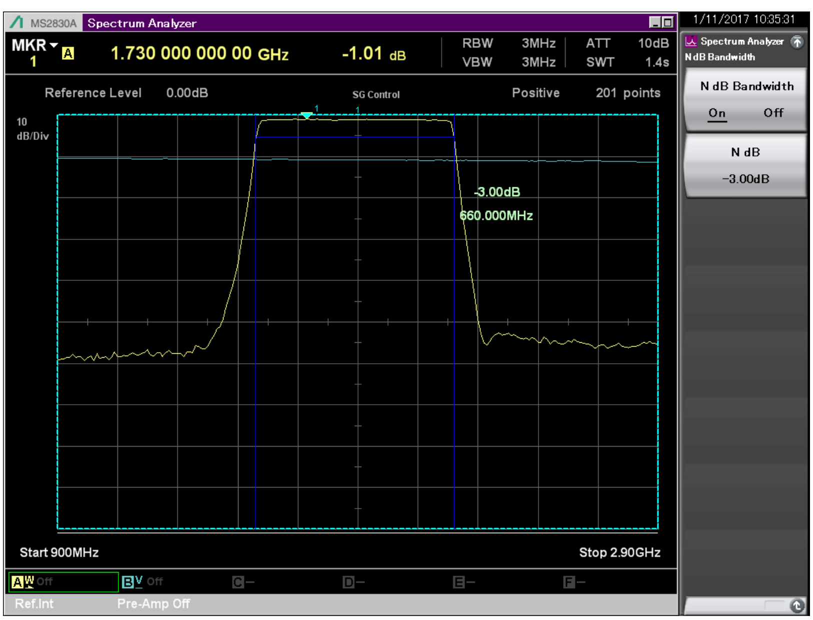
User Guide

Internal Signal Generator Control Function Simple Operation Guide

Signal Analyzer MS2830A

This guide outlines the operation procedure for the **Internal Signal Generator Control Function (Opt-052)** for the Signal Analyzer MS2830A.

It describes an example of setting a DUT Band-pass Filter with a center frequency of 1.9 GHz and confirming the passband width. Use this manual as a reference when setting actual DUT measurements.



Measurement Image: Baseband Filter

Signal Analyzer MS2830A

For further details, refer to the following section in the operation manual.

MS2830A/MS2840A Signal Analyzer Operation Manual
Spectrum Analyzer Function Operation
Chapter 6 Measure Function
6.9 Internal Signal Generator Control Function

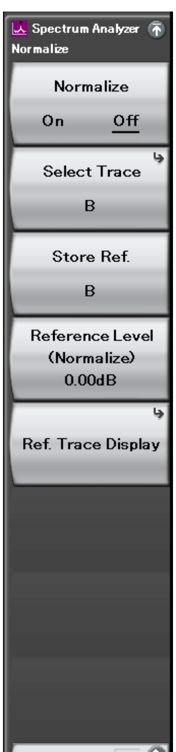
List of Internal Signal Generator Control Function Settings

The Internal Signal Generator Control Function is one of the spectrum analyzer Measure functions.

[Procedure]

[SPA] > [Measure] > [→] Page 2 > [F6: SG Control]

- SG Control: Sets Internal Signal Generator Control Function On/Off
  All traces are cleared at On/Off switching.
- SG Output Level: Sets internal signal generator output level
- SG Output: Sets internal signal generator RF output On/Off
- Normalize: Normalizes trace data (see below)
- N dB Bandwidth: Displays a bandwidth between two points N dB below the selected peak marker point. (see below)
- Switching Speed: Selects frequency switching speed
  Selections: Fast Tuning, Normal



- Normalize: Sets Normalize function On/Off
- Select Trace: Selects trace to save in Store Ref. (A/B/C/D/E/F)
- Store Ref.: Saves selected trace as reference
- Reference Level (Normalize): Sets reference level at Normalize
- Ref. Trace Display: Switches display of trace saved in Store. Ref On/Off

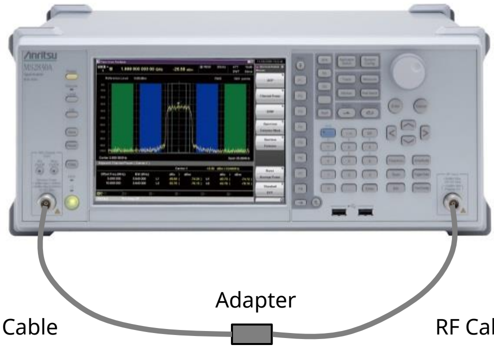
- N dB Bandwidth: Sets N dB Bandwidth measurement function On/Off
- N dB: Sets peak marker level difference (N dB)

[Measurement Example] Band-pass Filter Frequency Characteristics 1/7

☐ Calibrating Measurement System Loss/Frequency Characteristics

First, make the connections shown in the figure on the right and check the loss/frequency characteristics of the built-in signal generator and spectrum analyzer, RF cables, adapter, etc.

Signal Analyzer MS2830A



[Procedure]

① Switch to the spectrum analyzer function [SPA].

② Set the frequency (1.9 GHz for example).
[Frequency] > [1.9] [F1: GHz]

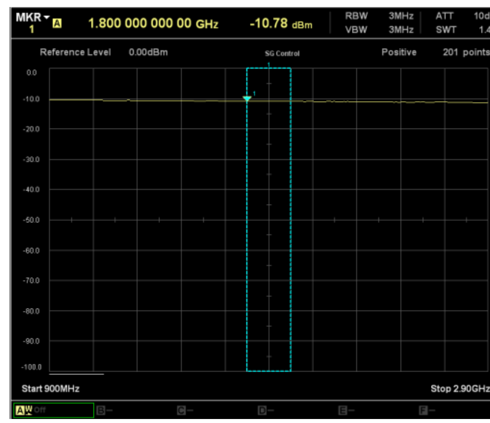
③ Set the sweep frequency (2 GHz for example)
[Span] > [2] [F1: GHz]

④ Set Positive detection.
[Trace] > [F8: Detection] > [F2: Positive]

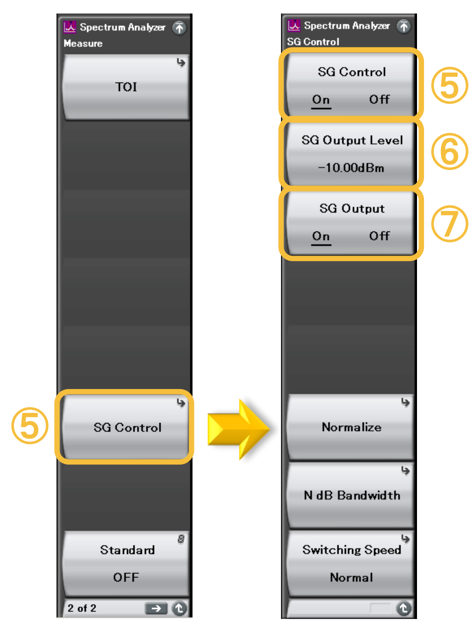
⑤ Enable the built-in signal generator tracking function.
[Measure] > [→] Page 2 > [F6: SG Control]
> [F1: SG Control] = On

⑥ Set the signal generator output level (–10 dBm for example).
[F2: SG Output Level] > [-10] [F1: dBm]

⑦ Enable the signal generator output.
[F3: SG Output] = On



Example of Screen for Checking Frequency Characteristics



[Measurement Example] Band-pass Filter Frequency Characteristics 2/7

◻ Calibrating Measurement System Loss/Frequency Characteristics

Set the previously confirmed loss/frequency characteristics of the measurement system as the reference value.

[Procedure] (Continued)

① [F6: Normalize]

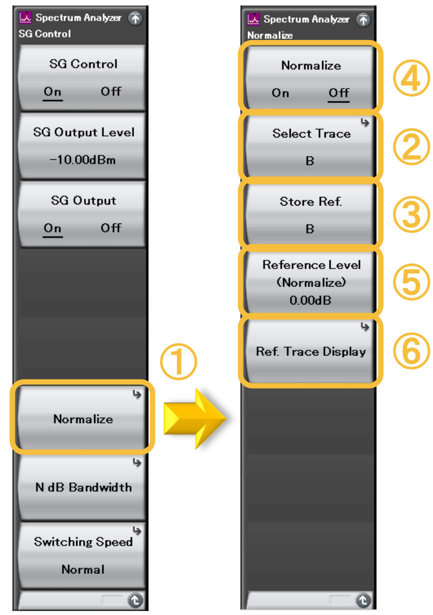
② Select the trace to save in Store Ref. (default is B).
[F2: Select Trace] = B

③ Save the selected trace as the reference value.
[F3: Store Ref.]

④ Set the Normalize function to On.
[F1: Normalize] = On

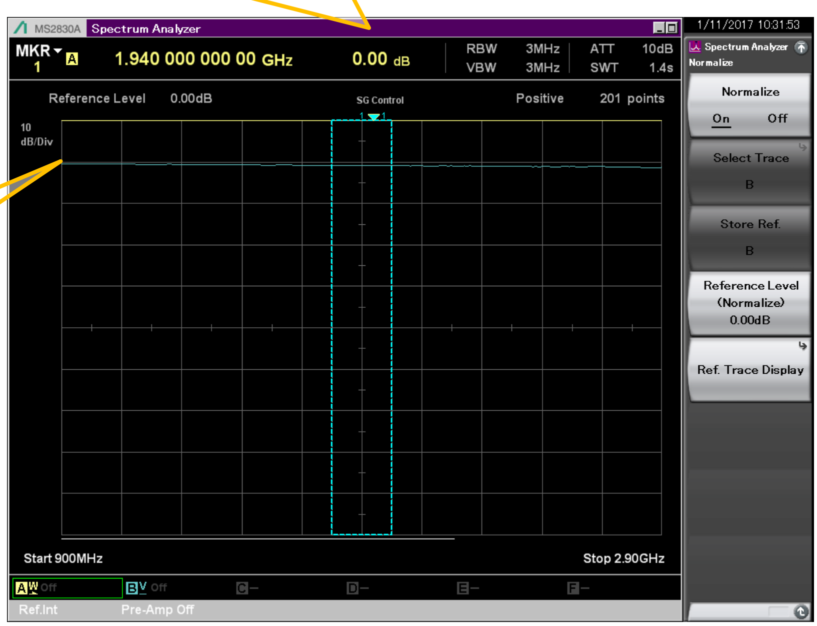
⑤ Set the reference level when executing the Normalize function.
[F4: Reference Level] (adjust appropriately).

⑥ Display the trace saved in Store Ref.
[F5: Ref. Trace Display] (switch display as necessary).



At F1: Normalize On, the loss/frequency characteristics of the measurement system (trace B in blue) are displayed as the reference along with the relative level (trace A in yellow). Confirm that the relative level is 0 dB within the entire frequency range.

Blue trace B indicates loss/frequency characteristics of previously confirmed measurement system.



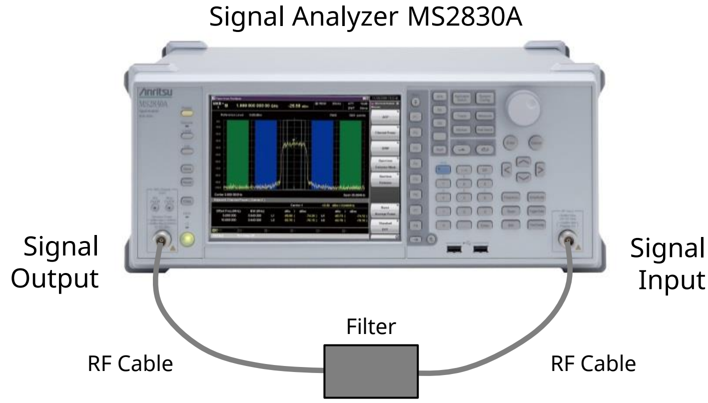
Example of Screen for Checking Frequency Characteristics

[Measurement Example] Band-pass Filter Frequency Characteristics 3/7

☐ Evaluating Band-pass Filter 3-dB passband width

Next, remove the adapter from the previous measurement setup and insert a bandpass filter as the DUT.

Note: When changing the measurement system, set the signal output to Off, make the change and then set it to On again.
SG On/Off:
Lit = On
Not lit = Off

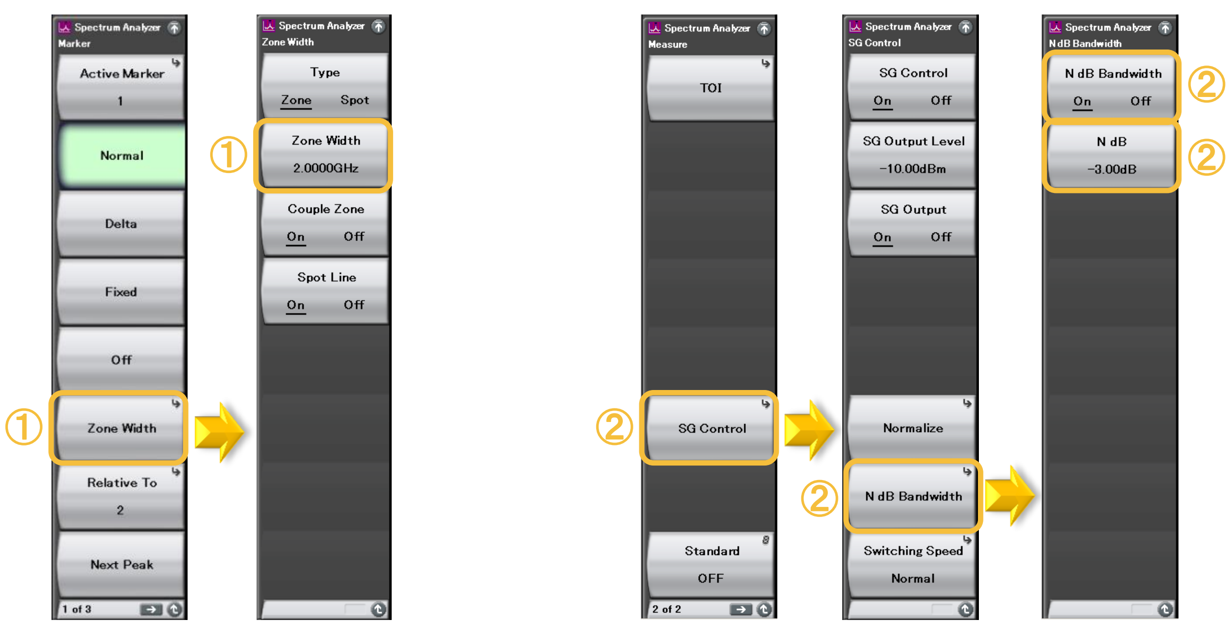


The procedure for measuring the 3-dB passband width is described as an example.

[Procedure] (continued)

① Match the marker width with the frequency sweep width (2 GHz for example).
[Marker] > [F6: Zone Width]
> [F2: Zone Width] > [2] [F1: GHz]
(The up/down keys can also be used for setting.)

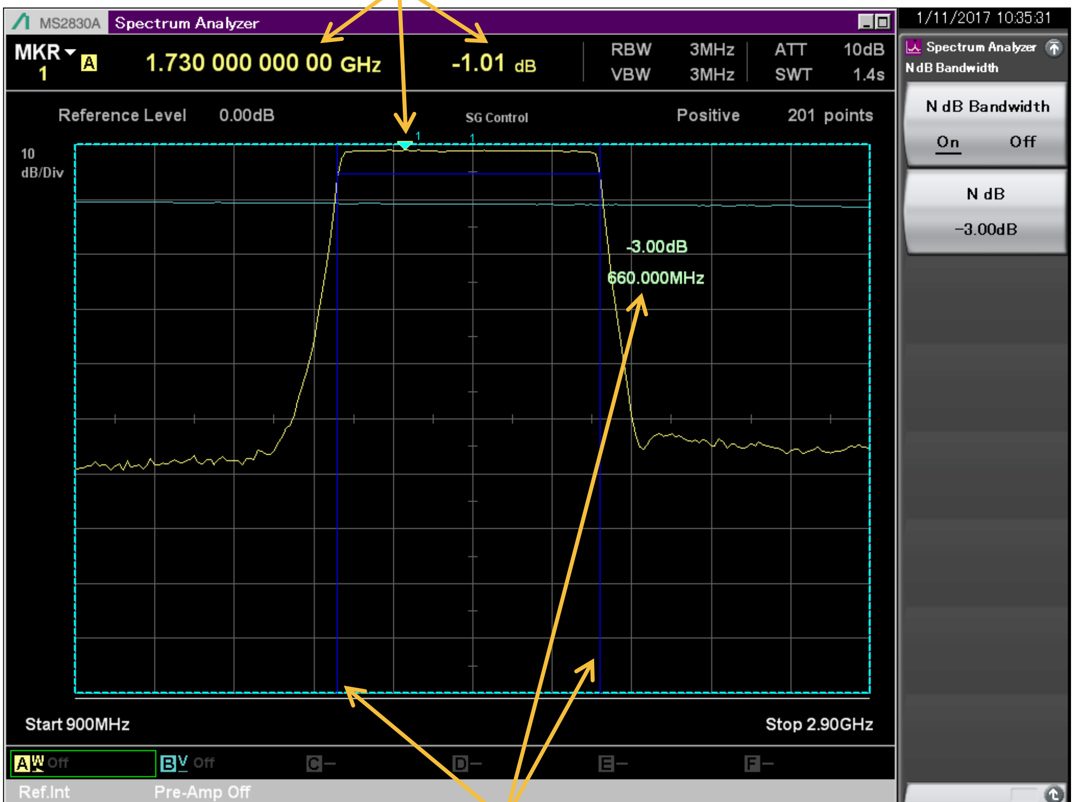
② Measure the 3-dB bandwidth.
[Measure] > [→] Page 2 > [F6: SG Control]
> [F7: N dB Bandwidth]
> [F2: N dB] = [-3] [F1: dB]
> [F1: N dB Bandwidth] = On



[Measurement Example] Band-pass Filter Frequency Characteristics 4/7

◻ Evaluating Band-pass Filter 3-dB passband width

The Zone marker function automatically detects the peak (▼) in the blue rectangle and the frequency and level are displayed at the top of the screen.

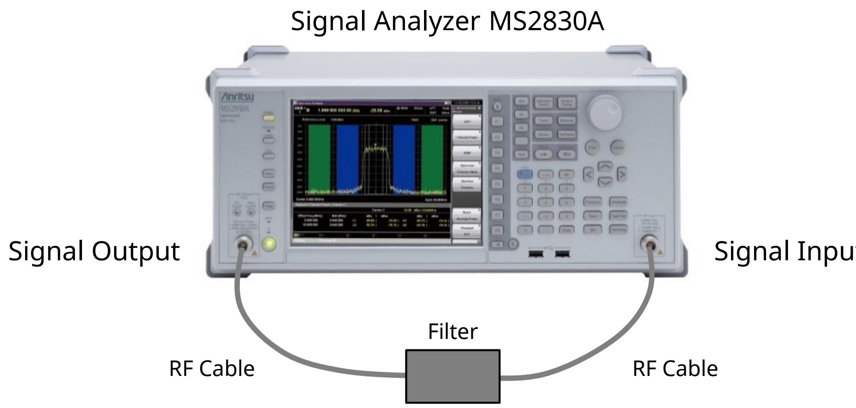


When N dB Bandwidth is On, the frequency bandwidth is measured between two points N dB below the selected peak marker point.
In the measurement figure example, the –3 dB frequency band width is 660 MHz.

[Measurement Example] Band-pass Filter Frequency Characteristics 5/7

◻ Evaluation of loss and flatness within Band-pass Filter passband

The loss and flatness within the passband are confirmed.



[Procedure] (continued)

① Enable the N dB Bandwidth function.
[F1: N dB Bandwidth] = Off

② Set the vertical axis to 1 dB/div.
[Amplitude] > [F6: Scale]
> [F2: Log Scale Division] > [1] [F1: dB/div]

[Measurement Example] Band-pass Filter Frequency Characteristics 6/7

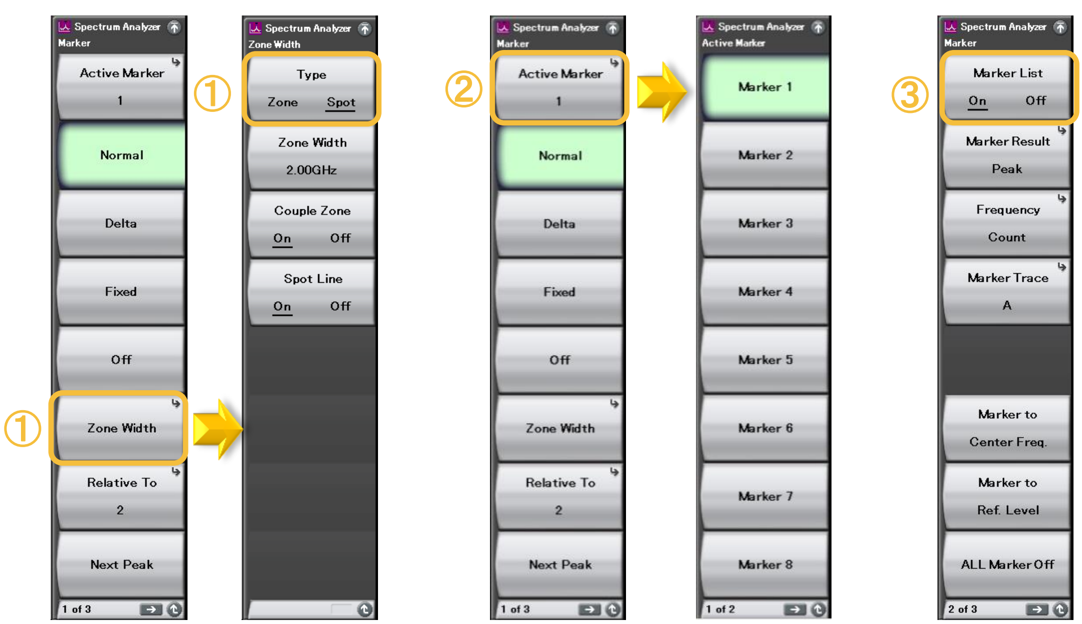
◻ Evaluation of loss and flatness within Band-pass Filter passband

[Procedure] (continued)

① Switch the marker type from Zone to Spot.
[Marker] > [F6: Zone Width] > [F1: Type] = Spot

② Move the markers to the measurement points (Example: Marker 1)
[Marker] > [F1: Active Marker] > [F1: Marker 1] > Move using rotary knob
Similarly, move Marker 2 and Marker 3 within the passband.
*Markers can be set at up to 10 points.

③ Display the marker list.
[Marker] > [→] Page 2 > [F1: Marker List] = On

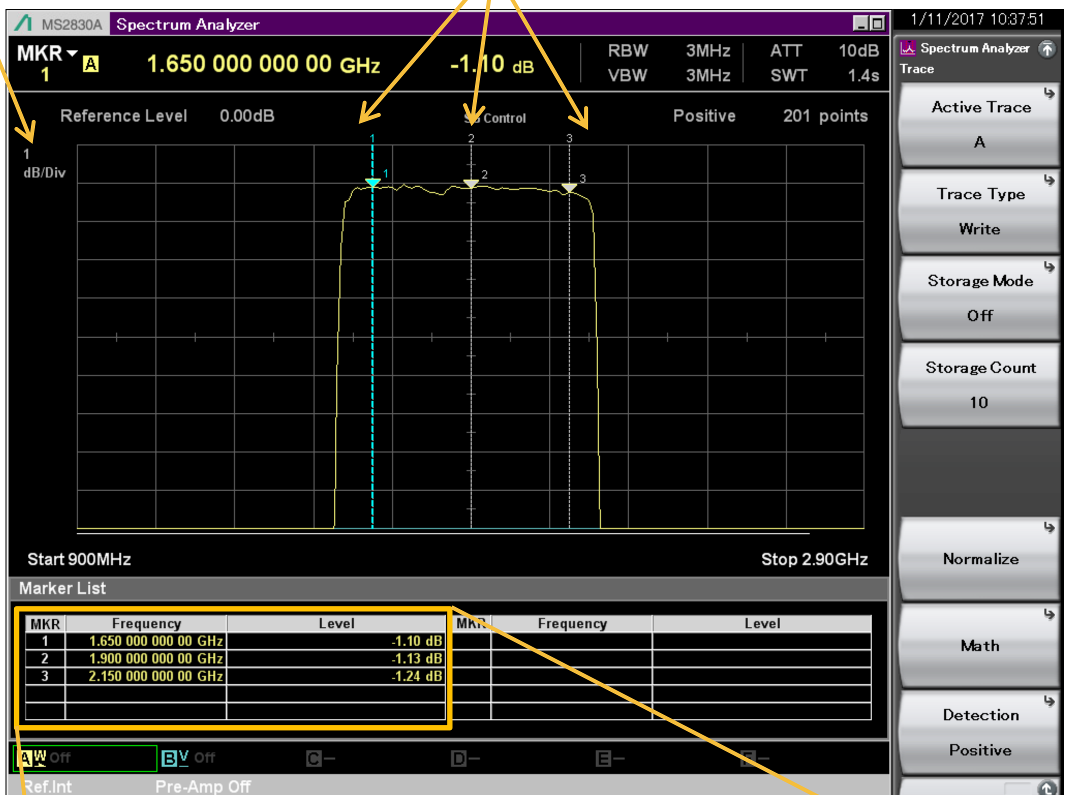


[Measurement Example] Band-pass Filter Frequency Characteristics 7/7

☐ Evaluation of loss and flatness within Band-pass Filter passband

It is easy to check the loss and flatness within the passband with the vertical axis set to 1 dB/div.

Arrange up to 10 markers at any points.



MKR	Frequency	Level
1	1.650 000 000 00 GHz	-1.10 dB
2	1.900 000 000 00 GHz	-1.13 dB
3	2.150 000 000 00 GHz	-1.24 dB

The Marker List displays the frequency and level of set markers.

MKR	Frequency	Level
1Δ2	-250.000 000 00 MHz	0.04 dB
2	1.900 000 000 00 GHz	-1.17 dB
3Δ2	250.000 000 00 MHz	-0.12 dB

Any marker can be set as the reference to display the difference (delta: Δ).

[Reference] Example of Internal Signal Generator Control Function Measurement Time

The sweep time for the internal signal generator control function is determined automatically by the MS2830A internal processing time.

The SG Control function menu Switch Speed setting can be switched between [Normal] and [Fast Tuning] to change the measurement speed.

Switch the speed according to the measurement application.

Fast Tuning:
Sets fast frequency change speed
Use to measure frequency characteristics of wide-band analog filters or cables.

Normal:
Optimizes phase noise characteristics
Use to minimize impact from SA phase noise characteristics, such as filter measurement in narrow band. The measurement speed is slower than the Fast Tuning mode.

Selects frequency switching speed
Selections: Fast Tuning, Normal

The following compares the actual measurement times* at a span of 1 GHz and 10 MHz.

Use it as a reference guide for measurement time.

Span: 1 GHz
RBW: 1 MHz (Auto)
VBW: 1 MHz (Auto)

Trace Points	Measurement Time [s]	
	Normal	Fast Tuning
201	2.6	1.5
251	3.2	1.9
401	5.0	2.9
501	6.2	3.6
1001	12.0	7.0

Span: 10 MHz
RBW: 30 kHz (Auto)
VBW: 30 kHz (Auto)

Trace Points	Measurement Time [s]	
	Normal	Fast Tuning
201	2.5	1.5
251	3.1	1.9
401	5.0	3.0
501	6.2	3.7
1001	12.0	7.2

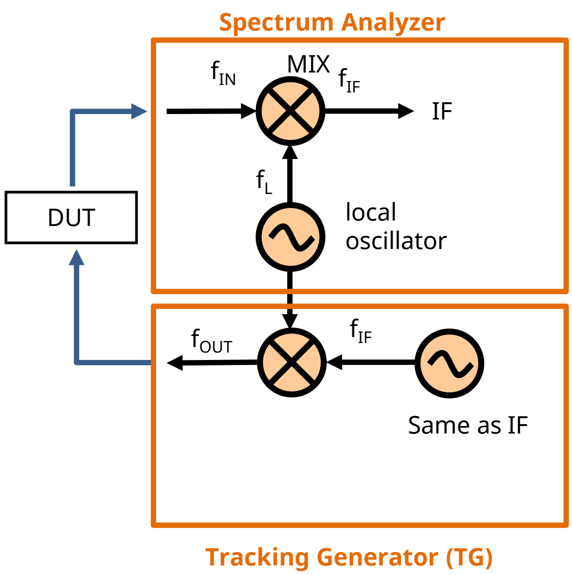
*Value measured at design but not guaranteed specification

[Reference] Difference between Tracking Generator and Internal Signal Generator Control Function

Tracking Generator

The **local oscillator is shared** between the spectrum analyzer and tracking generator (TG).

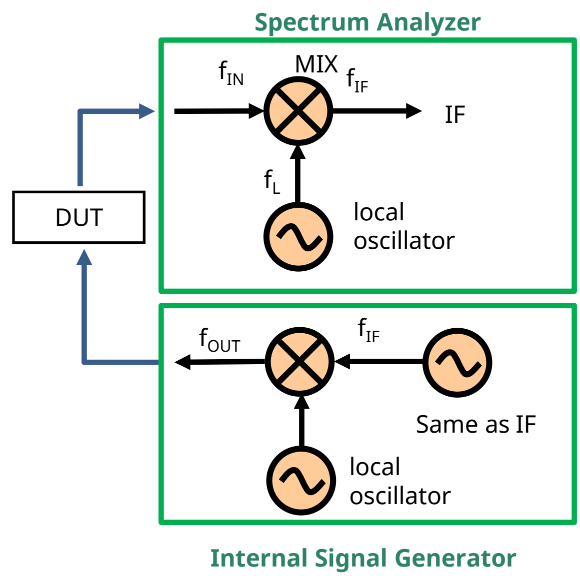
The spectrum analyzer and TG use one local oscillator to track the measurement frequency.



Internal Signal Generator Control Function

The spectrum analyzer and internal signal generator have different **local oscillators**.

The spectrum analyzer and internal signal generator are **controlled by software** to track each measurement frequency.



Recommended Configuration

This page lists the minimum recommended configuration for using the internal signal generator control function (Opt.052) for the Signal Analyzer MS2830A. Other hardware and software may be required depending on the actual measurement environment and communications method. MS2840A and MS269xA do not support this function.

- With either internal vector signal generator or vector signal generator and analog signal generator

Model	Name	Remarks
MS2830A-040	3.6 GHz Signal Analyzer	[Mandatory] Select any one.
MS2830A-041	6 GHz Signal analyzer	
MS2830A-043	13.5 GHz Signal Analyzer	
MS2830A-020	3.6 GHz Vector Signal Generator	[Mandatory] Select any one.
MS2830A-021	6 GHz Vector Signal Generator	
MS2830A-022	Vector Signal Generator Low-power Extension	Expands lower limit of output level from −40 to −136 dBm. (Note: 5-dB drop in upper output level.)
MS2830A-029	Analog Function Extension for Vector Signal Generator	Option for adding analog signal generator to vector signal generator. Requires separate MX269018A and MS2830A-066, etc. For details, see the configuration guide. Note: Not supported by MS2830A-043 (13.5 GHz model).
MS2830A-052	Internal Signal Generator Control Function	[Mandatory]

- With built-in analog signal generator

Model	Name	Remarks
MS2830A-040	3.6 GHz Signal Analyzer	[Mandatory] Select any one.
MS2830A-041	6 GHz Signal analyzer	
MS2830A-088	3.6 GHz Analog Signal Generator	[Mandatory] Requires separate MX269018A and MS2830A-066, etc. For details, see the configuration guide.
MS2830A-052	Internal Signal Generator Control Function	[Mandatory]

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