MX269018A
Analog Measurement Software/
MS2830A Signal Analyzer
Analog Signal Generator
Operation Manual
Operation

16th 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

Document No.: M-W3555AE-16.0

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.

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

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⚠ 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.

MX269018A Analog Measurement Software/
MS2830A Signal Analyzer Analog Signal Generator
Operation Manual Operation

24 June 2011 (First Edition)
20 November 2015 (16th Edition)

For Safety

⚠ CAUTION

Check Terminal

- Never input a signal of more than the indicated value between the measured terminal and ground. Input of an excessive signal may damage the equipment.

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.

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Anritsu Corporation Contact

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   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.

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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.

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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.

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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.

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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: MX269018A Analog Measurement Software

2. Applied Directive and Standards

When the MX269018A Analog Measurement 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 MX269018A 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 marking

1. Product Model

Software: MX269018A Analog Measurement Software

2. Applied Directive and Standards

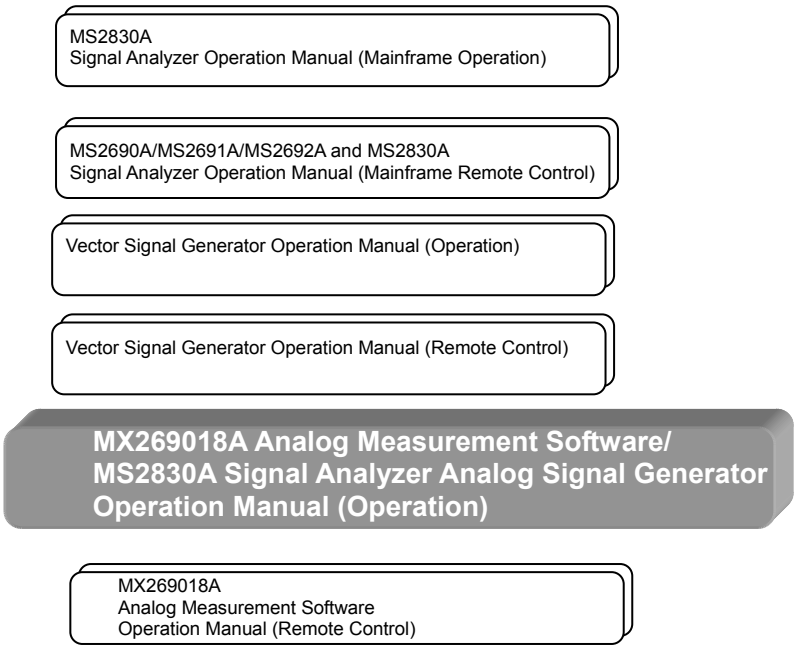
When the MX269018A Analog Measurement Software is installed in the MS2830A, the applied directive and standards of this unit conform to those of the MS2830A main frame.

PS: About main frame
Please contact Anritsu for the latest information on the main frame types that MX269018A can be used with.

About This Manual

■ About this document

This operation manual is for MX269018A Analog Measurement Software (Operation).



■ 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.

Vector Signal Generator Operation Manual (Operation)
Vector Signal Generator Operation Manual (Remote Control)

This describes the functions, operations, remote operations of Vector Signal Generator option and Analogue Signal Generator option.

MX269018A Analog Measurement Software/ MS2830A Signal Analyzer Analog Signal Generator Operation Manual (Operation) [This document]

This manual describes how to operate the MX269018A Analog Measurement Software. As for MS2830A signal analyzer hardware and its basic functions and operation outline, refer to "MS2830A Signal Analyzer Operation Manual (Mainframe Operation)".

MX269018A Analog Measurement Software Operation Manual (Remote Control)

This manual describes how to use the MX269018A Analog Measurement Software 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

Chapter 1 Outline

This chapter provides an overview and describes the product configuration of the MX269018A Analog Measurement Software.

1.1 Product Overview

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 MX269018A Analog Measurement Software (hereinafter, "MX269018A") is a software option used to measure the transmission and reception characteristics of radios which use analog modulation.
The MX269018A is available for the MS2830A that Low Phase Noise Performance option (MS2830A-062/066) is installed.

The MX269018A provides the following functions.

- Transmitter power measurement
- Carrier frequency
- Modulation accuracy measurement
- Distortion factor measurement
- Output signal for RX measurement
- Audio signal output for TX measurement (Audio Generator)
- Audio signal measurement (Audio Analyzer)

To use the function of signal output for RX measurement of MX269018A, either one of the following hardware options of MS2830A is required.

- MS2830A-088/188 3.6GHz Analog Signal Generator
- MS2830A-029/129 Analog Function Extension for Vector Signal Generator

To use Audio Generator/Audio Analyzer of the MX269018A, the MS2830A hardware option below is required.

- MS2830A-018/118 Audio Analyzer

1.2 Product Composition

1.2.1 Standard composition

Table 1.2.1-1 shows the standard composition for MX269018A.

Table 1.2.1-1 Standard Composition

Items	Model/ Symbol	Product Name	Q'ty	Remarks
Application	MX269018A	Analog Measurement Software	1	
Accessories	—	Installation CD-ROM	1	Application software, operation manual CD-ROM

1.2.2 Applicable parts

Table 1.2.2-1 lists the applicable parts for MX269018A.

Table 1.2.2-1 Applicable Parts

Model/Symbol	Product Name	Remarks
W3555AE	MX269018A Analog Measurement Software/ MS2830A Signal Analyzer Analog Signal Generator Operation Manual Operation	English, Printed Version
W3556AE	MX269018A Analog Measurement Software Operation Manual Remote Control	English, Printed Version
A0086A	USB Audio	ONKYO
A0086B	USB Audio	audio-technica

1.2.3 Options

MS2830A mainframe options for signal output function of MX269018A are described in Table 1.2.3-1.

Table 1.2.3-1 Options

Option No.	Product Name	Remarks
MS2830A-018	Audio Analyzer	Option for audio measurement
MS2830A-020	3.6GHz Vector Signal Generator	250 kHz to 3.6 GHz
MS2830A-021	6GHz Vector Signal Generator	250 kHz to 6 GHz
MS2830A-022	Low Power Extension for Vector Signal Generator	
MS2830A-029	Analog Function Extension for Vector Signal Generator	MS2830A-020/120 option
MS2830A-088	3.6GHz Analog Signal Generator	100 kHz to 3.6 GHz
MS2830A-118	Audio Analyzer Retrofit	Option for audio measurement
MS2830A-120	3.6GHz Vector Signal Generator Retrofit	250 kHz to 3.6 GHz
MS2830A-121	6GHz Vector Signal Generator Retrofit	250 kHz to 6 GHz
MS2830A-122	Low Power Extension for Vector Signal Generator Retrofit	
MS2830A-129	Analog Function Extension for Vector Signal Generator Retrofit	Please inquire us.
MS2830A-188	3.6GHz Analog Signal Generator, retrofit	100 kHz to 3.6 GHz
MS2830A-189	Vector Function Extension for Analog Signal Generator Retrofit	MS2830A-088/188 option

1.3 Product Specifications

When MS2830A is used, this software's specification is specified by the condition below, unless otherwise noted.

Attenuator Mode: Mechanical Atten Only

Nominal values are for designing and do not guarantee performance as standard values.
Typ. value does not represent guaranteed performance. The value just shows the level where the most products have satisfactory performance.

1.3.1 MX269018A Product Specifications

Table 1.3.1-1 shows the specifications of MX269018A.

Transmitter power measurement specification is specified, only when MS2830A-062 or MS2830A-066 Low Phase Noise Performance option is installed.

Table 1.3.1-1 MX269018A Product Specifications

Items	Specifications
Transmitter power measurement	
Target signal	FM, ϕ M, AM modulation signal
Frequency range	100 kHz to 2700 MHz FM measurement, at Wide Band FM measurement 10 to 2700 MHz
Measured level range	–15 to +30 dBm (at Pre-Amp Off, or Pre-Amp not installed.) –25 to +10 dBm (at Pre-Amp On)
Carrier frequency accuracy	After CAL execution at 18 to 28°C: ±(Reference frequency accuracy × carrier frequency + 1) Hz
FM measurement	
Frequency deviation	0 < Frequency deviation ≤ 20 kHz 20 kHz < Frequency deviation ≤ 40 kHz (Nominal)
Frequency deviation (Wide Band FM)	0 < Frequency deviation ≤ 20 kHz 20 kHz < Frequency deviation ≤ 1 MHz (Nominal)
Demodulation frequency range	20 Hz to 20 kHz
Frequency deviation accuracy	1% of an indication value ± residual FM
Residual FM	3.35 Hz rms, SN > 50 dB (at 1.5 kHz deviation, demodulation bandwidth: 0.3 to 3 kHz)
Modulation distortion	0.3% (at demodulation frequency: 1 kHz, frequency deviation: 5 kHz, demodulation bandwidth: 0.3 to 3 kHz)
DCS measurement function	Code demodulation result display for Digital Code Squelch
ϕM measurement	
ϕM Deviation	0 to (20 kHz/modulation frequency [Hz]) rad
Demodulation frequency range	20 Hz to 20 kHz
ϕM deviation accuracy	1% of an indication value ± residual ϕM
Residual ϕM	0.01 rad rms (at demodulation bandwidth: 0.3 to 3 kHz)
Modulation distortion	1% (at demodulation bandwidth: 0.3 to 3 kHz)
AM measurement	
AM depth	0 to 98%
Demodulation frequency range	20 Hz to 20 kHz
AM depth accuracy	1% of an indication value ± residual AM
Residual AM	0.3% (At demodulation bandwidth: 0.3 to 3 kHz)
Modulation distortion	0.3% (At demodulation bandwidth: 0.3 to 3 kHz)

Table 1.3.1-1 MX269018A Product Specifications (Cont'd)

Items	Specifications
Filter	
Low pass	300 Hz, 3 kHz, 15 kHz, 20 kHz
High pass	50 Hz, 300 Hz, 400 Hz, 30 kHz
Band pass	CCITT, C-Message, CCIR 468, CCIR-ARM, A-Weight
De-emphasis	750 µs, 500 µs, 75 µs, 50 µs, 25 µs
Transmitter power accuracy	After CAL execution at 18 to 28°C, input attenuator ≥ 10 dB, the signal measured is within the measurement level range and less than or equal to Input Level ±0.5 dB (At Pre-Amp Off, or Pre-Amp not installed) The transmitter power accuracy complies with the absolute amplitude accuracy of MS2830A mainframe.
Demodulation monitor	Outputs demodulated signals to USB Audio equipment connected to the MS2830A USB terminal. With MS2830A-018/118 installed: Outputs demodulated signals from the built-in speaker and headphone (FM measurement only).
Received power measurement	The function is enabled when the MS2830A-088/188 Analog Signal Generator option is installed or when the Analog Function Extension for MS2830A-029 Vector Signal Generator is installed to the MS2830A-020/021 Vector Signal Generator option.
RF signal output	The performance complies with the MS2830A-088/188 performance or MS2830A-020/021 performance when the MS2830A-029 is installed.
Frequency setting range	100 kHz to 3000 MHz
Frequency setting resolution	1 Hz
Output setting level	–127 to –3 dBm (Frequency ≤ 25 MHz) –127 to +15 dBm (Frequency > 25 MHz)
FM modulation	
Frequency deviation setting range	0 to 100 kHz
Frequency deviation setting resolution	0.1 Hz
Frequency deviation accuracy	±1% of a setting value (residual FM excluded)
Internal AF signal source	Without MS2830A-018/118: AF Tone source × 2, Digital Code Squelch signal generator With MS2830A-018/118 installed: AF Tone source × 3, Digital Code Squelch signal generator
Internal AF signal source setting range	20 Hz to 40 kHz
Internal AF signal source setting resolution	0.1 Hz, Setting value ±3 Hz on use of Digital Code Squelch signal
DCS code setting range	000 to 777 (Three-digit octal notation)

Table 1.3.1-1 MX269018A Product Specifications (Cont'd)

Items	Specifications
ϕM Modulation	
ϕM deviation setting range	Settable with the range of 0 to 50.0 rad (internal modulation frequency × phase deviation) < 100 k
ϕM deviation setting resolution	0.01 rad
ϕM deviation accuracy	±1% of a setting value (residual ϕM excluded)
Internal AF signal source	Without MS2830A-018/118: AF Tone source × 2 With MS2830A-018/118 installed: AF Tone source × 3
Internal AF signal source setting range	20 Hz to 40 kHz
Internal AF signal source setting resolution	0.1 Hz
AM modulation	
Modulation accuracy setting range	0 to 100%
Modulation rate setting resolution	1%
Modulation rate accuracy	±1% of a setting value (residual AM excluded)
Internal AF signal source	Without MS2830A-018/118: AF Tone source × 2 With MS2830A-018/118 installed: AF Tone source × 3
Internal AF signal source setting range	20 Hz to 40 kHz
Internal AF signal source setting resolution	0.1 Hz

1.3.2 MS2830A-029/088/188/189 Product Specifications

Table 1.3.2-1 lists the specifications for the MS2830A-029/088/188/189.

Table 1.3.2-1 MS2830A-029/088/188/189 Product Specifications

Items	Specifications
Function and performance	The following specifications are added to the specifications of the MS2830A-020/-021 and -022 installed.
Frequency	
Range	MS2830A-088/189: 100 kHz to 3.6 GHz MS2830A-029: Lower limit frequency: 100 kHz. The upper limit frequency depends on the vector signal generator installed.
Output level	
Output level accuracy	When the MS2830A-029/088/188 is installed, in CW mode, at 18 to 28 °C: Output level p [dBm] $-110 \leq p \leq -3$ ±3.0 dB typ. ($100\ kHz \leq f < 250\ kHz$)
Waveform generator	
	Available only when the MS2830A-189 is installed (when the MS2830A-088/188 is installed)

1.3.3 MS2830A-018/118 Product Specifications

When the MS2830A-018/118 is installed, Audio Analyzer and Audio Generator functions are available. Table 1.3.3-1 shows the specifications.

Table 1.3.3-1 MX269018A Product Specifications

Items	Specifications
Audio Analyzer	
Measurement Function	Amplitude, frequency, THD,THD+N,SINAD
Analog Measurement	Below is the specifications for the single tone measurement.
Connection Type	Balance: 1/4 inch phone jack (3 poles, ϕ6.3 mm) Unbalance: BNC-J
Impedance	Balance: 200 kΩ (AC coupling, Nominal) Unbalance: 100 kΩ (AC coupling, Nominal)
Frequency Measurement Range	20 Hz to 50 kHz
Level Measurement Range	1 mVrms to 25 Vrms (30 Vrms MAX)
Input Range Setting	50 mVpeak, 500 mVpeak, 5 Vpeak, 50 Vpeak
Level Accuracy	±0.4 dB (20 Hz ≤ f ≤25 kHz) ±3.0 dB (25 kHz < f ≤ 50 kHz) (18 to 28°C)
THD+N (Total Harmonic Distortion + Noise)	In the conditions of 1 kHz, 1.4 Vrms, 20 Hz to 20 kHz band, 5 Vpeak range, 18 to 28°C: < –60 dB < –80 dB (Nominal)
Audio Filter	
HPF	Off, 20 Hz, 50 Hz, 100 Hz, 300 Hz, 400 Hz, 30 kHz
LPF	Off, 3 kHz, 15 kHz, 20 kHz, 30 kHz, 50 kHz
Weighting Filter	Off, CCITT, C-Message, CCIR468, CCIR-ARM, A-Weight

Table 1.3.3-1 MX269018A Product Specifications (Continued)

Items	Specifications
Audio Generator	
Analog Measurement	Below is the specifications for the single tone measurement.
Connection Type	Balance: 1/4 inch phone jack (3 poles, ϕ6.3 mm) Unbalance: BNC-J
Interface	Balance: 100/600 Ω (AC coupling, Nominal) Unbalance: 50/600 Ω (AC coupling, Nominal)
Output Waveform	Single tone, multi tone (Tone×3, DCS, pseudo voice, DTMF)
Frequency Guarantee Range	20 Hz to 25 kHz
Frequency Setting Range	10 Hz to 50 kHz
Frequency Resolution	0.01 Hz
Output Level Range	Balance: 0 (off), 1 mVrms to 12.4 Vrms (100 kΩ termination) off, –63 to +18 dBm (Output Impedance = 600 Ω, and Output Impedance Reference = 600 Ω) Unbalance: 0 (off), 1 mVrms to 6.2 Vrms (100 kΩ termination) off, –63 to +12 dBm (Output Impedance = 600 Ω, and Output Impedance Reference = 600 Ω)
Output Level Resolution	1 mV (350 mVrms < Output Level ≤ 6.2 Vrms) 100 μV (35 mVrms < Output Level ≤ 350 mVrms) 10 μV (Output Level ≤ 35 mVrms)
Output Level Accuracy	±0.3 dB (At 1 kHz, 100 kΩ termination, 18 to 28°C)
Maximum Output Currency	100 mA (Nominal, no short circuit)
THD+N (Total Harmonic Distortion + Noise)	In the conditions of 1 kHz, 0.7 Vrms, 20 Hz to 25 kHz band, 100 kΩ termination, 18 to 28°C: < –60 dB < –80 dB (Nominal)
Pseudo Voice	
Output Level Range	Output Impedance = 600 Ω, and Output Impedance Reference = 600 Ω Balance: off, –60 to +6 dBm (Nominal) Unbalance: off, –60 to 0 dBm (Nominal)
Output Level Resolution	0.01 dB (Nominal)
Output Level Accuracy	±3 dB (Nominal)
Evaluation Filter	ITU-T Recommendation G.227
FM measurement	Below is the specifications added when the MS2830A-018/118 is installed.
Demodulation Monitor Output Level	–10 dBm ±2 dB (Frequency deviation = 3.5 kHz, 600 Ω)
Demodulation Monitor Output Impedance	600 Ω
Sound Monitor	Built-in speaker or headphone (3.5 mm mono phone plug)

Table 1.3.3-1 MX269018A Product Specifications (Continued)

Items	Specifications
Others	
Crosstalk	Crosstalk from Audio Generator to Audio Analyzer > 80 dB
PTT	Banana jack (ϕ4.0 mm, 30 V max, 500 mA max)
Audio Function	
Connector	D-Sub 15 (jack)
Function	Open Collector: 1 (5 V, 100 mA max) TTL output: 2 TTL input: 2

Chapter 2 Preparation

This chapter describes the preparations required for using the application you are using. Refer to *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)* for common features of the MS2830A not included in this manual.

2.1 Part Names

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

2.1.1 Front panel

This section describes the front-panel keys and connectors.

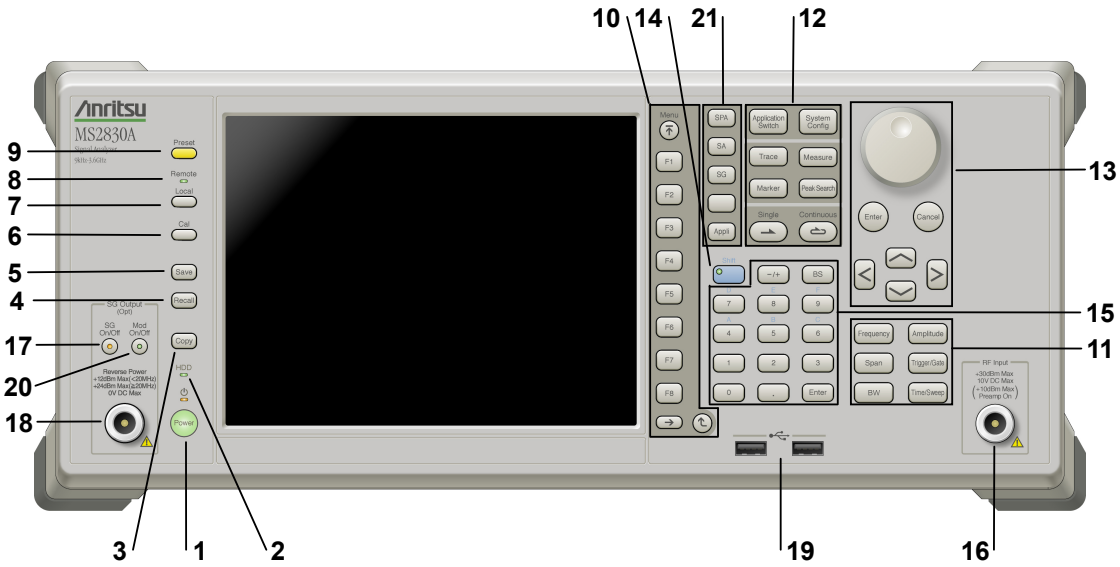


Figure 2.1.1-1 Front panel

1 

Power switch

Press to switch between the standby state (AC power supplied) and power-on state. The Power lamp lights orange at Standby and green at Power On. Press the power switch for about 2 seconds.

2 

Hard disk access lamp

Lights when accessing the internal hard disk

3 

Copy key

Press to capture display screen and save to file.

4 

Recall key

Press to recall parameter file.

5 

Save key
Press to save parameter file.

6 

Cal key
Press to display the Calibration menu.

7 

Local key
Press to return to local operation from remote control via GPIB, Ethernet, or USB (B), and enable panel settings.

8 

Remote lamp
Lights when in remote-control state.

9 

Preset key
Press to display the Preset menu. Resets parameters to initial settings.

10 

Function keys
Selects or configures function menu displayed on the right of the screen. The function menu is provided in multiple pages and layers.

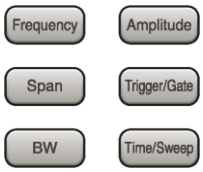
The number on the bottom of the screen indicates the menu page number.

Next key
Press to go to the next page.

Back key
Press to go back to the previous layer within the function menu.

Top key
Press to go back to the uppermost (top) layer.

11



Main function keys 1

Press to set or execute main functions.

Executable functions vary with the current application. When nothing happens with the press, it indicates that the application in use does not support the key.

Frequency Press to set frequency parameters.

Amplitude Press to set level parameters.

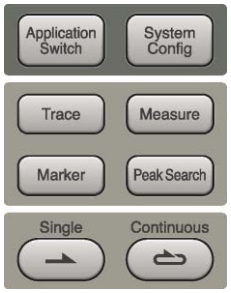
Span No function is assigned to this key.

Trigger/Gate Press to set trigger parameters.

BW No function is assigned to this key.

Time/Sweep Press to set measurement item parameters.

12



Main function keys 2

Press to set or execute main functions.

Executable functions vary with the current application. When nothing happens with the press, it indicates that the application in use does not support the key.

Application Switch Press to switch application.

System Config Press to display Configuration screen.

Trace Press to set the trace items or to switch the operation window.

Measure Press to set measurement item parameters.

Marker Use when switching graph marker operation.

Peak Search Press to set parameters related to the peak search function.

Single Press to start single measurement.

Continuous Press to start continuous measurements.

13

Rotary knob/Cursor keys/Enter key/Cancel key

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

Press Enter to set the entered or selected data.

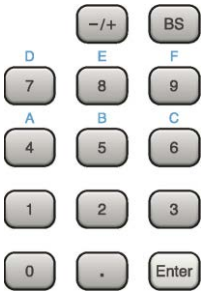
Press Cancel to cancel input or selected data.

14

Shift key

Operates keys with functions in blue characters on panel. Press the Shift key so the key lamp is green and then press the target key.

15



Numeric keypad

Enters numbers on parameter setup screens.

Press BS to delete the last entered digit or character.

[A] to [F] can be entered by pressing keys 4 to 9 while the Shift key lamp Shift is green.

16

RF Input connector

Inputs RF signal.

17

RF Output Control key

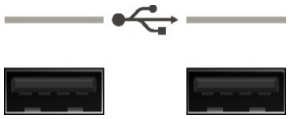
Press SG On/Off to switch on/off the modulation of RF signal when the Vector Signal Generator option is installed. The RF output control key lamp lights orange when the RF signal output is set to On.

This is not available when the Option 044/045 is installed.

18 RF Output connector

Outputs RF signal, when the Vector Signal Generator option is installed. This is not available when the Option 044/045 is installed.

19 USB connector (type A)



Connect the accessory USB keyboard, mouse or USB memory.

20 Modulation control key

Press 

to switch on/off the modulation of RF signal when the Vector Signal Generator option is installed. When modulation is on, the key lamp lights up green.
This is not available when the Option 044/045 is installed.

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 Generator 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.
For details, refer to 3.5.4 “Changing application layout” in *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)*.

2.1.2 Rear panel

This section describes the rear-panel connectors.

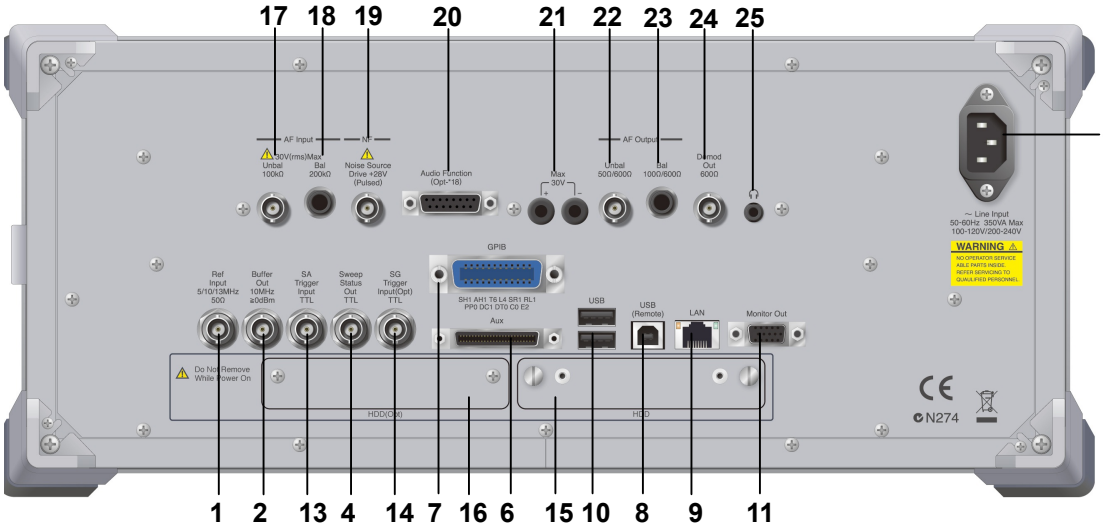


Figure 2.1.2-1 Rear panel

1 Ref Input 5/10/13MHz 50Ω

Ref Input connector (reference frequency signal input connector)
Inputs external reference frequency signal (5 MHz/10 MHz/13 MHz). It is for inputting reference frequency signals with higher accuracy than the instrument's internal reference signal, or for synchronizing the frequency of the mainframe to that of other equipment.

2 Buffer Out 10MHz ≧0dBm

Buffer Out connector (reference frequency signal output connector)
Outputs the internal reference frequency signal (10 MHz). It is for synchronizing frequencies between other equipment and the mainframe.

4 Sweep Status Out TTL

Sweep Status Out connector
Outputs signal when internal measurement is performed or measurement data is obtained.

6 

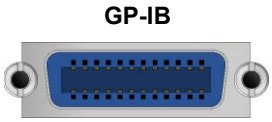
AUX connector

This is a complex connector for inputting an error rate measurement signal and inputting a baseband clock reference signal of the Vector Signal Generator (optional). See Table 2.1.2-1, for the internal pin assignment of the AUX connector.

Table 2.1.2-1 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 2.1.2-1, because they are interface connectors provided for device maintenance.

7 

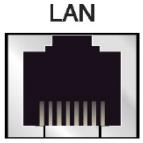
GPIB connector

For external control via GPIB

8 

USB connector (type B)

For external control via USB

9 

Ethernet connector

Connects PC or Ethernet network.

10 

USB connector (type A)

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

11 **Monitor Out**

Monitor Out connector

Connects external display.

12

AC inlet

Supplies power.

13 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.

14 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.

15 HDD

HDD slot

This is a standard hard disk slot.

16 HDD (Opt)

HDD slot for Option

This is a hard disk slot for the options.

17 

AF Input connector (unbalanced)

BNC connector to input unbalanced AF signal from external device.
This is mounted on the unit in which the Option 018/118 is installed.
Impedance: 100 kΩ (AC coupling, Nominal)
Input Range: 1 mVrms to 25 Vrms (30 Vrms MAX)

18 

AF Input connector (balanced)

1/4 inch phone jack (3 poles, ϕ6.3 mm) connector to input balanced AF signal from external device.
This is mounted on the unit in which the Option 018/118 is installed.
Impedance: 200 kΩ (AC coupling, Nominal)
Input Range: 1 mVrms to 25 Vrms (30 Vrms MAX)

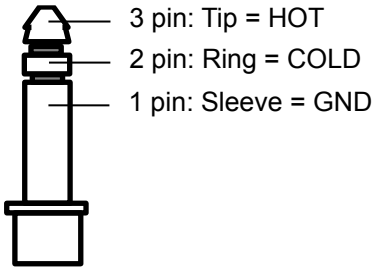
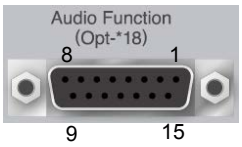


Figure 2.1.2-2 1/4 Inch Phone Plug

19 

Noise Source connector

Supply (+28V) of the Noise Source Drive.
This is available when the Option 017/117 is installed.

20 

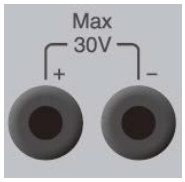
General Input/Output (Audio Function) connector

D-Sub 15 connector for general purpose input/output from/to the external device.

This is mounted on the unit in which the Option 018/118 is installed.

Table 2.1.2-2 Audio Function connector

Function	Pin Number	Signal Name
Audio	1	GND
	2	GND
	3	GND
	4	RSV (Reserved)
	5	RSV (Reserved)
	6	GND
	7	GND
	8	GND
	9	Open collector
	10	TTL Output 1
	11	TTL Output 2
	12	Non Connection
	13	TTL Input 1
	14	TTL Input 2
	15	Non Connection

21 

PTT Control connector

Banana plug jack connector to control PTT (Push to Talk).

This is mounted on the unit in which the Option 018/118 is installed.

Input Voltage Range: +30 V Max

22 

AF Output connector (unbalanced)

BNC connector to output unbalanced AF signal to external device.

This is mounted on the unit in which the Option 018/118 is installed.

Impedance: 50 Ω/600 Ω (AC coupling, Nominal)

Table 2.1.2-3 Output Range (Unbalance, Output Impedance: 600 Ω)

Function	Termination	Output Range
Single Tone	100 kΩ	0 (off), 1 mVrms to 6.2 Vrms
	600 Ω	0 (off), 0.5 mVrms to 3.1Vrms
White Noise*	100 kΩ	0 (off), 1.545 mVrms to 1.545 Vrms (Nominal)
	600 Ω	0 (off), 0.774 mVrms to 0.774 Vrms (Nominal)

*: (through ITU-T Rec. G.227 filter)

23 

AF Output connector (balanced)

1/4 inch phone jack (3 poles, ϕ6.3 mm) connector to output balanced AF signal to external device.

This is mounted on the unit in which the Option 018/118 is installed.

Impedance: 100 Ω/600 Ω (AC coupling, Nominal)

Table 2.1.2-4 Output Range (Balance, Output Impedance: 600 Ω)

Function	Termination	Output Range
Single Tone	100 kΩ	0 (off), 1 mVrms to 12.4 Vrms
	600 Ω	0 (off), 0.5m Vrms to 6.2 Vrms
White Noise*	100 kΩ	0 (off), 1.545 mV rms to 3.083 V rms (Nominal)
	600 Ω	0 (off), 0.774 mV rms to 1.545 V rms (nominal)

*: (through ITU-T Rec. G.227 filter)

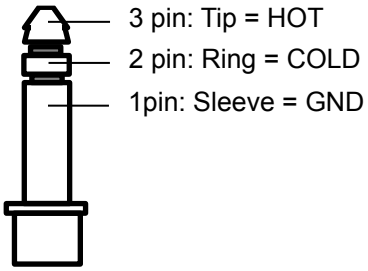


Figure 2.1.2-3 1/4 Inch Phone Plug

24 

Demodulation Output connector

BNC connector to output demodulated AF signal to external device.

This is mounted on the unit in which the Option 018/118 is installed.

Output Level: –10 dBm ±2 dB (Frequency deviation = 3.5 kHz, 600 Ω)

Impedance: 600 Ω

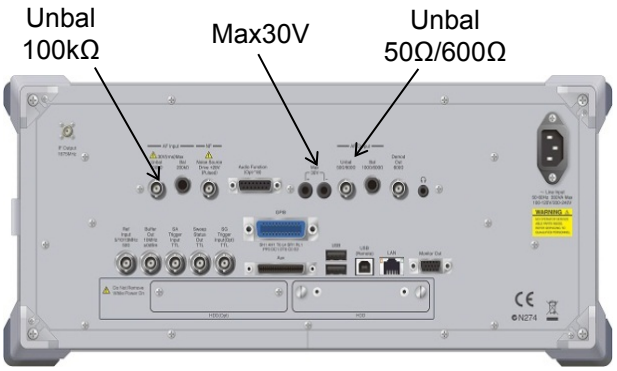
25 

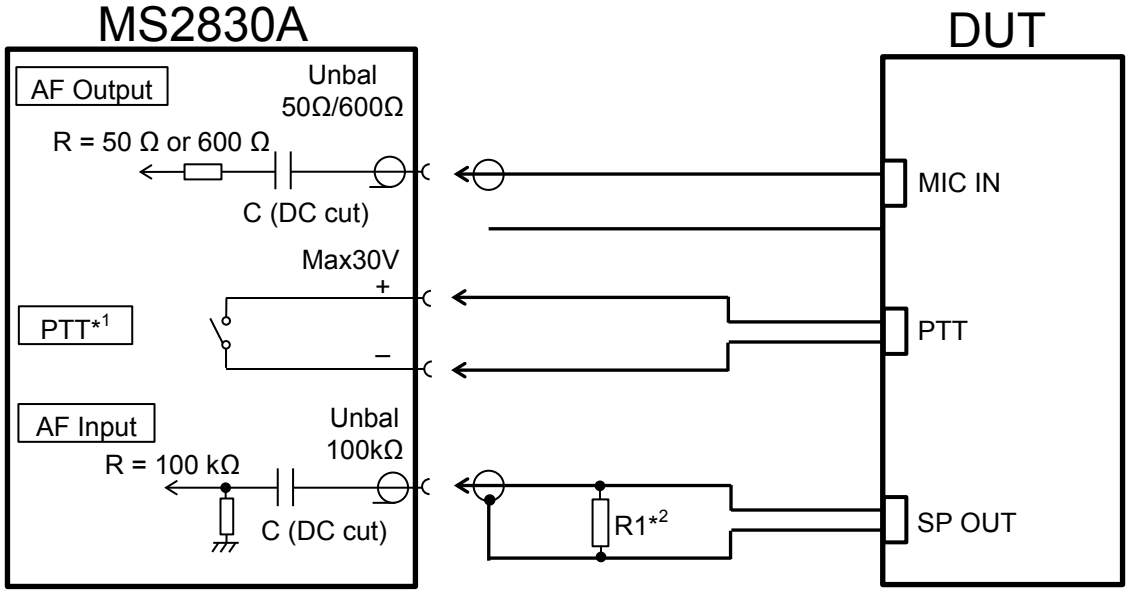
Headphone Output connector (Monaural)

3.5 mm phone jack connector (3.5 mm phone plug: ϕ3.5 mm) to output demodulated AF audio signal to external device.

This is mounted on the unit in which the Option 018/118 is installed.

Figure 2.1.2-4 shows an example of connection between the DUT and the MS2830A-018 Audio Analyzer. Either "unbalanced connector" or "balanced connector" can be used for AF input-output connector according to the DUT.





*1: PTT terminal shows polarity for identifying terminals. It doesn't have polarity for a circuit.
PTT terminal has a built-in overcurrent protection circuit. If the protection circuit operates, turn Off the MS2830A and turn it On again.

*2: R1: Termination corresponding to audio output impedance of the DUT.

Figure 2.1.2-4 Example of Connection Between DUT and MS2830A

2.2 Signal Path Setup

As shown in Figure 2.2-1, connect the mainframe 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 MS2830A.

Figure 2.2-1 Signal path setup example

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

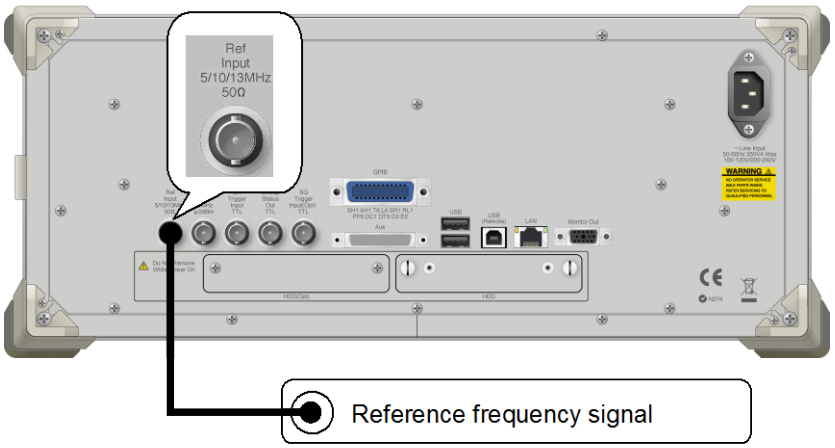


Figure 2.2-2 External signal input

2.3 Application Startup and Selection

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

2.3.1 Launching application

The application startup procedure is described below.

Note:

The XXX indicates the application name currently in use.

■Procedure

1. Press System Config to display the Configuration screen.
2. Press F4 (Application Switch Settings) to display the Application Switch Registration screen.
3. Press F1 (Load Application Select), and move the cursor to "XXX" in the Unloaded Applications list.
   - If "XXX" is displayed in the **Loaded Applications** list, this means that the application is already loaded.
   - If "XXX" appears in neither the **Loaded Applications** nor **Unloaded Applications** list, this means that the application has not been installed.
4. Press F7 (Set) to load the application. If "XXX" is displayed in the **Loaded Applications** list, this means that the application is already loaded.

2.3.2 Selecting application

The selection procedure is described below.

■Procedure

1. Press Application Switch to display the Application Switch menu.
2. Press the menu function key displaying "XXX".
   - The application can also be selected with mouse, by clicking "XXX" on the task bar.

2.4 Initialization and Calibration

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

2.4.1 Initialization

After selecting this application, first perform initialization. Initialization should be performed in order to return the settable parameters to their default settings.

The initialization procedure is as follows.

■Procedure

1. Press Preset to display the Preset function menu.
2. Press F1 (Preset).

2.4.2 Calibration

Perform calibration before 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, or if beginning measurement when there is a difference in ambient temperature from the last time calibration was performed.

■Procedure

1. Press Cal to display the Application Cal function menu.
2. Press F1 (SIGANA All).

For details on calibration functionality only executable with the MS2830A, refer to *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

This section describes the cautions to be observed when using this application.

3.1.1 Signal generator function

This application uses the signal generator function, but the settings used for this application are independent from those for the MS2830A-020/021 3.6/6 GHz Vector Signal Generator Option or MS2830A-189 Vector Function Extension for Analog Signal Generator Retrofit Option (hereafter, the "SG application"). Note that the DUT might be damaged by sudden rise of output level when switching from this application to the SG application by **Application Switch** after the SG application level is raised and the output is On.

The output frequency and RF output level for the Signal Generator of the MX269018A are set to the measurement parameters Rx Frequency and Output Level respectively.

3.1.2 Demodulation monitor and AF monitor function

MX269018A allows monitoring AF signals of demodulated modulation signals and AF signals of modulation signals output from this instrument when USB Audio equipment and a speaker are connected to this instrument.
Use Windows XP- compliant USB Audio equipment.
The operation on the USB Audio (A0086A), which is the optional accessory of this software, has been confirmed.

Note:

Do not plug and unplug the USB Audio device connector during analysis. The operation can be unstable.

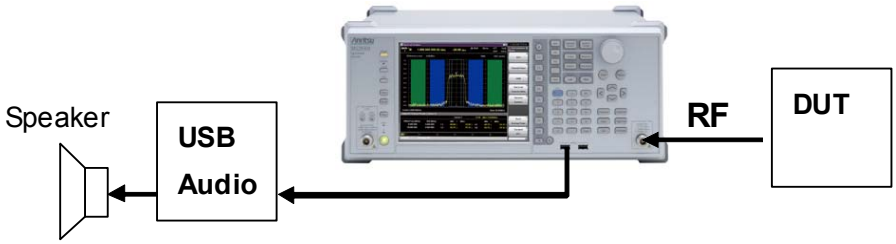


Figure 3.1.2-1 USB Audio Connection Example

3.1.2.1 When Audio Analyzer Option is installed

When the MS2830A-018/118 Audio Analyzer is installed, the speaker is built-in the MS2830A.
When selecting FM modulation in TX measurement mode for continuous measurement, demodulated FM signal can be output from the speaker. The speaker output can be monitored by connecting a headphone, etc. to the headphone output connector. For the position of the headphone output connector, refer to 2.1.2, “Rear Panel”.

3.2 Basic Operation

3.2.1 Screen layout

This section describes the screen layout of this application. The MX269018A has two types of screen: TX mode screen for transmission measurement and RX mode screen for reception measurement.
The screens of TX mode and RX mode vary depending on the installed option. The details are shown below.

3.2.1.1 TX mode screen

When the MS2830A-018/118 Audio Analyzer is not installed, selecting TX mode displays the screen below.

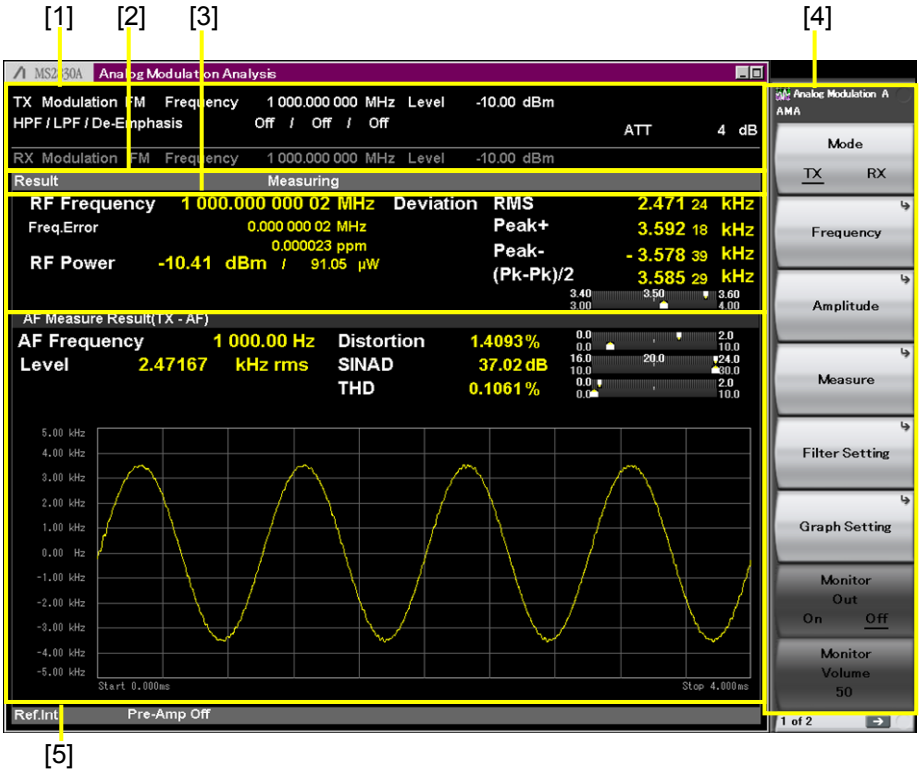


Figure 3.2.1.1-1 TX Mode Screen

[1] Measurement parameter
Displays the specified parameter.

[2] Status message
Displays signal status.

[3] Result window
Displays the measurement results for frequency, level, and modulation index of RF input signals.

[4] Function menu

Displays the functions executable with function keys.

[5] AF Measure Result (TX-AF) window

Displays the frequency, level, distortion factor, and graph of demodulated AF signals.

[6] Meter

Displays the measurement results.

☞ Figure 3.2.1.2-2 Examples of Setting Meter
3.4.3.2 Setting Meter

3.2.1.2 TX mode + Audio Generator Screen

When the MS2830A-018/118 Audio Analyzer is installed, selecting TX mode displays the screen below.

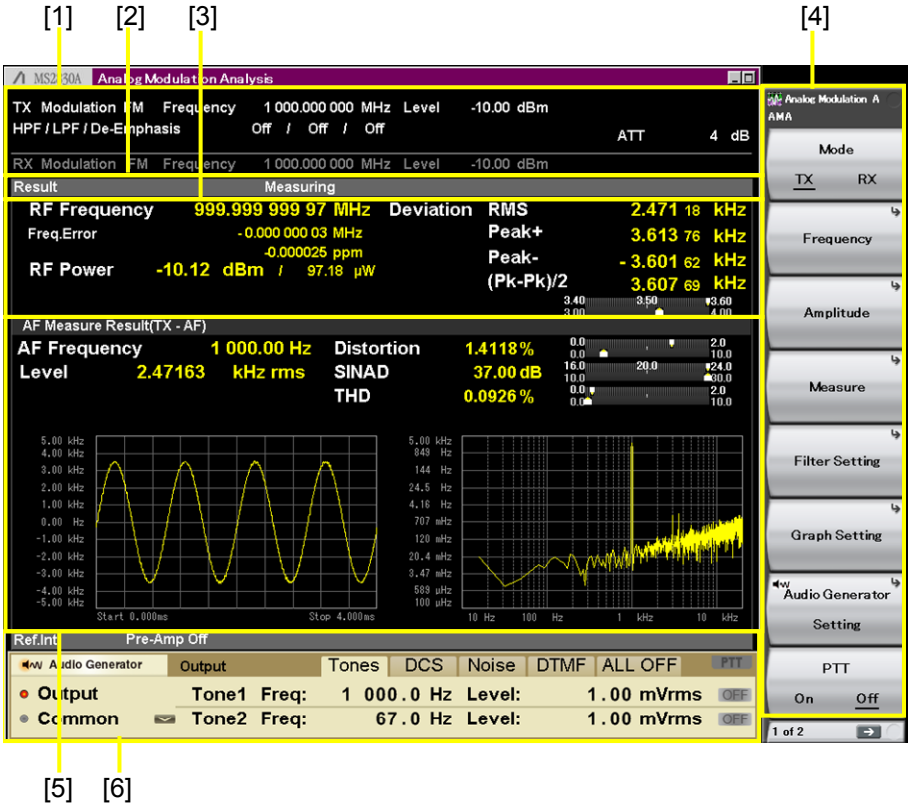


Figure 3.2.1.2-1 TX Mode + Audio Generator Screen

[1] Measurement parameter

Displays the specified parameter.

[2] Status message

Displays signal status.

[3] Result window

Displays the measurement results for frequency, level, and modulation index of RF input signals.

[4] Function menu

Displays the functions executable with function keys.

[5] AF Measure Result (TX-AF) window

Displays the frequency, level, distortion factor, and graph of demodulated AF signals.

[6] Audio Generator window

Displays the setting for AF output signals.

[7] Meter

Displays the measurement results.

3.4.3.2 Setting Meter

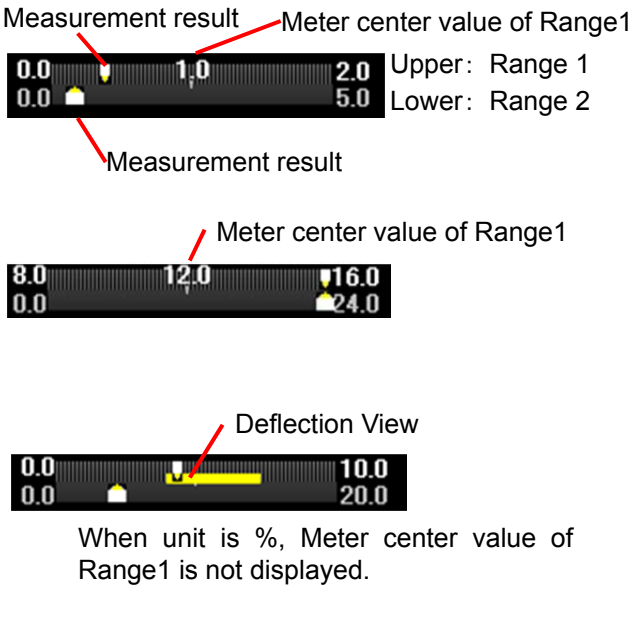


Figure 3.2.1.2-2 Examples of Setting Meter

3.2.1.3 RX mode screen

Under the following conditions, selecting RX mode displays the screen below.

- The Analog Signal Generator (MS2830A-x88) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029) is installed.
- The MS2830A-018/118 Audio Analyzer is not installed.

Figure 3.2.1.3-1 RX Mode Screen

[1] Measurement parameter
Displays the specified parameter.

[2] Status message
Displays signal status.

[3] RX Setting window
Displays the setting values of frequency, level, and modulation index of RF output signals.

[4] Function menu
Displays the functions executable with function keys.

[5] AF Setting window
Displays the setting values for AF signals to be modulated.

3.2.1.4 RX mode (Audio Analyzer) screen

Under the following conditions, selecting RX mode displays the screen below.

- Neither the Analog Signal Generator (MS2830A-x88) nor the Analog Function Extension Option for Vector Signal Generator (MS2830A-029) is installed.
- The MS2830A-018/118 Audio Analyzer is installed.

Figure 3.2.1.4-1 Audio Analyzer Screen

[1] Measurement parameter
Displays the specified parameter.

[2] Status message
Displays signal status.

[3] Audio Analyzer Setting window
Sets analysis conditions for AF input signals.

[4] Function menu
Displays the functions executable with function keys.

[5] AF Measure Result window
Displays the frequency, level, distortion factor, and graph of AF input signals.

[6] Meter

Displays the measurement results.

Figure 3.2.1.5-2 Setting Meter examples
3.9.4 Setting Meter

3.2.1.5 RX mode (Audio Analyzer) + RF Signal Generator screen

Under the following conditions, selecting RX mode displays the screen below.

- The Analog Signal Generator (MS2830A-x88) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029) is installed.
- The MS2830A-018/118 Audio Analyzer is installed.

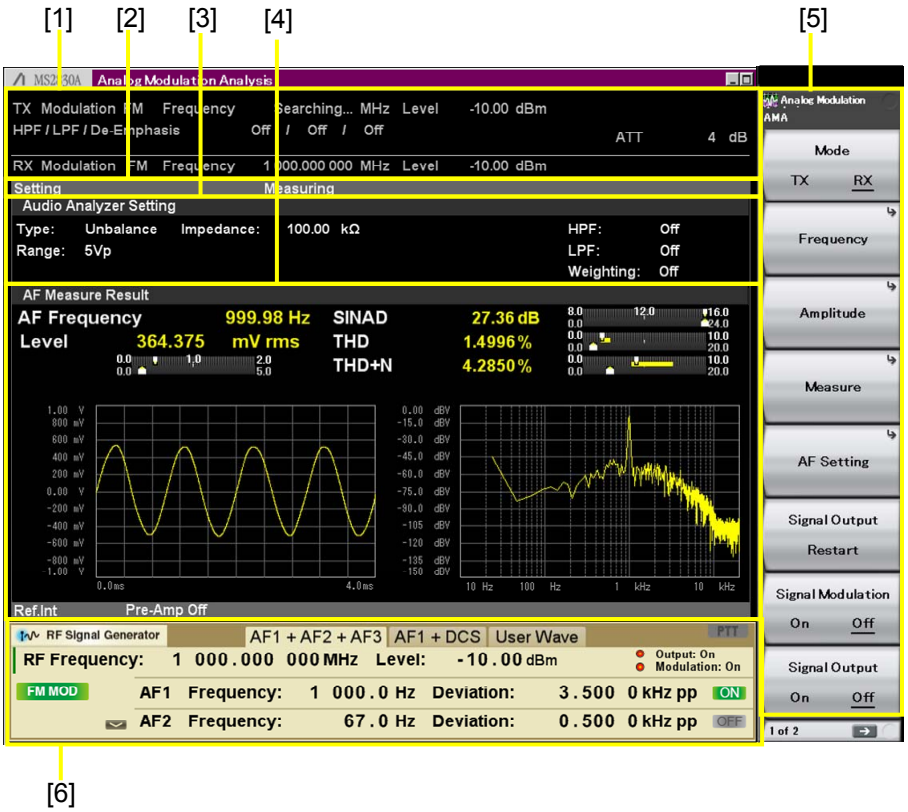


Figure 3.2.1.5-1 Audio Analyzer + RF Signal Generator Screen

[1] Measurement parameter

Displays the specified parameter.

[2] Status message

Displays signal status.

[3] Audio Analyzer Setting window

Sets analysis conditions for AF input signals.

[4] AF Measure Result window

Displays the frequency, level, distortion factor, and graph of AF input signals.

[5] Function menu

Displays the functions executable with function keys.

[6] RF Signal Generator window

Displays the specified AF signals and the specified frequency, level, modulation rate of RF output signals.

[7] Meter

Displays the measurement results.

3.9.4 Setting Meter

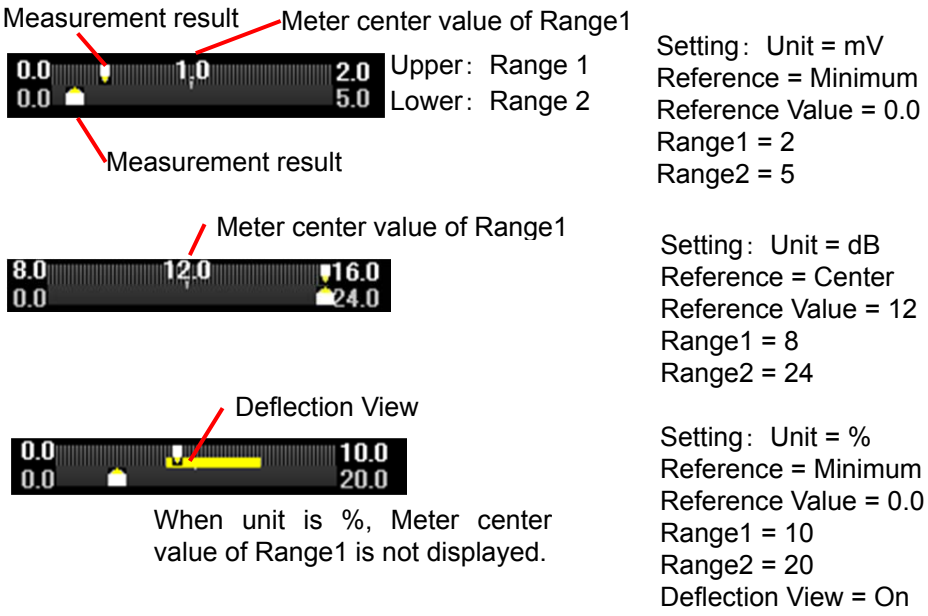


Figure 3.2.1.5-2 Examples of Setting Meter

3.2.2 Main function menu

3.2.2.1 TX mode screen

This section explains the main function menu of TX mode screen when the MS2830A-018/118 Audio Analyzer is not installed.

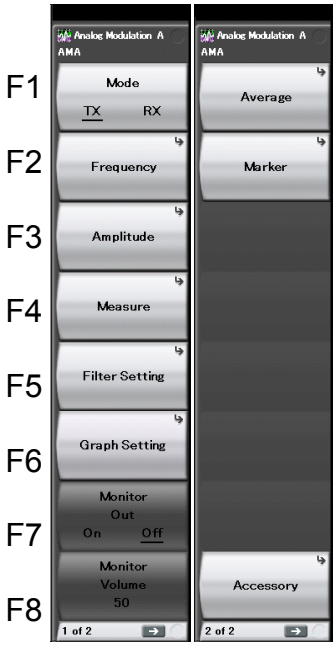


Figure 3.2.2.1-1 Main Function Menu (TX Mode)

Table 3.2.2.1-1 Main Function Menu (TX Mode) Explanation

Menu Display	Function
Mode	Sets continuous or single measurement mode. 3.3 “Setting Measurement Mode”
Frequency	Sets a frequency. 3.4.1 “Setting frequency”
Amplitude	Sets a level. 3.4.2 “Setting level”
Measure	Sets measurement items. 3.4.3 “Setting measurement items”
Filter Setting	Sets filter. 3.4.4 “Setting filter”
Graph Setting	Sets the graphs of Time Domain and Frequency Domain. 3.4.8 “Setting AF Measure Result (TX-AF) graph”
Monitor Out	Sets demodulation monitor. 3.4.5 “Setting demodulation monitor”
Monitor Volume	Sets demodulation monitor volume. 3.4.5 “Setting demodulation monitor”

Table 3.2.2.1-1 Main Function Menu (TX Mode) Explanation (Cont'd)

Menu Display	Function
Average	Sets whether to set averaging. ☞ 3.4.6 "Setting averaging"
Marker	Sets marker. ☞ 3.4.7 "Setting marker"
Accessory	Performs settings for other functions. ☞ 5.1 "Selecting Other Functions"

3.2.2.2 TX mode + Audio Generator screen

This section explains the main function menu when the MS2830A-018/118 Audio Analyzer is installed.

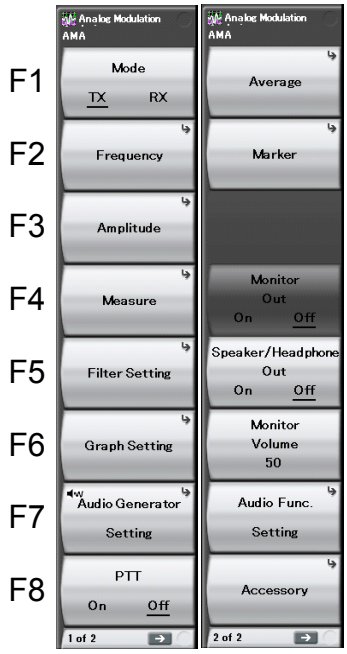


Figure 3.2.2.2-1 Main Function Menu (TX Mode + Audio Generator)

Table 3.2.2.2-1 Description of Main Function Menu (TX Mode + Audio Generator)

Menu Display	Function
Mode	Sets the measurement mode. ☞ 3.3 "Setting Measurement Mode"
Frequency	Sets the frequency. ☞ 3.4.1 "Setting frequency"
Amplitude	Sets the level. ☞ 3.4.2 "Setting level"
Measure	Sets measurement items. ☞ 3.4.3 "Setting measurement items" ☞ 3.6 "Simultaneous Use With Other Applications"

Table 3.2.2.2-1 Description of Main Function Menu (TX Mode + Audio Generator) (Cont'd)

Menu Display	Function
Filter Setting	Sets filter. ☞ 3.4.4 "Setting filter"
Graph Setting	Sets the graphs of Time Domain and Frequency Domain. ☞ 3.4.8 "Setting AF Measure Result (TX-AF) graph"
Audio Generator Setting	Sets Audio Generator. ☞ 3.5.1 "Setting Audio Generator"
PTT	Sets PTT (Push to Talk). ☞ 3.5.2 "Setting PTT"
Average	Sets whether to set averaging. ☞ 3.4.6 "Setting averaging"
Marker	Sets marker. ☞ 3.4.7 "Setting marker"
Monitor Out	Sets demodulation monitor. ☞ 3.4.5 "Setting demodulation monitor"
Speaker/Head phone Out	Sets speaker or headphone. ☞ 3.4.5 "Setting demodulation monitor"
Monitor Volume	Sets demodulation monitor volume. ☞ 3.4.5 "Setting demodulation monitor"
Audio Func. Setting	Sets input/output of the terminal to control external device. ☞ 3.10 "Setting Terminals for External Device Control"
Accessory	Performs settings for other functions. ☞ 5.1 "Selecting Other Functions"

3.2.2.3 RX mode screen

This section explains the main function menu on the RX mode screen under the following conditions.

- The Analog Signal Generator (MS2830A-x88) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029) is installed.
- The MS2830A-018/118 Audio Analyzer is not installed.

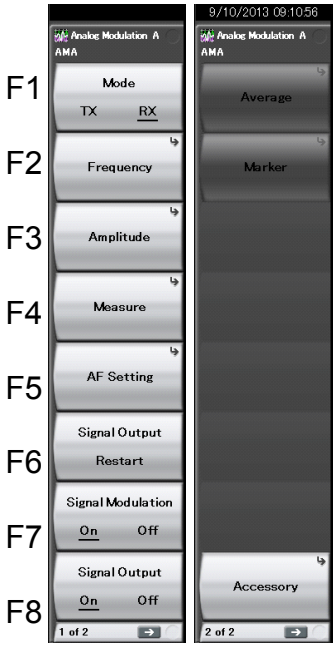


Figure 3.2.2.3-1 Main Function Menu (RX Mode)

Table 3.2.2.3-1 Main Function Menu (RX Mode) Explanation

Menu Display	Function
Mode	Sets continuous or single measurement mode. 3.3 “Setting Measurement Mode”
Frequency	Sets a frequency. 3.7.1 “Setting frequency”
Amplitude	Sets a level. 3.7.2 “Setting level”
Measure	Sets measurement items. 3.7.3 “Setting measurement items”
AF Setting	Sets AF signal. 3.7.4 “Setting AF signal”

Table 3.2.2.3-1 Main Function Menu (RX Mode) Explanation (Cont'd)

Menu Display	Function
Signal Output Repeat	Restarts transmission output of modulation wave signal. ☞ 3.8.1 "Setting modulation wave signal"
Signal Modulation	Sets modulation for output signal. ☞ 3.8.1 "Setting modulation wave signal"
Signal Output	Sets signal output On/Off. ☞ 3.8.1 "Setting modulation wave signal"
Average	Not available in RX mode.
Marker	Not available in RX mode.
Accessory	Performs settings for other functions. ☞ 5.1 "Selecting Other Functions"

3.2.2.4 RX mode (Audio Analyzer) screen

This section explains the main function menu on the RX mode screen under the following conditions.

- Neither the Analog Signal Generator (MS2830A-x88) nor the Analog Function Extension Option for Vector Signal Generator (MS2830A-029) is installed.
- The MS2830A-018/118 Audio Analyzer is installed.

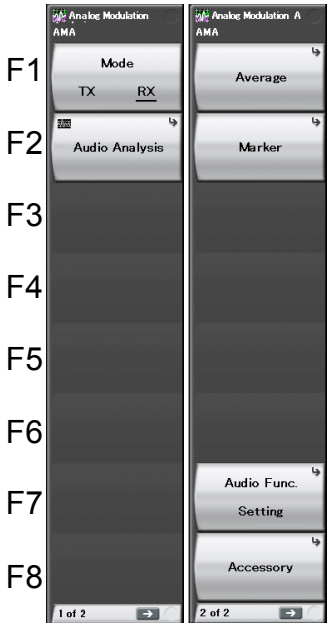


Figure 3.2.2.4-1 RX Mode Main Function Menu (Audio Analyzer Screen)

Table 3.2.2.4-1 Description of RX Mode Main Function Menu (Audio Analyzer Screen)

Menu Display	Function
Mode	Sets the measurement mode. ☞ 3.3 “Setting Measurement Mode”
Audio Analysis	Performs settings for Audio Analyzer. ☞ 3.9 “Audio Analyzer Function”
Average	Sets whether to set averaging. Setting items are the same as TX mode. ☞ 3.4.6 “Setting averaging”
Marker	Sets marker. Setting items are the same as TX mode. ☞ 3.4.7 “Setting marker”
Audio Func. Setting	Sets input/output of the terminal to control external device. ☞ 3.10 “Setting Terminals for External Device Control”
Accessory	Performs settings for other functions. ☞ 5.1 “Selecting Other Functions”

3.2.2.5 RX mode (Audio Analyzer) + RF Signal Generator screen

This section explains the main function menu on the RX mode screen under the following conditions.

- The Analog Signal Generator (MS2830A-x88) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029) is installed.
- The MS2830A-018/118 Audio Analyzer is installed.

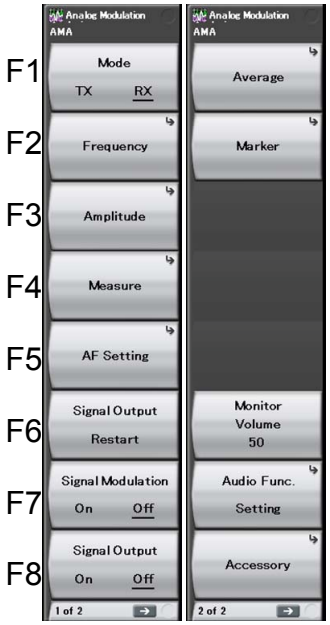


Figure 3.2.2.5-1 RX Mode Main Function Menu (Audio Analyzer +RF Signal Generator Screen)

Table 3.2.2.5-1 Description of RX Mode Main Function Menu (Audio Analyzer +RF Signal Generator Screen)

Menu Display	Function
Mode	Sets the measurement mode. ☞ 3.3 “Setting Measurement Mode”
Frequency	Sets the frequency. ☞ 3.7.1 “Setting frequency”
Amplitude	Sets the level. ☞ 3.7.2 “Setting level”
Measure	Sets measurement items. ☞ 3.7.3 “Setting measurement items” ☞ 3.9 “Audio Analyzer Function”
AF Setting	Sets AF signal. ☞ 3.7.4 “Setting AF signal”
Signal Output Restart	Restarts transmission output of modulation wave signal. ☞ 3.8.1 “Setting modulation wave signal”
Signal Modulation	Sets modulation for output signal. ☞ 3.8.1 “Setting modulation wave signal”
Signal Output	Sets signal output On/Off. ☞ 3.8.1 “Setting modulation wave signal”
Average	Sets whether to set averaging. Setting items are the same as TX mode. ☞ 3.4.6 “Setting averaging”
Marker	Sets marker. Setting items are the same as TX mode. ☞ 3.4.7 “Setting marker”
Monitor Volume	Sets demodulation monitor volume. ☞ 3.4.5 “Setting demodulation monitor”
Audio Func. Setting	Sets input/output of the terminal to control external device. ☞ 3.10 “Setting Terminals for External Device Control”
Accessory	Performs settings for other functions. ☞ 5.1 “Selecting Other Functions”

3.2.3 Performing measurement

There are two measurement modes: single and continuous. Measurement is performed once in the single measurement mode, and continuously in the continuous measurement mode.

Single Measurement

Items are measured only for the measurement count (Storage Count) before measurement is stopped.

<Procedure>

1. Press 

.

Continuous Measurement

The selected measurement items are continuously measured for the measurement count (Storage Count). Measurement will continue even if parameters are changed or the window display is changed. If other applications are selected, the measurement will stop.

<Procedure>

1. Press 

.

3.3 Setting Measurement Mode

This section describes switching of measurement mode. Pressing F1 (Mode) in the main function menu switches the measurement mode.

Mode

■Summary

Sets the measurement mode. Switch to the TX measurement mode for transmission measurement. Switch to the RX measurement mode for reception measurement. The RX measurement mode is available when the signal generator option is installed.

■Options

TX Switches the measurement mode to the TX measurement mode.

RX Switches the measurement mode to the RX measurement mode.

3.4 TX Measurement Mode

This measurement mode is for the radio transmission test. Parameters can be set for measurement of signals input to the RF Input connector of this instrument.

RX measurement mode parameters of RX Frequency and Output Level can be set even in the TX measurement mode.

3.4.1 Setting frequency

This section describes the frequency-related settings. Pressing F2 (Frequency) in the main function menu displays the Frequency function menu. Pressing Frequency displays the Frequency function menu.

TX Frequency

■Summary

Sets a frequency for transmission measurement.
This is available when Coupled Frequency is set to Off.

■Setting range

100 kHz to the upper limit depending on main unit

Auto Detect

■Summary

Detects signal frequency input to RF Input in the range of 300 kHz to 2.7 GHz, and sets an analyzable value to TX Frequency automatically.

Auto Detect Range Setting

■Summary

Sets the frequency range to search by Auto Detect. When the DUT frequency range is known in advance, the search duration can be shortened by limiting the range.

Up to 8 frequency ranges can be specified.

Auto Detect Range Setting - Edit Number

■Summary

Specifies a frequency range number to search by Auto Detect.

■Setting range

1 to 8

Auto Detect Range Setting - Range *n**

■Summary

Enables or disables the range selected by Edit Number.

■Options

On	Auto Detect searches in the frequency range specified by Range n*.
Off	Auto Detect skips the search in the frequency range specified by Range n*.

＊: n:Range number 1 to 8

Auto Detect Range Setting - Start Frequency

■Summary

Specifies the search start frequency for the range selected by Edit Number.

■Setting range

300 kHz to 3 GHz

Note:

The actual search start frequency should be smaller than Start Frequency.

Auto Detect Range Setting - Stop Frequency

■Summary

Specifies the search end frequency for the range selected by Edit Number.

■Setting range

300 kHz to 3 GHz

Note:

The actual search end frequency should be greater than Stop Frequency.

RX Frequency

■Summary

Sets a frequency for output signal.

This is available when Coupled Frequency is set to Off.

■Setting range

100 kHz to 3 GHz

Auto Adjust Range

■Summary

Executes Adjust Range automatically when the signal frequency is detected by Auto Detect.

■Options

On	Automatically sets the Input Level according to the input signal level when the signal frequency is detected by Auto Detect.
Off	Not automatically set the Input Level when the signal frequency is detected by Auto Detect.

■Detecting range

See the range described in Transmitter power measurement of Section 1.3 “Product Specifications”.

Coupled Frequency

■Summary

Sets the function to couple the TX Frequency setting with the RX Frequency setting.

■Options

On	Changes the TX Frequency setting value to the RX Frequency setting value, and enables the TX/RX Frequency setting items that are common settings for TX and RX.
Off	Disables the coupling of the TX Frequency to the RX Frequency.

TX/RX Frequency

■Summary

Sets frequencies for TX and RX at the same time.
This is available when Coupled Frequency is set to On.

■Setting range

Refer to the setting range of RX Frequency.

3.4.2 Setting level

This section describes the level- related settings. Pressing F3 (Amplitude) in the main function menu displays the TX Amplitude function menu. In addition, pressing Amplitude displays the TX Amplitude function menu.

Input Level

■Summary

Sets the level of signal input from the target for transmission measurement.

■Setting range

When Pre Amp is On:
(–80.00 + Offset Value) to (10.00 + Offset Value) dBm
When Pre Amp is Off:
(–60.00 + Offset Value) to (30.00 + Offset Value) dBm

Note:

When **Input Offset** is set to **On**, the setting range is changed to the above range with **Input Offset Value** added.

Adjust Range

■Summary

Automatically sets the Input Level according to the input signal level.
Pressing the menu key for Adjust Range executes the function.

Input PreAmp

■Summary

Enables/disables Pre-Amp. This can be set only when the MS2830A-008 is installed.

■Options

On	Enables Pre-Amp.
Off	Disables Pre-Amp.

Input Offset

■Summary

Turns on/off the Offset function.

■Options

On	Enables the offset function.
Off	Disables the offset function.

Input Offset Value

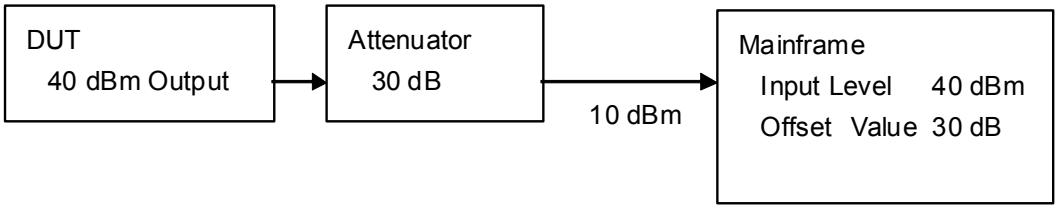
■Summary

This sets the level correction coefficient.

■Setting range

–100.00 to 100.00 dB

■Setting example



Output Level

■Summary

Sets the level of signals output from this instrument.

■Setting range

When output unit is dBm:

–127 dBm to +15 dBm (RX frequency > 25 MHz)

–127 dBm to –3 dBm (RX frequency ≤ 25 MHz)

When output unit is dBμV (EMF):

–13.99 dBμV to +128.01 dBμV (EMF) (RX frequency > 25 MHz)

–13.99 dBμV to +110.01 dBμV (EMF) (RX frequency ≤ 25 MHz)

When output unit is dBμV (Term):

–20.01 dBμV to +121.99 dBμV (RX frequency > 25 MHz)

–20.01 dBμV to +103.99 dBμV (RX frequency ≤ 25 MHz)

Note:

When **Output Offset** is set to **On**, the setting range is changed to the above range with **Output Offset Value** added.

Output Unit

■Summary

Sets the setting unit for Output Level.

■Options

dBμV (EMF)	Sets the setting unit to dBμV (EMF).
dBμV (Term)	Sets the setting unit to dBμV (Term).
dBm	Sets the setting unit to dBm.

Output Offset

■Summary

Turns on/off the Offset function.

■Options

On	Enables the offset function.
Off	Disables the offset function.

Output Offset Value

■Summary

This sets the level correction coefficient.

■Setting range

–100.00 to 100.00 dB

3.4.3 Setting measurement items

This section describes the settings for the measurement items. Pressing F4 (Measure) and then pressing F1 (Modulation Analysis) in the main function menu displays the Modulation Setting function menu.

Modulation

■Summary

Selects the modulation mode for the input signal.

■Options

FM	Select this when measuring FM modulation signal.
Wide FM	Select this when measuring Wide Band FM modulation signal.
AM	Select this when measuring AM modulation signal.
ϕM	Select this when measuring ϕM modulation signal.

RF Power Set Reference

■Summary

Adds the display of relative value results as the RF Power measurement results. The RF Power measurement result at the point when this setting is turned On is assumed to be the reference (0 dB), and the relative values of the subsequent RF Power measurement results are displayed.

Note:

This can be set to On only when AF Level measurement results are displayed.

■Options

On	Displays the relative values of the RF Power measurement results.
Off	Does not display the relative values of the RF Power measurement results.

DCS Analysis

■Summary

Demodulates DCS (Digital Code Squelch) signal and displays the DCS Code. This setting is enabled when Modulation is set to FM.

■Options

Off	Disables DCS Code analysis.
Normal	Enables DCS Code analysis and displays the analysis result.
Inverted	Enables DCS Code analysis and displays the analysis result as invert signal.

Limit Level

■Summary

Sets the lower limit of RF Power to display the AF Measurement result. If the RF Power signal is lower than the value set with Limit Level, the AF Measurement result is not displayed.

■Setting range

When Pre-Amp is Off:
(–60.0 + Input Offset Value) to (30.0 + Input Offset Value) dB
When Pre-Amp is On:
(–80.0 + Input Offset Value) to (10.0 + Input Offset Value) dB

AF Level Set Reference

■Summary

Adds the display of relative value results as the AF Power measurement results. Using the AF Power measurement result as a 0 dB reference (when this function is set to On), this displays the relative value results of subsequent AF Power measurements.

Note:

This can be set to On only when AF Level measurement results are displayed.

■Options

On	Displays the AF Level measurement results in relative value.
Off	Hides the AF Level measurement results in relative value.

RF Frequency Correction

■Summary

Selects whether to output carrier frequency deviation as DC offset for AF demodulation when measuring FM or Wide FM. Enabled when **Modulation** is set to **FM** or **Wide FM**.

■Options

On	Carrier frequency deviation is not output as DC offset for AF demodulation.
Off	Carrier frequency deviation is output as DC offset for AF demodulation.

3.4.3.1 Setting AF Frequency Reference

This section describes the settings for AF Frequency Reference. Press F7 (AF Frequency Reference Setting) on the Modulation Setting Function menu to display the AF Frequency Reference Function menu.

AF Frequency Reference

■Summary

Sets whether to refer to the reference frequency. When set to On, AF Frequency displayed in AF Measure Result (TX-AF) changes to AF Freq. Error (value relative to the reference).

■Options

On	Refers to the reference frequency.
Off	Does not refer to the reference frequency.

AF Reference Frequency

■Summary

Sets the reference frequency.
Enabled when **AF Frequency Reference** is set to **On**.

■Setting range

20 Hz to 60 kHz

AF Frequency Reference Unit

■Summary

Sets the unit for AF Freq. Error (value relative to the reference) displayed in AF Measure Result (TX-AF).

■Options

ppm	Displays a value relative to reference frequency in ppm.
%	Displays a value relative to reference frequency in %.
delta	Displays a value relative to reference frequency in delta (Hz).

AF Level

■Summary

Sets the display type of AF Level.

■Options

Tone	Displays the peak frequency level (rms).
Total	Displays the total band level (rms).

3.4.3.2 Setting Meter

This section describes the meter settings for Distortion (distortion factor), SINAD (Signal-to-Noise and Distortion Ratio), THD (Total Harmonic Distortion), and Deviation. Press F8 (Meter Settings) on the Modulation Setting Function menu to display the Meter Settings Function menu. Select one of Distortion, SINAD, THD, and Deviation and perform settings for distortion factor measurement.
The Deviation meter is enabled when **Modulation** is set to **FM** or **Wide FM**.

(1) Setting meter display for Distortion, SINAD, and THD

Reference

■Summary

Sets the reference for meter. Enabled when **Meter** is set to **On**.

■Options

Minimum	Displays the meter with the minimum value as reference.
Center	Displays the meter with the center value as reference.
Maximum	Displays the meter with the maximum value as reference.

Reference Value

■Summary

Sets the reference value for meter. Enabled when **Meter** is set to **On**.

■Setting range

When the unit is dB:
–100.0 to 100.0 dB
When the unit is %:
0.00 to 10000.00%

Range1

■Summary

Sets Range1 for meter. Enabled when **Meter** is set to **On**.

■Setting range

When the unit is dB:
0.0 to 100.0 dB
When the unit is %:
0.0 to 10000.00%

Range2

■Summary

Sets Range2 for meter. Enabled when **Meter** is set to **On**.

■Setting range

When the unit is dB:

0.0 to 100.0 dB

When the unit is %:

0.0 to 10000.00%

Deflection View

■Summary

Selects whether to display the deflection view on the meter. Enabled when **Meter** is set to **On**.

■Options

On	Displays the deflection view on the meter.
Off	Hides the deflection view on the meter.

Deflection Count

■Summary

Sets the measurement count for setting deflection view on the meter. Enabled when **Deflection View** is **On** and **Meter** is **On**.

■Setting range

2 to 100

Deflection Judge

■Summary

Selects whether to make a pass/fail judgment on the measurement results by deflection view on the meter. Enabled when **Deflection View** is **On** and **Meter** is **On**.

■Options

On	Makes a pass/fail judgment on the measurement results by deflection view.
Off	Does not make a pass/fail judgment on the measurement results by deflection view.

Pass Range

■Summary

Sets a pass range for deflection view on the meter. Enabled when **Deflection View** is **On** and **Meter** is **On**.

■Setting range

When the unit is dB:

0.0 to 100.0 dB

When the unit is %:

0.0 to 10000.0%

Meter

■Summary

Displays/hides the meter display.

■Options

On	Displays the meter.
Off	Hides the meter.

Unit

■Summary

Sets the unit for meter.

■Options

dB	Displays the meter in dB.
%	Displays the meter in %.

(2) Setting meter display for Deviation

Reference

■Summary

Sets the reference for meter. Enabled when **Meter** is set to **On**.

■Options

Minimum	Displays meter with the minimum value as reference.
Center	Displays meter with the center value as reference.
Maximum	Displays meter with the maximum value as reference.

Reference Value

■Summary

Sets the reference value for meter. Enabled when **Meter** is set to **On**.

■Setting range

When the unit is Hz:

0.0 to 1000000.0 Hz

When the unit is %:

0.00 to 10000.00%

Range1

■Summary

Sets Range1 for meter. Enabled when **Meter** is set to **On**.

■Setting range

When the unit is Hz:

0.0 to 1000.0000 kHz

When the unit is %:

0.0 to 10000.0%

Range2

■Summary

Sets Range2 for meter.

■Setting range

When the unit is Hz:

0.0 to 1000.0000 kHz

When the unit is %:

0.0 to 10000.0%

Deflection View

■Summary

Displays/hides the deflection view on the meter. Enabled when **Meter** is set to **On**.

■Options

On	Displays the deflection view on the meter.
Off	Hides the deflection view on the meter.

Deflection Count

■Summary

Sets the measurement count for setting deflection view on the meter. This setting is enabled when **Deflection View** is **On**.

■Setting range

2 to 100

Deflection Judge

■Summary

Selects whether to make a pass/fail judgment on the measurement results by deflection view on the meter. Enabled when **Deflection View** is **On** and **Meter** is **On**.

■Options

On	Makes a pass/fail judgment on the measurement results by deflection view.
Off	Does not make a pass/fail judgment on the measurement results by deflection view.

Pass Range

■Summary

Sets a pass range for the deflection view on the meter. Enabled when **Deflection View** is **On** and **Meter** is **On**.

■Setting range

When the unit is Hz:

0.0 to 1000.0000 kHz

When the unit is %:

0.0 to 10000.0%

Deviation Reference

■Summary

Sets the reference frequency when the meter is displayed in %. Enabled when **Unit** on the meter is set to **%** and **Meter** is set to **On**.

■Setting range

10 Hz to 1000.000 kHz

Meter

■Summary

Displays/hides the meter.

■Options

On	Displays the meter.
Off	Hides the meter.

Unit

■Summary

Sets the reference for meter.

■Options

Hz	Displays the meter in Hz.
%	Displays the meter in %.

Deviation Type

■Summary

Sets Deviation type displayed on the Deviation meter.

■Options

RMS	Displays the Deviation RMS result
Peak+	Displays the Deviation Peak+ result
Peak–	Displays the Deviation Peak– result
(Pk-Pk)/2	Displays the Deviation (Pk-Pk)/2 result

3.4.3.3 Setting for trace

Refer to 3.4.8 “Setting AF Measure Result (TX-AF) graph”.

3.4.3.4 Settings for distortion factor measurement

This section describes the settings for Distortion, SINAD, and THD. Press F8 (Distortion Measurement Setting) on Page 2 of the Modulation Setting Function menu to display the Distortion Settings Function menu. Select Distortion or SINAD or THD and perform settings for distortion factor measurement.

Signal Frequency

■Summary

Sets frequency mode for distortion factor measurement.

■Options

Peak	Measures distortion factor at the peak frequency.
Manual	Sets the frequency to measure the distortion factor manually.
Generator	Measures the distortion factor as signal frequency set for Tone1 Freq of the Audio Generator.

Manual Frequency

■Summary

Sets the frequency for the distortion factor measurement manually. When **Signal Frequency** is **Manual**, the distortion factor is calculated using this value.

■Setting range

10 to 60000 Hz

Note:

An error occurs when Manual Frequency, Start Frequency, and Stop Frequency fail to meet the following condition.
Start Frequency ≤ Manual Frequency ≤ Stop Frequency

Start Frequency

■Summary

Sets Start Frequency for distortion factor measurement.

■Setting range

10 Hz to Manual Frequency set value for distortion factor measurement

Stop Frequency

■Summary

Sets Stop Frequency for distortion factor measurement.

■Setting range

Manual Frequency set value for distortion factor measurement to 60000 Hz

Unit

■Summary

Sets the unit for the distortion factor measurement results.

■Options

dB	Displays the distortion factor measurement results in dB.
%	Displays the distortion factor measurement results in %.

3.4.4 Setting filter

This section describes the settings for the filter. Pressing F5 (Filter Setting) in the main function menu displays the Filter Setting function menu.

HPF

■Summary

Executes the band filtering with High Pass Filter for the AF signal demodulated according to the modulation method for the transmission measurement.

■Options

Off	Does not use High Pass Filter.
50 Hz	Uses High Pass Filter with a pass band of 50 Hz.
300 Hz	Uses High Pass Filter with a pass band of 300 Hz.
400 Hz	Uses High Pass Filter with a pass band of 400 Hz.
30 kHz	Uses High Pass Filter with a pass band of 30 kHz.

LPF

■Summary

Executes the band filtering with Low Pass Filter for the AF signal demodulated according to the modulation method for the transmission measurement.

■Options

Off	Does not use Low Pass Filter.
300 Hz	Uses Low Pass Filter with a pass band of 300 Hz.
3 kHz	Uses Low Pass Filter with a pass band of 3 kHz.
15 kHz	Uses Low Pass Filter with a pass band of 15 kHz.
20 kHz	Uses Low Pass Filter with a pass band of 20 kHz.

1st-Filter De-Emphasis

■Summary

Executes De-Emphasis for the demodulated AF signal on FM modulation measurement of the transmission measurement.

■Options

Off	Does not use De-Emphasis Filter.
750 us	Uses De-Emphasis Filter of 750 µs.
500 us	Uses De-Emphasis Filter of 500 µs
75 us	Uses De-Emphasis Filter of 75 µs
50 us	Uses De-Emphasis Filter of 50 µs
25 us	Uses De-Emphasis Filter of 25 µs

2nd-Filter

■Summary

Applies Band Pass Filter for the AF signal demodulated according to the modulation method for the transmission measurement.

■Options

Off	Does not use Band Pass Filter.
ITU-T P.53 (CCITT)	Uses Band Pass Filter defined in ITU-T P.53/O.41.
C-Message	Uses Band Pass Filter defined in C-Message.
CCIR-468	Uses the weighting defined in CCIR-468.
CCIR-ARM	Uses the weighting defined in CCIR-ARM.
A-Weighting	Uses A-weighting defined in IEC 61672.

3.4.5 Setting demodulation monitor

3.4.5.1 When USB audio device is connected

This section describes the settings for the demodulation monitor. Pressing F7 (Monitor Out) in the main function menu starts outputting the demodulated AF signal.
When MS2830A-018/118 Audio Analyzer is not installed, "running monitor…" is displayed on the screen while the demodulation monitor is running, and operations other than Mode, Monitor Out, and Monitor Volume are disabled.

When MS2830A-018/118 Audio Analyzer is installed, "running monitor…" is displayed on the screen while the demodulation monitor is running, and the operations of only Mode, Monitor Out, Monitor Volume, Audio Generator Setting, PTT, and Audio Func. Setting are enabled until the demodulation monitor is stopped.

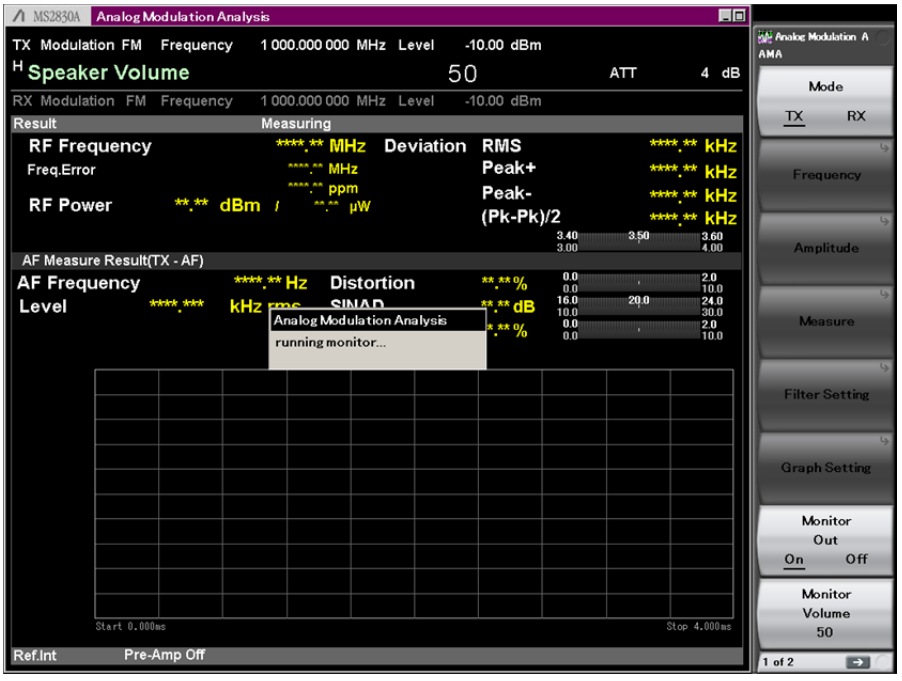


Figure 3.4.5.1-1 Screen When Demodulation Monitor is Running

Monitor Out

■Summary

Outputs the demodulated AF signal. Enabled when **Speaker/Headphone Out** is set to **Off**.

■Options

Off	Stops the demodulation monitor.
On	Starts the demodulation monitor.

Monitor Volume

■Summary

Sets the AF signal output level.
The value can be changed by the rotary knob.
When changed by the rotary knob, the Monitor Volume value is displayed at the upper part of the window as Figure 3.4.5.1-2.

Figure 3.4.5.1-2 Monitor Volume Change

Note:

The value can be changed by the rotary knob when a parameter is not selected by the Audio Generator window or the RF Signal Generator window.

■Setting range

0 to 100

3.4.5.2 When Audio Analyzer Option is installed

When the MS2830A-018/118 Audio Analyzer is installed, the MX269018A has a built-in speaker. When selecting FM modulation in TX measurement mode, the demodulated FM signals can be output from the speaker for sweeping. Additionally, the speaker output can be monitored by connecting a headphone, etc. to the headphone output connector.

Performs settings for the speaker or headphone. When setting F5 (Speaker/Headphone Out) to **On** on Page 2 of the main function menu, demodulated FM signals will be output.

Speaker/Headphone Out

■Summary

Outputs the demodulated FM signals.

■Options

Off	Stops the demodulation monitor.
On	Starts the demodulation monitor.

Monitor Volume

Refer to Monitor Volume in 3.4.5.1 “When USB audio device is connected”.

3.4.6 Setting averaging

This section describes the settings for the measurement results averaging. Pressing F1 (Average) on Page 2 of the main function menu displays the Average function menu.

Average

■Summary

Sets the storage mode.

■Options

Off	Updates the data for every measurement.
Average	Displays the average value for every measurement.

Count

■Summary

Sets the measurement count.

■Setting range

2 to 9999

3.4.7 Setting marker

This section describes the settings for the marker-related. Pressing F2 (Marker) on Page 2 of the main function menu or Marker displays the Marker function menu.

Normal

■Summary

Enables the marker. The marker is displayed on the graph result in the AF Measurement Result window. The time, frequency, and level value of the marker position are displayed.

Delta

■Summary

Enables the delta marker. Marker1 and Marker2 are displayed in the graph of the measurement results in the AF Measurement Result window.

Off

■Summary

Disables the marker. The marker is not displayed on the graph result in the AF Measurement Result window.

Graph

■Summary

Selects the graph to display the marker on. This setting is enabled when **Time Domain** and **Frequency Domain** are both **On**.

■Options

Time	Displays the marker in the Time Domain graph.
Freq	Displays the marker in the Frequency Domain graph.

Marker1

■Summary

Sets the time/frequency of Marker1. The Y-axis value and the specified value of time/frequency are displayed in the graph. This setting is enabled when **Delta** is selected.

■Setting range

The setting range follows the X-axis graph display range.

Marker2

■Summary

Sets the time/frequency of Marker2. The Y-axis value and the specified value of time/frequency are displayed in the graph. This setting is enabled when Delta is selected.

■Setting range

The setting range follows the X-axis graph display range.

Peak Search

■Summary

Detects the peak level of Y-axis in the Frequency Domain graph, and moves the marker to the peak position. This setting is enabled when **Graph Select** is set to **Frequency** and **Frequency Domain** is set to **On**.

Next Peak Search

■Summary

Moves the marker from the current value to the next peak in the TX measurement Frequency Domain graph. This setting is enabled when **Graph Select** is set to **Frequency** and **Frequency Domain** is set to **On**.

Note:

When Frequency Domain is On, the marker resolution depends on the Time Range value. For details, refer to *the MX269018A Analog Measurement Software Operation Manual (Remote Control)*.

3.4.8 Setting AF Measure Result (TX-AF) graph

This section describes the graph settings in the AF Measurement Result (TX-AF) window.

Pressing F6 (Graph Setting) on the main function menu, F1 (Trace) on Page 2 of the Modulation Analysis function menu, or Trace displays the Trace function menu.

Graph Select

■Summary

Sets the graph type in the AF Measurement Result (TX-AF) window.

■Options

Time Domain Sets the Time Domain graph to On/Off.

Frequency Domain Sets the Frequency Domain graph to On/Off.

3.4.8.1 Setting Time Domain graph

This section describes the setting for the Time Domain graph. Press F2 (Time Domain Setting) on the Trace Function menu to display the Time Domain Setting Function menu. The setting is enabled when Time Domain is set to On.

Time Range

■Summary

Sets the horizontal scale (X-axis) in the Time Domain graph.

■Setting range

1 to 200 ms

The following vertical scale (Y-axis) can be set only when TX Modulation is set to FM.

Scale Mode

■Summary

Sets Auto scale/Fixed scale of the vertical scale (Y-axis) in the Time Domain graph.

■Options

Auto Sets the vertical scale to Auto scale.

Fixed Sets the vertical scale to Fixed scale.

Minimum Range

■Summary

Sets the minimum range of the vertical scale (Y-axis) in the Time Domain graph. This setting is enabled when **Scale Mode** is set to **Auto**.

■Options

±500 kHz	Sets the minimum range of the vertical scale to ±500 kHz.
±100 kHz	Sets the minimum range of the vertical scale to ±100 kHz.
±50 kHz	Sets the minimum range of the vertical scale to ±50 kHz.
±10 kHz	Sets the minimum range of the vertical scale to ±10 kHz.
±5 kHz	Sets the minimum range of the vertical scale to ±5 kHz.
±500 Hz	Sets the minimum range of the vertical scale to ±500 Hz.

Fixed Range

■Summary

Sets the range of the vertical scale (Y-axis) in the Time Domain graph. This setting is enabled when **Scale Mode** is set to **Fixed**.

■Options

±1 MHz	Sets the range of the vertical scale to ±1 MHz.
±500 kHz	Sets the range of the vertical scale to ±500 kHz.
±250 kHz	Sets the range of the vertical scale to ±250 kHz.
±100 kHz	Sets the range of the vertical scale to ±100 kHz.
±50 kHz	Sets the range of the vertical scale to ±50 kHz
±25 kHz	Sets the range of the vertical scale to ±25 kHz
±10 kHz	Sets the range of the vertical scale to ±10 kHz
±5 kHz	Sets the range of the vertical scale to ±5 kHz
±2.5 kHz	Sets the range of the vertical scale to ±2.5 kHz
±1 kHz	Sets the range of the vertical scale to ±1 kHz
±500 Hz	Sets the range of the vertical scale to ±500 Hz

3.4.8.2 Setting Frequency Domain graph

This section describes the settings for the Frequency Domain graph. Press F3 (Frequency Domain Setting) on the Trace Function menu to display the Frequency Domain Setting Function menu. The setting is enabled when **Frequency Domain** is set to **On**.

Window Function

■Summary

Sets a window function for the Frequency Domain graph.

■Options

Rectangular	Uses Rectangular window.
Hann	Uses Hann window.
Blackman-Harris	Uses Blackman-Harris window.
Hamming	Uses Hamming window.
Flat Top	Uses Flat Top window.

X-AXIS

■Summary

Sets the horizontal scale (X-axis) on the Frequency Domain graph.

■Options

Linear	Display the horizontal scale in linear.
Log	Display the horizontal scale in log.

Start Freq

■Summary

Sets the minimum frequency for X-axis on the Frequency Domain graph.

■Setting range (X-AXIS is Linear)

10 to 49950 Hz

■Options (X-AXIS is Log)

10 Hz	Sets the minimum value of the X-axis scale to 10 Hz.
20 Hz	Sets the minimum value of the X-axis scale to 20 Hz.
30 Hz	Sets the minimum value of the X-axis scale to 30 Hz.
50 Hz	Sets the minimum value of the X-axis scale to 50 Hz.
100 Hz	Sets the minimum value of the X-axis scale to 100 Hz.
200 Hz	Sets the minimum value of the X-axis scale to 200 Hz.
300 Hz	Sets the minimum value of the X-axis scale to 300 Hz.
500 Hz	Sets the minimum value of the X-axis scale to 500 Hz.
1 kHz	Sets the minimum value of the X-axis scale to 1 kHz.

2 kHz	Sets the minimum value of the X-axis scale to 2 k Hz.
3 kHz	Sets the minimum value of the X-axis scale to 3 kHz.
5 kHz	Sets the minimum value of the X-axis scale to 5 kHz.
10 kHz	Sets the minimum value of the X-axis scale to 10 kHz.
20 kHz	Sets the minimum value of the X-axis scale to 20 kHz.
30 kHz	Sets the minimum value of the X-axis scale to 30 kHz.

Stop Freq

■Summary

Sets the maximum frequency for X-axis on the Frequency Domain graph.

■Setting range (X-AXIS is Linear)

60 to 50000 Hz

■Options (X-AXIS is Log)

20 Hz	Sets the maximum value of the X-axis scale to 20 Hz.
30 Hz	Sets the maximum value of the X-axis scale to 30 Hz.
50 Hz	Sets the maximum value of the X-axis scale to 50 Hz.
100 Hz	Sets the maximum value of the X-axis scale to 100 Hz.
200 Hz	Sets the maximum value of the X-axis scale to 200 Hz.
300 Hz	Sets the maximum value of the X-axis scale to 300 Hz.
500 Hz	Sets the maximum value of the X-axis scale to 500 Hz.
1 kHz	Sets the maximum value of the X-axis scale to 1 kHz.
2 kHz	Sets the maximum value of the X-axis scale to 2 kHz.
3 kHz	Sets the maximum value of the X-axis scale to 3 kHz.
5 kHz	Sets the maximum value of the X-axis scale to 5 kHz.

10 kHz	Sets the maximum value of the X-axis scale to 10 kHz.
20 kHz	Sets the maximum value of the X-axis scale to 20 kHz.
30 kHz	Sets the maximum value of the X-axis scale to 30 kHz.
50 kHz	Sets the maximum value of the X-axis scale to 50 kHz.

Top Level

■Summary

Sets the maximum value of the Y-axis on the Frequency Domain graph.

■Setting range

For FM modulation:
(Setting value of Bottom Level × 1.4125375) to 1000 kHz
For AM modulation:
(Setting value of Bottom Level × 1.4125375) to 1000%
For ϕM modulation:
(Setting value of Bottom Level × 1.4125375) to 1000 rad

Note:

The setting range of Top Level should meet the following conditions.

- Top Level ≥ Bottom Level × 1.4125375
- Top Level − Bottom Level ≥ 3 dB

Bottom Level

■Summary

Sets the bottom level of the Y-axis on the Frequency Domain graph.

■Setting range

For FM modulation:
0.0001 to (setting value of Top Level/1.4125375) Hz
For AM modulation:
0.0001 to (setting value of Top Level/1.4125375) %
For ϕM modulation:
0.0001 to (setting value of Top Level/1.4125375) rad

Note:

The setting range of Bottom Level should meet the following conditions.

- Bottom Level ≤ Top Level/1.41253755
- Top Level − Bottom Level ≥ 3 dB

3.4.9 Display result

The Result window displays analysis result of RF signal.

Figure 3.2.1.1-1 TX Mode Screen

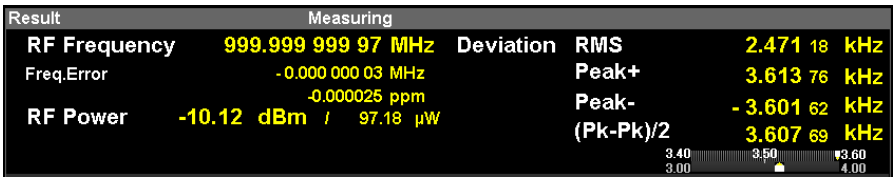


Figure 3.4.9-1 Result Window (For FM Modulation)

RF Frequency

■Summary

Displays the difference [MHz and ppm] of the carrier frequency of measured signal [MHz] and the frequency setting value of TX Frequency. [MHz]

RF Power

■Summary

Displays the power result of measured signal in dBm and W units.

Deviation

■Summary

Displayed when Modulation is set to FM or Wide FM.

Displays the +Peak, –Peak, (+Peak to –Peak)/2, and RMS result of frequency deviation of measured signal in Hz unit.

Displays the Average and Max. Hold results when Average is set to ON.

Meter Display

■Summary

Displays the result of the measurement signal frequency deviation on the meter.

Displayed when Modulation is set to FM or Wide FM.

3.4.3.2 “Setting Meter”

Radian

■Summary

Displayed when Modulation is set to ϕM.

Displays the +Peak, –Peak, (+Peak to –Peak)/2, and RMS result of phase transition of measured signal in radian unit.

Displays the Average and Max. Hold results when Average is set to ON.

Depth

■Summary

Displayed when Modulation is set to AM.
Displays the +Peak, –Peak, (+Peak to –Peak)/2, and RMS result of modulation index of measured signal in % unit.
Displays the Average and Max. Hold results when Average is set to ON.

DCS Code (Normal / Inverted)

■Summary

Displays the DCS code analysis result for measured signal with three-digit octal notation.
Displayed when DCS Analysis is set to Normal or Inverted.
The first code of the displayed result is displayed when the code that corresponds to the 83 Standard Code defined in TIA-603-C is detected. If no code is detected, the result display will be ***.
The subsequent codes in parentheses that correspond to codes other than the 83 Standard Code are displayed.

3.4.10 Displaying AF Measure Result (TX-AF)

The AF Measure Result (TX-AF) window displays the analysis result of modulation signal.

Figure 3.2.1.1-1 TX Mode Screen

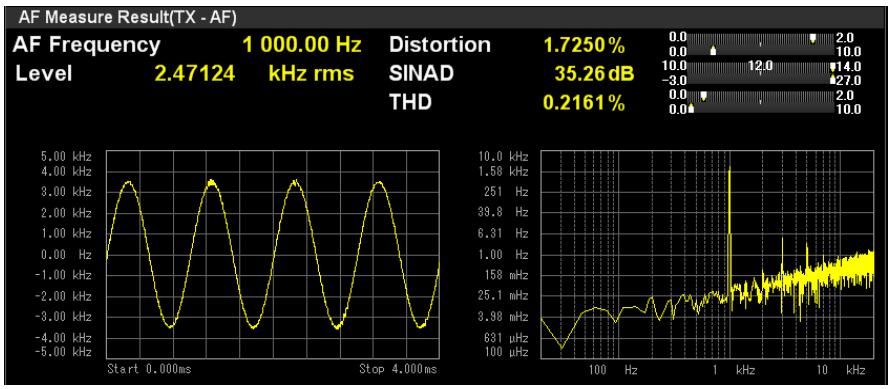


Figure 3.4.10-1 AF Measure Result (TX-AF) Window

AF Frequency

■Summary

Displays the maximum level frequency from the frequency spectrum of demodulated signal in Hz unit.
Displayed when AF Frequency Reference is Off.

AF Freq. Error

■Summary

Displays the maximum level frequency from the frequency spectrum of demodulated signals in relative value to the reference. Displayed when AF Frequency Reference is On.

3.4.3.1 “Setting AF Frequency Reference”

Level

■Summary

Displays the level of the Frequency above. The unit of measurement result depends on the modulation method. kHz rms, radian rms, and % rms are used for FM modulation, ϕM modulation, and AM modulation respectively.

Distortion

■Summary

Displays the Distortion measurement results.

3.4.3.4 “Settings for distortion factor measurement”

SINAD

■Summary

Displays the SINAD measurement results.

3.4.3.4 “Settings for distortion factor measurement”

THD

■Summary

Displays the THD measurement results.

3.4.3.4 “Settings for distortion factor measurement”

Meter Display

■Summary

Displays the Distortion, SINAD, and THD measurement results.

3.4.3.2 “Setting Meter”

Graph result

■Summary

Displays the Time Domain graph and Frequency Domain graph.

3.4.8 “Setting AF Measure Result (TX-AF) graph”
3.4.7 “Setting marker”

3.5 Audio Generator Function

When the MS2830A-018/118 Audio Analyzer is installed, the MS2830A can output AF signals in TX measurement mode (Audio Generator function).

3.5.1 Setting Audio Generator

Press F7 (Audio Generator Setting) in the main function menu to display the Audio Generator Setting function menu.

Waveform

■Summary

Sets AF signal mode to output.

■Options

Tones	Outputs Tone signal.
Tone+DCS	Outputs Tone signal + DCS signal.
Noise	Outputs Tone signal or Noise signal (pseudo voice).
DTMF	Outputs DTMF (Dual Tone Multiple Frequency) signal.
All Off	Does not output AF signal.

Output Tone1

■Summary

Sets Tone1 to On/Off.

■Options

On	Sets Tone1 to On.
Off	Sets Tone1 to Off.

Tone1 Freq

■Summary

Sets the Tone1 frequency.

■Setting range

10.0 to 50000.0 Hz

Tone1 Level

■Summary

Sets the Tone1 level.

■Setting range

When **Output Type** is **Bal.**:
0.001 to 12.400 Vrms
When **Output Type** is **Unbal.**:
0.001 to 6.200 Vrms

Output Tone2

■Summary

Sets the Tone2 to On/Off.
This setting is enabled when **Waveform is** set to **Tones**.

■Options

On	Sets Tone2 to On.
Off	Sets Tone2 to Off.

Tone2 Freq

■Summary

Sets the Tone2 frequency.
This setting is enabled when **Waveform** is set to **Tones**.

■Setting range

10.0 to 50000.0 Hz

Tone2 Level

■Summary

Sets the Tone2 level.
This setting is enabled when **Waveform** is set to **Tones**.

■Setting range

When **Output Type** is **Bal.**:
0.001 to 12.400 Vrms
When **Output Type** is **Unbal.**:
0.001 to 6.200 Vrms

Output Tone3

■Summary

Sets the Tone3 to On/Off.
This setting is enabled when **Waveform** is set to **Tones**.

■Options

On	Sets Tone3 to On.
Off	Sets Tone3 to Off.

Tone3 Freq

■Summary

Sets the frequency of Tone3.
This setting is enabled when **Waveform** is set to **Tones**.

■Setting range

10.0 to 50000.0 Hz

Tone3 Level

■Summary

Sets the Tone3 level.
This setting is enabled when **Waveform** is set to **Tones**.

■Setting range

When **Output Type** is **Bal.**:
0.001 to 12.400 Vrms
When **Output Type** is **Unbal.**:
0.001 to 6.200 Vrms

DCS

■Summary

Sets DCS signal output to On/Off.
This setting is enabled when **Waveform** is set to **Tones+DCS**.

■Options

On	Sets DCS signal output to On.
Off	Sets DCS signal output to Off.

DCS Code

■Summary

Sets the DCS code.
This setting is enabled when **Waveform** is set to **Tones+DCS**.

■Setting range

0 to 777 (Set an octal number of 3 digits.)

DCS Level

■Summary

Sets the DCS signal output level.
This setting is enabled when **Waveform** is set to **Tones+DCS**.

■Setting range

When **Output Type** is **Bal.**:
0.001 to 7.000 Vp
When **Output Type** is **Unbal.**:
0.001 to 3.500 Vp

DCS Polarity

■Summary

Sets the polarity of DCS signal output.
This setting is enabled when **Waveform** is set to **Tones+DCS**.

■Options

Normal	Outputs DCS signals without inverting polarity.
Inverted	Outputs DCS signal inverting polarity.

Output Noise

■Summary

Sets Noise signal output to On/Off.
This setting is enabled when **Waveform** is set to **Noise**.

■Options

On	Sets Noise signal output to On.
Off	Sets Noise signal output to Off.

Type

■Summary

Sets the Noise signal type.
This setting is enabled when **Waveform** is set to **Noise**.

■Options

1k	Outputs 1k Tone signal.
1.25k	Outputs 1.25k Tone signal.
Noise	Outputs pseudo voice signal.

Level

■Summary

Sets the Noise signal output level.
This setting is enabled when Waveform is set to Noise.

Note:

When **Type** is set to **Noise**, the level is set referencing the value in the state that **G.227 Filter** is **On**. When **G.227 Filter** is **Off**, the pseudo voice filter is bypassed (G.227) and the actual output level is different from the level set for this parameter.

■Setting range

When Output Type is Bal.:
0.001 to 12.400 Vrms
When Output Type is Unbal.:
0.001 to 6.200 Vrms

Level Offset

■Summary

Sets the level adjustment coefficient of the Noise signal output.
This setting is enabled when **Waveform** is set to **Noise**.

■Setting range

–20.0 to 20.0 dB

Offset

■Summary

Enables/disables the offset function of the Noise signal output.
The setting is available when **Waveform** is set to **Noise**.

■Options

On	Enables the offset function of Noise signal output.
Off	Disables the offset function of Noise signal output.

G.227 Filter

■Summary

Enables/disables the pseudo voice filter (G.227).
This setting is enabled when **Waveform** is set to **Noise**.

■Options

On	Enables the pseudo voice filter (G.227).
Off	Disables the pseudo voice filter (G.227).

Code

■Summary

Sets the DTMF signal code.
This setting is enabled when **Waveform** is set to **DTMF**.

■Setting range

0 to 9, A to D, *, #
(Selects one from the above.)

Level

■Summary

Sets the DTMF signal output level.
This setting is enabled when **Waveform** is set to **DTMF**.

■Setting range

When **Output Type** is **Bal.**:
0.001 to 3.000 Vp
When **Output Type** is **Unbal.**:
0.001 to 1.500 Vp

Length

■Summary

Sets the DTMF signal length.

This setting is enabled when **Waveform** is set to **DTMF**.

■Setting range

1 to 2000 ms

Send Once

■Summary

Outputs the DTMF signal once.

This setting is enabled when **Waveform** is set to **DTMF**.

Output Type

■Summary

Selects balanced/unbalanced output of AF signals.

■Options

Bal.	Balanced output.
Unbal	Unbalanced output.

Output Impedance

■Summary

Sets the impedance of AF signal output.

■Options

When **Output Type** is **Bal.**:

100 Ω	Sets impedance to 100 Ω.
600 Ω	Sets impedance to 600 Ω.

When **Output Type** is **Unbal.**:

50 Ω	Sets impedance to 50 Ω.
600 Ω	Sets impedance to 600 Ω.

Output Impedance Reference

■Summary

Sets the impedance reference used for converting power to dBm. When the output level is set in power, specify the impedance value of the DUT to connect to the Audio Generator. The output level of the Audio Generator can be set in either voltage or power. The voltage value and power value are converted to each other by the following calculation formula.

$$\mathrm{dBm} = 10 \times log_{10}\left(1000 \times Rr \times \left(\frac{V_{rms}}{Rs + Rr}\right)^2\right)$$

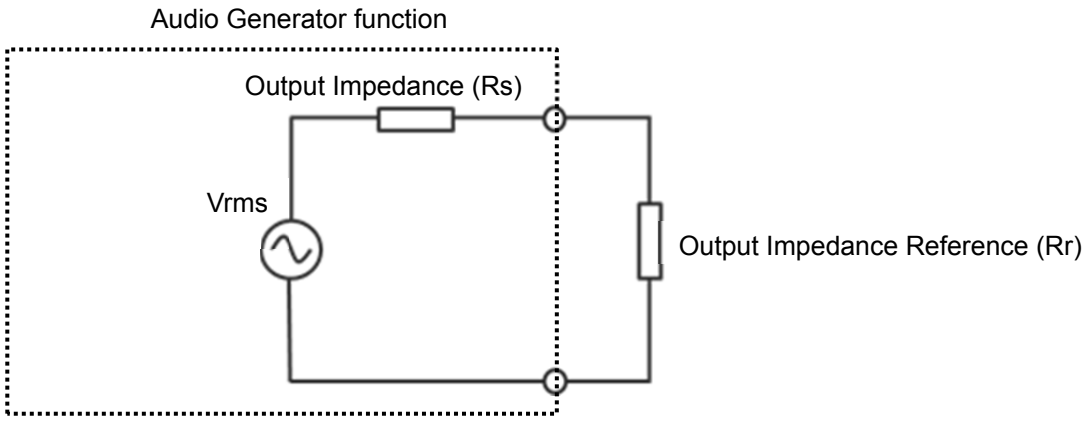


Table 3.5.1-1 Relationship between Output Impedance and Output Impedance Reference

■Setting range

0.01 to 1 000 000 000.00 Ω

AF Output Unit

■Summary

Sets the AF signal output unit.

■Options

mV	Sets the unit to mV.
V	Sets the unit to V.
dBm	Sets the unit to dBm.

The below table shows the waveform signal units corresponding to the AF output units.

Table 3.5.1-1 Waveform Signal Unit Corresponding to AF Output Unit

AF Output Unit	Waveform			
	Tones	Tone+DCS	Noise	DTMF
mV	mVrms	mVp	mVrms	mVp
V	Vrms	Vp	Vrms	Vp
dBm	dBm	mVp	dBm	mVp

Note:

Relationship between AF Output Unit and Output Level Display

dBm: Display Termination Power

mV, V: Display Open Circuit Voltage

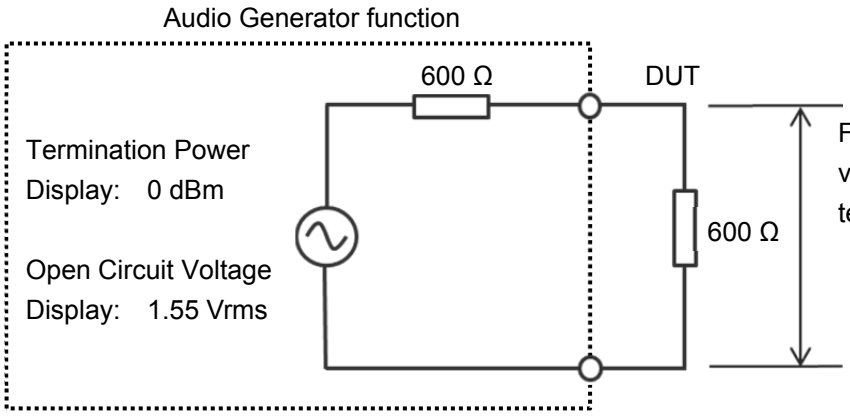


Figure 3.5.1-2 Relationship between Termination Power and Open Circuit Voltage (Output Impedance: At Unbalanced 600 Ω)

3.5.2 Setting PTT

This section describes the PTT (Push to Talk) setting. Press F8 (PTT) in the main function menu to enable/disable PTT.
When PTT is On, press Cancel twice to turn it Off. Additionally, when the measurement mode is changed from RX mode to TX mode, PTT is automatically set to Off.

PTT

■Summary

Enables/disables the PTT.

■Options

On	Enables PTT.
Off	Disables PTT.

3.5.3 Audio Generator Window

The Audio Generator window displays AF signal output setting.

Figure 3.2.1.2-1 TX Mode + Audio Generator Screen

In the Audio Generator window, the display can be changed and the parameters can be set by using the rotary knob, Cursor key, Enter key, and Cancel key.

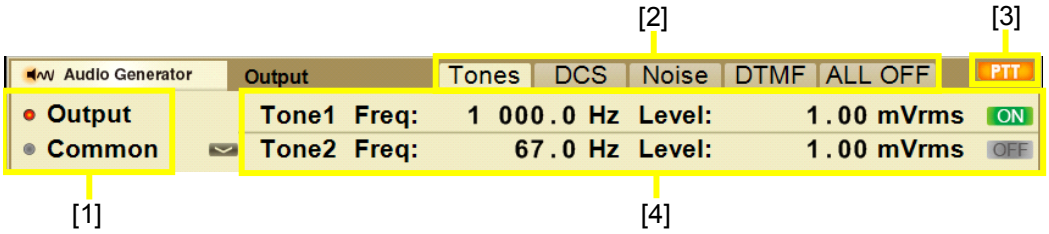


Figure 3.5.3-1 Audio Generator Window (No parameter is selected)

[1] Selecting Output/Common

Selects Output or Common by using ^ and v. Then the parameters displayed in [4] are changed.

Output	Displays the selected waveform parameter.
Common	Displays the AF signal type and impedance.

[2] Selecting waveform

Selects waveform by using < and >. The selected AF signal mode is highlighted and the parameters are displayed in [4].

Note:

The operation [1] and [2] are available when no parameter is selected (See Figure 3.5.3-1). Press Cancel to deselect the selected parameter.

[3] Displaying PTT state

Displays whether PTT is On or Off. It is highlighted in orange when PTT is On, and it is in grey when PTT is Off.

3.5.2 "Setting PTT"

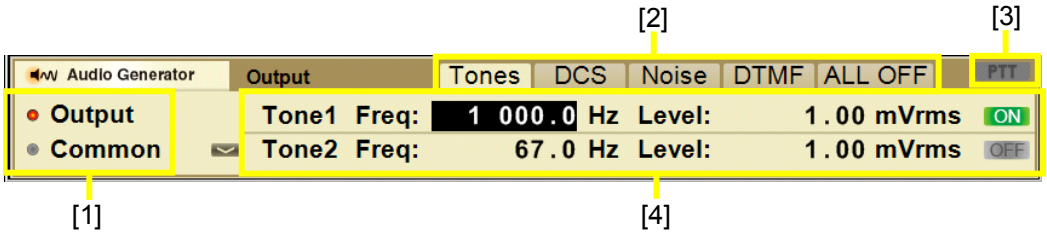


Figure 3.5.3-2 Audio Generator Window (a parameter is selected)

[4] Parameter setting

Press Enter to select a parameter in the Audio Generator window (See Figure 3.5.3-2).

The parameters can be selected by using < and >.

The parameter values can be changed by using the rotary knob or ∧ and ∨.

3.5.1 "Setting Audio Generator"

Press Cancel to deselect the selected parameter.

3.6 Simultaneous Use With Other Applications

When the MS2830A-018/118 Audio Analyzer is installed, the Audio Generator function and other applications (Spectrum Analyzer, Signal Analyzer, etc.) can be used simultaneously.
Input audio signal in the DUT and measure occupation bandwidth or spurious using Spectrum Analyzer.

Press F4 (Measure) in the main function menu and press F6 (Switch Application with Audio Generator). The screen of the previously-used application appears and the Audio Generator window will be downsized.

Generator Window Position

■Summary

Sets the display position of the downsized Audio Generator screen.

■Options

Bottom	Displays the Audio Generator screen under the other application screen.
Top	Displays the Audio Generator screen above the other application screen.

Back to AMA

■Summary

Quits the joint screen with the other application and displays the screen of this application only.

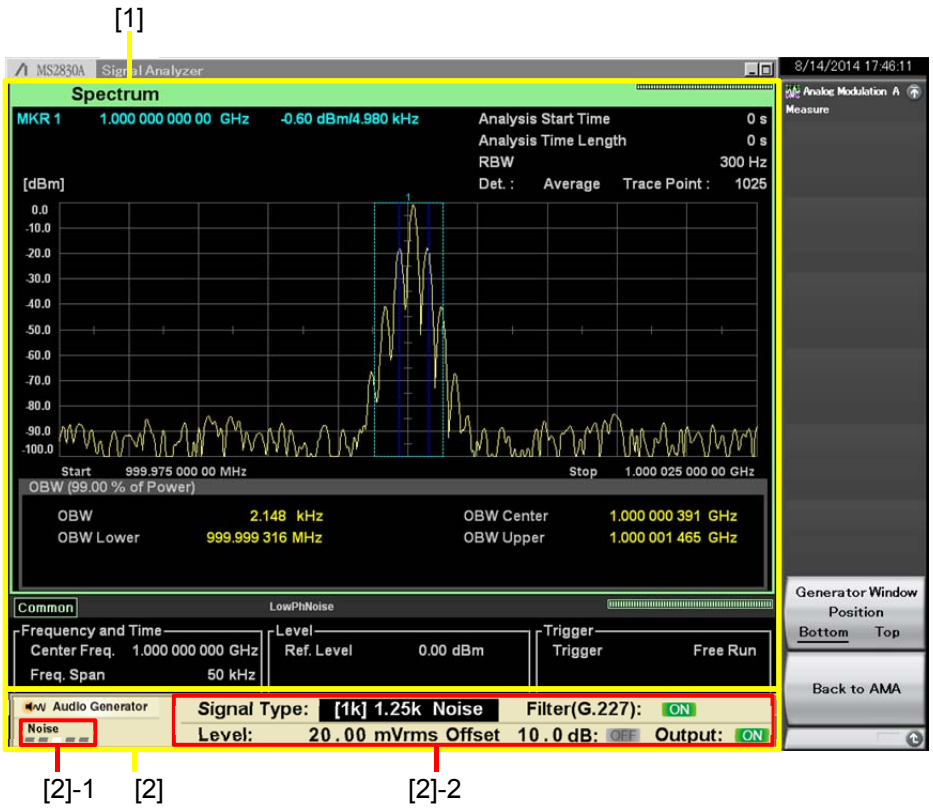


Figure 3.6-1 Simultaneous Use with Other Applications (Downsized Audio Generator Window)

[1] Other application window

Displays the application previously used.

[2] Audio Generator window

Displays the downsized Audio Generator window.

The display can be changed and the parameters can be set by using the rotary knob, Cursor key, Enter key, and Cancel key. Operate the downsized window in the same manner as the standard size window.

☞ 3.5.3 “Audio Generator Window”

[2]-1 Selecting Output/Common/Waveform

[2]-2 Parameter setting

3.7 RX Measurement Mode

This measurement mode is for the radio reception test. Parameters for signals output from the SG Output connector of this instrument can be set.

The RX measurement mode is enabled when the signal generator option is installed.

3.7.1 Setting frequency

Configures settings related to frequency. Press F2 (Frequency) in the main function menu to display the Frequency function menu. Pressing Frequency displays the Frequency function menu.

RX Frequency

■Summary

Sets a frequency for output signal.

This is available when Coupled Frequency is set to Off.

■Setting range

100 kHz to 3 GHz

TX/RX Frequency

■Summary

Sets frequencies for TX and RX at the same time.

This is available when Coupled Frequency is set to On.

■Setting range

Refer to the setting range of RX Frequency.

Coupled Frequency

■Summary

Sets the function to couple the TX Frequency setting with the RX Frequency setting.

■Options

On	Changes the RX Frequency setting value to the TX Frequency setting value, and enables the TX/RX Frequency setting items that are common settings for TX and RX.
Off	Disables the coupling of the TX Frequency to the RX Frequency.

3.7.2 Setting level

Configures settings related to output signal level. Pressing F3 (Amplitude) on the main function menu displays the RX Amplitude function menu. Pressing Amplitude on the main function menu displays the RX Amplitude function menu.

Output Level

■Summary

Sets the output level from the main frame.

■Setting range

When **Output Unit** is **dBm**:

–127 dBm to +15 dBm (RX frequency > 25 MHz)

–127 dBm to –3 dBm (RX frequency ≤ 25 MHz)

When **Output Unit** is **dBμV (EMF)**:

–13.99 dBμV to +128.01 dBμV (RX frequency > 25 MHz)

–13.99 dBμV to +110.01 dBμV (RX frequency ≤ 25 MHz)

When **Output Unit** is **dBμV (Term)**:

–20.01 dBμV to +121.99 dBμV (RX frequency > 25 MHz)

–20.01 dBμV to +103.99 dBμV (RX frequency ≤ 25 MHz)

Output Unit

■Summary

Sets the setting unit for Output Level.

■Options

dBμV (EMF)	Sets the setting unit to dBμV (EMF).
dBμV (Term)	Sets the setting unit to dBμV (Term).
dBm	Sets the setting unit to dBm.

Output Offset

■Summary

Turns on/off the Offset function.

■Options

On	Enables the offset function.
Off	Disables the offset function.

Output Offset Value

■Summary

This sets the level correction coefficient.

■Setting range

–100.00 to 100.00 dB

3.7.3 Setting measurement items

This section describes the settings for the measurement items. Pressing F4 (Measure) and then pressing F1 (Modulation Analysis) in the main function menu displays the Modulation Setting function menu.

Modulation

■Summary

Selects the modulation mode for the output signal.

■Options

FM	Select this when outputting FM modulation signal.
AM	Select this when outputting AM modulation signal.
ϕM	Select this when outputting ϕM modulation signal.

Signal Output Play Mode

■Summary

Selects outputting the modulation wave signal continuously or outputting only for the time of waveform length. When the user waveform is used, the waveform length of the user waveform is used. If the user waveform is not used, the waveform length is decided with the Tone frequency of AF signal and DCS setting.

■Options

Once	Sets the modulation wave signal to output only for the time of waveform length.
Repeat	Sets the modulation wave signal to output continuously.

■Wavelength

When DCS Code Squelch is set to Off, the waveform length is decided with the setting value of first decimal place of AF Tone frequency. If AF1 and AF2 have different frequency setting, the one with longer waveform length is used.

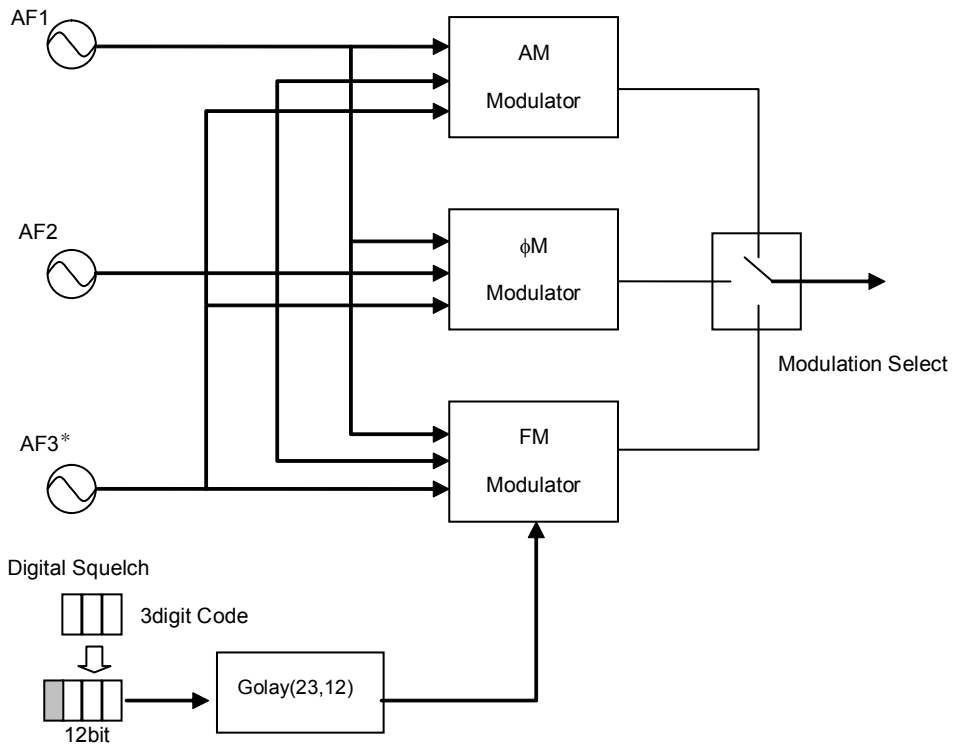
Setting value of first decimal place of AF Tone frequency [Hz]	Waveform length [s]
0	1
5	2
2, 4, 8	5
1, 3, 6, 7	10

When the DCS Code Squelch is set to On, the waveform length is integral multiple of 23/134.3 [s] with the DCS Code setting and Deviation setting.

3.7.4 Setting AF signal

This section describes the setting for the AF signal. Pressing F5 (AF Setting) in the main function menu displays the AF Setting function menu.

Each AF signal source is modulated with the modulation method set with Modulation for AF signal to be output. The AF signal sources include two signal sources (AF1 and AF2) that generate Tone signals and a signal source that generates DCS signals. The file created by USER can be used from AF1 instead of Tone signals.



*: AF3 is available only when MS2830A-018/118 is installed.

Figure 3.7.4-1 AF Signal Generation Method Diagram

AF1 Tone

■Summary

Selects the signal output of AF1 signal source.

If User is selected, AF2 Tone and Digital Code Squelch are set to Off automatically.

■Options

Off	Does not generate signals.
On	Generates Tone signals.
User Wave	Generates the signal of the User file selected in Select AF1 Wave setting. If waveform has not been selected in Select AF1 Wave, the options are not displayed.

AF2 Tone

■Summary

Selects the signal output of AF2 signal source.

■Options

Off	Does not generate signals.
On	Generates Tone signals.

AF1 Tone Frequency

■Summary

Sets the Tone frequency of AF1 signal source.

■Setting range

20.0 to 40000.0 Hz

AF2 Tone Frequency

■Summary

Sets the Tone frequency of AF2 signal source.

■Setting range

20.0 to 40000.0 Hz

AF1 Tone Deviation (FM)

■Summary

Sets the Deviation of AF1 signals.

Displayed when Modulation is set to FM.

■Setting range

0.0 to 100000.0 Hz

AF2 Tone Deviation (FM)

■Summary

Sets the Deviation of AF2 signals.

Displayed when Modulation is set to FM.

■Setting range

0.0 to 100000.0 Hz

AF1 Tone Radian (ϕM)

■Summary

Sets the Deviation of AF1 signals.

Displayed when Modulation is set to ϕM.

■Setting range

0.00 to 50.00 rad

However, the setting range is limited to within the range which meets the following formula.

(AF1 Tone Frequency × AF1 Tone Radian) <100k

AF2 Tone Radian (ϕM)

■Summary

Sets the Deviation of AF2 signals.

Displayed when Modulation is set to ϕM.

■Setting range

0.00 to 50.00 rad

However, the setting range is limited to within the range which meets the following formula.

(AF2 Tone Frequency×AF2 Tone Radian) <100k

AF1 Tone Depth (AM)

■Summary

Sets the AM modulation index of AF1 signal.

Displayed when Modulation is set to AM.

■Setting range

0 to 100%

AF2 Tone Depth (AM)

■Summary

Sets the AM modulation index of AF2 signal.

Displayed when Modulation is set to AM.

■Setting range

0 to 100%

AF3 – AF3 Tone

■Summary

Selects the signal output of AF3 signal source.

This setting is enabled when the MS2830A-018/118 is installed.

■Options

Off	Does not generate signals.
On	Generates Tone signals.

AF3 – AF3 Tone Frequency

■Summary

Sets the Tone frequency of AF3 signal source.
This setting is enabled when the MS2830A-018/118 is installed.

■Setting range

20.0 to 40000.0 Hz

AF3 – AF3 Tone Deviation (FM)

■Summary

Sets the Deviation of AF3 signals.
Displayed when the MS2830A-018/118 is installed and Modulation is set to FM.

■Setting range

0.0 to 100000.0 Hz

AF3 – AF3 Tone Radian (ϕM)

■Summary

Sets the Deviation of AF3 signals.
Displayed when the MS2830A-018/118 is installed and Modulation is set to ϕM.

■Setting range

0.00 to 50.00 rad
However, the setting range is limited to within the range which meets the following formula.
(AF3 Tone Frequency × AF3 Tone Radian) < 100k

AF3 – AF3 Tone Depth (AM)

■Summary

Sets the AM modulation index of AF3 signal.
Displayed when the MS2830A-018/118 is installed and Modulation is set to AM.

■Setting range

0 to 100%

Auto Set

■Summary

Selects whether to allow value change in the dialog box without determining by the **Set** key .

■Options

On	Enables setting change by the knob or up/down keys without determining by the **Set** key on the AF Tone setting screens.
Off	Value changed by the knob or up/down keys will not be set without determining by the **Set** key .

Digital Code Squelch

■Summary

Selects the signal output of DCS signal.

Enabled when Modulation is set to FM.

■Options

Off	Does not generate signals.
On	Generates DCS signals.

Digital Code Squelch Data

■Summary

Sets DCS Code.

■Setting range

0 to 777 (three-digit octal notation)

Or

000…0 to 111…1 (23-digit binary notation)

3.8 “Digital Code Squelch Data Setting”

Digital Code Squelch Deviation

■Summary

Sets the Deviation of DCS signals.

■Setting range

0.0 to 100000.0 Hz

Digital Code Squelch Polarity

■Summary

Sets polarity of DCS signal.

■Setting range

Normal	Polarity of DCS Code is not inverted.
Inverted	Polarity of DCS Code is inverted.

LPF

■Summary

Limits the range of DCS signal in AF level by using Low Pass Filter. If set to On, removes high-frequency elements and controls noise at demodulation.

■Setting range

Off	The range of DCS signal is not limited by Low Pass Filter.
On	The range of DCS signal is limited by Low Pass Filter.

AF Monitor

■Summary

Outputs the synthesized signals of AF1 Tone, AF2 Tone, and AF3 Tone (only when the MS2830A-018/118 is installed) to the monitor. Outputs the signal to USB Audio. Enabled when USB Audio equipment for signal output is connected to this instrument. User waveform signal cannot be output.

■Options

Off	Stops the AF monitor.
On	Starts the AF monitor.

Monitor Volume

■Summary

Sets the AF monitor signal output level.

■Setting range

0 to 100

Device

■Summary

Sets Device to which User waveform is stored.

■Setting range

Drive name (D, E, F,…)

Select AF1 Wave

■Summary

Selects the Wave file stored in Folder of Drive selected with Device setting. The selected file is used when AF1 Tone is set to User Wave.

■Destination to store Wave file

Create the following Folder in Drive to store Wave file.

[Drive]:\Anritsu Corporation\Signal Analyzer\User Data\Wave Data

■Supported format for Wave file

Wave audio format is supported. The following restrictions apply:

- Linear PCM file

(The compression format for ADPCM and expanded PCM cannot be supported.)

- Replay method is monaural or stereo.

(Multi-channel is not supported. For the stereo format, L-channel is used for replay.)

- The number of bits for sampling quantization is 8 bits or 16 bits.

(Modulation index is set for full scale on modulation.)

- The data size allows replay time for 10 seconds or less.
- The sampling frequency is any of 44.1 kHz, 48 kHz, or 96 kHz.

Note:

Even if the Wave file satisfies the specifications described above, you may be unable to load the file. An error message is displayed when specifying a Wave file that cannot be loaded.

☞ Appendix A Error Message

3.8 Digital Code Squelch Data Setting

When pressing Digital Code Squelch Data in the AF Setting function menu, the Digital Code Squelch Data dialog box is displayed. Digital Code Squelch Data (DCS Code) can be set to Binary or Octal Code.

Set DCS Code to Octal Code usually, but set to Binary Code for adding errors to DCS Code.

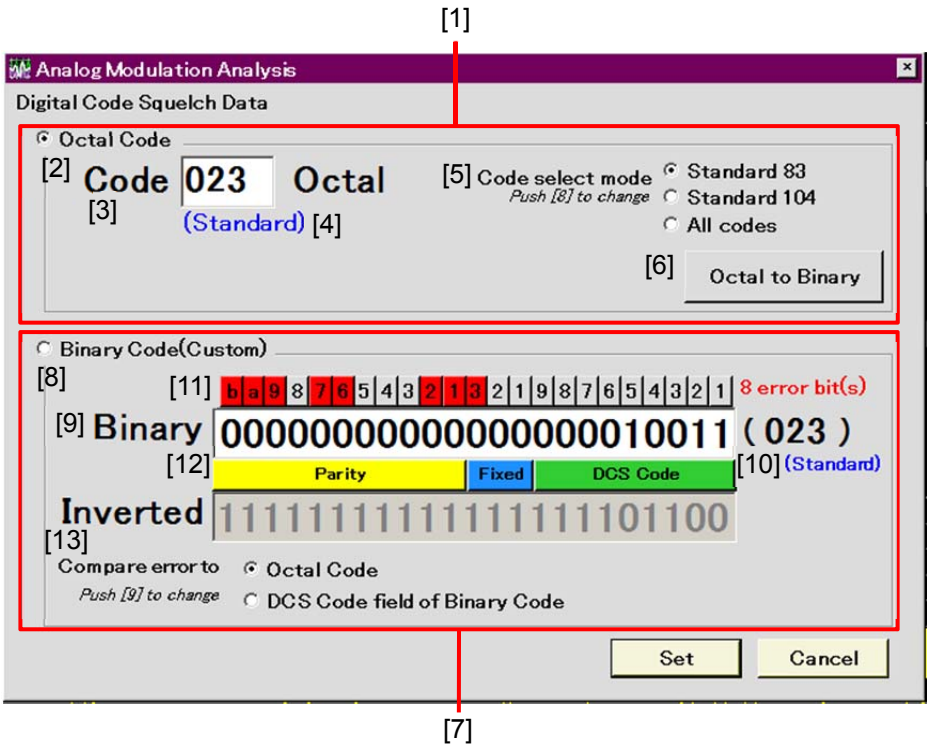


Figure 3.8-1 Digital Code Squelch Data Setting Dialog Box

[1] Octal notation setting area

[2] Octal Code

Waveforms are generated by a set value in octal notation. Octal Code is used in most cases.

[3] Octal text field

Input DCS Code by numerical keypad or rotary knob in octal notation.

[4] Standard/Non-Standard display

This indicates whether or not the input DCS Code is defined in Standard 83 or Standard 104.

Standard: Defined

Non-Standard: Undefined

[5] Code select mode

Selects how to set DCS Code.

When editing the code by rotary knob,

Standard 83: Only the codes defined in Standard 83 are displayed.

Standard 104: Only the codes defined in Standard 104 are displayed.

All codes: The code can be edited in increments or decrements by 1. Standard/Non-Standard is not displayed.

[6] Octal to Binary button

Pressing this button will convert a DCS Code of octal number into a binary number in the text field of the binary notation setting area.

[7] Binary notation setting area

[8] Binary Code (Custom)

Waveforms are generated by a set value in binary notation.

Binary Code is used to add errors to DCS Code.

[9] Binary text field

Input DCS Code by numerical keypad or rotary knob in binary notation.

The binary DCS Code is displayed in octal notation inside the parenthesis.

[10] Standard/Non-Standard display

See [4].

[11] Bit button

A bit is reversed when its corresponding button is pressed. When a bit has an error, the button turns red.

[12] [Parity], [Fixed], [DCS Code] field button

When the corresponding field has an error, pressing the button can correct it.

[13] Compare error to

Octal Code: Calculates errors of the binary text field based on the Octal Code value.

DCS Code field of Binary Code: Calculates errors of the binary text field based on the DCS Code value.

Table 3.8-1 DCS Standard 104 (only codes without "*" for Standard 83)

023	114	205	306	411	516	606	703
025	115	212*	311	412	506	612	712
026	116	223	315	413	516	624	723
031	122*	225*	325*	423	523*	627	731
032	125	226	331	431	526*	631	732
036*	131	243	332*	432	532	632	734
043	132	244	343	445	546	654	743
047	134	245	346	446*	565	662	754
051	143	246*	351	452*	--	664	--
053*	145*	251	356*	454*	--	--	--
054	152	252*	364	455*	--	--	--
065	155	255*	365	462*	--	--	--
071	156	261	371	464	--	--	--
072	162	263	--	465	--	--	--
073	165	265	--	466	--	--	--
074	172	266*	--	--	--	--	--
--	174	271	--	--	--	--	--
--	--	274*	--	--	--	--	--

3.8.1 Setting modulation wave signal

This section describes the settings to output modulation wave signal and to turn it On/Off in the main function menu.

Signal Output Restart

■Summary

Restarts output of a modulated signal. Starts output of a modulated signal when Signal Output Play Mode is set to Once. Restarts output starting from the beginning of the waveform when Signal Output Play Mode is set to Repeat.

Signal Modulation

■Summary

Selects Modulation On/Off for signals output from SG Output.

■Options

Off	Outputs Continuous Waves (CW).
On	Outputs modulation waves.

Signal Output

■Summary

Selects Output On/Off from SG Output.

■Options

Off	No signal is output.
On	Outputs signal.

3.9 Audio Analyzer Function

When the MS2830A-018/118 Audio Analyzer is installed, AF signals can be input from the DUT to the MS2830A and analyzed in RX measurement mode (Audio Analyzer function).

3.9.1 Audio Analyzer basic settings

Press F4 (Measure) and then press F8 (Audio Analysis) in the main function menu to display the Audio Analysis function menu.

This section explains the basic settings of the Audio Generator.

Input Type

■Summary

Selects balanced/unbalanced input of AF signal.

■Options

Bal.	Balanced input.
Unbal	Unbalanced input.

Input Range

■Summary

Sets the range for AF input signal.

■Options

50mVp	Sets the AF input signal range to 50 mV.
500mVp	Sets the AF input signal range to 500 mV.
5Vp	Sets the AF input signal range to 5 V.
50Vp	Sets the AF input signal range to 50 V.

Input Impedance Reference

■Summary

Sets the impedance reference used for converting AF Level measurement value into power of W, dBm.

■Setting range

0.01 to 1000000000.00 Ω

AF Level Unit

■Summary

Sets the AF Level unit.

Displays the values calculated by the formulas below.

$$\text{dBu} = 20 \times log_{10}\left(\frac{V_{rms}}{\sqrt{0.6}}\right)$$

$$\text{dBV} = 20 \times log_{10}(V_{rms})$$

$$\text{W} = \frac{(V_{rms})^2}{Input\ Impedance\ Reference}$$

$$\text{dBm} = 10 \times log_{10}\left(\frac{1000\ \times\ (V_{rms})^2}{Input\ Impedance\ Reference}\right)$$

■Options

Vrms	Sets the unit to Vrms.
dBu	Sets the unit to dBu.
dBV	Sets the unit to dBV.
W	Sets the unit to W.
dBm	Sets the unit to dBm.

Note:

Enabled to change the setting only when the AF Level Set Reference is Off.

AF Level Set Reference

■Summary

Additionally displays the relative value results in the AF level measurement results. Using the AF Level measurement result as a 0 dB reference (when this function is set to On), this displays the relative value results of subsequent AF Level measurements.

When AF Level Unit is Vrms, dBu, or dBV,

Calculates the values using Voltage Ratio ($20 \times \log_{10}$).

When AF Level Unit is dBm or W,

Calculates the values using Power Ratio ($10 \times \log_{10}$).

Note:

Enabled to set to On only when the AF Level measurement results are displayed.

■Options

On	Displays the AF Level measurement results in relative value.
Off	Hides the AF Level measurement results in relative value.

3.9.1.1 Setting AF Frequency Reference

This section describes the settings for AF Frequency Reference. Press F6 (AF Frequency Reference Setting) in the Audio Analysis function menu to display the AF Frequency Reference function menu.

AF Frequency Reference

■Summary

Sets whether to refer to reference frequency. When set to On, AF Frequency displayed in AF Measure Result changes to AF Freq. Error (relative value to reference).

■Options

On	Refers to reference frequency.
Off	Does not refer to reference frequency.

AF Reference Frequency

■Summary

Sets the reference frequency.
Enabled when **AF Frequency Reference** is set to **On**.

■Setting range

20 Hz to 60 kHz

AF Frequency Reference Unit

■Summary

Sets the unit of AF Freq. Error (relative value to reference) displayed in AF Measure Result.
Enabled when **AF Frequency Reference** is set to **On**.

■Options

ppm	Displays a value relative to the reference frequency in ppm.
%	Displays a value relative to the reference frequency in %.
delta	Displays a value relative to the reference frequency in delta (Hz).

AF Level

■Summary

Sets the AF Level display format.

■Options

Tone	Displays the peak frequency level (rms).
Total	Displays the level of the total bandwidth (rms).

3.9.2 Setting filter

This section describes the filter setting in the Audio Analysis function menu.

HPF

■Summary

Limits the bandwidth by High Pass Filter against AF input signal.

■Options

Off	Does not use High Pass Filter.
20 Hz	Uses High Pass Filter with a pass band of 20 Hz.
50 Hz	Uses High Pass Filter with a pass band of 50 Hz.
100 Hz	Uses High Pass Filter with a pass band of 100 Hz.
300 Hz	Uses High Pass Filter with a pass band of 300 Hz.
400 Hz	Uses High Pass Filter with a pass band of 400 Hz.
30 kHz	Uses High Pass Filter with a pass band of 30 kHz.

LPF

■Summary

Limits the bandwidth by Low Pass Filter against AF input signal.

■Options

Off	Does not use Low Pass Filter.
3 kHz	Uses Low Pass Filter with a pass band of 3 kHz.
15 kHz	Uses Low Pass Filter with a pass band of 15 kHz.
20 kHz	Uses Low Pass Filter with a pass band of 20 kHz.
30 kHz	Uses Low Pass Filter with a pass band of 30 kHz.
50 kHz	Uses Low Pass Filter with a pass band of 50 kHz.

Weighting

■Summary

Applies weighting to AF input signal.

■Options

Off	Does not use Band Pass Filter.
CCITT	Uses Band Pass Filter defined in ITU-T P.53/O.41.
C-Message	Uses Band Pass Filter defined in C-Message.
CCIR-468	Uses weighing defined in CCIR-468.
CCIR-ARM	Uses weighing defined in CCIR-ARM.
A-Weighting	Uses A-weighting defined in IEC 61672.

3.9.3 Setting for distortion factor measurement

This section describes the settings for SINAD, THD, and THD+N (Total Harmonic Distortion plus Noise). Press F7 (Distortion Measurement Setting) in Page 2 of the Audio Analysis function menu to display the Distortion Setting (RX) function menu. Select SINAD or THD or THD+N and perform settings for distortion factor measurement.

Signal Frequency

■Summary

Sets frequency mode of distortion factor measurement.

■Options

Peak	Measures distortion factor in peak frequency.
Manual	Sets the frequency for measuring distortion factor manually.
Generator	Measures distortion factor with the frequency set for **AF1 Tone Frequency** in **AF Setting** as signal frequency.

Manual Frequency

■Summary

Sets the frequency of distortion factor measurement manually. Calculates distortion factor using this value when **Signal Frequency** is **Manual**.

■Setting range

10 to 60000 Hz

Note:

An error will result if Manual Frequency, Start Frequency, Stop Frequency do not satisfy the following conditions.

Start Frequency ≤ Manual Frequency ≤ Stop Frequency

Start Frequency

■Summary

Sets the Start Frequency for distortion factor measurement.

■Setting range

10 Hz to Manual Frequency set value for distortion factor measurement

Stop Frequency

■Summary

Sets the Stop Frequency for distortion factor measurement.

■Setting range

Manual Frequency set value for distortion factor measurement to 60000 Hz

Unit

■Summary

Sets the unit of distortion factor measurement.

■Options

dB	Displays the distortion factor measurement results in dB.
%	Displays the distortion factor measurement results in %.

3.9.4 Setting Meter

This section describes the meter settings for SINAD, THD, THD+N, and AF Level. Press F8 (Meter Settings) in Page 2 of the Audio Analysis function menu to display the Meter Settings function menu. Select SINAD, THD, THD+N, or AF Level and perform the meter settings.

Reference Minimum

■Summary

Sets the reference of the meter.

Enabled when **Meter** is set to **On**.

■Options

Minimum	Displays the meter with the minimum value as reference.
Center	Displays the meter with the center value as reference.
Maximum	Displays the meter with the maximum value as reference.

Reference Value

■Summary

Sets the reference value of the meter display.

Enabled when **Meter** is set to **On**.

■Setting range

When the **Unit** is **dB**:

–100.0 to 100.0 dB

When the **Unit** is **AFLU**:

0.000 to 1000.000

When the **Unit** is **%**:

0.00 to 10000.00%

Range1

■Summary

Sets Range1 of the meter display.

Enabled when **Meter** is set to **On**.

■Setting range

When the **Unit** is **dB**:

0.0 to 100.0 dB

When the **Unit** is **AFLU**:

0.000 to 1000.000

When the **Unit** is **%**:

0.0 to 10000.00%

Range2

■Summary

Sets Range2 of the meter display.

Enabled when **Meter** is set to **On**.

■Setting range

When the **Unit** is **dB**:

0.0 to 100.0 dB

When the **Unit** is **AFLU**:

0.000 to 1000.000

When the **Unit** is **%**:

0.0 to 10000.00%

Deflection View

■Summary

Selects whether to display deflection view in the meter.

Enabled when **Meter** is set to **On**.

■Options

On	Displays deflection view in the meter.
Off	Hides deflection view in the meter.

Deflection Count

■Summary

Sets the measurement count for setting deflection view on the meter. Enabled when **Deflection View** is **On** and **Meter** is **On**.

■Setting range

2 to 100

Deflection Judge

■Summary

Selects whether to judge pass/fail of the measurement result by deflection view in the meter. Enabled when **Deflection View** is **On** and **Meter** is **On**.

■Options

On	Judges pass/fail of the measurement result by deflection view.
Off	Does not judge pass/fail of the measurement result by deflection view.

Pass Range

■Summary

Sets pass range of deflection view in the meter. Enabled when **Deflection View** is **On** and **Meter** is **On**.

■Setting range

When the **Unit** is **dB**:

0.0 to 100.0 dB

When the **Unit** is **AFLU**:

0.0 to 100.000

When the **Unit** is **%**:

0.0 to 10000.0%

AF level Reference

■Summary

Sets the AF Level for reference when **Unit** of AF Level is **%**. Enabled when **Unit** is **%** and **Meter** is **On**.

■Setting range

–1000.000 to 1000.000

Meter

■Summary

Displays/hides the meter.

■Options

On	Displays the meter.
Off	Hides the meter.

Note:

The AF Level meter is hidden when AF Level Set Reference is On.

Unit

■Summary

Sets the unit for the meter.

■Options

dB	Displays the meter in dB.
AFLU	The meter is displayed in the unit set by **AF Level Unit**.
%	Displays the meter in %.

3.9.5 Setting AF Measure Result graph

The graph in the AF Measurement Result window can be set by the Audio Analysis function menu.

Graph Select

■Summary

Sets the graph type in the AF Measurement Result window.

■Options

Time Domain	Sets Time Domain Graph to On/Off.
Frequency Domain	Sets Frequency Domain Graph to On/Off.

3.9.5.1 Setting Time Domain graph

This section describes the settings for the Time Domain graph. Press F2 (Time Domain Setting) in the Audio Analysis function menu to display the Time Domain Setting function menu.

Time Range

■Summary

Sets the horizontal scale (X-axis) of the Time Domain graph.

■Setting range

1 to 200 ms

Scale Mode

■Summary

Sets Auto scale and Fixed scale of the vertical scale (Y-axis) in the Time Domain graph.

■Options

Auto	Displays the vertical scale in Auto scale.
Fixed	Displays the horizontal scale in Fixed scale.

Minimum Range

■Summary

Sets the minimum range of the vertical scale (Y-axis) in the Time Domain graph. Enabled when **Scale Mode** is set to **Auto**.

■Options

±0.5mV	Sets the minimum range of the vertical scale to ±0.5 mV.
±1mV	Sets the minimum range of the vertical scale to ±1 mV.
±5mV	Sets the minimum range of the vertical scale to ±5 mV.
±10mV	Sets the minimum range of the vertical scale to ±10 mV.
±50mV	Sets the minimum range of the vertical scale to ±50 mV.
±100mV	Sets the minimum range of the vertical scale to ±100 mV.
±500mV	Sets the minimum range of the vertical scale to ±500 mV.
±1V	Sets the minimum range of the vertical scale to ±1 V.

Fixed Range

■Summary

Sets the vertical scale (Y-axis) range in the Time Domain graph. Enabled when **Scale Mode** is set to **Fixed**.

■Options

±0.5mV	Sets the vertical scale range to ±0.5 mV.
±1mV	Sets the vertical scale range to ±1 mV.
±5mV	Sets the vertical scale range to ±5 mV.
±10mV	Sets the vertical scale range to ±10 mV.
±50mV	Sets the vertical scale range to ±50 mV.
±100mV	Sets the vertical scale range to ±100 mV.
±500mV	Sets the vertical scale range to ±500 mV.
±1V	Sets the vertical scale range to ±1 V.
±5V	Sets the vertical scale range to ±5 V.
±10V	Sets the vertical scale range to ±10 V.
±20V	Sets the vertical scale range to ±20 V.

3.9.5.2 Setting Frequency Domain graph

This section describes the settings for the Frequency Domain graph. Press F3 (Frequency Domain Setting) in the Audio Analysis function menu to display the Frequency Domain Setting function menu.

Window Function

■Summary

Sets the Frequency Domain graph window function.

■Options

Rectangular	Uses rectangular window.
Hann	Uses Hann window.
Blackman-Harris	Uses Blackman-Harris window.
Hamming	Uses Hamming window.
Flat Top	Uses Flat Top window.

X-AXIS

■Summary

Sets the horizontal scale (X-axis) in the Frequency Domain graph.

■Options

Linear	Displays the horizontal scale in linear.
Log	Displays the horizontal scale in log.

Start Freq

■Summary

Sets the minimum frequency for the horizontal scale (X-axis) in the Frequency Domain graph.

■Setting range (X-AXIS is Linear)

10 to 49950 Hz

■Options (X-AXIS is Log)

10 Hz	Sets the minimum value of the horizontal scale to 10 Hz.
20 Hz	Sets the minimum value of the horizontal scale to 20 Hz.
30 Hz	Sets the minimum value of the horizontal scale to 30 Hz.
50 Hz	Sets the minimum value of the horizontal scale to 50 Hz.
100 Hz	Sets the minimum value of the horizontal scale to 100 Hz.
200 Hz	Sets the minimum value of the horizontal scale to 200 Hz.
300 Hz	Sets the minimum value of the horizontal scale to 300 Hz.
500 Hz	Sets the minimum value of the horizontal scale to 500 Hz.
1 kHz	Sets the minimum value of the horizontal scale to 1 kHz.
2 kHz	Sets the minimum value of the horizontal scale to 2 kHz.
3 kHz	Sets the minimum value of the horizontal scale to 3 kHz.
5 kHz	Sets the minimum value of the horizontal scale to 5 kHz.
10 kHz	Sets the minimum value of the horizontal scale to 10 kHz.
20 kHz	Sets the minimum value of the horizontal scale to 20 kHz.
30 kHz	Sets the minimum value of the horizontal scale to 30 kHz.

Stop Freq

■Summary

Sets the maximum frequency for X-axis in the Frequency Domain graph.

■Setting range (X-AXIS is Linear)

60 to 50000 Hz

■Options (X-AXIS is Log)

20 Hz	Sets the maximum value of the horizontal scale to 20 Hz.
30 Hz	Sets the maximum value of the horizontal scale to 30 Hz.
50 Hz	Sets the maximum value of the horizontal scale to 50 Hz.
100 Hz	Sets the maximum value of the horizontal scale to 100 Hz.
200 Hz	Sets the maximum value of the horizontal scale to 200 Hz.
300 Hz	Sets the maximum value of the horizontal scale to 300 Hz.
500 Hz	Sets the maximum value of the horizontal scale to 500 Hz.
1 kHz	Sets the maximum value of the horizontal scale to 1 kHz.
2 kHz	Sets the maximum value of the horizontal scale to 2 kHz.
3 kHz	Sets the maximum value of the horizontal scale to 3 kHz.
5 kHz	Sets the maximum value of the horizontal scale to 5 kHz.
10 kHz	Sets the maximum value of the horizontal scale to 10 kHz.
20 kHz	Sets the maximum value of the horizontal scale to 20 kHz.
30 kHz	Sets the maximum value of the horizontal scale to 30 kHz.
50 kHz	Sets the maximum value of the horizontal scale to 50 kHz.

Top Level

■Summary

Sets the vertical scale (Y-axis) in the Frequency Domain graph.

■Setting range

(Bottom Level set value + 3) to 50 dBV

Bottom Level

■Summary

Sets the vertical scale (Y-axis) bottom level in the Frequency Domain graph.

■Setting range

–200 to (Top Level set value – 3) dBV

3.9.6 Displaying Audio Analyzer setting

This section describes the display of AF input signal settings in the Audio Analyzer Setting window.

Figure 3.2.1.4-1 Audio Analyzer Screen
Figure 3.2.1.5-1 Audio Analyzer + RF Signal Generator Screen

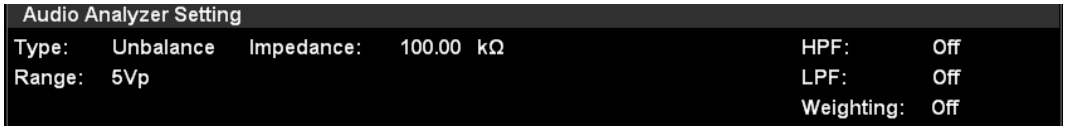


Figure 3.9.6-1 Audio Analyzer Setting Window

Type

■Summary

Displays the AF input signal type (balanced/unbalanced).

Range

■Summary

Displays the AF input signal range.

Impedance

■Summary

Displays input impedance and impedance reference.

HPF

■Summary

Displays the HPF setting for AF input signal.

LPF

■Summary

Displays the LPF setting for AF input signal.

Weighting

■Summary

Displays the weighting setting for AF input signal.

3.9.7 Displaying AF Measure result

This section describes the display of the demodulated signal analysis results in the AF Measure Result window.

Figure 3.2.1.4-1 Audio Analyzer Screen
Figure 3.2.1.5-1 Audio Analyzer + RF Signal Generator Screen

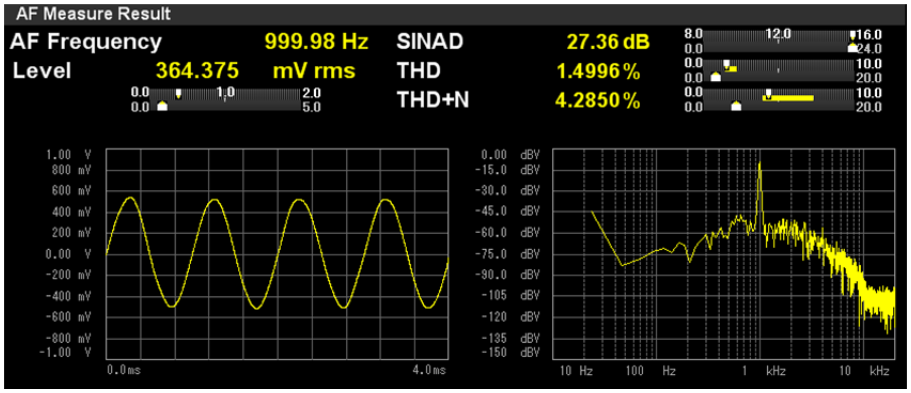


Figure 3.9.7-1 AF Measure Result Window

AF Frequency

■Summary

Displays the maximum level frequency from the frequency spectrum of input signal in Hz.

Displayed when **AF Frequency Reference** is set to **Off**.

AF Freq. Error

■Summary

Displays the maximum level frequency from the frequency spectrum of input signal as a value relative to the reference.

Displayed when **AF Frequency Reference** is set to **On**.

3.9.1.1 “Setting AF Frequency Reference”

Level

■Summary

Displays the level of the AF Frequency above.

SINAD

■Summary

Displays the SINAD measurement results.

3.9.3 “Setting for distortion factor measurement”

THD

■Summary

Displays the THD measurement results.

☞ 3.9.3 “Setting for distortion factor measurement”

THD+N

■Summary

Displays the THD+N measurement results.

☞ 3.9.3 “Setting for distortion factor measurement”

Meter Display

■Summary

Displays the SINAD, THD, THD+N, and AF Level* measurement results in meter.

*: The AF Level meter is hidden when AF Level Set Reference is On.

☞ 3.9.4 “Setting Meter”

Measurement Result Graph

■Summary

Displays the Time Domain graph and the Frequency Domain graph.

☞ 3.9.5 “Setting AF Measure Result graph”
☞ 3.4.7 “Setting marker”

3.9.8 RF Signal Generator window

This section describes the display of RF signal settings output to DUT in the RF Signal Generator window.

Figure 3.2.1.5-1 Audio Analyzer + RF Signal Generator Screen

In the RF Signal Generator window, the display can be changed and the parameters can be set by using the rotary knob, Cursor key, Enter key, and Cancel key.

Note:

Press Enter to select a parameter. Press Cancel to deselect the selected parameter.

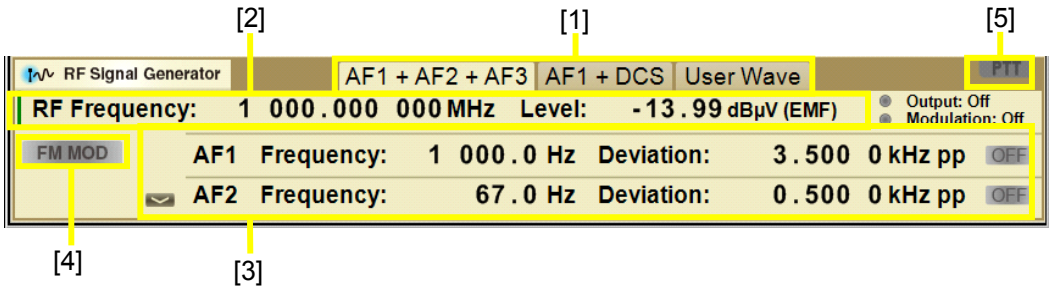


Figure 3.9.8-1 RF Signal Generator Window
(RF Signal Setting Mode, No parameter is selected)

[1] AF signal type

Selects AF signal type by using < and >. The selected AF signal type is highlighted and the parameters are displayed in [3].

[2] Setting RF signal

Selects RF signal setting mode by using ^ and v. When the green line is displayed at the left of RF Frequency as in Figure 3.9.8-1, RF signal setting mode is active. Press Enter to set the window to parameter selection state, which allows frequency and level settings by using the rotary knob or ^ and v.

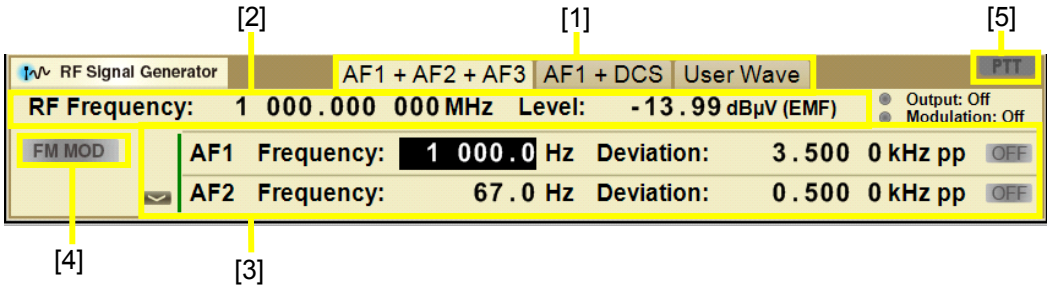


Figure 3.9.8-2 RF Signal Generator Window (RF Signal Setting Mode, a parameter is selected)

[3] RF Signal Setting

Selects AF signal setting mode by using ∧ and ∨. When the green line is displayed at the left of AF signal parameters as in Figure 3.9.8-2, AF signal setting mode is active.

Press Enter to select a parameter, and set frequency and level by using the rotary knob or ∧ and ∨.

3.7.4 "Setting AF signal"

[4] Modulation

Displays modulation type of output signal. When **Signal Modulation** is **On**, it is highlighted in green. When it is **Off**, it is gray.

[5] PTT state

Displays whether PTT is On or Off. It is highlighted in orange when PTT is On, and it is in grey when PTT is Off.

3.5.2 "Setting PTT"

3.10 Setting Terminals for External Device Control

This section describes the settings for external device control connectors. The setting is enabled when the MS2830A-018/118 Audio Analyzer is installed and it is common for TX measurement mode and RX measurement mode.
Press F7 (Audio Func. Setting) in Page 2 of the main function menu to display the Audio Func. Setting function menu.

Output1 – Output1

■Summary

Sets Output1 to On/Off.

■Options

On	Sets Output1 to On.
Off	Sets Output1 to Off.

Output1 - Polarity

■Summary

Selects the Output1 logic.

■Options

Pos.	Sets Output1 to positive logic.
Neg.	Sets Output1 to negative logic.

Output2 – Output2

■Summary

Sets Output2 to On/Off.

■Options

On	Sets Output2 to On.
Off	Sets Output2 to Off.

Output2 - Polarity

■Summary

Selects the Output2 logic.

■Options

Pos.	Sets Output2 to positive logic.
Neg.	Sets Output2 to negative logic.

Input1 - Detect Polarity

■Summary

Selects the Input1 logic.

■Options

Pos.	Sets Input1 to positive logic.
Neg.	Sets Input1 to negative logic.

Input2 - Detect Polarity

■Summary

Selects the Input2 logic.

■Options

Pos.	Sets Input2 to positive logic.
Neg.	Sets Input2 to negative logic.

Open Collector

■Summary

Selects Short or Open for the Open Collector connector.

■Options

Short	Sets Open Collector connector to Short.
Open	Sets Open Collector connector to Open.

PTT - PTT Polarity

■Summary

Selects the PTT connector logic.

■Options

Pos.	Sets PTT connector to positive logic.
Neg.	Sets PTT connector to negative logic.

Chapter 4 Performance Test

This chapter describes the measurement devices, setup methods, and performance test procedures required for performing performance tests as preventive maintenance of the equipment.

4.1 Overview of Performance Test

Performance tests are performed as part of preventive maintenance in order to prevent degradation of the performance of the equipment.

Use performance tests when required for acceptance inspection, routine inspection and performance verification after repairs. Use performance tests when necessary for acceptance inspection, routine inspection and performance verification after repairs. Also perform the following performance tests for acceptance inspection, routine inspection and performance verification after repairs of the equipment.

- Carrier frequency accuracy
- Residual Vector Error

With MS2830A-018/118 installed.

- Input level accuracy
- Input distortion
- Crosstalk
- Output level accuracy
- Total harmonic distortion + Noise

Perform items deemed critical at regular intervals as preventive maintenance. A cycle for routine tests of once or twice a year is recommended.

If items that do not meet the required level are detected during performance testing, 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.

⚠ CAUTION

Warm up the device to be tested and the measuring instruments for at least 30 minutes except if specified otherwise, in order to stabilize them sufficiently before running performance tests. Maximum measurement accuracy requires, in addition to the above, conducting performance tests under ambient temperatures and with little AC power supply voltage fluctuations, as well as the absence of noise, vibrations, dust, humidity and other problems.

4.2 RF Performance Test Items

(1) Test target standards

- Residual FM
- Residual ϕM
- Residual AM

(2) Measuring instrument for tests

- Signal generator

  Residual FM is 2 Hz or less.
- Frequency standard device

  Unnecessary if signal source has sufficient frequency accuracy
- Power meter

  Unnecessary if signal source has sufficient transmitter power accuracy

(3) Setups

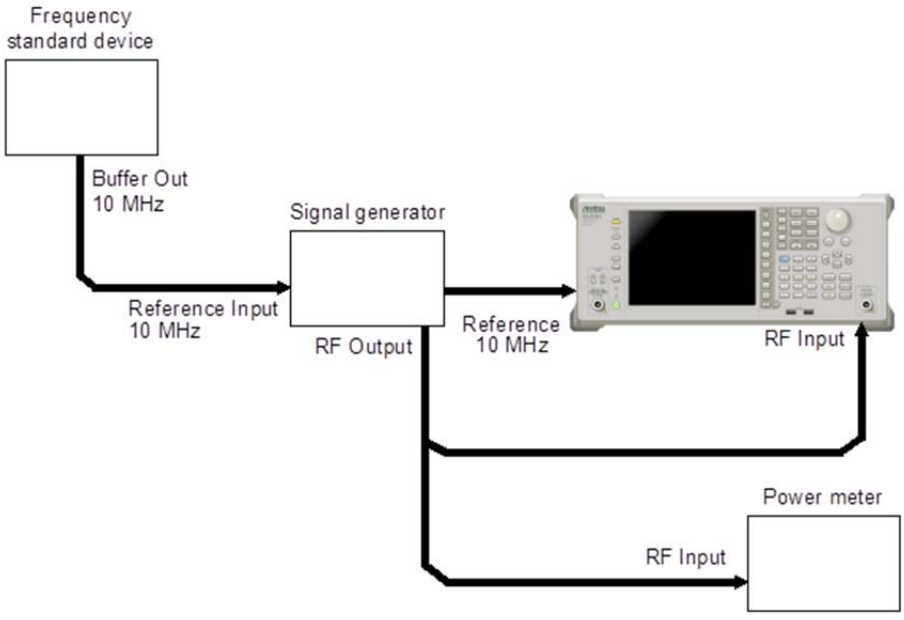


Figure 4.2-1 Performance Test

(4) Test Procedure

1. Turn on the power switch on the front panel and then wait until the internal temperature stabilizes (approx. 1.5 hours after the temperature in the thermostatic bath stabilizes).
2. Input the 10 MHz reference signal output from the frequency standard device to the Reference Input connector of the vector signal generator.
3. Input the 10 MHz reference signal output from the signal generator to the Reference Input connector.
4. Press Preset.
5. Press F1 (Preset) to initialize.
6. Press Cal.
7. Press F1 (SIGANA All) to perform calibration.
8. Press F8 (Close).
9. Set as follows for the signal generator.
   - Continuous wave (CW) output
   - Frequency: 100 kHz
   - Level: –15 dBm
10. Set as follows for the equipment.
    - TX Frequency: 100 kHz
    - Input Level: –15 dBm
    - High Pass Filter: 300 Hz
    - Low Pass Filter: 3 kHz
11. Input the signal output from the vector signal generator into the power meter, adjust the output level so that the power reading falls between –15 dBm ± 0.1 dB.
12. Input the signal output from the vector signal generator into the MS2830A.
13. Set as follows for the equipment.
    - Modulation: FM
14. Press Single to measure.
15. Record the measurement result for Deviation rms (residual FM).
16. Confirm that the recorded measurement result for residual FM satisfies the specifications.
17. Set as follows for this instrument.
    ・Modulation: ϕM
18. Press Single to measure.

19. Record the measurement result for Radian rms (residual ϕM).
20. Confirm that the recorded measurement result for residual ϕM satisfies the specifications.
21. Set as follows for this instrument.
    • Modulation: AM
22. Press 

to measure.
23. Record the measurement result for Depth rms (residual AM).
24. Confirm that the recorded measurement result for residual AM satisfies the specifications.
25. Set the frequency of the signal generator and MS2830A to 400 MHz, and repeat Steps 13 through 24.
26. Set the frequency of the signal generator and MS2830A to 2700 MHz, and repeat Steps 13 through 24.

4.3 Audio Performance Test

4.3.1 Output level calibration

(1) Measuring instrument for tests
Audio Analyzer: U8903A

(2) Setups

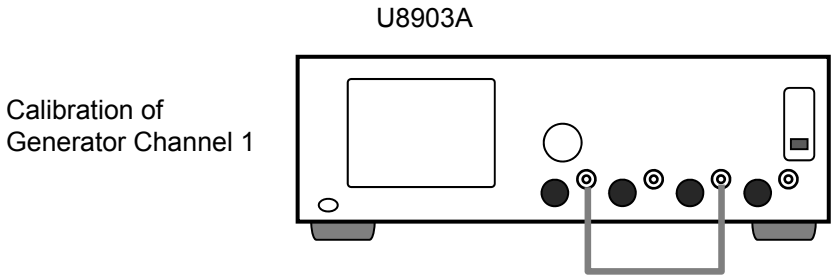


Figure 4.3.1-1 Connection to Calibrate Output Level of Audio Signal Generator (U8903A)

(3) Test Procedure

Table 4.3.1-1 Measurement Point and Measurement Level

Measurement Point	Measurement Level (mV rms)
1	3500
2	1400
3	350.0
4	700
5	35.00
6	7.000

1. Set Analyzer Channel 1 of the U8903A as below.
   HPF: OFF
   LPF: 80 kHz
   Range: AUTO
   Measurement Mode: AC
   Detection Mode: RMS
2. Connect Generator Channel 1 and Analyzer Channel 1 of the U8903A with a coaxial cable.

3. Set Generator Channel 1 as below.

   Output Frequency: 5 kHz
   Output Level: 3500 mV rms
   Output Waveform: Sine
   DC Offset: 0 V
   Output Type: Unbal
   Output Impedance: 50 Ω

4. Adjust the output level of Generator Channel 1 so that the measurement level of Analyzer Channel 1 will be 3500 mV rms. This value will be the correction value of 3500 mV rms ([Syscal_Unbal_3500] (mV rms)).

5. Change the setting level of Generator Channel 1 so that the Analyzer Channel 1 will be in the measurement level of the measurement point No. 2 or of bigger number in Table 4.3.1-1, and obtain the correction value.

6. Set Generator Channel 1 as below.

   Output Frequency: 5 kHz
   Output Level: 3500 mV rms
   Output Waveform: Sine
   DC Offset: 0 V
   Output Type: Bal
   Output Impedance: 100 Ω

7. Adjust the output level of Generator Channel 1 so that the measurement level of Analyzer Channel 1 will be 3500 mV rms. This value will be the correction value of 3500 mV rms ([Syscal_Bal_3500] (mV rms)).

8. Change the setting level of Generator Channel 1 so that the Analyzer Channel 1 will be in the measurement level of the measurement point No. 2 or of bigger number in Table 4.3.1-1, and obtain the correction value.

4.3.2 Input level accuracy

(1) Measuring instrument for tests
Audio Analyzer: U8903A

(2) Setups
Below is the connection when the U8903A is used as Audio Signal Generator.

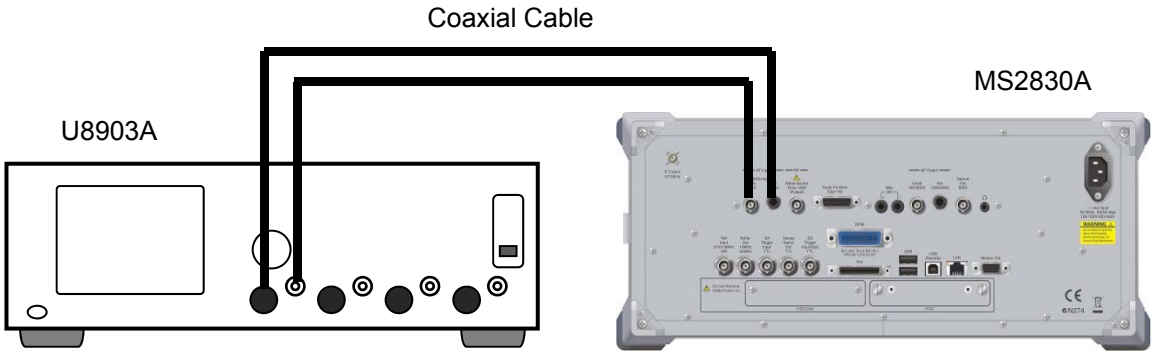


Figure 4.3.2-1 Connection for Input Level Accuracy Test

(3) Test target standards

Table 4.3.2-1 Standard

Standard	Condition
±0.4 dB	18 to 28°C

(4) Test Procedure

Table 4.3.2-2 Setting Level

No.	MS2830A Audio Analyzer Level Range (mV peak)	U8903A Output Level (mV rms)
1	5000	3500*
2	500	350.0*
3	50	35.00*

*: The input level to the MS2830A Audio Analyzer in Figure 4.3.2-1. Set the correction value of **Syscal_Unbal/Syscal_Bal** acquired in 4.3.1 “Output level calibration” in the U8903A.

Table 4.3.2-3 Frequency Setting

No.	Frequency (Hz)
1	400
2	1000

1. Connect the devices according to Figure 4.3.2-1.
2. Press Preset.
3. Press F1 (Preset) to initialize the MS2830A.
4. Initialize the U8903A.
5. Set the Mode of the MS2830A to RX measurement mode.
6. Set the MS2830A as below.
   - High Pass Filter: Off
   - Low Pass Filter: Off
   - Weighting: Off
7. Set AF Input of the MS2830A as below.
   - Input Type: Unbal.
   - Input Range: 5 V p
8. Set Generator Channel 1 of the U8903A as below.
   - Frequency: 1 kHz
   - Output Level: [Syscal_Unbal_3500] mV rms
   - Output Type: Unbal
   - Impedance: 50 Ω
   - Output Signal: On
9. Set the frequency of Generator Channel 1 of the U8903A to 400 Hz.
10. Press Single to measure.
11. Record the measurement results of AF Level rms of the MS2830A.
12. Calculate input level accuracy by the formula below.
    Input level accuracy = 20 × log (MS2830A Audio Analyzer measured value/U8903A set value)
13. Set the frequency of No.2 or of bigger number in Table 4.3.2-3 for the U8903A and repeat Steps 9 through 12.
14. Set the level of No.2 or of bigger number in Table 4.3.2-2 for the U8903A and the MS2830A and repeat Steps 8 through 13.
15. Set Generator Channel 1 of the U8903A as below.
    - Frequency: 1 kHz
    - Output Level: [Syscal_Unbal_3500] mV rms
    - Output Type: Bal
    - Impedance: 100 Ω
    - Output Signal: On
16. Repeat Steps 9 through 12.
17. Turn Off the U8903A output.

4.3.3 Input distortion

(1) Measuring instrument for tests
Audio Analyzer: U8903A

(2) Setups
Below is the connection when the U8903A is used as Audio Signal Generator.

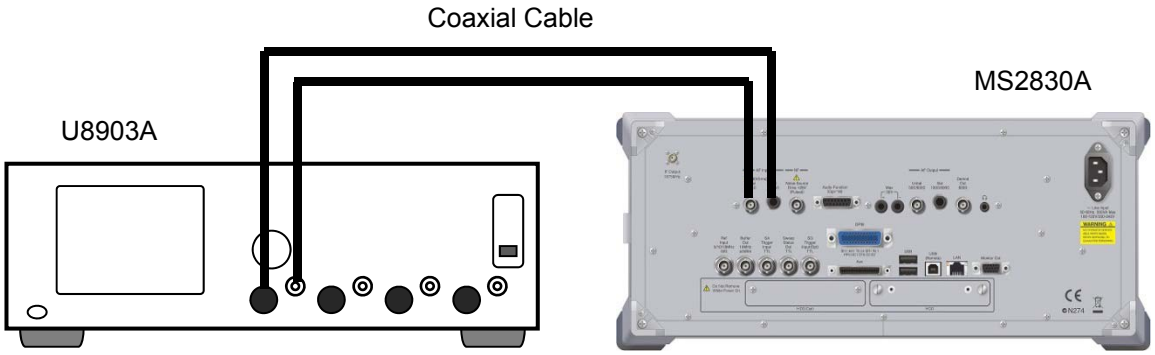


Figure 4.3.3-1 Connection of Input Distortion Test

(3) Test target standards

Table 4.3.3-1 Standard

Standard	Condition
< –60 dB	18 to 28°C

(4) Test Procedure

1. Connect the devices according to Figure 4.3.3-1.
2. Press Preset.
3. Press F1 (Preset) to initialize the MS2830A.
4. Initialize the U8903A.
5. Set the Mode of the MS2830A to RX measurement mode.
6. Set the MS2830A as below.
   - High Pass Filter: Off
   - Low Pass Filter: Off
   - Weighting: Off
7. Set AF Input of the MS2830A as below.
   - Input Type: Unbal.
   - Input Range: 5 V p

8. Set Generator Channel 1 of the U8903A as below.
   Frequency: 1 kHz
   Output Level: [Syscal_Unbal_1400] V rms
   Output Type: Unbal
   Impedance: 50 Ω
   Output Signal: On
9. Press 

to measure.
10. Record the measurement results of AF Level rms of the MS2830A.
11. Read THD+N of the MS2830A. This value is a measured value of the input distortion.
12. Set AF Input of the MS2830A as below.
    ・Input Type: Bal.
    ・Input Range: 5 V p
13. Set Generator Channel 1 of the U8903A as below.
    Frequency: 1 kHz
    Output Level: [Syscal_bal_1400] V rms
    Output Type: Bal
    Impedance: 100 Ω
    Output Signal: On
14. Repeat Steps 9 through 10.
15. Turn Off the U8903A output.

4.3.4 Crosstalk

(1) Measuring instrument for tests
Only MS2830A

(2) Setups
Remove the cables from AF Input and AF Output of the MS2830A.

(3) Test target standards

Table 4.3.4-1 Standard

Standard	Condition
> 80 dB	18 to 28°C

(4) Test Procedure

Table 4.3.4-2 Frequency Setting

No.	U8903A Output Frequency (Hz)
1	400
2	1000

1. Press Preset.
2. Press F1 (Preset) to initialize the MS2830A.
3. Set the MS2830A as below.
   Waveform: Tones
   Tone1 Freq: 400 Hz
   Tone1 Level: 3500 mV rms
   Output Type: Unbal.
   Output Impedance: 50 Ω
4. Set Output Tone1 of the MS2830A to On to turn On the signal output.
5. Set the Mode of the MS2830A to RX measurement mode.
6. Set the MS2830A as below.
   ·High Pass Filter: Off
   ·Low Pass Filter: Off
   ·Weighting: Off
7. Set AF Input of the MS2830A as below.
   ·Input Type: Unbal.
   ·Input Range: 5 V p
8. Press Single to measure.
9. Record the measurement results of AF Level rms of the MS2830A.
10. Calculate crosstalk (AF Output → AF Input) in the next formula.
    Crosstalk = –20 × log (measured value/3500)

11. Set the frequency of No.2 or of bigger number in Table 4.3.4-2 to Tone1 Frequency and repeat Steps 4 through 10.
12. Set the MS2830A as below.

Waveform:	Tones
Tone1 Freq:	400 Hz
Tone1 Level:	3500 mV rms
Output Type:	Bal.
Output Impedance:	100 Ω

13. Set AF Input of the MS2830A as below.

·Input Type:	Bal.
·Input Range:	5 V p

14. Repeat Steps 8 through 11.
15. Set Output Tone1 to Off to turn Off the signal output.

4.3.5 Output level accuracy

(1) Measuring instrument for tests
Audio Analyzer: U8903A

(2) Setups
Below is the connection when the U8903A is used as Audio Analyzer.

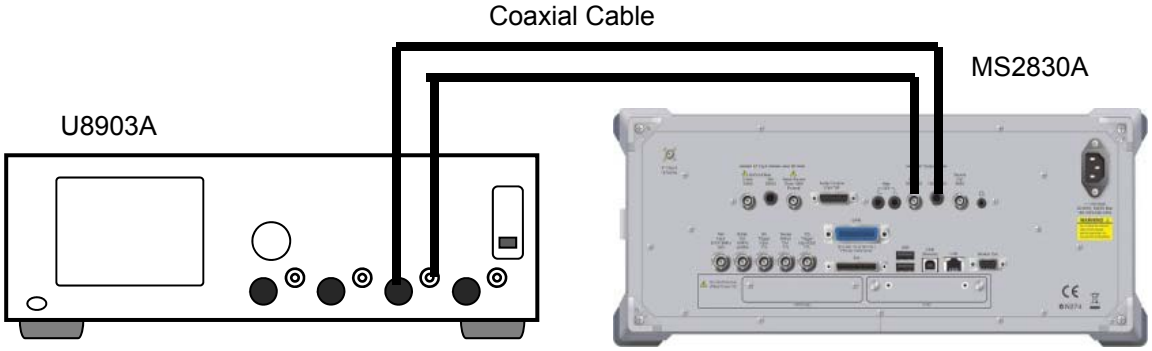


Figure 4.3.5-1 Connection for Output Level Accuracy Test

(3) Test target standards

Table 4.3.5-1 Standard

Standard	Condition
±0.3 dB	1 kHz, 100 kΩ termination, 18 to 28°C

(4) Test Procedure

Table 4.3.5-2 Setting Level

No.	MS2830A Audio Generator Output Level (mV rms)	
	Output Type:Unbal.	Output Type:Bal.
1	3500	7000
2	350.0	700.0
3	7.000	7.000

1. Connect the devices according to Figure 4.3.5-1.
2. Press Preset.
3. Press F1 (Preset) to initialize the MS2830A.
4. Perform the Audio Generator setting on the MS2830A as below.
   Output Type: Unbal.
5. Initialize the U8903A.
6. Turn Off the LPF of the U8903A analyzer.

7. Set the MS2830A as below.
   Waveform : Tones
   Tone1 Freq: 1 kHz
   Tone1 Level: 3500 mV rms
8. Set Output Tone1 of the MS2830A to On to turn On the signal output.
9. Measure the level (mV rms) by Analyzer Channel 1 of the U8903A.
10. Calculate the input level accuracy of these channels by the formula below.
    Output level accuracy = 20 × log(Measured value/Output level)
11. Set the level of No. 2 or of bigger number in Table 4.3.5-2 for Tone1 Level of the MS2830A and repeat Steps 7 through 11.
12. Perform the Audio Generator setting on the MS2830A as below.
    ・Output Type: Bal.
13. Set the MS2830A as below.
    Waveform : Tones
    Tone1 Freq: 1 kHz
    Tone1 Level: 7000 mV rms
14. Repeat Steps 8 through 11.
15. Set Output Tone1 of the MS2830A to Off to turn Off the signal output.

4.3.6 Total harmonic distortion + noise

(1) Measuring instrument for tests
Audio Analyzer: U8903A

(2) Setups
Below is the connection when the U8903A is used as Audio Analyzer.

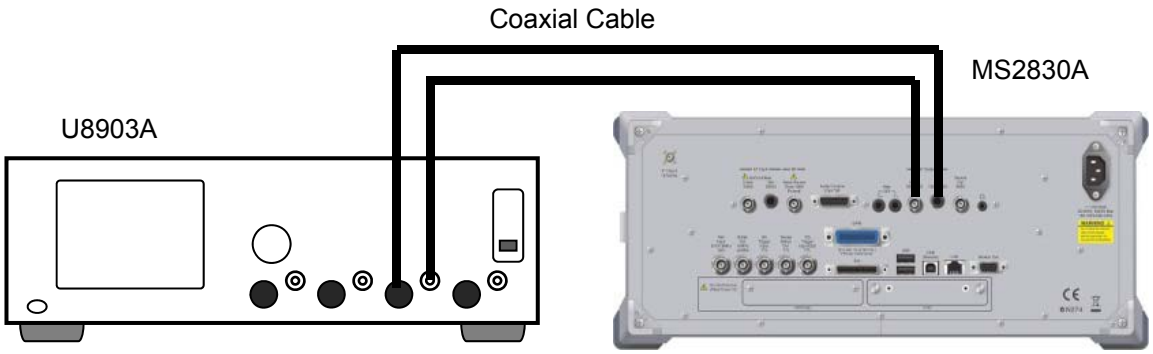


Figure 4.3.6-1 Connection for Total Harmonic Distortion + Noise Test

(3) Test target standards

Table 4.3.6-1 Standard

Standard	Condition
< –60 dB	1 kHz, 100 kΩ termination, 0.7 V rms, 20 Hz to 25 kHz band, 18 to 28°C

(4) Test Procedure

1. Connect the devices according to Figure 4.3.6-1.
2. Press Preset.
3. Press F1 (Preset) to initialize the MS2830A.
4. Perform the Audio Generator setting on the MS2830A as below.
   Output Type: Unbal.
5. Initialize the U8903A.
6. Set the MS2830A as below.
   Waveform: Tones
   Tone1 Freq: 1 kHz
   Tone1 Level: 700 mV rms
7. Set the LPF of the U8903A analyzer to 30 kHz.
8. Set Output Tone1 of the MS2830A to On to turn On the signal output.
9. Measure THD+N (dB) by Analyzer Channel 1 of the U8903A.

10. Perform the Audio Generator setting on the MS2830A and the U8903A setting as below.
    Output Type: Bal.
11. Set the MS2830A as below.
    Waveform: Tones
    Tone1 Freq: 1 kHz
    Tone1 Level: 700 mV rms
12. Measure THD+N (dB) by Analyzer Channel 1 of the U8903A.
13. Set Output Tone1 of the MS2830A to Off to turn Off the signal output.

4.4 Example of Performance Test Result Form

RF Performance Test

Table 4.4-1 Residual FM

Frequency	Measured Value [Hz]	Specifications	Pass/Fail
100 kHz		3.35 Hz	
400 MHz			
2700 MHz			

Table 4.4-2 Residual ϕM

Frequency	Measured Value [rad]	Specifications	Pass/Fail
100 kHz		0.01 rad	
400 MHz			
2700 MHz			

Table 4.4-3 Residual AM

Frequency	Measured Value [%]	Specifications	Pass/Fail
100 kHz		0.30%	
400 MHz			
2700 MHz			

Output Level Calibration:

Table 4.4-4 Value of Syscal

Calibration Level (mV rms)	Syscal_Unbal (mV rms)	Syscal_Bal (mV rms)
3500		
1400		
700.0		
350.0		
35.00		
7.000		

Input Level Accuracy

Table 4.4-5 Unbalance Measured Value (dB)

Frequency (Hz)	Setting Level (mV rms)		
	3500	350.0	35.00
400			
1000			

Minimum rating: –0.4 dB
Maximum rating: +0.4 dB

Table 4.4-6 Balance Measured Value (dB)

Frequency (Hz)	Setting Level (mV rms)		
	3500	350.0	35.00
400			
1000			

Minimum rating: –0.4 dB
Maximum rating: +0.4 dB

Input Distortion

Table 4.4-7 Measured Value (dB)

Input Type	Minimum Rating	Measured Value	Maximum Rating
Unbalance			–60
Balance			–60

Crosstalk

Table 4.4-8 Audio Generator → Audio Analyzer (Unbalance) (dB)

Frequency (Hz)	Minimum Rating	Measured Value	Maximum Rating
400	80		
1000	80		

Table 4.4-9 Audio Generator → Audio Analyzer (Balance) (dB)

Frequency (Hz)	Minimum Rating	Measured Value	Maximum Rating
400	80		
1000	80		

Output Level Accuracy

Table 4.4-10 Unbalance Measured Value (dB)

Frequency (Hz)	Setting Level (mV rms)		
	3500	**350.0**	**7.000**
1000			

Minimum rating: –0.3 dB
Maximum rating: +0.3 dB

Table 4.4-11 Balance Measured Value (dB)

Frequency (Hz)	Setting Level (mV rms)		
	7000	**700.0**	**7.000**
1000			

Minimum rating: –0.3 dB
Maximum rating: +0.3 dB

Total harmonic distortion + Noise

Table 4.4-12 Unbalance Measured Value (dB)

Frequency (Hz)	Minimum Rating	Measured Value	Maximum Rating
1000			–60

Table 4.4-13 Balance Measured Value (dB)

Frequency (Hz)	Minimum Rating	Measured Value	Maximum Rating
1000			–60

Chapter 5 Other Functions

This chapter describes other functions of this application.

5.1 Selecting Other Functions

Pressing F8 (Accessory) on the main function menu displays the Accessory function menu.

Table 5.1-1 Accessory function menu

Function Keys	Menu Display	Function
F1	Title	Sets the title character string.
F2	Title (On/Off)	Displays (On) or hides (Off) the title character string.
F4	Erase Warm Up Message	Erases the warmup message display.

5.2 Setting Title

A title of up to 32 characters can be displayed on the screen. (Character strings of up to 17 characters can be displayed on a function menu. The maximum number of characters to be displayed on the top of the function menu varies according to character string.)

<Procedure>

1. Press F8 (Accessory) on the main function menu.
2. Press F1 (Title) to display the character string input screen. Select a character using the rotary knob, and enter it by pressing Enter. Enter the title by repeating this operation. When the title is entered, press F7 (Set).
3. Press F2 (Title) and then select "Off " to hide the title.

5.3 Erasing Warmup Message

The warmup message (⧖ Warm Up), which is displayed upon power-on and indicates that the level and frequency are not stable, can be deleted.

<Procedure>

1. Press F8 (Accessory) on the main function menu.
2. Press F4 (Erase Warm Up Message) to erase the warmup message.

Appendix A Error Message

Table A-1 Error Messages

Message	Description
Out of range.	–
Prohibited when Mode is TX.	–
Prohibited when Mode is RX.	–
Invalid Operation for running decode monitor.	–
Valid only when Mode is TX and modulation is FM.	–
USB Audio device doesn't exist.	–
AF1 user wave-file format is abnormal	–
Valid only when measurement is complete state	–
Insufficient data.	The number of command arguments is wrong. Only the remote control is supported.
Invalid numeric data.	Invalid data was specified for numeric data. Only the remote control is supported .
Invalid string data.	Invalid data was specified for string data. Only the remote control is supported.
Not available when AF Level is invalid value.	–
Only available while replaying.	–
Shortage of data samples in IQ data file.	Analysis cannot be performed because the number of data samples of the IQ data file is less than the minimum number of data samples required for analysis.
Unsupported SpanFrequency.	–
Unsupported SamplingClock.	–
Not available if not re-capture after changing common parameter	The operation is invalid if re-capture is not performed after common parameters change.
Not available during measurement.	–
Invalid character	–
Not available when Frequency Graph or Time Graph is Off.	The setting is not available when **Frequency Domain** or **Time Domain** is **Off**.
Not available when Deflection View is Off.	–
Valid only when Signal Frequency is Manual.	–
Not available when AF Frequency Reference is Off.	_
Valid only when the Audio Analyzer option is installed.	Invalid if the MS2830A-018/118 Audio Analyzer is not installed.
Not available when AMA is being operated with other applications.	_

Table A-1 Error Messages (Cont'd)

Message	Description
Valid only when Audio Generator's Waveform is Tones.	–
Valid only when Audio Generator's Waveform is DCS.	–
Valid only when Audio Generator's Waveform is Tones or DCS.	–
Valid only when Audio Generator's Waveform is Noise.	–
Valid only when Audio Generator's Waveform is DTMF.	–
Entered value cannot exceed "xxx".	A value exceeding "xxx" cannot be set for **Bottom Level**.
Entered value cannot be less than "xxx".	A value less than "xxx" cannot be set for **Top Level**.
Entered value cannot exceed "xxx".	A value exceeding "xxx" cannot be set for **Start Frequency**.
Entered value cannot be less than "xxx".	A value less than "xxx" cannot be set for **Stop Frequency**.
Valid only when Time Domain is On.	–
Valid only when Frequency Domain is On.	–
Valid only when Scale Mode is Fixed.	**Fixed Range** can be set only when **Scale Mode** is **Fixed**.
Valid only when Scale Mode is Auto.	**Minimum Range** can be set only when **Scale Mode** is **Auto**.
Valid only when Unit is %.	–
Valid only when Unit is dB.	–
Valid only when Unit is Hz.	–
Valid only when Meter is On.	–
Valid only when Mode is TX and modulation is AM.	–
Valid only when Mode is TX and modulation is PM.	–
Valid only when X-AXIS is Log.	–
Valid only when X-AXIS is Linear.	–
Valid only when Marker Mode is Delta.	–
Valid only when Modulation is not Wide FM.	–
Valid only when AMA is being operated with other applications.	–

Appendix B Default Value List

<Setting Measurement Mode>

Mode	TX

<TX Measurement Mode>

Frequency	
TX Frequency	1 GHz
Auto Detect	Off
RX Frequency	1 GHz
Auto Adjust Range	Off
Coupled Frequency	Off
Amplitude	
Input Level	–10 dBm
Input PreAmp	Off
Input Offset	Off
Input Offset Value	0.00 dB
Output Level	–13.99 dBµV (EMF)
Output Unit	dBµV (EMF)
Output Offset	Off
Output Offset Value	0.00 dB
Modulation Analysis	
Modulation	FM
RF Power Set Reference	Off
DCS Analysis	Off
Limit Level	–50 dBm
AF Level Set Reference	Off
RF Frequency Correction	On
AF Frequency Reference Setting	
AF Frequency Reference	Off
AF Reference Frequency	1 kHz
AF Frequency Reference Unit	ppm
AF Level	Tone
Meter Settings	
Reference	Deviation Peak to Peak: Center Except Deviation Peak to Peak: Center (Unit = dB) Minimum (Unit = %)
Reference Value	Deviation Peak to Peak: 3.5 kHz / 0% SINAD: 20 dB / 0% Distortion, THD: –40 dB / 0%

Range1	Deviation Peak to Peak: 200 Hz / 2% SINAD: 8 dB / 2000% Distortion or THD: 20 dB / 2%
Range2	Deviation Peak to Peak: 1000 Hz / 10% SINAD: 20 dB / 10000% Distortion, THD: 40 dB / 10%
Deflection View	Off
Deflection Count	10
Deflection Judge	Off
Pass Range	Deviation Peak to Peak: 100 Hz / 1% SINAD: 2 dB / 2000% Distortion: 2 dB / 1% THD: 2 dB / 2%
Deviation Reference	3500 Hz (Deviation Peak to Peak)
Meter	Deviation Peak to Peak: On Except Deviation Peak to Peak: Off
Unit	Deviation Peak to Peak: Hz SINAD, Distortion: dB THD: %
Distortion Measurement Setting	
Signal Frequency	Peak
Manual Frequency	1 kHz
Start Frequency	10 Hz
Stop Frequency	60 kHz
Unit	SINAD, Distortion: dB THD: %
Filter Setting	
HPF	Off
LPF	Off
1st-Filter De-Emphasis	Off
2nd-Filter	Off
Monitor Out	
Monitor Out	Off
Monitor Volume	50
Speaker/Headphone Out	Off
Average	
Average	Off
Count	10

Marker

Marker	Off
Graph	Time
Marker1 / Marker2	Time Domain: 0 ms
	Frequency Domain: 15.625 Hz

Graph Setting

Graph Select	Time Domain: On
	Frequency Domain: Off

Time Domain Setting

Time Range	4 ms
Scale Mode	Auto
Minimum Range	5 kHz
Fixed Range	5 kHz

Frequency Domain Setting

Window Function	Hann
X-AXIS	Log
Start Freq	10 Hz
Stop Freq	20 kHz
Top Level	AM Modulation: 100%
	FM Modulation: 5 kHz
	ϕM Modulation: 5 rad
Bottom Level	AM Modulation: 0.001%
	FM Modulation: 0.001 Hz
	ϕM Modulation: 0.001 rad

<Audio Generator Function>

Audio Generator Setting

Waveform	Tones
Output Tone1	Off
Tone1 Freq	1000 Hz
Tone1 Level	1 mV
Output Tone2	Off
Tone2 Freq	67 Hz
Tone2 Level	1 mV
Output Tone3	Off
Tone3 Freq	88 Hz
Tone3 Level	1 mV
DCS	Off
DCS Code	023
DCS Level	1 mV
DCS Polarity	Normal
Output Noise	Off
Type	Noise
Level (Noise)	1 mV

	Level Offset	Off
	Offset	10 dB
	G.227 Filter	On
	Code	0
	Level (DTMF)	1 mV
	Length	30 ms
	Output Type	Unbalance
	Output Impedance	600 Ω
	Output Impedance Reference	600 Ω
PTT		
	PTT	Off
Generator Window Position		
	Generator Window Position	Bottom
<RX Measurement Mode>		
Frequency		
	RX Frequency	1 GHz
	Coupled Frequency	Off
Amplitude		
	Output Level	–13.99 dBµV (EMF)
	Output Unit	dBµV (EMF)
	Output Offset	Off
	Output Offset Value	0.00 dB
Modulation Analysis		
	Modulation	FM
	Signal Output Play Mode	Repeat
AF Setting		
	AF1 Tone	Off
	AF2 Tone	Off
	AF1 Tone Frequency	1000.0 Hz
	AF2 Tone Frequency	67.0 Hz
	AF1 Tone Deviation (FM)	3500.0 Hz
	AF2 Tone Deviation (FM)	500.0 Hz
	AF1 Tone Radian (ϕM)	3.50 rad
	AF2 Tone Radian (ϕM)	7.46 rad
	AF1 Tone Depth (AM)	30%
	AF2 Tone Depth (AM)	30%
	AF3 Tone	Off
	AF3 Tone Frequency	67.0 Hz
	AF3 Tone Deviation (FM)	500.0 Hz
	AF3 Tone Radian (ϕM)	7.46 rad
	AF3 Tone Depth (AM)	30%
	Digital Code Squelch	Off
	Digital Code Squelch Data	023
	Digital Code Squelch Deviation	500.0 Hz

	Digital Code Squelch Polarity	Normal
	LPF	Off
	AF Monitor	Off
	Monitor Volume	50
	Device	D
Setting modulation wave signal		
	Signal Modulation	Off
	Signal Output	Off
<Audio Analyzer Function>		
Audio Analysis		
	Input Type	Unbalance
	Input Range	5 Vp
	AF Level Set Reference	Off
	HPF	Off
	LPF	Off
	Weighting	Off
AF Frequency Reference Setting		
	AF Frequency Reference	Off
	AF Reference Frequency	1 kHz
	AF Frequency Reference Unit	ppm
	AF Level	Tone
Distortion Measurement Setting		
	Signal Frequency	Peak
	Manual Frequency	1 kHz
	Start Frequency	10 Hz
	Stop Frequency	60 kHz
	Unit	SINAD: dB THD, THD+N: %
Meter Settings		
	Reference	Center (Unit = dB) Minimum (Unit = %)
	Reference Value	SINAD: 12 dB / 0% THD, THD+N: –30 dB / 0%
	Range1	SINAD: 8 dB / 2000% THD, THD+N: 10 dB / 10%
	Range2	SINAD: 24 dB / 5000% THD, THD+N: 20 dB / 20%
	Deflection View	Off
	Deflection Count	SINAD: 30 THD, THD+N: 10
	Deflection Judge	Off
	Pass Range	SINAD: 3 dB / 2000% THD, THD+N: 2 dB / 5%

Meter	SINAD: On THD, THD+N: Off
Unit	SINAD: dB THD, THD+N: %
Graph Setting	
Graph Select	Time Domain: On Frequency Domain: Off
Time Domain Setting	
Time Range	4 ms
Scale Mode	Auto
Minimum Range	±5 mV
Fixed Range	±1 V
Frequency Domain Setting	
Window Function	Hann
X-AXIS	Log
Start Freq	10 Hz
Stop Freq	20 kHz
Top Level	0 dBV
Bottom Level	–150 dBV
Average	
Average	Off
Count	10
Marker	
Marker	Off
Graph	Time
Marker1 / Marker2	Time Domain: 0 ms Frequency Domain: 23.4375 Hz

<Setting Terminals for External Device Control>

Audio Func. Setting → Output1	
Output1	Off
Polarity	Positive
Audio Func. Setting → Output2	
Output2	Off
Polarity	Positive
Audio Func. Setting → Input1	
Detect Polarity	Positive
Audio Func. Setting → Input2	
Detect Polarity	Positive
Audio Func. Setting	
Open Collector	Open
Audio Func. Setting → PTT	
PTT Polarity	Positive