

MX283087A TRX Sweep Calibration Operation Manual Operation

Second Edition

- For safety and warning information, please read this manual before attempting to use the equipment.
- Additional safety and warning information is provided within the MS2830A Signal Analyzer Operation Manual (Mainframe: Operation). Please also refer to this document before using the equipment.
- Keep this manual with the equipment.

ANRITSU CORPORATION

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual



DANGER

This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.



WARNING

This indicates a hazardous procedure that could result in serious injury or death if not performed properly.



CAUTION

This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

MX283087A

TRX Sweep Calibration

Operation Manual Operation

15 October 2010 (First Edition)

29 May 2013 (Second Edition)

Copyright © 2010-2013, ANRITSU CORPORATION.

All rights reserved. No part of this manual may be reproduced without the prior written permission of the publisher.

The contents of this manual may be changed without prior notice.

Printed in Japan

Equipment Certificate

Anritsu Corporation guarantees that this equipment was inspected at shipment and meets the published specifications.

Anritsu Warranty

- During the warranty period, Anritsu Corporation will repair or exchange this software free-of-charge if it proves defective when used as described in the operation manual.
- The warranty period is 6 months from the purchase date.
- The warranty period after repair or exchange will remain 6 months from the original purchase date, or 30 days from the date of repair or exchange, depending on whichever is longer.
- This warranty does not cover damage to this software caused by Acts of God, natural disasters, and misuse or mishandling by the customer.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation shall assume no liability for injury or financial loss of the customer due to the use of or a failure to be able to use this equipment.

Anritsu Corporation Contact

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

When you dispose of export-controlled items, the products/manuals need to be broken/shredded so as not to be unlawfully used for military purpose.

Software End-User License Agreement (EULA)

Please read this Software End-User License Agreement (hereafter this EULA) carefully before using (includes executing, copying, registering, etc.) this software (includes programs, databases, scenarios, etc., used to operate, set, etc., Anritsu electronic equipment). By reading this EULA and using this software, you are agreeing to be bound by the terms of its contents and Anritsu Corporation (hereafter Anritsu) hereby grants you the right to use this Software with the Anritsu-specified equipment (hereafter Equipment) for the purposes set out in this EULA.

1. Grant of License and Limitations

1. Regardless of whether this Software was purchased from or provided free-of-charge by Anritsu, you agree not to rent, lease, lend, or otherwise distribute this Software to third parties and further agree not to disassemble, recompile, reverse engineer, modify, or create derivative works of this Software.
2. You may make one copy of this Software for backup purposes only.
3. You are not permitted to reverse engineer this software.
4. This EULA allows you to install one copy of this Software on one piece of Equipment.

2. Disclaimers

To the extent not prohibited by law, in no event shall Anritsu be liable for personal injury, or any incidental, special, indirect or consequential damages whatsoever, including, without limitation, damages for loss of profits, loss of data, business interruption or any other commercial damages or losses, arising out of or related to your use or inability to use this Software.

3. Limitation of Liability

- a. If a fault (bug) is discovered in this Software, preventing operation as described in the operation manual or specifications whether or not the customer uses this software as described in the manual, Anritsu shall at its own discretion, fix the bug, or exchange the software, or suggest a workaround, free-of-charge. However, notwithstanding the above, the following items shall be excluded from repair and warranty.
 - i) If this Software is deemed to be used for purposes not described in the operation manual or specifications.
 - ii) If this Software is used in conjunction with other non-Anritsu-approved software.
 - iii) Recovery of lost or damaged data.
 - iv) If this Software or the Equipment has been modified, repaired, or otherwise altered without Anritsu's prior approval.
 - v) For any other reasons out of Anritsu's direct control and responsibility, such as but not limited to, natural disasters, software virus infections, etc.
- b. Expenses incurred for transport, hotel, daily allowance, etc., for on-site repairs by Anritsu engineers necessitated by the above faults shall be borne by you.
- c. The warranty period for faults listed in article 3a above covered by this EULA shall be either 6 months from the date of purchase of this Software or 30 days after the date of repair, whichever is longer.

4. Export Restrictions

You may not use or otherwise export or re-export directly or indirectly this Software except as authorized by Japanese and United States law. In particular, this software may not be exported or re-exported (a) into any Japanese or US embargoed countries or (b) to anyone on the Japanese or US Treasury Department's list of Specially Designated Nationals or the US Department of Commerce Denied Persons List or Entity List. By using this Software, you warrant that you are not located in any such country or on any such list. You also agree that you will not use this Software for any purposes prohibited by Japanese and US law, including, without limitation, the development, design and manufacture or production of missiles or nuclear, chemical or biological weapons of mass destruction.

5. Termination

Anritsu shall deem this EULA terminated if you violate any conditions described herein. This EULA shall also be terminated if the conditions herein cannot be continued for any good reason, such as violation of copyrights, patents, or other laws and ordinances.

6. Reparations

If Anritsu suffers any loss, financial or otherwise, due to your violation of the terms of this EULA, Anritsu shall have the right to seek proportional damages from you.

7. Responsibility after Termination

Upon termination of this EULA in accordance with item 5, you shall cease all use of this Software immediately and shall as directed by Anritsu either destroy or return this Software and any backup copies, full or partial, to Anritsu.

8. Dispute Resolution

If matters of dispute or items not covered by this EULA arise, they shall be resolved by negotiations in good faith between you and Anritsu.

9. Court of Jurisdiction

This EULA shall be interpreted in accordance with Japanese law and any disputes that cannot be resolved by negotiation described in Article 8 shall be settled by the Japanese courts.

Cautions against computer virus infection

- Copying files and data
Only files that have been provided directly from Anritsu or generated using Anritsu equipment should be copied to the instrument.
All other required files should be transferred by means of USB or CompactFlash media after undergoing a thorough virus check.
- Adding software
Do not download or install software that has not been specifically recommended or licensed by Anritsu.
- Network connections
Ensure that the network has sufficient anti-virus security protection in place.

CE Conformity Marking

Anritsu affixes the CE conformity marking on the following product(s) in accordance with the Council Directive 93/68/EEC to indicate that they conform to the EMC and LVD directive of the European Union (EU).

CE marking



1. Product Model

Software: MX283087A TRX Sweep Calibration

2. Applied Directive and Standards

When the MX283087A TRX Calibration Software is installed in the MS2830A, the applied directive and standards of this unit conform to those of the MS2830A main frame.

PS: About main frame

Please contact Anritsu for the latest information on the main frame types that MX283087A can be used with.

C-Tick Conformity Marking

Anritsu affixes the C-Tick mark on the following product(s) in accordance with the regulation to indicate that they conform to the EMC framework of Australia/New Zealand.

C-Tick mark



1. Product Model

Software: MX283087A TRX Sweep Calibration

2. Applied Directive and Standards

When the MX283087A TRX Sweep Calibration is installed in the MS2830A, the applied directive and standards of this unit conform to those of the MS2830A main frame.

PS: About main frame

Please contact Anritsu for the latest information on the main frame types that MX283087A can be used with.

About This Manual

■ About this document

This operation manual is for MS283087A TRX Sweep Calibration (Operation).

MS2830A
Signal Analyzer Operation Manual (Mainframe Operation)

MS2690A/MS2691A/MS2692A and MS2830A
Signal Analyzer Operation Manual (Mainframe Remote Control)

MX283087A
TRX Sweep Calibration
Operation Manual (Operation)

MX283087A
TRX Sweep Calibration
Operation Manual (Remote Control)

■ Related manuals

Each related manual describes the following operations.
Refer to each operation manual for details.

Signal Analyzer Operation Manual (Mainframe Operation)

Signal Analyzer Operation Manual (Mainframe Remote Control)

These describe basic operations, maintenance procedure, common functions and common remote functions of the signal analyzer.

MS283087A TRX Sweep Calibration Operation Manual (Operation) [This document]

This manual describes how to operate the MS283087A TRX Sweep Calibration . As for MS2830A signal analyzer hardware and its basic functions and operation outline, refer to “MS2830A Signal Analyzer Operation Manual (Mainframe Operation)”.

TRX Sweep Calibration Operation Manual (Remote Control)

This manual describes how to use the MS283087A TRX Sweep Calibration via remote command. As for MS2830A signal analyzer application's basic remote control functions and its definitions of common commands, refer to “MS2690A/MS2691A/MS2692A and MS2830A Signal Analyzer Operation Manual (Mainframe Remote Control)”.

■ Document Conventions



This indicates the Signal Analyzer panel keys.



This indicates pages and sections to be referred to.

Boldface

This indicates message that appears on the screen.

‘ ’

This indicates reference that does not pertain to screen messages.

“ ”

This indicates reference, or jump to other section of the manual.

Table of Contents

About This Manual.....	I
Chapter 1 Outline	1-1
1.1 Product Outline	1-2
1.2 Product Composition	1-3
1.3 Product Specifications	1-4
Chapter 2 Preparation.....	2-1
2.1 Part Names	2-2
2.2 Signal Path Setup	2-10
2.3 Loading and Switching Applications	2-11
2.4 Initialization and Calibration.....	2-12
Chapter 3 Measurement	3-1
3.1 Usage Precautions	3-2
3.2 Overview of Measurement.....	3-4
3.3 Measurement Flow	3-8
3.4 Measurement Screen	3-13

1

2

3

Appendix

Index

Appendix A Default Value List A-1

Index Index-1

Chapter 1 Outline

This chapter provides an overview and describes the product configuration of the MX283087A TRX Sweep Calibration Software.

1.1	Product Outline	1-2
1.2	Product Composition	1-3
	1.2.1 Standard composition	1-3
	1.2.2 Applicable parts	1-3
1.3	Product Specifications	1-4

1.1 Product Outline

The MS2830A Signal Analyzer enables high-speed, high-accuracy, and simple measurements of transmission characteristics of base stations and mobile stations for various types of mobile communications. The MS2830A has high-performance signal analyzer and spectrum analyzer functions as standard, with optional measurement software allowing modulation analysis functionality supporting various digital modulation modes.

The MX283087A TRX Sweep Calibration (hereinafter, “MX283087A”) is a software option used to measure the transmission and reception power characteristics of wireless transceivers at high speed.

Chapter 3 describes how to perform major measurements with the MX283087A by using remote commands.

The MX283087A supports the following measurements.

- TRX Sweep Measurement
- RX Sweep Measurement

1.2 Product Composition

1.2.1 Standard composition

Table 1.2.2-1 lists the application parts for the MX283087A.

Table 1.2.1-1 Standard composition

Item	Model/Symbol	Name	Quantity	Remarks
Application	MX283087A	TRX Sweep Calibration	1	
Accessories	—	Installation CD-ROM	1	Application software, operation manual CD-ROM

1.2.2 Applicable parts

Table 1.2.2-1 lists the application parts for the MX283087A.

Table 1.2.2-1 Applicable parts

Model/Symbol	Name	Remarks
W3448AE	MX283087A TRX Sweep Calibration Operation Manual Operation	English, Printed Version
W3449AE	MX283087A TRX Sweep Calibration Operation Manual Remote Control	English, Printed Version

1.3 Product Specifications

Table 1.3-1 lists the specifications for the MX283087A.

Table 1.3-1 Product specifications

Item	Specification
Function	Performs measurement while switching both the level for each measurement unit (segment) according to the level list and the frequency for each measurement unit group (sequence) according to the frequency list.
Measurement mode	TRX mode: Performs transmission measurement and reception measurement at the same time. RX mode: Performs reception measurement only. In the RX mode, a trigger signal, which consists of output On (active) and Off (inactive) intervals, can be output before a measurement signal.
Items common to transmission and reception	
Frequency Range	400 to 3500 MHz
Setting range of segment length	10 ms, 20 ms
Setting range of segment	1 to 80
Setting range of sequence	1 to 20
Transmitter Power Measurement	
Analysis bandwidth	2.5 MHz, 5 MHz, 10 MHz, 25 MHz
Measurement time range	Symmetric about the center of the segment and 20 to 90% of the specified segment length
Trigger	
Trigger mode	Free Run (Trig Off), Video (Trig On)
Trigger setting range	-30 to -10 dB (compared to the measurement level specified for the first segment)
Measured level range	-30 dBm to +30 dBm
Transmitter power accuracy	After CAL execution at 18 to 28°C, the input signal level is within the measurement level range, and the input level is as follows: ±0.7 dB The transmitter power accuracy is calculated from an input attenuator switching error, a measured linearity error, and a root sum square (RSS) error of the absolute amplitude accuracy and in-band frequency characteristics.

Table 1.3-1 Product specifications (Continued)

Item	Specification
Reception Power measurement	
Output level range	-120 dBm to -5 dBm
Output level accuracy	CW, at 18 to 28°C ±0.5 dB (Output level ≥ -110 dBm) ±1 dB (Output level < 110 dBm) The output level accuracy is based on that of the MS2830A-020/021 Vector Signal Generator Option.
Level error from CW during vector modulation	AWGN signal whose bandwidth is 5 MHz, at 18 to 28°C, with an output frequency of 100 MHz or higher ±0.2 dB Based on the level error from CW during vector modulation with MS2830A-020/021 Vector Signal Generator Option.
Trigger signal	Output On interval (short burst) and Off interval (time offset)
Short burst interval setting range	1 to 100 Segment
Time offset interval setting range	1 to 100 Segment

Chapter 2 Preparation

This section describes the preparations required for using the MX283087A. Refer to the MS2830A Signal Analyzer Operation Manual (Mainframe Operation) for common features of the MS2830A not included in this manual.

2.1	Part Names	2-2
2.1.1	Part names	2-2
2.2	Signal Path Setup	2-10
2.3	Loading and Switching Applications	2-11
2.3.1	Loading applications	2-11
2.3.2	Switching applications	2-11
2.4	Initialization and Calibration	2-12
2.4.1	Initialization	2-12
2.4.2	Calibration	2-12

2.1 Part Names

This section describes the MS2830A panel keys for operating the MX283087A and connectors used to connect external devices. For general points of caution, refer to the MS2830A Signal Analyzer Operation Manual (Mainframe Operation).

2.1.1 Part names

Front Panel

This section describes the keys and connectors located on the front panel.

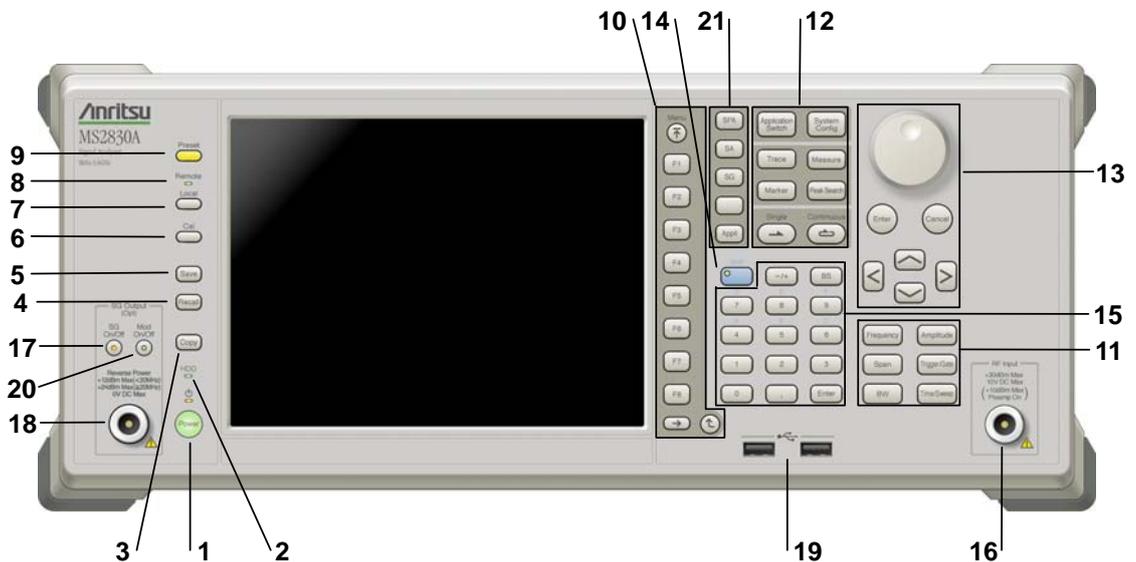


Figure 2.1.1-1 Front Panel

- 1  **Power Switch**
 Press to switch between the standby state in which AC power is supplied and the Power On state in which the MS2830A is under operation. The Power lamp  lights up orange in the standby state, and lights up green in the Power On state. Press the power switch for a reasonably long duration (for about two seconds).
- 2  **HDD**
Hard disk access lamp
 Lights up when the MS2830A internal hard disk is being accessed.
- 3  **Copy key**
 Press to capture a screen image from the display and save it to a file.
- 4  **Recall key**
 Press to recall a parameter file.

- | | | |
|----|--|---|
| 5 |  | <p>Save key
Press to save a parameter file.</p> |
| 6 |  | <p>Cal key
Press to display the calibration execution menu.</p> |
| 7 |  | <p>Local key
Press to return to local operation from remote control operation through GPIB, Ethernet or USB (B), and enable panel settings.</p> |
| 8 |  | <p>Remote lamp
Lights up when the MS2830A is in a remote control state.</p> |
| 9 |  | <p>Preset key
Resets parameters to their initial settings.</p> |
| 10 | 








 
 | <p>Function keys
Used for selecting or executing function menu displayed on the right of the screen. The function menu contents are provided in multiple pages and layers.</p> <p>The number on the bottom of the screen indicates the menu page number.</p> <p>Next key
 Press to go to the next page.</p> <p>Back key
 Press to go back to the previous layer within the function menu.</p> <p>Top key
 Press to go back to the uppermost (top) layer.</p> |

11



Main function keys 1

Used to set or execute main functions of the MS2830A.
Executable functions vary depending on the application currently selected.

 Press to set parameters related to frequency.

 Press to set parameters related to level.

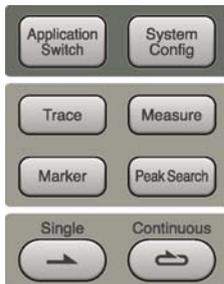
 Press to set parameters related to frequency span.

 Press to set parameters related to trigger.

 Press to set parameters related to RBW/VBW.

 Press to set parameters related to Time/Sweep.

12



Main function keys 2

Used to set or execute main functions of the MS2830A.
Executable functions vary depending on the application currently selected.

 Press to switch an application.

 Press to display the Configuration screen.

 Press to set parameters related to trace.

 Press to set parameters related to the measurement function.

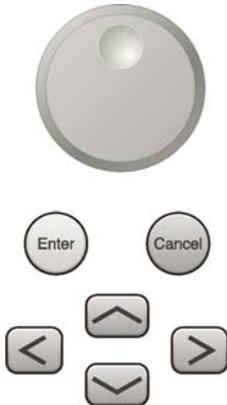
 Press to set parameters related to the marker function.

 Press to set parameters related to the peak search function.

 Press to start a single measurement.

 Press to start continuous measurements.

13

**Rotary knob/Cursor keys/Enter key/Cancel key**

The rotary knob and cursor keys are used to select display items or change settings.

Pressing  fixes the entered or selected data.

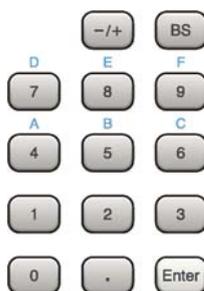
Pressing  cancels the entered or selected data.

14

**Shift key**

Used to operate any keys with functions described in blue characters on the panel. First press the Shift key, then press the target key when the Shift key lamp lights up green.

15

**Numeric keypad**

Used to enter numbers on parameter setup screens.

Pressing  deletes the last entered digit or character.

Hexadecimal values [A] to [F] can be entered by pressing  to  when the Shift key lamp  lights up green.

16

RF Input**RF Input connector**

Inputs an RF signal.

17

SG On/Off**RF output control key**

If the Vector Signal Generator option is installed, pressing  enables (On) or disables (Off) the RF signal output. The lamp of the RF output control key lights up orange when the RF signal output is set to On.

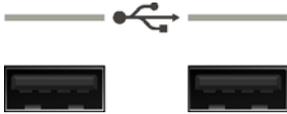
18 SG Output(Opt)



RF output connector

Outputs an RF signal, when the vector signal generator option is installed.

19



USB connector (type A)

Used to connect a USB keyboard or mouse or the USB memory supplied with the MS2830A.

20



Modulation control key

When the vector signal generator option is installed, RF signal modulation can be turned on and off by pressing . When modulation is on, the key lamp lights up green.

21



Application key

Press to switch between applications.



SPA key

Press to display the Spectrum Analyzer main screen.



SA key

Press to display the Signal Analyzer main screen, when Option 005/105 and 006/106 are installed.



SG key

Press to display the Signal Analyzer main screen, when Vector Signal Generator option is installed.



Blank key

Not used.

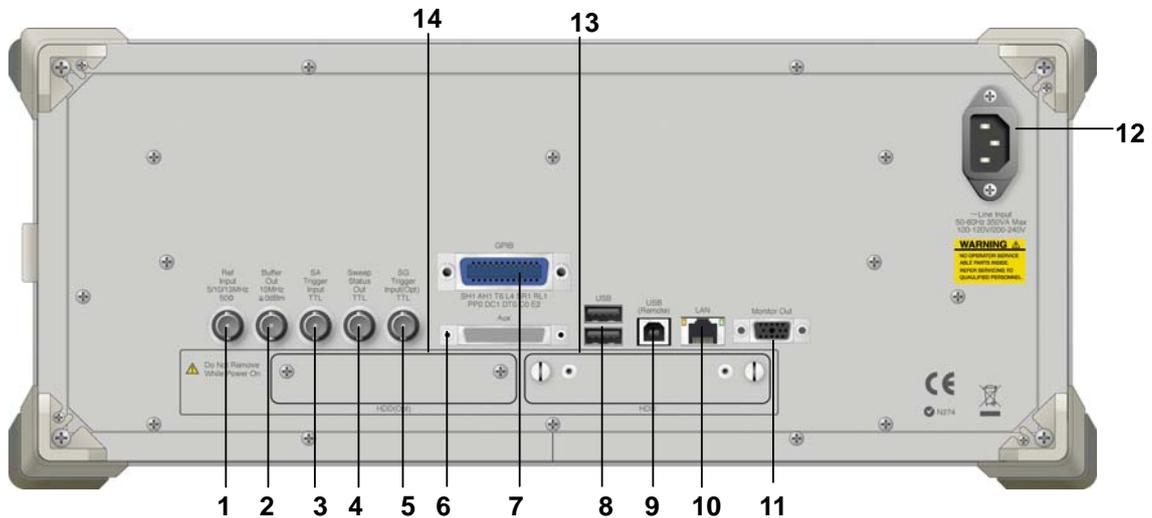


Appli key

When Auto is specified, the application selected by using the Application Switch is displayed. When Manual is specified, the pre-specified Application is displayed. Refer to 3.5.4 Changing application layout in “MS2830A Signal Analyzer Operation Manual (Mainframe Operation)”.

Rear panel

This section describes the connectors located on the rear panel.



2

Preparation

Figure 2.1.1-2 Rear panel

- 1 Ref Input
5/10/13MHz
50Ω



Ref Input connector (reference frequency signal input connector)
Inputs an external reference frequency signal (5 MHz/10 MHz/13 MHz). It is used for inputting reference frequency signals with accuracy higher than that of those inside the MS2830A, or for synchronizing the frequency of the MS2830A to that of other device.

- 2 Buffer Out
10MHz
≥0dBm



Buffer Out connector (reference frequency signal output connector)
Outputs the reference frequency signal (10 MHz) generated inside the MS2830A. It is used for synchronizing the frequencies between other devices and the MS2830A based on the reference frequency signal output from this connector.

- 3 SA Trigger Input
TTL



SA Trigger Input connector
This is a BNC connector used to input the external trigger signal (TTL) for the SPA or SA application.

- | | | | |
|----|--|---|--|
| 4 | Sweep
Status
Out
TTL |  | Sweep Status Out connector
Outputs a signal that is enabled when an internal measurement is performed or measurement data is obtained. |
| 5 | SG
Trigger
Input(Opt)
TTL |  | SG Trigger Input connector
This is a BNC connector used to input the external trigger signal (TTL) for the vector signal generator option. |
| 6 |  | AUX connector | This is a complex connector for inputting a baseband clock reference signal of the Vector Signal Generator (optional). See Table 2.1.1-1 for the internal pin assignment of the AUX connector. |
| 7 |  | GPIB connector | Used when controlling the MS2830A externally via GPIB. |
| 8 | USB
 | USB connectors (type A) | Used to connect a USB keyboard or mouse or the USB memory supplied with the MS2830A. |
| 9 | USB(Remote)
 | USB connector (type B) | Used when controlling the MS2830A externally via USB. |
| 10 | LAN
 | Ethernet connector | Used for connecting to a personal computer (PC) or for Ethernet connection. |
| 11 |  | Monitor Out connector | Used for connection with an external display. |

12



~Line Input
50-60Hz 440VA Max
100-120V/200-240V

AC inlet

Used for supplying power.

13 HDD

HDD slot

This is a hard disk slot.

14 HDD (Opt)

HDD slot for options

This is a hard disk slot for the options.

2

Preparation

Table 2.1.1-1 Pin assignment of AUX connector

Function	Pin Number	Signal Name
SG	13	MARKER1
	11	GND
	38	MARKER2
	36	GND
	39	MARKER3
	16	GND
	42	PULS_MOD
	41	GND
	22	BB_REF_CLK
	20	GND

Do not connect anything to connectors not listed in Table 2.1.1-1, because they are interface connectors provided for device maintenance.

2.2 Signal Path Setup

As shown in Figure 2.2-1, connect the MS2830A and the DUT using an RF cable, so that the signal to be tested is input to the RF Input connector.

CAUTION

Do not input a signal that has an excessive level to the MS2830A. Some points must be noted when using the signal generator function of the MX283087A. For details, see Section 3.1.2 “Signal generator function”.



Figure 2.2-1 Signal Path Setup Example

Set the 5 MHz/10 MHz/13 MHz reference signal from external sources, as required.

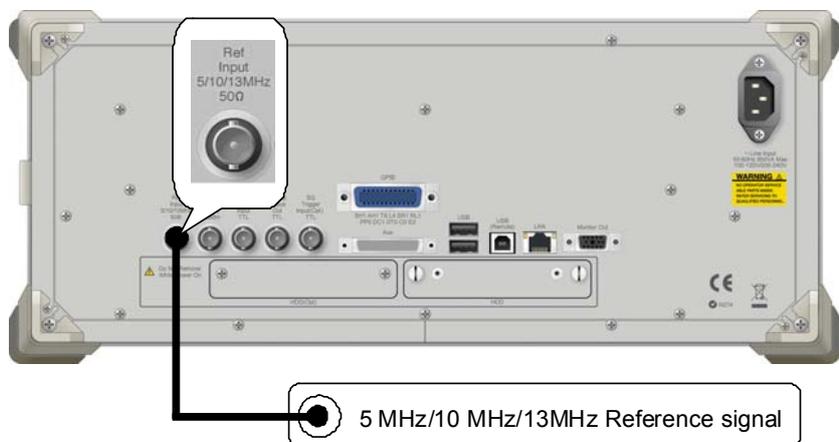


Figure 2.2-2 External signal input

2.3 Loading and Switching Applications

To use the MX283087A, it is necessary to load (start up) and select the MX283087A.

2.3.1 Loading applications

The MX283087A startup procedure is described below.

■ Procedure

1.  Press to display the Configuration screen.
2. Press **Application Switch Settings** on the Configuration menu to display the **Application Switch Registration** screen.
3. Press **Load Application Select**, and then move the cursor to **TRX Sweep Calibration in Unloaded Applications**.
 - If **TRX Sweep Calibration** is displayed in **Loaded Applications**, this application has been installed.
 - If **TRX Sweep Calibration** is not displayed in either **Loaded Applications** or **Unloaded Applications**, this application has not been installed.
4. Press **Set** to load the MX283087A. Loading is complete once **TRX Sweep Calibration** appears within the **Loaded Applications** list.

2.3.2 Switching applications

Follow the procedure below to switch to/from this application.

■ Procedure

1.  Press to display the Application Switch menu.
2. Press the menu function key displaying **TRX Sweep Calibration**.
 - This application can be switched by clicking **TRX Sweep Calibration** in the Task bar using the mouse.

2.4 Initialization and Calibration

This section describes the parameter settings using the MX283087A and the preparations required before starting measurement.

2.4.1 Initialization

After selecting the MX283087A, first perform initialization. Initialization should be performed in order to return the settable parameters to their initial value.

The initialization procedure is as follows.

■ Procedure

1.  Press to display the Preset menu.
2. Press **Preset** to perform initialization.

2.4.2 Calibration

Perform calibration before performing measurement. Calibration sets the level accuracy frequency characteristics for the input level to flat, and adjusts level accuracy deviation caused by internal temperature fluctuations. Calibration should be performed when first performing measurement after turning on power, when executing a performance test of MS2830A, or if beginning measurement when there is a difference in ambient temperature from the last time calibration was performed.

■ Procedure

1.  Press to display Cal function menu.
2. Press then **SIGANA All** to calibrate.

For details on calibration functionality only executable with the MS2830A, refer to the MS2830A Signal Analyzer Operation Manual (Mainframe Operation).

Chapter 3 Measurement

This section describes the measurement function, the parameter contents and the setting methods for this application.

3.1	Usage Precautions	3-2
3.1.1	MX283087A restrictions	3-2
3.1.2	Signal generator function	3-2
3.2	Overview of Measurement.....	3-4
3.2.1	Measurement operation	3-4
3.2.2	TRX measurement mode	3-6
3.2.3	RX measurement mode	3-7
3.3	Measurement Flow	3-8
3.3.1	Setting up RX waveform.....	3-9
3.3.2	Selecting measurement mode.....	3-9
3.3.3	Setting up segment and sequence.....	3-9
3.3.4	Setting up RX	3-9
3.3.5	Setting up TX.....	3-10
3.3.6	Setting up trigger sequence	3-11
3.3.7	Starting TRX measurement.....	3-11
3.3.8	Starting RX measurement	3-11
3.3.9	Finishing measurement	3-12
3.3.10	Checking measurement results	3-12
3.4	Measurement Screen	3-13

3.1 Usage Precautions

This section describes the cautions to be observed when using the MX283087A.

3.1.1 MX283087A restrictions

A PC is necessary to control the MS2830A externally because the MX283087A is operated through remote control.

To use the MX283087A together with the MX269018A Analog Measurement Software, activate and preset the MX283087A before using the MX269018A.

3.1.2 Signal generator function

The MX283087A uses the signal generator function, but the settings used for the MX283087A are independent from those for the MS2830A-020/021 3.6/6 GHz Vector Signal Generator Option (hereafter, the “SG application”). Note that the DUT might be damaged if the MX283087A is switched to the SG application while a higher signal level is enabled for the SG application.

The output frequency and RF output level for the signal generator of the MX283087A are set to the measurement parameters Rx frequency and Rx level, respectively.

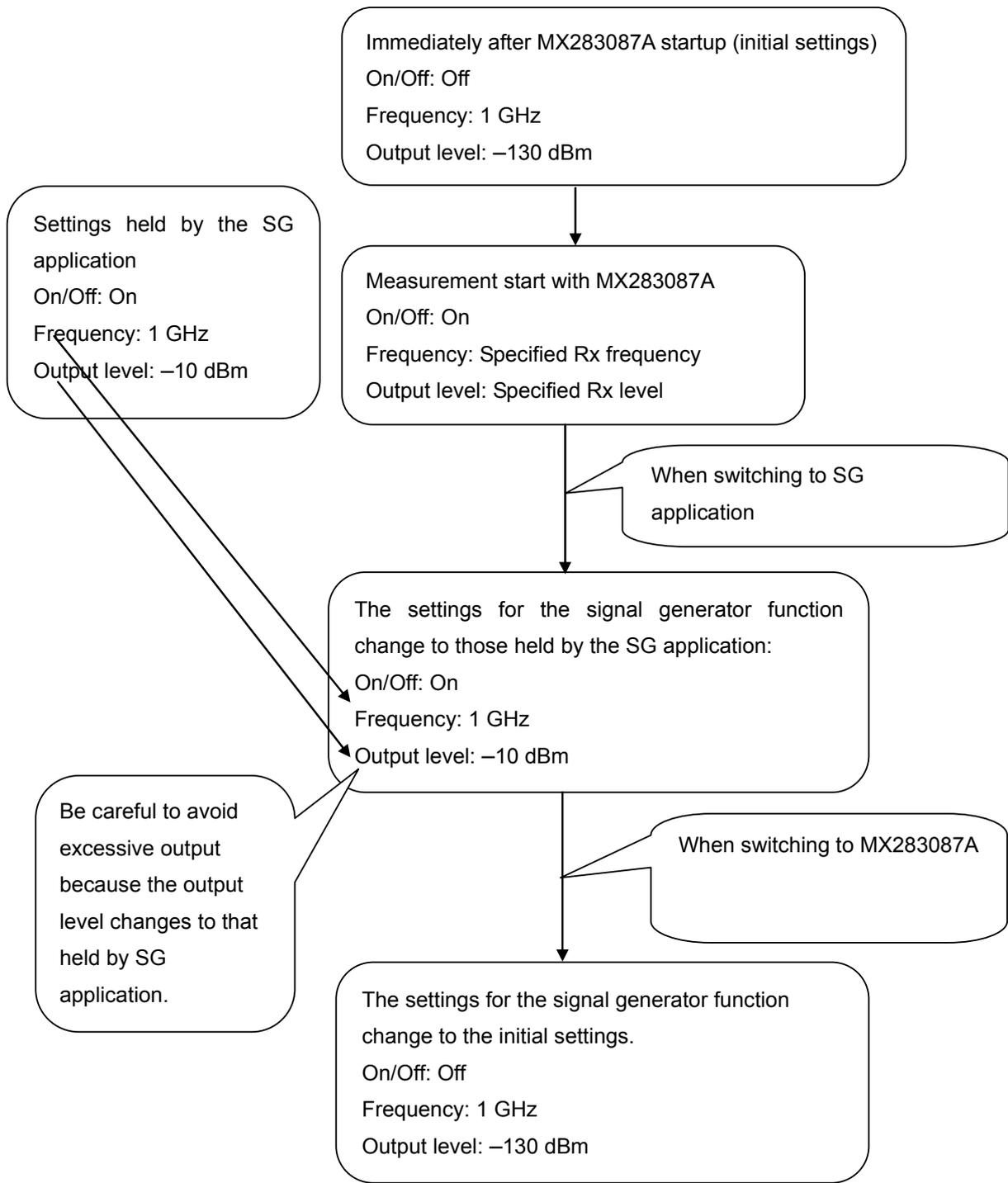


Figure 3.1.2-1 Cautions regarding signal generator function

3.2 Overview of Measurement

This section provides an overview of measurement using the MX283087A.

3.2.1 Measurement operation

The MX283087A outputs signals for transmission power measurement and reception power measurement by using the minimum time unit (segment), based on the previously specified level, frequency, and other settings.

Figure 3.2.1-1 shows an example of a measurement waveform during TRX measurement.

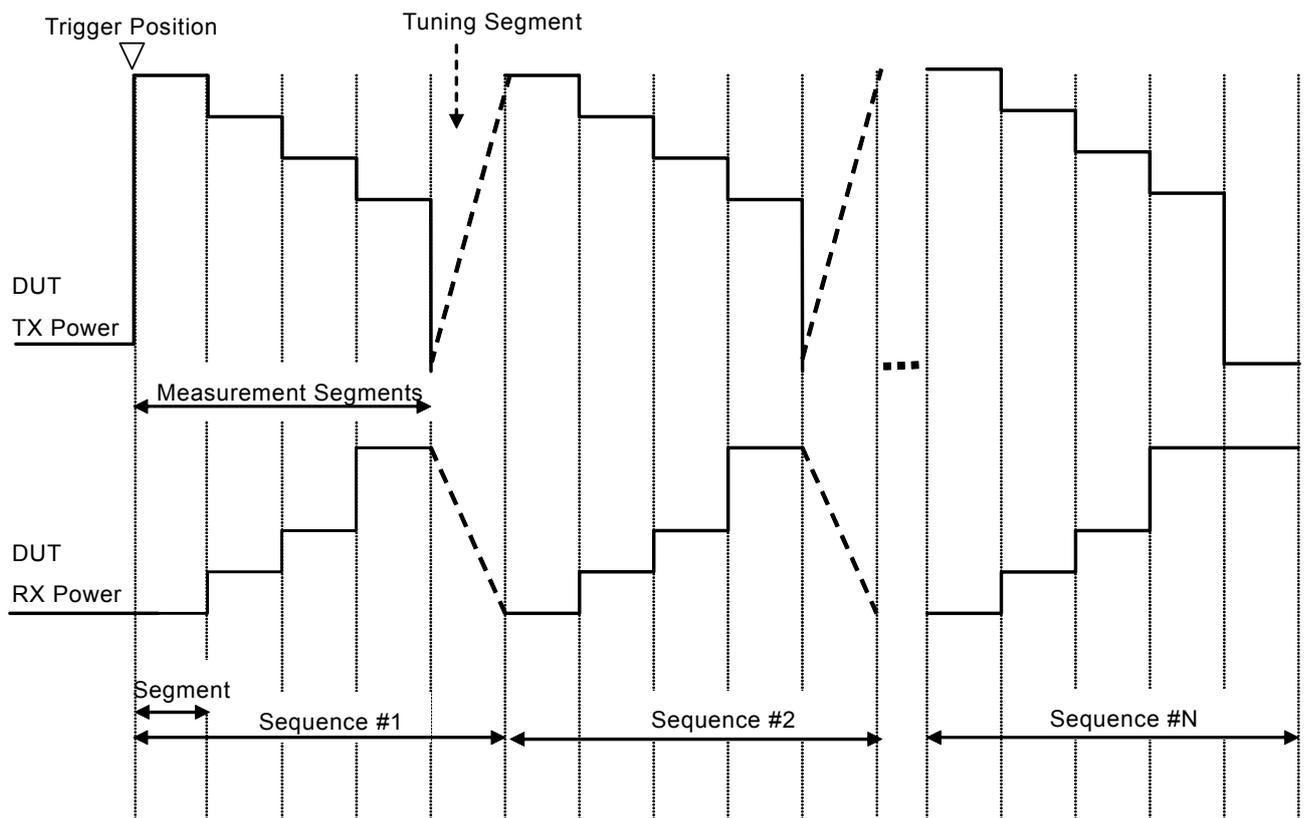


Figure 3.2.1-1 Example of signals during TRX measurement

The segment count per frequency for which transmission or reception power measurement is performed is assumed to be m , and a group of $(m + 1)$ segments is defined as a sequence. The frequency is changed at the last segment in a sequence. This segment is called the *tuning segment*. The tuning segment is not subject to transmission power measurement.

Measurement ends when a sequence is repeated for the specified number of times.

The following two measurement modes are available.

- TRX measurement mode
- RX measurement mode

3.2.2 TRX measurement mode

In the TRX measurement mode, the transmission power measurement (TX) and SG output setup for reception power measurement (RX) are performed at the same time.

For an example of the measurement waveform during TRX measurement, see Figure 3.2.2-1.

The segment count and sequence count apply to both TX and RX.

The level trigger of the transmission power measurement signal is used to start measurement (as shown by Trigger Position in Figure 3.2.2-1).

An interval in the segment time interval (segment length) in which power measurement is performed is called a *measurement interval*. The measurement interval can be specified as a ratio to the segment length, based on the center of the segment.

When measurement finishes, the transmission power measurement results for all segments except the tuning segment can be obtained.

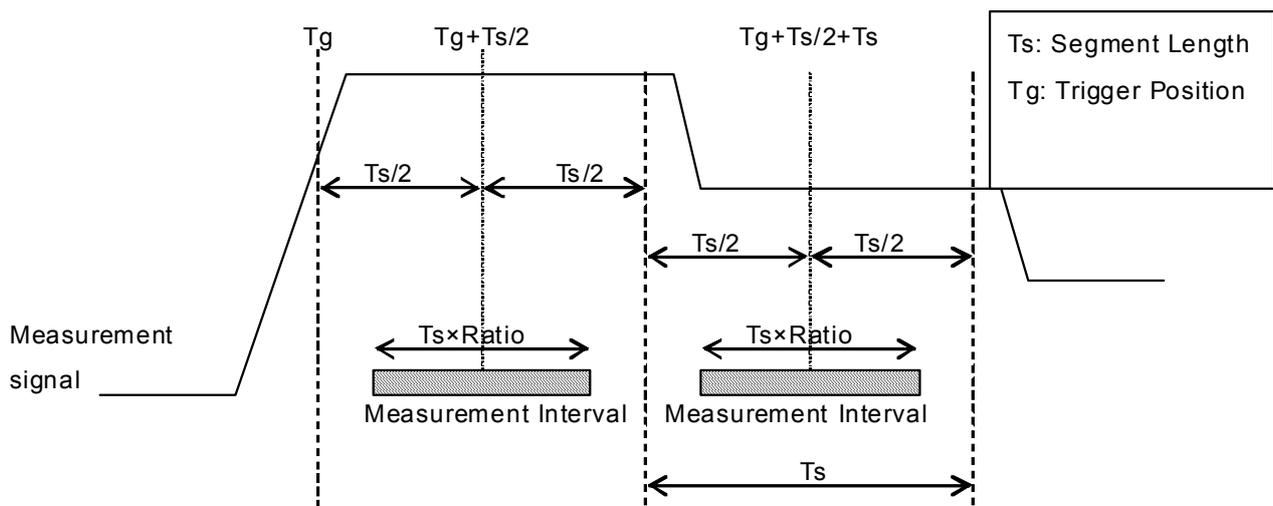


Figure 3.2.2-1 Measurement interval for transmission power measurement

3.2.3 RX measurement mode

In the RX measurement mode, only the SG output setup for reception power measurement (RX) is performed.

An example of a signal in the RX measurement mode is shown in Figure 3.2.3-1.

Unlike the RX operation in the TRX measurement, a trigger sequence signal is transmitted before the measurement sequence in the RX measurement.

The signal for RX starts at any time after the measurement instrument receives the measurement start command. A trigger sequence can be used to synchronize with the DUT.

For a trigger sequence, signal output that has any segment count (short burst) and a signal output stop interval of any segment count (time offset) can be specified for the first frequency of the measurement sequence.

When a measurement operation ends, the RX signal output is stopped. The transmission power measurement results are not updated because TX measurement is not performed.

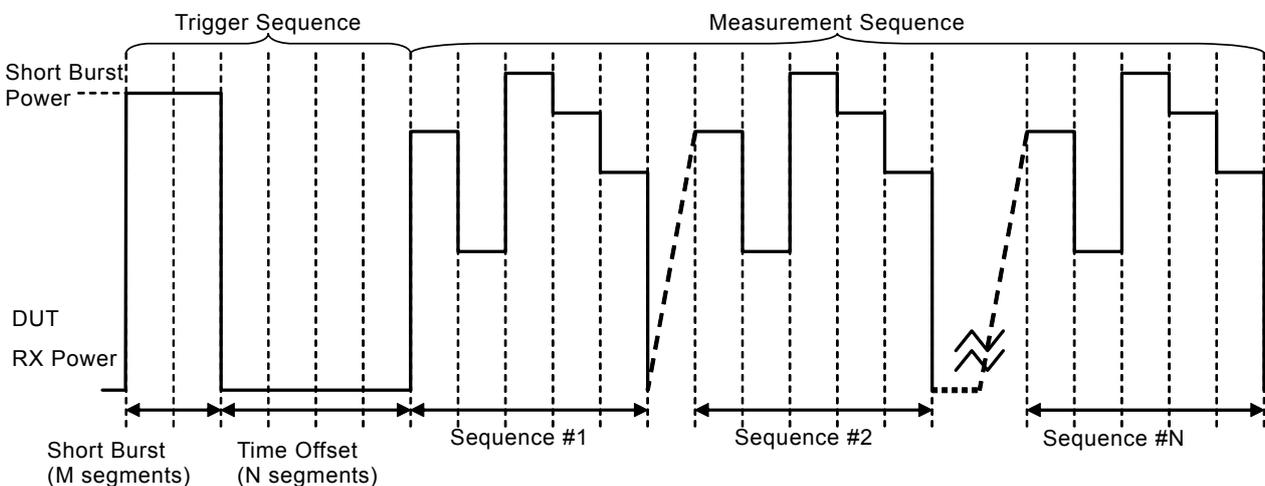


Figure 3.2.3-1 Example of signals during RX measurement

3.3 Measurement Flow

This section describes the measurement flow from the actual start of measurement until measurement ends.

The following flow chart is a simplified representation of the measurement flow.

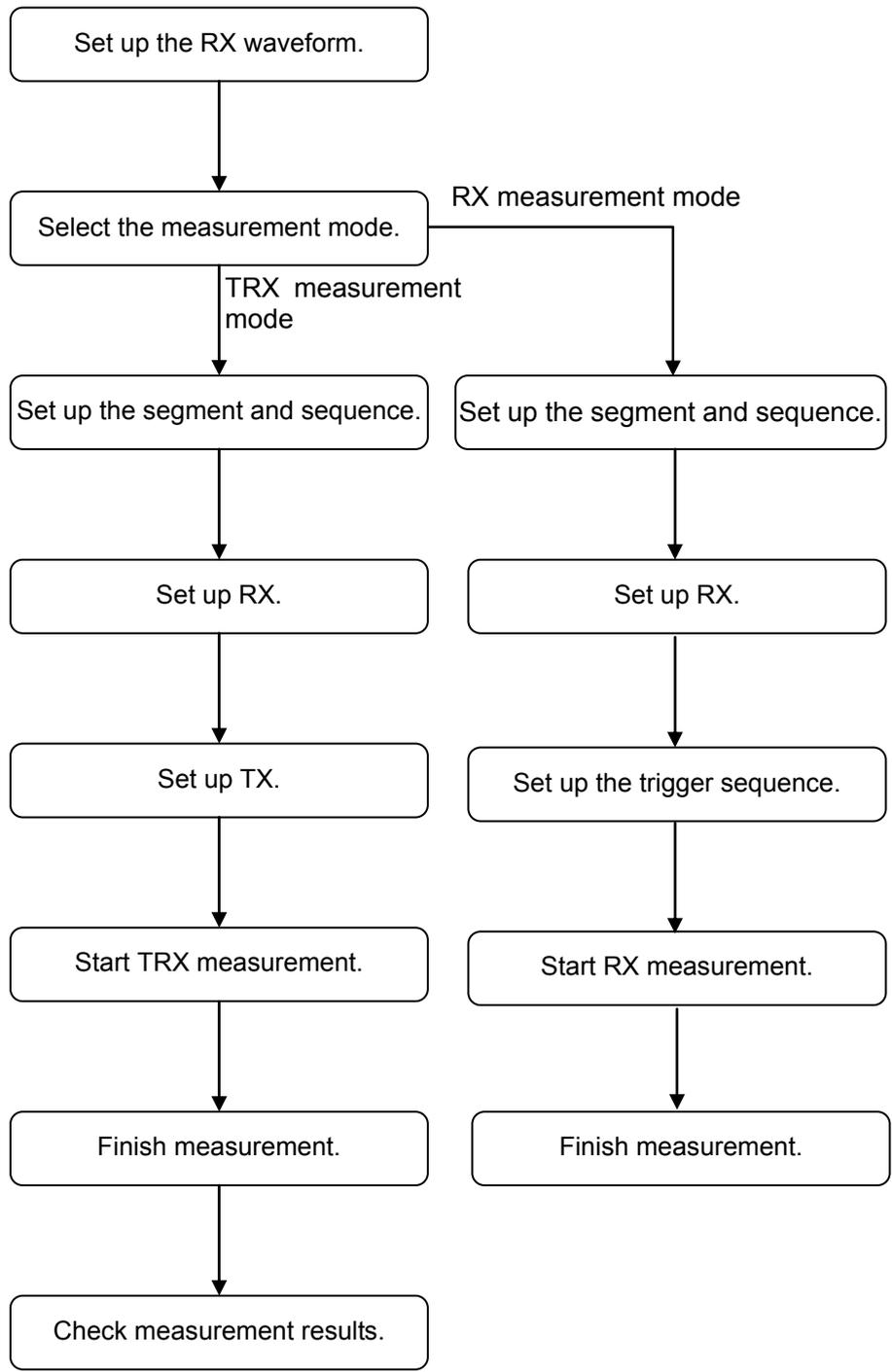


Figure 3.3-1 Measurement flow

3.3.1 Setting up RX waveform

The waveform selected by the Signal Generator application is used as the RX signal waveform for received power measurement. For details about setting up a waveform, see *MS2830A Signal Analyzer Vector Signal Generator Operation Manual Remote Control*.

3.3.2 Selecting measurement mode

Set the measurement mode.

Measurement mode

Options: TRX, RX

3.3.3 Setting up segment and sequence

Specify the segment length, segment count, and sequence count. The specified settings apply to both TX and RX.

Segment length

Options: 10 ms, 20 ms

Segment Count

Options: 1 to 80

Sequence Count

Options: 1 to 20

3.3.4 Setting up RX

Set up the SG output signal.

Specify the frequency for each sequence, as well as the level for each segment repeated in a sequence. Specify the level offset value for each sequence.

RX frequency list:

Options: 400 to 3500 MHz

RX level list

Options: -120 to -5 dBm

RX level offset mode:

Options: ON, OFF

RX level offset list

Options: -100 to 100 dB

3.3.5 Setting up TX

Set up transmission power measurement.

Specify the frequency span, measurement filter, measurement interval ratio, level trigger, frequency for each sequence, and level for each segment repeated in a sequence. When specifying the TX level, specify the level of the signal expected to be input to the measuring instrument. The measuring instrument automatically sets up the attenuator for each segment by using the TX level setting information.

Frequency Span

Options: 2.5 MHz, 5 MHz, 10 MHz, 25 MHz

Filter

Options: Off, Root Nyquist

Details Root Nyquist can be specified if Frequency Span is 5 MHz. The filter type of Root Nyquist is BW = 3.84 MHz and Roll Off = 0.22.

Measurement interval ratio

Options: 0.2 to 0.9

Resolution 0.01

TX frequency list

Options: 400 to 3500 MHz

Resolution: 1 Hz

TX level list

Options: -30 to 30 dBm

Resolution 0.1 dBm

Trigger

Options: On, Off

Trigger Level

Options: -30 to -10 dB

Resolution 0.1 dB

Trigger Time Out

Options: 1 to 30 seconds

Resolution 1 second

3.3.6 Setting up trigger sequence

Specify the short burst output level, segment count of the short burst, and segment count of the time offset for the trigger sequence.

Short Burst Output Level

Options: -120 to 30 dBm

Resolution: 0.1 dBm

Segment Count of ShortBurst

Options: 1 to 100

Segment Count of Time Offset

Options: 1 to 100

3.3.7 Starting TRX measurement

Perform TRX measurement.

Use the measurement start command `INITiate` to start TRX measurement.

After TRX measurement starts, make sure that the measuring instrument is ready to detect a measurement trigger. Next, start signal transmission from the DUT.

Use the query command `ARM:TSCalibration?` to check the measurement trigger detection state.

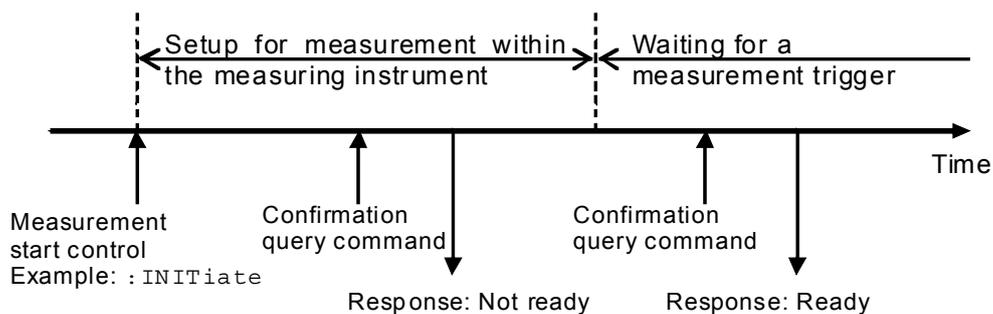


Figure 3.3.7-1 Example of measurement trigger detection

3.3.8 Starting RX measurement

Perform RX measurement.

Use the measurement start command `INITiate` to start RX measurement.

When RX measurement starts, RX signal transmission starts.

3.3.9 Finishing measurement

Make sure that measurement has finished.

Use the measurement status query command `STATus:ERRor?` to check whether measurement has finished.

3.3.10 Checking measurement results

When measurement finishes, make sure that there is no error. If measurement finished normally, read out the measurement results.

Use the measurement result query command `FETCh:TSCalibration?` to read out the measurement results.

The number of measurement results is the product of the specified segment count and sequence count.

3.4 Measurement Screen

The measurement status, frequency list for Tx and Rx, and level list for Tx and Rx are displayed on the measurement screen.

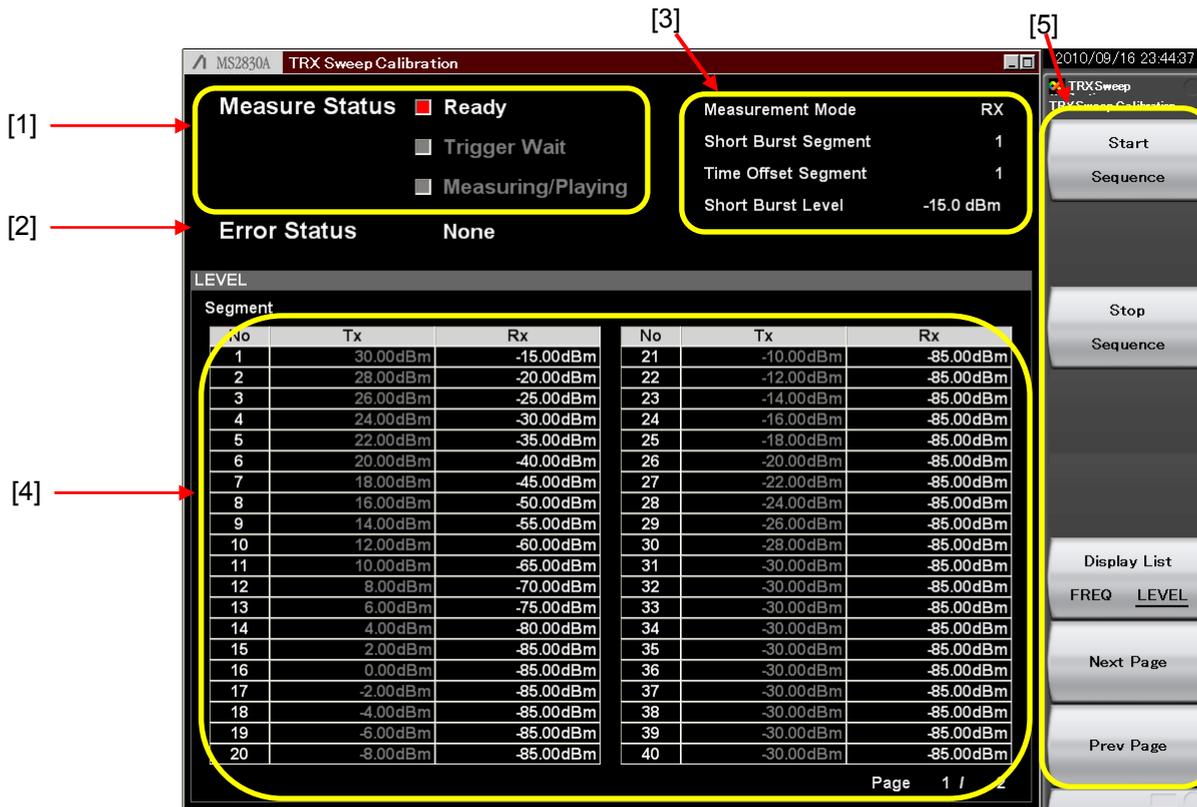


Figure 3.4-1 Measurement screen (in RX measurement mode)

[1] Measurement status

Displays the measurement status.

Ready

The MS2830A can start measurement. Parameters can be specified in this status.

Trigger Wait

The MS2830A is waiting for a sequence execution trigger. When the MS2830A detects a trigger, it transitions to the Measuring/Playing status. The MS2830A returns to the Ready status upon timeout.

Measuring/Playing

The MS2830A is performing measurement. It returns to the Ready status when the measurement finishes.

[2] Error status

Displays the error status at the end of measurement.

None The initial contents are displayed.

Done The measurement has finished normally.

Time Out The measurement has timed out.

Level Over

The input to the measuring instrument was excessive.

Abort Measurement has been aborted.

[3] Measurement mode display

Displays the measurement mode. If the measurement mode is RX, the trigger sequence information, such as the short burst segment count, time offset segment count, and short burst level, is displayed.

[4] Set value list

The specified frequencies or levels for TX and RX are listed.

In the frequency list, the specified TX and RX frequencies corresponding to sequences are displayed.

In the level list, the specified TX and RX levels corresponding to segments are displayed.

The values that are not used for measurement according to the measurement mode, sequence count, or segment count are displayed in gray.

The frequency list and level list display can be switched by pressing the frequency/level display switching key (Display List).

[5] Menu keys

Start Sequence

Start measurement according to the specified settings. This has the same function as the measurement execution remote command INITiate.

Stop Sequence

Stop measurement.

Display List

Switch the display between the frequency list and level list.

Next Page/Prev Page

Go to the next or previous setting list page.

Appendix A Default Value List

RX Frequency

1933.0 MHz, 1933.2 MHz, 1933.4 MHz, 1933.6 MHz, 1933.8 MHz,
1934.0 MHz, 1934.2 MHz, 1934.4 MHz, 1934.6 MHz, 1934.8 MHz,
1935.0 MHz, 1935.2 MHz, 1935.4 MHz, 1935.6 MHz, 1935.8 MHz,
1936.0 MHz, 1936.2 MHz, 1936.4 MHz, 1936.6 MHz, 1936.8 MHz

References are to page numbers.

A

AC inlet	2-9
Appli key	2-6
Application key	2-6
AUX connector	2-8

B

Back key	2-3
Buffer Out connector	2-7

C

Cal key	2-3
Cancel key	2-5
Copy key	2-2
Cursor keys	2-5

E

Enter key	2-5
Error status	3-14
Ethernet connector	2-8

F

Filter	3-10
Frequency Span	3-10
Front Panel	2-2
Function keys	2-3

G

GPIB connector	2-8
----------------------	-----

H

Hard disk access lamp	2-2
HDD slot	2-9

L

last segment	3-4
Local key	2-3

M

<i>measurement interval</i>	3-6
Measurement interval ratio	3-10
measurement results	
number of,	3-12

Measurement status	3-13
Modulation control key	2-6
Monitor Out connector	2-8

N

Next key	2-3
Numeric keypad	2-5

P

Power Switch	2-2
Preset key	2-3

R

Rear panel	2-7
Recall key	2-2
Ref Input connector	2-7
reference frequency signal	2-7
Remote lamp	2-3
RF Input connector	2-5
RF output connector	2-6
RF output control key	2-5
Rotary knob	2-5
RX measurement mode	3-7

S

SA key	2-6
SA Trigger Input connector	2-9
Save key	2-3
segment	3-4
segment count	3-4
segment length	3-6
segment time interval	3-6
sequence	3-4
SG key	2-6
SG Trigger Input connector	2-9
Shift key	2-5
short burst	3-7
SPA key	2-6
Sweep Status Out connector	2-7

T

time offset	3-7
Top key	2-3

Index

Trigger Position 3-6
trigger sequence 3-7
Trigger signal..... 2-9
TRX measurement mode 3-6
tuning segment..... 3-4

U

USB connector
 Type A..... 2-6
 Type B..... 2-8
USB connectors
 Type A..... 2-8