advanced Selection | ADVANCED WINDOW SHAPE SETUP Dialog Box
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Range Setup | RANGE SETUP Time Low Pass | Window Shape | WINDOW SHAPE | Advanced Selection | ADVANCED WINDOW SHAPE SETUP Dialog Box



1. ADVANCED WINDOW SETUP – Advanced Window Shape dialog box for Kaiser-Bessel at left.

2. ADVANCED WINDOW SETUP – Advanced Window Shape dialog box for Dolph-Chebyshev at right.

Figure 27-36. ADVANCED WINDOW SHAPE SETUP Dialog Box

Instructions

The Advanced Window Shape area provides a two-button selection group (Kaiser-Bessel or Dolph-Chebyshev) where the selection of one button de-selects the other button. If selected, each button provides an additional configuration parameter.

Note	If a lower side-lobe window is used, a wider gate must be used. If a higher side-lobe window is used, a narrower gate must be used.
-------------	---

1. Make a selection of one of the two available choices.
 - Kaiser-Bessel
 - Dolph-Chebyshev
2. If Kaiser-Bessel is selected, the Kaiser-Bessel Beta area below the button becomes available.
 - Either use the up/down arrows to select a pre-defined value, or enter a value from the front panel or keyboard.
 - Note that the input value must be ≥ 0 (greater than or equal to zero).
3. If Dolph-Chebyshev is selected, the Side-Lobe Level (dB) area button becomes available.
 - Either use the up/down arrows to select a pre-defined value, or enter a value from the front panel or keyboard.
 - Note that the input value must be $0 \geq \text{Level} \geq 200$ (greater than or equal to zero and less than or equal to 200).
4. Click Apply to set the changes.
 - If you click Close without clicking the Apply button, any dialog box changes are discarded and the prior window shape state is retained.
5. Click Close to close the dialog box and return to the ADVANCED WINDOW SHAPE SETUP dialog box.
 - [“ADVANCED WINDOW SHAPE SETUP Dialog Box” on page 27-69](#)

GATE SETUP Menu

Previous

- [“Frequency, with Time Gate” on page 27-34](#)
- [“Time, Low Pass” on page 27-35](#)
- [“Time, Band Pass” on page 27-35](#)
- [“Time, Eye Diagram” on page 27-37](#)

Prerequisites

- On the DOMAIN menu, Domain Type is set to one of the following: Frequency, with Time Gate; Time, Band Pass; Time, Low Pass.
- Time Low Pass requires on the FREQUENCY menu, a harmonic sweep setup such as:
Start Frequency = 10 MHz; Stop Frequency = 50 MHz; # of Points = 5 points
 - [“FREQUENCY Freq.-Based Linear Sweep Menu” on page 4-4](#)
 - [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
 - MAIN | Frequency | FREQUENCY

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Gate Setup | GATE SETUP
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Gate Setup | GATE SETUP
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Gate Setup | GATE SETUP

Gate Setup		X
Display Unit	Time	
Start	1000 ps	
Stop	2 ns	
Center	1.5 ns	
Span	1 ns	
Gate Function	Off	
Notch	OFF	
Gate Shape	Nominal	
Gate Impedance		

Figure 27-37. GATE SETUP Menu

GATE SETUP Menu Button Units

The units of the GATE SETUP menu and its Start, Stop, Center, and Span buttons change between Distance or Time, depending on the setting of the Display Unit toggle button. This button is shared by the GATE SETUP and the RANGE SETUP menus. The GATE SETUP (Distance) menu is shown at left.

- See the RANGE SETUP menu above for an example of time setup values in a menu.
- [“RANGE SETUP Frequency with Time Gate Menu” on page 27-58](#)

Display Unit (Distance/Time) (Gate)

The RANGE SETUP and the GATE SETUP menus use the same Display Unit button setting. Changing the Display Unit setting on one menu changes the other menu setting to an identical setting.

Select toggles between distance and time. When toggled to Distance, the Start, Stop, Center, and Span button fields show distance values as described in the buttons below.

Start (Distance/Time) (Gate)

If the Display Unit toggle button is set to distance, select displays the Start (Distance) toolbar.

Start :	9.0391 cm	^	v	km	m	cm	mm	um	X
---------	-----------	---	---	----	---	----	----	----	---

If the Display Unit toggle button is set to time, select displays the Start (Time) toolbar.

Start :	1.0000 ns	^	v	s	ms	us	ns	ps	X
---------	-----------	---	---	---	----	----	----	----	---

Stop (Distance/Time) (Gate)

As above, select either displays the Stop (Distance) or Stop (Time) toolbar.

Stop :	1.1988 m	^	v	km	m	cm	mm	um	X
--------	----------	---	---	----	---	----	----	----	---

Stop :	4.0000 ns	^	v	s	ms	us	ns	ps	X
--------	-----------	---	---	---	----	----	----	----	---

Center (Time or Distance) (Gate)

As above, select either displays the Center (Distance) or Center (Time) toolbar.

Center :	44.9543 cm	^	v	km	m	cm	mm	um	X
----------	------------	---	---	----	---	----	----	----	---

Center :	1.5000 ns	^	v	s	ms	us	ns	ps	X
----------	-----------	---	---	---	----	----	----	----	---

Span (Time or Distance) (Gate)

As above, select either the Span (Distance) or Span (Time) toolbar.

Span :	84.0391 um	^	v	km	m	cm	mm	um	X
--------	------------	---	---	----	---	----	----	----	---

Span :	5.0000 ns	^	v	s	ms	us	ns	ps	X
--------	-----------	---	---	---	----	----	----	----	---

Gate Function (Off/On)

Select displays the Gate Function menu.

- [“GATE FUNCTION Menu” on page 27-73](#)

Notch (Off/On)

Select toggles notch between off and on.

Gate Shape

Read-only display of the Gate Shape setting.

Gate Impedance

Select opens the Gate Impedance dialog box.

- [“GATE IMPEDANCE Dialog Box”](#)

GATE FUNCTION Menu

Previous

- [“GATE SETUP Menu” on page 27-71](#)

Prerequisites

- On the DOMAIN menu, Domain Type is set to one of the following: Frequency, with Time Gate; Time, Band Pass; Time, Low Pass.
- Time Low Pass requires on the FREQUENCY menu, a harmonic sweep set such as:
 - Start Frequency = 10 MHz
 - Stop Frequency = 50 MHz
 - # of Points = 5 points
- FREQUENCY Menus
 - [“FREQUENCY Freq.-Based Linear Sweep Menu” on page 4-4](#)
 - [“FREQUENCY Freq.-Based Log Sweep Menu” on page 4-6](#)
 - MAIN | Frequency | FREQUENCY

Navigation

- MAIN | Display | DISPLAY | Domain | DOMAIN Frequency with Time Gate | Gate Setup | GATE SETUP | Gate Function | GATE FUNCTION
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Band Pass | Gate Setup | GATE SETUP | Gate Function | GATE FUNCTION
- MAIN | Display | DISPLAY | Domain | DOMAIN Time Low Pass | Gate Setup | GATE SETUP | Gate Function | GATE FUNCTION



Figure 27-38. GATE FUNCTION Menu

GATE Function Area Button Selection Group

The three (3) Gate Function Area buttons (Off, Display, and On) form a button selection group where the selection of any one button de-selects the other two buttons.

Off (Gate Function)

Select turns OFF the gate function on the active trace.

Display (Gate Function)

Select displays the gate function on the active trace

On (Gate Function)

Select turns ON the gate function on the active trace.

Gate Shape Area Button Selection Group

The four (4) Gate Shape Area buttons (Minimum, Nominal, Wide, Maximum, and Advanced Selection) form a button selection group where the selection of any one button de-selects the other four buttons.

Minimum (Gate Function)

Select sets the gate function to its minimum setting.

Nominal (Gate Function)

Select sets the gate function to its nominal setting.

Wide (Gate Function)

Select sets the gate function to its widest setting.

Maximum (Gate Function)

Select sets the gate function to its maximum setting.

Advanced Selection (Gate Function)

Select displays the Advanced Gate (Shape) Setup dialog box which allows selection either of a Kaiser-Bessel or Dolph-Chebyshev shaped gate. Each gate option allows selectable parameters.

- [“ADVANCED GATE SHAPE SETUP Dialog Box” on page 27-75](#)

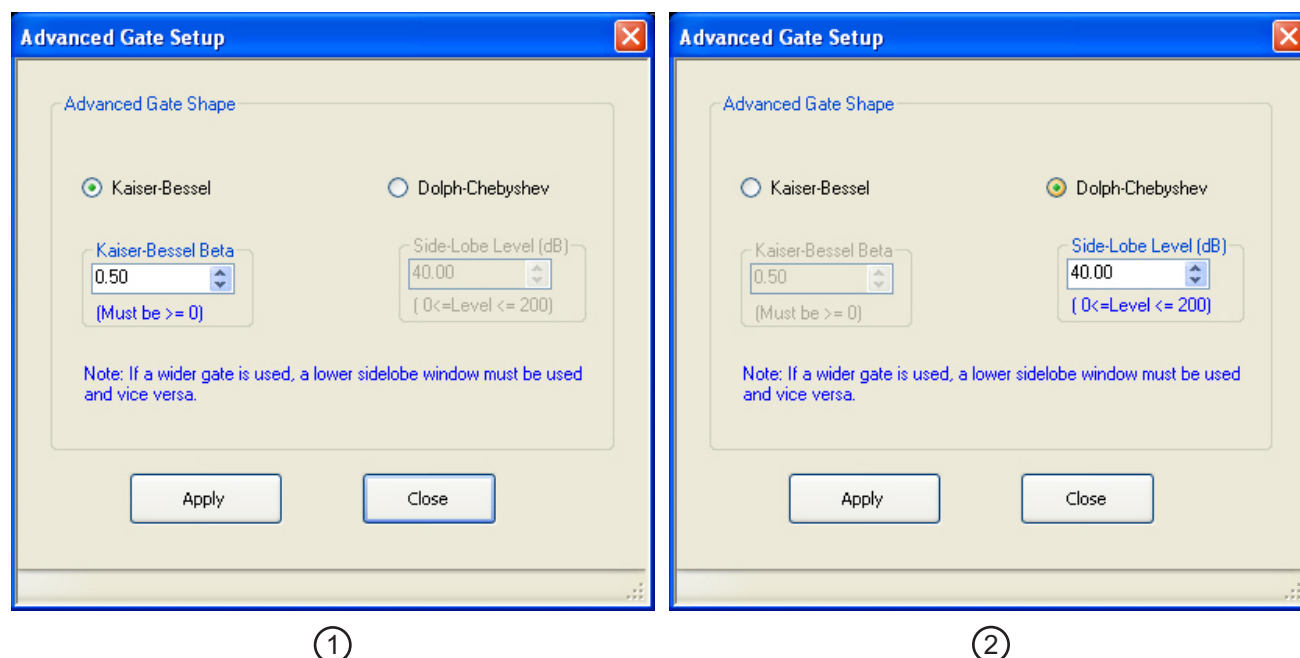
ADVANCED GATE SHAPE SETUP Dialog Box

Previous

- “GATE FUNCTION Menu” on page 27-73

Navigation

- MAIN | Display | DISPLAY | Domain | TIME DOMAIN | Gate Setup | GATE SETUP | Gate Function | GATE FUNCTION | Advanced Selection | ADVANCED GATE (SHAPE) SETUP Dialog Box



1. ADVANCED WINDOW SETUP – Advanced Gate Shape dialog box for Kaiser-Bessel at left.

2. ADVANCED WINDOW SETUP – Advanced Gate Shape dialog box for Dolph-Chebyshev at right.

Figure 27-39. ADVANCED GATE SHAPE SETUP Dialog Box

Button Selection Group

The Advanced Gate Shape area provides a two-button selection group (Kaiser-Bessel or Dolph-Chebyshev) where the selection of one button de-selects the other button. If selected, each button provides an additional configuration parameter.

Note

If a lower side-lobe window is used, a wider gate must be used. If a higher side-lobe window is used, a narrower gate must be used.

1. Make a selection of one of the two available choices.
 - Kaiser-Bessel, shown at left at #1 in Figure 27-39 above.
 - Dolph-Chebyshev, shown at right at #2 in Figure 27-39 above.
2. If Kaiser-Bessel is selected, the Kaiser-Bessel Beta area below the button becomes available.
 - Either use the up/down arrows to select a pre-defined value, or enter a value from the front panel or keyboard.
 - Note that the input value must be ≥ 0 (greater than or equal to zero).

3. If Dolph-Chebyshev is selected, the Side-Lobe Level (dB) area button becomes available.
 - Either use the up/down arrows to select a pre-defined value, or enter a value from the front panel or keyboard.
 - Note that the input value must be $0 \geq \text{Level} \geq 200$ (greater than or equal to zero and less than or equal to 200).
4. Click **Apply** to set the changes.
 - If you click **Close** without clicking the **Apply** button, any dialog box changes are discarded and the prior window shape state is retained.
5. Click **Close** to close the dialog box and return to the **ADVANCED GATE (SHAPE) SETUP** dialog box.

GATE IMPEDANCE Dialog Box

Previous

- “GATE SETUP Menu” on page 27-71

Prerequisites

- For the Calculate Local Impedance button to be active, Modify Gate Start or Modify Gate Stop must be checked and the Domain Mode must be set to Time Low Pass.
- Local and reference impedances must be positive real.

Navigation

- MAIN | Display | DISPLAY | Domain | TIME DOMAIN | Gate Setup | GATE SETUP | Gate Impedance | GATE IMPEDANCE Dialog Box

Gate Impedance

Gate Impedance Modifications

"When 'Modify Gate' is checked, the impedance modification for that gate edge will become active and the fields editable. Note that gate start and stop time/distance changes propagate back to the main menu.

☒ Modify Gate Start

Gate Start Time (ns) 1.0000

Reference Impedance (ohms) 50.000

Local Impedance (ohms) 50.000

☒ Modify Gate Stop

Gate Stop Time (ns) 2.0000

Reference Impedance (ohms) 50.000

Local Impedance (ohms) 50.000

Calculate Local Impedance

(*Only available with Time, Low Pass or Frequency with Time Gate with Harmonic Sweep)

Line Loss Compensation

Loss (dB/ns) 0.0000

Frequency (GHz) 0.0000

Save Cancel

Figure 27-40. GATE IMPEDANCE Modification Dialog Box

Introduction

When a gate starts or stops in a region whose impedance is not the reference impedance (usually 50 ohms), there can be some complications in interpreting the Frequency-with-time-gate result.

The GATE IMPEDANCE Dialog Box provides a means to re-reference the impedance at either end of the gate to something that might be more desirable (often the calibration reference impedance which is usually 50 ohms). This process works by synthetically introducing impedance transitions at gate start and/or gate stop to get the net result back to the desired impedance planes.

Modify Gate Start Area

Note	Depending whether Time or Distance is selected on the Display Unit field of the Gate Setup menu, the Dialog will show either Gate Start/Stop (in time units) or Gate Start/Stop (in distance units).
-------------	--

- **Gate Start Time (or Distance)**
 - Set the gate start time (or distance) to the desired value that will properly re-reference the impedance.
- **Reference Impedance**
 - Set this to the typical impedance of the line (usually 50 ohms).
- **Local Impedance**
 - Set this to the known non-typical value of impedance along the line. If it is unknown, use the Calculate Local Impedance tool.

Modify Gate Stop Area

- **Gate Stop Time (or Distance)**
 - Set the gate stop time (or distance) to the desired value that will properly re-reference the impedance.
- **Reference Impedance**
 - Set this to the typical impedance of the line (usually 50 ohms)
- **Local Impedance**
 - Set this to the known non-typical value of impedance along the line. If it is unknown, use the Calculate Local Impedance tool.

Calculate Local Impedance

- Calculate Local Impedance button is enabled if Modify Gate Start or Modify Gate Stop is checked and the Domain Mode (also accessed via the ["DISPLAY Menu"](#)) is set to Time Low Pass.

When selected, the system will calculate the local impedance at gate start and stop locations. This calculation is based on a step response integration of the current data and can be helpful if the DUT impedance levels are not precisely known. Note that if the gate start or stop are placed very close (within a few impulse widths) to physical impedance transitions, the accuracy of this calculation will be reduced.

Line Loss Compensation

- Set the Loss and Frequency to desired values.

If the DUT is lossy, the synthetic modifications should be based on that loss level as well as the impedances involved and the loss-per-unit length at a specific frequency can be entered here. A square-root-of-frequency dependence will be assumed and the loss will be treated as being equally distributed along the length of the DUT (up until gate stop).

27-11 Inter- and Intra-Trace Math and Operand Setup Menus

INTER-TRACE MATH Menu

This menu allows operand setting and then mathematical comparisons between a user-defined trace 1 (one) and trace 2 (two). The two traces values can be added together, subtracted from each other, multiplied, or divided. If using Equation Editor, multiple traces can be operated upon.

Previous

- [“DISPLAY Menu” on page 27-3](#)

Navigation

- MAIN | Display | DISPLAY | Inter-Trace Math | INTER-TRACE MATH

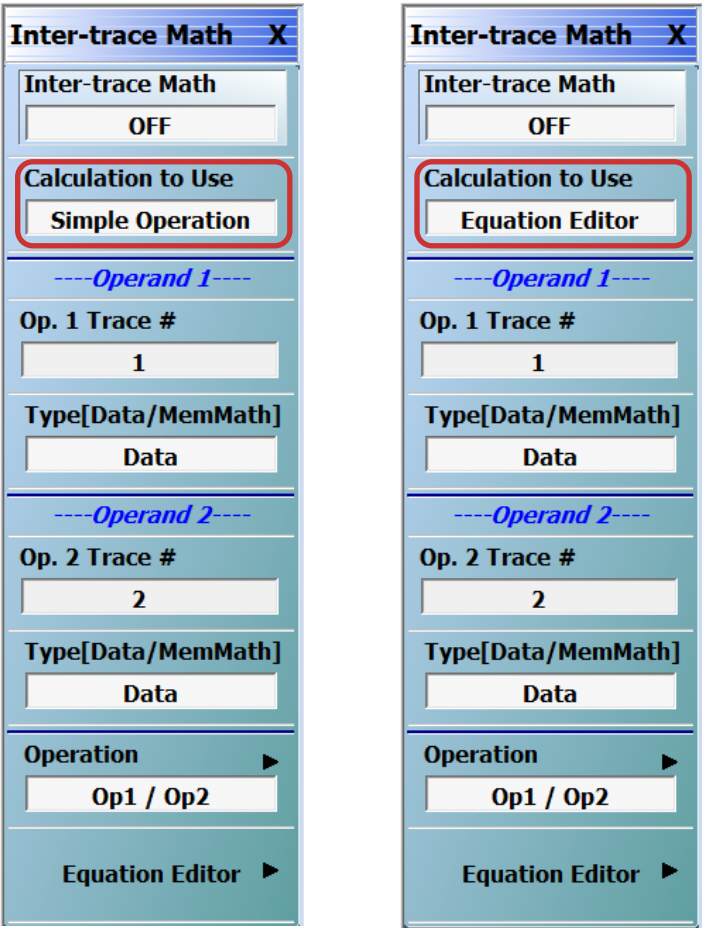


Figure 27-41. INTER-TRACE MATH Menu

Inter-Trace Math (Off/On)

Toggles Inter-Trace Math off and on.

Calculation to Use

Allows toggling between using the Simple Operation (default) or the Equation Editor function (defined by equation editor at bottom of menu).

Operand 1 Area**Op. 1 Trace #**

Operand One Trace Number. Select displays the Op 1 Trace # field toolbar which allows selection of the trace number of trace math operand 1 (one).

**(Op. 1) Type (Data/MemMath)**

The Operand 1 Type toggle button switches between DataMemMath and Data for Operand 1.

Operand 2 Area**Op. 2 Trace #**

Operand Two Trace Number. Select displays the Op 2 Trace # field toolbar which allows selection of the trace number of trace math operand 2 (two).

**(Op. 2) Type (Data/MemMath)**

The Operand 2 Type toggle button switches between DataMemMath and Data for Operand 2.

Operation Area**Operation**

Select displays the INTRA TRACE OP. menu.

- [“INTRA TRACE OP. Menu” on page 27-81](#)

Equation Editor

Select brings up the Equation Editor dialog.

- [“EQUATION EDITOR Dialog Box” on page 27-82](#)

INTRA TRACE OP. Menu

The menu provides mathematical operations between the values on two separate traces.

Full Name

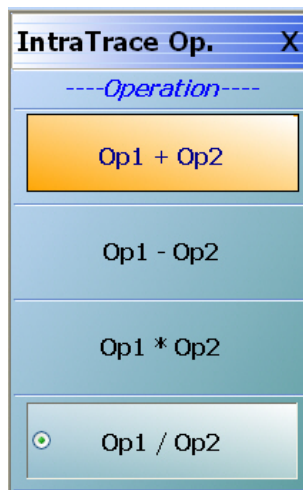
Intra-trace Operand

Previous

- [“INTER-TRACE MATH Menu” on page 27-79](#)

Navigation

- MAIN | Display | DISPLAY | Inter-trace Math | INTER-TRACE MATH | Operation | INTRA-TRACEOP



See below for button function descriptions.

Figure 27-42. INTRA-TRACE OP. (INTRA TRACE OPERATIONS) Menu

INTRA TRACE OP. Menu Button Selection Group

The four (4) buttons of the INTRA TRACE OPERATIONS menu form a button selection group where the selection of any one (1) button de-selects the other three (3) buttons.

Operation Area

Op1 + Op2 (Operand Plus)

The trace value assigned to Operand 1 is added to the trace value assigned to Operand 2.

Op1 – Op2 (Operand Subtraction)

The trace value assigned to Operand 2 is subtracted from the trace value assigned to Operand 1.

Op1 * Op2 (Operand Multiplication)

The trace value assigned to Operand 1 is multiplied times the trace value assigned to Operand 2.

Op1 / Op2 (Operand Division)

The trace value assigned to Operand 1 is divided by the trace value assigned to Operand 2.

EQUATION EDITOR Dialog Box

The Equation Editor allows a much more complete set of operations between trace data sets (and S-parameter sets) than does the Simple Operation inter-trace math. The main dialog is shown in [Figure 27-43](#) and consists of a selection of functions, input variables (traces and s-parameters in various formats) and scalar entry along with some editing tools.

A central concept is that the entire equation is based on complex vectors of length equal to the number of points. Scalars (real or complex) can be used throughout but, where necessary, will be automatically vectorized (same value at each position in a vector of length equal to the number of points).

Previous

- [“INTER-TRACE MATH Menu” on page 27-79](#)

Navigation

MAIN | Display | DISPLAY | Inter-Trace Math | INTER-TRACE MATH | Equation Editor | EQUATION EDITOR FOR TRx Dialog Box

Equation Editor for Ch1.Tr1

Tr1

Equation result will be processed by the destination graph type (Example: log mag graph type will take $20 \log(\text{equation result})$).

Clear Equation Show History Clear History < > Delete

Extend Entry On-Screen Keyboard

Arithmetic

7 8 9

4 5 6

1 2 3

. 0 .

+ - *

() /

j PI E

FREQ NUM_POINTS

Channel Selection

Ch1 Ch2 Ch3 Ch4 Ch5 Ch6 Ch7 Ch8

Ch9 Ch10 Ch11 Ch12 Ch13 Ch14 Ch15 Ch16

Only those channels are available which have same # of points as Active channel Active (Ch1)

Incoming Data Selection

☒ Trace ☐ S-Parameter ☐ SnP File

Tr1 Tr2 Tr3 Tr4

Tr5 Tr6 Tr7 Tr8

Tr9 Tr10 Tr11 Tr12

Tr13 Tr14 Tr15 Tr16

Format

☐ Formatted (cal applied and uses current graph type format. Example: log mag graph type on a trace will produce a variable in dB)

☒ Corrected (complex number with cal applied)

☐ Raw (complex number)

☐ Use All Traces as Time Domain data

Data Source

☒ Data

☐ Memory

Function Selection

ABS

ACOS

ANGLE

ASIN

ATAN

ATAN2

CONJ

COS

CPX

EXP

IM

KFACTOR

Function Info:

ABS(input)

Returns complex magnitude for complex input and absolute value for real input. Output is real.

SnP 1 File Select file Browse

SnP 2 File Select file Browse

SnP 3 File Select file Browse

SnP 4 File Select file Browse

SnP 5 File Select file Browse

SnP 6 File Select file Browse

Apply Cancel Save Recall

Figure 27-43. Inter-Trace Math Equation Editor

Note

Syntax errors will be flagged if parentheses are not used to resolve precedence problems (e.g., $\text{Tr1} * -\text{T2}$ will not be accepted but $\text{Tr1} * (-\text{Tr2})$ will be).

Equation Editor Contents:**Clear Equation Button**

- Clears equation entry bar above.

Show History Button

- Clicking button opens window showing equation history (equation controls are hidden). Clicking again returns user to equation controls.

Clear History Button

- Clears equation history.

< and > Buttons

- Moves the cursor either left or right within the equation entry bar.

Extend Entry Button

- Clicking Extend Entry opens a larger text edit field for directly typing in longer or more complex equations.

Function Selection Pane

Following are descriptions of the functions supported (the output of the function is complex unless otherwise noted).

- **ABS()** – Complex magnitude for complex input and absolute value for real input. Output is real.
- **ACOS()** – Arccosine, radian output. This will accept complex arguments and uses the standard branch cut.
- **ANGLE()** – Phase of complex input; radian output. Output is real.
- **ASIN()** – Arcsine, radian output. This will accept complex arguments and uses the standard branch cut.
- **ATAN()** – Arctangent, radian output. This will accept complex arguments and uses the standard branch cut.
- **ATAN2()** – Arctangent with the ability to properly resolve quadrants. The argument is complex and it is internally split into real and imaginary components with sign checking. Radian output
- **CONJ()** – Conjugate
- **COS()** – Cosine, radian input. Note that this function will accept complex inputs and treat them as such. Commonly one would use this function only with a formatted trace set up for phase and then multiplied by $\pi/180$ to convert to radians.
- **CPX(a,b)** – Complex equivalent taking 2 real inputs; output is $a+jb$. If the inputs are complex, the real part of each is taken prior to combination into a new complex variable.
- **EXP()** – Exponential
- **IM()** – Imaginary part of a complex input. Output is real.
- **KFACTOR()** – Stability factor accepting 4 complex inputs (generally representing S11, S12, S21, and S22).

- KFACTOR(Tr1,Tr2,Tr3,Tr4) produces:

$$\frac{1 - |Tr1|^2 - |Tr4|^2 + |Tr1 \cdot Tr4 - Tr2 \cdot Tr3|^2}{2|Tr2 \cdot Tr3|}$$

Output is real.

Equation 27-1.

- LN() – Natural log; standard branch cut
- LOG10() – Log base 10; standard branch cut
- MAG() – Magnitude accepting complex input (same as ABS). Output is real.
- MAX() – Maximum value of the MAGNITUDE of the variable selected. (Note that this updates only after a sweep completes so there may be a one sweep delay until the value propagates to a plotted equation). Output is real.
- MAX_HOLD() Accumulates maximum value of the MAGNITUDE of the argument sweep-to-sweep. The process is reset by clearing the equation or turning inter-trace math off. (Note that this updates only after a sweep completes so there may be a one sweep delay until the value propagates to a plotted equation). Output is real.
- MEAN() – Average value in a complex sense; (Note that this updates only after a sweep completes so there may be a one sweep delay until the value propagates to a plotted equation)
- MEDIAN() – Median value of the MAGNITUDE of the argument; (Note that this updates only after a sweep completes so there may be a one sweep delay until the value propagates to a plotted equation). Output is real.
- MIN() – Minimum value of the MAGNITUDE of the argument; (Note that this updates only after a sweep completes so there may be a one sweep delay until the value propagates to a plotted equation). Output is real.
- MIN_HOLD() – Accumulates maximum value of the MAGNITUDE of the argument sweep-to-sweep. The process is reset by clearing the equation or turning inter-trace math off. (Note that this updates only after a sweep completes so there may be a one sweep delay until the value propagates to a plotted equation). Output is real.
- MRKX() – Readout of active marker on entered trace, x-value. If no marker is on, a 0 will be returned. If more than one marker is on, the active marker will be used. Output is real. Since this function relies on a trace marker value, the argument can be ONLY a trace and not a function involving a trace.
- MRKY() – Readout of active marker on entered trace, y-value. If no marker is on, a 0 will be returned. If more than one marker is on, the active marker will be used. Since this function relies on a trace marker value, the argument can be ONLY a trace and not a function involving a trace.
- MU: mu stability factor accepting four complex inputs (generally representing S11, S12, S21, and S22).
 - MU(Tr1,Tr2,Tr3,Tr4) produces:

$$\frac{1 - |Tr1|^2}{|Tr1 - Tr4^* (Tr1 \cdot Tr4 - Tr2 \cdot Tr3)| + |Tr2 \cdot Tr3|}$$

(where the * denotes conjugate)

Output is real.

Equation 27-2.

- PHASE() – Same as ANGLE but degree output. Output is real.
- POW(z,n) – Raises a complex variable z to the nth power. n is a scalar.
- RE() – Returns real part of a complex input. Output is real.

- REWRAP() – Rewraps phase of a complex variable when range was truncated (often by a power function). The calculation is based on slope of low frequency data.
- SDEV() – Standard deviation of input data. This is evaluated only at sweep completion so there may be a one sweep delay for values to propagate to a displayed equation.
 - This calculation is based on the equation below where N is the number of points. Output is real.

$$SDEV = \sqrt{\frac{\sum_{k=1}^N |y_k - MEAN|^2}{N - 1}}$$

Equation 27-3.

- SIN() – Sine; (Note that this function will accept complex inputs and treat them as such). Commonly one would use this function only with a formatted trace set up for phase and then multiplied by pi/180 to convert to radians.
- SQRT() – Square root; standard branch cut.
- SUBSET(a,b,Trace) – Accepts a vector argument (Trace) and extracts elements from point indices 'a' to 'b' of the Trace vector. Note that for the point indices 'a' and 'b', the first point of the sweep is point 0. 'Trace' refers to any vector representing a current data or memory trace (like the arguments for other functions) or a vector resulting from other computations.
- TAN() – Tangent. (Note that this function will accept complex inputs and treat them as such). Commonly one would use this function only with a formatted trace set up for phase and then multiplied by pi/180 to convert to radians.
- XAXISARRAY() – Generates the vector corresponding to the current sweep variable. Output is real.

Channel Selection Pane

Data (and memory and processed results) from other channels may be used in the calculation for the active channel. Specified parameters from the highlighted channel will be used in the equation. All channels being used are required to have the same number of sweep points. Default selection is Active channel.

Incoming Data Selection Pane

Format

- **Formatted**

If **Formatted** is selected, the current graph type format will be used so the vector may be purely real. Cal will be applied and will use current graph format.

- **Raw and Corrected**

If the trace selection format is selected as **Raw** or **Corrected**, the variable will enter the equation as a linear complex number (either with or without calibration applied; Note that receiver calibrations are applied to all).

- **Data Source Selections**

- **Data** – Current trace data
- **Memory** – Data stored in trace memory

Trace Radio Button

- Select enables buttons for selections of traces Tr1 through Tr16:

The interface shows three radio buttons at the top: 'Trace' (selected), 'S-Parameter', and 'SnP File'. Below them is a 4x4 grid of buttons labeled Tr1 through Tr16.

S-Parameter Radio Button

- Select enables buttons for selections of S-Parameters:

The interface shows three radio buttons at the top: 'Trace', 'S-Parameter' (selected), and 'SnP File'. Below them is a 4x4 grid of buttons labeled S11 through S44.

SnP File Radio Button

- Select enables fields for browsing to and selecting SnP files. The highlighted file will be used for SnP data. A maximum of 16 SnP files can be loaded; they are shared per system.

The 'Parameter Selection' dialog box has three radio buttons: 'Trace', 'S-Parameter', and 'SnP File' (selected). It includes a grid of S-Parameter buttons (S11-S44), a 'Format' section with options for 'Formatted' (selected), 'Corrected', and 'Raw', and a 'Data Source' section with 'Data' (selected) and 'Memory'. A checkbox 'Use All Traces as Time Domain data' is at the bottom. Below the dialog, a list of SnP files is shown, with 'SnP 2 File' highlighted. The files are: SnP 1 File (C:\Anritsu\VNA\Data\S1PFiles\load_std.S1P), SnP 2 File (C:\Anritsu\VNA\Data\S1PFiles\open_std.S1P), SnP 3 File (C:\Anritsu\VNA\Data\S1PFiles\short_std.S1P), SnP 4 File (Select file), SnP 5 File (Select file), and SnP 6 File (Select file). Buttons for 'Apply', 'Cancel', 'Save', and 'Recall' are at the bottom.

Arithmetic Keypad Area

- Constant π (PI) is available and the 'j' button is used for entering complex scalars. The scientific notation exponent marker 'E' is also available (e.g., 1E9 for 1,000,000,000).

Use All Traces as Time Domain Data

- If the time domain checkbox is selected, all traces and parameters will be processed into time domain in the background if they are not already displayed that way. Lowpass Processing will be used if the current frequency list supports it, but otherwise Bandpass Process will be used. Trace time domain parameters will be used which may be at default if not already configured. It is recommended to configure desired variables in time domain so the results are predictable. See the *Measurement Guide* (10410-00218) for more information.

Save Equation

- Saves existing equation to a designated location as a .eqn file.

Recall Equation

- Recalls an existing equation .eqn file from its saved location.

Note Trace memory and trace math can be used as the incoming variables.
--

27-12 Conversion and Display Utility Menus and Dialog Boxes

CONVERSION Menu

Previous

- [“DISPLAY Menu” on page 27-3](#)

Navigation

- MAIN | Display | DISPLAY | Conversion | CONVERSION



Figure 27-44. CONVERSION Menu

Conversion (Off/On)

Select toggles conversion OFF and ON.

CONVERSION Menu Reflection/Transmission Button Selection Group

The five (5) reflection, transmission, and 1/S buttons form a button selection group where the selection of any one button de-selects the other four buttons.

Z:Reflection

Selects the Z:Reflection impedance display conversion.

Z:Transmission

Selects the Z:Transmission impedance display conversion.

Y:Reflection

Selects the Y:Reflection admittance display conversion.

Y:Transmission

Selects the Y:Transmission admittance display conversion.

1/S (One Divided By S)

Selects an inverted 1/S (One/S) display conversion.

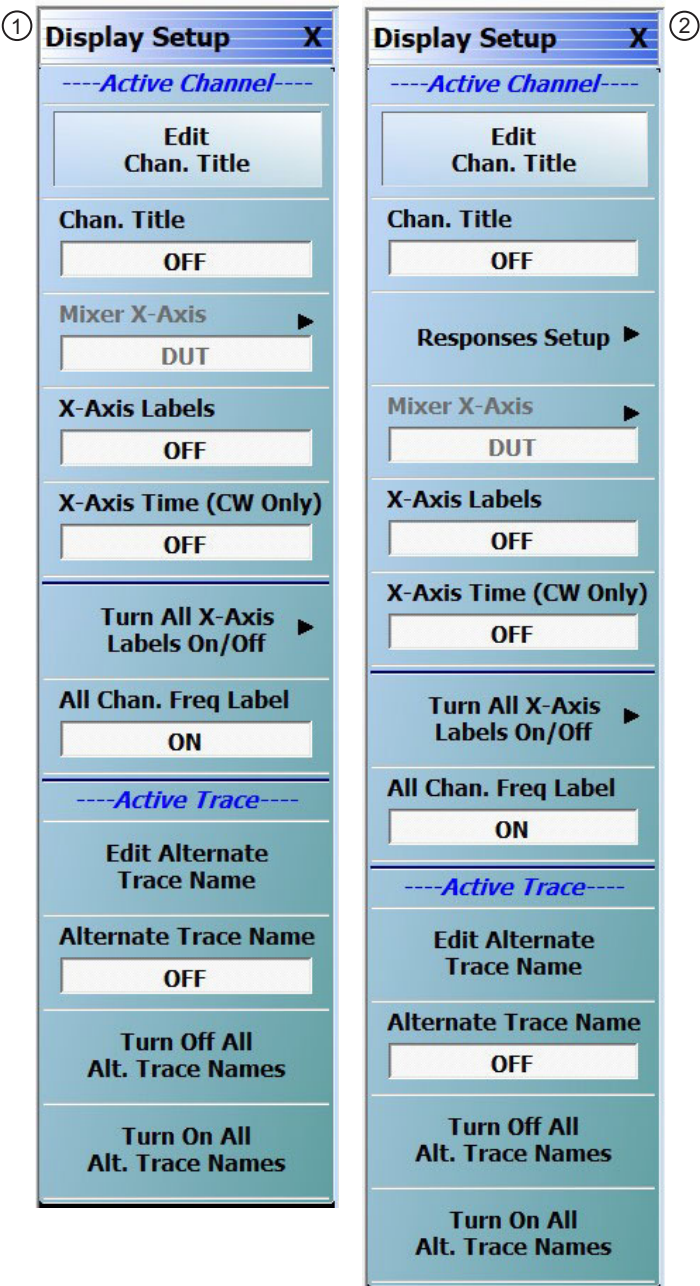
DISPLAY SETUP Menu

Previous

- [“DISPLAY Menu” on page 27-3](#)

Navigation

- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP



1. DISPLAY SETUP Menu for 2-Port VNAs at left. See button descriptions below.

2. DISPLAY SETUP Menu for 4-Port VNAs at right. See button descriptions below.

Figure 27-45. DISPLAY SETUP Menu

Edit Chan. Title

Edit Channel Title button. Select displays the EDIT CHANNEL TITLE dialog box to create a user-defined title for the active channel.

- [“EDIT CHANNEL TITLE Dialog Box” on page 27-97](#)

Chan. Title (Off/On)

Channel Title toggle button. Select toggles the channel title created by the EDIT CHANNEL TITLE dialog box OFF and ON. If ON, the user-defined channel title appears at the top of the channel display.

Responses Setup

This button is only available if the VNA is in 4-Port Mode.

If available, the button displays the RESPONSE SETUP menu where the user can perform a quick-set of the single-ended or mixed-mode response by choosing setting to:

- Single-ended
- 2 differential pairs
- 1 differential pair and 2 singletons
- 1 differential pair and 1 singleton

Select displays the RESPONSE SETUP – 4-Port VNAs menu.

- [“RESPONSES SETUP Menu – 4-Port VNAs” on page 27-93](#)

Mixer X-Axis

This menu item is disabled unless there is a mixer setup completed on the active channel. When it is enabled:

- Clicking on the Mixer X-Axis menu item displays the X-Axis Display menu.

[“X-AXIS DISPLAY Menu” on page 27-95](#)

X-Axis Labels

- Clicking on the “X-Axis Labels” toggle button will turn ON/ OFF the X-axis label display for the current active channel. See [Figure 27-46](#) for an example display.
- **X-Axis Labels and Frequency Blanking:** When System | Utility | Frequency Blanking option is turned ON, tall X-Axis labels on the display are turned off, and X-Axis and Labels Turn All X-Axis Labels On/Off menu selections are disabled and grayed out.

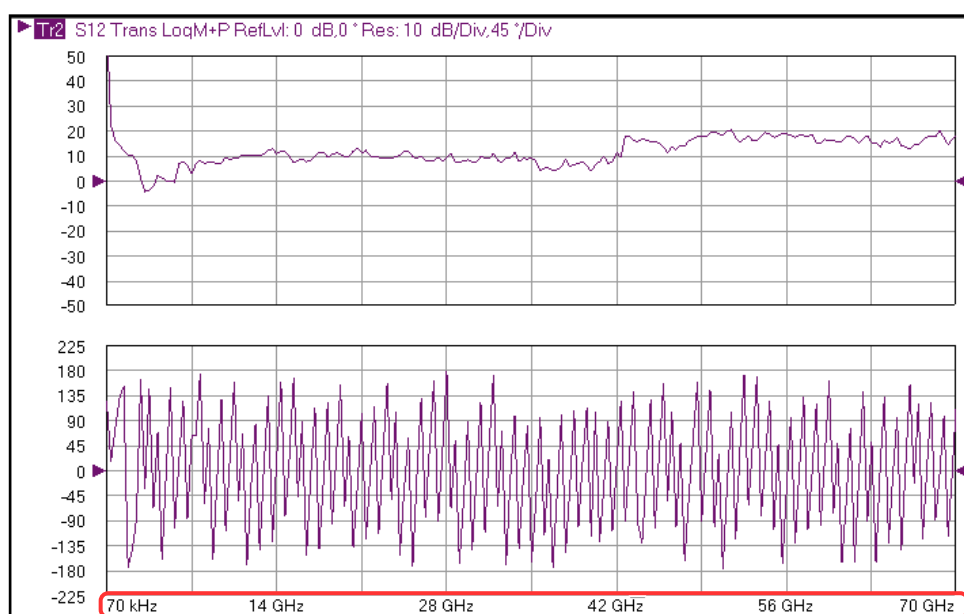


Figure 27-46. Trace Display with X-Axis Labels Turned On

X-Axis Time (CW Only)

Toggles the trace X-axis time labels ON or OFF. When the X-Axis Time (CW Only) button is ON and CW mode is set, the Bandwidth and Notch buttons are disabled in the ADVANCED SEARCH menu, and the X-axis will be in units of time. When data is saved in .txt, .csv, .tdf, or .tdu formats, time units will be shown instead of the CW frequency.

Turn All X-Axis Labels On/Off

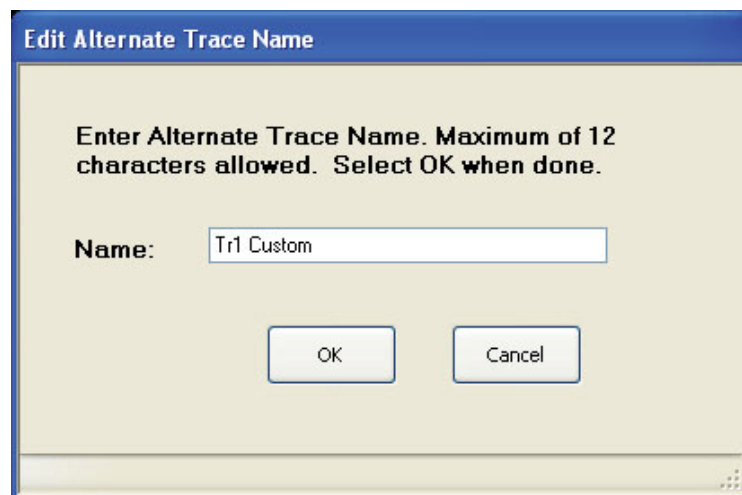
- Clicking on the Turn All X-Axis Labels On/Off menu item displays the X-Axis Labels menu.
 - [“X-AXIS LABELS Menu” on page 27-96](#)

All Chan. Freq Label

All Channel Frequency Label button. Select toggles the frequency labels for all channels OFF and ON. The frequency labels appear at the bottom of each channel display. When ON, the labels typically show starting and stopping frequencies and IFBW settings. When OFF, the frequency labels are removed.

Edit Alternate Trace Name

Select displays the EDIT ALTERNATE TRACE NAME dialog box (shown below) for the active trace.



If the default Tr# label is replaced, up to 12 alphanumeric characters can be input to identify the trace. If the Tr# label is kept, up to 9 characters can be added for Traces 1 to 9, and up to 8 characters added for Traces 10 to 16. Alternate trace names can be duplicated or unique as required. The user defined trace name replaces the instrument default trace number abbreviation. For example, with Alternative Trace Name = OFF, Trace 1 is default labeled as:

- Tr1 S11 Refl LogM RefLvl: 0 dB Res: 10 dB/Div

With Alternate Trace Name = ON, and a user-input Alternate Trace Name set as “DUT SN 12345”, the Trace 1 label becomes:

- DUT SN12345 S11 Refl LogM RefLvl: 0 dB Res: 10 dB/Div

Once setup, a user-defined alternate trace name configuration can be saved as a setup and then recalled as a preset using:

- MENU BAR | File | Save Setup | SAVE SETUP Dialog Box
- MAIN | File | FILE | Save Setup |SAVE SETUP Dialog Box

Alternate Trace Name (On/Off)

For the selected trace, toggles the alternate trace name ON and OFF.

Turn Off All Alt. Trace Names

For all traces on the active channel, turns off all alternate trace names and restores the default trace names.

Turn On All Alt. Trace Names

For all traces on the active channel, turns ON all alternate trace names.

RESPONSES SETUP Menu – 4-Port VNAs

Previous

- [“DISPLAY Menu” on page 27-3](#)

Prerequisites

- The RESPONSES SETUP menu is only available if the VNA is in 4-Port mode and allows selection between four different modes.

Alternate Mixed Mode Control

- The RESPONSES SETUP menu duplicates the functions available in the menu and dialog boxes below available in the RESPONSE 4-Port VNA menus:
 - [“Response Menus – 4-Port VNAs” on page 26-1](#)
 - [“MIXED MODE Setup Dialog Box – Two Diff. Pairs – 4-Port VNAs” on page 26-19](#)
 - [“MIXED MODE Setup Dialog Box – One Diff. Pair – One Singleton – 4-Port VNAs” on page 26-22](#)
 - [“MIXED MODE Setup Dialog Box – One Diff. Pair – Two Singletons – 4-Port VNAs” on page 26-24](#)

Navigation

- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Responses Setup | RESPONSES SETUP



Figure 27-47. RESPONSES SETUP Menu

Single-Ended

Select sets the response mode to single-ended mode where any S-Parameter can be selected in the RESPONSE menu group.

- S11, S12, S21, and S22 can be selected on the RESPONSE menu.
 - [“RESPONSE Menu – 4-Port VNAs” on page 26-7](#)
 - MAIN | Response | RESPONSE
- S13, S23, S32, S33, S14, S24, S34, S41, S42, S43, S44 can be selected on the SINGLE-MODE menu
 - [“SINGLE-MODE Menu – 4-Port VNAs” on page 26-10](#)
 - MAIN | Response | RESPONSE | More Single-Mode | SINGLE-MODE

2 Diff. Pair

Two Differential Pairs button. Select sets all traces on the 4-Port VNA to mixed-mode with two differential pairs. When the warning dialog appears, select **OK** to continue. This is the same mixed-mode as set by the MIXED-MODE dialog box.

- [“MIXED MODE Setup Dialog Box – Two Diff. Pairs – 4-Port VNAs” on page 26-19](#)
- MAIN | Response | RESPONSE | Mixed-Mode | MIXED-MODE Dialog Box – Two Differential Pairs

1 Pair, 2 Singletons

Select sets all traces on the 4-Port VNA to mixed-mode with one differential pair and two singletons. When the warning dialog appears, select **OK** to continue. This is the same mixed-mode as set by the MIXED-MODE dialog box.

- [“MIXED MODE Setup Dialog Box – One Diff. Pair – Two Singletons – 4-Port VNAs” on page 26-24](#)
- MAIN | Response | RESPONSE | Mixed-Mode | MIXED-MODE Dialog Box – One Differential Pair and Two Singletons

1 Pair, 1 Singleton

Select sets all traces on the 4-Port VNA to mixed-mode with one differential pair and one singleton. When the warning dialog appears, select **OK** to continue. This is the same mixed-mode as set by the MIXED-MODE dialog box.

- [“MIXED MODE Setup Dialog Box – One Diff. Pair – One Singleton – 4-Port VNAs” on page 26-22](#)
- MAIN | Response | RESPONSE | Mixed-Mode | MIXED-MODE Dialog Box – One Differential Pair and One Singleton

X-AXIS DISPLAY Menu

Previous

- [“DISPLAY SETUP Menu” on page 27-89](#)

Prerequisites

- A valid mixer setup must be complete (via the Main | Application menu) for X-Axis Display menu to be active. See [Chapter 17, “Mixer Setup”](#) for more information.

Navigation

MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | X-Axis Display | X-AXIS DISPLAY

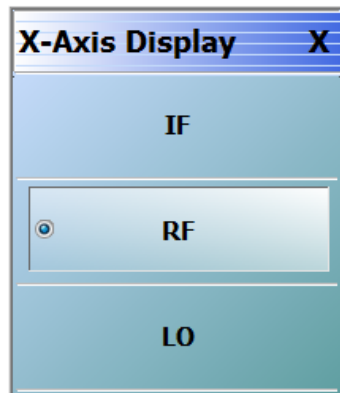


Figure 27-48. X-AXIS DISPLAY Menu

IF

- Select displays mixer IF on the display X-axis.

RF

- Select displays mixer RF on the display X-axis.

LO

- Select displays mixer LO on the display X-axis.

X-AXIS LABELS Menu

Previous

- “DISPLAY SETUP Menu” on page 27-89

Navigation

MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Turn All X-Axis Labels On/Off | X-AXIS LABELS



Figure 27-49. X-AXIS LABELS Menu

Turn Off All X-Axis Labels

- Select will hide the X-axis labels in all the channels.

Turn On All X-Axis Labels

- Select will show the X-axis labels in all the channels:

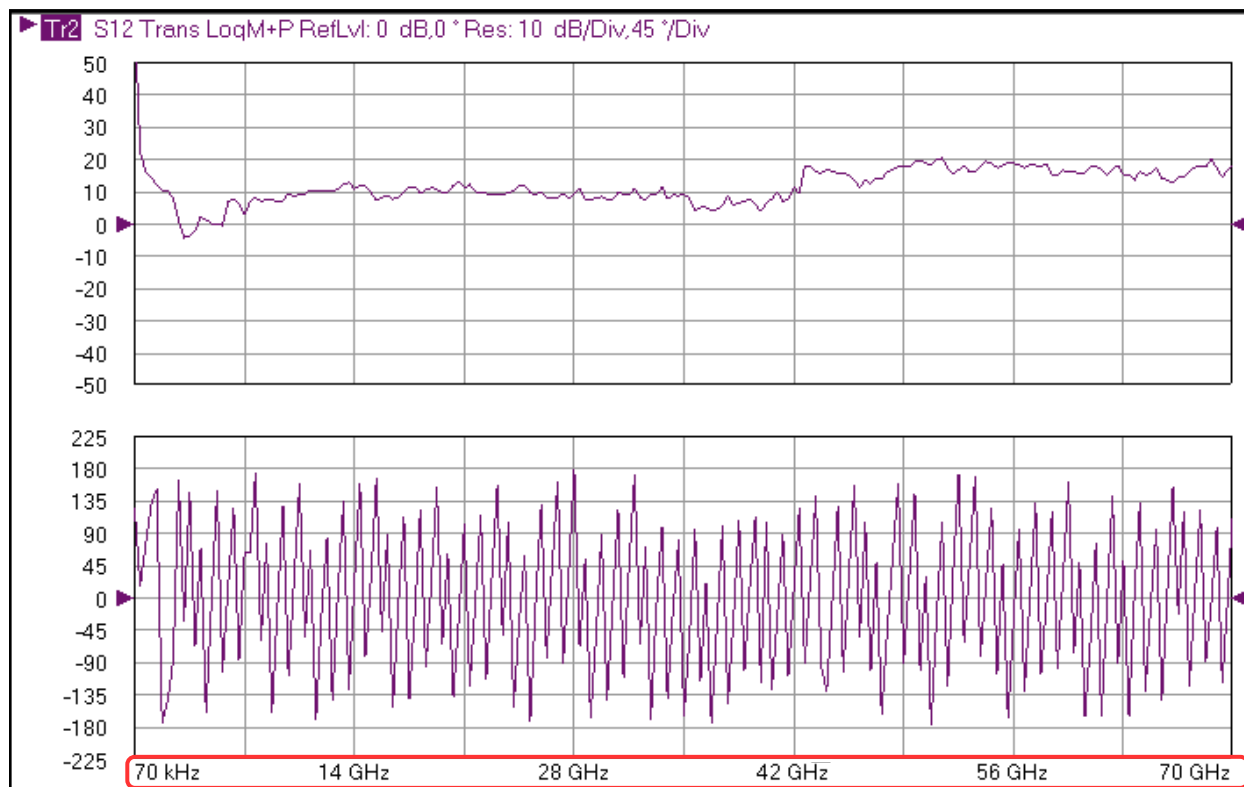


Figure 27-50. Trace Display with X-Axis Labels On

EDIT CHANNEL TITLE Dialog Box

Previous

- [“DISPLAY SETUP Menu” on page 27-89](#)

Navigation

- MAIN | Display | DISPLAY | Display Area Setup | DISPLAY SETUP | Edit Chan Title | EDIT CHANNEL TITLE Dialog Box

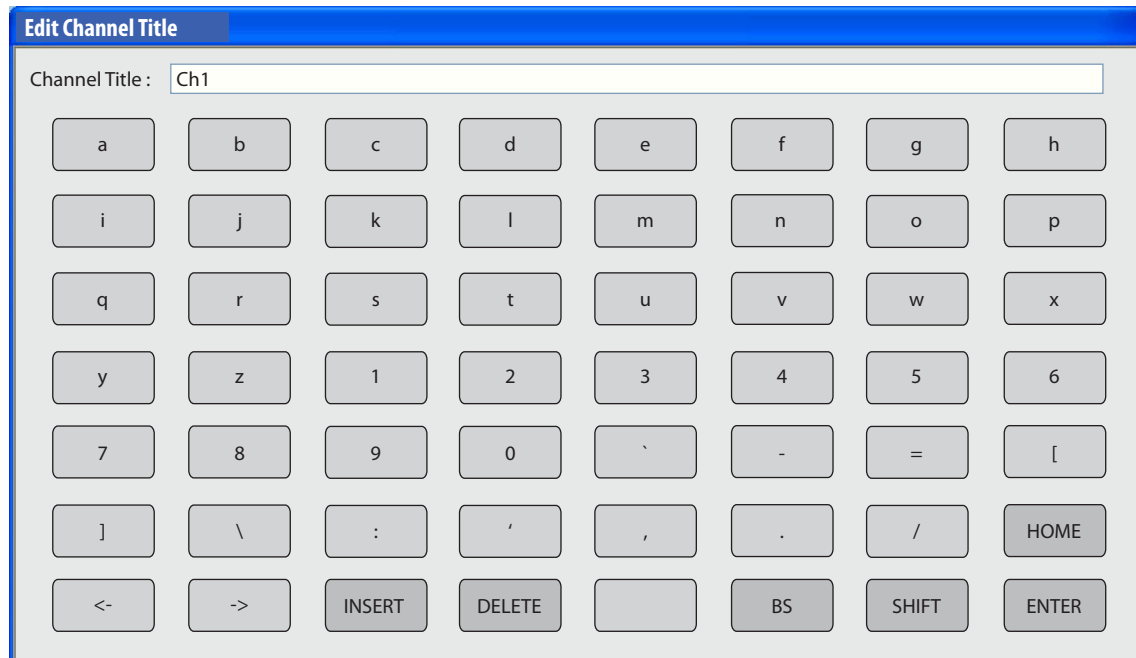


Figure 27-51. EDIT CHANNEL TITLE Dialog Box

Use an Input Device

To enter a channel title label, use any of the following devices:

- **Attached Keyboard:** Use an attached USB keyboard by typing directly into the Channel Table name field name.
- **Attached Mouse:** If a keyboard is not attached, use a mouse to click the required alphanumeric symbols.
- **QWERTY Keyboard:** The available characters are those from a full QWERTY keyboard.

Enter a Channel Title Label

Use the buttons on the EDIT CHANNEL TITLE dialog box to enter the required text string into the Channel Title field:

- **Uppercase Characters:** For UPPERCASE characters, click SHIFT. Click again to change to lowercase.
- **Cursor Up:** To move the cursor to the start of the Channel Title field, click HOME.
- **Cursor Left:** To move the cursor one character to the LEFT, click the ← arrow button.
- **Cursor Up:** To move the cursor one character to the RIGHT, click the → arrow button.
- **Delete to Left:** To delete characters to the LEFT of the cursor position, click the BS (Backspace) button.
- **Delete to Right:** To delete characters to the RIGHT of the cursor position, click DELETE.
- **Insert Character String:** To insert the character string into the Channel Title field, click INSERT.

Save the Channel Label: To save the Channel Table character string, and return to the DISPLAY SETUP menu, click ENTER.

Chapter 28 — Scale Menus

28-1 Chapter Overview

This chapter provides information about the button controls for the SCALE menu variants. SCALE menus provide trace display control of settings such as resolution, reference value, and the scale of units. The number of buttons on a SCALE menu depends on the settings on the TRACE FORMAT menu. The bottom five (5) buttons on the SCALE menu, always the same, apply settings to the active trace, channel, or all channels and also control of the number of display vertical divisions.

28-2 Scale Menu Appearance, Common Buttons, and Units

Appearance

The appearance of the SCALE menu label buttons, their units, and the menu area names change depending on the trace type selected in the TRACE FORMAT menu.

- [“TRACE FORMAT Menu” on page 27-6](#)
- MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT

Common SCALE Menu Buttons

In all SCALE menus, the bottom five (5) buttons on the SCALE menu are always the same and described at the end of this section. The five common buttons are:

- Auto Scale Active Trace
- Auto Scale Active Channel
- Auto Scale All Channels
- # of Vert. Divisions
- Apply # of Div. to All Channels

The description of these buttons is found at:

- [Section 28-13 “SCALE Menu Common Buttons” on page 28-41](#)

SCALE Menu Units

The table below summarizes the displayed fields and units available in the SCALE menu variants.

Table 28-1. SCALE Menu Parameter Buttons (1 of 2)

Scale Menu	Resolution Button and Field Toolbar	Reference Value Button and Field Toolbar	Reference Position Button and Field Toolbar	Scale Selection Button	Wrap Offset Button and Field Toolbar	Aperture Button and Field Toolbar	Auto Scale Active Trace Button	Auto Scale Active Channel Button	Auto Scale All Channel Button	# of Vert Div Button and Field Toolbar	Apply # of Div. to All Channels Buttons
Notes	<p>YES – The button or link to submenu APPEARS on the menu. NO – The button DOES NOT APPEAR on the menu # – A number without units is entered. NA – The button appears on the menu but is not available (is grayed out). Time Units – The available time units are s (seconds), ms (milliseconds), us (microseconds), ns (nanoseconds, and ps (picoseconds). Dual Entries – Table cells with dual entries are for SCALE menus that have separate controls for dual displays with upper and lower traces. For example, the SCALE menu for Log Mag and Phase, a dual display, has an upper menu area titled Log Mag with these buttons: Resolution (dB/Division), Reference Value (dB), and Reference Position (Number). The lower menu area is titled Phase with these buttons: Resolution (Deg/Division), Reference Value (dB), Reference Position (Number), and Wrap Offset (Deg)</p>										
Log Mag	dB/Div.	# dB	#	NO	NO	NO	YES	YES	YES	#	YES
Lin Mag	Units/Div.	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
Phase	Deg/Div.	# Deg	#	NO	Deg	NO	YES	YES	YES	#	YES
Real	Units/Div.	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
Imaginary	Units/Div.	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Inductance	Henrys/Div.	# Henrys	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Capacitance	Farads/Div	# Farads	#	NO	NO	NO	YES	YES	YES	#	YES
SWR	Units/Div.	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Real	Ohms/Div.	# Ohms	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Imaginary	Ohms/Div.	# Ohms	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Magnitude	Ohms/Div.	# Ohms	#	NO	NO	NO	YES	YES	YES	#	YES
Impedance: Real & Imaginary (dual display)	Ohms/Div.	# Ohms	#	NO	NO	NO	YES	YES	YES	#	YES
	Ohms/Div.	# Ohms	#	NO	NO	NO					
Smith Chart Impedance: Lin/Phase, Log Phase, Real/Imaginary, Impedance, L/C	NA	NA	NA	Yes to Sub-menu	Deg on Sub menu Also Wrap Setup button with link to Wrap Setup menu.	NO	YES	YES	YES	#	YES

Table 28-1. SCALE Menu Parameter Buttons (2 of 2)

Scale Menu	Resolution Button and Field Toolbar	Reference Value Button and Field Toolbar	Reference Position Button and Field Toolbar	Scale Selection Button	Wrap Offset Button and Field Toolbar	Aperture Button and Field Toolbar	Auto Scale Active Trace Button	Auto Scale Active Channel Button	Auto Scale All Channel Button	# of Vert Div Button and Field Toolbar	Apply # of Div. to All Channels Buttons
Notes	<p>YES – The button or link to submenu APPEARS on the menu. NO – The button DOES NOT APPEAR on the menu # – A number without units is entered. NA – The button appears on the menu but is not available (is grayed out). Time Units – The available time units are s (seconds), ms (milliseconds), us (microseconds), ns (nanoseconds, and ps (picoseconds). Dual Entries – Table cells with dual entries are for SCALE menus that have separate controls for dual displays with upper and lower traces. For example, the SCALE menu for Log Mag and Phase, a dual display, has an upper menu area titled Log Mag with these buttons: Resolution (dB/Division), Reference Value (dB), and Reference Position (Number). The lower menu area is titled Phase with these buttons: Resolution (Deg/Division), Reference Value (dB), Reference Position (Number), and Wrap Offset (Deg)</p>										
Smith Chart Admittance: Lin/Phase, Log/Phase, Real/ Imaginary, Admittance, LC	NA	NA	NA	Yes to Sub-menu	Deg on Sub menu Also Wrap Setup button with link to Wrap Setup	NO	YES	YES	YES	#	YES
Linear Polar: Lin/Phase, Real/Imag	Units/Div.	# Units	NA	NO	Deg	NO	YES	YES	YES	#	YES
Log Polar: Log/Phase and Real/Imag	Units/Div.	# Units	NA	NO	Deg	NO	YES	YES	YES	#	YES
Log Mag and Phase (dual display)	dB/Div.	# dB	#	NO	NO	NO	YES	YES	YES	#	YES
	Deg/Div.	# Deg	#		# Deg						
Linear Mag and Phase (dual display)	dB/Div.	# dB	#	NO	NO	NO	YES	YES	YES	#	YES
	Deg/Div.	# Deg	#		# Deg						
Real and Imaginary (dual display)	Units/Div.	# Units	#	NO	NO	NO	YES	YES	YES	#	YES
	Units/Div.	# Units	#								
Group Delay	Time/Div.	Time Units	#	NO	NO	% of Sweep	YES	YES	YES	#	YES
Power Out	dB/Div.	# dBm	#	NO	NO	NO	YES	YES	YES	#	YES
Power In	dB/Div.	# dBm	#	NO	NO	NO	YES	YES	YES	#	YES

28-3 Overview of SCALE Menu Variants

All SCALE menu variants are shown in the sections and links below:

- [“SCALE Magnitude Menus” on page 28-5](#)
 - [“SCALE Log Magnitude Menu” on page 28-5](#)
 - [“SCALE Linear Magnitude Menu” on page 28-6](#)
 - [“SCALE Impedance Magnitude Menu” on page 28-7](#)
- [“SCALE Phase Menu” on page 28-8](#)
- [“SCALE Real or Imaginary Menus” on page 28-10](#)
 - [“SCALE Real Magnitude Menu” on page 28-10](#)
 - [“SCALE Imaginary Menu” on page 28-11](#)
 - [“SCALE Impedance Real Menu” on page 28-12](#)
 - [“SCALE Impedance Imaginary Menu” on page 28-13](#)
- [“SCALE Inductance Menu” on page 28-14](#)
- [“SCALE Capacitance Menu” on page 28-15](#)
- [“SCALE SWR Menu” on page 28-16](#)
 - [“SCALE Standing Wave Ratio Menu” on page 28-16](#)
- [“SCALE Smith Chart Menus” on page 28-17](#)
 - [“SCALE Smith Chart Impedance Menu” on page 28-17](#)
 - [“SCALE Smith Chart Admittance Menu” on page 28-26](#)
- [“SCALE Polar Chart Menus” on page 28-28](#)
 - [“SCALE Linear Polar Chart Menu” on page 28-28](#)
 - [“SCALE Log Polar Chart Menu” on page 28-29](#)
- [“SCALE Dual-Trace Display Menus” on page 28-30](#)
 - [“SCALE Impedance Real and Imaginary Menu” on page 28-30](#)
 - [“SCALE Log Magnitude and Phase Menu” on page 28-32](#)
 - [“SCALE Linear Magnitude and Phase Menu” on page 28-34](#)
 - [“SCALE Real and Imaginary Menu” on page 28-36](#)
- [“SCALE Group Delay Menu” on page 28-38](#)
- [“SCALE Power Menus” on page 28-39](#)
 - [“SCALE Power Out Menu” on page 28-39](#)
 - [“SCALE Power In Menu” on page 28-40](#)
- [“SCALE Menu Common Buttons” on page 28-41](#)

28-4 SCALE Magnitude Menus

SCALE Log Magnitude Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale

X

Log Mag

Resolution

10 dB/Div

Reference Value

0 dB

Reference Position

5

Auto Scale

Active Trace

Auto Scale

Active Channel

Auto Scale

All Channels

of Vert. Divisions

10

Apply # of Div.

to All Channels

SCALE (Log Magnitude) Menu

This menu is available when TRACE FORMAT is set to Log Magnitude. Button units are set to:

- Button Units: dB

Resolution (dB/Div)

Select displays the Resolution (dB) toolbar with units in dB per division.

Resolution (dB/Div) Field Toolbar

Resolution : 10.0000 dB ^ v dB X

Reference Value (dB)

Select displays the Reference Value (dB) toolbar.

Reference Value (dB) Field Toolbar

Reference Value : 10.0000 dB ^ v dB X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-1. SCALE Log Magnitude Menu

MS4640B Series VNA UIRM

PN: 10410-00319 Rev: AE

28-5

SCALE Linear Magnitude Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---Lin Mag---

Resolution

10 U/Div

Reference Value

0 U

Reference Position

5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Linear Magnitude) Menu

This menu is available when TRACE FORMAT is set to Linear Magnitude. Button units are set to:

- Button Units: U (Units)

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Div) Field Toolbar

Resolution : 1.000 U ^ v nU uU mU U X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar

Reference Value : 5.000 U ^ v nU uU mU U

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-2. SCALE Linear Magnitude Menu

28-6

PN: 10410-00319 Rev: AE

MS4640B Series VNA UIRM

SCALE Impedance Magnitude Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---Impedance Mag---

Resolution

10 Ω/Div

Reference Value

0 Ω

Reference Position

5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Impedance Magnitude) Menu

This menu is available when TRACE FORMAT is set to Impedance - Magnitude. Button units are set to:

- Button Units: Ω (Ohms)

Resolution (Ohms/Div)

Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.

Resolution (Ohms/Div) Field Toolbar

Resolution : 10.000 Ω ^ v Ω X

Reference Value (Ohms)

Select displays the Reference Value (Ohms) toolbar with units in Ohms.

Reference Value (Ohms) Field Toolbar

Reference Value : 10.000 Ω ^ v Ω X

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41.](#)

Figure 28-3. SCALE Impedance Magnitude Menu

28-5 SCALE Phase Menu

SCALE Phase Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale

X

Phase

Resolution

45 °/Div

Reference Value

0 °

Reference Position

5

Wrap Setup

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Phase) Menu

This menu is available when TRACE FORMAT is set to Phase. Button units are set to:

- Button Units: ° (Degrees)

Resolution (Degs/Div)

Select displays the Resolution (Degrees/Division) toolbar with units in degrees per division.

Resolution (Degs/Div) Field Toolbar

Resolution : 45.00 ° ^ v ° X

Reference Value (Degrees)

Select displays the Reference Value (Degrees) toolbar.

Reference Value (Degree) Field Toolbar

Reference Position : 5 ^ v Enter X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Wrap Setup (Degrees)

Select opens the Wrap Setup menu and allows the user to toggle wrapping On and Off, and define the phase offset in degrees which, when selected, displays the Wrap Offset field toolbar. See the [“WRAP Setup Menu” on page 28-9](#).

Wrap Offset (Degrees) Field Toolbar

Wrap Offset : 5.00 ° ^ v ° X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-4. SCALE Phase Menu

28-8

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MS4640B Series VNA UIRM

WRAP Setup Menu

Previous

- [“SCALE Phase Menu” on page 28-8](#)
- [“SCALE Log Magnitude and Phase Menu” on page 28-32](#)
- [“SCALE Linear Magnitude and Phase Menu” on page 28-34](#)

Prerequisites

- The WRAP SETUP submenu is linked to the:
 - SCALE Phase Menu
 - SCALE Log Magnitude and Phase Menu
 - SCALE Linear Magnitude and Phase Menu
- The Wrap Setup menu is only available if the Trace Format in the DISPLAY menu is set to one of these parameters.
 - [Chapter 27, “Display Menus”](#)

Navigation

- MAIN | Scale | SCALE Phase | Wrap Setup | WRAP SETUP
- MAIN | Scale | SCALE Log Magnitude and Phase | Wrap Setup | WRAP SETUP
- MAIN | Scale | SCALE Linear Magnitude and Phase | Wrap Setup | WRAP SETUP

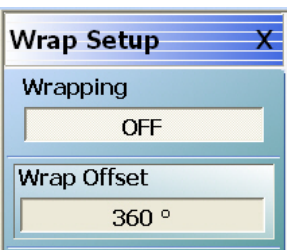
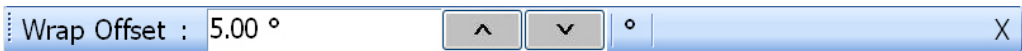
	<p>Wrapping (On/Off) Select toggles phase wrapping on and off, with the current state displayed in the button field.</p> <p>Wrap Offset (Degrees) Select displays the Wrap Offset field toolbar where the user can define the phase offset in degrees from 0 degrees to 360 degrees.</p> <p>Wrap Offset (Degrees) Field Toolbar</p> 
--	---

Figure 28-5. Wrap Setup Menu

28-6 SCALE Real or Imaginary Menus

SCALE Real Magnitude Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale

Real

Resolution

1 U/Div

Reference Value

0 U

Reference Position

5

Auto Scale

Active Trace

Auto Scale

Active Channel

Auto Scale

All Channels

of Vert. Divisions

10

Apply # of Div.

to All Channels

SCALE (Real) Menu

This menu is available when TRACE FORMAT is set to Real. Button units are set to:

- Button Units: U (Units)

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Div) Field Toolbar

Resolution : 1.000 U

^

v

nU

uU

mU

U

X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar

Reference Value : 5.000 U

^

v

nU

uU

mU

U

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5

^

v

Enter

X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-6. SCALE Real Menu

28-10

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MS4640B Series VNA UIRM

SCALE Imaginary Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale

-----Imaginary-----

Resolution

1 U/Div

Reference Value

0 U

Reference Position

5

Auto Scale
Active Trace

Auto Scale
Active Channel

Auto Scale
All Channels

of Vert. Divisions

10

Apply # of Div.
to All Channels

SCALE (Imaginary) Menu

This menu is available when TRACE FORMAT is set to Imaginary. Button units are set to:

- Button Units: U (Units)

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Division) Field Toolbar

Resolution : 1.000 U ^ v nU uU mU U X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar

Reference Value : 5.000 U ^ v nU uU mU U

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-7. SCALE Imaginary Menu

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28-11

SCALE Impedance Real Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

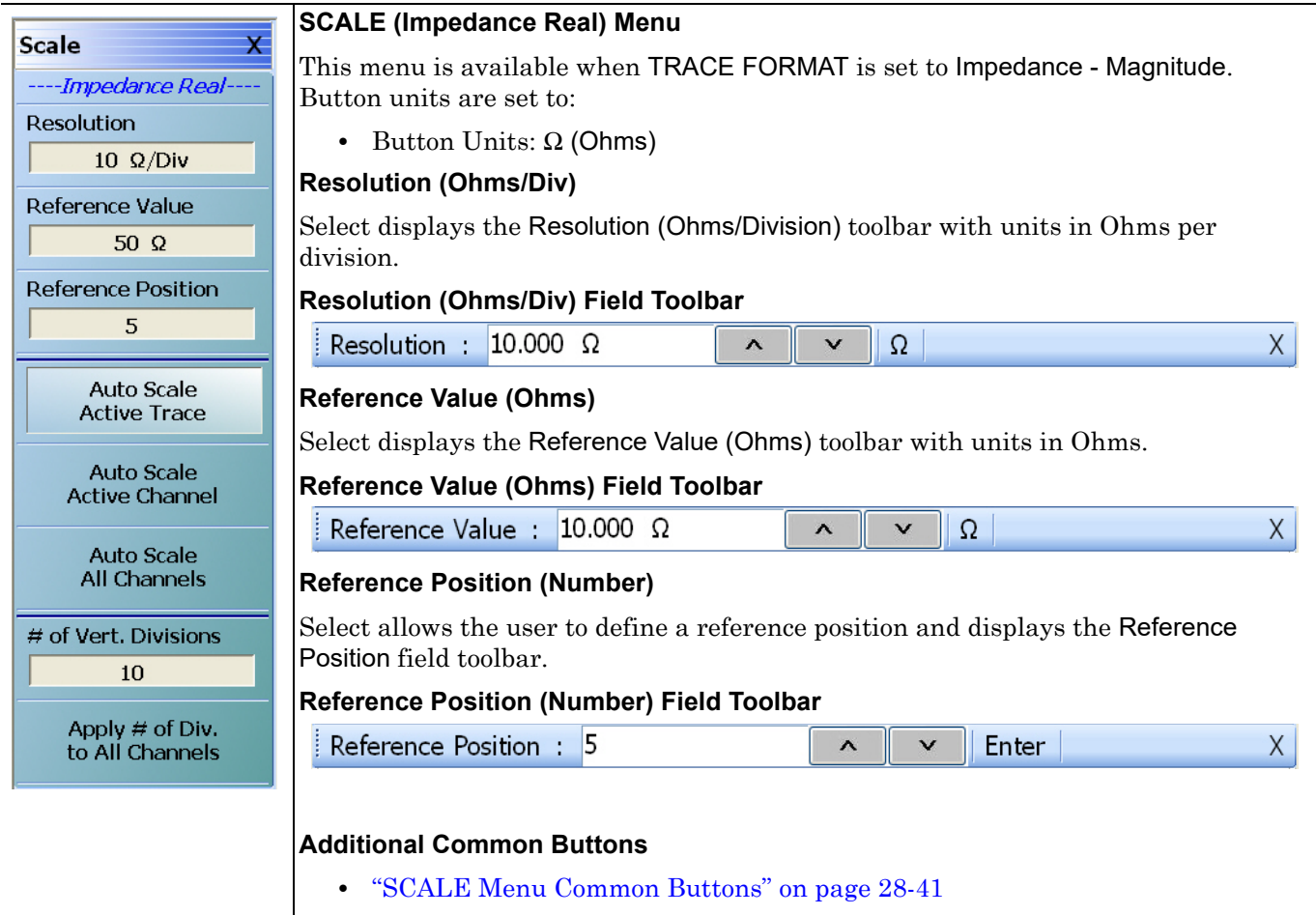


Figure 28-8. SCALE Impedance Real Menu

SCALE Impedance Imaginary Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale X

----Impedance Imag----

Resolution

10 Ω/Div

Reference Value

0 Ω

Reference Position

5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Impedance Imaginary) Menu

This menu is available when TRACE FORMAT is set to Impedance - Imaginary. Button units are set to:

- Button Units: Ω (Ohms)

Resolution (Ohms/Div)

Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.

Resolution (Ohms/Div) Field Toolbar

Resolution : 10.000 Ω ^ v Ω X

Reference Value (Ohms)

Select displays the Reference Value (Ohms) toolbar with units in Ohms.

Reference Value (Ohms) Field Toolbar

Reference Value : 10.000 Ω ^ v Ω X

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-9. SCALE Impedance Imaginary Menu

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28-13

SCALE Inductance Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---Inductance---

Resolution1 nH/Div

Reference Value0 nH

Reference Position5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions10

Apply # of Div. to All Channels

SCALE (Inductance) Menu

This menu is available when TRACE FORMAT is set to Impedance - Inductance. Button units are set to:

- Button Units: H (Henrys)

Resolution (H/Div)

Select displays the Resolution (H/Division) toolbar with units in Henrys per division.

Resolution (H/Div) Field Toolbar

Resolution : 1.000 nH ^ v fH pH nH uH mH H

Reference Value (H)

Select displays the Reference Value (H) toolbar with units in Henrys.

Reference Value (H) Field Toolbar

Reference Value : 0.000 nH ^ v fH pH nH uH mH H

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

The selected trace display is redrawn according to the scale settings entered. The trace annotation changes accordingly.

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-10. SCALE Inductance Menu

28-14

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MS4640B Series VNA UIRM

SCALE Capacitance Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- “MAIN Menu” on page 2-2

Navigation

- MAIN | Scale | SCALE

SCALE (Capacitance) Menu

This menu is available when TRACE FORMAT is set to Impedance - Capacitance. Button units are set to:

- Button Units: F (Farads)

Resolution (F/Div)

Select displays the Resolution (Farads/Division) toolbar with units in Farads per division.

Resolution (F/Div) Field Toolbar

Reference Value (F)

Select displays the Reference Value (Farads) toolbar with units in Farads.

Reference Value (F) Field Toolbar

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

The selected trace display is redrawn according to the scale settings entered. The trace annotation changes accordingly.

Additional Common Buttons

- “SCALE Menu Common Buttons” on page 28-41

Figure 28-11. SCALE Capacitance Menu

28-7 SCALE SWR Menu

SCALE Standing Wave Ratio Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---SWR---

Resolution

10 U/Div

Reference Value

0 U

Reference Position

5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Standing Wave Ratio SWR) Menu

This menu is available when TRACE FORMAT is set to SWR. Button units are set to:

- Button Units: U (Units)

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Division) Field Toolbar

Resolution : 1.000 U ^ v nU uU mU U X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Unit) Field Toolbar

Reference Value : 5.000 U ^ v nU uU mU U

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-12. SCALE SWR (Standing Wave Ratio) Menu

28-16

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MS4640B Series VNA UIRM

28-8 SCALE Smith Chart Menus

The SCALE menu for Smith Charts contain two unique buttons to control the display scale (Scale Selection) and control of the phase wrapping (Wrap Setup). Both are described in the sections below.

SCALE Smith Chart Impedance Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2](#) for SCALE menu identification and prerequisites.

Previous

- “MAIN Menu” on page 2-2

Prerequisites

- The TRACE FORMAT is set to Smith (R+jX Impedance).
 - [Chapter 27, “Display Menus”](#)
 - MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (R+jX)
- The SMITH readout style is set to Linear/Phase, Log/Phase, Real/Imaginary, Impedance, or L/C.
 - “SMITH (IMPEDANCE) Menu” on page 27-10
 - MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (R+jX) | SMITH Readout Style

Navigation

- MAIN | Scale | SCALE

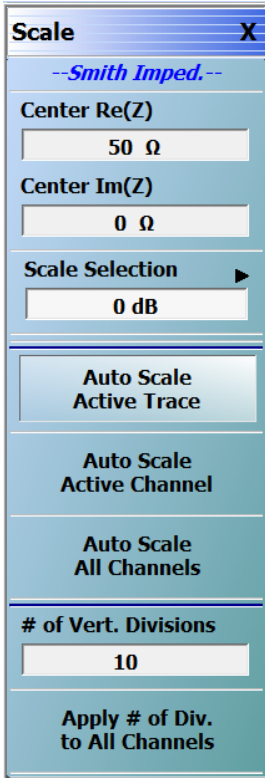
	<h4>SCALE (Smith Impedance) Menu</h4> <p>This menu is available when TRACE FORMAT is set to:</p> <ul style="list-style-type: none"> Smith (R+jX Impedance) and either Linear/Phase, Log/Phase, Real/Imaginary, Impedance, or L/C is selected. <h4>Center Re(Z)</h4> <p>This sets the Real (ReZ) part for the center of the Smith Chart display. The field changes depending on the state of the Smith chart readout (log mag/phase, lin/phase, impedance, L/C).</p> <h4>Center Im(Z)</h4> <p>This sets the Imaginary (ImZ) part for the center of the Smith Chart display. The field changes depending on the state of the Smith chart readout (log mag/phase, lin/phase, impedance, L/C).</p> <h4>Scale Selection</h4> <p>The button displays the Smith Chart scale in dB. Select displays the SMITH SCALING menu.</p> <ul style="list-style-type: none"> “SMITH SCALING Impedance Menu” on page 28-18 <h4>Wrap Setup</h4> <p>Select displays the WRAP SETUP menu which allows the user to define if wrapping of on or off, and if on, the wrap offset in degrees.</p> <h4>Additional Common Buttons</h4> <ul style="list-style-type: none"> “SCALE Menu Common Buttons” on page 28-41
--	---

Figure 28-13. SCALE Smith Impedance Menu

SMITH SCALING Impedance Menu

SMITH SCALING Admittance Menu

The SMITH SCALING Impedance and SMITH SCALING Admittance menus provide discrete Smith Chart scaling options from the default 0 dB display. Both the impedance and admittance menus provide the same functions. The user can zoom to areas of interest by expanding or compressing the display at the display at selectable levels as shown in [Figure 28-14](#)

Previous

- [“TRACE FORMAT Menu” on page 27-6](#)

Prerequisites

- The TRACE FORMAT is set to Smith (R+jX Impedance).
 - [Chapter 27, “Display Menus”](#)
 - MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (R+jX)
- The SMITH readout style is set to Linear/Phase, Log/Phase, Real/Imaginary, Impedance, or L/C.
 - [“SMITH \(IMPEDANCE\) Menu” on page 27-10](#)
 - MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (R+jX) | SMITH Readout Style

Navigation

- MAIN | Scale | SCALE Smith Impedance | SCALE SMITH IMPED. | SMITH SCALING IMPEDANCE

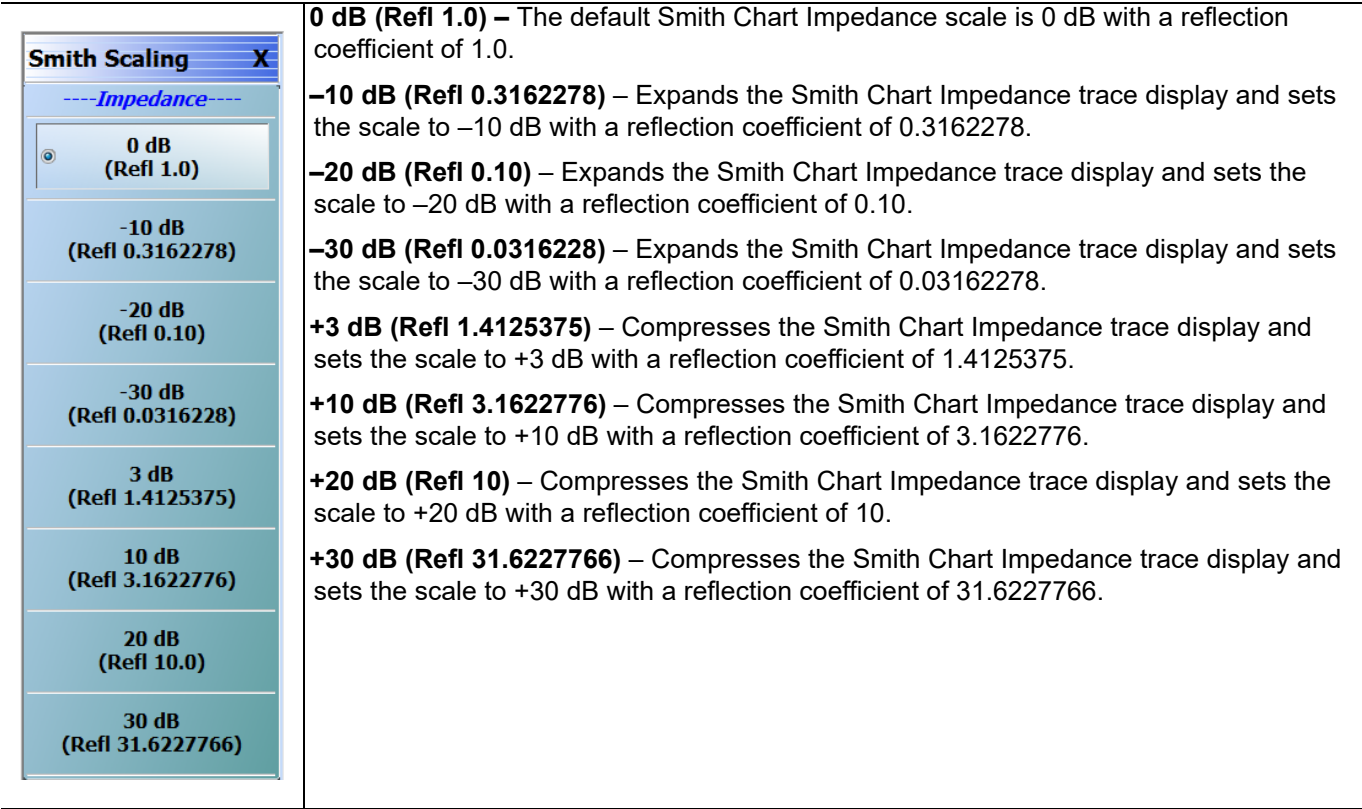


Figure 28-14. SCALE Smith Impedance Menu

Button Selection Group

- The five buttons of the SMITH SCALING IMPEDANCE menu form a button selection group where the selection of any one button de-selects the other four buttons.

Smith Chart Scaling Operations

A typical Smith Chart display is shown below at the default 0 dB setting.

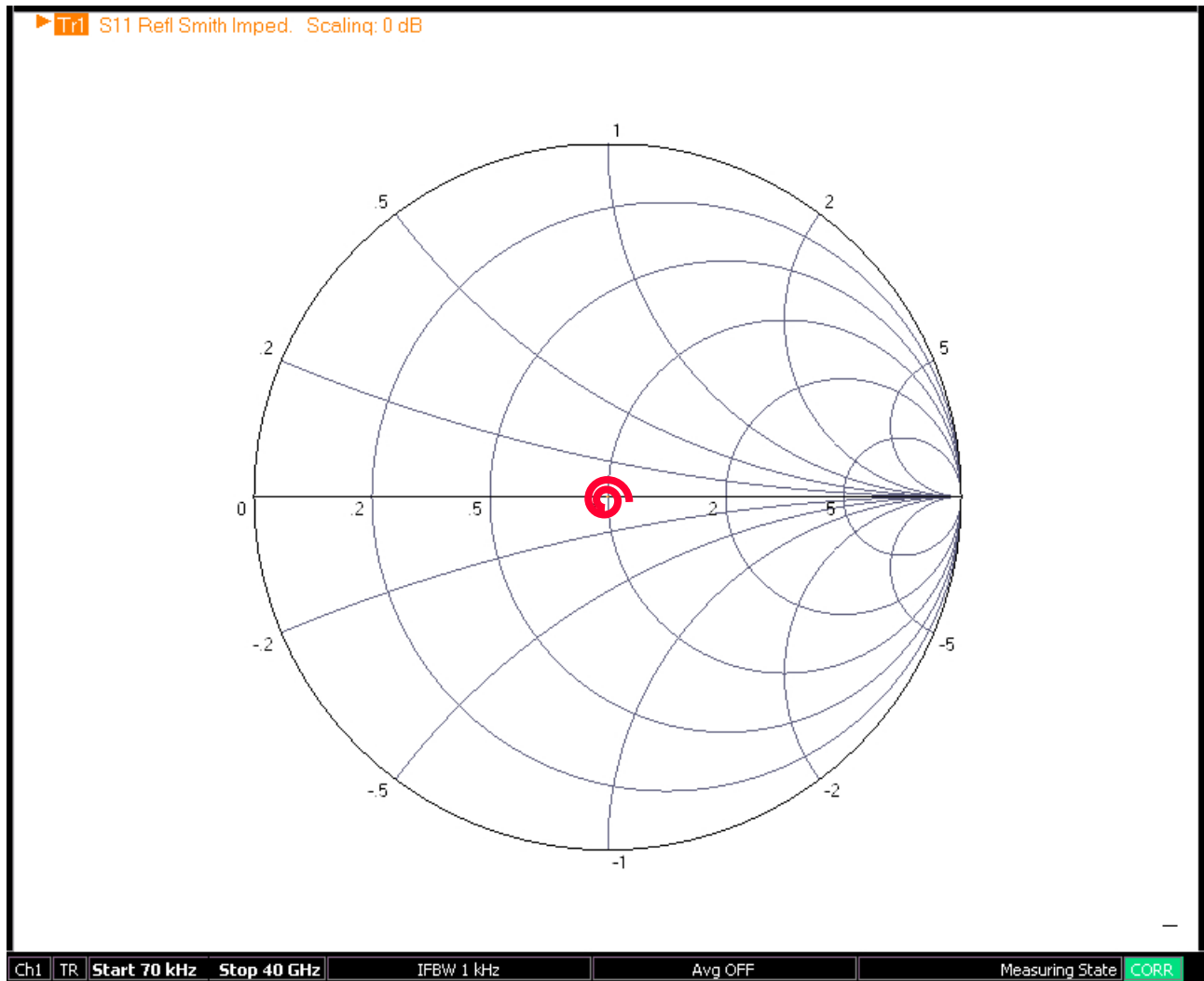


Figure 28-15. Smith Chart Impedance Display – Typical Results at 0 dB

Expanded Smith Chart Displays

The user can zoom the display in by expanding the Smith Chart as shown in the figures below:

- –10 dB in [Figure 28-16, “Smith Chart Impedance Display – Expanded to -10 dB”](#) on page 28-20
- –20 dB in [Figure 28-17, “Smith Chart Impedance Display – Expanded to -20 dB”](#) on page 28-21
- –30 dB in [Figure 28-18, “Smith Chart Impedance Display – Expanded to -30 dB”](#) on page 28-22

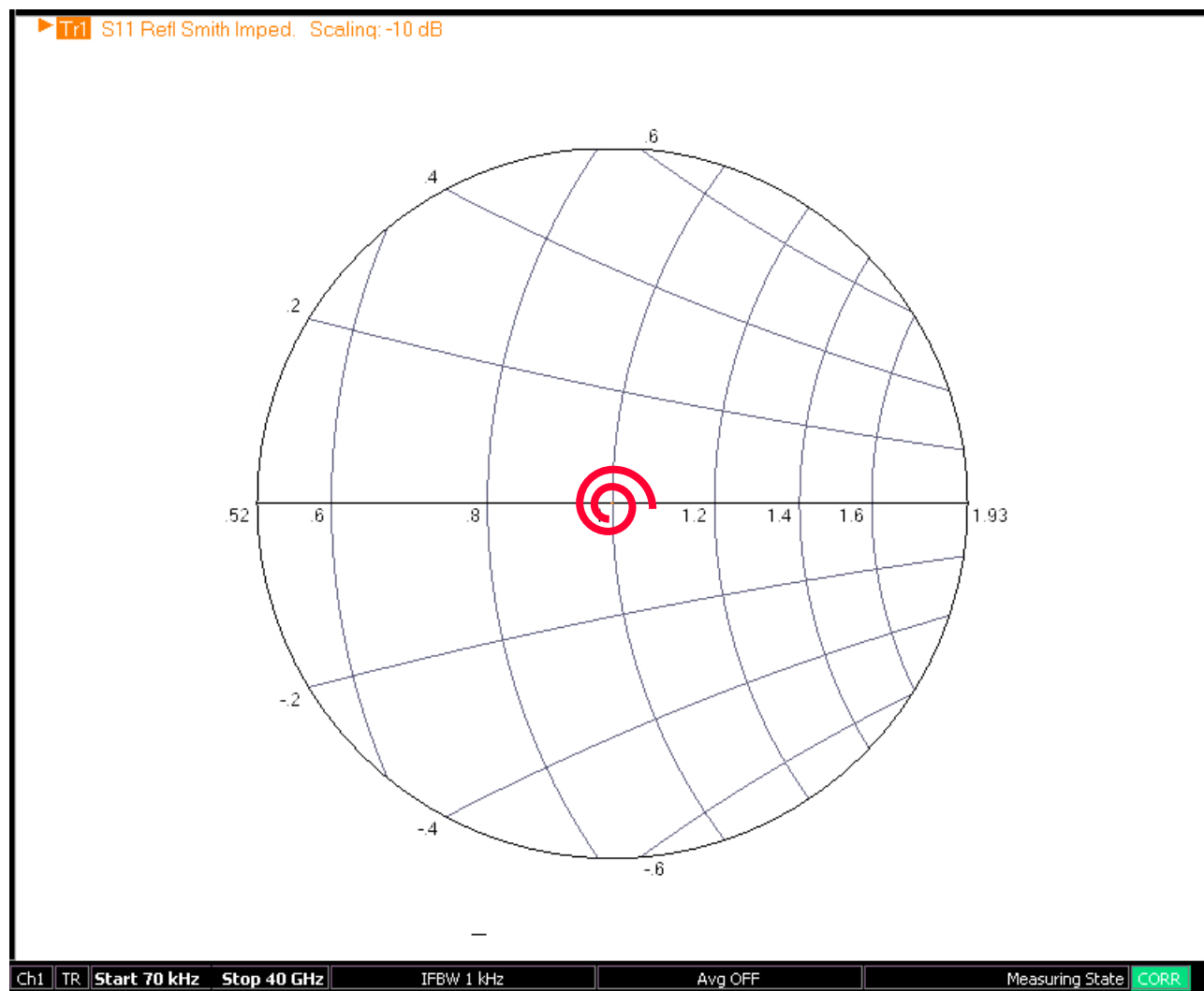


Figure 28-16. Smith Chart Impedance Display – Expanded to -10 dB

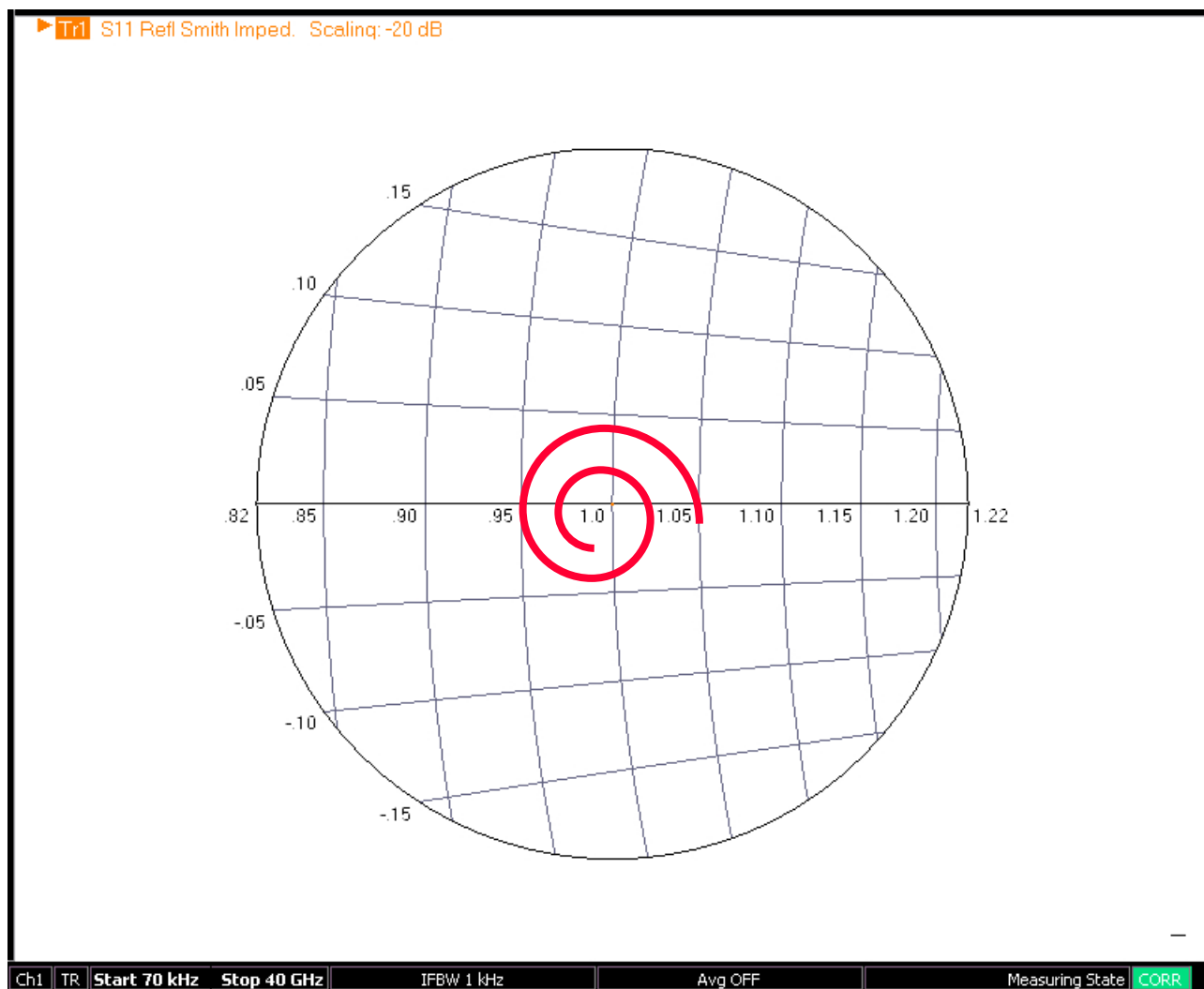


Figure 28-17. Smith Chart Impedance Display – Expanded to -20 dB

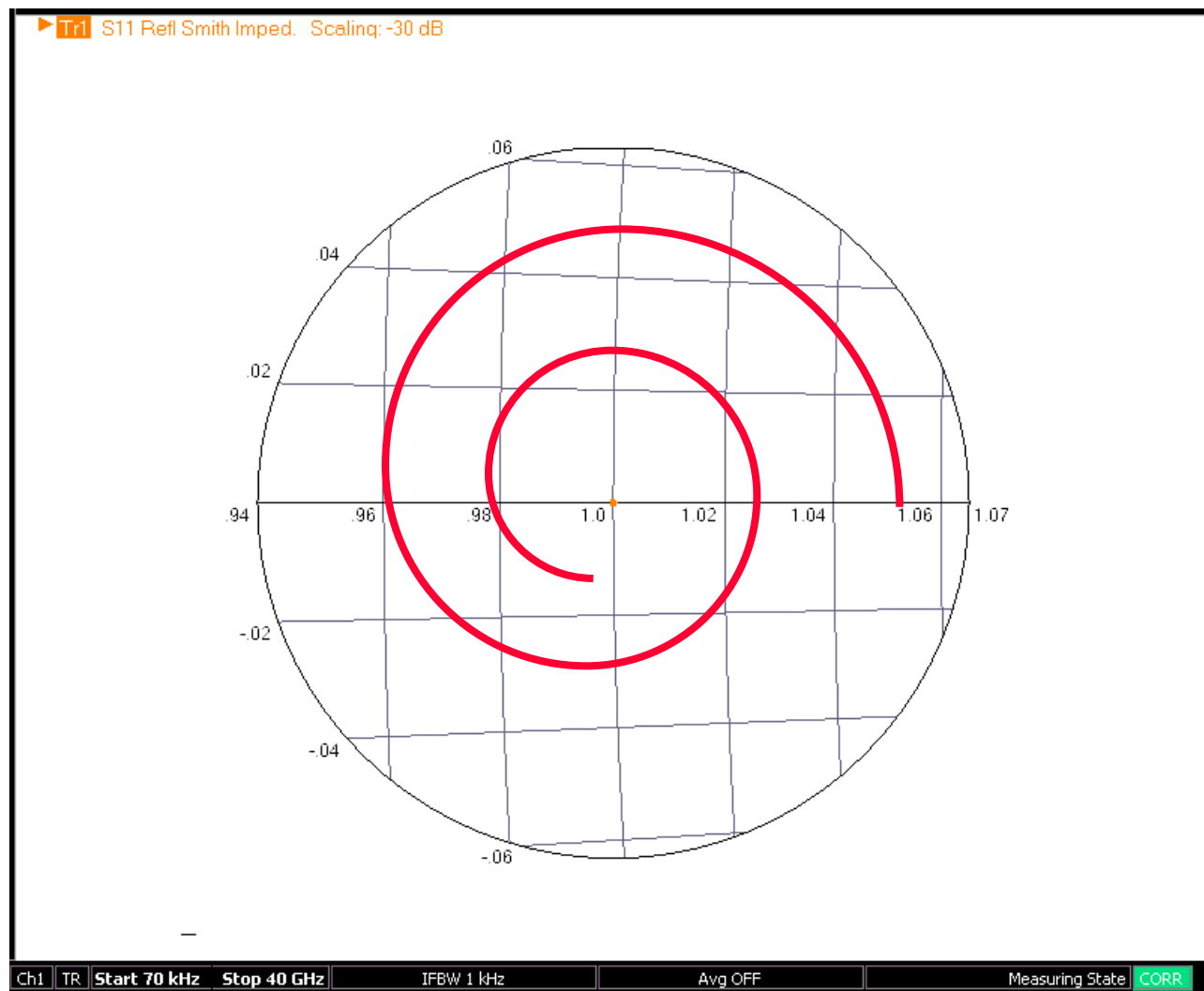


Figure 28-18. Smith Chart Impedance Display – Expanded to -30 dB

Compressed Smith Chart Displays

The user can zoom the display out by compressing the Smith Chart as shown in the figures below:

- 3 dB in [Figure 28-19, “Compressed Smith Chart Example: 3 dB” on page 28-23](#)
- 10 dB in [Figure 28-20, “Compressed Smith Chart Example: 10 dB” on page 28-24](#)
- 20 dB in [Figure 28-21, “Compressed Smith Chart Example: 20 dB” on page 28-24](#)
- 30 dB in [Figure 28-22, “Compressed Smith Chart Example: 30 dB” on page 28-25](#)

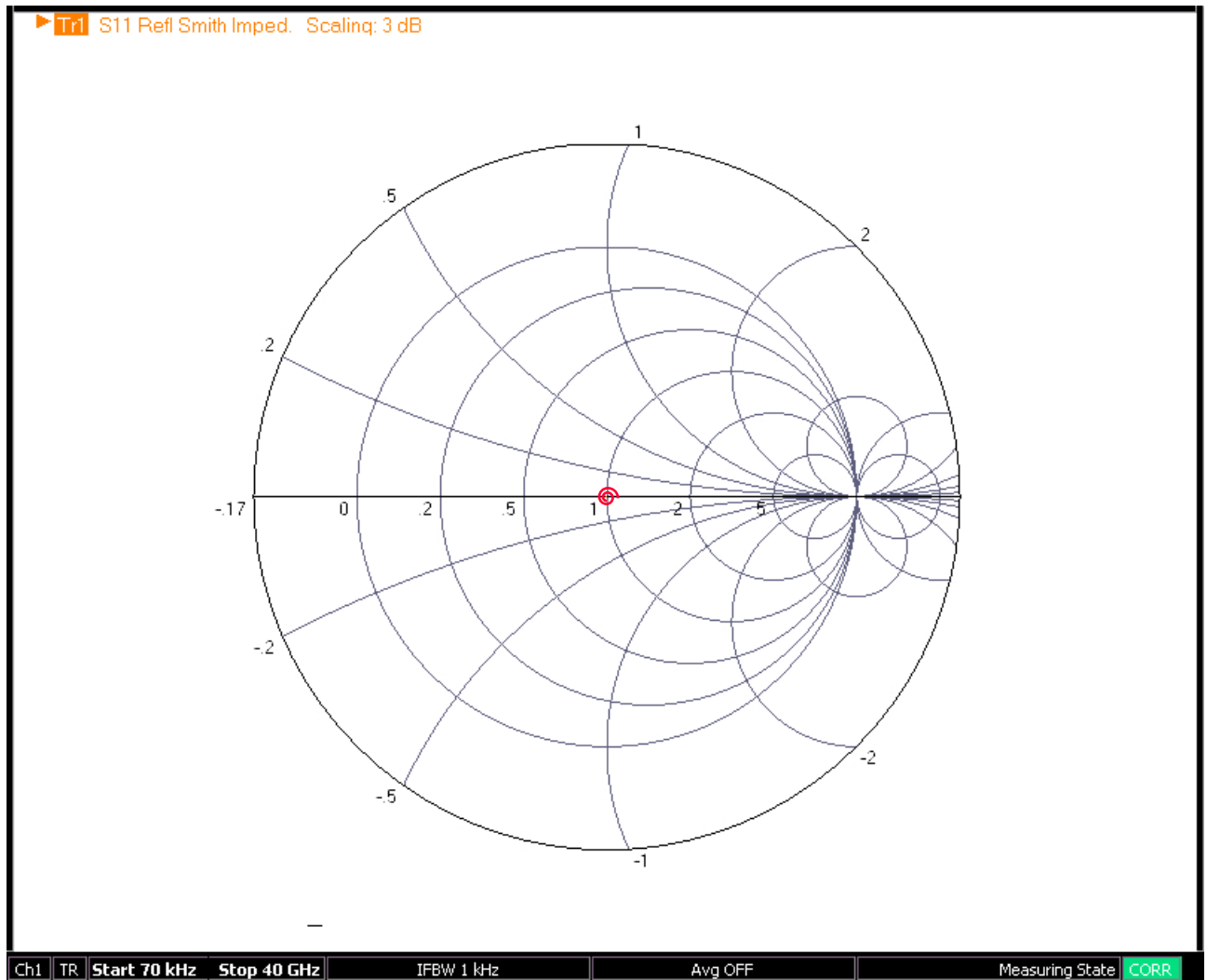


Figure 28-19. Compressed Smith Chart Example: 3 dB

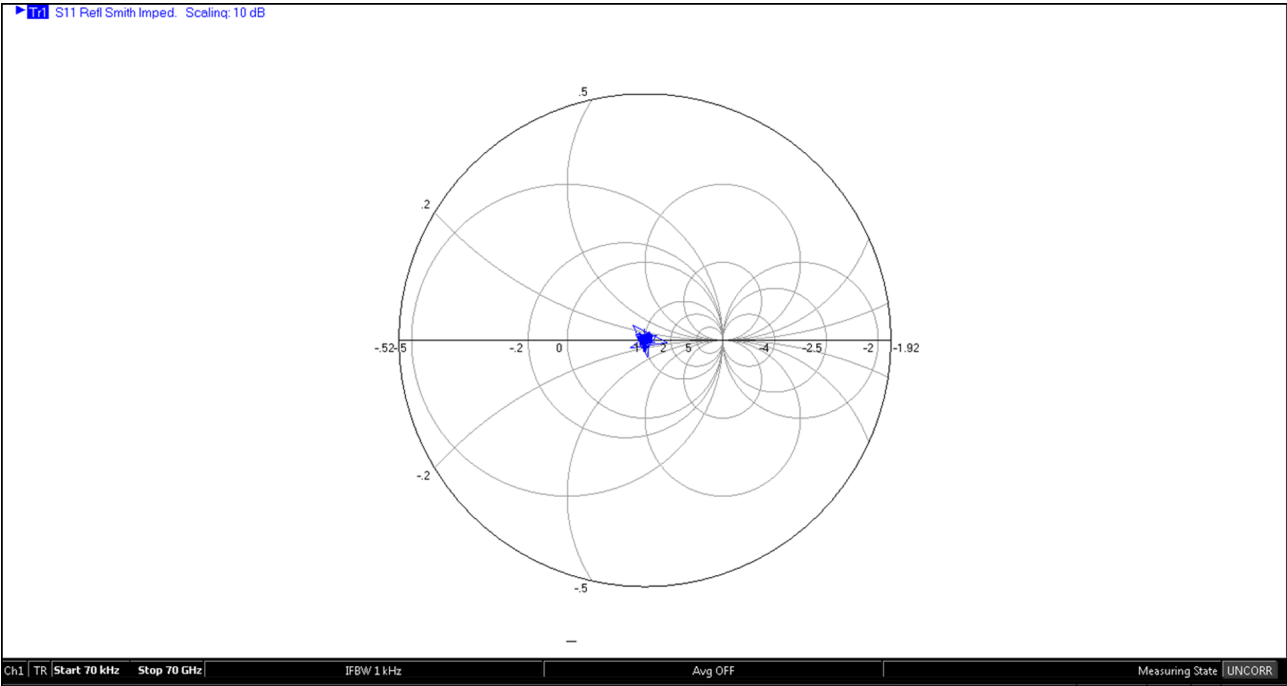


Figure 28-20. Compressed Smith Chart Example: 10 dB

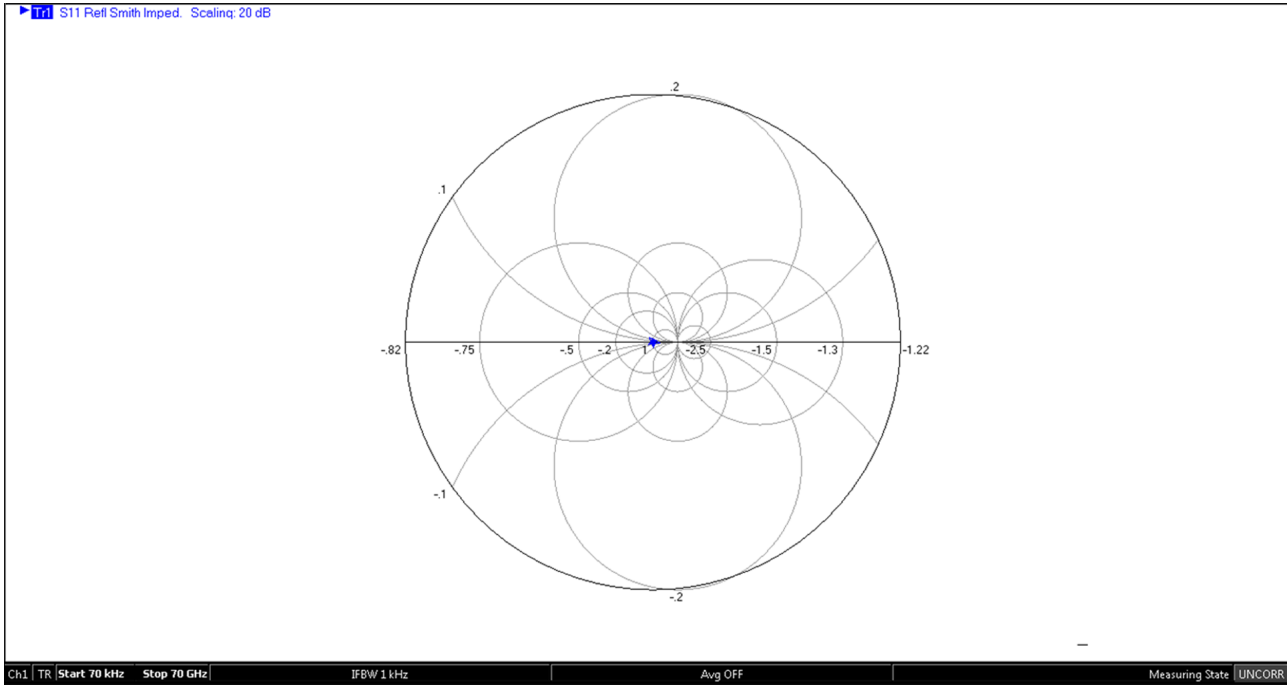


Figure 28-21. Compressed Smith Chart Example: 20 dB

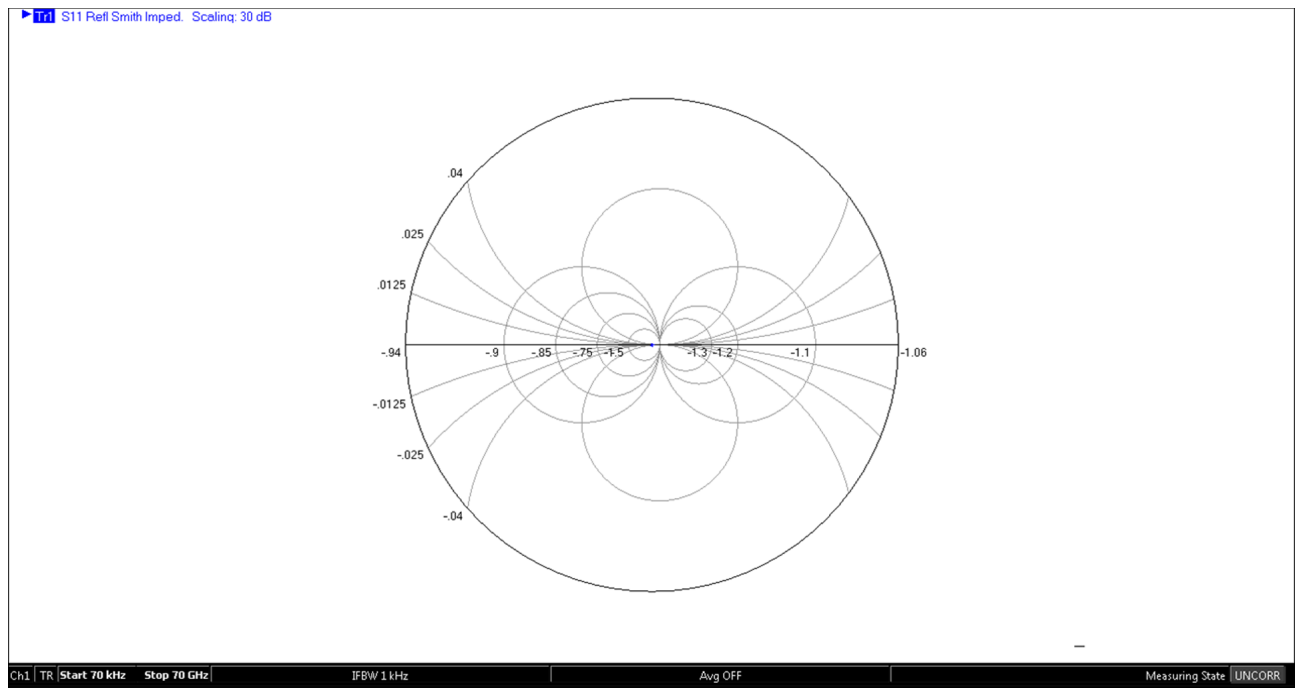


Figure 28-22. Compressed Smith Chart Example: 30 dB

SCALE Smith Chart Admittance Menu

Menu Appearance

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- The TRACE FORMAT is set to Smith (G+jB Impedance).
 - [Chapter 27, “Display Menus”](#)
 - MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (G+jB)
- The SMITH readout style is set to Linear/Phase, Log/Phase, Real/Imaginary, Impedance, or L/C.
 - [“SMITH \(IMPEDANCE\) Menu” on page 27-10](#)
 - MAIN | Display | DISPLAY | Trace Format | TRACE FORMAT | Smith (G+jB) | SMITH Readout Style

Navigation

- MAIN | Scale | SCALE

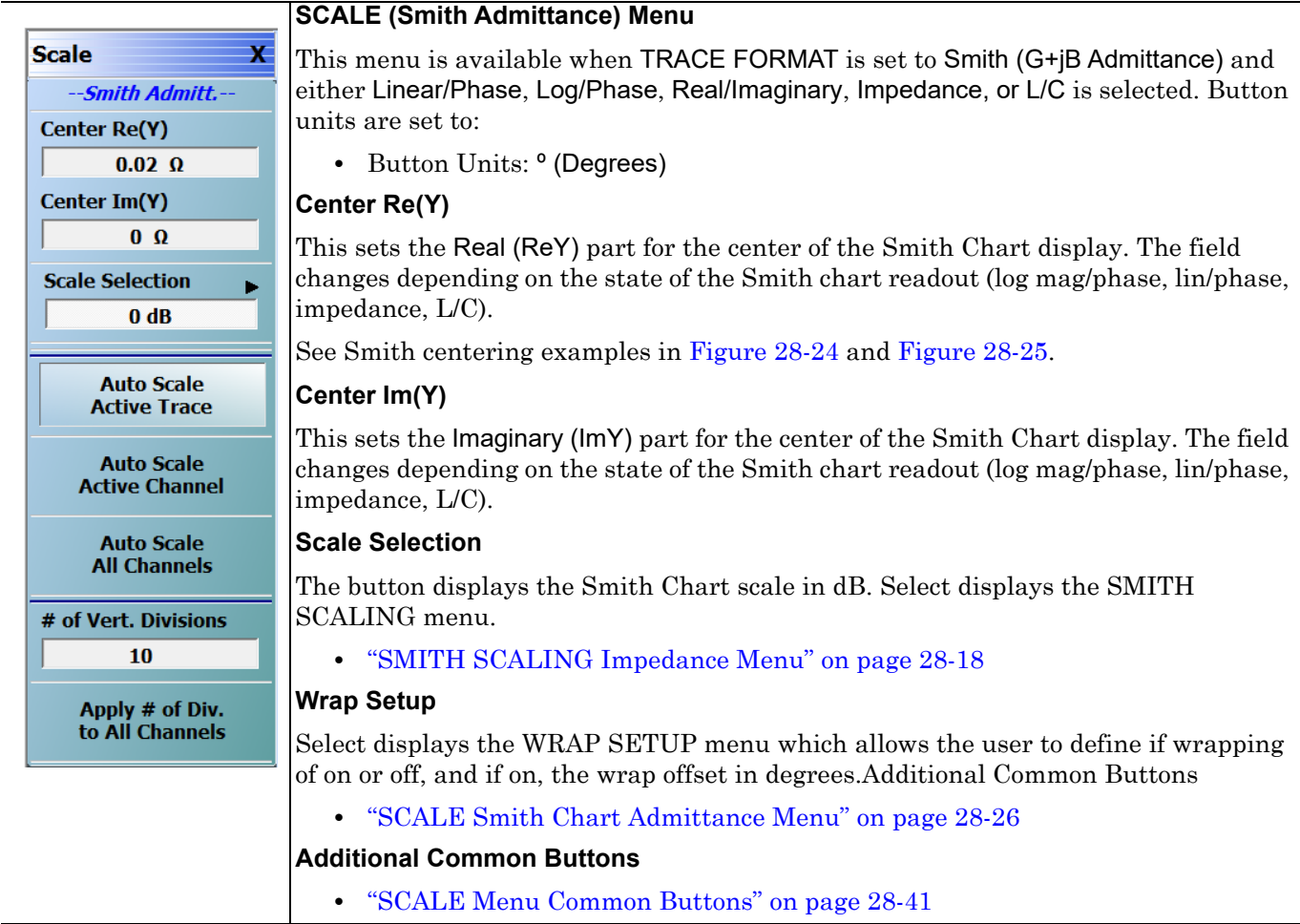


Figure 28-23. SCALE Smith Admittance Menu

Smith Charting Examples

► **T1** S11 Refl Smith Imped. Scaling: 0 dB

>M1 : 65.45000455 GHz 21.916 mU 46.522 mU

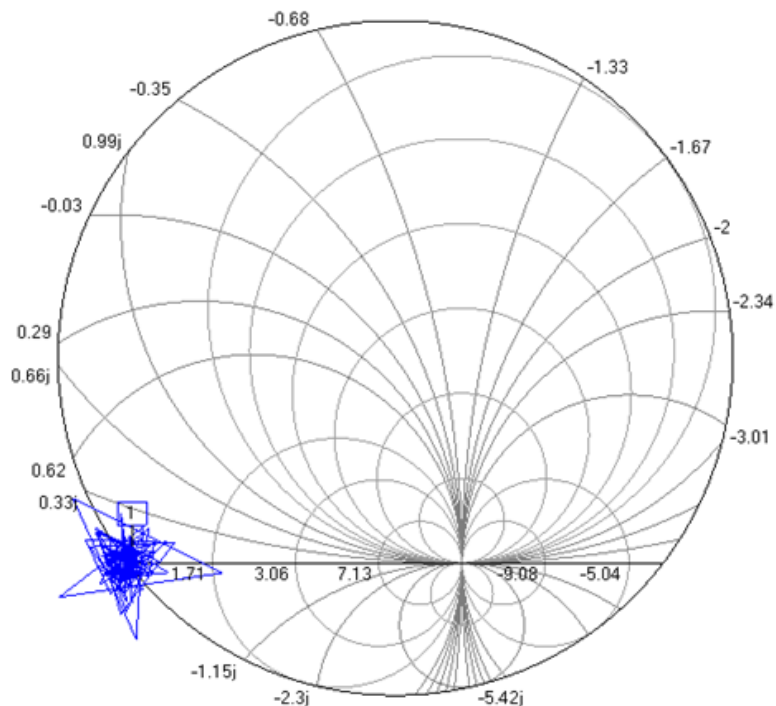
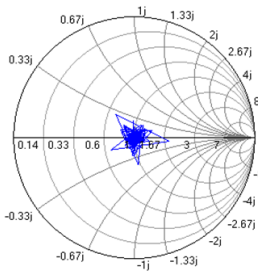
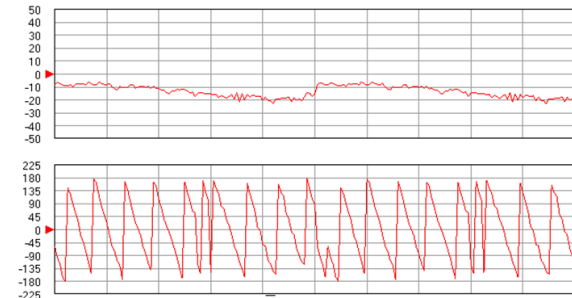


Figure 28-24. Smith Chart with Shifted Physical Center

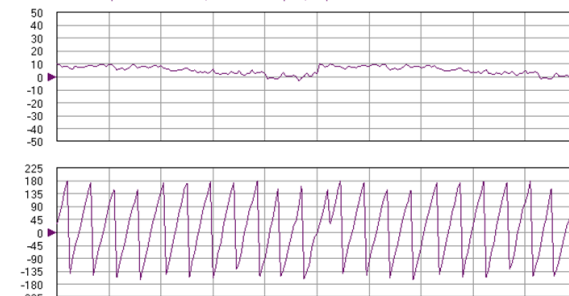
► **T1** S11 Refl Smith Imped. Scaling: 0 dB



Tr3 S21 Trans LogM+P RefLvl: 0 dB, 0 * Res: 10 dB/Div, 45 °/Div



Tr2 S12 Trans LogM+P RefLvl: 0 dB, 0 * Res: 10 dB/Div, 45 °/Div



Tr4 S22 Refl Smith Imped. Scaling: 0 dB

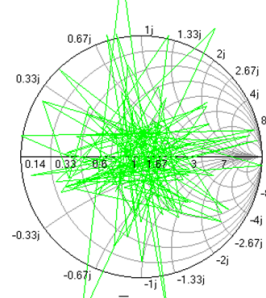


Figure 28-25. Default display with Smith Chart Arbitrary Center Changes

28-9 SCALE Polar Chart Menus

SCALE Linear Polar Chart Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Prerequisites

- The SCALE (Linear Polar) menu is available when TRACE FORMAT is set to either Linear Polar (Linear/Phase) or Linear Polar (Real/Imaginary).
- Button Units: U (Units)
- Button Units: ° (Degrees)
- The Reference Position button is unavailable.

Navigation

- MAIN | Scale | SCALE

Scale

---Linear Polar---

Resolution

1 U/Div

Reference Value

5 U

Reference Position

5

Wrap Offset

0 °

Auto Scale

Active Trace

Auto Scale

Active Channel

Auto Scale

All Channels

of Vert. Divisions

10

Apply # of Div.

to All Channels

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Division) Field Toolbar

Resolution : 1.000 U

^

v

nU

uU

mU

U

X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar

Reference Value : 5.000 U

^

v

nU

uU

mU

U

X

Reference Position (Number)

The Reference Position button is unavailable.

Wrap Offset (Degrees)

Select allows the user to define the phase offset in degrees and displays the Wrap Offset field toolbar.

Wrap Offset (Degrees) Field Toolbar

Wrap Offset : 5.00 °

^

v

°

X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-26. SCALE Linear Polar Menu

28-28

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SCALE Log Polar Chart Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- “MAIN Menu” on page 2-2

Prerequisites

- The SCALE (Log Polar) menu is available when TRACE FORMAT is set to either Log Polar (Linear/Phase) or Log Polar (Real/Imaginary).
- Button Units: dB
- Button Units: ° (Degrees)

Navigation

- MAIN | Scale | SCALE

	<p>Resolution (dB/Div) Select displays the Resolution (dB) toolbar with units in dB per division.</p> <p>Resolution (dB/Division) Field Toolbar Resolution : 10.0000 dB ^ v dB X</p> <p>Reference Value (dB) Select displays the Reference Value (dB) toolbar.</p> <p>Reference Value (dB) Field Toolbar Reference Value : 10.0000 dB ^ v dB X</p> <p>Reference Position (Number) The Reference Position button is unavailable.</p> <p>Wrap Offset (Degrees) Select allows the user to define the phase offset in degrees and displays the Wrap Offset field toolbar.</p> <p>Wrap Offset (Degrees) Field Toolbar Wrap Offset : 5.00 ° ^ v ° X</p> <p>Additional Common Buttons</p> <ul style="list-style-type: none"> “SCALE Menu Common Buttons” on page 28-41
--	--

Figure 28-27. SCALE Log Polar Menu

28-10 SCALE Dual-Trace Display Menus

SCALE Impedance Real and Imaginary Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale

Impedance Real

Resolution

10 Ω/Div

Reference Value

0 Ω

Reference Position

5

Impedance Imag

Resolution

10 Ω/Div

Reference Value

0 Ω

Reference Position

5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Impedance Real & Impedance Imaginary) Menu

This menu is available when TRACE FORMAT is set to Impedance - Real & Impedance - Imaginary. There are separate button sets for Impedance-Real and Impedance-Imaginary. Button units are set to:

- Button Units: Ω (Ohms)

Impedance Real Button Set

Resolution (Ohms/Div)

Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.

Resolution (Ohms/Div) Field Toolbar

Resolution : 10.000 Ω

Reference Value (Ohms)

Select displays the Reference Value (Ohms) toolbar with units in Ohms.

Reference Value (Ohms) Field Toolbar

Reference Value : 10.000 Ω

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5

Figure 28-28. SCALE Impedance Real and Impedance Imaginary Menu (1 of 2)

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Impedance Imaginary Button Set**Resolution (Ohms/Div)**

Select displays the Resolution (Ohms/Division) toolbar with units in Ohms per division.

Resolution (Ohms/Div) Field ToolbarA screenshot of the Resolution (Ohms/Div) field toolbar. It features a text input field containing '10.000' followed by a unit selector dropdown menu currently set to 'Ω'. To the right of the dropdown are two small square buttons with upward and downward arrows. Further right is a close button labeled 'X'.**Reference Value (Ohms)**

Select displays the Reference Value (Ohms) toolbar with units in Ohms.

Reference Value (Ohms) Field ToolbarA screenshot of the Reference Value (Ohms) field toolbar. It features a text input field containing '10.000' followed by a unit selector dropdown menu currently set to 'Ω'. To the right of the dropdown are two small square buttons with upward and downward arrows. Further right is a close button labeled 'X'.**Reference Position (Number)**

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field ToolbarA screenshot of the Reference Position (Number) field toolbar. It features a text input field containing the number '5'. To the right of the field are two small square buttons with upward and downward arrows, followed by an 'Enter' button. A close button labeled 'X' is located at the far right.**Additional Common Buttons**

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-28. SCALE Impedance Real and Impedance Imaginary Menu (2 of 2)

SCALE Log Magnitude and Phase Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---Log Mag---

Resolution

10 dB/Div

Reference Value

0 dB

Reference Position

5

---Phase---

Resolution

45 °/Div

Reference Value

0 °

Reference Position

5

Wrap Setup ▶

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Log Magnitude & Phase) Menu

This menu is available when TRACE FORMAT is set to Log Magnitude and Phase. There are separate button sets for Log Magnitude and Phase. Button units are set to:

- Button Units: dB
- Button Units: ° (Degrees)

Log Magnitude Area Button Set

Resolution (dB/Div)

Select displays the Resolution (dB) toolbar with units in dB per division.

Resolution (dB/Division) Field Toolbar

Resolution : 10.0000 dB ^ v dB X

Reference Value (dB)

Select displays the Reference Value (dB) toolbar.

Reference Value (dB) Field Toolbar

Reference Value : 10.0000 dB ^ v dB X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Phase Area Button Set

Resolution (Degs/Div)

Select displays the Resolution (Degrees/Division) toolbar with units in degrees per division.

Resolution (Degs/Div) Field Toolbar

Resolution : 45.00 ° ^ v ° X

Reference Value (Degrees)

Select displays the Reference Value (Degrees) toolbar.

Reference Value (Degrees) Field Toolbar

Reference Value : 5.00 ° ^ v ° X

Figure 28-29. SCALE Log Magnitude and Phase Menu (1 of 2)

	<div><div>Reference Position (Number)</div><div>Select displays the Reference Position toolbar.</div><div>Reference Position (Number) Field Toolbar</div><div><div>Reference Position : 5</div><div>^</div><div>v</div><div>Enter</div><div>X</div></div><div>Wrap Setup</div><div>Select opens the Wrap Setup menu and allows the user to toggle wrapping On and Off, and define the phase offset in degrees which, when selected, displays the Wrap Offset field toolbar: See the “WRAP Setup Menu” on page 28-9.</div><div>Wrap Offset (Degrees) Field Toolbar</div><div><div>Wrap Offset : 5.00 °</div><div>^</div><div>v</div><div>°</div><div>X</div></div><div>Additional Common Buttons</div><div><ul style="list-style-type: none">“SCALE Menu Common Buttons” on page 28-41</div></div>
--	---

Figure 28-29. SCALE Log Magnitude and Phase Menu (2 of 2)

SCALE Linear Magnitude and Phase Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale

X

Lin Mag

Resolution

10 U/Div

Reference Value

0 U

Reference Position

5

Phase

Resolution

45 °/Div

Reference Value

0 °

Reference Position

5

Wrap Setup

Auto Scale

Active Trace

Auto Scale

Active Channel

Auto Scale

All Channels

of Vert. Divisions

10

Apply # of Div.

to All Channels

SCALE (Linear Magnitude & Phase) Menu

This menu is available when TRACE FORMAT is set to Linear Magnitude and Phase. Button units are set to:

• Button Units: U (Units)

• Button Units: ° (Degrees)

There are separate button sets for Linear Magnitude and Phase.

Linear Magnitude Area Button Set

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Div) Field Toolbar

Resolution : 1.000 U

nU

uU

mU

U

X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar

Reference Value : 5.000 U

nU

uU

mU

U

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5

Enter

X

Phase Area Button Set

Resolution (Degs/Div)

Select displays the Resolution (Degrees/Division) toolbar with units in degrees per division.

Resolution (Degs/Div) Field Toolbar

Resolution : 45.00 °

°

X

Reference Value (Degs)

Select displays the Reference Value (Degrees) toolbar.

Reference Value (Degrees) Field Toolbar

Reference Value : 5.00 °

°

X

Figure 28-30. SCALE Linear Magnitude and Phase Menu (1 of 2)

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	<div><div>Reference Position (Number)</div><div>Select displays the Reference Position toolbar.</div><div>Reference Position (Number) Field Toolbar</div><div><div>Reference Position : 5</div><div>^</div><div>v</div><div>Enter</div><div>X</div></div><div>Wrap Setup</div><div>Select opens the Wrap Setup menu and allows the user to toggle wrapping On and Off, and define the phase offset in degrees which, when selected, displays the Wrap Offset field toolbar: See the “WRAP Setup Menu” on page 28-9.</div><div>Wrap Offset (Degrees) Field Toolbar</div><div><div>Wrap Offset : 5.00 °</div><div>^</div><div>v</div><div>°</div><div>X</div></div><div>Additional Common Buttons</div><div><ul style="list-style-type: none">“SCALE Menu Common Buttons” on page 28-41</div></div>
--	---

Figure 28-30. SCALE Linear Magnitude and Phase Menu (2 of 2)

SCALE Real and Imaginary Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale

---Real---

Resolution

1 U/Div

Reference Value

0 U

Reference Position

4

---Imaginary---

Resolution

1 U/Div

Reference Value

0 U

Reference Position

5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

30

Apply # of Div. to All Channels

SCALE (Real & Imaginary) Menu

This menu is available when TRACE FORMAT is set to Real and Imaginary. Button units are set to:

- Button Units: U (Units)

There are separate button sets for Real and Imaginary.

Real Area Button Set

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Div) Field Toolbar

Resolution : 1.000 U

^

v

nU

uU

mU

U

X

Reference Value (Units)

Select displays the Reference Value (Units) toolbar.

Reference Value (Units) Field Toolbar

Reference Value : 5.000 U

^

v

nU

uU

mU

U

X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5

^

v

Enter

X

Imaginary Area Button Set

Resolution (Units/Div)

Select displays the Resolution (Units/Division) toolbar with units of units per division.

Resolution (Units/Div) Field Toolbar

Resolution : 1.000 U

^

v

nU

uU

mU

U

X

Figure 28-31. SCALE Real and Imaginary Menu (1 of 2)

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	<p>Reference Value (Units)</p> <p>Select displays the Reference Value (Units) toolbar.</p> <p>Reference Value (Units) Field Toolbar</p>  <p>The toolbar shows a text field with 'Reference Value : 5.000 U'. To the right are two small buttons with up and down arrows, followed by four buttons labeled 'nU', 'uU', 'mU', and 'U'. A small dropdown arrow is on the far right.</p> <p>Reference Position (Number)</p> <p>Select displays the Reference Position toolbar.</p> <p>Reference Position (Number) Field Toolbar</p>  <p>The toolbar shows a text field with 'Reference Position : 5'. To the right are two small buttons with up and down arrows, followed by an 'Enter' button and an 'X' button.</p> <p>Additional Common Buttons</p> <ul style="list-style-type: none">• “SCALE Menu Common Buttons” on page 28-41
--	--

Figure 28-31. SCALE Real and Imaginary Menu (2 of 2)

28-11 SCALE Group Delay Menu

SCALE Group Delay Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale

Group Delay

Resolution

1 us/Div

Reference Value

0 s

Reference Position

5

Aperture

0.5 % of sweep

2 Point(s)

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Group Delay) Menu

This menu is available when TRACE FORMAT is set to Group Delay. Button units are set to:

• Button Units: s (seconds), ms (milliseconds), us (microseconds), ns (nanoseconds), ps (picoseconds)

• Button Units:% (Percentage)

Resolution (Time/Div)

Select displays the Resolution (Time/Division) toolbar with available units of s (seconds, ms (milliseconds), us (microseconds), ns (nanoseconds), or ps (picoseconds) per division.

Resolution (Time/Div) Field Toolbar

Resolution : 1.0000 s

smsusnspsX

Reference Value (Time)

Select displays the Reference Value (Time) toolbar with available units of s (seconds, ms (milliseconds), us (microseconds), ns (nanoseconds), or ps (picoseconds) per division.

Reference Value (Time) Field Toolbar

Reference Value : 2.0000 dBm

dBmX

Reference Position (Number)

Select allows the user to define a reference position and displays the Reference Position field toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5

EnterX

Aperture (% of Sweep)

The Aperture Percentage is the width of the sweep frequency that is used in the group delay calculation where group delay is the integrated slope of the signal measurement.

Aperture % (Percentage) Field Toolbar

Aperture % : 6.67

EnterX

Additional Common Buttons

• [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-32. SCALE Group Delay Menu

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28-12 SCALE Power Menus

SCALE Power Out Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---Power Out---

Resolution

10 dB/Div

Reference Value

0 dBm

Reference Position

5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Power Out) Menu

This menu is available when TRACE FORMAT is set to Power Out. Button units are set to:

- Button Units: dB
- Button Units: dBm

Resolution (dB/Div)

Select displays the Resolution (dB) toolbar with units in dB per division.

Resolution (dB/Division) Field Toolbar

Resolution : 10.0000 dB ^ v dB X

Reference Value (dBm)

Select displays the Reference Value (dB) toolbar.

Reference Value (dBm) Field Toolbar

Reference Value : 2.0000 dBm ^ v dBm X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Additional Common Buttons

- [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-33. SCALE Power Out Menu

SCALE Power In Menu

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

Scale X

---Power In---

Resolution

10 dB/Div

Reference Value

0 dBm

Reference Position

5

Auto Scale Active Trace

Auto Scale Active Channel

Auto Scale All Channels

of Vert. Divisions

10

Apply # of Div. to All Channels

SCALE (Power In) Menu

This menu is available when TRACE FORMAT is set to Power In. Button units are set to:

• Button Units: dB

• Button Units: dBm

Resolution (dB/Div)

Select displays the Resolution (dB) toolbar with units in dB per division.

Resolution (dB/Div) Field Toolbar

Resolution : 10.0000 dB ^ v dB X

Reference Value (dBm)

Select displays the Reference Value (dB) toolbar.

Reference Value (dBm) Field Toolbar

Reference Value : 2.0000 dBm ^ v dBm X

Reference Position (Number)

Select displays the Reference Position toolbar.

Reference Position (Number) Field Toolbar

Reference Position : 5 ^ v Enter X

Additional Common Buttons

• [“SCALE Menu Common Buttons” on page 28-41](#)

Figure 28-34. SCALE Power In Menu

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28-13 SCALE Menu Common Buttons

The button descriptions below apply to all SCALE menus.

Menu Identification

- The appearance and button availability of the SCALE menu depends on the settings on the DISPLAY menu. Consult [Section 28-2 “Scale Menus Appearance, Common Buttons, and Units”](#) for SCALE menu identification and prerequisites.

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | Scale | SCALE

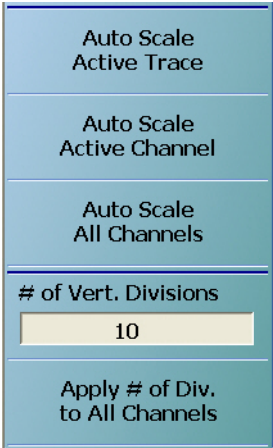
	<div>SCALE Menu Common Buttons</div> <p>These buttons appear on all SCALE menus.</p> <div>Auto Scale Active Trace</div> <p>Select applies the auto scale function to the active trace only and de-selects the Auto Scale Active Channel and Auto Scale Active Channel buttons.</p> <div>Auto Scale Active Channel</div> <p>Select applies the auto scale function to all traces on the active channel only and de-selects the Auto Scale Active Trace and Auto Scale Active Channel buttons.</p> <div>Auto Scale All Channels</div> <p>Select applies the auto scale function to all traces on all channels and de-selects the Auto Scale Active Trace and Auto Scale Active Channel buttons.</p> <div># of Vert. Divisions (Number)</div> <p>Select displays the Number of Vertical Divisions field toolbar.</p> <div># of Vert. Divisions (Number) Field Toolbar</div>  <div>Apply # of Div. to All Channels</div> <p>The Apply Number of Divisions to All Channels button applies the division selection made by the button above to all channels.</p>
--	--

Figure 28-35. SCALE Menu – Common Buttons

Chapter 29 — Marker Menus

29-1 Chapter Overview

This chapter provides information for configuring and controlling the marker functions. The instrument provides up to 13 markers per trace, of which 12 can be direct markers and one (1) a reference marker. Each marker can be individually controlled on/off and positioned as required. If the reference marker is off, each marker provides measurement data based on its display position. If the reference marker is on, each marker provides differential measurement data based on its position relative the reference. Other functions for display options and various types of single- and multi-peak search are available.

29-2 Overview of Marker Menus, Dialog Boxes, and Toolbars

The available menus and dialog boxes are:

- “MARKERS [1] Menu” on page 29-4
- “MARKERS [2] Menu” on page 29-6
- “MARKER SETUP Menu” on page 29-7
 - “MARKER TABLE DISPLAY Tableau” on page 29-10
- “MRK POSITION Menu” on page 29-11
- “EYE STATISTICS Menu” on page 29-12
 - “AMPLITUDE SETUP Menu (NRZ)” on page 29-13
 - “TIME SETUP Menu (NRZ)” on page 29-16
- “DISPLAY POSITION Menu” on page 29-19
- “MARKER SEARCH Menu” on page 29-20
- “PEAK (Marker) Menu” on page 29-21
- “TARGET (Marker) Menu” on page 29-22
- “ADVANCED SEARCH Markers Menu” on page 29-24
- “MULTI PEAK Marker Search Menu” on page 29-25
- “MULTI TARGET Marker Search Menu” on page 29-26
- “SEARCH RANGE Marker Menu” on page 29-27
- “BANDED SEARCH RANGE CONFIGURATION Dialog Box” on page 29-30
- “BANDWIDTH Marker Search Menu” on page 29-34
- “NOTCH Marker Search Menu” on page 29-37
- “RELATIVE TARGET Marker Menu” on page 29-40.
- “MKR FUNCTIONS Menu” on page 29-41

29-3 Marker Menu Overview

Marker Button Label Changes

The labels for marker buttons 1 through 12 change depending on whether they are on or off and whether the Ref. Mkr function (described below) is on or off.

Marker Unit Changes

The marker units change depending on the selected instrument sweep setting on the SWEEP TYPES menu and settings on the DOMAIN and RANGE menus:

- Frequency Sweep (Linear):
 - Marker units set to frequency (GHz, MHz, kHz, Hz)
- Frequency Sweep (Log):
 - Marker units set to frequency (GHz, MHz, kHz, Hz)
- Segmented Sweep (Frequency-Based):
 - Marker units set to frequency (GHz, MHz, kHz, Hz)
- Segmented Sweep (Index-Based):
 - Marker units set to Index number.
- Power Sweep (CW Frequency):
 - Marker units set to power (dBm)
- Power Sweep (Swept Frequency):
 - Marker units set to frequency (GHz, MHz, kHz, Hz)

Reference Marker Off or On

If Ref. Mkr is set to OFF, the label is formatted as:

- Mkr # [OFF] if the marker is off (where # is the marker number).
- Mkr # [ON] if the marker is on.
- For example, Marker 1 would be labeled either Mkr #1 [OFF] or Mkr #1 [ON].

If Ref. Mkr. is set to ON, the label is formatted as:

- Mkr#-Ref [OFF] if the marker is off.
- Mkr#-Ref [ON] if the marker is on.
- For example, Marker 1 would be labeled either Mkr#1-Ref [OFF] or Mkr#1-Ref [ON].

Turning Individual Markers Off and On

The MARKERS [1] menu described below is shown with Marker 1 (Mkr 1) through Marker 4 (Mkr 4) turned off. Individual markers can be turned off manually by clicking their buttons.

Turning All Markers On

All markers can be turned on either manually one-by-one (as above) or at the MARKERS [2] menu, by clicking the All Markers On button.

Navigation

- MAIN | Markers | MARKERS | More Markers | MARKERS [2] | All Markers On

Turning All Markers Off

All markers can be turned off either manually one-by-one or at the MARKERS [2] menu, by clicking the All Markers Off button.

Navigation

- MAIN | Markers | MARKERS [1] | More Markers | MARKERS [2] | All Markers Off

Naming Conventions for Marker Buttons and Toolbars

The following conventions are used to label the marker buttons and toolbars in this section.

Marker Buttons

- Mkr # [Ref] [OFF/ON] is used for all button names (where # is the number of the marker).
- For example, Mkr1 [Ref] [OFF/ON] is used for the Marker 1 button when it is labeled Mkr 1 [OFF], Mkr 1 [ON], Mkr1-Ref [OFF], or Mkr1-Ref [ON].

Marker Toolbars

- Mkr # [Ref] [ON] is used for all marker toolbars (where # is the number of the marker).
- For example, Mkr1-[Ref] [ON] is used for the Marker 1 toolbar when it is labeled Mkr 1 [ON] or Mkr1-Ref [ON].
- Note the marker must be on for the toolbar to be available.

29-4 Primary Marker Menus

MARKERS [1] Menu

Previous

- “MAIN Menu” on page 2-2
- “SPA SETUP Menu” on page 23-6

Navigation

- MAIN | Marker | MARKERS [1]

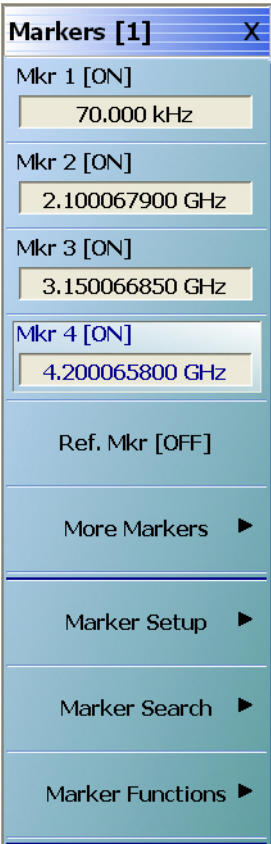
	<p>Mkr 1 [Ref] [OFF/ON]</p> <p>The Marker 1 Button appearance depends on instrument settings:</p> <ul style="list-style-type: none">• If the label reads Mkr 1 [OFF], Marker 1 is set to off.• If the label reads Mkr 1 [ON], Marker 1 is set to on.• If the label reads Mkr1-Ref [OFF], the Ref. Mkr button (described below) is set to on, and Marker 1 is set to off.• If the label reads Mkr1-Ref [ON], the Ref. Mkr button is set to on, and Marker 1 is set to on.• If the marker button reads Mkr1-Ref1[ON], the Mkr1-Ref [ON] Toolbar is available. Allows input of frequency value and selection of GHz, MHz, kHz, or Hz units. <p>Mkr 2 [Ref] [OFF/ON]</p> <p>Used to control Marker 2. The button is similar in appearance and operation to the Mkr 1 [Ref] [OFF/ON] button above.</p> <p>Mkr 3 [Ref] [OFF/ON]</p> <p>Used to control Marker 3. The button is similar in appearance and operation to the Mkr 1 [Ref] [OFF/ON] button above.</p> <p>Mkr 4 [Ref] [OFF/ON]</p> <p>Used to control Marker 4. The button is similar in appearance and operation to the Mkr 1 [Ref] [OFF/ON] button above.</p> <p>Ref. Mkr [OFF/ON]</p> <p>Select toggles the reference marker off and on.</p> <p>Ref. Mkr ON</p> <p>If toggled to ON, a user-defined reference value can be entered and:</p> <ul style="list-style-type: none">• The labels for the Mkr 1, Mkr 2, Mkr 3, and Mkr 4 buttons (described above) change to Mkr1-Ref, Mkr2-Ref, Mkr3-Ref, and Mkr4-Ref.• The labels for Mkr 5 through Mkr 12 on the Markers [2] menu (described below) are changed to Mkr5-Ref through Mkr12-Ref.• The Ref. Mkr [ON] toolbar appears below the icon toolbar.• The units in the reference marker toolbar depend on the sweep, domain, and time/distance settings.
---	--

Figure 29-1. MARKERS [1] Menu (1 of 2)

	<div><div>Ref. Mkr OFF</div><div>If toggled to OFF:<ul style="list-style-type: none">• The labels for the Mkr1-Ref, Mkr2-Ref, Mkr3-Ref, and Mkr4-Ref buttons change to Mkr 1, Mkr 2, Mkr 3, and Mkr 4.• The labels for Mkr5-Ref through Mkr12-Ref. on the Markers [2] menu change to Mkr 5 through Mkr 12.• The menu changes automatically from the Markers [1] menu to the Markers [2] menu.</div><div><div>More Markers</div><div>Select displays the MARKERS [2] menu and the controls for Marker 5 through Marker 12. The button labels for these markers are the same as Marker 1 through Marker 4.<ul style="list-style-type: none">• “MARKERS [2] Menu” on page 29-6</div><div><div>Markers Setup</div><div>Select displays the MARKER SETUP menu.<ul style="list-style-type: none">• “MARKER SETUP Menu” on page 29-7</div><div><div>Markers Search</div><div>Select displays the MARKER SEARCH button.<ul style="list-style-type: none">• “MARKER SEARCH Menu” on page 29-20</div><div><div>Marker Functions</div><div>Select displays the MKR FUNCTIONS menu.<ul style="list-style-type: none">• “MKR FUNCTIONS Menu” on page 29-41</div></div></div></div></div></div>
--	---

Figure 29-1. MARKERS [1] Menu (2 of 2)

MARKERS [2] Menu

Previous

- [“MARKERS \[1\] Menu” on page 29-4](#)

Navigation

- [MAIN](#) | [Marker](#) | [MARKERS \[1\]](#) | [More Markers](#) | [MARKERS \[2\]](#)

Markers [2]

All Markers Off

All Markers On

Mkr 5 [OFF]

Mkr 6 [OFF]

Mkr 7 [OFF]

Mkr 8 [OFF]

Mkr 9 [OFF]

Mkr 10 [OFF]

Mkr 11 [OFF]

All Markers Off

Select toggles all 12 regular markers off. If on, Reference Marker is turned off.

All Markers On

Select toggles all 12 regular markers on. If OFF, the Reference Marker is not turned on. If ON, the Reference Marker is not affected.

Mkr 5 [Ref] [OFF/ON]

Used to control Marker 5.

Mkr 1 [Ref] [OFF/ON]

on page 29-4

Mkr 6 [Ref] [OFF/ON]

Used to control Marker 6.

Mkr 1 [Ref] [OFF/ON]

on page 29-4

Mkr 7 [Ref] [OFF/ON]

Used to control Marker 7.

Mkr 1 [Ref] [OFF/ON]

on page 29-4

Mkr 8 [Ref] [OFF/ON]

Used to control Marker 8.

Mkr 1 [Ref] [OFF/ON]

on page 29-4

Mkr 9 [Ref] [OFF/ON]

Used to control Marker 9.

Mkr 1 [Ref] [OFF/ON]

on page 29-4

Mkr 10 [Ref] [OFF/ON]

Used to control Marker 10.

Mkr 1 [Ref] [OFF/ON]

on page 29-4

Mkr 11 [Ref] [OFF/ON]

Used to control Marker 11.

Mkr 1 [Ref] [OFF/ON]

on page 29-4

Mkr 12 [Ref] [OFF/ON]

Used to control Marker 12.

Mkr 1 [Ref] [OFF/ON]

on page 29-4

Figure 29-2. MARKERS [2] Menu

MARKER SETUP Menu

Previous

- [“MARKERS \[1\] Menu” on page 29-4](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Setup | MARKER SETUP

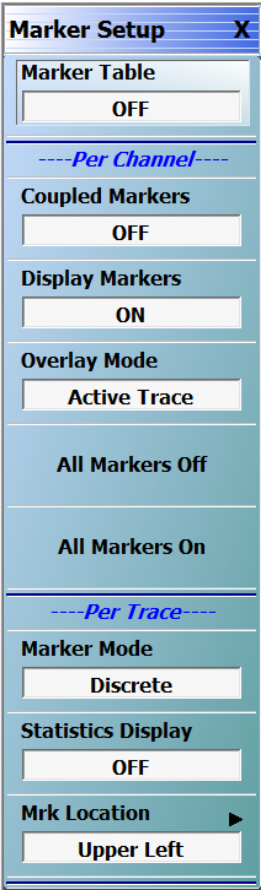
	<p>Marker Table: Select toggles the marker table off and on. When OFF is selected, the Marker Table display area is not visible. When ON is selected, the display area is shortened, and the marker table appears below the main display.</p> <ul style="list-style-type: none"> • “MARKER TABLE DISPLAY Tableau” on page 29-10 <p>Coupled Markers (Off/On)</p> <p>Select toggles the marker coupling off and on for a per channel basis.</p> <ul style="list-style-type: none"> • In Coupled Markers ON mode, moving a specific marker in one trace display moves the same numbered marker in all other trace displays in that channel. • In Coupled Markers OFF mode, markers can be moved independently in each trace without affecting the position of other markers in other traces. • If Coupled Markers was on, was then turned off and markers moved, and then Coupled Markers was turned on again, the markers will realign with the active trace determining the x-axis value. <p>Display Markers (Off/On)</p> <p>Select toggles the markers display off and on. The number and position of displayed markers is not changed when the display is turned back on.</p> <p>Overlay Mode</p> <p>Select toggles the overlay mode between Active Trace and All Traces. When Active Trace is selected, only the markers for the active trace are displayed when in overlay trace format. When All Traces is selected, the markers that are turned on for all traces are displayed in overlay trace format. See Figure 29-4 and Figure 29-5 on page 29-9 for example marker overlay modes. Note that the user can place the marker readout anywhere in the display by click/drag/dropping the readout.</p> <p>All Markers Off</p> <p>Select toggles all markers OFF. If on, the Reference Marker is also turned OFF.</p> <p>All Markers On</p> <p>Select toggles all 12 regular markers ON. If OFF, the Reference Marker is not turned on. If ON, the Reference Marker is not affected.</p> <p>Note: The Per Trace selections below are not shown when the Eye Diagram domain mode is selected from the MAIN Display DOMAIN menu. (See menu variant below and “Time, Eye Diagram” on page 27-37.)</p> <p>Marker Mode</p> <p>On a per-trace basis, select toggles between Discrete Marker Mode and Continuous Marker Mode.</p> <ul style="list-style-type: none"> • In Discrete Mode, markers can only be moved from measured point to measured point and cannot be set between measured points. • In Continuous Mode, markers can be moved between measured points. If a non-measured position is selected, the instrument interpolates the measurement value.
--	--

Figure 29-3. MARKER SETUP Menu (1 of 2)

Marker Setup X

Marker Table

OFF

-----Per Channel-----

Coupled Markers

OFF

Display Markers

ON

Overlay Mode

Active Trace

All Markers Off

All Markers On

Statistics Display: On a per-trace basis, select toggles the statistics display off and on.

Mkr Location: Select opens the MKR. POSITION menu. See “MRK POSITION Menu” on page 29-11.

Marker Setup Menu Variant – Display Domain Mode in Eye Diagram

The Per Trace selections shown above are not available on the Marker Setup menu when the display mode is in Eye Diagram domain mode (selected from the MAIN | Display | DOMAIN menu. See “Time, Eye Diagram” on page 27-37 and “EYE STATISTICS Menu” on page 29-12.)

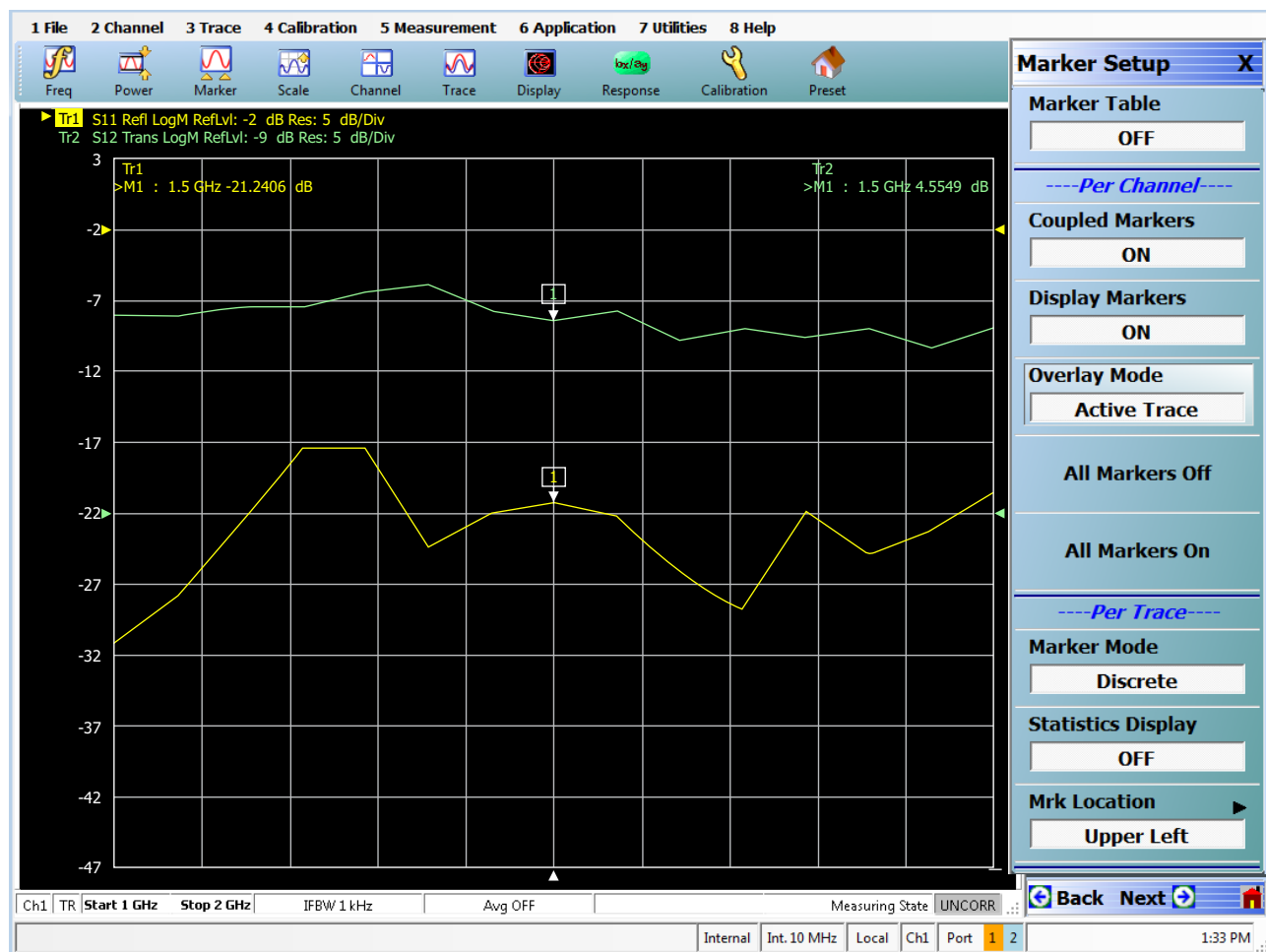
Also note:

- When Marker Table is ON, the eye statistics info will be displayed in the table area depending on the ON/OFF status of amplitude related statistics and time related statistics.
- Display Markers ON/OFF states will not affect Eye Statistics.
- Overlay Mode selection will not affect Eye Statistics.
- All Markers OFF and All Markers ON buttons will not affect Eye Statistics.

Figure 29-3. MARKER SETUP Menu (2 of 2)



Figure 29-4. Marker Overlay Mode – Active Trace Only



Note that with All Traces selected in Overlay Mode, marker readouts for each trace are displayed.

Figure 29-5. Marker Overlay Mode – All Traces Updated to show multiple marker readouts

MARKER TABLE DISPLAY Tableau

Previous

- “MARKER SETUP Menu” on page 29-7

Navigation

- MAIN | Marker | MARKERS [1] | Marker Setup | MARKER SETUP | Marker Table Display

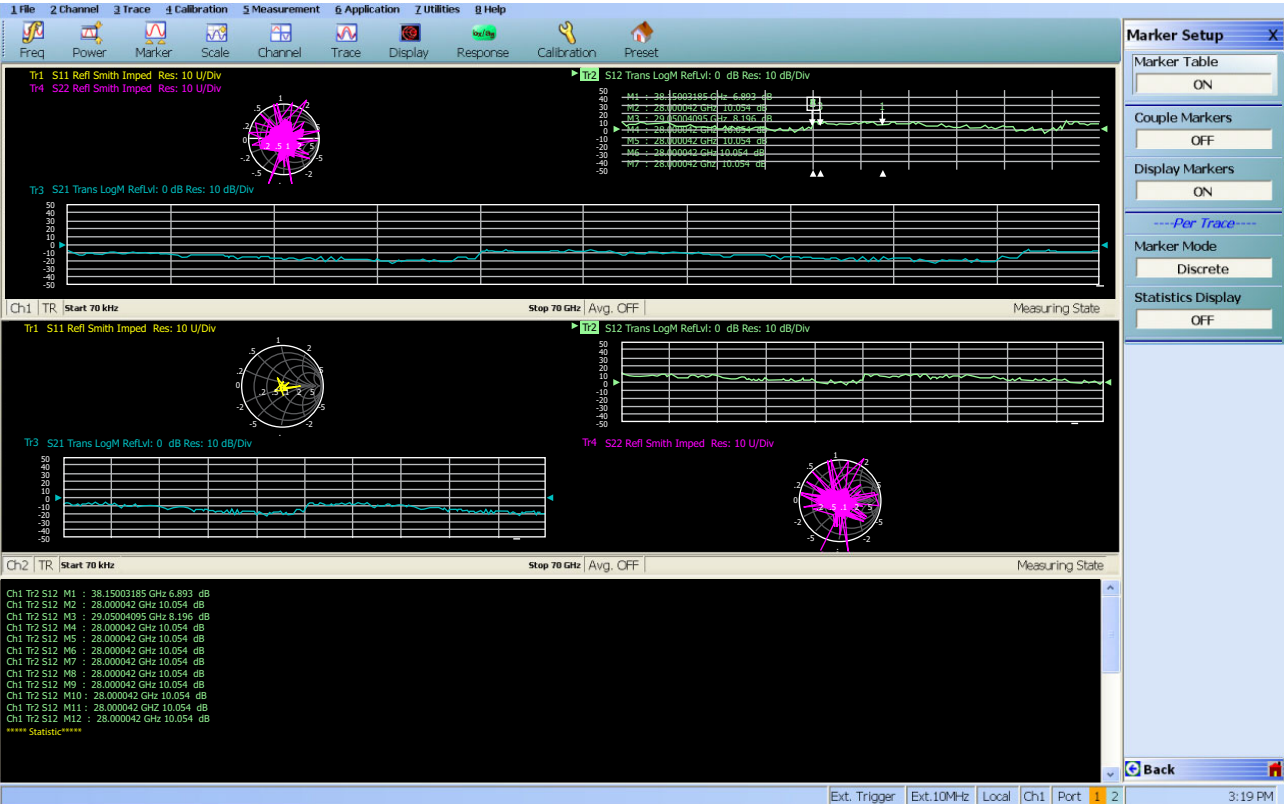


Figure 29-6. MARKER TABLE DISPLAY Tableau

Marker Labels

Marker labels in the Marker Table Display show the response type set for the Trace. For example, if Noise Temperature is selected in the Response Menu, the Marker Table listing starts with “Noise Temperature”.

MRK POSITION Menu

Previous

- “MARKER SETUP Menu” on page 29-7

Navigation

MAIN | Marker | MARKERS [1] | Marker Setup | MARKER SETUP | Mrk Location | MRK. POSITION

Mrk. Position X

☒ Upper Left

Upper Right

Lower Left

Lower Right

Custom

X Offset (1 - 100)

0

Y Offset (1 - 100)

0

Display Off

Mrk. Position X

Upper Left

Upper Right

Lower Left

Lower Right

☒ Custom

X Offset (1 - 100)

39.7

Y Offset (1 - 100)

38.13

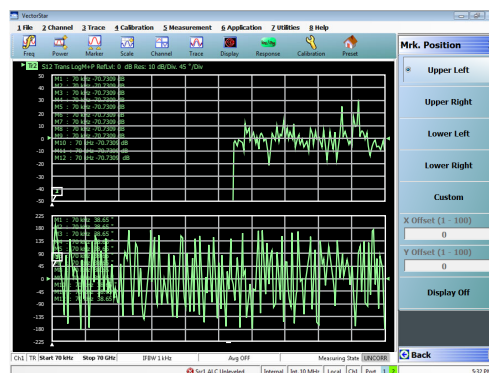
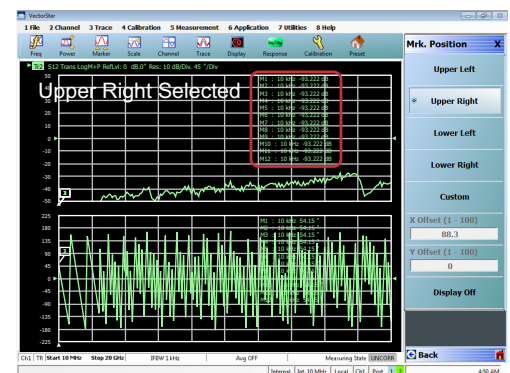
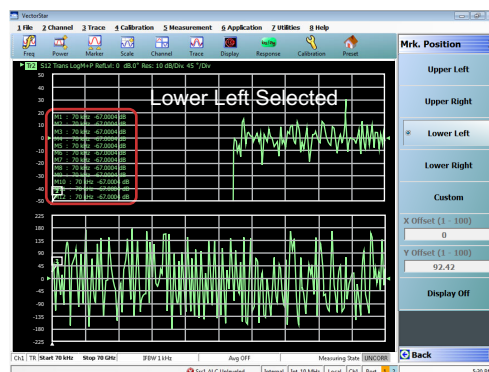
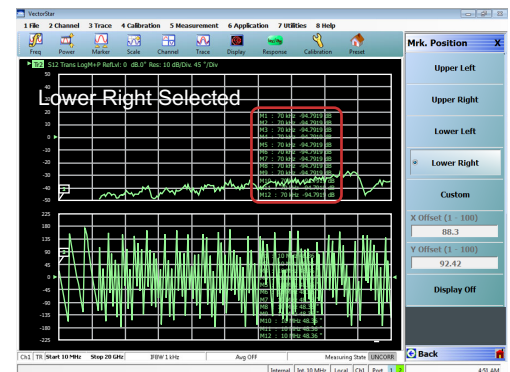
Display Off

Marker Position Menu

Location of the marker table (see “MARKER TABLE DISPLAY Tableau” on page 29-10) on a trace can be changed using this menu. The following selections are available:

- Upper Left (Default), Upper Right, Lower Left, Lower Right, Custom (Enter X, Y values or drag and drop), Display Off

Selecting any button positions the marker table as shown in the following examples:



Custom Position:

Select Custom to enter X and Y values, which places marker data at those coordinates on the trace area.

Marker Data Drag and Drop:

The user can click, hold, and drag the displayed marker data from its current position to any new position on the trace area.

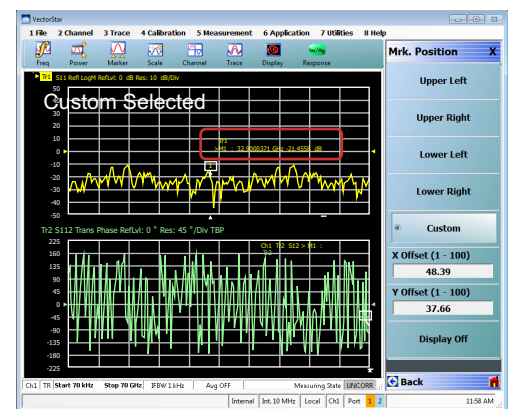


Figure 29-7. MARKER POSITION Menu

EYE STATISTICS Menu

When Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) is installed and the domain selected is Time, Eye Diagram, the EYE STATISTICS menu is available via MAIN | Marker.

Previous

- “MAIN Menu” on page 2-2

Prerequisites

Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) are installed, Domain selected (“DOMAIN Menu” on page 27-33) is Time, Eye Diagram.

Navigation

MAIN | Marker | Domain | EYE STATISTICS

For information on setting up a trace for Eye Diagram, see “DOMAIN Menu” on page 27-33.

Eye Statistics X

Amplitude Related

OFF

Amplitude Setup ▶

Time Related

OFF

Time Setup ▶

Rise/Fall Time % Definitions

Low %

10 %

High % = 100-Low%

90 %

Display Position ▶

Upper Left

Marker Setup ▶

Eye Statistics

Using the EYE STATISTICS menu, the following are the typical measurements that can be performed on an eye diagram.

Amplitude Parameters: Eye 0 Level, Eye 1 Level, Eye level mean, Eye amplitude, Eye height, Eye opening factor, Eye signal to noise, Crossing Percentage

Time Parameters: Eye width, Eye rise time, Eye fall time, Eye Pk-Pk jitter, Eye RMS jitter, Eye duty cycle distortion

Note: The values corresponding to the selected amplitude/time parameters (when a parameter toggle status is ON) is displayed in the trace display area only if the Amplitude Related or Time Related button on the EYE STATISTICS menu is set to ON.

Amplitude Related

Select toggles amplitude related measurement ON/OFF.

Amplitude Setup

Select opens the “AMPLITUDE SETUP Menu (NRZ)” on page 29-13 or the “AMPLITUDE SETUP Menu (PAM-4)” on page 29-14.

Time Related

Select toggles time related measurement ON/OFF.

Time Setup

Select opens the “TIME SETUP Menu (NRZ)” on page 29-16. or the “TIME SETUP Menu (PAM-4)” on page 29-17.

Low %

Sets the low Rise/Fall time percentage.

High %

Displays the high Rise/Fall time percentage.

Display Position

Select opens the DISPLAY POSITION menu. See “DISPLAY POSITION Menu” on page 29-19.

Marker Setup

Select opens the MARKER SETUP menu. See “MARKER SETUP Menu” on page 29-7.

Figure 29-8. EYE STATISTICS Menu

AMPLITUDE SETUP Menu (NRZ)

Prerequisites

Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) installed, domain selected is Time, Eye Diagram, signaling format is NRZ (see “DOMAIN Menu” on page 27-33).

Previous

- “EYE STATISTICS Menu” on page 29-12

Navigation

MAIN | Marker | EYE STATISTICS | Amplitude Setup | AMPLITUDE SETUP

Amplitude Setup Menu	
<div><div>Amplitude Setup X</div><div>'0' Level<div>ON</div></div><div>'1' Level<div>ON</div></div><div>Level Mean<div>ON</div></div><div>Amplitude<div>ON</div></div><div>Height<div>ON</div></div><div>Opening Factor<div>ON</div></div><div>Signal to Noise<div>ON</div></div><div>Crossing Percentage<div>ON</div></div></div>	<p>Note: The values corresponding to the selected amplitude parameters (when a parameter toggle status is ON) is displayed in the trace display area only if the Amplitude Related button on the EYE STATISTICS menu is set to ON.</p> <p>0 Level Select toggles ON/OFF.</p> <p>1 Level Select toggles ON/OFF.</p> <p>Level Mean Select toggles ON/OFF.</p> <p>Amplitude Select toggles ON/OFF.</p> <p>Height Select toggles ON/OFF.</p> <p>Opening Factor Select toggles ON/OFF.</p> <p>Signal to Noise Select toggles ON/OFF.</p> <p>Crossing Percentage Select toggles ON/OFF.</p>

Figure 29-9. AMPLITUDE SETUP Menu – NRZ Signaling Format

AMPLITUDE SETUP Menu (PAM-4)

Prerequisites

Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) installed, domain selected is Time, Eye Diagram, signaling format is PAM-4 (see “DOMAIN Menu” on page 27-33).

Previous

- “EYE STATISTICS Menu” on page 29-12

Navigation

MAIN | Marker | EYE STATISTICS | Amplitude Setup | AMPLITUDE SETUP

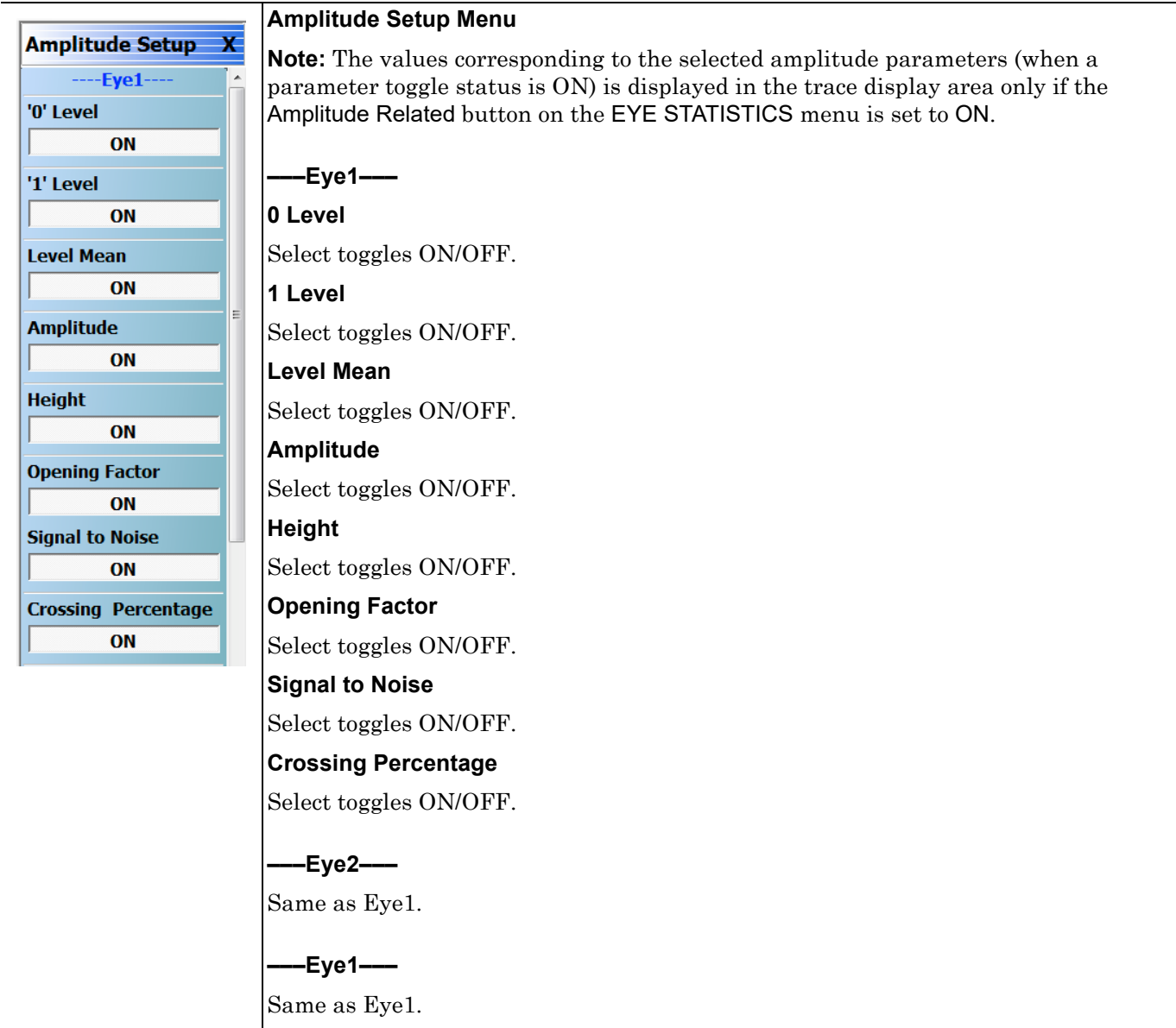


Figure 29-10. AMPLITUDE SETUP Menu – PAM-4 Signaling Format (1 of 2)

----Eye2----	
'1' Level	<input type="text" value="ON"/>
'2' Level	<input type="text" value="ON"/>
Level Mean	<input type="text" value="ON"/>
Amplitude	<input type="text" value="ON"/>
Height	<input type="text" value="ON"/>
Opening Factor	<input type="text" value="ON"/>
Signal to Noise	<input type="text" value="ON"/>
Crossing Percentage	<input type="text" value="ON"/>

----Eye3----	
'2' Level	<input type="text" value="ON"/>
'3' Level	<input type="text" value="ON"/>
Level Mean	<input type="text" value="ON"/>
Amplitude	<input type="text" value="ON"/>
Height	<input type="text" value="ON"/>
Opening Factor	<input type="text" value="ON"/>
Signal to Noise	<input type="text" value="ON"/>
Crossing Percentage	<input type="text" value="ON"/>

Figure 29-10. AMPLITUDE SETUP Menu – PAM-4 Signaling Format (2 of 2)

TIME SETUP Menu (NRZ)

Prerequisites

Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) installed, domain selected is Time, Eye Diagram, signaling format is NRZ (see “DOMAIN Menu” on page 27-33).

Previous

- “EYE STATISTICS Menu” on page 29-12

Navigation

MAIN | Marker | EYE STATISTICS | Time Setup | TIME SETUP

Time SetupX

Width

ON

Rise Time

ON

Fall Time

ON

Pk - Pk Jitter

ON

RMS Jitter

ON

Duty Cycle Distortion

ON

Time Setup Menu

Note: The values corresponding to the selected time parameters (when a parameter toggle status is ON) is displayed in the trace display area only if the Time Related button on the EYE STATISTICS menu is set to ON.

Width
Select toggles ON/OFF.

Rise Time
Select toggles ON/OFF.

Fall Time
Select toggles ON/OFF.

Pk-Pk Jitter
Select toggles ON/OFF.

RMS Jitter
Select toggles ON/OFF.

Duty Cycle Distortion
Select toggles ON/OFF.

Figure 29-11. TIME SETUP Menu – NRZ Signaling Format

TIME SETUP Menu (PAM-4)

Prerequisites

Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) installed, domain selected is Time, Eye Diagram, signaling format is PAM-4 (see “DOMAIN Menu” on page 27-33).

Previous

- “EYE STATISTICS Menu” on page 29-12

Navigation

MAIN | Marker | EYE STATISTICS | Time Setup | TIME SETUP

Time Setup

Eye1

Width

ON

Rise Time

ON

Fall Time

ON

Pk - Pk Jitter

ON

RMS Jitter

ON

Duty Cycle Distortion

ON

Eye2

Width

ON

Rise Time

ON

Fall Time

ON

Pk - Pk Jitter

ON

RMS Jitter

ON

Duty Cycle Distortion

ON

Time Setup Menu

Note: The values corresponding to the selected time parameters (when a parameter toggle status is ON) is displayed in the trace display area only if the Time Related button on the EYE STATISTICS menu is set to ON.

Eye1

Width

Select toggles ON/OFF.

Rise Time

Select toggles ON/OFF.

Fall Time

Select toggles ON/OFF.

Pk-Pk Jitter

Select toggles ON/OFF.

RMS Jitter

Select toggles ON/OFF.

Duty Cycle Distortion

Select toggles ON/OFF.

Eye2

Eye2

Same as Eye1.

Eye3

Same as Eye1.

Figure 29-12. TIME SETUP Menu – PAM-4 Signaling Format (1 of 2)



Figure 29-12. TIME SETUP Menu – PAM-4 Signaling Format (2 of 2)

DISPLAY POSITION Menu

When Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) is installed and the display domain selected is Time, Eye Diagram, the EYE STATISTICS menu is available via Main | Marker.

Previous

- [“EYE STATISTICS Menu” on page 29-12](#)

Prerequisites

Option 47 (Eye Diagram) and Option 2 (Time Domain Measurements) installed, Domain selected ([“DOMAIN Menu” on page 27-33](#)) is Time, Eye Diagram.

Navigation

MAIN | Marker | EYE STATISTICS | Display Position | DISPLAY POSITION

Display Position X

Upper Left

Upper Right

Lower Left

Lower Right

☒ Custom

X Offset (1 - 100)

51.2

Y Offset (1 - 100)

0

Display Off

Display Position Menu

Location of the Eye Diagram Amplitude Data or Time Data on the selected trace can be changed using this menu. The following selections are available:

- Upper Left (Default)
- Upper Right
- Lower Left
- Lower Right
- Custom
 - X Offset entry field
 - Y Offset entry field
- Display Off

Marker Data Drag and Drop

The user can click, hold, and drag the displayed marker data from its current position to any new position, or select Custom on the menu and enter X and Y values to specify an exact position.

Figure 29-13. DISPLAY POSITION

29-5 Marker Search Menus

MARKER SEARCH Menu

Previous

- [“MARKERS \[1\] Menu” on page 29-4](#)

Navigation

- [MAIN](#) | [Marker](#) | [MARKERS \[1\]](#) | [Marker Search](#) | [MARKER SEARCH](#)

Marker Search

Max

Min

Peak

Target

Tracking

OFF

Track-and-Center

OFF

Advanced Search

NOTE

Only 1 Track-and-Center marker per channel. If selected here, other will be disabled.

MARKER SEARCH Menu Button Selection Group

The Max, Min, Peak, and Target buttons form a four (4) button selection group where the selection of any one button de-selects the other three (3) buttons.

Max (Marker)

Select sets marker search to maximum values and de-selects Min, Peak, and Target.

Min (Marker)

Select sets marker search to minimum values and de-selects Max, Peak, and Target.

Peak (Marker)

Select sets marker search to Peak values, de-selects Max, Min, and Target, and then displays the PEAK menu.

• [“PEAK \(Marker\) Menu” on page 29-21](#)

Target (Marker)

Select sets marker search to Target values, de-selects Max, Min, and Peak, and then displays the TARGET menu.

• [“TARGET \(Marker\) Menu” on page 29-22](#)

Tracking (Off/On) (Marker)

Select toggles marker tracking off and on.

Track-and-Center (Off/On) (Marker)

Select toggles marker track-and-center off and on. Whenever the marker location is updated, the center frequency is automatically updated to the same value. There can be only one Track-and-Center marker per channel.

Advanced Search (Marker)

Select displays the ADVANCED SEARCH menu.

• [“ADVANCED SEARCH Markers Menu” on page 29-24](#)

Figure 29-14. MARKER SEARCH Menu

PEAK (Marker) Menu

Previous

- [“MARKER SEARCH Menu” on page 29-20](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Peak | PEAK

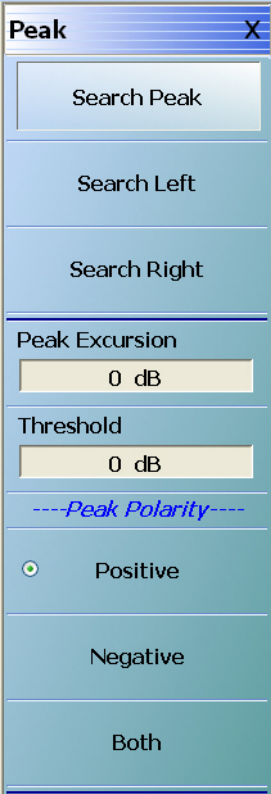
	<p>PEAK (Marker) Menu Search Button Selection Group</p> <p>The Search Peak, Search Left, and the Search Right buttons form a three (3) button selection group where selection of any one button de-selects the other two (2) buttons.</p> <p>Search Peak (Marker Peak)</p> <p>Select moves the active marker to the peak with the highest absolute value that matches the selected Peak Excursion, Threshold, and Polarity values.</p> <p>Search Left (Marker Peak)</p> <p>Select moves the active marker to the target that is nearest on its left to the peak value that matches the selected Peak Excursion, Threshold, and Polarity values.</p> <p>Search Right (Marker Peak)</p> <p>Select moves the active marker to the target that is nearest on its right to the peak value that matches the selected Peak Excursion, Threshold, and Polarity values.</p> <p>Peak Excursion (Marker Peak)</p> <p>Select displays the Peak Excursion field toolbar. Depending on instrument settings, allows the user to enter the peak excursion value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units (U).</p> <p>Example Peak Excursion (dB) Field Toolbar</p>  <p>Threshold (Marker Peak)</p> <p>Select displays the Threshold field toolbar. Depending on instrument settings, allows the user to enter the peak threshold value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units (U).</p> <p>Example Threshold (dB) Field Toolbar</p>  <p>Peak Polarity Button Selection Group</p> <p>The Positive, Negative, and Both buttons form a three (3) button selection group where the selection of any one button de-selects the other two (2) buttons.</p> <p>Positive (Marker Peak)</p> <p>Sets the peak search object polarity to positive.</p> <p>Negative (Marker Peak)</p> <p>Sets the peak search object polarity to negative.</p> <p>Both (Marker Peak)</p> <p>Sets the peak search object polarity to either positive or negative.</p>
--	---

Figure 29-15. PEAK (Marker) Menu

TARGET (Marker) Menu

Previous

- [“MARKER SEARCH Menu” on page 29-20](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Target | TARGET

TargetX

Search Target

Search Left

Search Right

Target Type

Absolute

Target Value (Abs.)

0 U

Tolerance

1 mU

--Target Transition--

Positive

Negative

Both

Absolute

TARGET Search Button Selection Group

The Search Target, Search Left, and the Search Right buttons form a three (3) button selection group where selection of any one button de-selects the other two (2) buttons.

Search Target (Marker)

Select moves the active marker to the marker that matches the target value and polarity.

Search Left (Marker)

Select moves the active marker to the marker that is nearest on its left that matches the target value and polarity.

Search Right (Marker)

Select moves the active marker to the marker that is nearest on its right that matches the target value and polarity.

Target Type

Select Absolute or Relative.

Target Value (Abs./Rel.) (Marker)

Select displays the Target Value field toolbar. If Target Type is Absolute, then the search will be performed for the entered Target Value (Abs.). If the Target Type is Relative, then the search will be performed for a delta Target Value (Rel.) relative to a reference specified by the Relative To entry. Depending on instrument settings, allows the user to enter the target value in dB , dBm, Degrees, Henrys (H), Farads (F), or Units (U) (shown below).

Example Target Value (U) Field Toolbar

Target Value (Abs.) : 0.000 U

^

v

nU

uU

mU

U

kU

Tolerance

Depending on instrument settings, allows the user to enter the tolerance value in dB, dBm, Degrees, Henrys (H), Farads (F), or Units (U).

Figure 29-16. TARGET (Marker) Menu (1 of 2)

<div><div>TargetX</div><div>Search Target</div><div>Search Left</div><div>Search Right</div><div>Target Type<div>Relative</div></div><div>Relative To<div>Maximum</div></div><div>Target Value (Rel.)<div>0 U</div><div>Absolute values use for Max./Min.</div></div><div>Tolerance<div>1 mU</div></div><div>--Target Transition--</div><div>Positive</div><div>Negative</div><div>☒ Both</div></div> <div>Relative To</div>	<div>Relative To (Only present if Target Type is Relative)</div> <div>Select displays the RELATIVE TARGET menu.</div> <div><ul style="list-style-type: none">• “RELATIVE TARGET Marker Menu” on page 29-40.</div> <div>Target Transition Button Selection Group</div> <div>The Positive, Negative, and Both buttons form a three (3) button selection group where the selection of any one button de-selects the other two (2) buttons.</div> <div>Positive (Marker Target)</div> <div>Sets the target transition to search for a positive transition.</div> <div>Negative (Marker Target)</div> <div>Sets the target transition to search for a negative transition.</div> <div>Both (Marker Target)</div> <div>Sets the target transition to search for either a positive or negative transition.</div>
---	--

Figure 29-16. TARGET (Marker) Menu (2 of 2)

ADVANCED SEARCH Markers Menu

Previous

- See: [“MARKER SEARCH Menu” on page 29-20](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH

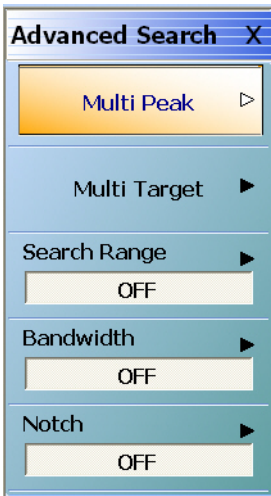
	<p>Multi Peak (Marker)</p> <p>Select displays the MULTI PEAK (Marker) menu.</p> <ul style="list-style-type: none">• “MULTI PEAK Marker Search Menu” on page 29-25 <p>Multi Target (Marker)</p> <p>Select displays the MULTI TARGET (Marker) menu.</p> <ul style="list-style-type: none">• “MULTI TARGET Marker Search Menu” on page 29-26 <p>Search Range (Off/On) (Marker)</p> <p>Select displays the SEARCH RANGE (Marker) menu.</p> <ul style="list-style-type: none">• “SEARCH RANGE Marker Menu” on page 29-27 <p>Bandwidth (Marker)</p> <p>Select displays the BANDWIDTH (Marker) menu.</p> <ul style="list-style-type: none">• “BANDWIDTH Marker Search Menu” on page 29-34 <p>Notch (Marker)</p> <p>Select displays the NOTCH (Marker) menu.</p> <ul style="list-style-type: none">• “NOTCH Marker Search Menu” on page 29-37
--	--

Figure 29-17. ADVANCED SEARCH (Marker) Menu

MULTI PEAK Marker Search Menu

Previous

- [“ADVANCED SEARCH Markers Menu” on page 29-24](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Multi Peak | MULTI PEAK

Multi Peak X

All Markers Off

Search Multi Peak

Peak Excursion0 dB

Threshold0 dB

---Peak Polarity---

☒ Positive

☐ Negative

☐ Both

All Markers Off (Multi Peak)
Select turns all markers off.

Search Multi Peak
Select starts the defined multi peak marker search.

Peak Excursion (Multi Peak)
Select displays the Peak Excursion (Multi Peak) toolbar. Depending on instrument settings, allows entry of the peak excursion value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units (U).

Example Peak Excursion (dB) (Multi Peak) Field Toolbar

Peak Excursion : 0.0000 dB ^ v dB X

Threshold (Multi Peak)
Select displays the Threshold field toolbar. Depending on instrument settings, allows the user to enter the peak excursion value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units (U).

Example Threshold (dB) (Multi Peak) Field Toolbar

Threshold : 0.0000 dB ^ v dB X

Multi Peak Polarity Button Selection Group
The Positive, Negative, and Both buttons form a button selection group where the selection of any one button de-selects the other two (2) buttons.

Positive Polarity (Multi Peak)
Sets the peak search object polarity to positive.

Negative Polarity (Multi Peak)
Sets the peak search object polarity to negative.

Both Polarity (Multi Peak)
Sets the peak search object polarity to either positive or negative.

Figure 29-18. MULTI PEAK (Marker) Menu

MULTI TARGET Marker Search Menu

Previous

- [“ADVANCED SEARCH Markers Menu” on page 29-24](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Multi Target | MULTI TARGET

Multi Target X

All Markers Off

Search Multi Target

Target Value0 U

Tolerance1 mU

--Target Transition--

Positive

Negative

Both

All Markers Off (Multi Target)
Select turns all markers off.

Search Multi Target (Multi Target)
Select starts the defined multi peak marker search with search units. Depending on instrument settings, allows entry of values in dB, dBm, Degrees, Henrys (H), or Farads (F), or Units (U) (shown below).

Example Target Value (U) Toolbar
Target Value (Abs.) : 0.000 U ^ v nU uU mU U kU

Tolerance
The tolerance value indicates how close the search must come to the target for a match to be detected. This is only needed when the computed target is close to a minimum or maximum local value of the trace in case one is not looking for an exact value match.

Example Tolerance Toolbar
Tolerance : 1.000 mU ^ v nU uU mU U kU

Multi Target Transition Button Selection Group
The Positive, Negative, and Both buttons form a button selection group where the selection of any one button de-selects the other two (2) buttons.

Positive (Multi Target)
Sets the target transition to search for a positive transition.

Negative (Multi Target)
Sets the target transition to search for a negative transition.

Both (Multi Target)
Sets the target transition to search for either a positive or negative transition.

Figure 29-19. MULTI TARGET (Marker) Menu

SEARCH RANGE Marker Menu

Previous

- [“ADVANCED SEARCH Markers Menu” on page 29-24](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Search Range | SEARCH RANGE

	<p>Search Range (Marker) (Off/On)</p> <p>Select toggles the search range off and on.</p> <p>Trace Range</p> <p>Marker Search Range Units</p> <p>The marker search range units can vary depending on the settings in the SWEEP TYPES menu and in the DOMAIN menu. The button descriptions below and their related field toolbars reflect a marker units setting of frequency in Hertz. Alternatively, marker units can be:</p> <ul style="list-style-type: none"> • dBm • Distance (km to um) • Frequency (GHz to Hz) • Number (Index Number) • Time (s to ps) <p>Start Range Buttons and Field Toolbars</p> <p>Only one of the following Start Range button/toolbar pairs appears depending on the instrument settings.</p> <p>Start Range (dBm) (Marker)</p> <p>Select displays the Start Range (dBm) field toolbar and allows entry of a starting search point in units of dBm.</p> <p>Start Range (dBm) Field Toolbar</p> <p>Start Range (Distance) (Marker)</p> <p>Select displays the Start Range (Distance) field toolbar and allows entry of a starting search point in Distance units.</p> <p>Start Range (Distance) Field Toolbar</p> <p>Start Range (Frequency) (Marker)</p> <p>Select displays the Start Range (Frequency) field toolbar and allows entry of a starting search point units of Hertz.</p> <p>Start Range (Frequency) Field Toolbar</p> <p>Start Range (Number) (Marker)</p> <p>Select displays the Start Range (Number) field toolbar and allows entry of a starting search point of Index Number.</p>
--	--

Figure 29-20. SEARCH RANGE (Marker) Menu (1 of 3)

Start Range (Number) Field Toolbar

Start Range :	0.000000000	^	v	Enter	X
---------------	-------------	---	---	-------	---

Start Range (Time) (Marker)

Select displays the Start Range (Time) field toolbar and allows entry of a starting search point in units of Time.

Start Range (Time) Field Toolbar

Start Range :	0.0000 s	^	v	s	ms	us	ns	ps	X
---------------	----------	---	---	---	----	----	----	----	---

Stop Range Buttons and Field Toolbars

Only one of the following Stop Range button/toolbar pairs appears depending on the instrument settings.

Stop Range (dBm) (Marker)

Select displays the Stop Range (dBm) field toolbar and allows entry of a stop search point in units of dBm.

Stop Range (dBm) Field Toolbar

Start Range :	0.0000 dBm	^	v	dBm	X
---------------	------------	---	---	-----	---

Stop Range (Distance) (Marker)

Select displays the Stop Range (Distance) field toolbar and allows entry of a stop search point units of Distance.

Stop Range (Distance) Field Toolbar

Stop Range :	0.0000 m	^	v	km	m	cm	mm	um	X
--------------	----------	---	---	----	---	----	----	----	---

Stop Range (Frequency) (Marker)

Select displays the Stop Range (Frequency) field toolbar and allows entry of stop search point in units of Hertz.

Stop Range (Frequency) Field Toolbar

Stop Range :	10.000000000 GHz	^	v	GHz	MHz	kHz	Hz	X
--------------	------------------	---	---	-----	-----	-----	----	---

Stop Range (Number) (Marker)

Select displays the Stop Range (Number) field toolbar and allows entry of a stop search point as an Index Number.

Stop Range (Number) Field Toolbar

Start Range :	0.000000000	^	v	Enter	X
---------------	-------------	---	---	-------	---

Stop Range (Time) (Marker)

Select displays the Stop Range (Time) field toolbar and allows entry of a stop search point in units of Time.

Stop Range (Time) Field Toolbar

Stop Range :	0.0000 s	^	v	s	ms	us	ns	ps	X
--------------	----------	---	---	---	----	----	----	----	---

Figure 29-20. SEARCH RANGE (Marker) Menu (2 of 3)

	<p>Apply to All Traces? (No/Yes) (Marker)</p> <p>Select toggles the Apply to All Traces between off and on.</p> <ul style="list-style-type: none">• If Yes (on), the trace search range set above is applied to all traces in the active channel.• If No (off), the trace search range only applies to the active trace in the active channel. <p>Banded Search Range Configuration</p> <p>Select opens the BANDED SEARCH RANGE CONFIGURATION Dialog Box.</p>
--	--

Figure 29-20. SEARCH RANGE (Marker) Menu (3 of 3)

BANDED SEARCH RANGE CONFIGURATION Dialog Box

Previous

- “SEARCH RANGE Marker Menu” on page 29-27

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Search Range | SEARCH RANGE | Banded Search Range Configuration | BANDED SEARCH RANGE CONFIGURATION Dialog Box

Banded Search Range Configuration(Channel 1;Trace 1) ✕

Define Search Range [Channel 1]
 Note: Trace 1 pertains to the current active trace range.
 Range1..20 are defined per Channel.

Range	Start Range	Stop Range
Trace 1	70 kHz	70 GHz
Range 1	0 Hz	0 Hz
Range 2	0 Hz	0 Hz
Range 3	0 Hz	0 Hz
Range 4	0 Hz	0 Hz
Range 5	0 Hz	0 Hz
Range 6	0 Hz	0 Hz
Range 7	0 Hz	0 Hz
Range 8	0 Hz	0 Hz
Range 9	0 Hz	0 Hz
Range 10	0 Hz	0 Hz
Range 11	0 Hz	0 Hz
Range 12	0 Hz	0 Hz
Range 13	0 Hz	0 Hz
Range 14	0 Hz	0 Hz
Range 15	0 Hz	0 Hz
Range 16	0 Hz	0 Hz

Assign Search Range and Settings to Markers [Trace 1]

Mrk Num	Associated Search Range	Search Type	Tracking ☐
1	Trace 1	Maximum	☐
2	Trace 1	Maximum	☐
3	Trace 1	Maximum	☐
4	Trace 1	Maximum	☐
5	Trace 1	Maximum	☐
6	Trace 1	Maximum	☐
7	Trace 1	Maximum	☐
8	Trace 1	Maximum	☐
9	Trace 1	Maximum	☐
10	Trace 1	Maximum	☐
11	Trace 1	Maximum	☐
12	Trace 1	Maximum	☐

Set all to use Trace Range

Set all Search Type to Max.

Set all Search Type to Min.

Set all Search Type to Peak

Set all Search Type to Targ.

Clear all Ranges

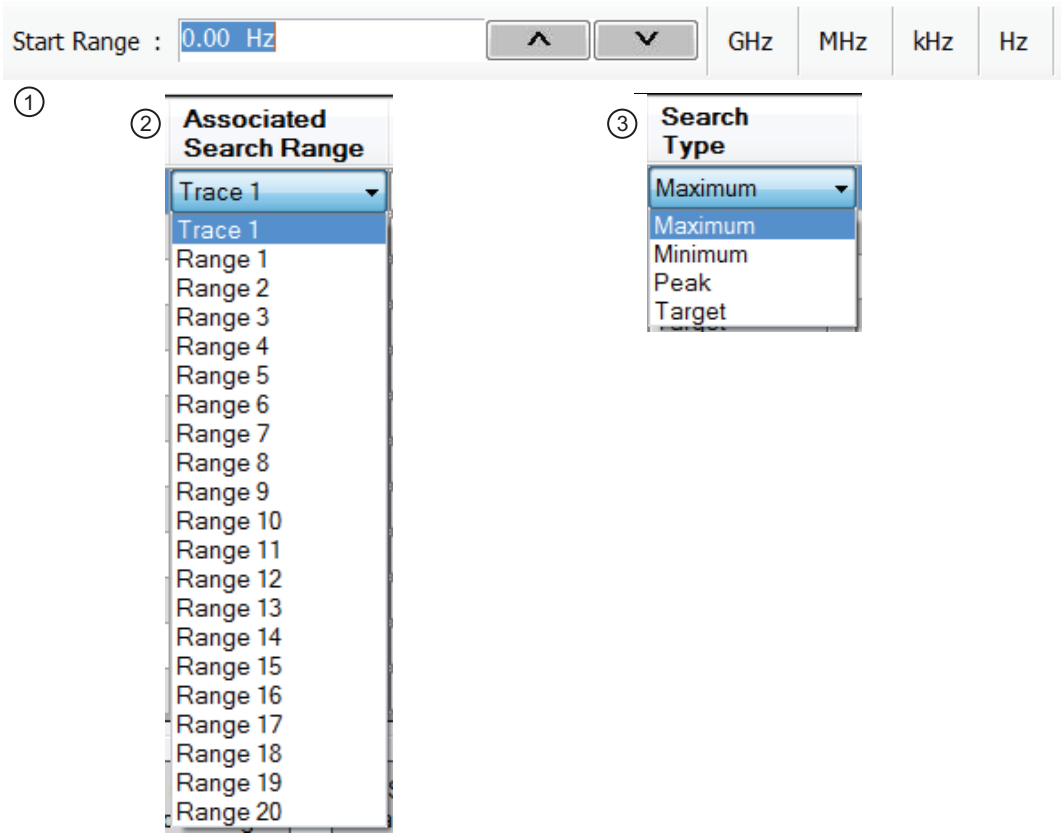
OK

Cancel

Figure 29-21. Banded Search Range Configuration Dialog Box – Frequency Sweep Example (1 of 2)

<p>Define Search Range (for active Channel 1)</p> <p>Trace X, where X signifies the active trace number. Range 1...20 are defined per channel.</p> <p>Each channel can define up to 20 search ranges that are shared by all traces within that channel.</p> <p>Trace Start range defaults to system min frequency. Trace Stop range defaults to system max. frequency. Range Start and Stop default to 0.</p> <p>Start Range – Select displays the Start Range toolbar (see Figure 29-22). Allows entry of a start range value in values that are based on the active trace domain.</p> <p>Stop Range – similar to Start Range.</p> <p>Clear All Ranges Button</p> <p>Resets all range to default values.</p> <p>Assign Search Range to Markers (for active Trace 1)</p> <p>Use to define settings for Trace 1 markers.</p> <p>Associated Search Range – Allows selection of Trace 1, Range 1, ... Range 20 (see Figure 29-22).</p> <p>Search Type – Allows selection of Maximum, Minimum, Peak, and Target (see Figure 29-22).</p> <p>Tracking – Allows marker tracking to be enabled. Selecting the Tracking header checkbox applies the selection to all markers.</p>	<p>Quick Action Buttons</p> <p>Set all to use Trace Range – All markers will use the trace range as the search range.</p> <p>Set all Search Type to Max. – Sets the search type for all markers to be 'maximum' (i.e., maximum trace value in the specified range).</p> <p>Set all Search Type to Min. – Sets the search type for all markers to be 'minimum', i.e., minimum trace value in the specified range).</p> <p>Set all Search Type to Peak – Sets the search type to 'peak' for all markers. Peak parameters defined on the peak search menu.</p> <p>Set all Search Type to Targ. – Sets the search type to target value for all markers. Target parameters defined on the relevant menu.</p>
---	--

Figure 29-21. Banded Search Range Configuration Dialog Box – Frequency Sweep Example (2 of 2)

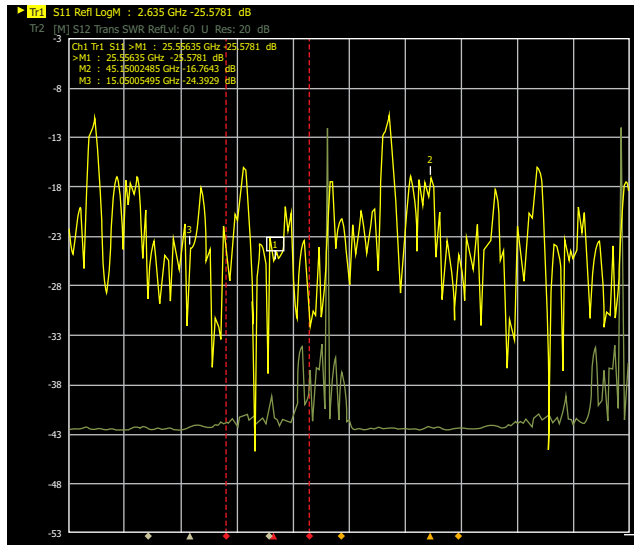


1. Start Range Toolbar: Frequency Domain example. Stop Range Toolbar is similar.	2. ASSOCIATED SEARCH RANGE Drop-down Menu
	3. SEARCH TYPE Drop-down Menu

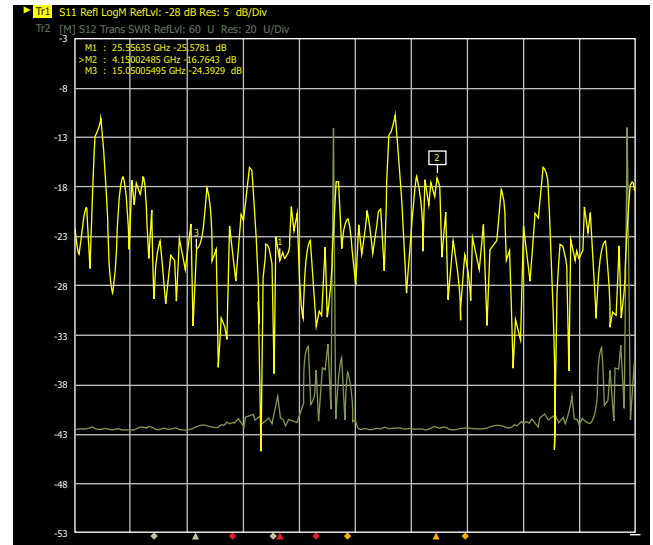
Figure 29-22. Banded Search Range Configuration Dialog Box Toolbar and Drop-Down Menus

For the display:

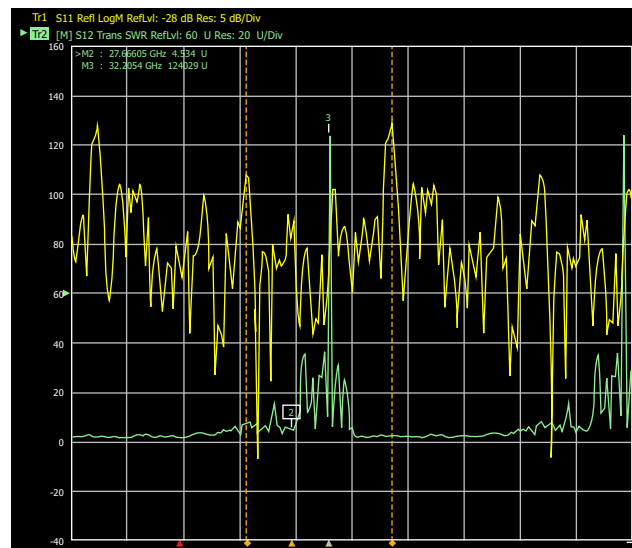
- The search range ticks are diamond shaped.
- The marker tick is triangular.
- The marker tick is the same color as the search tick of that marker.
- The tick color is per marker. Tick color is pre-defined.
- The search line color matches the tick color. Search lines are shown for the active marker.
- If search range is off, the marker tick will be white.



Trace 1, Marker 1 Active



Trace 1, Marker 2 Active

Figure 29-23. Banded Marker Search Range Examples 1 and 2

Trace 2, Marker 3 Active

Marker 2 and Marker 3 share the same search range.

Figure 29-24. Banded Marker Search Range Example 3

The statistics calculations can be a function of the search range. The statistical calculations are as follows:

- If the reference marker is on, the statistics will be calculated from the reference marker to the marker.
- If the reference marker is off and the search range is on, the statistics calculation will be based on the search range of the active marker.
- If reference marker is off and the search range is off, the statistics calculation will be based on the entire sweep range.

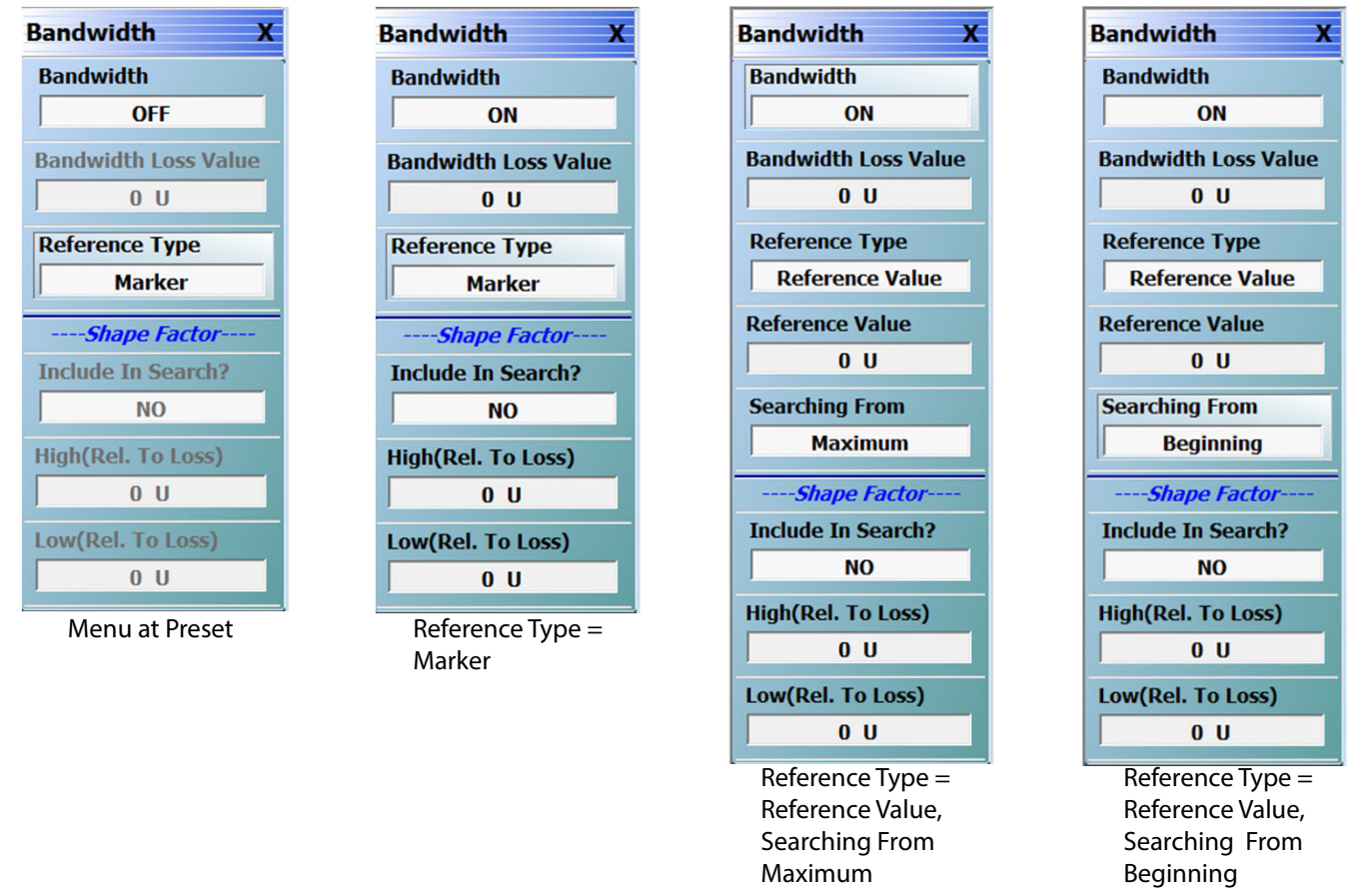
BANDWIDTH Marker Search Menu

Previous

- [“ADVANCED SEARCH Markers Menu” on page 29-24](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Bandwidth | BANDWIDTH



Bandwidth (Off/On) (Marker)

Select toggles the bandwidth marker search off and on.

Bandwidth Loss Value (Marker)

Select displays the Bandwidth Loss Value field toolbar. Depending on instrument settings, allows entry of a loss value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units.

Example Bandwidth Loss Value (dB) Field Toolbar



Reference Type

Select toggles between Marker and Reference Value. (Marker is default).

Reference Type → Marker: When Reference Type is set to Marker, the target will be the marker value – Bandwidth Loss Value.

Reference Type → Reference Value: When Reference Type is set to Reference Value, the target will be the reference value entered – Bandwidth Loss Value. See measurement example in [Figure 29-26](#).

Figure 29-25. BANDWIDTH (Marker) Menu (1 of 2)

Reference Value

Numeric entry for Reference Value. The Reference Value entry button is only visible if Reference Type is set to Reference Value. Select displays the Reference Value field toolbar and allows entry of values in Units. Depending on instrument settings, allows entry of a value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units.

Example Reference Value (dB) Field ToolbarA screenshot of the Reference Value field toolbar. It consists of a text input field containing "0.0000 dB", followed by two small square buttons with upward and downward arrows, and a unit dropdown menu currently set to "dB".

Reference Value :	0.0000 dB	^	v	dB
-------------------	-----------	---	---	----

Searching From

Toggles between Maximum and Beginning. Searching From is only visible if Reference Type is set to Reference Value. Note that if there is only one bandwidth present in the entire sweep, the Searching From field is irrelevant since both should give same result. However, if there are multiple bandwidths, then the beginning will find the first bandwidth.

Searching From → Maximum: If Maximum is selected, the algorithm will first search for the maximum value and start searching left and right for the target value from the position of the maximum value.

Searching from → Beginning: If Beginning is selected, the algorithm will search for the target value from the starting point (i.e. point 0 is search range off or search range starting position).

Note: The above settings are *per-marker* so there can be 12 different configurations that the user can set. Also, as the display readout is tied to the marker, the functionality does need the marker to be turned on but the calculation and searching is irrelevant to the marker.

— Shape Factor —**Include in Search? (Yes/No) (Marker)**

Select toggles whether the shape factor will be included in the marker search (Yes) or not included in the search (No).

High (Rel. To Loss) (dB) (Marker)

Select displays the High (Relative to Loss) field toolbar. Depending on instrument settings, allows entry of a high loss value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units.

Example High (Rel. To Loss) (dB) Field ToolbarA screenshot of the High (Rel. To Loss) field toolbar. It consists of a text input field containing "20.0000 dB", followed by two small square buttons with upward and downward arrows, a unit dropdown menu set to "dB", and a small 'X' button to clear the field.

High(Rel. To Loss) :	20.0000 dB	^	v	dB	X
----------------------	------------	---	---	----	---

Low (Rel. To Loss) (dB) (Marker)

Select displays the Low (Relative to Loss) field toolbar. Depending on instrument settings, allows entry of a low loss value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units.

Example Low (Rel. To Loss) (dB) Field ToolbarA screenshot of the Low (Rel. To Loss) field toolbar. It consists of a text input field containing "30.0000 dB", followed by two small square buttons with upward and downward arrows, a unit dropdown menu set to "dB", and a small 'X' button to clear the field.

Low(Rel. To Loss) :	30.0000 dB	^	v	dB	X
---------------------	------------	---	---	----	---

Figure 29-25. BANDWIDTH (Marker) Menu (2 of 2)

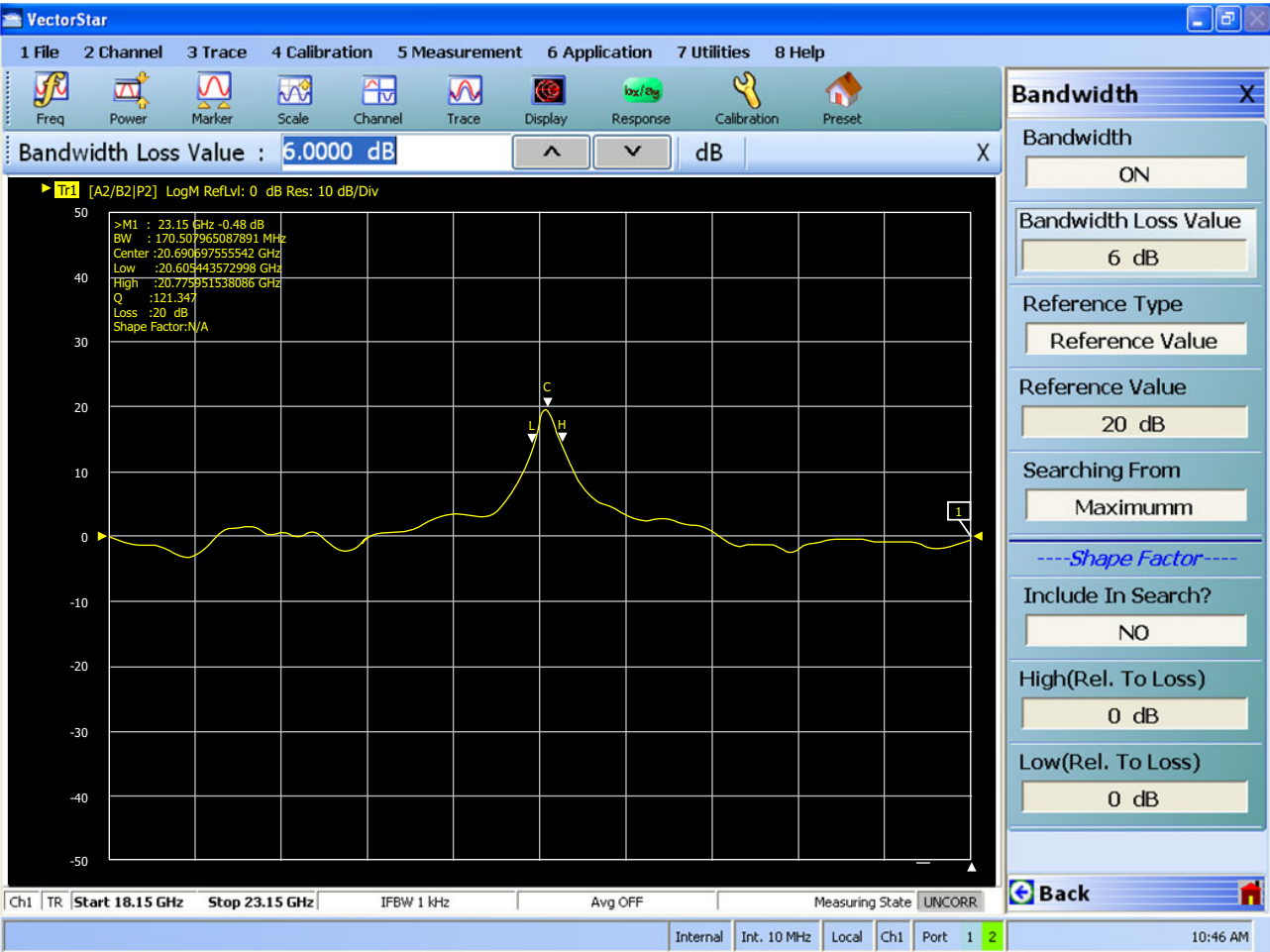


Figure 29-26. Example Bandwidth Marker Search Using Reference Value

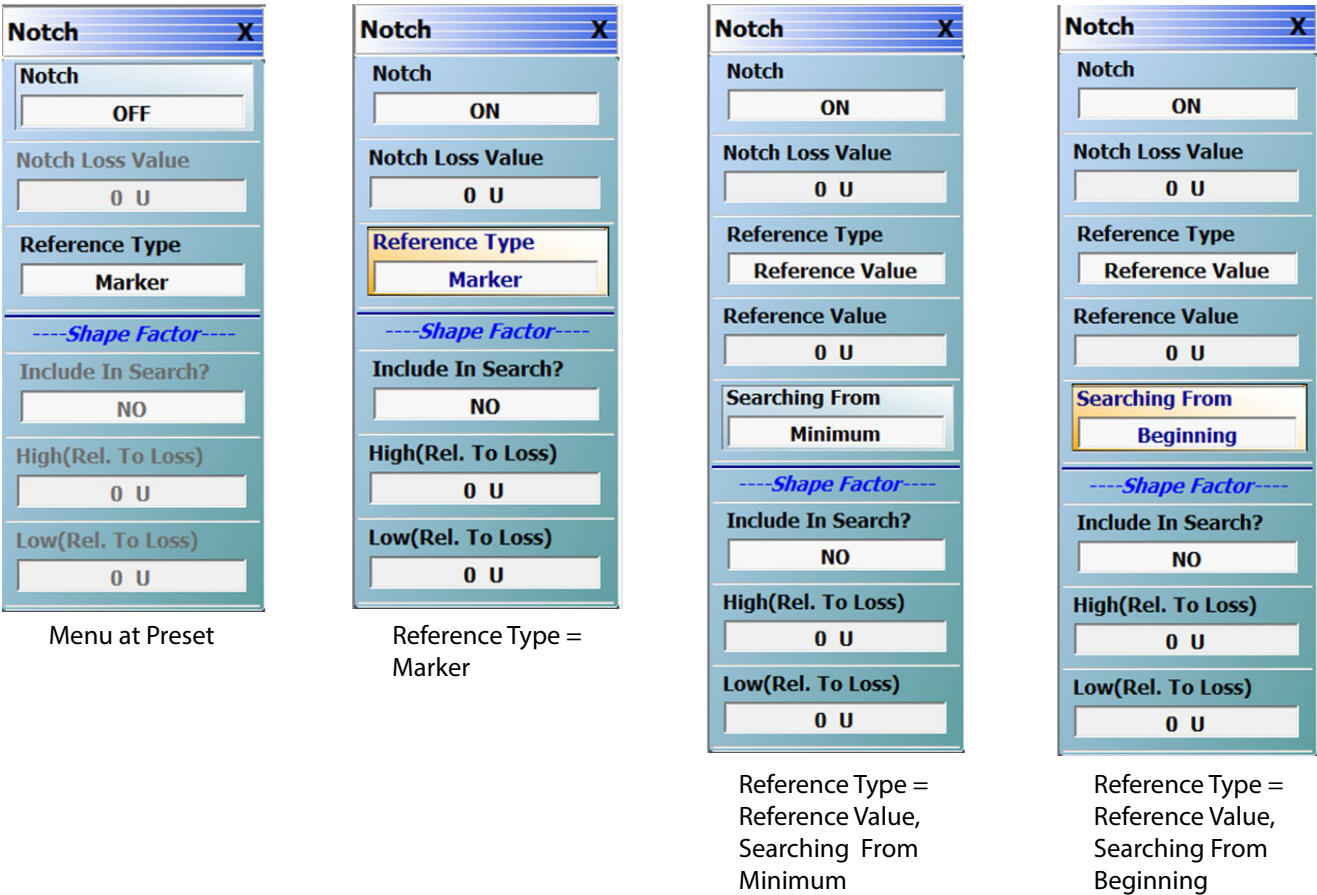
NOTCH Marker Search Menu

Previous

- “ADVANCED SEARCH Markers Menu” on page 29-24

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Advanced Search | ADVANCED SEARCH | Notch | NOTCH



Notch (Off/On) (Marker)

Select toggles the bandwidth marker search off and on.

Notch Loss Value (Marker)

Select displays the Notch Loss Value field toolbar. Depending on instrument settings, allows entry of a loss value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units.

Example Notch Loss Value (dB) Field Toolbar



Reference Type

Select toggles between Marker and Reference Value. (Marker is default).

Reference Type → Marker: When Reference Type is set to Marker, the target will be the marker value – Notch Loss Value

Reference Type → Reference Value: When Reference Type is set to Reference Value, the target will be the reference value entered – Notch Loss Value. See measurement example in [Figure 29-28](#).

Figure 29-27. NOTCH (Marker) Menu (1 of 2)

Reference Value

Numeric entry for Reference Value. This field is only visible if Reference Type is set to Reference Value. Select displays the Reference Value field toolbar and allows entry of values in Units. Depending on instrument settings, this search function can be in units of dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units (U).

Example Reference Value (dB) Field Toolbar.

Reference Value : 0.0000 dB ^ v dB X

Searching From

Toggles between Minimum and Beginning. This field is only visible if Reference Type is set to Reference Value. Note that if there is only one notch present in the entire sweep, the Searching From field is irrelevant since both should give same result. However, if there are multiple notches, then the beginning will find the first notch.

- Searching From → Minimum:** If Minimum is selected, the algorithm will first search for the minimum value and start searching left and right for the target value from the position of the minimum value.
- Searching from → Beginning:** If Beginning is selected, the algorithm will search for the target value from the starting point (i.e. point 0 is search range off or search range starting position).

Note: The above settings are *per-marker* so there can be 12 different configurations that the user can set. Also, as the display readout is tied to the marker, the functionality does need the marker to be turned on but the calculation and searching is irrelevant to the marker.

— Shape Factor —

Include in Search (No/Yes) (Marker)

Select toggles whether the notch shape factor is or is not included in the search.

High (Rel. To Loss) (dB) (Marker)

Select displays the High (Relative to Loss) (Notch) field toolbar. Depending on instrument settings, allows entry of a high loss value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units (U).

Example High (Rel. To Loss) (dB) Field Toolbar

High(Rel. To Loss) : 20.0000 dB ^ v dB X

Low (Rel. To Loss) (dB) (Marker)

Select displays the Low (Relative to Loss) (Notch) field toolbar. Depending on instrument settings, allows entry of a low loss value in dB (shown below), dBm, Degrees, Henrys (H), Farads (F), or Units (U).

Example Low (Rel. To Loss) (dB) Field Toolbar

Low(Rel. To Loss) : 10.0000 dB ^ v dB X

Figure 29-27. NOTCH (Marker) Menu (2 of 2)

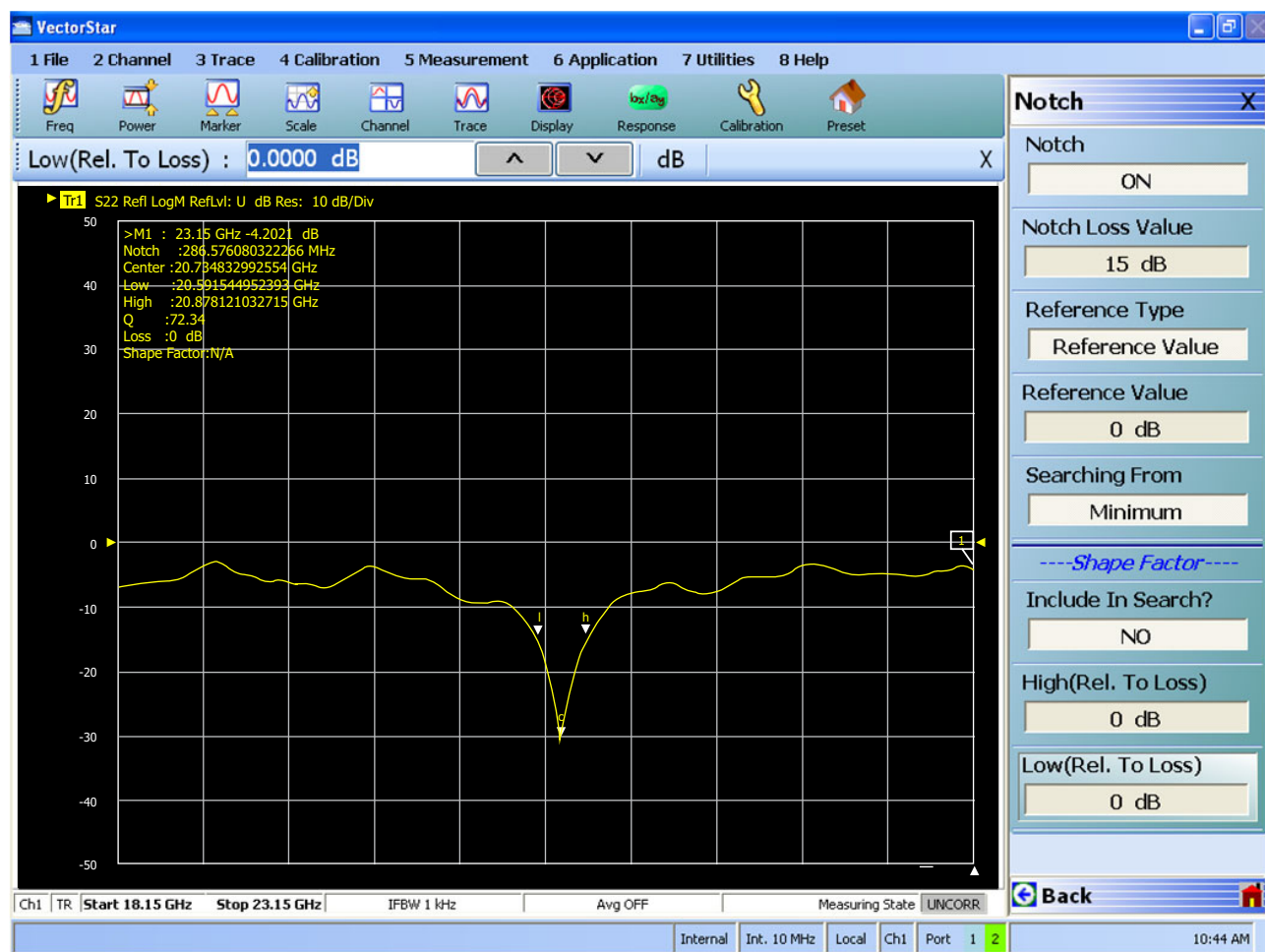


Figure 29-28. Example Notch Marker Search Using Reference Value

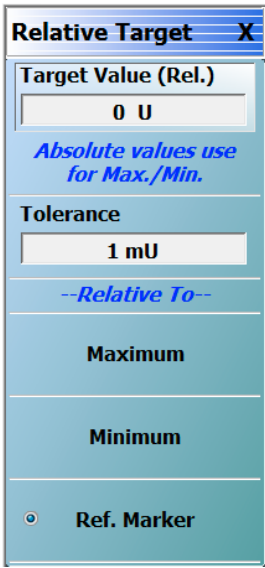
RELATIVE TARGET Marker Menu

Previous

- [“TARGET \(Marker\) Menu” on page 29-22](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Search | MARKER SEARCH | Target | TARGET | Target Type → Relative | Relative To | RELATIVE TARGET



Example Target Value (Rel.) Toolbar



Tolerance

The tolerance value indicates how close the search must come to the target for a match to be detected. This is only needed when the computed target is close to a minimum or maximum local value of the trace in case one is not looking for an exact value match.

Example Tolerance Toolbar



Relative To Button Group

Select toggles between Marker and Reference Value. (Marker is default).

- Maximum:** When Relative To is set to Maximum, the search will be for a value equal to the maximum value (in the relevant range) minus the absolute value of the target.
- Minimum:** When Relative To is set to Minimum, the search will be for a value equal to the minimum value (in the relevant range) plus the absolute value of the target.
- Ref. Marker:** When Relative To is set to Ref. Marker, the search will be for a value equal to the reference value plus the target value. Note that the target value can be positive or negative.

Figure 29-29. RELATIVE TARGET Marker Menu

29-6 Marker Value/Math Functions

MKR FUNCTIONS Menu

Full Name

Marker Functions

Previous

- [“MARKERS \[1\] Menu” on page 29-4](#)

Navigation

- MAIN | Marker | MARKERS [1] | Marker Functions | MKR FUNCTIONS

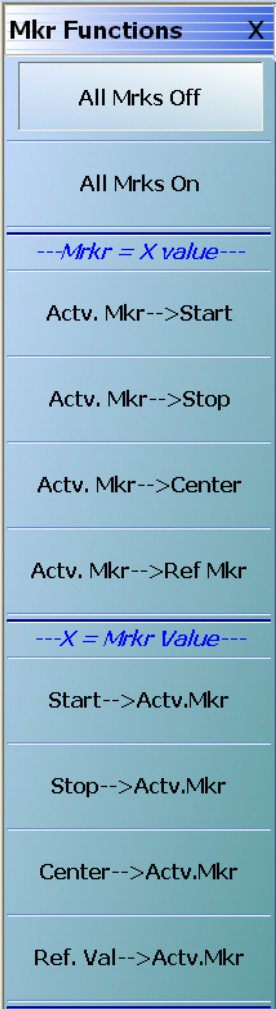
	<p>All Markers Off/On Button Selection Group</p> <p>The All Markers Off and All Markers On buttons form a two (2) button selection group where the selection of one button de-selects the other button.</p> <p>All Markers Off</p> <p>On a per-channel basis, if the All Markers Off button is selected, all markers (Marker 1 through Marker 12) are turned off including the Reference Marker (Ref. Mkr [OFF]).</p> <p>All Markers On</p> <p>On a per-channel basis, if the All Markers On button is selected, all markers (Marker 1 through Marker 12) are turned on. If off, the Reference Marker (Ref. Mkr [OFF]) is left off. If on, Ref. Mkr [ON] is left on.</p> <p>Marker = X Value Area</p> <p>The buttons in this area set the value of the currently selected marker to that of the specified start, stop, center, or reference marker.</p> <p>Actv. Mkr→Start</p> <p>Sets the value of the active marker on the active trace to that of the start range. If All Markers Off is set, the button is unavailable.</p> <p>Actv. Mkr→Stop</p> <p>Sets the value of the active marker on the active trace to that of the stop range. If All Markers Off is set, the button is unavailable.</p> <p>Actv. Mkr→Center</p> <p>Sets the value of the active marker on the active trace to that of the center range. If All Markers Off is set, the button is unavailable.</p> <p>Actv. Mkr→Ref. Mkr</p> <p>Sets the value of the active marker on the active trace to that of the Reference Marker. If All Markers Off is set, the button is unavailable.</p>
--	---

Figure 29-30. MKR FUNCTIONS (MARKER FUNCTIONS) Menu (1 of 2)

	<div><div>--- X Value Area = Mkr Value ---</div><div>The buttons in this area set the value of the currently specified start, stop, center, or reference marker to the selected marker.</div><div><div>Start→Actv. Mkr</div><div>Sets the value of the start frequency to that of the active marker on the active trace. If All Markers Off is set, the button is unavailable.</div></div><div><div>Stop→Actv. Mkr</div><div>Sets the value of the stop frequency to that of the active marker on the active trace. If All Markers Off is set, the button is unavailable.</div></div><div><div>Center→Actv. Mkr</div><div>Sets the value of the center frequency to that of the active marker on the active trace. If All Markers Off is set, the button is unavailable.</div></div><div><div>Ref. Val→Actv. Mkr</div><div>Sets the value of the reference line to that of the active marker on the active trace. If All Markers Off is set, the button is unavailable.</div></div></div>
--	---

Figure 29-30. MKR FUNCTIONS (MARKER FUNCTIONS) Menu (2 of 2)

Chapter 30 — System Menus

30-1 Chapter Overview

This chapter covers system and instrument management and configuration functions including initial setup, power-on options, preset options, remote interface management, network interface, self-test, and diagnostics.

- “SYSTEM Menu” on page 30-3
- “SETUP Menu” on page 30-5
- “PRESET SETUP Menu” on page 30-7
 - “SELECT PRESET SETUP Dialog Box” on page 30-8
- “POWER-ON SETUP Menu” on page 30-9
 - “SELECT USER SETUP FILE (CHA) Dialog Box” on page 30-10
 - “DATE AND TIME Dialog Box” on page 30-11
- “COLORS SETUP Menu” on page 30-12
 - “COLOR SETUP Dialog Box” on page 30-13
 - “COLOR Picker Dialog Box” on page 30-14
- “FONT DIALOG and FONT Dialog Boxes” on page 30-15
- “TRACE THICKNESS SETUP Dialog Box” on page 30-18
- “MAX. POINTS Menu” on page 30-19
- “MISC. SETUP Menu” on page 30-20
 - “MANAGE OPTIONS Dialog Box” on page 30-24
 - “INSTRUMENT SETTINGS Dialog Box” on page 30-25
 - “OPTION STATUS Dialog Box” on page 30-26
- “SnP Files Setup” on page 30-27
 - “SnP SETUP Dialog Box – 2-Port VNAs” on page 30-27
 - “SnP SETUP Dialog Box – 4-Port VNAs” on page 30-30
- “UTILITY Menu” on page 30-35
 - “HAMPSHIRE TSHARC (TOUCHSCREEN) CONTROL PANEL Dialog Box” on page 30-40
- “AUTOCAL CHARAC. Menu” on page 30-37
 - “Remote Interface Menus and Dialog Boxes” on page 30-43
 - “SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box” on page 30-39
- “REMOTE INTER. Menu” on page 30-43
 - “MULTIPOINT TEST SET CONFIGURATION Dialog Box – 4-Port VNAs” on page 30-45
- “REMOTE LANG. Menu” on page 30-46
- “EXT. SRC ADDR. Menu” on page 30-47
- “POWER METERS Menu” on page 30-48
 - “D-BAND POWER METER CONFIGURATION Dialog Box” on page 30-49
- “NETWORK INTERF. Menu” on page 30-50
 - “NETWORK CONNECTIONS Dialog Box” on page 30-52
 - “SELF TEST Dialog Box” on page 30-53
 - “EVENT VIEWER Dialog Box” on page 30-54

- “REAR PANEL OUT. Menu” on page 30-55
 - “EDIT REAR PANEL OUTPUT MODE Dialog Box” on page 30-57
 - “DIAGNOSTICS ACCESS Dialog Box” on page 30-59

30-2 System Menus

SYSTEM Menu

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | System | SYSTEM

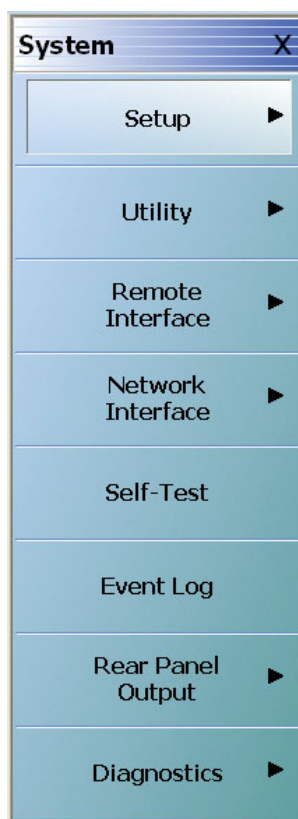


Figure 30-1. SYSTEM Menu

Setup

Select displays the SETUP menu.

- [“SETUP Menu” on page 30-5](#)

Utility

Select displays the UTILITY menu.

- [“UTILITY Menu” on page 30-35](#)

Remote Interface

Select displays the REMOTE INTERFACE menu where GPIB addresses for remote instruments are assigned.

- [“REMOTE INTER. Menu” on page 30-43](#)

Network Interface

Select displays the NETWORK INTERFACE menu.

- [“NETWORK INTERF. Menu” on page 30-50](#)

Self-Test

Select displays the SELF TEST dialog box.

- [“SELF TEST Dialog Box” on page 30-53](#)

Event Log

Select displays the EVENT VIEWER dialog box.

- [“EVENT VIEWER Dialog Box” on page 30-54](#)

Rear Panel Output

Select displays the REAR PANEL OUTPUT menu.

- [“REAR PANEL OUT. Menu” on page 30-55](#)

Diagnostics

Select displays the DIAGNOSTICS ACCESS dialog box.

- [“DIAGNOSTICS ACCESS Dialog Box” on page 30-59](#)

30-3 Setup Menu

SETUP Menu

Previous

- [“SYSTEM Menu” on page 30-3](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP

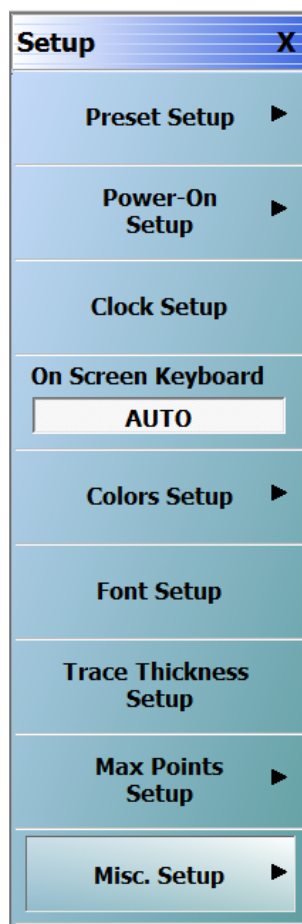


Figure 30-2. SETUP Menu

Preset Setup

Select displays the PRESET SETUP menu.

- [“PRESET SETUP Menu” on page 30-7](#)

Power On Setup

Select displays the POWER-ON SETUP menu.

- [“POWER-ON SETUP Menu” on page 30-9](#)

Clock Setup

Displays the DATA AND TIME PROPERTIES dialog box.

- [“DATE AND TIME Dialog Box” on page 30-11](#)

On Screen Keyboard

Select allows the user to change the on-screen keyboard mode from AUTO to OFF. When set to AUTO (which is the default mode), the VectorStar will launch the on-screen keyboard whenever needed. When toggled to OFF, no on-screen keyboard will be launched.

Colors Setup

Select opens the COLORS SETUP menu.

- [“COLORS SETUP Menu” on page 30-12](#)

Font Setup

Select displays the FONT DIALOG dialog box.

- [“FONT DIALOG and FONT Dialog Boxes” on page 30-15](#)

Trace Thickness Setup

Select displays the TRACE THICKNESS SETUP dialog box.

- [“TRACE THICKNESS SETUP Dialog Box” on page 30-18](#)

Max Points Setup

Select display the MAX POINTS menu.

- [“MAX. POINTS Menu” on page 30-19](#)

Misc. Setup

The MISC. SETUP menu varies depending on whether the VNA is in 2-Port or 4-Port Mode. Select displays the MISC SETUP menu.

- [“MISC. SETUP Menu” on page 30-20](#)

30-4 Preset Menus and Dialog Boxes

PRESET SETUP Menu

Use the PRESET SETUP menu to define which previously saved preset configuration file will be applied to the instrument.

Previous

- [“SETUP Menu” on page 30-5](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Preset Setup | PRESET SETUP

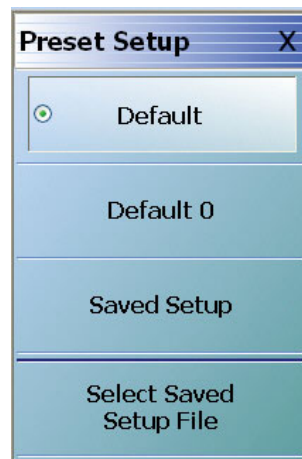


Figure 30-3. PRESET SETUP Menu

PRESET SETUP Menu Button Selection Group

The Default, Default 0, and Saved Setup buttons form a three-button selection group where selecting one button de-selects the other two buttons.

Preset Actions

The selected Default or Saved Setup presets (described below) are invoked by any of the following:

- **Preset Key**
- MENU BAR | Utilities | Preset

Default

If selected, Default selection loads the factory as-shipped preset configuration which is one channel with four traces displayed on a two-row and two-column trace display. This preset option is always available. Once this option is selected, if the user presses the front panel **Preset Key** or selects MENU BAR | Utilities | Preset, the instrument returns to the factory as-shipped configuration.

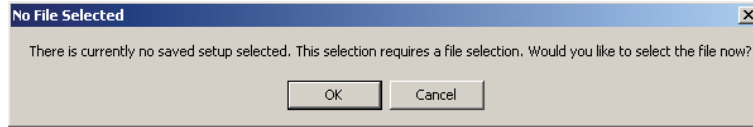
Default 0

The Default 0 button operates identical to the Default button (above) with the addition removing any Cal Kits and/or Characterization Coefficient files from instrument memory. Once used, all connector coefficients are then returned to the factory as-shipped default values. Note that any Cal Kit and/or Characterization Coefficient files resident on the instrument hard drive are not deleted and remain in place. If this command is used, the user must re-load into memory all required Cal Kit and other Characterization Coefficient files.

Saved Setup

If selected, the **Saved Setup** selection loads the setup file selected in the dialog box below. Once selected, if either of the preset actions (described above) occur, the preset file returns the instrument to the user-defined configuration.

If the **Saved Setup** button is clicked when no prior **Setup File** has been saved, a **NO FILE SELECTED** dialog box appears with the message: “There is currently no saved setup selected. This selection requires a file selection. Would you like to select the file now?”



- Click OK to open the **SELECT PRESET SETUP** dialog box described below.
- Click CANCEL to close the dialog box.

Select Saved Setup File

Select displays the **SELECT PRESET SETUP** dialog box where a previously saved setup configuration file is be selected. Once a file is selected, the **Saved Setup** button must be selected to implement the configuration from the:

- **Preset Key**
- MENU BAR | Utilities | Preset
- [“SELECT PRESET SETUP Dialog Box” on page 30-8](#)

SELECT PRESET SETUP Dialog Box

Previous

- [“PRESET SETUP Menu” on page 30-7](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Preset Setup | PRESET SETUP | Saved Setup | **SELECT PRESET SETUP Dialog Box**

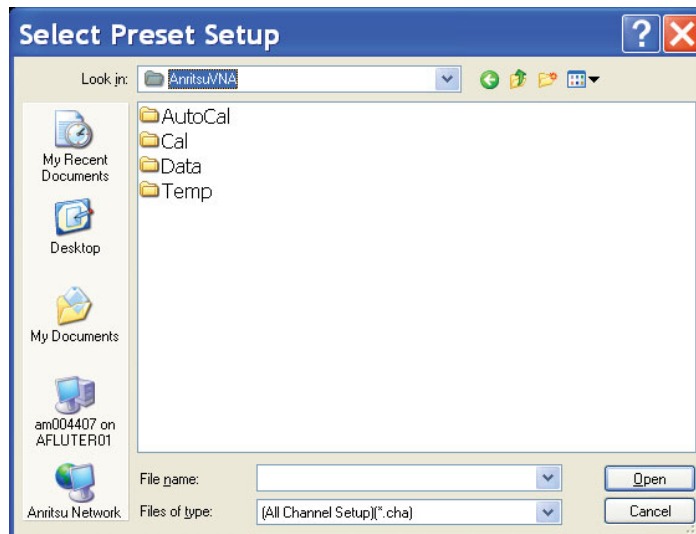


Figure 30-4. SELECT PRESET SETUP Dialog Box

Allows the user to select a previously saved All Channel Setup CHA file. Navigate to the saved CHA file, select it, and then click **Open** to use the file. Click **Cancel** to cancel the operation.

POWER-ON SETUP Menu

The POWER-ON SETUP menu defines in which configuration the instrument will restore to after a cold start and full power-up. In order to use the **Saved Setup** option, a previously stored power-up setup file must have been saved using the menu bar **Save Setup** command.

Menu Bar

- MENU BAR | File Drop-Down Menu

Previous

- [“SETUP Menu” on page 30-5](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Power-On Setup | POWER-ON SETUP

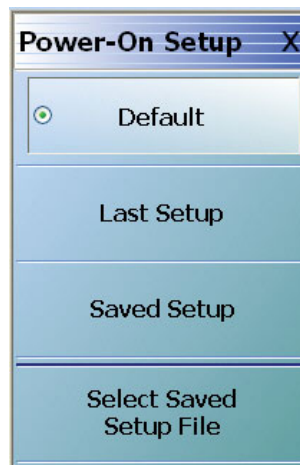


Figure 30-5. POWER-ON SETUP Menu

POWER-ON SETUP Menu Button Selection Group

The **Default**, **Last Setup**, and **Select Saved Setup File** buttons form a button selection group where only one (1) of the three buttons may be selected. Once selected, the power-on setting remains until changed.

Default

Select sets the factory default as-shipped power-on setup settings. This setting is always available.

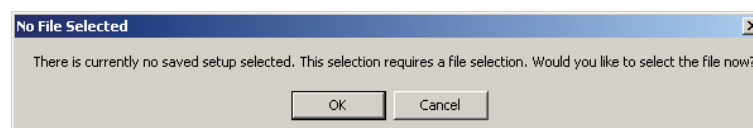
Last Setup

For many users in general purpose work, this setting is the user-selected default. Select sets the power-on setup to be from the last operational state including frequencies, channels, traces, markers, and limit lines.

Saved Setup

Select sets the power-on settings to a previously saved user-defined setup file, useful for repeated identical settings in a line production mode. Using the button described below, a previously-saved setting file can be recalled and will remain active until changed. The system can store multiple setup files but only one can be active at any time.

If the **Saved Setup** button is clicked when no prior Setup File has been saved, a **NO FILE SELECTED** dialog box appears with the message: “There is currently no saved setup selected. This selection requires a file selection. Would you like to select the file now?”



- Click OK to open the SELECT USER SETUP FILE (CHA FILE) dialog box described below.
- Click CANCEL to close the dialog box.

Select Saved Setup File

Use this button to display a dialog to recall a previously saved setup file. Once recalled, the file settings can be implemented by selecting the Saved Setup button above. Select displays the SELECT USER SETUP FILE dialog box.

- [“SELECT USER SETUP FILE \(CHA\) Dialog Box” on page 30-10](#)

SELECT USER SETUP FILE (CHA) Dialog Box

Use the SELECT USER SETUP FILE dialog to select a previously saved power-on setup file for use on the POWER-ON SETUP menu.

Previous

- [“POWER-ON SETUP Menu” on page 30-9](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Power-On Setup | POWER-ON SETUP | Saved Setup | SELECT USER SETUP FILE (CHA) Dialog Box

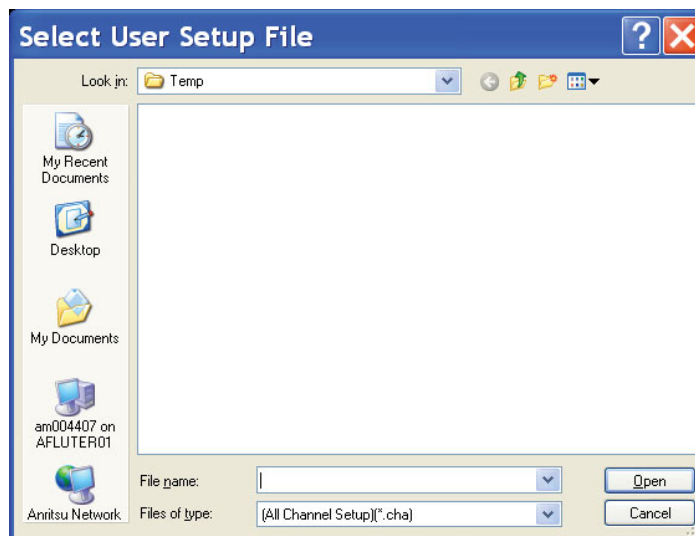


Figure 30-6. SELECT USER SETUP FILE (CHA) Dialog Box

Instructions

Use this dialog to select a previously stored power-on setup configuration file.

1. Navigate to the POWER-ON SETUP menu.
 - MAIN | System | SYSTEM | Setup | SETUP | Power-On Setup | POWER-ON SETUP | Select Saved Setup File
2. The Select User Setup File dialog box appears.
3. Navigate to the required folder and locate the required All Channel Setup (.CHA) file.
 - Best practices recommend the C:\AnritsuVNA folder.
4. Once the appropriate file is selected, click Open.
5. The selected power-on setup file is now available for use on the POWER-ON SETUP menu if the Saved Setup button is selected.
 - [“POWER-ON SETUP Menu” on page 30-9](#)

30-5 Time Setup Dialog Box

DATE AND TIME Dialog Box

Previous

- “SETUP Menu” on page 30-5

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Clock Setup | DATE AND TIME Dialog Box

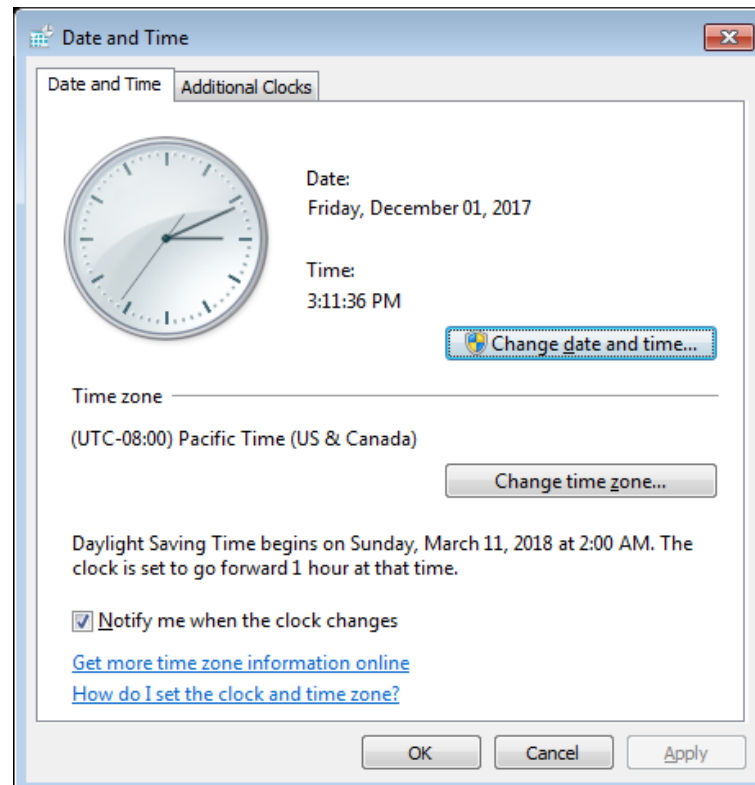


Figure 30-7. DATE AND TIME PROPERTIES Dialog Box

Instructions

Click OK to apply changes and close the dialog box. Click Cancel to close without changes. Click Apply to apply changes and remain in the dialog box.

30-6 Colors Setup Menu and Dialogs

COLORS SETUP Menu

Previous

- [“SYSTEM Menu” on page 30-3](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Colors Setup | COLORS SETUP

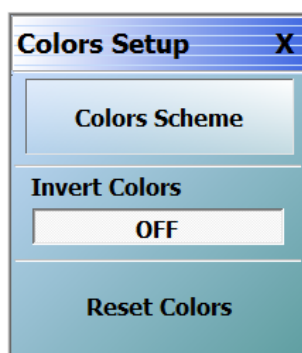


Figure 30-8. COLORS SETUP Menu

Colors Scheme

Select displays the COLOR SETUP dialog box used to change the display colors.

- [“COLOR SETUP Dialog Box” on page 30-13](#)

Invert Colors

Select toggles the main display from the system default off and on. From the default state, the first click inverts background color from black to white. A second click changes the background to the factory default setting of black background.

Reset Colors

Select displays the RESET Colors dialog box to confirm the reset. Click **Cancel** leave the colors as is. Click **OK** to reset the all colors to the factory default setting.

COLOR SETUP Dialog Box

Previous

- “SETUP Menu” on page 30-5

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Color Setup | COLOR SETUP Dialog Box

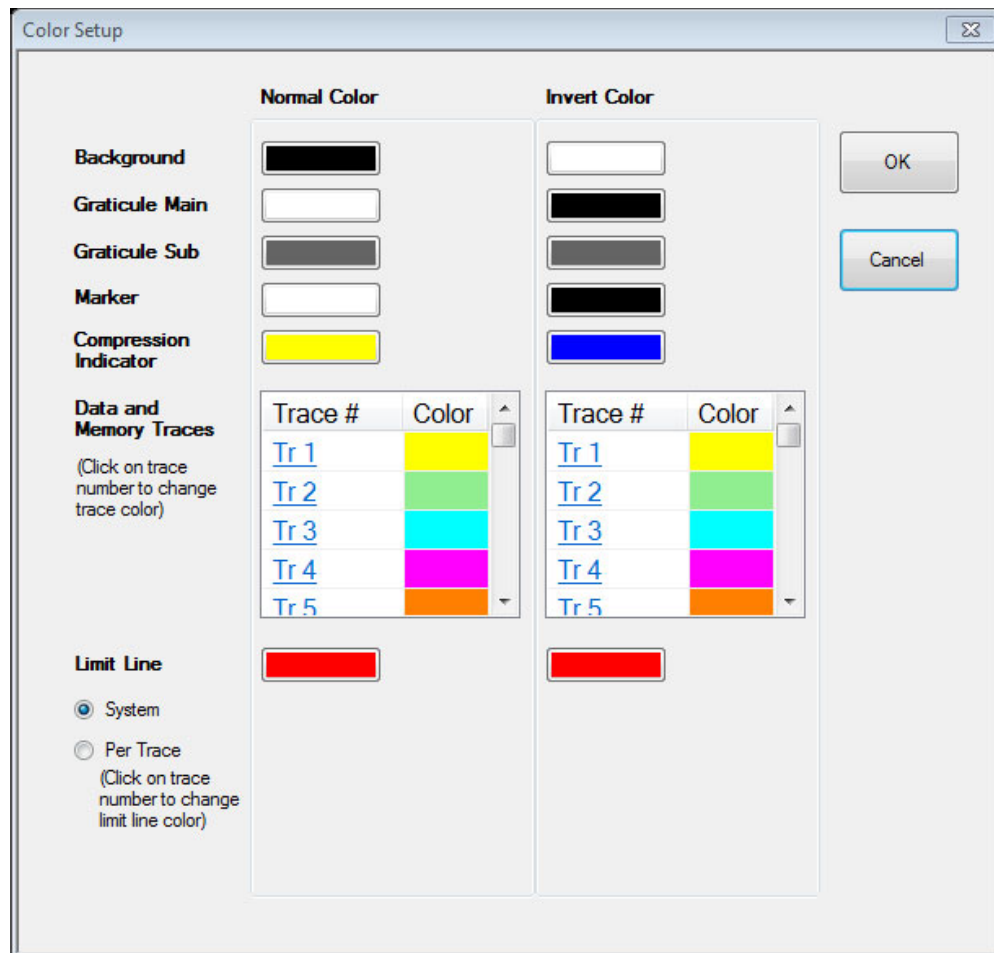


Figure 30-9. COLOR SETUP Dialog Box

Modifying Default Colors

Use the Color Setup dialog box to assign colors in:

- Normal Mode for Background, Graticule Main, Graticule Sub, Limit Lines, and each trace.
- Invert Color Mode for the same elements.

Color Setup

To change Background, Graticule Main, Graticule Sub, and Limit Line colors, click on the color block to display the Color Pallet dialog box. To change the trace color, click on the trace number such as Tr1. To save a color assignment, click OK or click Cancel to exit.

Limit Line System/Per Trace Radio Buttons

- System – Select any one color for all limit lines (both Normal and Invert).
- Per Trace – Select limit line color for each trace (both Normal and Invert). The selected color for each trace is applied to the limit lines for the corresponding trace in all the channels.

COLOR Picker Dialog Box

Previous

- [“COLOR SETUP Dialog Box” on page 30-13](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Color Setup | COLOR SETUP Dialog Box | Color Block | COLOR Picker Dialog Box

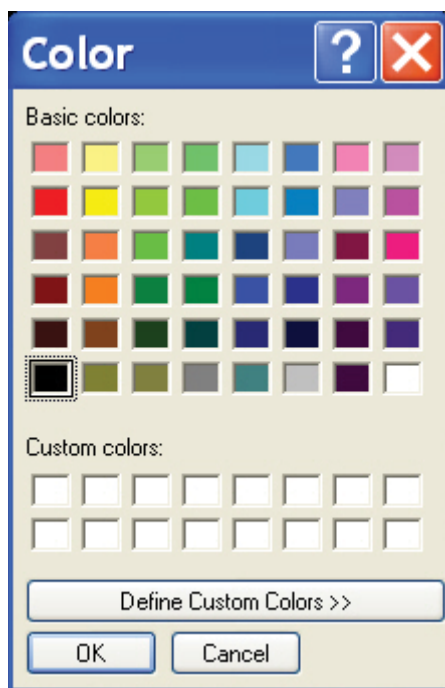


Figure 30-10. COLOR PALLET Dialog Box

Color Reset

To reset all colors to the factory-default setting, click the Reset Colors button.

- MAIN | System | SYSTEM | Setup | SETUP | Reset Colors

30-7 FONT DIALOG and FONT Dialog Boxes

Font Dialog

Previous

- “SETUP Menu” on page 30-5

Navigation

MAIN | System | SYSTEM | Setup | SETUP | Font Setup | FONT DIALOG (dialog box)

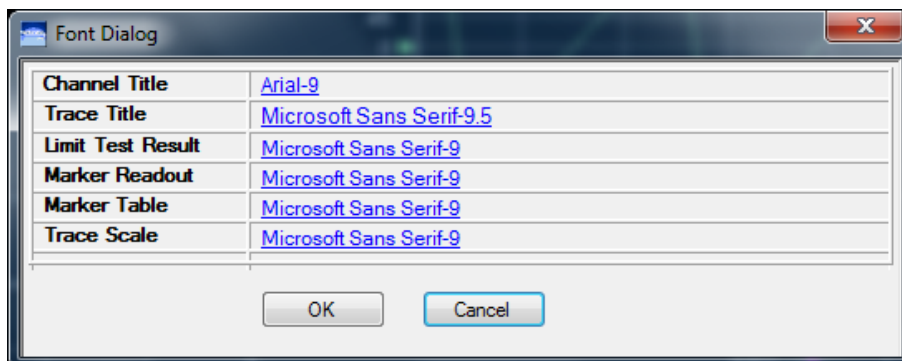
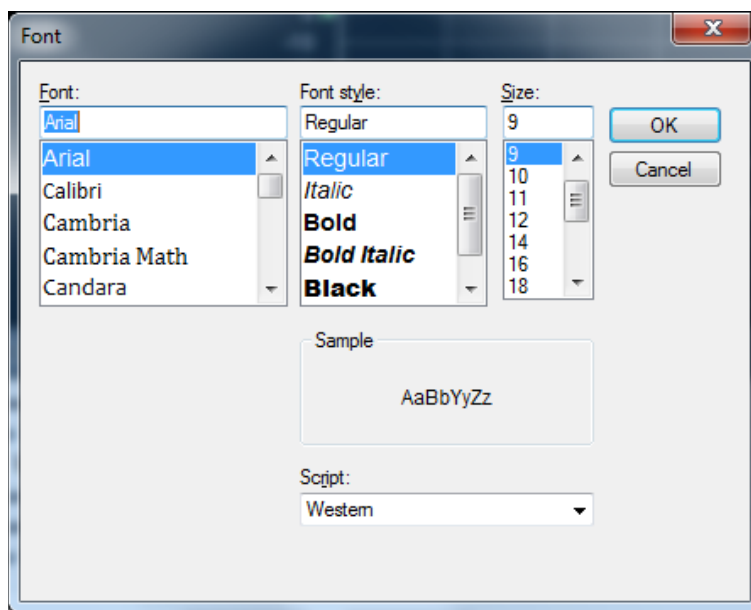


Figure 30-11. FONT DIALOG and FONT Dialog Boxes

Clicking on the Font Setup menu item will display a font setup dialog with the following items where the user can change their font details. By clicking on each item, the Font dialog is displayed where user can change the font, font style and size for that particular item:

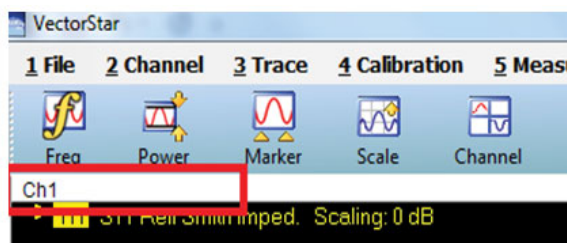
Channel Title

- User may modify the font for the active Channel Title text by setting the values from Font dialog.
- If the Channel Title is not displayed in the screen, the visibility can be changed from the menu “Display Area Setup” from the Display menu.

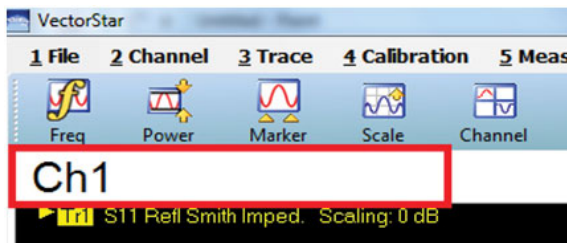
Navigation:

Main | Display | Display Area Setup | Chan. Title | (toggle On/Off)

Before



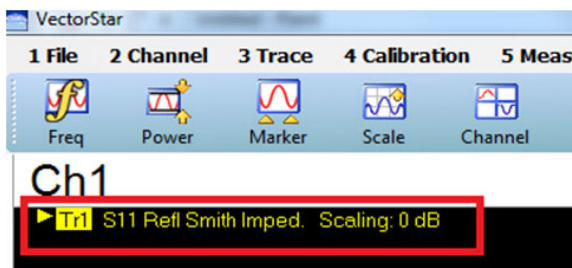
After



Trace Title

- User may modify the font for the Trace Title text by setting the values from Font dialog.

Before



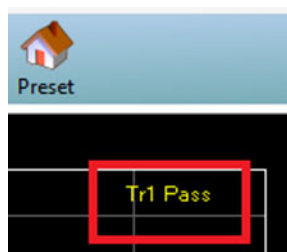
After



Limit Test Result

- User may modify the font for the Limit Test Result text by setting the values from Font dialog.

Before

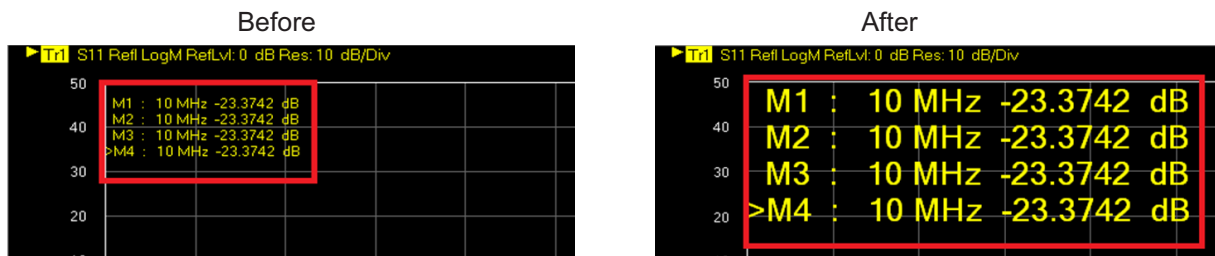


After



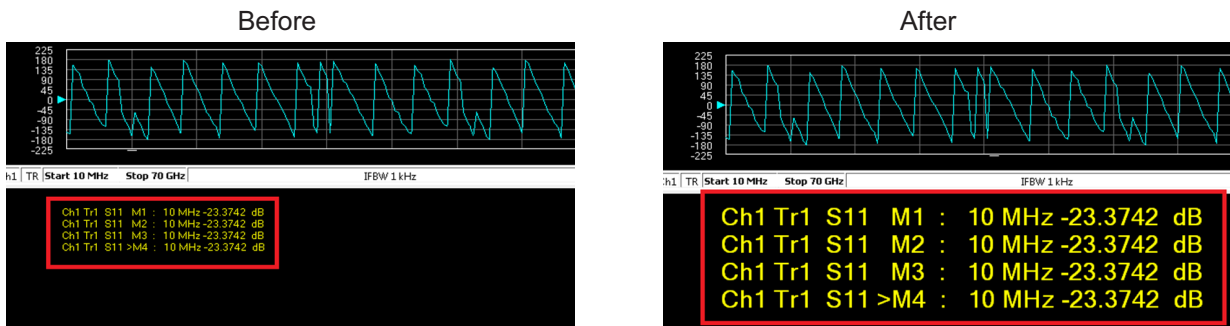
Marker Readout

- User may modify the font for the Marker Readout text by setting the values from Font dialog.



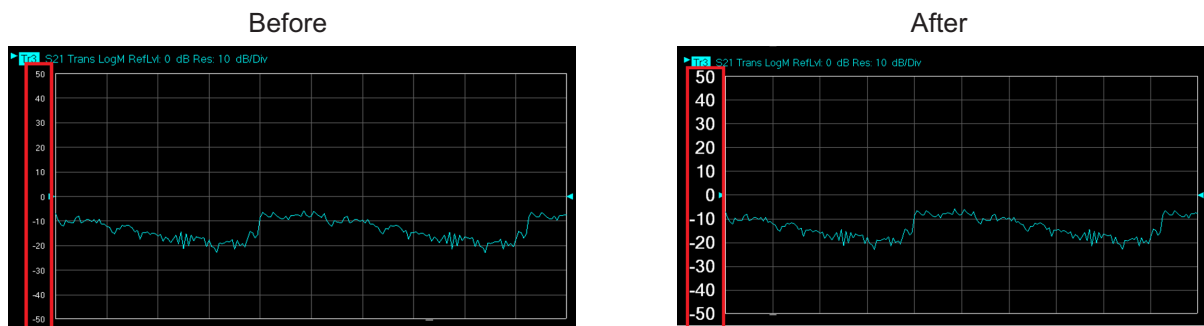
Marker Table

- User may modify the font for the Marker Table text by setting the values from Font dialog.



Trace Scale

- User may modify the font for the Trace Scale text by setting the values from Font dialog.



30-8 TRACE THICKNESS SETUP Dialog Box

Previous

- [“SETUP Menu” on page 30-5](#)

Navigation

MAIN | System | SYSTEM | Setup | SETUP | Trace Thickness Setup | TRACE THICKNESS SETUP Dialog

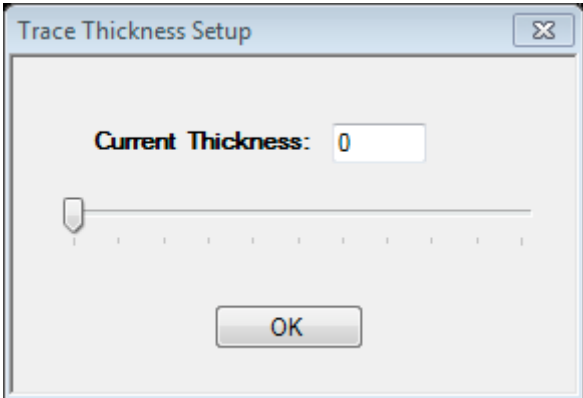


Figure 30-12. TRACE THICKNESS SETUP Dialog Box

Clicking on the Trace Thickness Setup menu item will display a TRACE THICKNESS SETUP dialog.

- Change the trace data thickness either by dragging the trace thickness track bar control or by changing the value in the thickness text box. A minimum thickness of 0 to a maximum of 10 can be set. See [Figure 30-13](#). The thickness value will be applied to all the traces across the system for rectilinear graph types.
- Click OK to close the dialog.
- The trace thickness default value is 0.

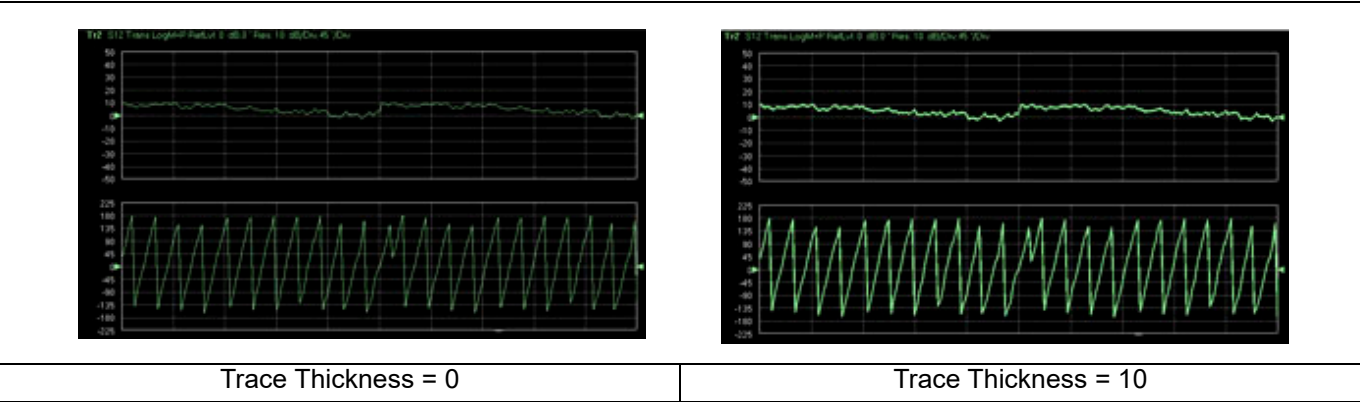


Figure 30-13. Trace Thickness Examples

30-9 Maximum Points and Options Control Menus

MAX. POINTS Menu

Full Name

Maximum Points

Previous

- [“SETUP Menu” on page 30-5](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Max Points Setup | MAX POINTS

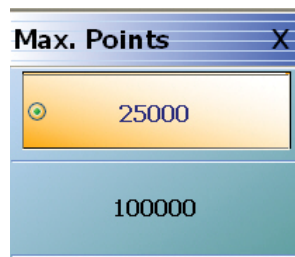


Figure 30-14. MAX. POINTS (MAXIMUM POINTS) Menu

MAX. POINTS Menu Button Selection Group

- The two buttons of the MAX POINTS menu form a button selection group where the selection of one button de-selects the other button.
- Note that if the Maximum Points setting is changed, the instrument requires a complete re-start to implement the change.

25000

Select de-selects the 100000 (100,000) points button, and sets the instrument to:

- 25,000 maximum system measurement points
- Up to a maximum of 16 channels
- Up to a maximum of 16 traces per channel.

Once selected, the system displays a **Context Switch Message** dialog box and requires a complete instrument re-start to implement the change.

- Click to **Yes** to proceed and restart the instrument
- Click **No** to abandon the change

100000

Select de-selects the 25000 (25,000) points button, and sets the instrument to:

- 100,000 maximum system measurement points
- Provides only one (1) channel
- The channel can have up to a maximum of 16 traces

Once selected, the system displays a **Context Switch Message** dialog box and requires a complete instrument re-start to implement the change.

- Click to **Yes** to proceed and restart the instrument.
- Click **No** to abandon the change.

MISC. SETUP Menu

Full Name

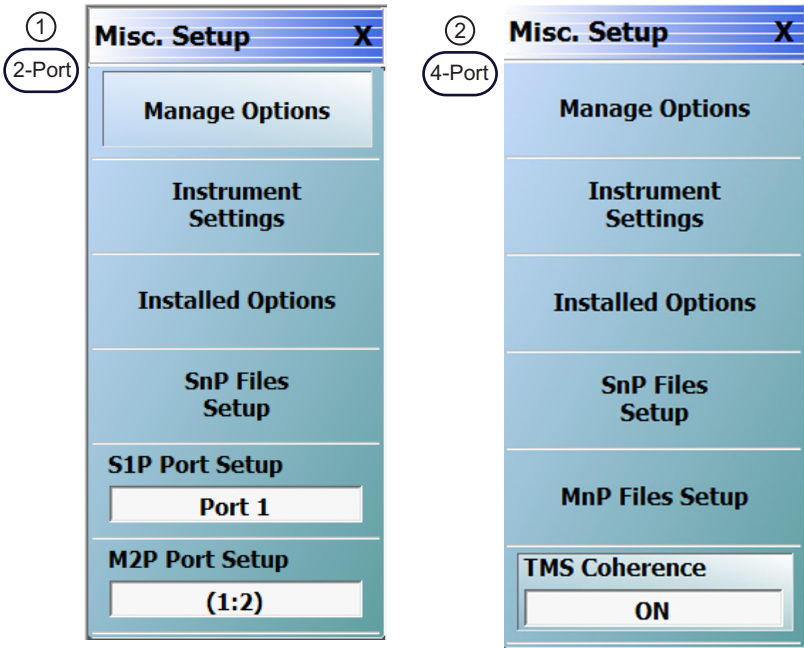
Miscellaneous Setup

Previous

- [“SETUP Menu” on page 30-5](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP



1. MISC. SETUP Menu – 2-Port VNA Mode	2. MISC. SETUP Menu – 4-Port VNA Mode
---------------------------------------	---------------------------------------

Figure 30-15. MISC. SETUP (MISCELLANEOUS SETUP) Menu

Manage Options

Available in 2-Port and 4-Port VNAs. For Anritsu Customer Service personnel. Provides access to option management menus. A password is required to enter the dialog box. Select displays the **MANAGE OPTIONS** dialog box.

- [“MANAGE OPTIONS Dialog Box” on page 30-24](#)

Instrument Settings

Available in 2-Port and 4-Port VNAs. For Anritsu Customer Service personnel. Provides access to the internal instrument setting menus. A password is required to enter the dialog box. Select displays the **INSTRUMENTS SETTINGS** dialog box.

- [“INSTRUMENT SETTINGS Dialog Box” on page 30-25](#)

Installed Options

Available in 2-Port and 4-Port VNAs. Select displays the **OPTION STATUS** dialog box which is a read-only listing of all installed, included, and not installed options.

- [“OPTION STATUS Dialog Box” on page 30-26](#)

SnP Files Setup

Available in 2-Port and 4-Port VNAs. The linked-to destination varies depending on the 2-Port/4-Port Mode.

- If the VNA is in 2-Port Mode, select displays the SnP FILES SETUP Dialog Box where the frequency units and output format of the SnP files is set.
 - [“SnP SETUP Dialog Box – 2-Port VNAs” on page 30-27](#)
- If the VNA is in 4-Port Mode, select displays the SnP FILES SETUP Dialog Box where the frequency units and output format of the SnP files is set.
 - [“SnP SETUP Dialog Box – 4-Port VNAs” on page 30-30](#)

S1P Port Setup

Available in 2-Port VNAs. Select toggles the S1P port between Port 1 and Port 2.

M2P Port Setup

Available in 2-Port VNAs. Select toggles the M2P port between 1:2 and 2:1.

MnP Files Setup

Available in 4-Port VNAs. Select displays the MXP SETUP dialog box. The dialog box allows mixed-mode DUT configuration as:

- M4P DUT with two differential pairs and no singletons
- M4P DUT with one differential pair and two singletons
- M3P DUT with one differential pair and one singleton
- M2P DUT with one differential pair and no singletons

Each configuration allows any VNA port to be assigned to any DUT port.

- [“MXP SETUP Dialog Box – 4-Port VNAs” on page 30-22](#)

TMS Coherence

Note

The TMS Coherence button is available when the VNA is in 4-Port mode and with Option 43 (True Mode Stimulus), and Option 31 (Dual Source) installed.

TMS Coherence ON changes the synthesizer configuration for 3739 broadband and banded modes to enable tighter phase correlation between the two driving sources at higher frequencies (those above the nominal source breakpoint of 54 GHz). This can improve phase stability in TMS modes at the expense of some potential additional spurs in low level measurements.

MXP SETUP Dialog Box – 4-Port VNAs

Full Name

Mixed-Mode DUT Setup – 4-Port VNAs

Previous

- [“MISC. SETUP Menu” on page 30-20](#)

Prerequisites

- VNA is in 4-Port Mode

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | MnP Files Setup | MXP SETUP Dialog Box

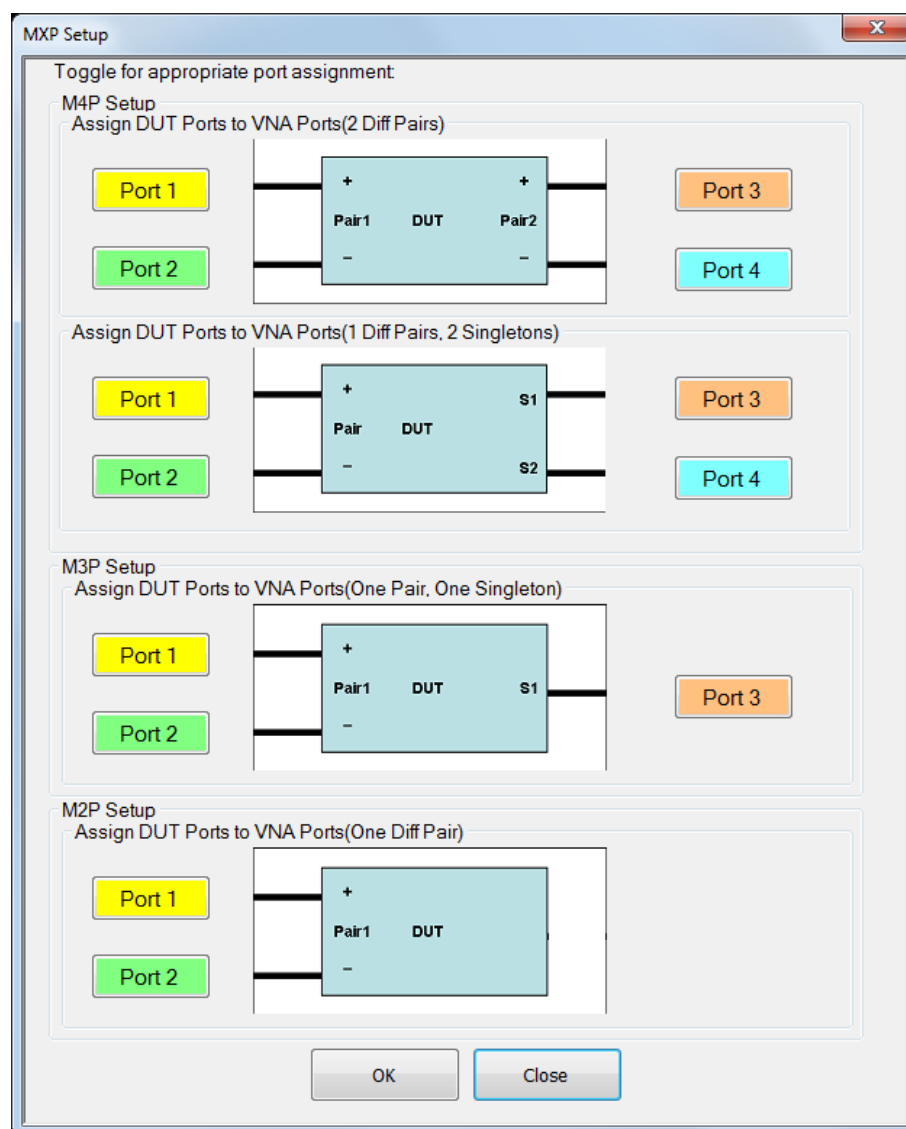


Figure 30-16. MXP (MIXED-MODE DUT) SETUP Dialog Box

Instructions

Select displays the **MXP SETUP** dialog box. The dialog box provides VNA-port to DUT-port configuration for output files for four mixed-mode DUT types:

- M4P Setup – Assign DUT ports with two differential pairs. For remote GPIB control, this is defined as D2S0.
- M4P Setup – Assign DUT ports with one differential pair and two singletons. For remote GPIB control, this is defined as D1S2
- M3P Setup – Assign DUT ports with one differential pair and one singleton. For remote GPIB control, this is defined as D2S1.
- M2P Setup – Assign DUT ports with one differential pair and no singletons. For remote GPIB control, this is defined as D1S0.

MANAGE OPTIONS Dialog Box

Previous

- [“MISC. SETUP Menu” on page 30-20](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | Manage Options | MANAGE OPTIONS Dialog Box

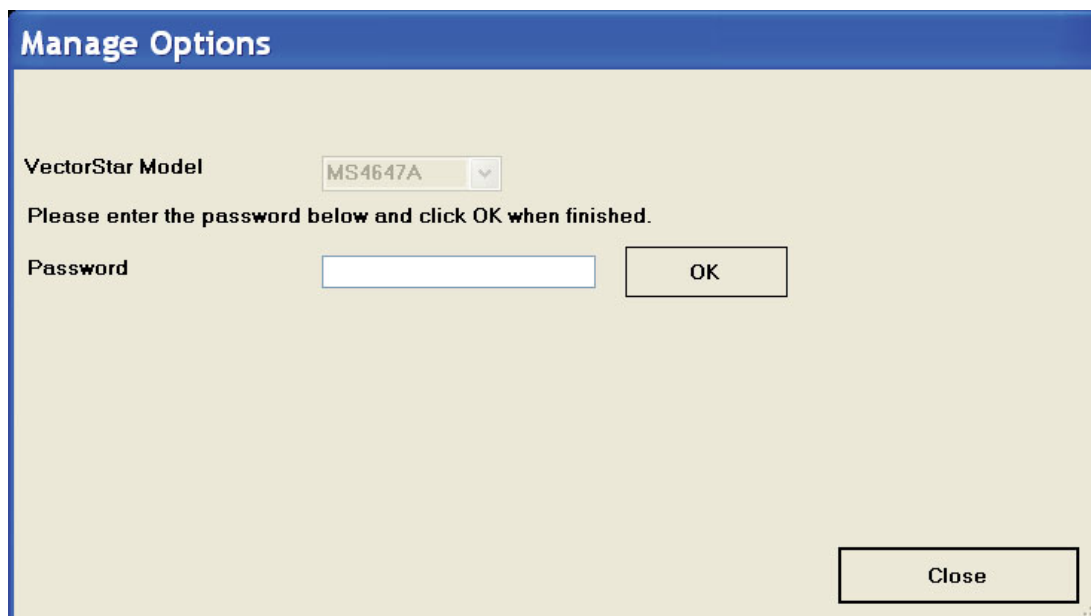


Figure 30-17. MANAGE OPTIONS Dialog Box

Instructions

An instrument-specific password is required to enter the MANAGE OPTIONS dialog box. The MANAGE OPTIONS dialog box is for use by Anritsu Customer Service only.

INSTRUMENT SETTINGS Dialog Box

Previous

- [“MISC. SETUP Menu” on page 30-20](#)

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | Instrument Settings | INSTRUMENT SETTINGS Dialog Box

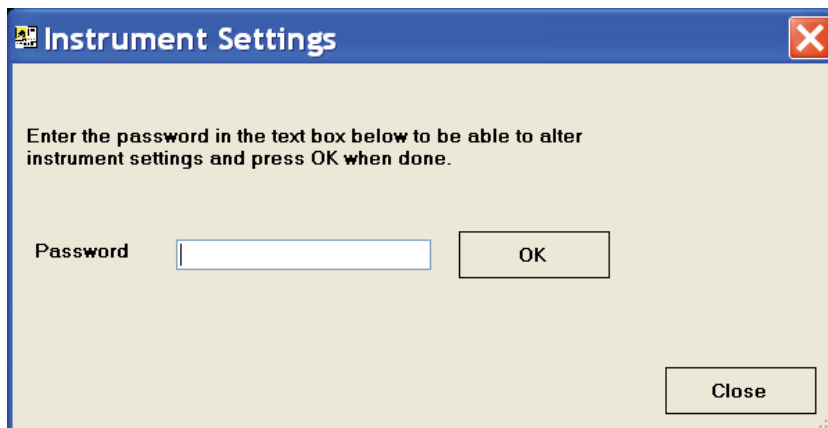


Figure 30-18. INSTRUMENT SETTINGS Dialog Box

Instructions

An instrument-specific password is required to enter the INSTRUMENT SETTINGS dialog box. The INSTRUMENT SETTINGS dialog box is for use by Anritsu Customer Service only.

OPTION STATUS Dialog Box

Previous

- “MISC. SETUP Menu” on page 30-20

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | Installed Options | OPTION STATUS Dialog Box

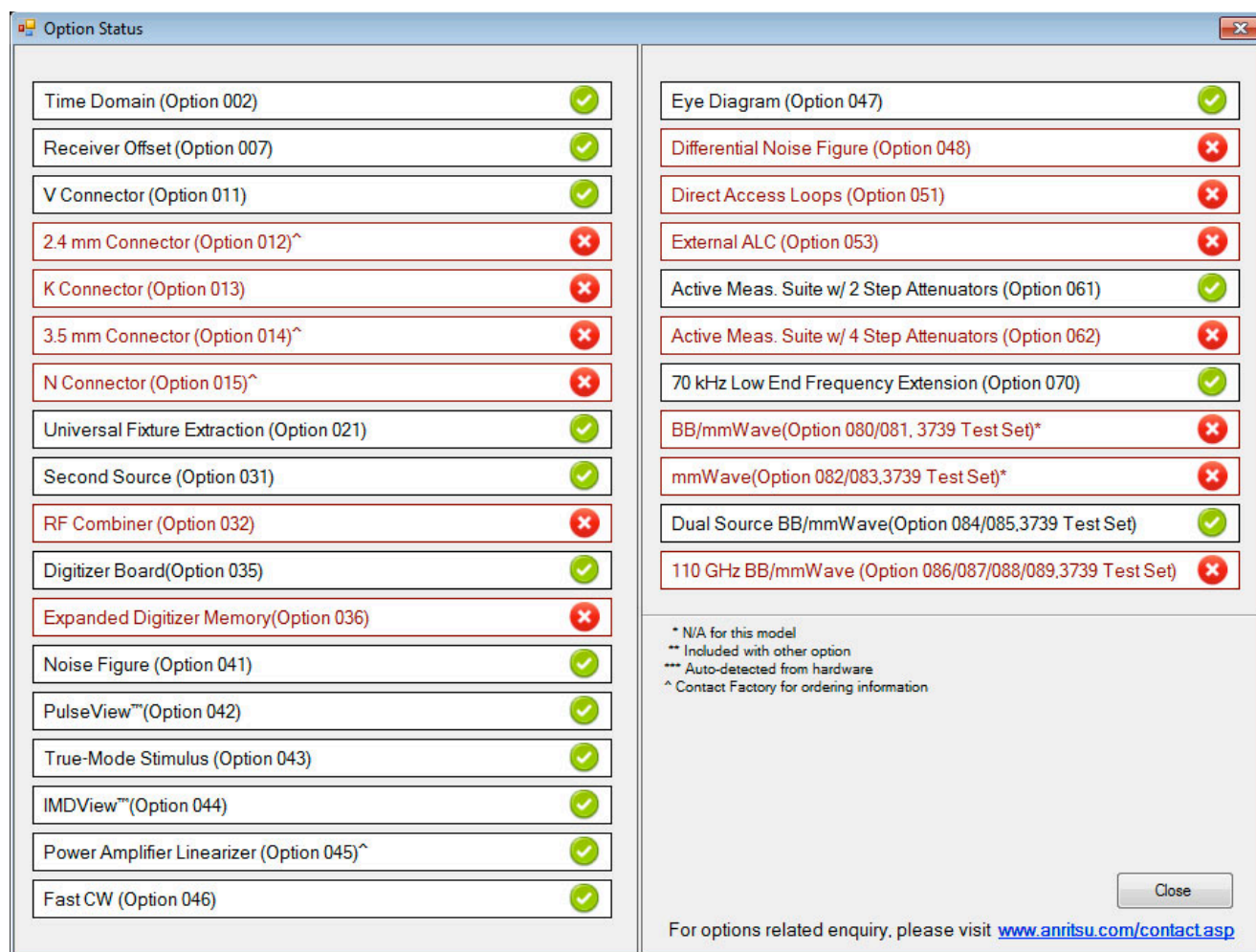


Figure 30-19. OPTION STATUS Dialog Box – Typical Option Set for the MS4647B VNA

Instructions

The OPTION STATUS dialog box provides a list of the VectorStar MS464xB Series VNA options and the installation status of each.

30-10 SnP Files Setup

The SnP files setup configuration user interface varies depending on the VNA port mode and can be either a 2-Port or 4-Port dialog box.

- For 2-Port VNAs, see [“SnP SETUP Dialog Box – 2-Port VNAs”](#).
- For 4-Port VNAs, see [“SnP SETUP Dialog Box – 4-Port VNAs”](#) on page 30-30.

SnP SETUP Dialog Box – 2-Port VNAs

Previous

- [“MISC. SETUP Menu”](#) on page 30-20

Prerequisites

- The VNA is in 2-Port Mode

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | SnP Files Setup | SnP SETUP Dialog

SnP Setup

Per System

Freq. Units

☒ GHz ☐ MHz ☐ kHz ☐ Hz

Output Format

☐ Linear Mag & Phase ☐ Log Mag & Phase ☒ Real & Imaginary

Per Channel

Passivity & Causality Enforcement

☐ Make Passive ☐ Make Causal Tolerance 0.0000100000 ☒ Passivity First

Interpolation Options (For Loaded SnP Files)

☒ Auto ☐ Always Spline ☐ Always Linear

Others

☐ Save Gated Data ☐ Save Trace Math ☐ Save Smoothing ☒ Swap Ports

Apply Cancel

Figure 30-20. SnP FILES SETUP Dialog – 2-Port VNAs

Per System Area:

- **Frequency Units Area Selections:**

- **GHz**
Select sets the units for the SnP file output to GHz.
- **MHz**
Select sets the units for the SnP file output to MHz.
- **kHz**
Select sets the units for the SnP file output to kHz.
- **Hz**
Select sets the units for the SnP file output to Hz.

- **Output Format Area Selections:**

In the Output Format area of the menu, the three (3) radio buttons form a group where the selection of one de-selects the other two.

- **Linear Magnitude & Phase**
Select sets the data file output format to record linear magnitude and phase information.
- **Log Magnitude & Phase**
Select sets the data file output format to record log magnitude and phase information.
- **Real & Imaginary**
Select sets the data file output format to record real and imaginary information.

Per Channel Area:

- **Passivity and Causality Enforcement Area:**

- **Make Passive Checkbox**

When selected, during the .SnP file save process, the following occurs:

At each frequency point, evaluates the eigenvalues of the S matrix. If the largest magnitude of eigenvalues is <1 , does nothing and proceeds to the next frequency. If the largest exceeds 1, scales all S-parameters at that frequency in a self-consistent way to ensure the maximum eigenvalue magnitude is <1 .

- **Passivity Tolerance**

Describes how close to 1 (in magnitude) the largest eigenvalue is allowed to get before action is taken ($1 - \sqrt{\text{tolerance}}$ is the limit used). This may need to be changed if the VNA data is being used in a simulator/model analyzer with a different numerical definition of passivity (based on resolution, convergence requirements, etc.). The default value is 0.00001. Generally values are not used outside the range of 0.0000001 to 0.001.

- **Passivity First Checkbox**

When both 'Make Passive' and 'Make Causal' boxes are checked, this checkbox determines which process is done first. The default is to perform 'Make Passive' first.

- **Make Causal Checkbox**

When selected, during the .SnP file save process, the following occurs:

A transform process is applied on each parameter to ensure minimal energy is present in the signal before the equivalent time $t=0$. Kramers-Kronig relations are enforced which does require reasonably fast decay of the parameter magnitude with frequency and certain aspects of analyticity. See the Calibration and Measurement Guide for more information. It is recommended to only use this function if there are observed problems when using saved data in a time domain simulator.

- **Interpolation Options (for Loaded SnP Files) Area**

- Choose between Auto, Always Spline (default), and Always Linear.

- **Others Area:**

- **Save Gated Data Checkbox**

When toggled ON, saves gated data into the SnP file. The Default value is OFF. This option is not available in power sweep modes.

- **Save Trace Math Checkbox**

When toggled ON, saves trace math to the applicable .SnP file. The Default value is OFF.

- **Save Smoothing**

When an .snp file is saved with " Save Smoothing enabled, a comment line ("! Smoothing applied") will be added to the generated .snp file, indicating smoothing is applied.

- **Swap Ports**

When toggled ON, the port functions are swapped. Swaps the s2p file on the given channel. The data will be swapped during the save process. The saved .snp data to be configured in a different orientation from how it was measured (in terms of which ports of the VNA were connected to which ports of the DUT).

SnP SETUP Dialog Box – 4-Port VNAs

The controls in the SnP SETUP dialog box allow for configuration of file output for all SnP file types.

Previous

- [“MISC. SETUP Menu” on page 30-20](#)

Prerequisites

- The VNA is in 4-Port Mode

Navigation

- MAIN | System | SYSTEM | Setup | SETUP | Misc. Setup | MISC. SETUP | SnP Files Setup | SnP SETUP Dialog Box

SnP Setup

Per System

Freq. Units
☒ GHz ☐ MHz ☐ kHz ☐ Hz

Output Format
☐ Linear Mag & Phase ☐ Log Mag & Phase ☒ Real & Imaginary

Per Channel

S1P Port Selection
☒ Port 1 ☐ Port 2 ☐ Port 3 ☐ Port 4

S2P Port Selection
☒ Port 1-2 ☐ Port 1-3 ☐ Port 1-4
☐ Port 2-3 ☐ Port 2-4 ☐ Port 3-4 ☐ Swap Ports

S3P Port Selection
☒ Port 1-2-3 ☐ Port 1-2-4 ☐ Port 1-3-4 ☐ Port 2-3-4
 Current Assignment: 1->1, 2->2, 3->3

S4P Port Selection
 Current Assignment: 1->1, 2->2, 3->3, 4->4

Passivity & Causality Enforcement

☐ Make Passive ☐ Make Causal Tolerance 0.0000100000 ☒ Passivity First

Interpolation Options (For Loaded SnP Files)

☐ Auto ☒ Always Spline ☐ Always Linear

Others

☐ Save Gated Data ☐ Save Trace Math ☐ Save Smoothing

Figure 30-21. SnP SETUP Dialog Box – 4-Port VNAs

Per System Area

- **Frequency Units Area Selections:**

- **GHz**
Select sets the units for the SnP file output to GHz.
- **MHz**
Select sets the units for the SnP file output to MHz.
- **kHz**
Select sets the units for the SnP file output to kHz.
- **Hz**
Select sets the units for the SnP file output to Hz.

- **Output Format Area Selections:**

In the Output Format area of the menu, the three (3) radio buttons form a group where the selection of one de-selects the other two.

- **Linear Magnitude & Phase**
Select sets the data file output format to record linear magnitude and phase information.
- **Log Magnitude & Phase**
Select sets the data file output format to record log magnitude and phase information.
- **Real & Imaginary**
Select sets the data file output format to record real and imaginary information.

Per Channel Area

- **S1P Port Selection**

On a per-channel basis, allows the S1P single port to be selected as:

- Port 1
- Port 2
- Port 3
- Port 4

- **S2P Port Selection**

On a per-channel basis, allows the S2P port pair to be selected as:

- Port 1-2
- Port 1-3
- Port 1-4
- Port 2-3
- Port 2-4
- Port 3-4

- **Swap Ports**

When toggled ON, the port functions are swapped. Swaps the s2p file on the given channel. The data will be swapped during the save process. The saved .snp data to be configured in a different orientation from how it was measured (in terms of which ports of the VNA were connected to which ports of the DUT).

• S3P Port Selection

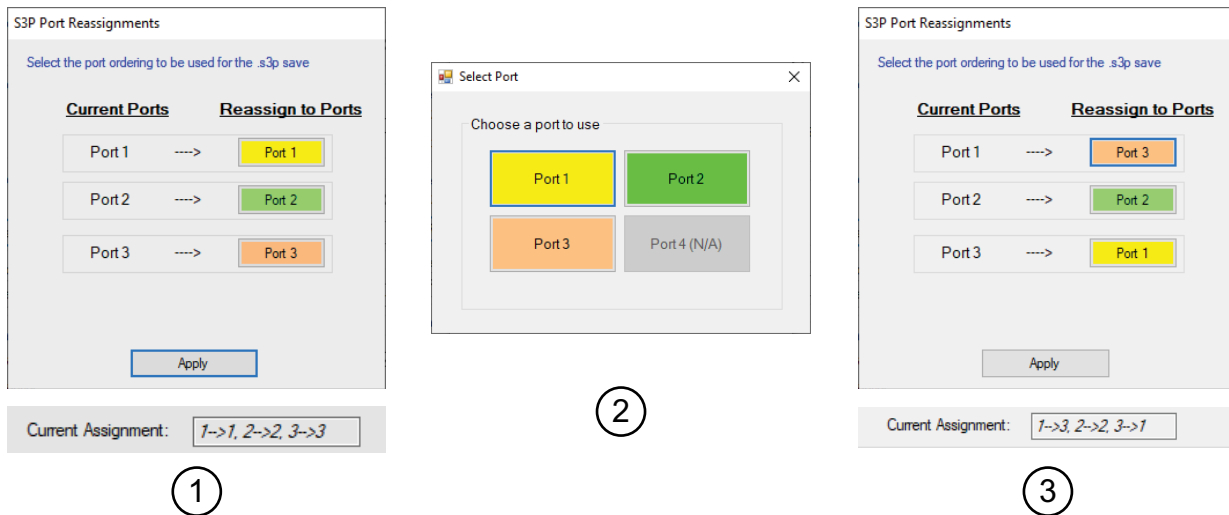
On a per-channel basis, allows the S2P port triad to be selected as:

- Port 1-2-3
- Port 1-2-4
- Port 1-3-4
- Port 2-3-4

• Port Reassignment

Swaps the s3p file on the given channel. The data will be swapped during the save process. The saved .snp data to be configured in a different orientation from how it was measured (in terms of which ports of the VNA were connected to which ports of the DUT).

1. Press the Port Reassignment in the S3P Port Selection section of the SnP Setup dialog shown in [Figure 30-21 on page 30-30](#). The S3P Port Reassignments dialog is displayed as shown in [Figure 30-22](#).
2. Press a colored port button to display the Select Port dialog
3. Press a colored port button in the Select Port dialog. This is new port to swap with the Current Port.
4. Repeat the S3P Port Reassignments again to make the change for the ported swap (i.e swap 1 to 3 also requires a swap of 3 to 1).
5. Press Apply. The Current Assignment in the SnP dialog will display the new port swap assignments.



1. S3P Port Reassignment Dialog (before swap)
2. Select Port dialog
3. S3P Port Reassignment Dialog (after Swap)

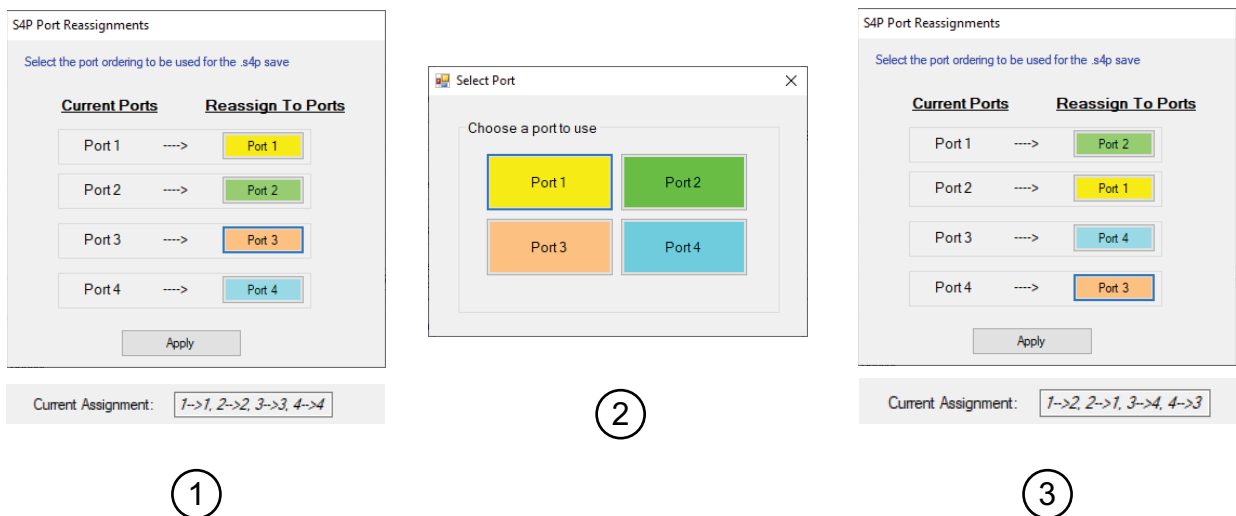
Figure 30-22. S3P Port Reassignments

S4P Port Selection

- **Port Reassignment**

Swaps the s4p file on the given channel. The data will be swapped during the save process. The saved .snp data to be configured in a different orientation from how it was measured (in terms of which ports of the VNA were connected to which ports of the DUT).

1. Press the Port Reassignment in the S4P Port Selection section of the SnP Setup dialog shown in [Figure 30-21 on page 30-30](#). The S4P Port Reassignments dialog is displayed as shown in [Figure 30-23](#).
2. Press a colored port button to display the Select Port dialog
3. Press a colored port button in the Select Port dialog. This is new port to swap with the Current Port.
4. Repeat the S4P Port Reassignments again to make the change for the ported swap (i.e swap 3 to 4 also requires a swap of 4 to 3).
5. Press Apply. The Current Assignment in the SnP dialog will display the new port swap assignments.



1. S4P Port Reassignment Dialog (before swap)
2. Select Port dialog
3. S4P Port Reassignment Dialog (after Swap)

Figure 30-23. S4P Port Reassignments

- **Passivity & Causality Enforcement**

- **Make Passive Checkbox**

When selected, during the .SnP file save process, the following occurs:

At each frequency point, evaluates the eigenvalues of the S matrix. If the largest magnitude of eigenvalues is <1, does nothing and proceeds to the next frequency. If the largest exceeds 1, scales all S-parameters at that frequency in a self-consistent way to ensure the maximum eigenvalue magnitude is <1.

- **Passivity Tolerance**

Describes how close to 1 (in magnitude) the largest eigenvalue is allowed to get before action is taken ($1 - \sqrt{\text{tolerance}}$ is the limit used). This may need to be changed if the VNA data is being used in a simulator/model analyzer with a different numerical definition of passivity (based on resolution, convergence requirements, etc.). The default value is 0.00001. Generally values are not used outside the range of 0.0000001 to 0.001.

- **Passivity First Checkbox**

When both 'Make Passive' and 'Make Causal' boxes are checked, this checkbox determines which process is done first. The default is to perform 'Make Passive' first.

- **Make Causal Checkbox**

When selected, during the .SnP file save process, the following occurs:

A transform process is applied on each parameter to ensure minimal energy is present in the signal before the equivalent time $t=0$. Kramers-Kronig relations are enforced which does require reasonably fast decay of the parameter magnitude with frequency and certain aspects of analyticity. See the Calibration and Measurement Guide for more information. It is recommended to only use this function if there are observed problems when using saved data in a time domain simulator.

- **Interpolation Options (for Loaded SnP Files) Area**

- Choose between Auto, Always Spline (default), and Always Linear.

- **Others Area:**

- **Save Gated Data Checkbox**

When toggled ON, saves gated data into the SnP file. The Default value is OFF. This option is not available in power sweep modes.

- **Save Trace Math Checkbox**

When toggled ON, saves trace math to the applicable .SnP file. The Default value is OFF.

- **Save Smoothing**

When an .snp file is saved with " Save Smoothing enabled, a comment line ("! Smoothing applied") will be added to the generated .snp file, indicating smoothing is applied.

30-11 System Utility Menus

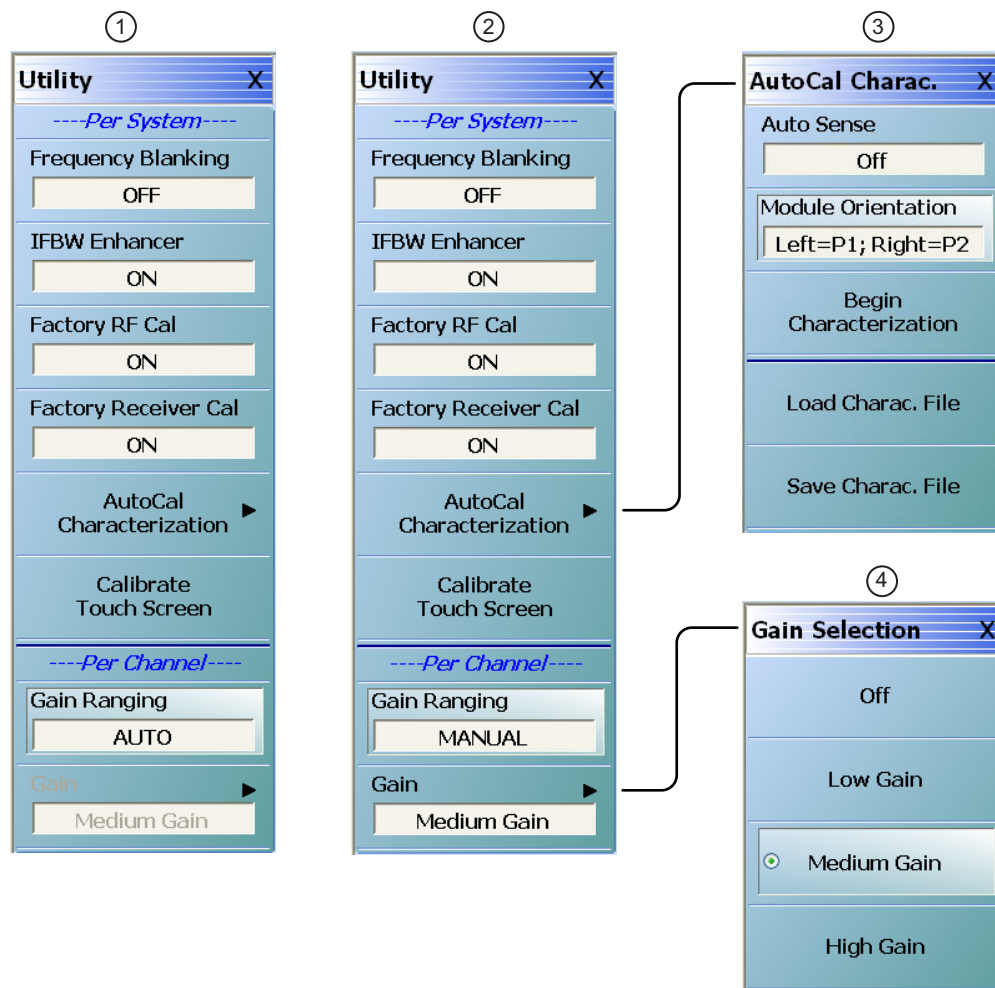
UTILITY Menu

Previous

- “SYSTEM Menu” on page 30-3

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY



1. Utility menu with Gain Ranging set to Auto (Gain Selection sub-menu disabled)
2. Utility menu with Gain Ranging set to Manual (Gain Selection sub-menu enabled)
3. AutoCal Charac. menu
4. Gain Selection menu (available only with Gain Ranging set to MANUAL)

Figure 30-24. UTILITY Menu

Per-System Utility Options

These settings are on a per-system basis.

Frequency Blanking (Off/On)

The default state is OFF where frequency values are displayed on the main display and on all menus, buttons, and dialogs. Select changes the button state to ON, and replaces all frequency displays with “Xs” as “XXXX” which includes all frequency displays on all buttons, menus, and dialogs such as all MARKER [1] menu frequency displays. To return all frequency displays, do one of the following:

- MENU BAR | Utilities | Preset
- **Preset Key**

IFBW Enhancer (Off/On)

Select toggles the IFBW enhancer function OFF and ON.

If the IFBW enhancer function is ON:

- The system automatically reduces the IFBW below 3 MHz to compensate for the lower system frequency.
- The system limits the maximum IFBW allowed so that it is less than or equal to the received frequency divided by 300.
- For example, if the received frequency is set to 300 kHz, the IFBW is equal to 300 kHz divided by 300 or 1 kHz.

Factory RF Cal (Off/On)

Select toggles the factory RF calibration OFF and ON.

Factory Receiver Cal

Select toggles the factory receiver calibration OFF and ON.

AutoCal Characterization

Select displays the AutoCal Characterization menu.

- [“AUTOCAL CHARAC. Menu” on page 30-37](#)

Calibrate Touch Screen

Select displays the Touch Screen Control Panel dialog box.

- [“HAMPSHIRE TSHARC \(TOUCHSCREEN\) CONTROL PANEL Dialog Box” on page 30-40](#)

Per-Channel Utility Options

This setting is on a per-channel basis.

Gain Ranging (AUTO/MANUAL)

Select toggles gain ranging between AUTO and MANUAL.

Gain

Active only when Gain Ranging set to MANUAL. Select opens Gain Selection menu.

- [“GAIN SELECTION Menu” on page 30-42](#)

AUTOCAL CHARAC. Menu

The best practice recommendation is to return the AutoCal module to Anritsu annually for an in-factory characterization. If a factory re-characterization is not possible, you can use this menu to re-characterize the module. Note that the re-characterization will be only as good as the prior instrument manual full calibration procedure. The recommended manual calibration is a Full Two Port calibration (12 Term Cal). For more information, contact Anritsu Customer Service.

Full Name

Automatic Calibrator (AutoCal) Characterization

AUTOCAL CHARAC. Menu Button Availability

The availability of the Module Orientation button depends on the setting of the Auto Sense (Off/On) button.

- If Auto Sense is off (shown at left), the Module Orientation button is available.
- If Auto Sense is on, the Module Orientation button is unavailable.

Previous

- [“UTILITY Menu” on page 30-35](#)

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | AutoCal Characterization | AUTOCAL CHARAC.

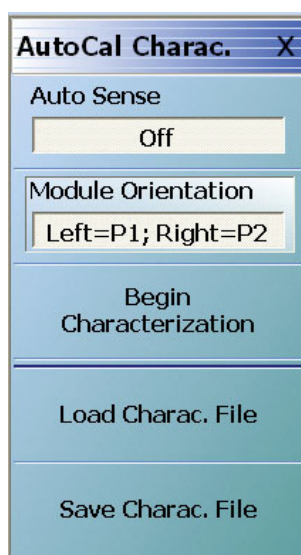


Figure 30-25. AUTOCAL CHARAC. (AUTOCAL CHARACTERIZATION) Menu

Auto Sense (Off/On)

If Auto Sense is on, the Module Orientation toggle button below is unavailable and during an auto-calibration run, the instrument will automatically detect the left and right port assignments.

If Auto Sense is off, the Module Orientation toggle button below is available allowing user definition of left/right port assignments. This is useful for test setups where the ports are reversed from the perspective of the user.

Module Orientation

This button is unavailable if the Auto Sense button above is ON and available if the Auto Sense button is OFF.

If available, use the orientation selection to define left/right port assignments from the point of view of the operator.

Select toggles between Left=P1;Right=P2 or Right=P1;Left=P2.

Begin Characterization

Select starts the characterization process. Note that the instrument must have completed a Full Two Port calibration (12 Term Cal) before starting this calibration step. During the characterization run, dialogs appear instructing the user for the each configuration action.

If a 12 Term Calibration is not applied, a warning message appears. Click OK to clear the warning message and apply the 12 Term Calibration before proceeding.

Load Charac. File

Selecting the Load Characterization File button displays the OPEN (AUTOCAL CHARACTERIZATION ACD FILE) dialog box.

- [“Remote Interface Menus and Dialog Boxes” on page 30-43](#)

Save Charac. File

Select displays the SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) dialog box.

- [“SAVE AS \(AUTOCAL CHARACTERIZATION ACD FILE\) Dialog Box” on page 30-39](#)

OPEN (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

Previous

- [“AUTOCAL CHARAC. Menu” on page 30-37](#)

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | AutoCal Characterization | AUTOCAL CHARAC. | Load Charac. File | OPEN (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

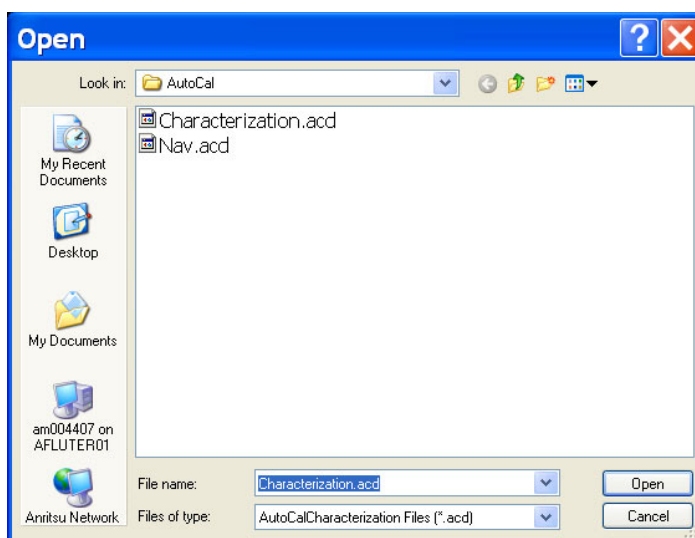


Figure 30-26. OPEN (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

Instructions

The OPEN (AUTOCAL CHARACTERIZATION ACD FILE) dialog box displays available ACD files. Navigate to and select the required ACD file and click **Open** to apply. Click **Cancel** to abort.

SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

Previous

- [“AUTOCAL CHARAC. Menu” on page 30-37](#)

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | AutoCal Characterization | AUTOCAL CHARAC. | Save Charac. File | SAVE AS (AUTO CAL CHARACTERIZATION ACD FILE) Dialog Box

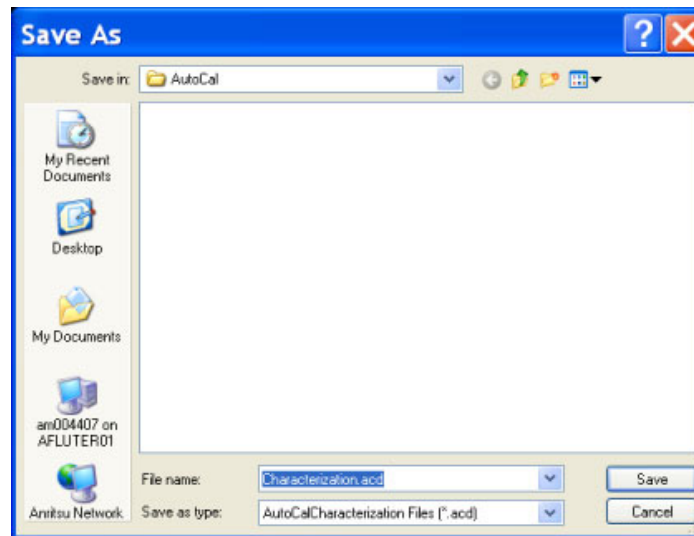


Figure 30-27. SAVE AS (AUTOCAL CHARACTERIZATION ACD FILE) Dialog Box

Instructions

Displays the Save As (AUTO CAL CHARACTERIZATION ACD FILE) dialog box. Navigate to the required folder and click Save to save the file. Click Cancel to abort.

HAMPSHIRE TSHARC (TOUCHSCREEN) CONTROL PANEL Dialog Box

The HAMPSHIRE™ TSHARC™ (TOUCH SCREEN) CONTROL PANEL dialog box has five (5) tabs for control of Screen Selection, Calibration, Click, Touch, and Capacitive settings. Each screen and its recommended parameters are defined below.

Note

When using the touch screen, a recommended best practice is to use a positive hard press to make sure the required setting is input into the system. A light touch may not change the instrument setting as required.

To recalibrate the touch screen, navigate to the CALIBRATE TOUCH SCREEN dialog box located at **MAIN | System | SYSTEM | Utility | UTILITY | Calibrate Touch Screen | TOUCH SCREEN CONTROL PANEL dialog box**. The procedure is described in [Chapter 30, “System Menus”](#) in [“HAMPSHIRE TSHARC \(TOUCHSCREEN\) CONTROL PANEL Dialog Box”](#) on page 30-40 below.

A more detailed touch screen calibration and adjustment procedure is described in the **VectorStar MS464xB Series VNA Maintenance Manual – 10410-00320**.

Previous

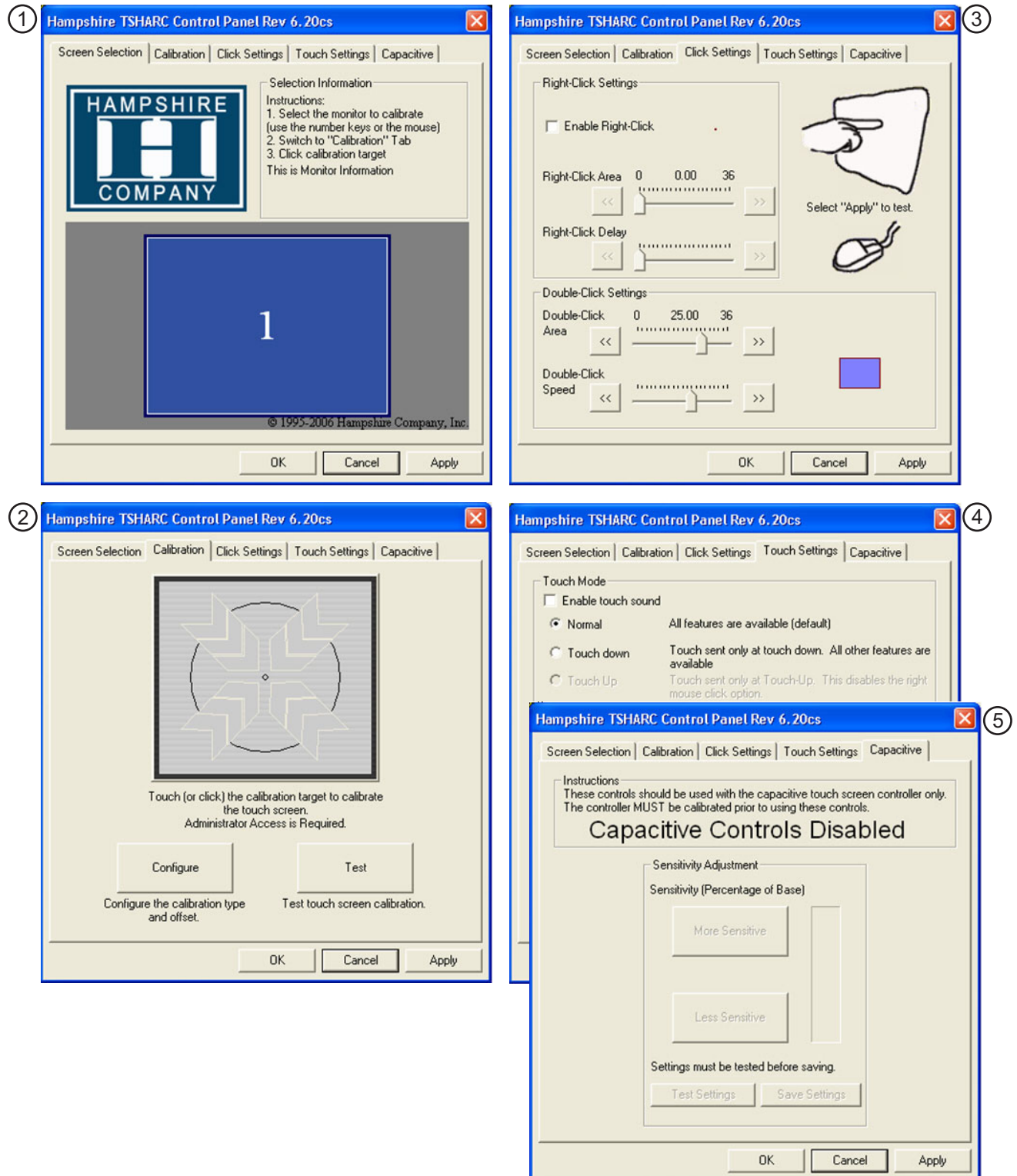
- [“UTILITY Menu”](#) on page 30-35

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | Calibrate Touch Screen | HAMPSHIRE TSHARC (TOUCHSCREEN) CONTROL PANEL Dialog Box

Operation

- The TOUCH SCREEN CONTROL PANEL dialog box shown above provides five tabbed sections for touch screen control as:
 - Screen Selection Control Tab at 1
 - Calibration Tab at 2
 - Click Settings Tab at 3
 - Touch Settings Tab at 4
 - Capacitive Tab at 5.



- | | |
|---|---|
| 1. Touch Screen Control Panel – Screen Selection Tab
2. Touch Screen Control Panel – Calibration Tab
3. Touch Screen Control Panel – Click Settings Tab | 4. Touch Screen Control Panel – Touch Settings Tab
5. Touch Screen Control Panel – Capacitive Tab – Use after calibration of the controller. |
|---|---|

Figure 30-28. TOUCH SCREEN CONTROL PANEL Dialog Box

GAIN SELECTION Menu

The Gain Selection menu is available only when Gain Ranging button is toggled to Manual.

Previous

- [“UTILITY Menu” on page 30-35](#)

Navigation

- MAIN | System | SYSTEM | Utility | UTILITY | Gain | GAIN SELECTION

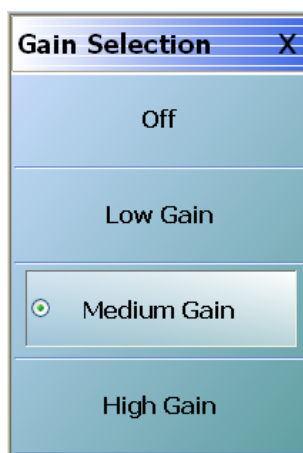


Figure 30-29. GAIN SELECTION Menu

After selecting a gain value from the menu, the user is automatically returned to the previous menu

Approximate Gain Selection Values:

- Off = 0 dB
- Low Gain = 14 dB
- Medium Gain = 28 dB
- High Gain = 37 dB

30-12 Remote Interface Menus and Dialog Boxes

REMOTE INTER. Menu

Full Name

Remote Interface

Previous

- [“SYSTEM Menu” on page 30-3](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER.

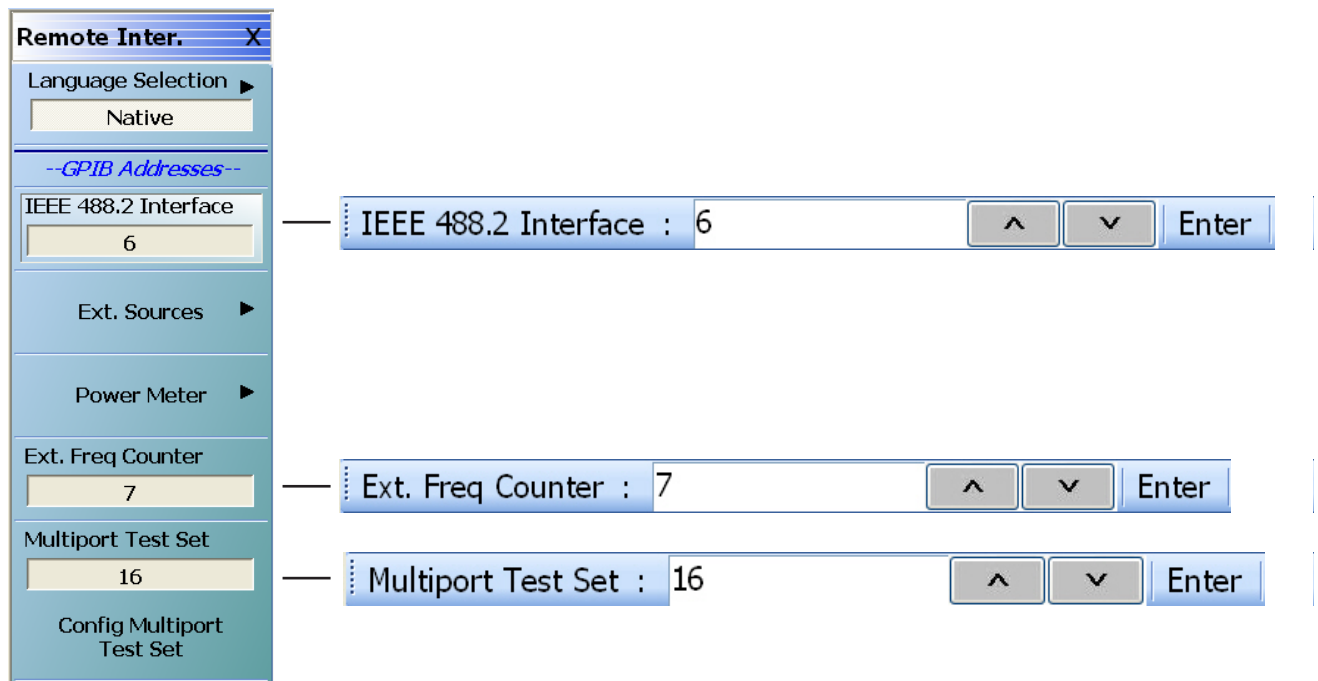


Figure 30-30. REMOTE INTER. (REMOTE INTERFACE) Menu

Language Selection

The Language Selection button displays currently set language as Native, Lightning, or HP8510. Select displays the REMOTE LANG menu.

- [“REMOTE LANG. Menu” on page 30-46](#)

IEEE 488.2 Interface

Displays the currently selected GPIB address for the VNA instrument. Select displays the IEEE GPIB field toolbar, used to establish the GPIB device number of the instrument.

- The default GPIB instrument address is 6.
- The allowable range is from 1 to 30 but must be unique for the power meter and not duplicate any other peripheral or instrument address.

Ext. Sources

The External Sources button select displays the EXT SRC ADDR (EXTERNAL SOURCE ADDRESS) menu.

- [“EXT. SRC ADDR. Menu” on page 30-47](#)

Power Meter

The Power Meter button select displays the Power Meters menu.

- [“POWER METERS Menu” on page 30-48](#)

Ext. Freq Counter

Select displays the External Frequency Counter field toolbar. Use the External Frequency Counter field toolbar to enter the GPIB device number for an optional attached frequency counter.

- The default GPIB device address is 7.
- The allowable range is from 1 to 30 but must be unique for the frequency counter and not duplicate any other address.

Multiport Test Set

Select displays the Multiport Test Set field toolbar. Use the toolbar to enter the GPIB device number for the optional Multiport Test Set.

- The default GPIB address is 16.
- The allowable range is from 1 to 20 but must be unique for the test set and not duplicate another address.

Config Multiport Test Set

Select displays the Multiport Test Set Configuration dialog box to optionally configure an attached **MN469xB/C Series Multiport Test Set**.

- [“MULTIPORT TEST SET CONFIGURATION Dialog Box – 4-Port VNAs” on page 30-45](#)

MULTIPOINT TEST SET CONFIGURATION Dialog Box – 4-Port VNAs

Previous

- [“REMOTE INTER. Menu” on page 30-43](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Configure Multiport Test Set | MULTIPOINT TEST SET CONFIGURATION Dialog Box

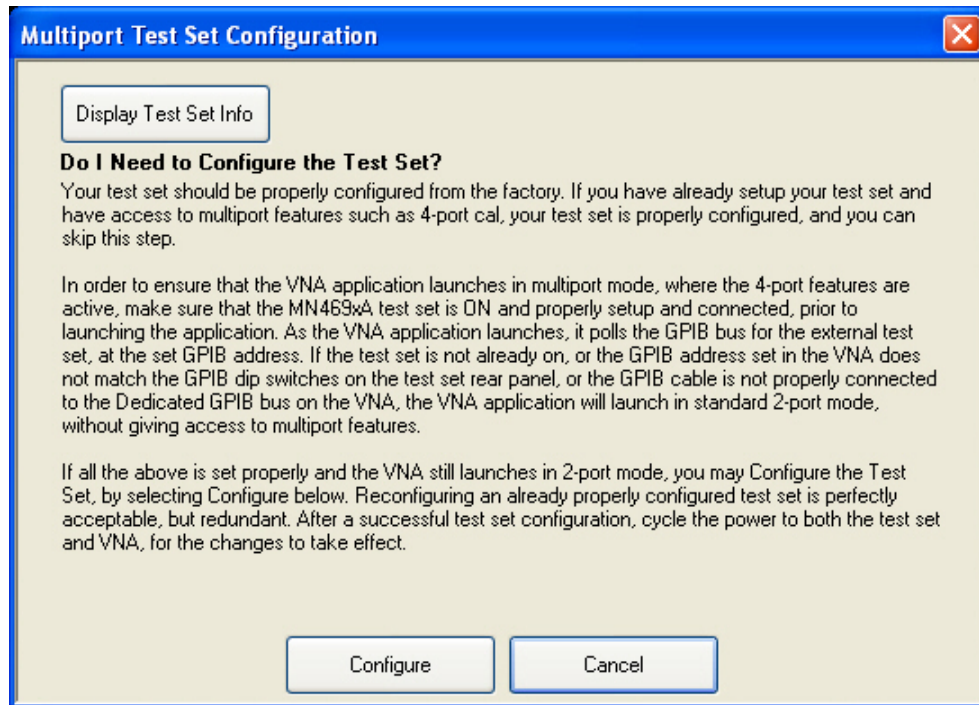


Figure 30-31. MULTIPOINT TEST SET CONFIGURATION Dialog Box

Display Test Set Info Button

Select displays a dialog box with the current attached multiport test set configuration information.

Advisory Configuration Information

Your test set should be properly configured from the factory. If you have already setup your test set and have access to multiport features such as 4-port cal, your test set is properly configured, and you can skip this step.

In order to ensure that the VNA application launches in multiport mode, where the 4-port features are active, make sure that the MN469xB/C Series test set is ON and properly setup and connected, prior to launching the application. As the VNA application launches, it polls the GPIB bus for the external test set, at the set GPIB address. If the test set is not already on, or the GPIB address set in the VNA does not match the GPIB dip switches on the test set rear panel, or the GPIB cable is not properly connected to the Dedicated GPIB bus on the VNA, the VNA application will launch in standard 2-port mode, without giving access to multiport features.

If all the above is set properly and the VNA still launches in 2-port mode, you may Configure the Test Set, by selecting Configure below. Re-configuring an already properly configured test set is perfectly acceptable, but redundant. After a successful test set configuration, cycle the power to both the test set and VNA, for the changes to take effect.

Controls

The Configure button starts the configuration process. Cancel closes the dialog box and returns to the REMOTE INTER. menu.

REMOTE LANG. Menu

Full Name

Remote Language

Previous

- [“REMOTE INTER. Menu” on page 30-43](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Language Selection | REMOTE LANG.



Figure 30-32. REMOTE LANG. (REMOTE LANGUAGE) Menu

REMOTE LANG. Menu Button Selection Group

The three (3) buttons of the REMOTE LANG. menu form an auto-return button selection group where the selection of one button de-selects the other two (2) buttons and returns to the REMOTE INTER. menu.

Native

Select sets the remote language to Native, de-selects the Lightning and HP8510 buttons, and auto-returns to the REMOTE INTER menu.

Lightning

Select sets the remote language to Lightning, de-selects the Native and HP8510 buttons, and auto-returns to the REMOTE INTER menu.

HP8510

Select sets the remote language to HP8510, de-selects the Native and Lightning buttons, and auto-returns to the REMOTE INTER menu.

EXT. SRC ADDR. Menu

Full Name

External Source Address

Previous

- [“REMOTE INTER. Menu” on page 30-43](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Ext. Sources | EXT. SRC ADDR.

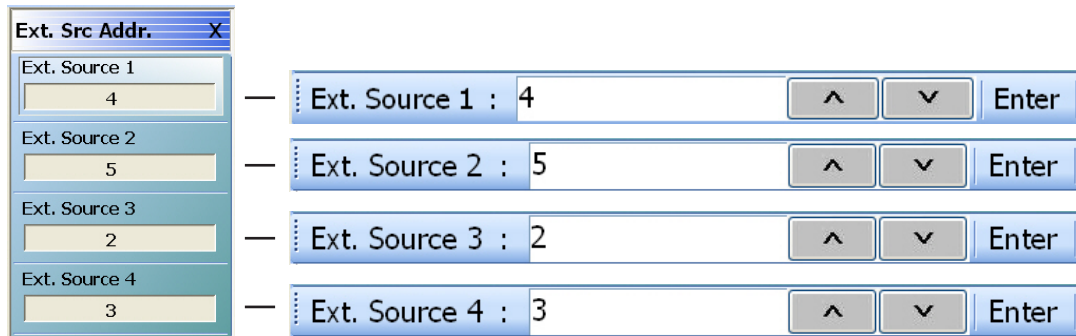


Figure 30-33. EXT. SRC ADDR. (EXTERNAL SOURCE ADDRESS) Menu

Ext. Source 1

Select displays the Ext. Source 1 field toolbar which is used to enter a GPIB device number for an optional external source.

- The default GPIB device address for external source 1 is 4.
- The allowable range is from 1 to 30 but must be unique for the external source and not duplicate any other address.

Ext. Source 2

Select displays the Ext. Source 2 field toolbar which is used to enter a GPIB device number for an optional external source.

- The default GPIB device address for external source 2 is 5.
- The allowable range is from 1 to 30 but must be unique for the external source and not duplicate any other address.

Ext. Source 3

Select displays the Ext. Source 3 field toolbar which is used to enter a GPIB device number for an optional external source.

- The default GPIB device address for external source 3 is 2.
- The allowable range is from 1 to 30 but must be unique for the external source and not duplicate any other address.

Ext. Source 4

Select displays the Ext. Source 4 field toolbar which is used to enter a GPIB device number for an optional external source.

- The default GPIB device address for external source 4 is 3.
- The allowable range is from 1 to 30 but must be unique for the external source and not duplicate any other address.

POWER METERS Menu

Full Name

Power Meters

Previous

- [“REMOTE INTER. Menu” on page 30-43](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Power Meter | POWER METERS.

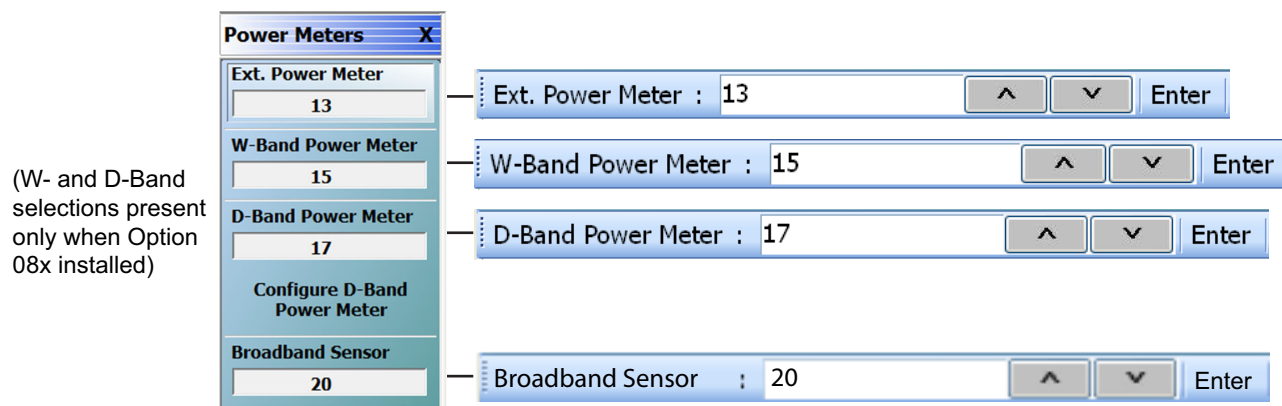


Figure 30-34. Power Meters Menu Showing Default GPIB Address Values

The allowable GPIB address range for the choices in this menu is from 1 to 30 but must be unique for the external source and not duplicate any other address.

Ext. Power Meter

Select displays the Ext. Power Meter field toolbar which is used to enter a GPIB device number for an external power meter.

- The default GPIB device address for external power meter is 13.

W-Band Power Meter

This selection is present only when Option 8x is installed. Select displays the W-Band Power Meter field toolbar which is used to enter a GPIB device number for a W-Band power meter.

- The default GPIB device address for external power meter is 15.

D-Band Power Meter

This selection is present only when Option 8x is installed. Select displays the D-Band Power Meter field toolbar which is used to enter a GPIB device number for a D-Band power meter.

- The default GPIB device address for external power meter is 17.

Configure D-Band Power Meter

This selection is present only when Option 8x is installed. Select displays D-Band Power Meter Configuration Dialog Box. Refer to [“D-BAND POWER METER CONFIGURATION Dialog Box” on page 30-49](#).

Broadband Sensor

Select displays the Broadband Sensor field toolbar which is used to enter a GPIB device number for a broadband power sensor.

- The default GPIB device address for external power meter is 20.

D-BAND POWER METER CONFIGURATION Dialog Box

This dialog box is available only when Option 8x is installed.

Previous

- [“POWER METERS Menu” on page 30-48](#)

Navigation

- MAIN | System | SYSTEM | Remote Interface | REMOTE INTER. | Power Meter | POWER METERS | Configure D-Band Power Meter Configuration | D-BAND POWER METER CONFIGURATION Dialog Box

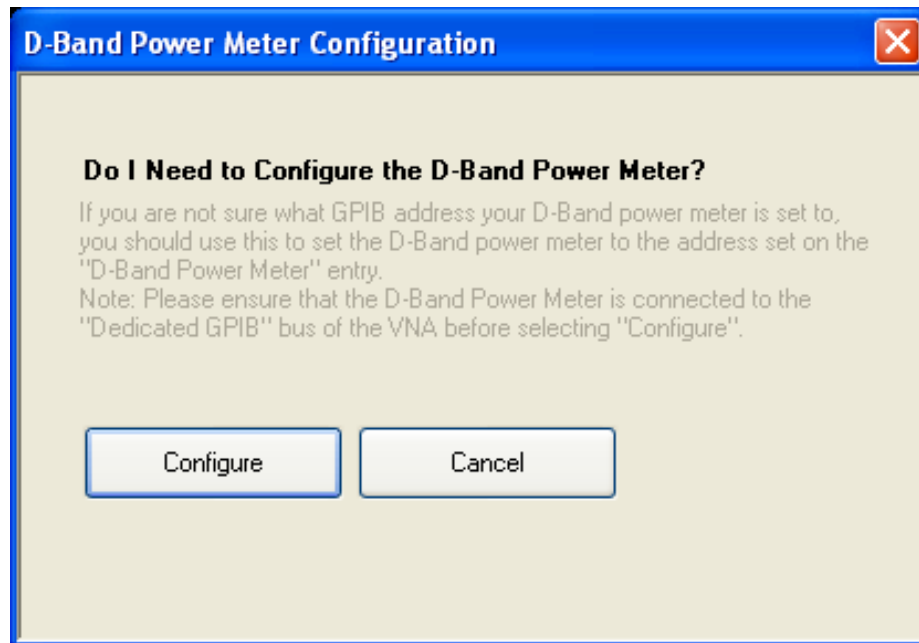


Figure 30-35. D-BAND POWER METER CONFIGURATION Dialog Box

Advisory Configuration Information

If you are not sure what GPIB address your D-Band power meter is set to, you should use this to set the D-Band power meter to the address set on the “D-Band Power Meter” entry. Ensure that the D-Band Power Meter is connected to the Dedicated GPIB bus of the VNA before selecting the Configure button.

Configure Button

Select sets the D-Band power meter GPIB address to the same address as was entered on the VNA. Cancel closes the dialog box and returns to the POWER METERS menu.

30-13 Network Interface Menus and Dialog Boxes

NETWORK INTERF. Menu

Full Name

Network Interface

Previous

- [“SYSTEM Menu” on page 30-3](#)

Navigation

- MAIN | System | SYSTEM | Network Interface | NETWORK INTERF.

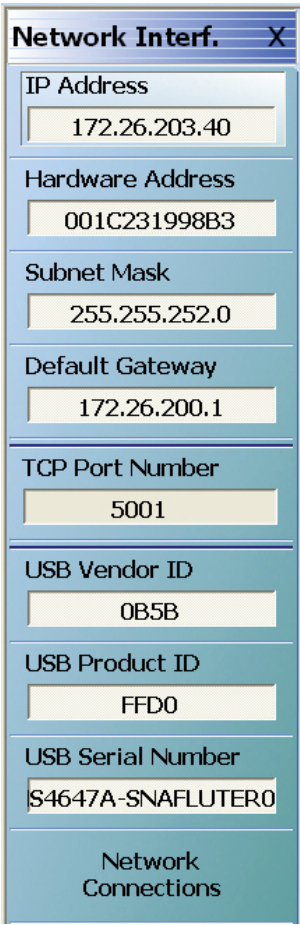


Figure 30-36. NETWORK INTERF. (NETWORK INTERFACE) Menu

IP Address

A read-only display. Shows the IP address of the instrument.

Hardware Address

A read-only display. Shows the internal network interface card hardware address.

Subnet Mask

A read-only display. Shows the network subnet mask value.

Default Gateway

A read-only display. Shows the network default gateway address.

TCP Port Number

A read-only display. Shows the network TCP port number.

USB Vendor ID

A read-only display. Shows the USB Port vendor identification number.

USB Product ID

A read-only display. Shows the USB product identification number.

USB Serial Number

A read-only display. Shows the USB serial number.

Network Connections

Select displays the Network Connections dialog box which is part of the Microsoft XP Operating System.

- [“NETWORK CONNECTIONS Dialog Box” on page 30-52](#)

NETWORK CONNECTIONS Dialog Box

Previous

- [“NETWORK INTERF. Menu” on page 30-50](#)

Navigation

- MAIN | System | SYSTEM | Network Interface | NETWORK INTERF. | Network Connections | NETWORK CONNECTIONS Dialog Box

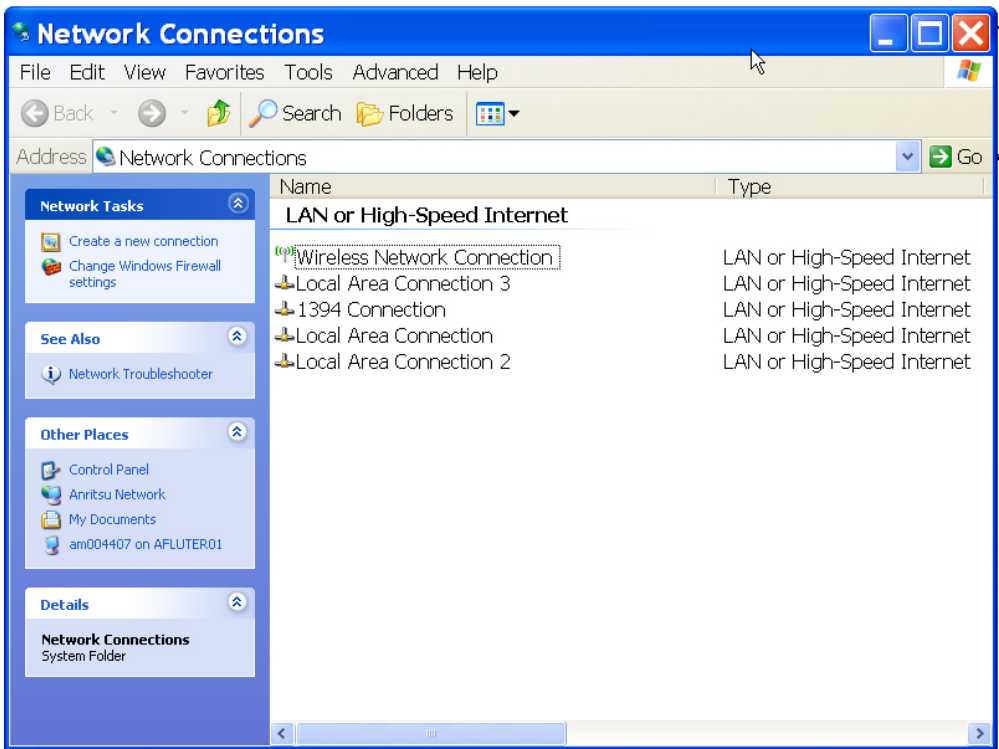


Figure 30-37. NETWORK CONNECTIONS Dialog Box

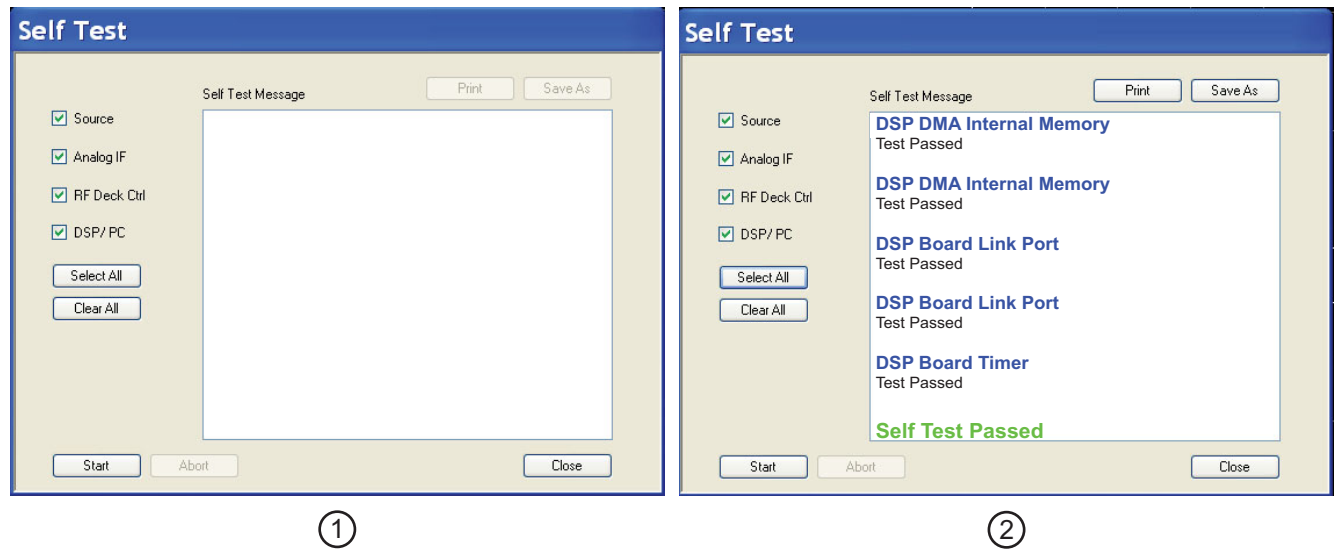
SELF TEST Dialog Box

Previous

- “SYSTEM Menu” on page 30-3

Navigation

- MAIN | System | SYSTEM | Diagnostics | DIAGNOSTICS | Self-Test | SELF TEST Dialog Box



1. SELF TEST Dialog Box – Test Not Started at left.

2. SELF TEST Dialog Box – Test Passed at right.

Figure 30-38. SELF TEST Dialog Box

Instructions

1. Select any combination of tests from the available check boxes:
 - Source
 - Analog IF
 - RF Deck Ctrl
 - DSP/PV
2. The Select All button selects all tests. The Clear All button de-selects all tests.
3. Once selections are made, click Start to run the tests. Click Abort to cancel in-process tests.
4. Test results are displayed in the Self Test Message area.
5. A normal message is Self Test Passed.
6. Click Print to print to the local printer through an open Print dialog box. Click Save As to save as a Self Test Result TXT file typically located in C:\AnritsuVNA\Data. Click Close to close the dialog box.

EVENT VIEWER Dialog Box

Previous

- “SYSTEM Menu” on page 30-3

Navigation

- MAIN | System | SYSTEM | Event Log | EVENT VIEWER Dialog Box

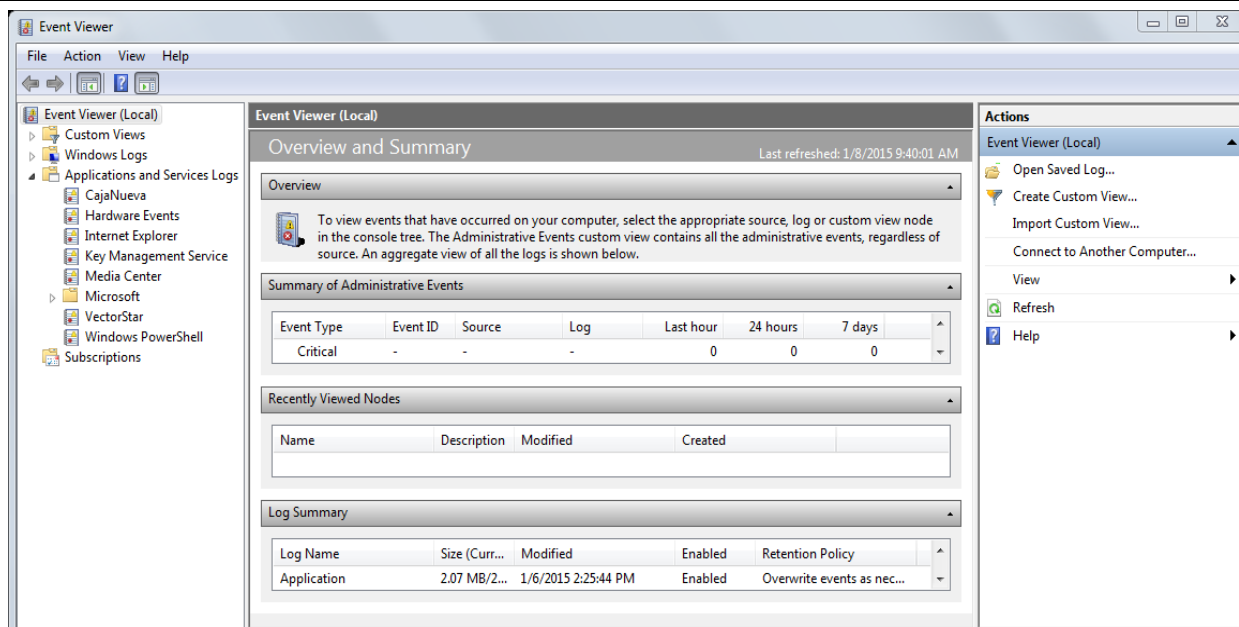


Figure 30-39. EVENT VIEWER Dialog Box

Instructions

Options on the menu bar are:

- File
 - Options: Displays the Options dialog box Disk Cleanup function.
 - Exit: Closes the dialog box and returns to the System menu
- Action
 - Open saved log
 - Create Custom View
 - Import Custom View
 - Connect to another computer
 - Refresh
 - Help
- View
 - Show Analytic and Debug Logs
 - Customize
- Help
 - Help Topics
 - TechCenter Web Site
 - About Microsoft Management Console
 - About Event Viewer

REAR PANEL OUT. Menu

Full Name

Rear Panel Output

Previous

- [“SYSTEM Menu” on page 30-3](#)

Navigation

- MAIN | System | SYSTEM | Rear Panel Output | REAR PANEL OUT.

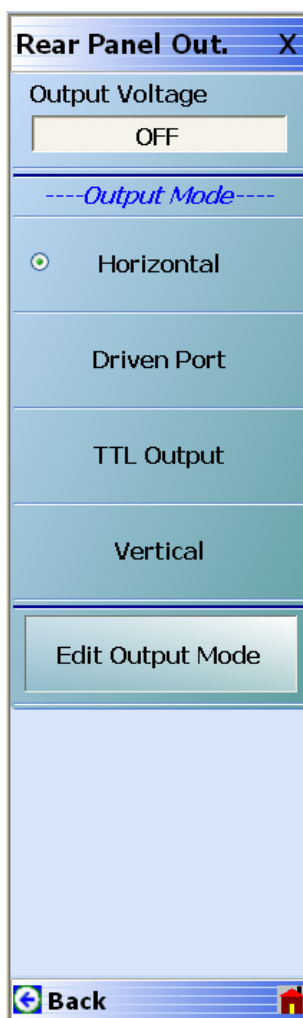


Figure 30-40. REAR PANEL OUT. (REAR PANEL OUTPUT) Menu

Output Voltage

Select toggles rear panel output voltage off and on.

Output Mode Button Selection Group

The Horizontal, Driven Port, and TTL Output buttons form a three (3) button selection group where the selection of any one button de-selects the other two buttons.

Horizontal Output Mode

The horizontal output mode sets the condition of the sweep independent of the port sweep voltage that corresponds to the start and stop sweep limits. The values are edited in the dialog box available from the Edit Output Mode button below.

Selecting the Horizontal button de-selects Driven Port and TTL Port.

Driven Port Output Mode

The driven port output mode assigns the voltage setting to whichever port is set as the driven port. The values are edited in the dialog box available from the Edit Output Mode button below.

Selecting the Driven Port button de-selects Horizontal and TTL Port.

TTL Output Mode

The TTL (Transistor-Transistor-Logic) button sets the voltage output to either pulse or level TTL. The values are edited in the dialog box available from the Edit Output Mode button below.

Selecting the TTL Output Mode button de-selects Horizontal and Driven Port Output.

Vertical Output Mode

Vertical Output Mode adds functionality to the rear panel analog out port so that it can represent the vertical magnitude of a trace in a scaled fashion. Users can employ this signal to drive external mechanical controllers and data recorders as part of a much larger measurement system.

Selecting the Vertical button adds output voltage to the analog out port that represents the vertical amplitude of a trace.

The Vertical Mode selection can be remotely programmed through the GPIB interface.

Edit Output Mode

Select displays the Edit Rear Panel Output Mode dialog box.

- [“EDIT REAR PANEL OUTPUT MODE Dialog Box” on page 30-57](#)

EDIT REAR PANEL OUTPUT MODE Dialog Box

Previous

- [“REAR PANEL OUT. Menu” on page 30-55](#)

Navigation

- MAIN | System | SYSTEM | Rear Panel Output | REAR PANEL OUT. | Edit Output Mode | EDIT REAR PANEL OUTPUT MODE Dialog Box

Edit Rear Panel Output Mode

Horizontal

Start (V) 0.000

Stop (V) 1.000

Driven Port

Set Output Voltage: Port 1 (V) 0.000

Port 2 (V) 0.000

TTL Output

Set Output Level: Port 1: High

Port 2: High

Pulse Width (ms) 0.000

Vertical

Min (V) 0.000 ☒ Use Active Trace

Max (V) 1.000 Trace To Use Tr1

OK Cancel

Figure 30-41. EDIT REAR PANEL OUTPUT MODE Dialog Box

Instructions

Use the dialog box for settings of horizontal voltage, driven port voltage, TTL output voltage levels, and Vertical voltage.

Horizontal Voltage

- Start (V). Selectable range from –10.000 to 0.000 to +10.000 V.
- Stop (V). Selectable range from –10.000 to 0.000 to +10.000 V.

Driven Port

- Set Output Voltage
- Port 1 (V). Selectable range from -10.000 to 0.000 to $+10.000$ V.
- Port 2 (V). Selectable range from -10.000 to 0.000 to $+10.000$ V.

TTL Output

- Set Output Level
- Port 1. Selectable options of High, Low, High Pulse, or Low Pulse.
- Port 2. Selectable options of High, Low, High Pulse, or Low Pulse.
- If High or Low Pulse selected, Pulse Width (ms) becomes available.

Vertical Voltage

- Min (V). Selectable range from -10.000 to 0.000 to $+10.000$ V.
- Max (V). Selectable range from -10.000 to 0.000 to $+10.000$ V.

Vertical has text boxes for entry of Vertical Mode Min (V), Vertical Mode Max (V), a check box for Use Active Trace, and a dropdown box to select which trace to use (Tr1 through Tr16)

The defaults for these fields are 0.000, 1.000, Checked (True), and Tr1 respectively.

These can be remotely programmed through the GPIB interface.

DIAGNOSTICS ACCESS Dialog Box

Previous

- [“SYSTEM Menu” on page 30-3](#)

Navigation

- [MAIN](#) | [System](#) | [SYSTEM](#) | [Diagnostics](#) | [DIAGNOSTICS ACCESS Dialog Box](#)

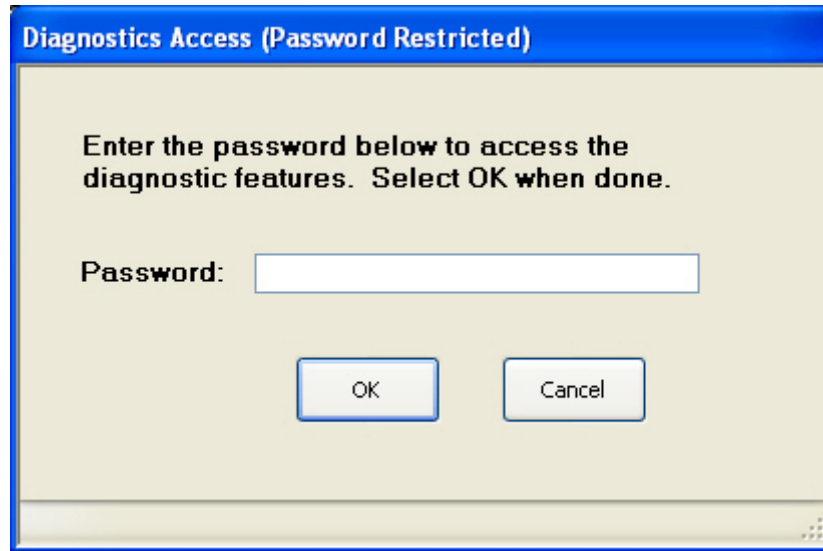


Figure 30-42. DIAGNOSTICS ACCESS Dialog Box

Instructions

An instrument-specific password is required to enter the DIAGNOSTICS ACCESS dialog box. Contact Anritsu Customer Service before using this dialog box.

Chapter 31 — File Management Menus

31-1 Chapter Overview

This chapter provides information for management of various system output and configuration files including Active channel TXT files, Active channel S2P files, Active channel CSV files, Active trace data (Formatted), and Active trace data (Unformatted).

31-2 Overview of File Management Menus and Dialog Boxes

There is one available menu with multiple related dialog boxes:

- [“FILE Menu” on page 31-2](#)
 - [“RECALL SETUP Dialog Box” on page 31-4](#)
 - [“RECALL DATA Dialog Box” on page 31-6](#)
 - [“SAVE SETUP Dialog Box” on page 31-7](#)
 - [“SAVE DATA Dialog Box” on page 31-8](#)
 - [“PRINT SETUP Dialog Box” on page 31-11](#)
 - [“PAGE SETUP Dialog Box” on page 31-10](#)
 - [“PRINT SETUP Dialog Box” on page 31-11](#)
 - EXIT Dialog Box: See [“Exit” on page 31-3](#)

31-3 File Menus and Dialog Boxes

FILE Menu

Previous

- [“MAIN Menu” on page 2-2](#)

Navigation

- MAIN | File | FILE

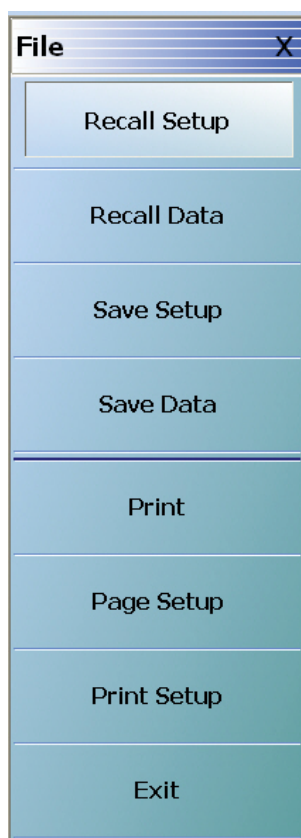


Figure 31-1. FILE Menu – Data Save/Recall Functions – Print Functions

Recall Setup

Select displays the Recall Setup dialog box which allows recalling of previously saved setup files.

- [“RECALL SETUP Dialog Box” on page 31-4](#)

Recall Data

Select displays the Recall Data dialog box.

- [“RECALL DATA Dialog Box” on page 31-6](#)

Save Setup

Use the **Save Setup** button to save variations of the current instrument setup. The configurations that can be saved are of the following types:

- Active Channel Setup and Calibration CHX files
- Active Channel Setup STX files
- All Channel Setup and Calibration CHA files
- All Channel Setup STA files

Select displays the **Save Setup** dialog box.

- [“SAVE SETUP Dialog Box” on page 31-7](#)

Save Data

Use the **Save Data** button to save the active channel data in several different formats and different purposes. For example, save data as a TXT file for use in another application such as a spreadsheet or word processor. Note the TXT data cannot be imported back into the instrument. Available formats are:

- Active Channel TXT files
- Active Channel S1P files
- Active Channel S2P files
- Active Channel M2P files
- Active Channel CSV files
- Active Channel BMP files
- Active Channel PNG files
- Active Channel JPEG files
- Active Trace Data (Formatted) TDF files
- Active Trace Data (Unformatted) TDU files

Select displays the **Save Data** dialog box.

- [“SAVE DATA Dialog Box” on page 31-8](#)

Print

Select prints the current main display to the default printer using a standard Windows **PRINT** dialog box. Print confirmation dialogs appear as the print job is spooled to the default printer. Note that the default printer and its configuration is set from the **Windows Desktop** using the **PRINTERS AND FAX** dialog box. If the VNA is standalone and not on a network, the attached printer is used. If the VNA is networked, any network printer can be used.

Page Setup

Select displays the **PAGE SETUP** dialog box where the paper size, margins, paper orientation, and other printer parameters can be set.

- [“PAGE SETUP Dialog Box” on page 31-10](#)

Print Setup

Select displays the **PRINT SETUP** dialog box where various print output parameters can be configured and set.

- [“PRINT SETUP Dialog Box” on page 31-11](#)

Exit

Select displays an exit warning, and if confirmed, ends all MS464xB processes, and exits the VNA application to the Windows operating system desktop.

RECALL SETUP Dialog Box

Use the Recall Setup dialog to recall one of several types of previously saved setup for general instrument configuration.

Power-On Configuration Setup

- Note that this dialog does not set the power-on configuration setting.
- Power-on settings are configured in the POWER-ON SETUP menu located within the SYSTEM menus.
- [“POWER-ON SETUP Menu” on page 30-9](#)
 - MAIN | System | SYSTEM | Power-On Setup | POWER-ON SETUP

Previous

- [“FILE Menu” on page 31-2](#)

Navigation

- MAIN | File | FILE | Recall Setup | RECALL SETUP Dialog Box

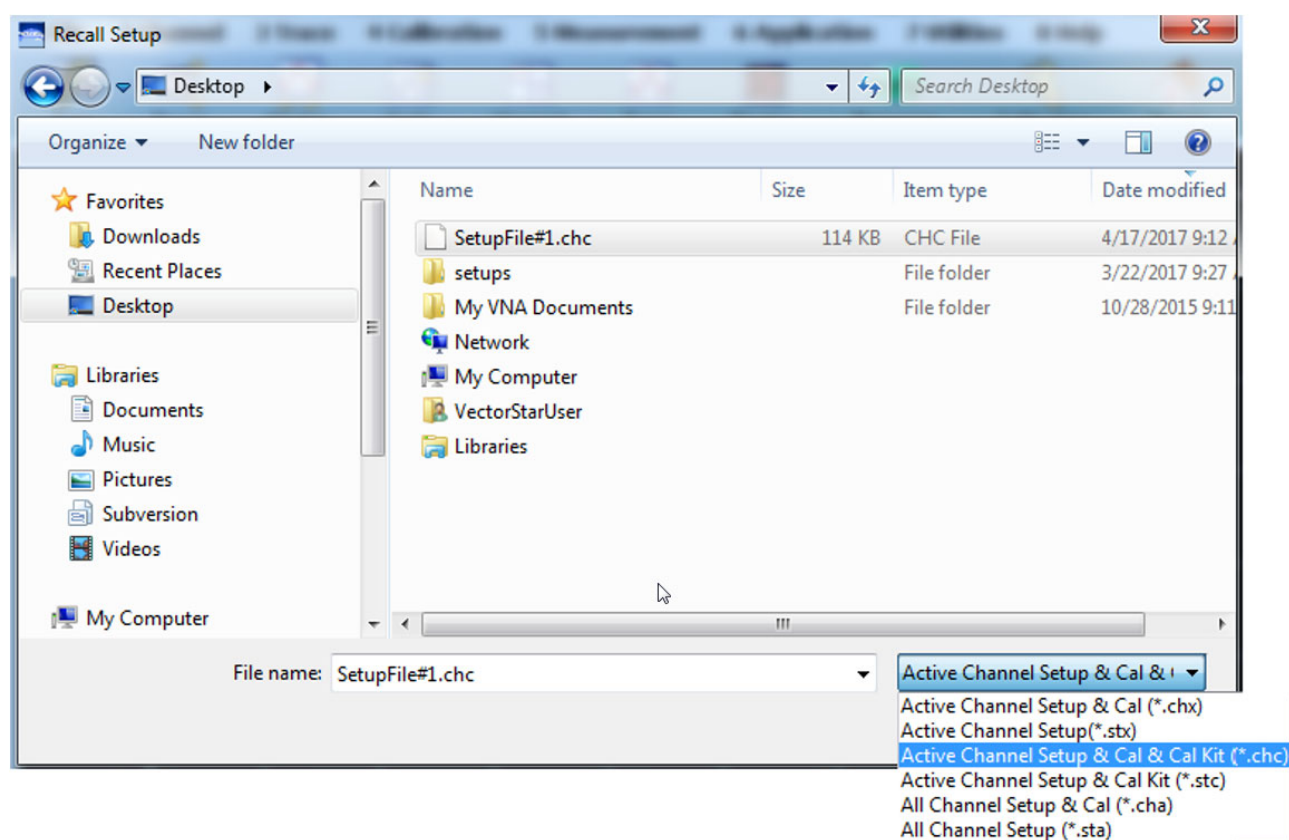


Figure 31-2. RECALL SETUP Dialog Box

Instructions

Use this dialog to select a previously stored setup configuration file.

1. Navigate to the File menu and the Power-On Setup dialog box.
 - MAIN | File | FILE | Recall Setup | RECALL SETUP Dialog Box
2. The Recall Setup dialog box appears.

3. Navigate to the required folder (recommend C:\AnritsuVNA folder) and locate the required setup file:
 - Active Channel Setup and Calibration CHX files
 - Active Channel Setup STX files
 - Active Channel Setup and Calibration and Cal Kit CHC files
 - Active Channel Setup and Cal Kit STC files
 - All Channel Setup and Calibration CHA files
 - All Channel Setup STA files
4. Once the appropriate file is selected, click **Open**.
5. The selected setup file is now available for use on the **PRESET SETUP** menu if the **Saved Setup** button is selected.
 - MAIN | System | SYSTEM | Preset Setup | PRESET SETUP
 - [“PRESET SETUP Menu” on page 30-7](#)

RECALL DATA Dialog Box

Previous

- [“FILE Menu” on page 31-2](#)

Navigation

- MAIN | File | FILE | Recall Data | RECALL DATA Dialog Box

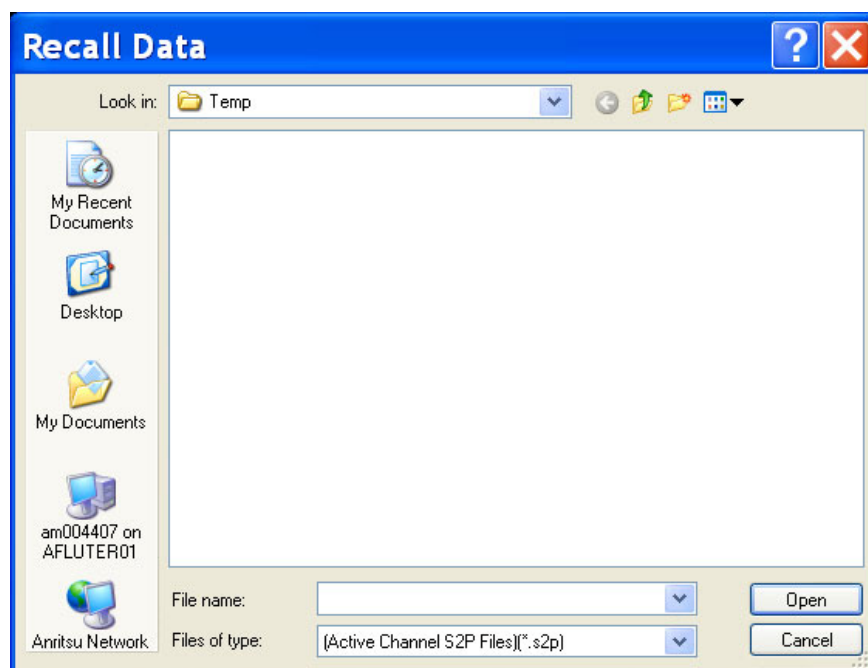


Figure 31-3. RECALL DATA Dialog Box

Instructions

Use this dialog to select a previously stored data configuration file. If the system is on hold, recall a TDF formatted file to overwrite the active trace memory. If system is not on hold, recall a TDF or TDU formatted file to overwrite the active trace memory. Note that the Active Channel TXT file cannot be imported back into the instrument.

Procedure

1. Navigate to the required folder and locate the required data file:
 - Active Channel S1P files
 - Active Channel S2P files
 - Active Channel M2P files
 - Active Channel CSV files
 - Active Channel BMP files
 - Active Channel PNG files
 - Active Channel JPEG files
 - Active Trace Data (Formatted) TDF files
 - Active Trace Data (Unformatted) TDU files
2. Best practices recommend the C:\AnritsuVNA folder.
3. Once the appropriate file is selected, click **Open**.
4. The selected data file is applied depending on the file type.

SAVE SETUP Dialog Box

Previous

- [“FILE Menu” on page 31-2](#)

Navigation

- MAIN | File | FILE | Save Setup | SAVE SETUP Dialog Box

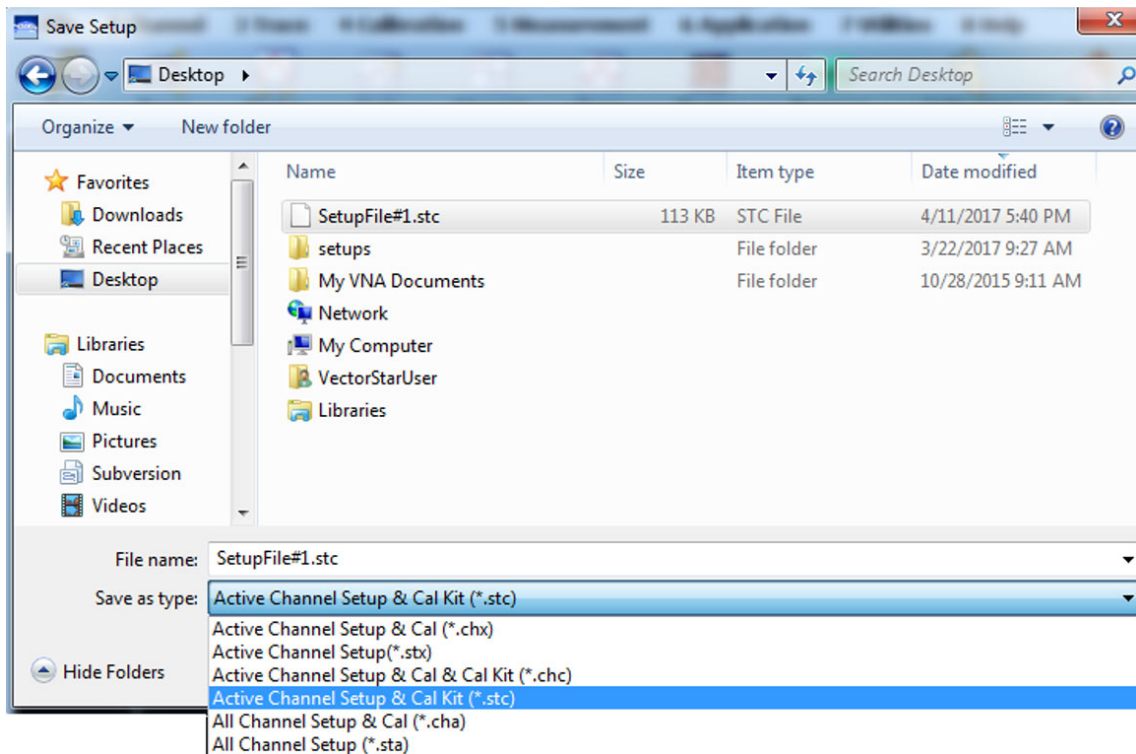


Figure 31-4. SAVE SETUP Dialog Box

Instructions

Use this dialog to select a previously stored setup configuration file.

1. Navigate to the required folder to save the setup file.
 - Best practices recommend the C:\AnritsuVNA folder.
2. Select the file type from the pull-down menu in the dialog box:
 - Active Channel Setup and Calibration CHX files
 - Active Channel Setup STX files
 - Active Channel Setup and Calibration and Cal Kit CHC files
 - Active Channel Setup and Cal Kit STC files
 - All Channel Setup and Calibration CHA files
 - All Channel Setup STA files
3. Once the appropriate file type and location is selected, click **Save**.
4. The selected setup file is saved and available for use on the PRESET SETUP menu if the Saved Setup button is selected.
 - MAIN | System | SYSTEM | Preset Setup | PRESET SETUP
 - [“PRESET SETUP Menu” on page 30-7](#)

SAVE DATA Dialog Box

Previous

- [“FILE Menu” on page 31-2](#)

Navigation

- MAIN | File | FILE | Save Data | SAVE DATA Dialog Box

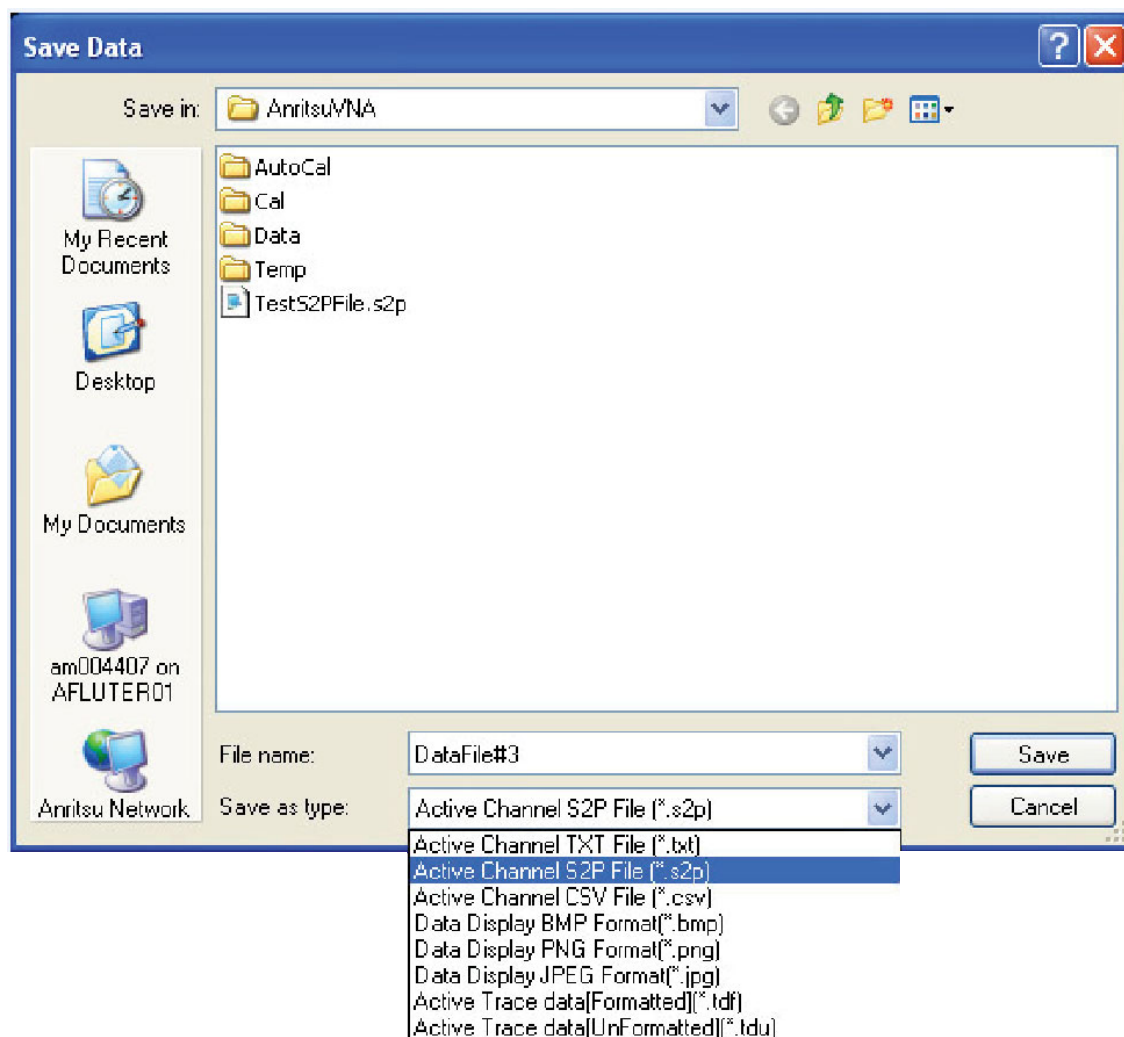


Figure 31-5. SAVE DATA Dialog Box

Note

Not all file data types are available in all application modes. For example, the S2P file type is not available for saving Pulse Profile or Pulse-to-Pulse data. The “Save as type” selection list automatically limits the available selections as appropriate for the current operating mode and data being saved.

Instructions

Use this dialog to save a data configuration file.

1. Navigate to the required folder.
 - Best practices recommend the C:\AnritsuVNA folder.

2. Select the data file type from the pull-down menu:
 - Active Channel TXT files
 - Active Channel S1P files
 - Active Channel S2P files
 - Active Channel M2P files
 - Active Channel CSV files
 - Active Channel BMP files
 - Active Channel PNG files
 - Active Channel JPEG files
 - Active Trace Data (Formatted) TDF files
 - Active Trace Data (Unformatted) TDU files
3. Once the appropriate file type is selected, click **Save**.
4. The selected data file is saved.

PAGE SETUP Dialog Box

Menu Bar

MENU BAR | File | Print

Previous

- [“FILE Menu” on page 31-2](#)

Navigation

- MAIN | File | FILE | Page Setup | PAGE SETUP Dialog Box

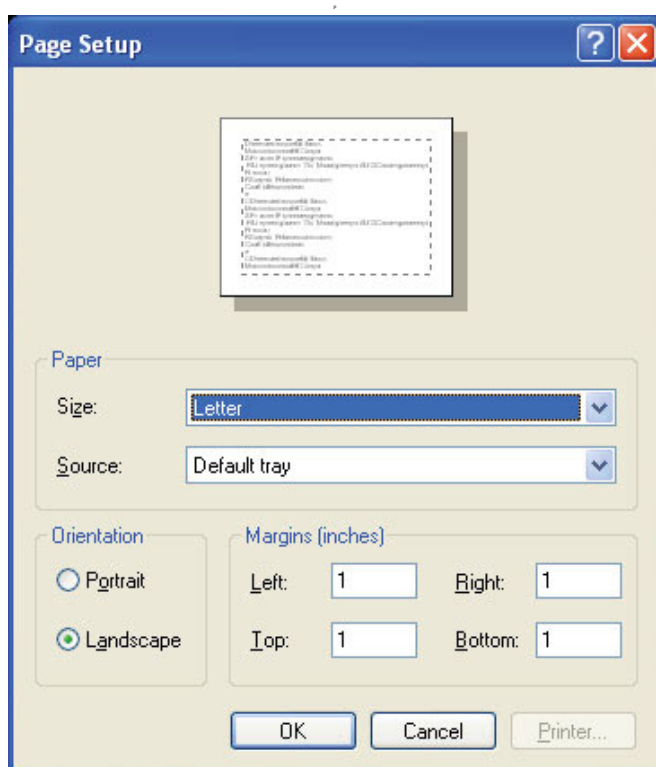


Figure 31-6. PRINT Dialog Boxes

Instructions

Select displays the standard Windows Print dialog box to print the current main display.

- If the VNA is networked, allows printing to any compatible networked printer. If a USB printer is attached, allows printing to any compatible USB printer.
- If the Graphics Header information is configured, selecting PRINT outputs the display data along with any user-defined parameters. The graphics header setup outputs data when the Remote Interface Language is set to Lightning AND the Graphics Header is set to ON.
- If the header is set to OFF, no header is printed, and the standard PAGE SETUP and then the PRINT dialog are displayed.
- If the Remote Interface Language is set to Native or HP8510, no header is output, regardless of the header setting and the same PAGE SETUP and PRINT dialogs are displayed

For additional information, see:

- [“MISC. SETUP Menu” on page 30-20](#)
- [“REMOTE LANG. Menu” on page 30-46](#)
- [“PAGE SETUP Dialog Box” on page 31-10](#)
- [“PRINT SETUP Dialog Box” on page 31-11](#)

PRINT SETUP Dialog Box

Menu Bar

MENU BAR | File | Print Setup

Previous

- [“FILE Menu” on page 31-2](#)

Navigation

- MAIN | File | FILE | Print Setup | PRINT SETUP Dialog Box

Print Setup

Output Format

☒ Bitmap with PageSetup ☐ Graphical ☐ Tabular

Header Output(Instruction: Select the appropriate checkBox to enable Header Output)

☒ Include Header

☒ Model ☒ Device ID

MS4647B 10410-00317

☒ Operator Name ☒ Print Date/Time

Jon Snow

☒ Operator Comment

First Test on DUT #1

Logo Setup

☒ Include Logo

Select Logo Type Location of User Logo File(.bmp extension)

☒ Anritsu ☐ User Browse

Apply Cancel

Figure 31-7. PRINT Dialog Boxes

The PRINT SETUP dialog box allows user configuration of various print output options described below.

Output Format

This button selection group allows three choices of print output:

- Bitmap with Page Setup
- Graphical
- Tabular

Header Output

The header output area provides control of which display elements are to appear on the output, and the contents of each.

Include Header

- When the check box is selected, all selected header elements below are included in the output type above. When the check box is not selected, no header fields are included in the output.

Model

- Typically the VNA Model Number, but it can be any alphanumeric string. It may be selected for inclusion in the output or not selected.

Device ID

- Typically the identification of the DUT, but it can be any alphanumeric string. It may be selected for inclusion in the output or not selected.

Operator Name

- Typically the identification of the test operator, but it can be any alphanumeric string. It may be selected for inclusion in the output or not selected.

Operator Comment

- Any free form comment from the test operator as alphanumeric strings. It may be selected for inclusion in the output or not selected.

Logo Setup

This area allows the inclusion of a logo on the output report. If not selected, the logo does not appear in the output.

Select Logo Type

- The output can be configured to output the Anritsu Logo or a user defined logo. If the user defined logo is selected, it must be added to the VNA system as a BMP (Bit Mapped Graphic) File to a known location on the VectorStar Solid State Drive (SSD).
- To load a user defined logo, copy the logo to a known SSD location. Then select the **User** radio button, and then browse to the logo location.
- The logo will remain until changed.
- If necessary, multiple logos can be added to the system and changed as needed.

Appendix A — File Specifications

A-1 Default File Directory Structure

This appendix defines the file directory structure used on the default-configuration MS464xB Series VNA and provides the general file extensions and specifications used in the instrument.

The following is the standard directory structure:

```
C:\AnritsuVNA
    \AutoCal
    \Cal
    \Data
    \Temp
```

A-2 File Extension Definitions

The following file types are used to support the instrument. The typical location provided is the default installation location.

Table A-1. File Extension Definitions (1 of 6)

Extension	Name	Definition
.acd	Precision Automatic Calibrator (AutoCal) Module Characterization File AutoCal Characterization File	Each AutoCal module has an associated characterization file that contains parametric data about the module. When AutoCal starts up, it looks for any files in the current directory with the extension .acd. If more than one file is found, the user is prompted for which file to use.
.ahc	All Hardware Calibration File	Saves all hardware calibration data on a per-system basis.
.aic	AIC Analog-In Calibration File	Saves analog-in calibration data on a per-system basis.
.alc	ALC Calibration File	Saves the ALC calibration on a per-system basis.
.bmp	Bit-mapped Graphics File	A Windows-compatible graphic file. In the MS464xB-Series VNA, the graphic capture of the main display results in a .bmp file that includes the running graphics display,
.ccf	Calibration Kit Coefficients File	A calibration kit coefficients file comes with each calibration kit, usually on a USB memory device. These files can be loaded onto the VNA hard disk and then recalled to active memory as required. See also .kit and .lst files.
.cha	All Channels Setup and Calibrations File	For saving and recalling all system and all channel setup parameters and RF calibration data coefficients. Upon recall, restores all configuration settings to all channels. Similar to the .sta file, but the .sta file does not save RF calibration coefficients.

Table A-1. File Extension Definitions (2 of 6)

Extension	Name	Definition
.chc	Active Channel Setup and Calibration File with Calibration Kit information.	<p>For the active channel, saves the channel setup parameters, RF calibration coefficients, and information on calibration kits.</p> <p>Upon recall, restores the setup parameters and RF calibration coefficients to the active channel, as well as calibration kit information.</p> <p>Similar to the .stc file, but the .stc file does not save RF calibration coefficients.</p> <p>Similar to the .chx file, but the .chx file does not save calibration kit information.</p>
.chx	Active Channel Setup and Calibration File	<p>For the active channel, saves the channel setup parameters and RF calibration coefficients.</p> <p>Upon recall, restores the setup parameters and RF calibration coefficients to the active channel.</p> <p>The .chx and .stx file formats are very convenient for copying the setup of one channel into another channel:</p> <ul style="list-style-type: none"> Save the setup from the active channel Open an additional channel Recall the saved .chx or .stx file into the new channel. <p>Similar to the .stx files, but the .stx file does not save RF calibration coefficients.</p> <p>Similar to the .chc file, but the .chc file also saves the calibration kit information.</p>
.cmu	Active Channel Memory Unformatted Data	For the active channel memory saves unformatted data.
.csv	Active Channel Information CSV File	<p>An exportable trace data file in a spreadsheet compatible comma-separated-value (CSV) format.</p> <p>Includes an optional descriptive heading in which the data for every trace is saved to a defined location folder.</p> <p>The data for each trace is saved as an X and a Y column to accommodate multiple parameters such as mixed frequency and time domain.</p> <p>Subsequent traces are added as additional columns.</p> <p>Instrument data can be saved to the .csv but the .csv file cannot be recalled into the VNA memory.</p> <p>Similar to the .txt file format.</p>
.edl	Embedding/De-embedding Configuration File	Default file name is EmbedDeembed.edl.
.eqn	Equation file	<p>File that defines equation used for Inter-trace math.</p> <p>On a per-channel, per-trace basis, saves the active Inter-trace equation.</p> <p>Upon recall, restores the saved inter-trace equation to the active trace.</p>

Table A-1. File Extension Definitions (3 of 6)

Extension	Name	Definition
.fpc	Frequency Sweep Power Calibration File	<p>On a per-channel, per-port basis, saves the active channel user power calibration.</p> <p>Upon recall, restores the saved user power calibration to the active channel.</p> <p>File extension for frequency sweep calibrations using Frequency Sweep (Linear), Frequency Sweep (Log), Segmented Sweep (Frequency-based), and Segmented Sweep (Index-based).</p> <p>Compare with .ppc file types below for power sweeps.</p>
.ini	AutoCal Default Setup File	<p>The default setup file for AutoCal. The default file name is auto_cal.ini.</p> <p>If another file is required, another AutoCal setup file should be loaded by selecting File Open Setup File.</p>
.jpg .jpeg	Joint Photographic Experts Group Image File	User-initiated capture of the data display area of the VNA.
.kit	Calibration Kit Coefficients File	<p>From Anritsu Lightning 37000D Series VNA.</p> <p>VectorStar VNAs will read .kit files but not save them. The VectorStar VNA will convert a .kit file to a .ccf file format.</p>
.lcf	LRL/LRM cal kit file	LRL/LRM or TRL/TRM cal kit file.
.lmt	Limit Line Configuration File	<p>For the active trace on the active channel, saves all limit line data including number of segments, frequency range or CW, test result signs, limit fail signals, and limit external output.</p> <p>Upon recall, restores the limit line configuration to the active trace on the active channel</p>
.log	Microsoft Windows Event Viewer Log File	<p>These are operating system files logging events for the Application, Security, System, and Vector. The files are viewable by navigating to:</p> <p>MAIN System SYSTEM Event Log EVENT VIEWER Dialog Box</p>
.lst	List of component file names for .s1p characterized calibration kits.	<p>LST text file lists the component file names for an .s1p characterized calibration kit so all components can be loaded at once.</p> <p>An .s1p file type holds the characteristics of a reflective calibration component. These files are loaded as needed during calibration if the calibration components are characterized by this file type.</p>
.mlcf	mTRL cal kit file	mTRL cal kit file.
.mNp	Active Channel Mixed mode parameter file	<p>For mixed-mode parameters, the .mNp text file format is exactly the same as for the .sNp format but mixed mode parameters are used instead.</p> <p>MNP file types can be .m2p (for 2-port), .m3p and .m4p (for 4-port).</p>
.mwzd	Mixer Wizard Setup File	Stores the mixer wizard configuration so that it can be recalled at a later time.

Table A-1. File Extension Definitions (4 of 6)

Extension	Name	Definition
.ppc	Power Sweep Power Calibration File	<p>On a per-channel, per-port basis, saves the active channel user power calibration.</p> <p>Upon recall, restores the saved user power calibration to the active channel.</p> <p>File extension for power sweep calibration files using Power Sweep (CW Frequency) or Power Sweep (Swept Frequency).</p> <p>Compare with .fpc file types above for frequency-based sweeps.</p>
.ptc	Pretune Calibration File	Saves the source pretune calibrations on a per-system basis.
.rcvr	Receiver Calibration File	<p>On a per-channel basis, saves all available user receiver calibration data.</p> <p>Upon recall, restored the user receiver calibration data to the active channel.</p>
.s1p .s2p .s3p .s4p	Active Channel S1P file Active Channel S2P file Active Channel S3P file Active Channel S4P file	<p>Generically, an .sNp file is in standard microwave simulator text format and is similar to the .txt file described below.</p> <p>Includes a controlled header and only one or four S-parameters are saved.</p> <p>An .s1p file type holds the characteristics of a reflective calibration component. These files are loaded as needed during calibration if the calibration components are characterized by this file type.</p> <p>An .s2p file type holds the characteristics of a 2-port microwave device.</p> <p>An .s3p file type holds the characteristics of a 3-port microwave device. (For 4-Port VNA)</p> <p>An .s4p file type holds the characteristics of a 4-port microwave device. (For 4-Port VNA)</p> <p>If a full two-port calibration is applied, all of the S-parameters are always measured, even if they do not need to be displayed. The resultant .s2p file is complete with all S-parameter information.</p> <p>Upon recall, the .sNp file can be recalled and displayed as trace memory when they are loaded into the active channel.</p>
.sgs	Segmented Sweep File	<p>On a per-channel basis, saves the segmented sweep definition configuration data. Use Segmented sweep definition file.</p> <p>Used for frequency-based sweep and index-based sweep.</p>
.slc	Source LO Calibration (Src LO) calibration file	Saves the LO calibration on a per-system basis.
.sqm	Source Quadrupler hardware calibration file	Saves the source quadrupler module calibration on a per-system basis.

Table A-1. File Extension Definitions (5 of 6)

Extension	Name	Definition
.sta	All Channels Setup File	<p>For saving and recalling all system and all channel setup parameters.</p> <p>Upon recall, restores all configuration settings to all channels.</p> <p>Similar to the .cha file, but the .cha file also saves RF calibration coefficients.</p>
.stc	Active Channel Setup File with Calibration Kit Information.	<p>For the active channel, saves the channel setup parameters and information on calibration kits.</p> <p>Upon recall, restores the setup parameters and calibration kit information.</p> <p>Similar to the .stx file, but the .stx file does not save calibration kit information.</p> <p>Similar to the .chc file, but the .chc file also saves RF calibration coefficients.</p>
.stx	Active Channel Setup File	<p>For the active channel, saves the channel setup parameters.</p> <p>Upon recall, restores the setup parameters to the active channel.</p> <p>The .chx and .stx file formats are very convenient for copying the setup of one channel into another channel:</p> <ul style="list-style-type: none"> Save the setup from the active channel Open an additional channel Recall the saved .chx or .stx file into the new channel. <p>Similar to the .chx files, but the .chx file also saves RF calibration coefficients.</p> <p>Similar to the .stc file, but the .stc file also saves the calibration kit information.</p>
.tdf	Active Trace Data Memory Formatted File – After Post Processing	<p>The .tdf file stores trace data or trace memory data after all post processing using an XML format.</p> <p>This is useful for comparing a DUT against a “golden device” or seeing if the performance of a DUT has changed over time.</p> <p>The file can be saved and recalled. The file will recalled into the same part of the chain that it was saved from and after any post-processing steps.</p>

Table A-1. File Extension Definitions (6 of 6)

Extension	Name	Definition
.tdu	Active Trace Data Memory Unformatted File – Before Post Processing	<p>The.tdf file stores trace data or trace memory data using an XML format.</p> <p>The file saves the active trace's memory before most post processing such as time domain, smoothing, and group delay calculations.</p> <p>The file can save data from the current trace or from the trace memory.</p> <p>A previously saved file can be recalled and loaded, and then either displayed on the current trace or displayed on the trace memory.</p> <p>This file can be recalled into either the active trace (normally in hold or sweeping very slowly) or into the active trace's memory.</p> <p>The file will recalled into the same part of the chain that it was saved from and before any post-processing steps.</p>
.tmz	Ten (10) MHz Calibration File	Saves the system 10 MHz reference calibration on a per-system basis.
.txt	Active channel trace data text file	<p>An exportable trace data file in a spreadsheet or word processor compatible format that uses tabs to delimit the output fields.</p> <p>Includes an optional descriptive heading in which the data for every trace is saved to a defined location folder.</p> <p>The data for each trace is saved as an X and Y column to accommodate multiple parameters such as mixed frequency and time domain.</p> <p>Subsequent traces are added as additional columns.</p> <p>Instrument data can be saved to the .txt file but the .txt file cannot be recalled into the VNA memory.</p> <p>Similar to the .csv file format.</p>
.xml	VNA configuration file in XML	<p>XML or eXtensible Markup Language file</p> <p>Used for the VNA configuration state when the instrument is shut down and subsequently powered back up.</p>
KIT_INFO.xyz	Calibration kit file for an Anritsu Lightning 37xxxD/37xxxE Series VNA.	<p>The .xyz file extension varies with the connector geometry and gender.</p> <p>The MS464xB Series VNA can read Lightning calibration kit files and convert them to a .ccf format.</p>

Appendix B — Error Messages

B-1 Appendix Overview

This appendix lists, describes, and provides corrective action for the error messages that appear on the instrument display. Any error messages that require action by a qualified service representative are also listed. The tables herein describe the name of the message, the typical reason for its occurrence, and recommended error correction methods. In many cases, the remedial action for the error message is described with applicable cross-references to documented procedures.

B-2 System Messages

System messages are displayed in the status bar or a pop-up dialog box. They indicate that the system may be malfunctioning. System messages are recorded into the event log. Contact Anritsu Customer service if problems are not resolved with instrument re-boot.

Table B-1. Status Bar Messages

Message	Description	Display Location
Lock Error “A”	Direct Digital Synthesis Reference Unlocked	Status Bar
Lock Error “B”	Local Oscillator 1 Heterodyne Unlocked	Status Bar
Lock Error “C”	Local Oscillator 1 Offset Unlocked	Status Bar
Lock Error “D”	Source 1 Offset Unlocked	Status Bar
Lock Error “E”	Local Oscillator 1 Main Unlocked	Status Bar
Lock Error “F”	Source 1 Main Unlocked	Status Bar
Lock Error “H”	Source 1 Heterodyne Unlocked	Status Bar
Lock Error “I”	Source 2 Offset Unlocked	Status Bar
Lock Error “J”	Source 2 Main Unlocked	Status Bar
Level Error “K”	Source 2 Unleveled (Automatic Level Control Loop Failed)	Status Bar
Lock Error “L”	Source 2 Heterodyne Unlocked	Status Bar
RF Power Unlevel	Automatic Level Control Loop Failed	Status Bar
Auto IF Cal Failed	Intermediate Frequency Power Level Failed	Status Bar
Trigger IF Cal Failed	Intermediate Frequency Power Level Failed	Dialog Box
Power Up Self Test Failed	Self Test Failed	Status Bar
Trigger Self Test Failed	Self Test Failed	Dialog Box
Source Pretune Cal Failed	Source Pretune Calibration Failed to Complete	Dialog Box
LO Level Cal Failed	Local Oscillator Calibration Failed to Complete	Dialog Box
ALC Cal Failed	Automatic Level Control Calibration Failed to Complete	Dialog Box
Memory Location Corrupted		Status Bar/ Dialog Box

Table B-1. Status Bar Messages

Message	Description	Display Location
System Out of Memory		Status Bar/dialog Box

B-3 Operational Messages

Operational messages are displayed in the status bar, a pop-up dialog box, or in a table. They indicate an operation error. A system malfunction does not typically cause operational messages. Operational messages are not recorded to the event log unless specified below.

Table B-2. Multiple Source Operational Messages

Message	Display Location	Corrective Action
Equation out of range	Table, Dialog Box	Enter values for the source equation that are within the operational range of the instrument.
Start must be less than stop	Table, Dialog Box	Enter a correct start or stop frequency for the current band.
Frequency range overlaps between bands	Table, Dialog Box	Enter a correct start or stop frequency for the current band.
Undefined divide by zero	Table, Dialog Box	Enter a correct divisor value.
Invalid data entries in band x	Table, Dialog Box	Enter an in band x value

Table B-3. LO Level Cal/ALC Cal Operational Messages

Message	Display Location	Corrective Action
Incorrect sensor detected	Dialog Box	Reconnect the sensors or change the port configuration.
Power cal in frequency sweep	Dialog Box	Change the sweep to a power sweep.
Power cal in power sweep	Dialog Box	Change the sweep to a frequency sweep
Power meter not detected	Dialog Box	Verify that the power meter is properly connected and communicating with the instrument.
Power sensor out of range	Dialog Box	Change the power range.
Wrong power meter detected	Dialog Box	Restart the calibration with the connected power meter or change the power meter.

Table B-4. AutoCal/AutoCal Characterization Operational Messages

Message	Display Location	Corrective Action
Characterization file not found	Dialog Box	Load the AutoCal module characterization file.
AutoCal module not detected	Dialog Box	Check the serial cable connection.
AutoCal module orientation not detected	Dialog Box	Select the module orientation on the next dialog.
AutoCal assurance failed	Dialog Box, Event Log	Rerun AutoCal. If the problem reoccurs, there might be a problem with the AutoCal Module.
12 term cal not applied	Dialog Box	Apply the 12-term calibration.

Table B-5. RF Calibration Operational Messages

Message	Display Location	Corrective Action
Label name already exist	Dialog Box	Enter a new label name.
Blank label name not allowed	Dialog Box	Enter a valid label name.

Table B-6. Operational Messages

Message	Display Location	Corrective Action
File read error		
File write error		
External drive has no room		Delete unneeded files from the external drive.
External drive unavailable		
Hard disk has no room		Delete unneeded files from the internal drive.
Hard disk unavailable		

Appendix C — Glossary of Terms

C-1 Introduction

The following terms are related to this product and technology.

C-2 Glossary Terms

3 dB rule : The 3 dB rule provides a means to estimate relative power values. A 3 dB gain indicates that power increases to twice the power (a multiple of 2). A 3 dB loss indicates that power decreases to half the power (a multiple of 1/2). A system with 40 watts of input power and a 6 dB insertion loss will have only 10 watts of output power (a multiple of 1/2 for each 3 dB loss, or 1/4 of 40 watts).

Adapter : A fitting that supplies a passage between two sets of equipment when they cannot be directly interconnected.

ADC : Analog-to-Digital Converter (ADC, A/D or A to D) is an electronic device that converts continuous signals to discrete digital numbers. The reverse operation is performed by a digital-to-analog converter (DAC). ADC can uniquely represent all analog input values within a specified total input range by a limited number of digital output codes. Refer also to DAC.

ALC : Automatic Level Control (ALC)

Analog System : An Analog system uses an analog transmission method to send voice, video and data-using analog signals, such as electricity or sound waves, that are continuously variable rather than discrete units as in digital transmissions. Mobile analog systems include AMPS, NMT and ETACS.

Analog

Transmission : Analog Transmission refers to signals propagated through the medium as continuously varying electromagnetic waves.

AutoCal : The AutoCal VNA calibration method uses an external calibrator, such as the Anritsu 36585. The 36585 AutoCal module provides an automatic system for fast, repeatable high-quality calibrations of a VNA. The AutoCal module is inserted between the VNA test ports to perform the calibration. A serial to USB converter (Anritsu part number 2000-1809-R USB to Serial adapter) must be employed to enable communication between the autocal unit and the VNA.

Average power : Average power is the peak power averaged over time and is usually applied to pulsed systems where the carrier power is switched on and off.

Band : Band, in telecommunication, refers to the following definitions: 1. The range of frequencies between two defined limits which are used for a specific purpose. 2. One of the geopolitical boundaries established to define a WATS (wide-area telephone service) serving area.

Band Pass Filter : A Band Pass Filter is a radio wave filter with a specific range of frequencies in which it is designed to pass. It rejects frequencies outside the pass-band range. A resistor-inductor-capacitor circuit is an example of a Band Pass Filter.

Bandwidth : Bandwidth usually identifies the capacity of a circuit or amount of data that can be sent through a given circuit. It may be user-specified in a PVC. It is an indication of the amount of data that is passing over a medium. Also, bandwidth is the portion of the frequency spectrum required to transmit desired information. Each radio channel has a center frequency and additional frequencies above and below this carrier frequency which is used to carry the transmitted information. The range of frequencies from the lowest to the highest used is called the bandwidth.

Broadband : Broadband refers to telecommunication that provides multiple channels of data over a single communications medium, typically using some form of frequency or wave division multiplexing. It is a service or system requiring transmission channels capable of supporting rates greater than the Integrated Services Digital Network (ISDN) primary rate.

Calibration : When making measurements, the instrument must be calibrated in order to remove residual errors due to measurement setup conditions. Anritsu recommends performing the calibration under the same conditions as the measurement: temperature, frequency, number of points, source power, and IFBW. Calibrations standards with known reflection coefficients are used to calculate the correction factors. The calibration must be conducted using the appropriate standards at the open end of any test port cables and adapters that are connected to the instrument. This ensures that the match, phase length, and loss of these cables and adapters are all accounted for. For optimal performance, high quality phase-stable cables and precision adapters must be used.

Command Unit : A Command Unit is a complete command that is formatted with parameters and terminators.

Configuration

Commands : Configuration Commands are commands that are issued to an instrument and that change a specific instrument configuration.

dB : Decibel or deciBel (dB) is a logarithmic ratio of the difference between two values (a logarithm ratio is equal to 10 times). dB is a unit for measuring relative power ratios in terms of gain or loss. The units of dB are expressed in terms of the logarithm to base 10 of a ratio and typically are expressed in watts. For example, a -3 dB loss indicates a 50% loss in power; a +3 dB reading is a doubling of power; 10 dB indicates an increase (or a loss) by a factor of 10; 20 dB indicates an increase (or a loss) of a factor of 100; 30 dB indicates an increase (or a loss) by a factor of 1000. Common values of dB expressed in ratios: 0 dB = 1:1, 10 dB = 10:1, 20 dB = 100:1, 30 dB = 1000:1, -30 dB = 0.001:1 [or (1/1000):1].

dBc : Decibels referenced to the carrier (dBc) is a technique for expressing a power measurement in logarithmic form using the carrier power as a reference. The units are used to describe how far down signals and noise are relative to a known signal. Typical use of this term is to describe spurious signals and noise compared to a desired transmit signal.

dBm : dBm is an absolute measurement of power relative to 1 milliwatt. In other words, dBm is a decibel value referenced to a milliWatt (dBm). This is a technique for expressing a power measurement in logarithmic form using 1 mW as a reference. dBm is a decibel ratio (log 10) of Watts (W) to one milliwatt (1mW). dBm, therefore, represents absolute power. Examples are: 0 dBm = 1.0 milliwatt, 10 dBm = 10 milliwatt, 30 dBm = 1000 milliwatt = 1 watt.

Eye diagram : An Eye diagram (or eye-pattern diagram) is a superposition of segments of a received PAM signal that is displayed on an oscilloscope or similar instrument. The eye diagram is used to assess impairments in the radio channel.

IF : Intermediate Frequency (IF) is a frequency to which a carrier frequency is shifted as an intermediate step in transmission or reception. An intermediate electromagnetic frequency is generated by a superheterodyne radio receiver.

Line Type : VNA calibration media: Coaxial, Non-dispersive, Microstrip, Waveguide

Linearity : Something may be described as linear if the characteristic is approximately but not exactly a straight line; and linearity may be valid only within a certain operating region.

LRL : VNA calibration method: Line-Reflect-Line

LRM : VNA calibration method: Line-Reflect-Match

Measurement

Uncertainty : The purpose of measurement is to provide information about a quantity of interest ñ a measurand. No measurement is exact. When a quantity is measured, the outcome depends on the measuring system, the measurement procedure, the skill of the operator, the environment, and other effects. Even if the quantity were to be measured several times, in the same way and in the same circumstances, a different measured value would in general be obtained each time, assuming the measuring system has sufficient resolution to distinguish between the values.

mTRL : Multiline Through-Reflect-Line (mTRL)

RBW : Resolution Bandwidth (RBW) With spectrum analyzers, a narrow band filter is swept across a frequency span to create the spectrum display. The filter bandwidth (RBW) determines the frequency resolution across the frequency axis.

Return Loss : Return loss is a measure of how well devices or lines are matched. A match is good if the return loss is high. A high return loss is desirable and results in a lower insertion loss. return loss is the loss of power in the signal returned/reflected by a discontinuity in a transmission line or optical fiber.

RL : Return loss is a measure of how well devices or lines are matched. A match is good if the return loss is high. A high return loss is desirable and results in a lower insertion loss. return loss is the loss of power in the signal returned/reflected by a discontinuity in a transmission line or optical fiber.

RMS : Is the square root of the arithmetic mean of the squares of the values, or the square of the function that defines the continuous waveform. Waveforms made by summing known simple waveforms have an RMS that is the root of the sum of squares of the component RMS values. Because of their usefulness in carrying out power calculations, listed voltages for power outlets (e.g., 120 V in the USA, or 230 V in Europe) are almost always quoted in RMS values, and not peak values.

SmartCal : The SmartCal VNA calibration method uses an external calibrator, such as the Anritsu MN252x8x, MN254x8x. The SmartCal module provides an automatic system for fast, repeatable high-quality calibrations of a VNA. The SmartCal module is inserted between the VNA test ports to perform the calibration. Connect the SmartCal to the VNA or control computer with the included USB A/Micro-B latch cable.

SNP file : Generically, an .sNp file is in standard microwave simulator text format and is similar to the .txt file. The SnP files setup configuration user interface varies depending on the VNA model's maximum number of ports as .s1p, .s2p, .s3p, .s4p

SOLR : VNA calibration method: Short-Open-Load-Return

SOLT : VNA calibration method: Short-Open-Load-Thru

SOLT : SOLT or Short Open Load Thru calibration method for coaxial line types with simple and redundant standards. It is not band-limited. It requires well-defined standards. It has lower accuracy at higher frequencies. Calibrations standards with known reflection coefficients are used to calculate the correction factors. Refer to Calibration. Compare this with SSLT or Offset Short 1, Offset Short 2, Load, Thru calibration method for waveguide line types.

Spectrum Analyzer : A spectrum analyzer measures the magnitude of an input signal versus frequency within the full frequency range of the instrument. The primary use is to measure the power of the spectrum of known and unknown signals.

SSLT : VNA calibration method: Offset Short or Short-Short-Load-Thru

SSST : VNA calibration method: Triple Offset Short or Short-Short-Short-Thru. Short-Short-Short-Thru (SSLT) uses Shorts that all have different offset lengths. It is a calibration (common in waveguide or high-frequency coax) with simple and redundant standards, but it is band-limited. It requires well-defined standards. It has better accuracy at higher frequencies than SOLT, but has high sensitivity to connector repeatability errors, and is poor with on-wafer.

TDR : Time Domain Reflection - Converted S-Parameter data into an impedance profile (TDR) with an open end.

TDT : Time Domain Transmission - Converted S-Parameter data into an impedance profile (TDT) with matched terminations.

Termination : A special device, known as a terminator, connected at the beginning and end of a wire or cable to prevent an RF signal from being reflected back from each end, causing interference, or power loss. The terminator is usually placed at the end of a transmission line or daisy chain bus (such as in SCSI), and is designed to match the AC impedance of the cable and hence minimize signal reflections, and power losses.

True RMS : The true RMS voltage is measured using the following method: $P(\text{avg})$ is the average power dissipated in a resistor R when a RMS voltage $V(\text{rms})$ is applied. The power is measured by a thermistor and the scale of the meter is calibrated as a ratio of temperature to resistance. This is true for any waveform and frequencies. Note that most meters you use are not true RMS meters. They measure only an average or a DC equivalent of a 60Hz pure sine wave.

UFX : Universal Fixture Extraction (UFX) provides more calibration choices for probe and in-fixture calibrations where a full set of calibration standards may not be available. It provides advanced de-embedding tools that improve the success of de-embedding test fixtures by including incremental calibration standard information as it becomes available. As a result, de-embedding of the test fixture improves, thereby improving DUT measurement accuracy.

VNA : Vector Network Analyzer (VNA)

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Anritsu utilizes recycled paper and environmentally conscious inks and toner.

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