

MX269018A
Analog Measurement Software/
MS2830A/MS2840A
Signal Analyzer
Analog Signal Generator
Operation Manual

22nd 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) or MS2840A Signal Analyzer Operation Manual (Mainframe: Operation). Please also refer to them before using the equipment.
- Keep this manual with the equipment.

ANRITSU CORPORATION

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Symbols used in manual



DANGER

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



WARNING

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



CAUTION

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

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



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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/MS2840A Signal Analyzer Analog Signal Generator
Operation Manual Operation

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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.

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

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 - iii) Recovery of lost or damaged data.
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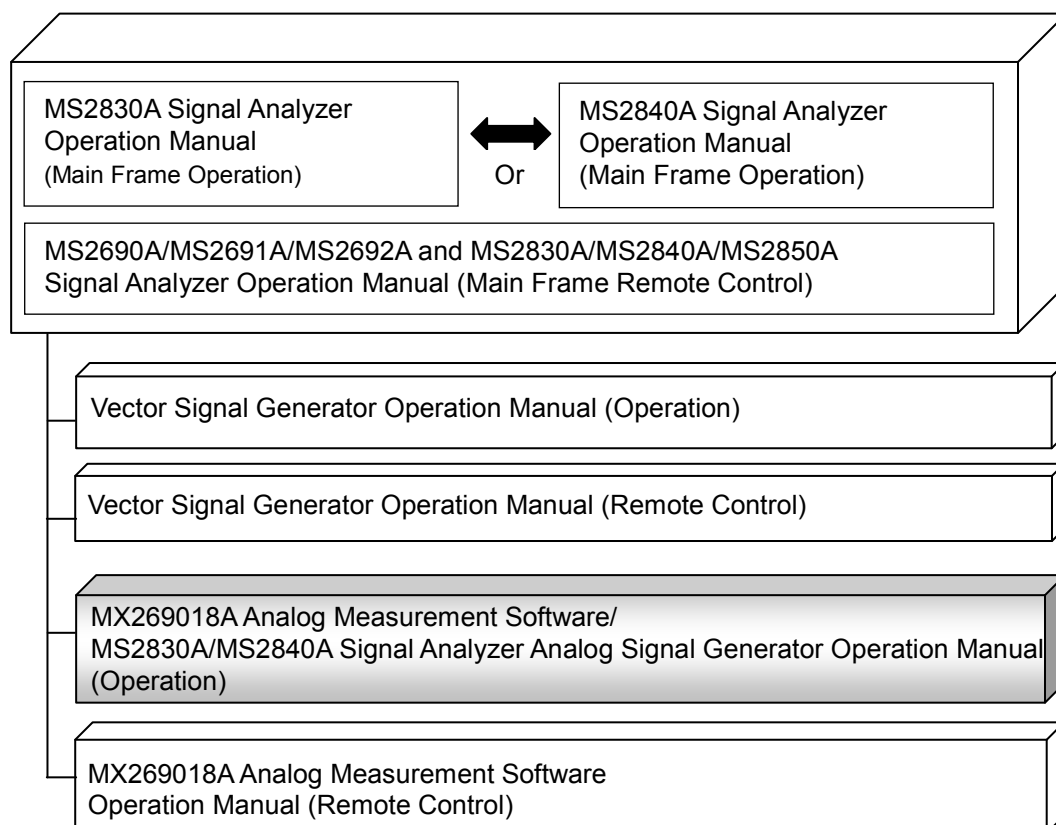
Cautions against computer virus infection

- 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.

About This Manual

■ Composition of Operation Manuals

This operation manual is for MX269018A Analog Measurement Software (Operation) are comprised as shown in the figure below.



- 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.
- MX269018A Analog Measurement Software/
MS2830A/MS2840A Signal Analyzer Analog Signal Generator Operation Manual (Operation)
This manual describes how to operate the MX269018A Analog Measurement Software and MS2830A, MS2840A signal analyzer analog signal generator.

- MX269018A Analog Measurement Software Operation Manual (Remote Control)

This manual describes how to use the MX269018A Analog Measurement Software and MS2830A, MS2840A signal analyzer analog signal generator via remote command.

As for MS2830A, MS2840A signal analyzer application's basic remote control functions and its definitions of common commands, refer to "MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A 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.

Convention Used in This Manual

Throughout this document, the use of MS2830A is assumed unless otherwise specified. If using MS2840A, change MS2830A to read MS2840A.

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Chapter 1 Outline

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

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1.1 Product Overview

The MS2830A and MS2840A 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 and MS2840A 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 MS2840A, or 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 or MS2840A is required.

- MS2830A-088/188, MS2840A-088/188 3.6GHz Analog Signal Generator
- MS2830A-029/129, MS2840A-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. They are sold separately.

Table 1.2.2-1 Applicable Parts

Model/Symbol	Product Name	Remarks
W3555AE	MX269018A Analog Measurement Software/ MS2830A/MS2840A 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
A0086C	USB Audio	CREATIVE

1.2.3 Options

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

Table 1.2.3-1 Options (MS2830A)

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

MS2840A mainframe options for signal output function of MX269018A are described in Table 1.2.3-1. They are sold separately.

Table 1.2.3-2 Options (MS2840A)

Option No.	Product Name	Remarks
MS2840A-020	3.6GHz Vector Signal Generator	250 kHz to 3.6 GHz
MS2840A-021	6GHz Vector Signal Generator	250 kHz to 6 GHz
MS2840A-022	Low Power Extension for Vector Signal Generator	
MS2840A-029	Analog Function Extension for Vector Signal Generator	MS2840A-020/120 option
MS2840A-088	3.6GHz Analog Signal Generator	100 kHz to 3.6 GHz
MS2840A-120	3.6GHz Vector Signal Generator Retrofit	250 kHz to 3.6 GHz
MS2840A-121	6GHz Vector Signal Generator Retrofit	250 kHz to 6 GHz
MS2840A-122	Low Power Extension for Vector Signal Generator Retrofit	
MS2840A-129	Analog Function Extension for Vector Signal Generator Retrofit	
MS2840A-188	3.6GHz Analog Signal Generator, retrofit	100 kHz to 3.6 GHz
MS2840A-189	Vector Function Extension for Analog Signal Generator Retrofit	MS2840A-088/188 option

1.3 Product Specifications

When MS2830A, MS2840A 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, when MS2840A or MS2830A-062/066 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
Setting frequency range	FM, ϕ M, AM measurement: 100 kHz to the upper limit of the main unit Wide Band FM measurement: 10 MHz to the upper limit of the main unit
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: $\pm(\text{Reference frequency accuracy} \times \text{carrier frequency} + 1) \text{ Hz}$
FM measurement	FM measurement performance is defined in the following conditions. 100 kHz \leq frequency \leq 2700 MHz (FM measurement) 10 MHz \leq frequency \leq 2700 MHz (Wide Band FM measurement)
Frequency deviation (FM)	0 < Frequency deviation \leq 20 kHz 20 kHz < Frequency deviation \leq 40 kHz (Nominal)
Frequency deviation (Wide Band FM)	0 < Frequency deviation \leq 20 kHz 20 kHz < Frequency deviation \leq 1 MHz (Nominal)
Demodulation frequency range	20 Hz to 20 kHz
Frequency deviation accuracy	1% of an indication value \pm 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

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

Items	Specifications
<p>ϕM measurement</p> <p>ϕM Deviation</p> <p>Demodulation frequency range</p> <p>ϕM deviation accuracy</p> <p>Residual ϕM</p> <p>Modulation distortion</p>	<p>ϕM measurement performance is defined in the following conditions.</p> <p>$100 \text{ kHz} \leq \text{frequency} \leq 2700 \text{ MHz}$</p> <p>0 to (20 kHz/modulation frequency [Hz]) rad</p> <p>20 Hz to 20 kHz</p> <p>1% of an indication value \pm residual ϕM</p> <p>0.01 rad rms (at demodulation bandwidth: 0.3 to 3 kHz)</p> <p>1% (at demodulation bandwidth: 0.3 to 3 kHz)</p>
<p>AM measurement</p> <p>AM depth</p> <p>Demodulation frequency range</p> <p>AM depth accuracy</p> <p>Residual AM</p> <p>Modulation distortion</p> <p>Filter</p> <p>Low pass</p> <p>High pass</p> <p>Band pass</p> <p>De-emphasis</p> <p>Transmitter power accuracy</p> <p>Demodulation monitor</p>	<p>AM measurement performance is defined in the following conditions.</p> <p>$100 \text{ kHz} \leq \text{frequency} \leq 2700 \text{ MHz}$</p> <p>0 to 98%</p> <p>20 Hz to 20 kHz</p> <p>1% of an indication value \pm residual AM</p> <p>0.3% (At demodulation bandwidth: 0.3 to 3 kHz)</p> <p>0.3% (At demodulation bandwidth: 0.3 to 3 kHz)</p> <p>300 Hz, 3 kHz, 15 kHz, 20 kHz</p> <p>< 1 Hz*, < 20 Hz*, 50 Hz, 300 Hz, 400 Hz, 30 kHz</p> <p>CCITT, C-Message, CCIR 468, CCIR-ARM, A-Weight</p> <p>750 μs, 500 μs, 75 μs, 50 μs, 25 μs</p> <p>*: Available only when Modulation is set to FM.</p> <p>After CAL execution at 18 to 28°C, input attenuator $\geq 10 \text{ dB}$, the signal measured is within the measurement level range and less than or equal to Input Level</p> <p>$\pm 0.5 \text{ dB}$</p> <p>(At Pre-Amp Off, or Pre-Amp not installed) The transmitter power accuracy complies with the absolute amplitude accuracy of MS2830A/MS2840A mainframe.</p> <p>Outputs demodulated signals to USB Audio equipment connected to the MS2830A/MS2840A USB terminal.</p> <p>With MS2830A-018/118 installed:</p> <p>Outputs demodulated signals from the built-in speaker and headphone (FM measurement only).</p>

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

Items	Specifications
Received power measurement	<p>MS2830A: The function is enabled when the MS2830A-088/188 Analog Signal Generator option is installed or when the MS2830A-020/120/021/121 Vector Signal Generator option and MS2830A-029/129 Analog Function Extension option for Vector Signal Generator is installed.</p> <p>MS2840A: The function is enabled when the MS2840A-088/188 Analog Signal Generator option is installed or when the MS2840A-020/120/021/121 Vector Signal Generator option and MS2840A-029/129 Analog Function Extension option for Vector Signal Generator is installed.</p>
RF signal output	<p>MS2830A: The performance complies with the MS2830A-088/188, or MS2830A-020/120/021/121 and MS2830A-029/129.</p> <p>MS2840A: The performance complies with the MS2830A-088/188, or MS2830A-020/120/021/121 and MS2840A-029/129.</p>
Frequency setting range	100 kHz to 3000 MHz
Frequency setting resolution	1 Hz
Output setting level	<p>–136 to –3 dBm (Frequency ≤ 25 MHz)</p> <p>–136 to +15 dBm (Frequency > 25 MHz)</p>
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	<p>Without MS2830A-018/118, or MS2840A: AF Tone source × 2, Digital Code Squelch signal generator</p> <p>With MS2830A-018/118 installed: AF Tone source × 3, Digital Code Squelch signal generator</p>
Internal AF signal source setting range	20 Hz to 40 kHz
Internal AF signal source setting resolution	0.1 Hz,
DCS code setting range	Setting value ±3 Hz on use of Digital Code Squelch signal 000 to 777 (Three-digit octal notation)

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

Items	Specifications
ϕ M Modulation	
ϕ M deviation setting range	Settable with the range of 0 to 50.0 rad (internal modulation frequency \times phase deviation) < 100 k
ϕ M deviation setting resolution	0.01 rad
ϕ M deviation accuracy	$\pm 1\%$ of a setting value (residual ϕ M excluded)
Internal AF signal source	Without MS2830A-018/118, or MS2840A: AF Tone source $\times 2$ With MS2830A-018/118 installed: AF Tone source $\times 3$
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	$\pm 1\%$ of a setting value (residual AM excluded)
Internal AF signal source	Without MS2830A-018/118, or MS2840A: AF Tone source $\times 2$ With MS2830A-018/118 installed: AF Tone source $\times 3$
Internal AF signal source setting range	20 Hz to 40 kHz
Internal AF signal source setting resolution	0.1 Hz

1.3.2 MS2830A-029/129/088/188/189 Product Specifications

Table 1.3.2-1 lists the specifications for the MS2830A-029/129/088/188/189.

Table 1.3.2-1 MS2830A-029/129/088/188/189 Product Specifications

Items	Specifications
Function and performance	The following specifications are added to the specifications of the MS2830A-020/120/021/121 and MS2830A-022/122 installed.
Frequency	
Range	MS2830A-088/188/189: 100 kHz to 3.6 GHz MS2830A-029/129: Lower limit frequency: 100 kHz. The upper limit frequency depends on the vector signal generator installed.
Output level	
Output level accuracy	When the MS2830A-029/129/088/188 is installed, in CW mode, at 18 to 28 °C: Output level p [dBm] $-110 \leq p \leq -3 \pm 3.0 \text{ dB typ.}$ (100 kHz \leq frequency < 250 kHz)
Waveform generator	
	Available only when the MS2830A-189 is installed (when the MS2830A-088/188 is installed)

1.3.3 MS2840A-029/129/088/188/189 Product Specifications

Table 1.3.3-1 lists the specifications for the MS2840A-029/129/088/188/189.

Table 1.3.3-1 MS2840A-029/129/088/188/189 Product Specifications

Items	Specifications
Function and performance	The following specifications are added to the specifications of the MS2840A-020/120/021/121 and MS2840A-022/122 installed.
Frequency	
Range	MS2840A-088/188/189: 100 kHz to 3.6 GHz MS2840A-029/129: Lower limit frequency: 100 kHz. The upper limit frequency depends on the vector signal generator installed.
Output level	
Output level accuracy	When the MS2840A-029/129/088/188 is installed, in CW mode, at 18 to 28 °C: Output level p [dBm] $-110 \leq p \leq -3 \pm 3.0 \text{ dB typ.}$ (100 kHz \leq frequency < 250 kHz)
Waveform generator	
	Available only when the MS2840A-189 is installed (when the MS2840A-088/188 is installed)

1.3.4 MS2830A-018/118 Product Specifications

When the MS2830A-018/118 is installed, Audio Analyzer and Audio Generator functions are available. Table 1.3.4-1 shows the specifications.

Table 1.3.4-1 MS2830A-018/118 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, $\phi 6.3$ mm) Unbalance: BNC-J
Impedance	Balance: 200 k Ω (AC coupling, Nominal) Unbalance: 100 k Ω (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 \leq frequency \leq 25 kHz) ± 3.0 dB (25 kHz < frequency \leq 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, Time Range = 25 ms, 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 1.3.4-1 MS2830A-018/118 Product Specifications (Cont'd)

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, $\phi 6.3$ 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 \times 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 k Ω 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 k Ω 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 \leq 6.2 Vrms) 100 μ V (35 mVrms < Output Level \leq 350 mVrms) 10 μ V (Output Level \leq 35 mVrms) ± 0.3 dB (At 1 kHz, 100 k Ω termination, 18 to 28°C)
Output Level Accuracy	100 mA (Nominal, no short circuit)
Maximum Output Current	In the conditions of 1 kHz, 0.7 Vrms, 20 Hz to 25 kHz band, 100 k Ω termination, 18 to 28°C:
THD+N (Total Harmonic Distortion + Noise)	< -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 1.3.4-1 MS2830A-018/118 Product Specifications (Cont'd)

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)* or *MS2840A Signal Analyzer Operation Manual (Mainframe Operation)* for common features of the MS2830A or MS2840A not included in this manual.

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2.1.2	Rear panel	2-7
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2.3.2	Selecting application.....	2-15
2.4	Initialization and Calibration.....	2-16
2.4.1	Initialization	2-16
2.4.2	Calibration	2-16

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)* or *MS2840A Signal Analyzer Operation Manual (Mainframe Operation)*.

2.1.1 Front panel

This section describes the front-panel keys and connectors.

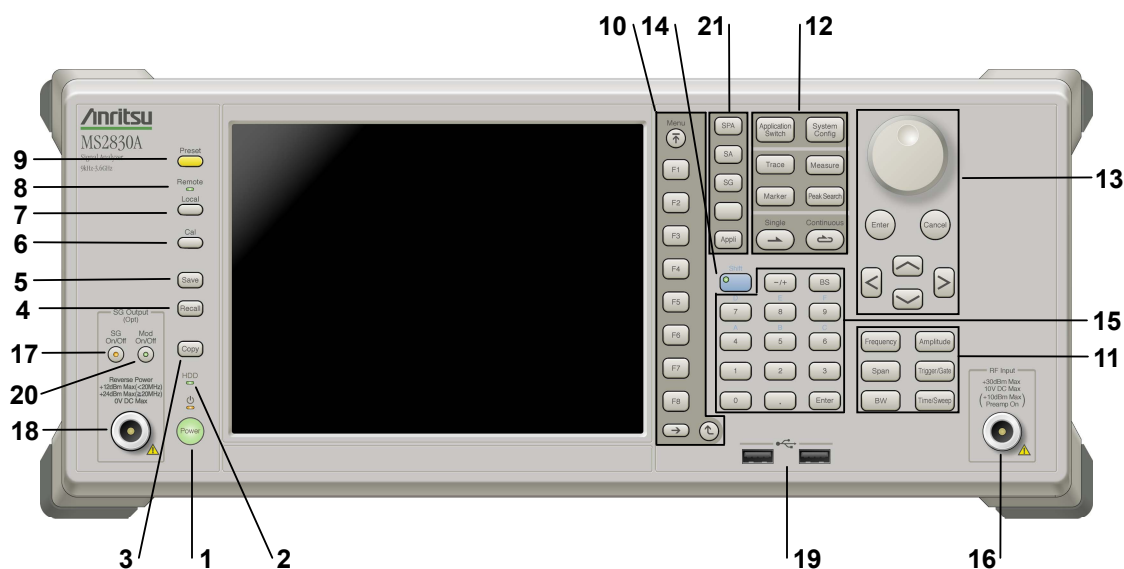












Figure 2.1.1-1 Front panel


- | | | |
|---|---|---|
| 1 |  | <p>Power switch</p> <p>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.</p> |
| 2 | <p>HDD</p>  <p>SSD</p>  | <p>Hard disk access lamp (MS2830A)</p> <p>Lights when accessing the internal hard disk</p> <p>SSD access lamp (MS2840A)</p> <p>Lights when accessing the internal SSD</p> |
| 3 |  | <p>Copy key</p> <p>Press to capture display screen and save to file.</p> |
| 4 |  | <p>Recall key</p> <p>Press to recall parameter file.</p> |

- 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
- Menu



F1

F2

F3


F4


F5

F6

F7

F8






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.

Menu



Top key

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

2-3


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.


 Press to set frequency parameters.

 Press to set level parameters.

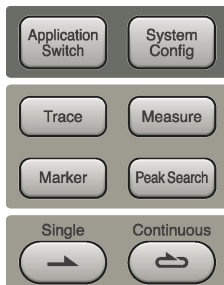
 No function is assigned to this key.

 Press to set trigger parameters.

 No function is assigned to this key.

 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.

 Press to switch application.


 Press to display Configuration screen.


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

 Press to set measurement item parameters.

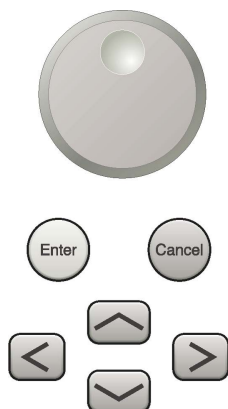
 Use when switching graph marker operation.

 Press to set parameters related to the peak search function.


 Press to start single measurement.


 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  to set the entered or selected data.

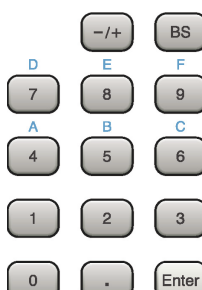
Press  to cancel input or selected data.

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  to delete the last entered digit or character.

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

16

RF Input

**RF Input connector**


Inputs an RF signal. Type N connector.

When MS2830A-045 or MS2840A-046 is installed: Type K connector

17

**RF Output Control key**

(MS2830A-020/120/021/121, MS2840A-020/120/021/121)

Press  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 MS2830A-044/045, MS2840A-044/046 is installed.

18 SG Output(Opt)



RF Output connector (MS2830A-020/120/021/121,
MS2840A-020/120/021/121)

Outputs RF signal, when the Vector Signal Generator option is installed.
This is not available when the MS2830A-044/045, MS2840A-044/046 is
installed.

19




USB connector (type A)

Connect the accessory USB keyboard, mouse or USB memory.

20



Modulation control key (MS2830A-020/120/021/121,
MS2840A-020/120/021/121)

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 MS2830A-044/045, MS2840A-044/046 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
MS2830A-005/105/007/006/106/009/109/077/078 or
MS2840A-005/105/006/106/009/109/077/177/078/178 is
installed.



SG key

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



Blank key

Not used.

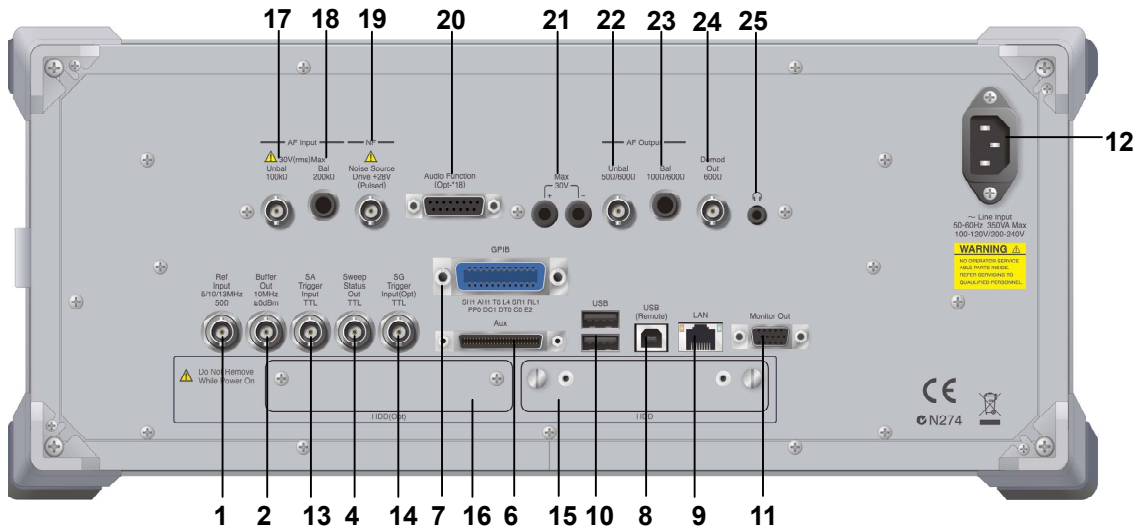


Appli key

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)* or *MS2840A Signal Analyzer Operation
Manual (Mainframe Operation)*.

2.1.2 Rear panel

This section describes the rear-panel connectors.




2
Preparation

Figure 2.1.2-1 Rear panel


- 1

Ref Input
5/10/13MHz
50Ω




2

Buffer Out
10MHz
≥0dBm



4

Sweep Status Out
TTL



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.

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.

Sweep Status Out connector

Outputs signal when internal measurement is performed or measurement data is obtained.
- 2-7

6



AUX connector

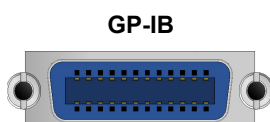
This is a complex connector for inputting an error rate measurement signal and inputting a baseband clock reference signal of the Vector Signal Generator (optional). See Table 2.1.2-1, for the internal pin assignment of the AUX connector.

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.

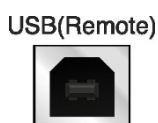
7



GP-IB connector

For external control via GPIB

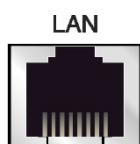
8



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



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

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 Primary HDD/SSD

Primary HDD/SSD
This is a standard HDD (MS2830A) or SSD (MS2840A) slot.

16 Secondary HDD/SSD

Secondary HDD/SSD
This is an optional HDD (MS2830A) or SSD (MS2840A) slot.

17



AF Input connector (unbalanced)

BNC connector to input unbalanced AF signal from external device.

This is mounted on the unit in which the MS2830A-018/118 is installed.

Impedance: 100 k Ω (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, ϕ 6.3 mm) connector to input balanced AF signal from external device.

This is mounted on the unit in which the MS2830A-018/118 is installed.

Impedance: 200 k Ω (AC coupling, Nominal)

Input Range: 1 mVrms to 25 Vrms (30 Vrms MAX)

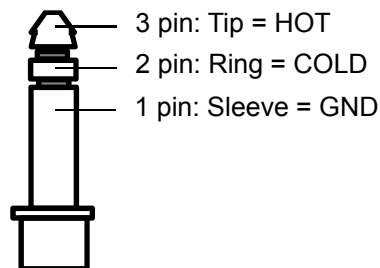


Figure 2.1.2-2 1/4 Inch Phone Plug

19

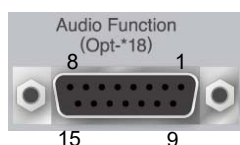


Noise Source connector

Supply (+28V) of the Noise Source Drive.

This is available when the Option 017/117 is installed.

20



General Input/Output (Audio Function) connector

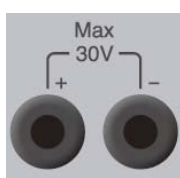
D-Sub 15 connector for general purpose input/output from/to the external device.

This is mounted on the unit in which the MS2830A-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 MS2830A-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 MS2830A-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, $\phi 6.3$ mm) connector to output balanced AF signal to external device.

This is mounted on the unit in which the MS2830A-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 k Ω	0 (off), 1 mVrms to 12.4 Vrms
	600 Ω	0 (off), 0.5m Vrms to 6.2 Vrms
White Noise*	100 k Ω	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)

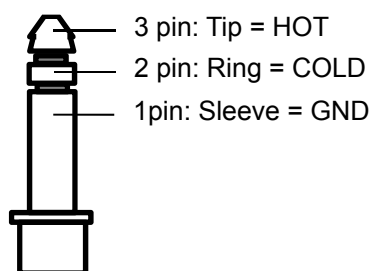


Figure 2.1.2-3 1/4 Inch Phone Plug

24



Demodulation Output connector

BNC connector to output demodulated AF signal to external device.

This is mounted on the unit in which the MS2830A-018/118 is installed.

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

Impedance: 600 Ω

25

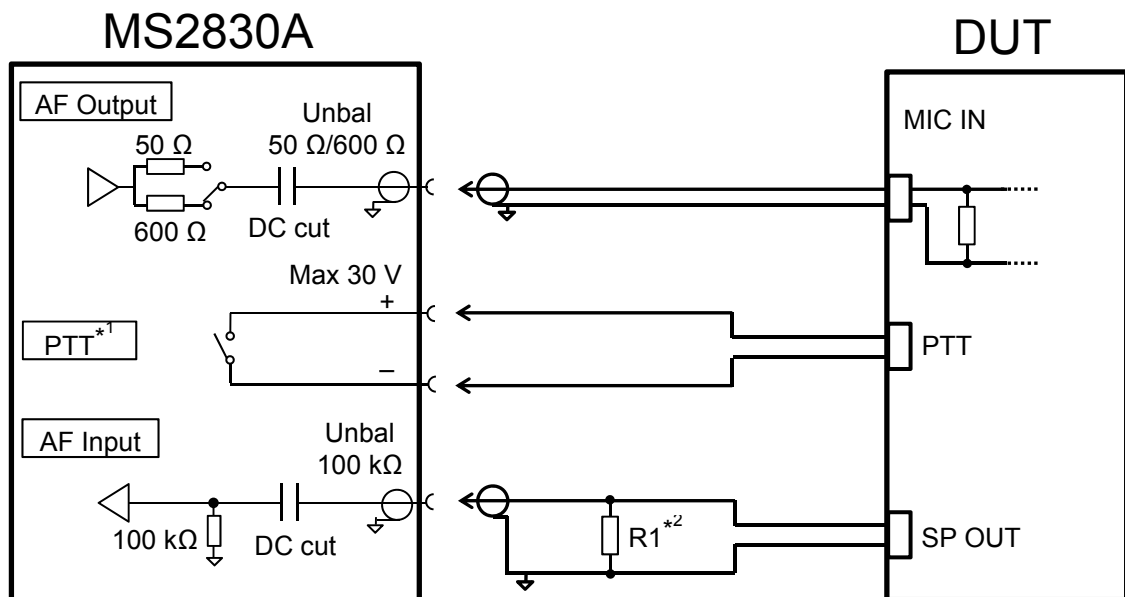
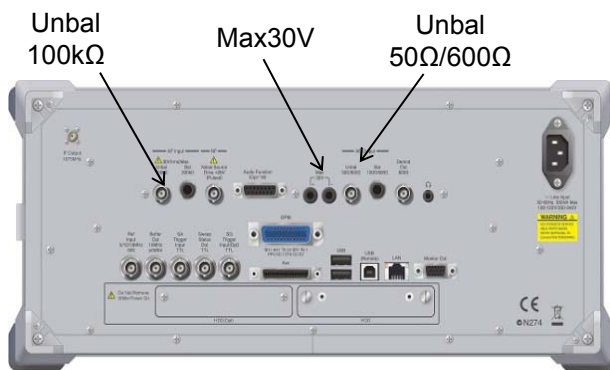


Headphone Output connector (Monaural)

3.5 mm phone jack connector (3.5 mm phone plug: $\phi 3.5$ mm) to output demodulated AF audio signal to external device.

This is mounted on the unit in which the MS2830A-018/118 is installed.

Figure 2.1.2-4 shows an example of connection between the DUT and the MS2830A-018/118 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, MS2840A.



Figure 2.2-1 Signal path setup example

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

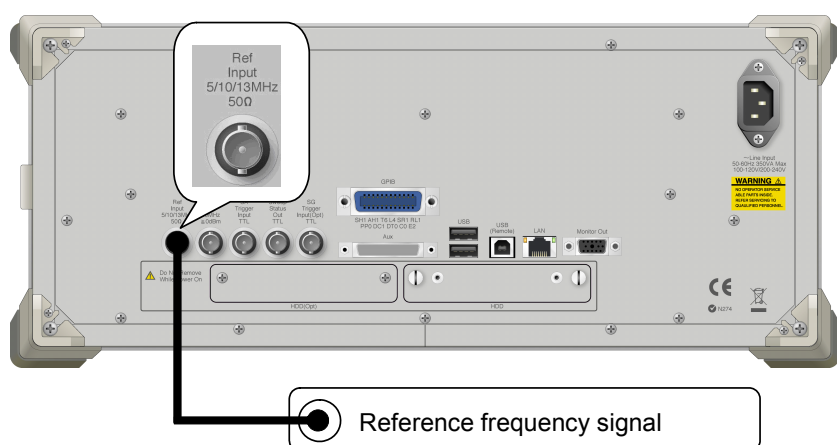


Figure 2.2-2 External signal input

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  to display the Configuration screen.
2. Press  (Application Switch Settings) to display the Application Switch Registration screen.
3. Press  (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  (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  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  to display the Preset function menu.
2. Press  (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  to display the Application Cal function menu.
2. Press  (SIGANA All).

For details on calibration functionality only executable with the MS2830A or MS2840A, refer to *MS2830A Signal Analyzer Operation Manual (Mainframe Operation)* or *MS2840A 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.

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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-020/120/021/121, MS2840A-020/120/021/121 3.6/6 GHz Vector Signal Generator Option or MS2830A-189, MS2840A-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.

The operation on the USB Audio (A0086x), 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.

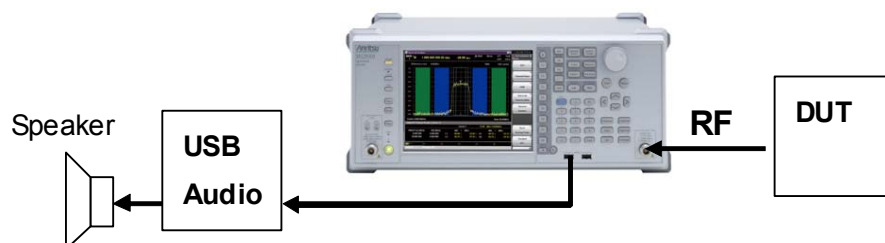


Figure 3.1.2-1 USB Audio Connection Example

Notes on using A0086C

In the initial setting of the A0086C, output audio frequency band is up to 24 kHz, but the following setting expands the output range up to 48 kHz.

The setting is available for the MS2830A and MS2840A with the factory-installed BlasterX Acoustic Engine Pro Drivers for the A0086C.

Also, the MX269018A Analog Measurement Software is required.

MS2830A/MS2840A desktop display

Right-click on the mouse in an arbitrary place of the MS2830A/MS2840A screen. Left-click on **Show the Desktop** in the displayed menu to display the desktop.

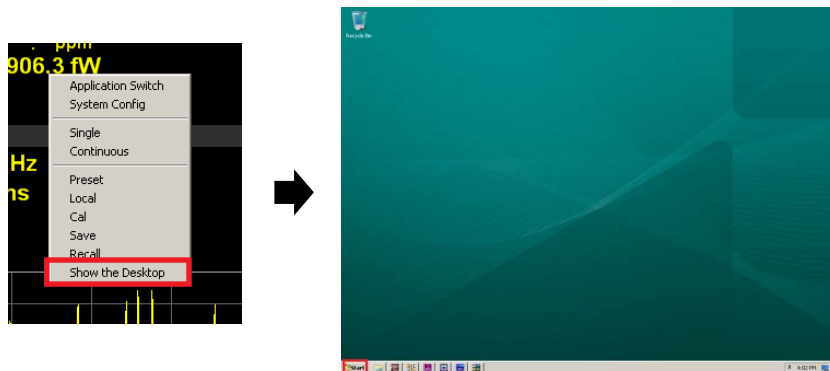


Figure 3.1.2-2 How to Display MS2830A/MS2840A Desktop

Setting Sound

Connect the A0086C as in Figure 3.1.2-1.

Open the Windows Start menu on the bottom left and select **Control Panel > Sound**.

When “Sound BlasterX G5” is displayed as Speakers on the **Playback** tab as the following figure, select the icon.

Then click the **Properties** button on the bottom right corner.

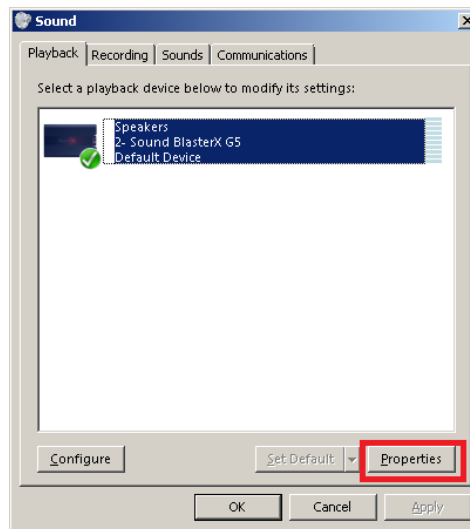


Figure 3.1.2-3 Sound Dialog Box

Select the **Advanced** tab on the **Speakers Properties** dialog box and set **Default Format** to 16 bit, 96000 Hz. Click **Apply** on the bottom right and then click **OK**.

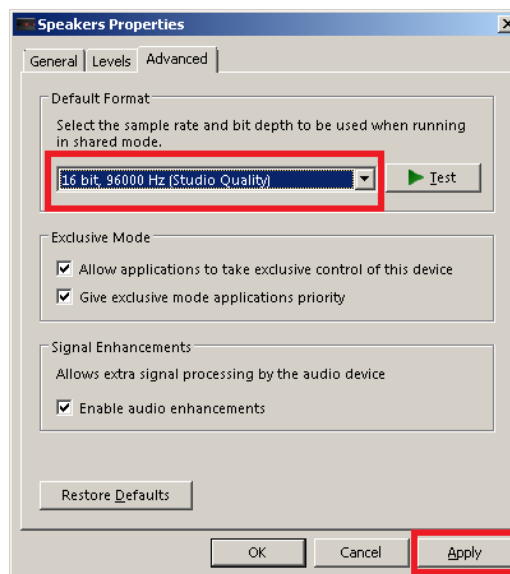


Figure 3.1.2-4 Speakers Properties Dialog Box

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. MS2840A does not support the Audio Analyzer option.

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.

3.2.1.1 TX mode screen

When the MS2830A-018/118 Audio Analyzer is not installed or MS2840A, selecting TX mode displays the screen below.

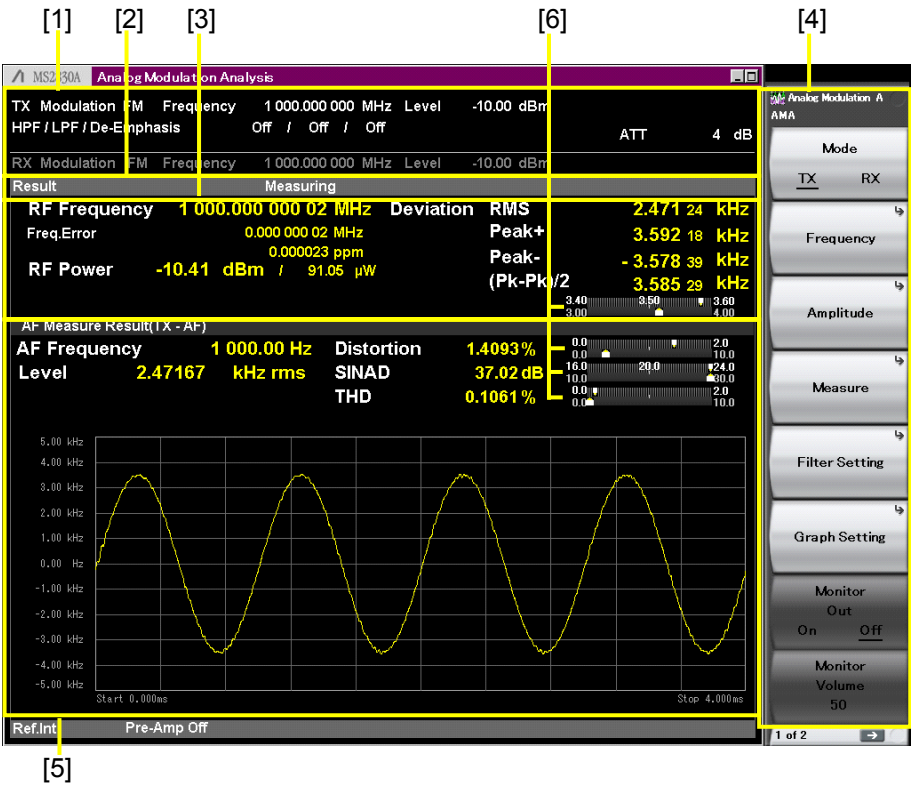



Figure 3.2.1.1-1 TX Mode Screen

- [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.
Setting Display Mode can narrow down the items to display.

- [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.
Setting Display Mode can narrow down the items to display.
- [6] Meter
Displays the measurement results.

 3.4.8.3 Setting Display Mode

 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.

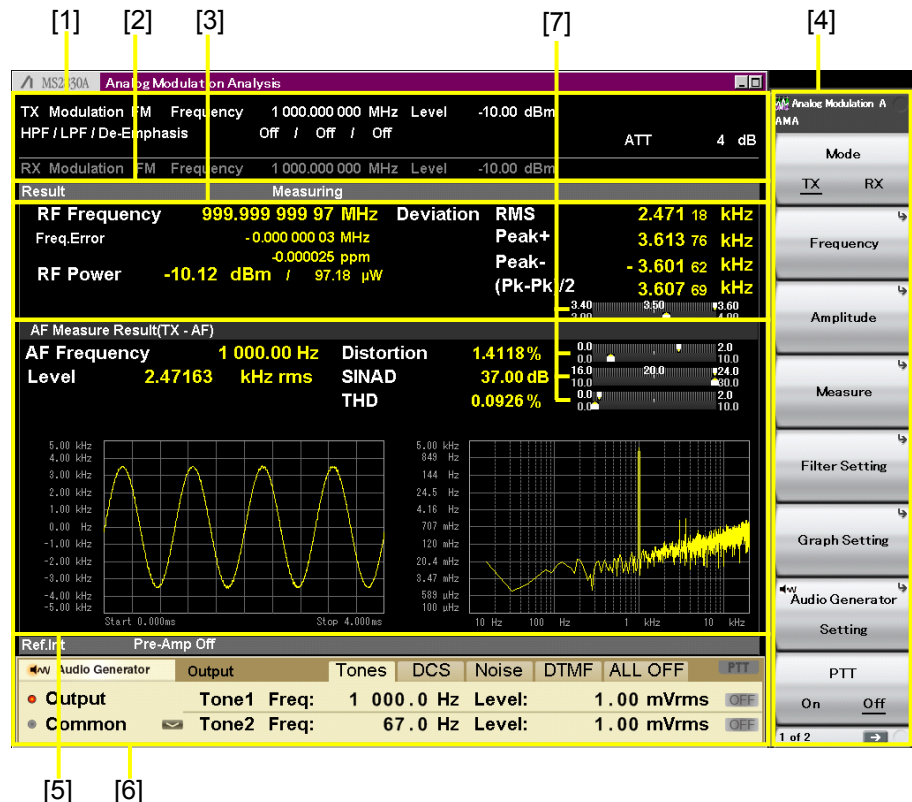


Figure 3.2.1.2-1 TX Mode + Audio Generator Screen

- [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

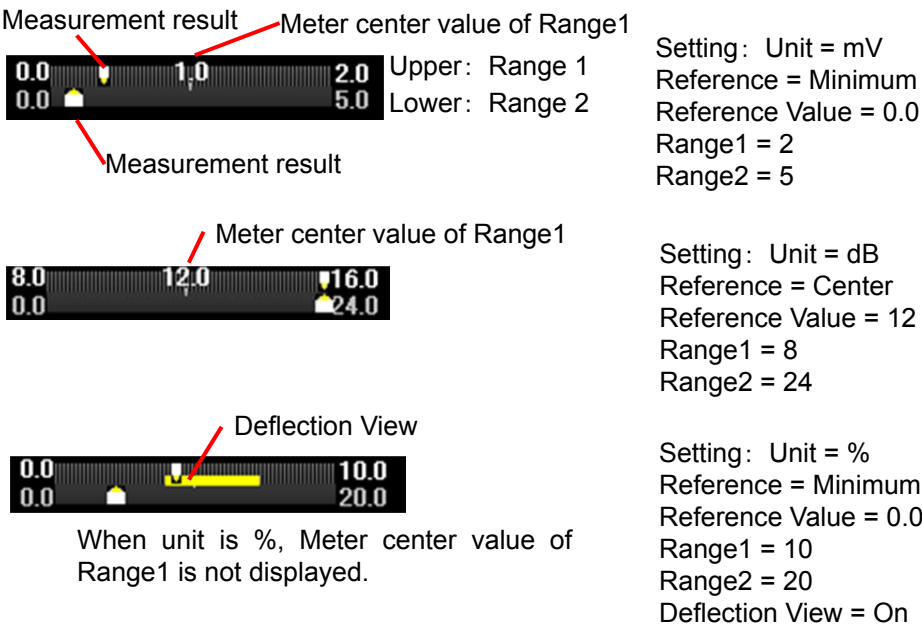


Figure 3.2.1.2-2 Examples of Setting Meter

3.2.1.3 RX mode screen

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

- The Analog Signal Generator (MS2830A-088/188, MS2840A-088/188) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029/129, MS2840A-029/129) is installed.
- The MS2830A-018/118 Audio Analyzer is not installed, MS2840A.

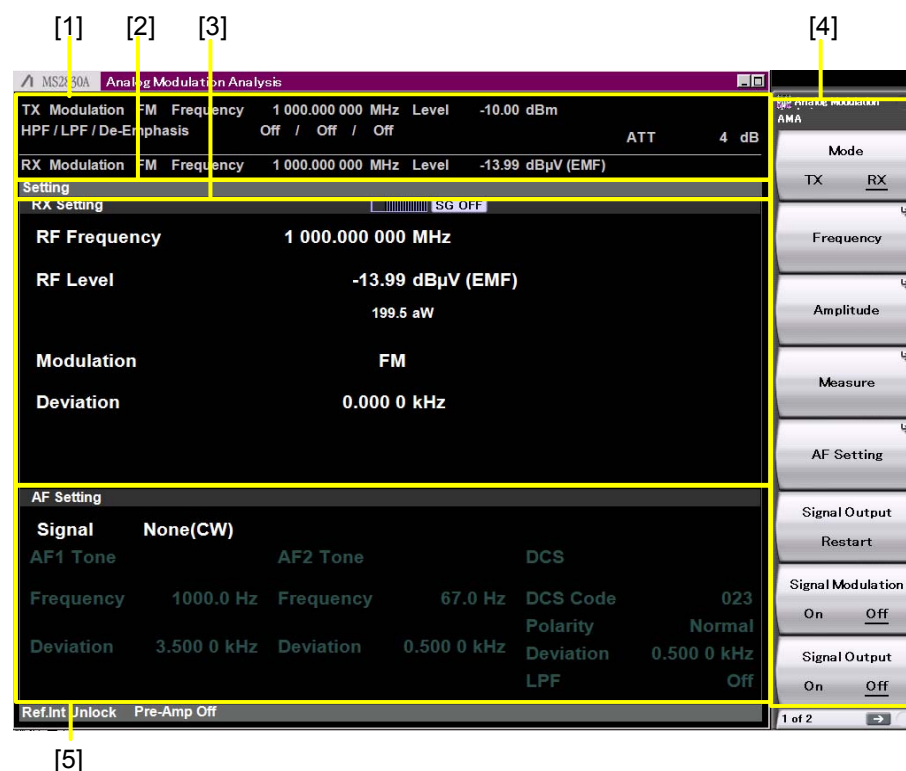


Figure 3.2.1.3-1 RX Mode Screen

- [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-088/188) nor the Analog Function Extension Option for Vector Signal Generator (MS2830A-029/129) is installed.
- The MS2830A-018/118 Audio Analyzer is installed.

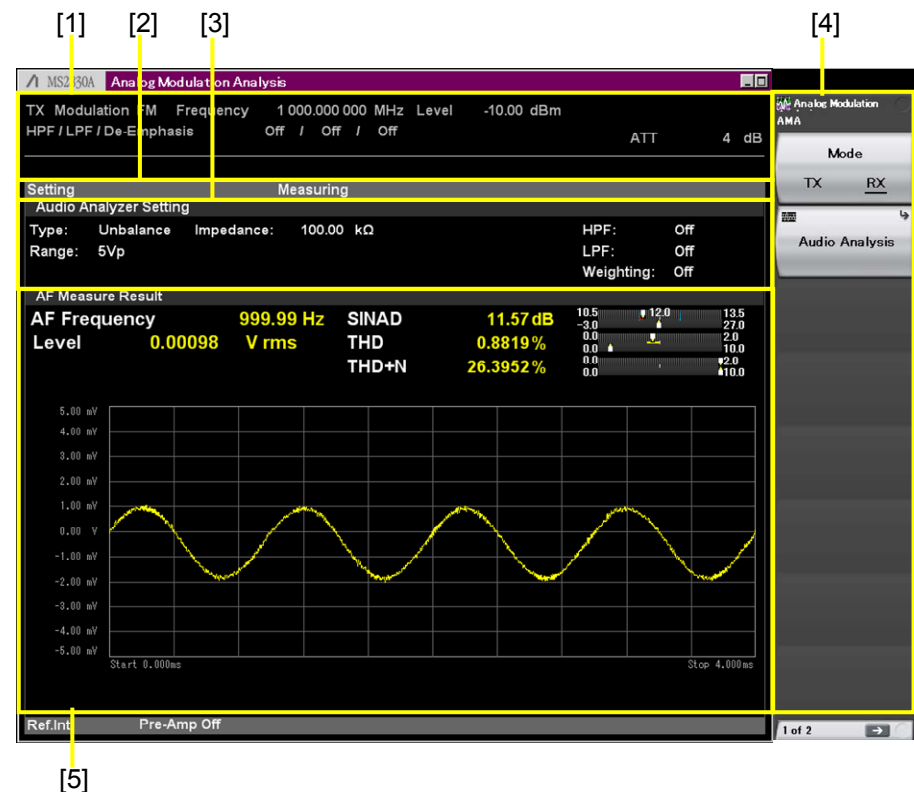




Figure 3.2.1.4-1 Audio Analyzer Screen

- [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-088/188) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029/129) is installed.
- The MS2830A-018/118 Audio Analyzer is installed.

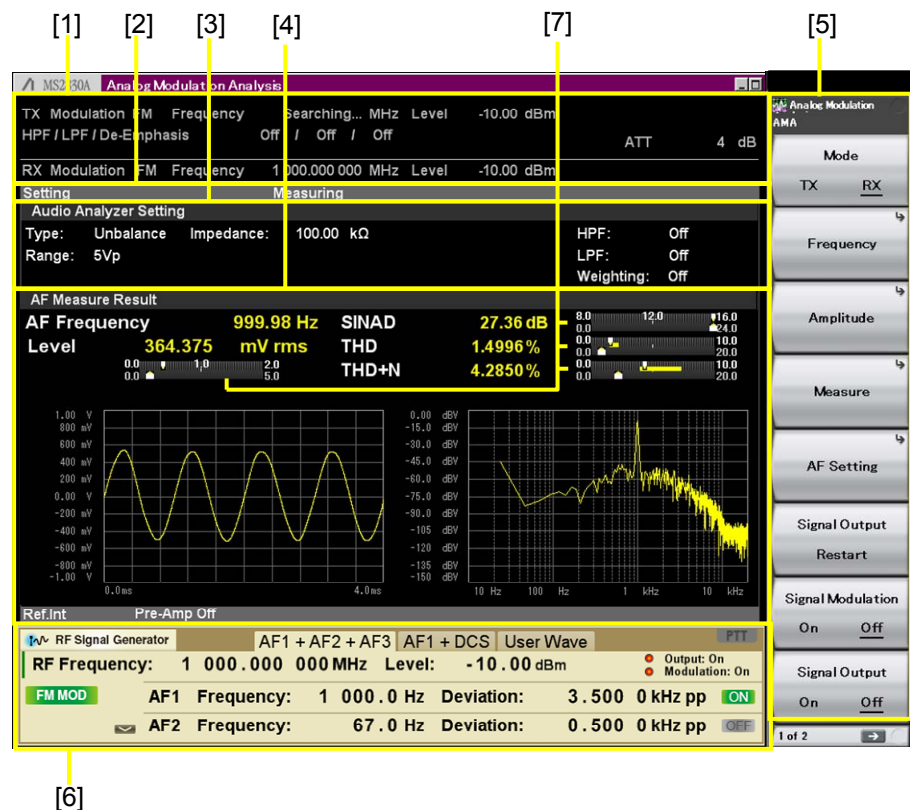


Figure 3.2.1.5-1 Audio Analyzer + RF Signal Generator Screen

- [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

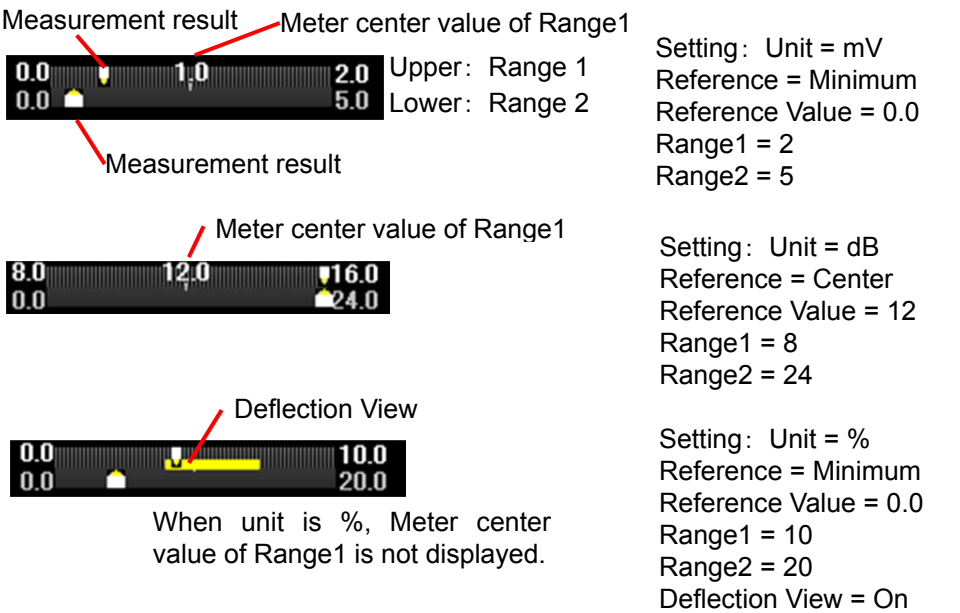


Figure 3.2.1.5-2 Examples of Setting Meter

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 or MS2840A.

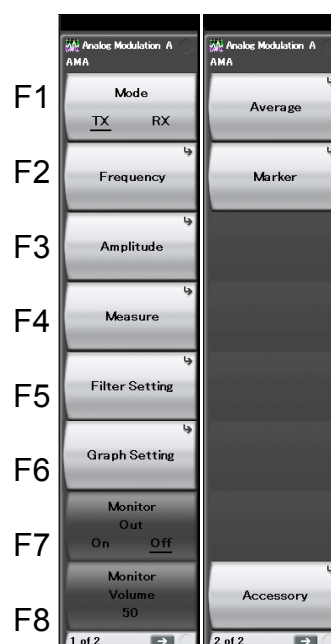


Figure 3.2.2.1-1 Main Function Menu (TX Mode)

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.

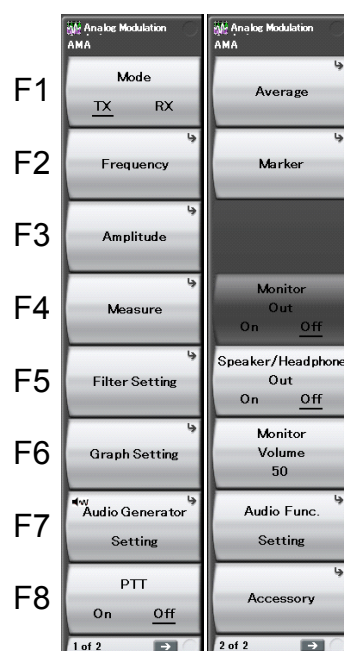













Figure 3.2.2.2-1 Main Function Menu (TX Mode + Audio Generator)

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-088/188, MS2840A-088/188) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029/129, MS2840A-029/129) is installed.
- The MS2830A-018/118 Audio Analyzer is not installed or MS2840A.

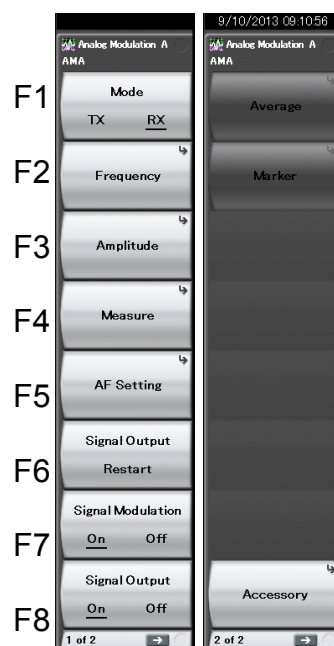


Figure 3.2.2.3-1 Main Function Menu (RX Mode)

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-088/188) nor the Analog Function Extension Option for Vector Signal Generator (MS2830A-029/129) 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-088/188) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029/129) is installed.
- The MS2830A-018/118 Audio Analyzer is installed.

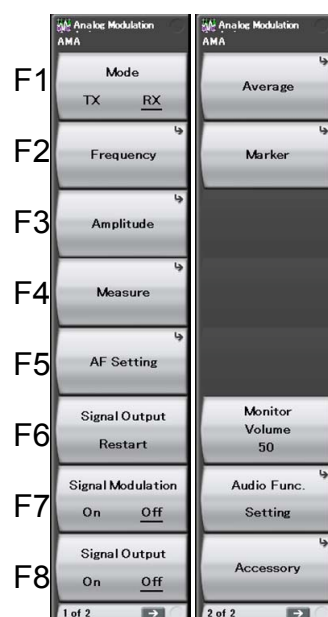
















Figure 3.2.2.5-1 RX Mode Main Function Menu (Audio Analyzer +RF Signal Generator Screen)

**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  (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  (Frequency) in the main function menu displays the Frequency function menu. Pressing  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  (Amplitude) in the main function menu displays the TX Amplitude function menu. In addition, pressing  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:
 $(-80.00 + \text{Offset Value})$ to $(10.00 + \text{Offset Value})$ dBm
 When Pre Amp is Off:
 $(-60.00 + \text{Offset Value})$ to $(30.00 + \text{Offset Value})$ 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-008/108, MS2840A-008/108/068/168/069/169 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

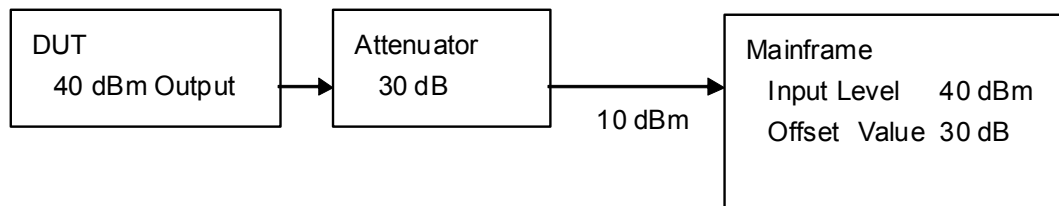
■ Summary

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:

−136 dBm to +15 dBm (RX frequency > 25 MHz)

−136 dBm to −3 dBm (RX frequency ≤ 25 MHz)

When output unit is dB μ V (EMF):

−22.99 dB μ V to +128.01 dB μ V (EMF) (RX frequency > 25 MHz)

−22.99 dB μ V to +110.01 dB μ V (EMF) (RX frequency ≤ 25 MHz)

When output unit is dB μ V (Term):

−29.01 dB μ V to +121.99 dB μ V (RX frequency > 25 MHz)

−29.01 dB μ V to +103.99 dB μ V (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

dB μ V (EMF) Sets the setting unit to dB μ V (EMF).

dB μ V (Term) Sets the setting unit to dB μ V (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  (Measure) and then pressing  (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.

AF Level reference value can be manually set by AF Level Reference Value.

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.

AF Level Reference Value

■ Summary

Sets the AF Level Reference value for calculating the AF Level Set Reference.


Note:

Available only when AF Level Set Reference is On.

■ Setting range and Resolution

Mode	Modulation	Lower	Upper	Unit	Resolution
Tx	FM	0.01	200 000.00	Hz	0.01 Hz
	AM	0.00001	100.00000	%	0.00001%
	PM	0.00001	5000.00000	rad	0.00001 rad.

3.4.3.1 Setting AF Frequency Reference

This section describes the settings for AF Frequency Reference. Press  (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  (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  (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.
 $\text{Start Frequency} \leq \text{Manual Frequency} \leq \text{Stop Frequency}$

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  (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.
< 1 Hz	Uses High Pass Filter with a pass band of 1 Hz*
< 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.
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.

*: Available only when Modulation is set to FM.

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  (Monitor Out) in the main function menu starts outputting the demodulated AF signal.

When MS2830A-018/118 Audio Analyzer is not installed or MS2840A, "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 MS2830A 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  (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  (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  (Marker) on Page 2 of the main function menu or  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  (Graph Setting) on the main function menu,  (Trace) on Page 2 of the Modulation Analysis function menu, or  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  (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  (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 kHz.
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 \times 1.4125375) to 1000 kHz

For AM modulation:

(Setting value of Bottom Level \times 1.4125375) to 1000%

For ϕ M modulation:

(Setting value of Bottom Level \times 1.4125375) to 1000 rad

Note:

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

- Top Level \geq Bottom Level \times 1.4125375
- Top Level – Bottom Level \geq 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 ϕ M 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 \leq Top Level/1.41253755
- Top Level – Bottom Level \geq 3 dB

3.4.8.3 Setting Display Mode

This section describes the settings of the items on the Result window and AF Measurement Result (TX-AF) window. Press **F4** (Display Mode) on the Trace function menu to display the Display Mode function menu.

ALL

■ Summary

Displays all measurement results.

Carrier

■ Summary

Displays the Result window only.

The Result window displays RF Frequency, Freq. Error, and RF Power.

Modulation

■ Summary

Displays the Result window and AF Measurement Result (TX-AF) window.

The Result window displays the following.

- Deviation (Modulation is **FM** or **Wide FM**)
- Depth (Modulation is **AM**)
- Radian (Modulation is **φM**)

The AF Measurement Result (TX-AF) window displays the following.

- Level
- Distortion or SINAD or THD.

3.4.8.4 Setting Carrier Display Mode

This section describes the settings for Carrier Display Mode. When **Display Mode** is **Carrier**, press **F5** (Carrier Setup) on the Trace function menu to display the Carrier Setup function menu.

RF Power Unit

■ Summary

Sets the unit of RF Power measurement results.

■ Options

- | | |
|-----|--------------------------------------|
| W | Displays the RF Power result in W. |
| mW | Displays the RF Power result in mW. |
| dBm | Displays the RF Power result in dBm. |

RF Frequency (Hz) Resolution

■ Summary

Sets the resolution of RF Frequency measurement result and Freq. Error measurement result.

■ Options

1 Hz	Displays the RF Frequency result in 1 Hz.
0.1 Hz	Displays the RF Frequency result in 0.1 Hz.
0.01 Hz	Displays the RF Frequency result in 0.01 Hz.

RF Power (W/mW) Resolution


■ Summary

Sets the resolution of RF Power measurement results.

■ Options

0.01 W/mW	Displays the RF Power result in 0.01 W or 0.01 mW.
0.001 W/mW	Displays the RF Power result in 0.001 W or 0.001 mW.
0.0001 W/mW	Displays the RF Power result in 0.0001 W or 0.0001 mW.

3.4.8.5 Setting Modulation Display Mode

This section describes the settings for Modulation Display Mode. When **Display Mode** is **Modulation**, press  (Modulation Setup) on the Trace function menu to display the Modulation Setup function menu.

Deviation Type

■ Summary

Sets the type of analysis results to display on the Result window.
The following setting is common for all modulation modes.

- Deviation (Modulation is **FM** or **Wide FM**)
- Depth (Modulation is **AM**)
- Radian (Modulation is **φM**)

■ Options

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

Distortion Type

■ Summary

Sets the distortion type to display on the AF Measurement Result (TX-AF) window.

■ Options

Distortion	Displays the result of distortion (Distortion Factor).
SINAD	Displays the result of SINAD (Signal-to-Noise and Distortion Ratio).
THD	Displays the result of THD (Total Harmonic Distortion).

Deviation (Hz) Resolution

■ Summary

Sets the resolution of the Deviation measurement result on the AF Measurement Result (TX-AF) window.

■ Options

1 Hz	Displays the Deviation result in 1 Hz.
0.1 Hz	Displays the Deviation result in 0.1 Hz.
0.01 Hz	Displays the Deviation result in 0.01 Hz.

AF Level (Hz rms) Resolution

■ Summary

Sets the resolution when AF Level measurement result is displayed in Hz rms on the AF Measurement Result (TX-AF) window.

■ Options

1 Hz rms	Displays the AF Level result in 1 Hz rms.
0.1 Hz rms	Displays the AF Level result in 0.1 Hz rms.
0.01 Hz rms	Displays the AF Level result in 0.01 Hz rms.

AF Level (dBr) Resolution

■ Summary

Sets the resolution when AF Level measurement result is displayed in dBr on the AF Measurement Result (TX-AF) window.

■ Options

0.01 dBr	Displays the AF Level result in 0.01 dBr.
0.001 dBr	Displays the AF Level result in 0.001 dBr.
0.0001 dBr	Displays the AF Level result in 0.0001 dBr.

Distortion (%) Resolution

■ Summary


Sets the resolution of the Distortion factor measurement result on the AF Measurement Result (TX-AF) window.

■ Options

0.01%	Displays the Distortion factor result in 0.01%.
0.001%	Displays the Distortion factor result in 0.001%.
0.0001%	Displays the Distortion factor result in 0.0001%.

3.4.9 Display result

The Result window displays analysis result of RF signal.

 Figure 3.2.1.1-1 TX Mode Screen

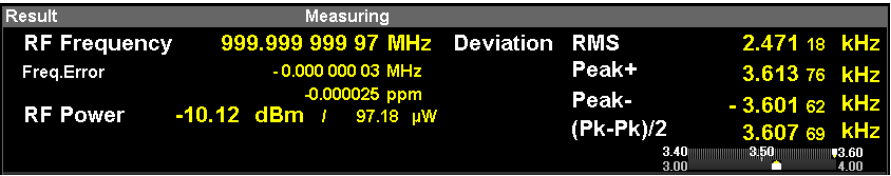


Figure 3.4.9-1 Result Window (For FM Modulation)

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]

It is not displayed when **Display Mode** is **Modulation**.

RF Power

■ Summary

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

It is not displayed when **Display Mode** is **Modulation**.

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.

It is not displayed when **Display Mode** is **Carrier**.


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.

It is not displayed when **Display Mode** is **Carrier** or **Modulation**.

 3.4.3.2 “Setting Meter”

Radian

■ Summary

Displayed when Modulation is set to ϕ M.

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.

It is not displayed when **Display Mode** is **Carrier**.

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.

It is not displayed when **Display Mode** is **Carrier**.

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.

It is not displayed when **Display Mode** is **Carrier** or **Modulation**.

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

It is not displayed when **Display Mode** is **Carrier**.

 3.4.8.3 Setting Display Mode

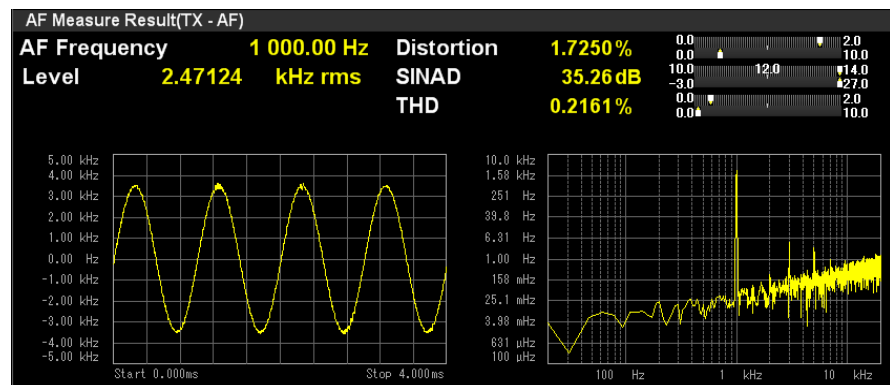


Figure 3.4.10-1 AF Measure Result (TX-AF) Window

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.

It is not displayed when **Display Mode** is **Modulation**.

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.

It is not displayed when **Display Mode** is **Modulation**.

 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, ϕ M 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”

*: When **Display Mode** is **Modulation**, any one of Distortion, SINAD or THD is displayed.


 “Distortion Type” in 3.4.8.5 “Setting Modulation Display Mode”

Meter Display

■ Summary

Displays the Distortion, SINAD, and THD measurement results.


It is not displayed when **Display Mode** is **Modulation**.


 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  (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.

$$\text{dBm} = 10 \times \log_{10} \left(1000 \times R_r \times \left(\frac{V_{rms}}{R_s + R_r} \right)^2 \right)$$

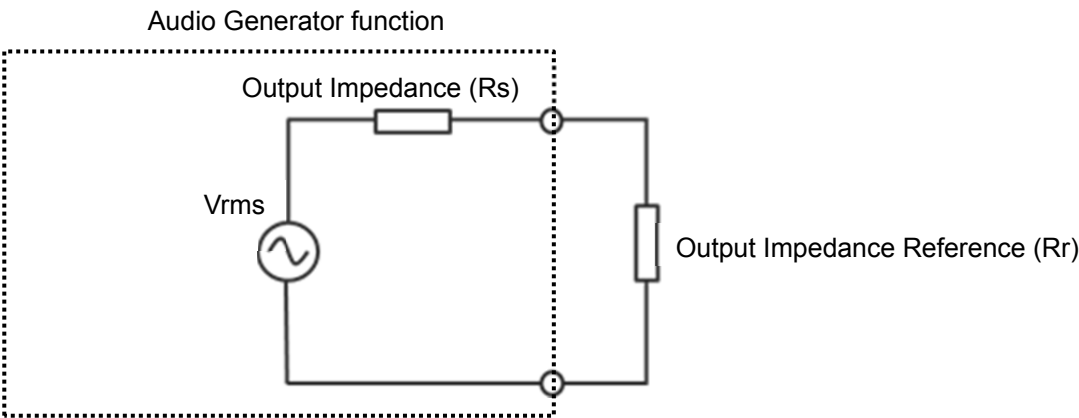


Table 3.5.1-1 Relationship between Output Impedance and Output Impedance Reference

■ 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

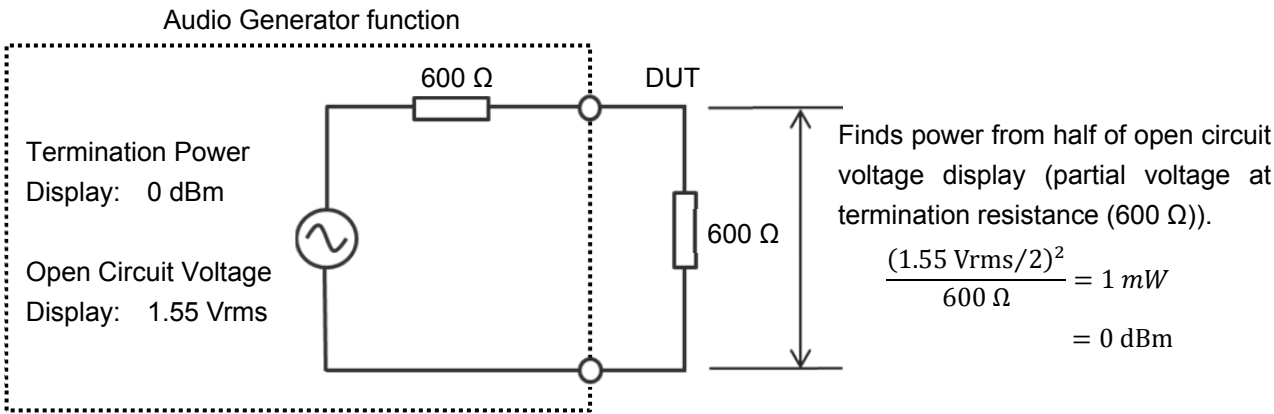




Figure 3.5.1-2 Relationship between Termination Power and Open Circuit Voltage (Output Impedance: At Unbalanced 600 Ω)

3.5.2 Setting PTT

This section describes the PTT (Push to Talk) setting. Press  (PTT) in the main function menu to enable/disable PTT.
When PTT is On, press  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.

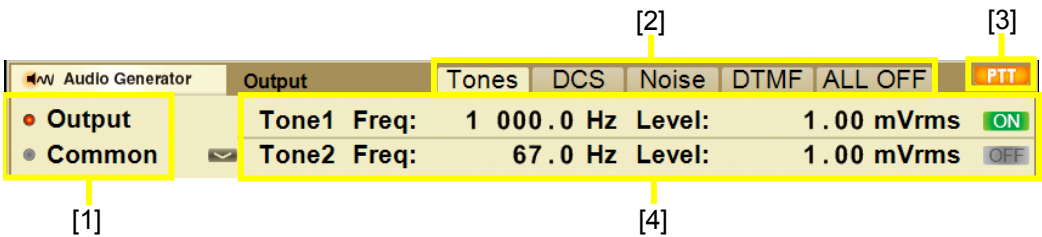








Figure 3.5.3-1 Audio Generator Window (No parameter is selected)

- [1] Selecting Output/Common
Selects Output or Common by using  and . 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  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”

3
Measurement

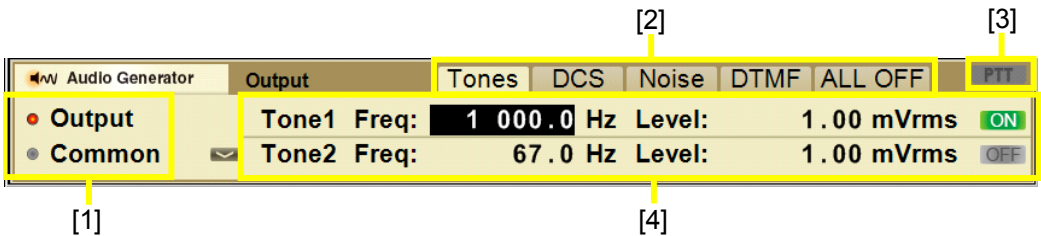









Figure 3.5.3-2 Audio Generator Window (a parameter is selected)

- [4] Parameter setting
Press  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  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  (Measure) in the main function menu and press  (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.



- [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.

[2]-1 Selecting Output/Common/Waveform

[2]-2 Parameter setting



3.7 RX Measurement Mode

This measurement mode is for the radio reception test. Under the following conditions, this measurement mode is available.

- The Analog Signal Generator (MS2830A-088/188, MS2840A-088/188) or the Analog Function Extension Option for Vector Signal Generator (MS2830A-029/129, MS2840A-029/129) is installed.

Parameters for signals output from the SG Output connector of this instrument can be set.

3.7.1 Setting frequency

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

Output Level

■ Summary

Sets the output level from this instrument.

■ Setting range

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

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

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

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

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

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

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

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

–29.01 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  (Measure) and then pressing  (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.
ϕ M	Select this when outputting ϕ M 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.

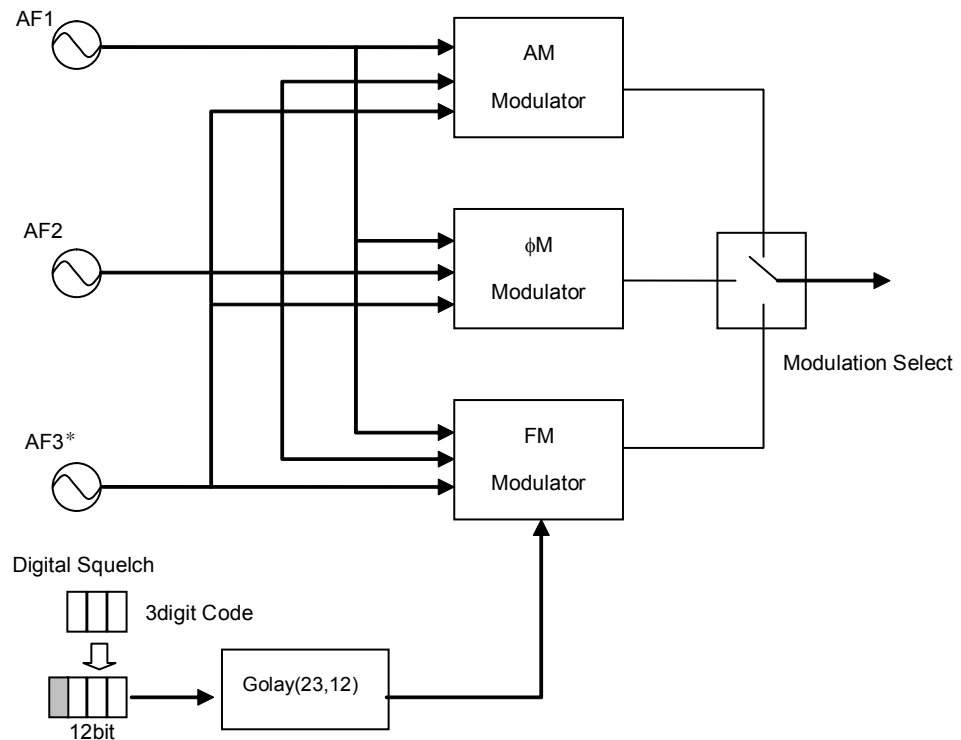
Setting value of first decimal place of AF Tone frequency [Hz]	Waveform length [s]
0	1
5	2
2, 4, 8	5
1, 3, 6, 7	10

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  (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 (ϕ M)**■ Summary**

Sets the Deviation of AF1 signals.

Displayed when Modulation is set to ϕ M.

■ Setting range

0.00 to 50.00 rad

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

$(\text{AF1 Tone Frequency} \times \text{AF1 Tone Radian}) < 100\text{k}$

AF2 Tone Radian (ϕ M)**■ Summary**

Sets the Deviation of AF2 signals.

Displayed when Modulation is set to ϕ M.

■ Setting range

0.00 to 50.00 rad

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

$(\text{AF2 Tone Frequency} \times \text{AF2 Tone Radian}) < 100\text{k}$

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 (ϕ M)

■ Summary

Sets the Deviation of AF3 signals.

Displayed when the MS2830A-018/118 is installed and Modulation is set to ϕ M.

■ Setting range

0.00 to 50.00 rad

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

$(\text{AF3 Tone Frequency} \times \text{AF3 Tone Radian}) < 100\text{k}$

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.

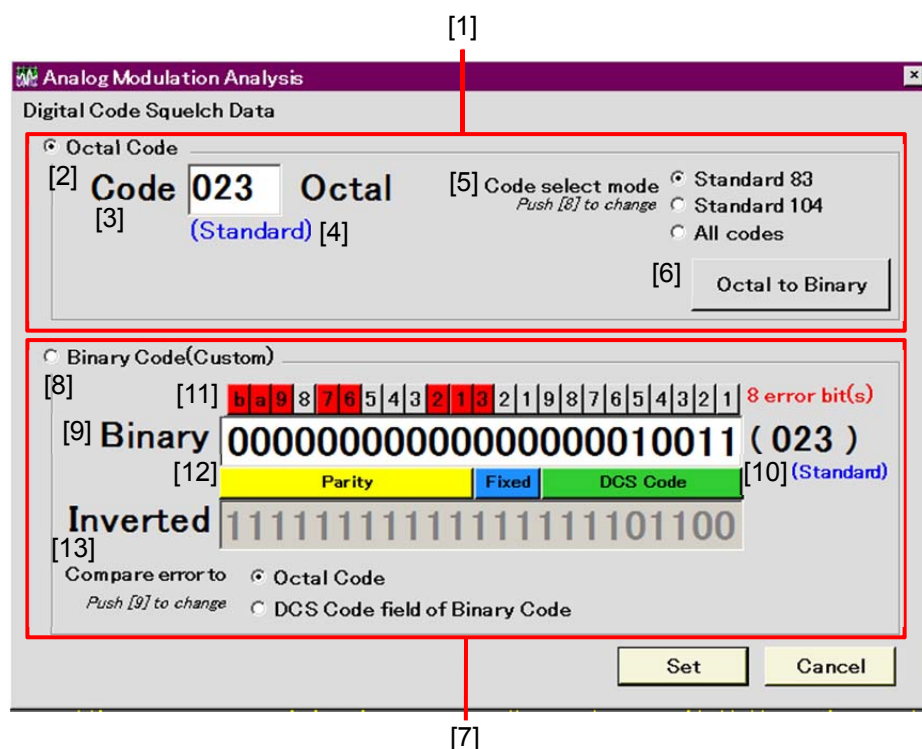


Figure 3.8-1 Digital Code Squelch Data Setting Dialog Box

- [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  (Measure) and then press  (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 1000 000 000.00 Ω

AF Level Unit

■ Summary

Sets the AF Level unit.

Displays the values calculated by the formulas below.

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

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

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

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

■ 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 Reference Value

■ Summary

Sets the AF Level Reference value for calculating the AF Level Set Reference.

Note:

Available only when AF Level Set Reference is set to ON.

■ Setting range and Resolution

Mode	AF Level Unit	Lower	Upper	Unit	Resolution
Rx	Vrms	0.001000	100.000000	Vrms	0.000001 Vrms
	dBμ	-67.78	32.22	dBμ	0.01 dBμ
	dBv	-60.00	40.00	dBV	0.01 dBV
	dBm	-120.00	90.00	dBm	0.01 dBm
	W	0.000000001	10000	W	0.000000001 W

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 ($10 \times \log_{10}$).

AF Level reference value can be manually set by AF Level Reference Value.


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  (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  (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.
 $\text{Start Frequency} \leq \text{Manual Frequency} \leq \text{Stop Frequency}$

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  (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  (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  (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

Audio Analyzer Setting					
Type:	Unbalance	Impedance:	100.00 kΩ	HPF:	Off
Range:	5Vp			LPF:	Off
				Weighting:	Off

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

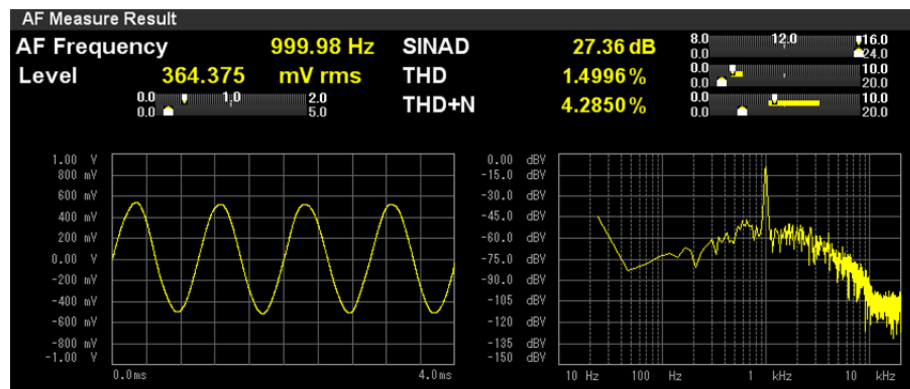


Figure 3.9.7-1 AF Measure Result Window

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

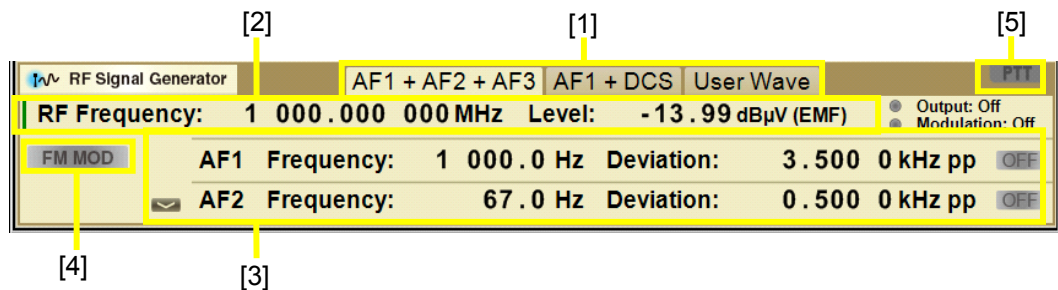









Figure 3.9.8-1 RF Signal Generator Window
(RF Signal Setting Mode, No parameter is selected)

- [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 . 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  to set the window to parameter selection state, which allows frequency and level settings by using the rotary knob or  and .

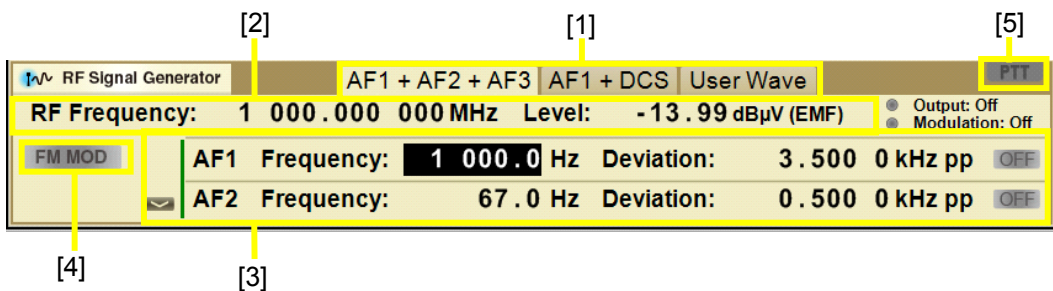


Figure 3.9.8-2 RF Signal Generator Window (RF Signal Setting Mode, a parameter is selected)

- [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 to select a parameter, and set frequency and level by using the rotary knob or and .
- [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.

3.7.4 “Setting AF signal”

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.

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4.4	Example of Performance Test Result Form	4-18

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.

RF Performance Test

- Residual FM, Residual ϕ M, Residual AM

With MS2830A-018/118 installed.

Audio Performance Test

- 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 is available in a separate file (for the PDF version), and on the last page of this manual (for the printed 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

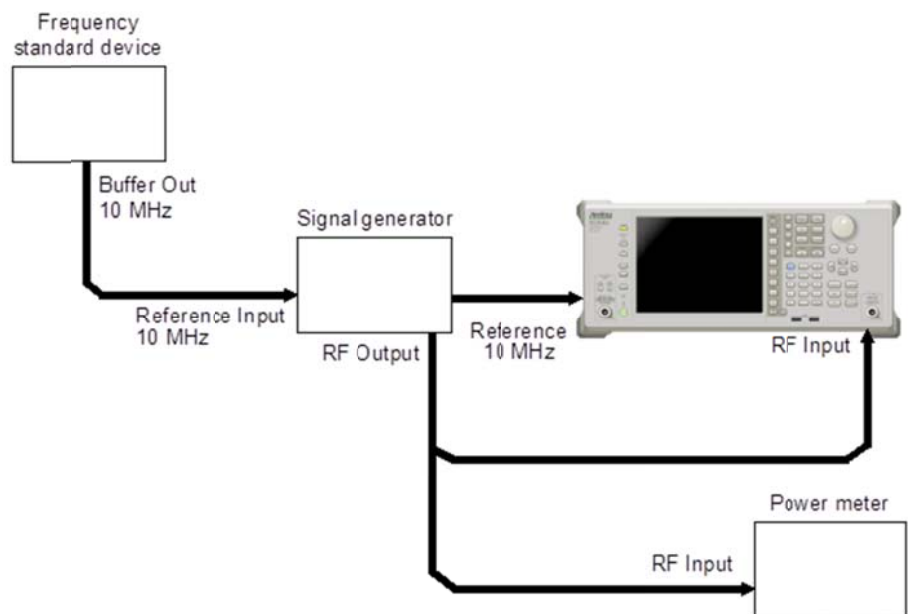










Figure 4.2-1 Performance Test

(4) Test Procedure

1. Turn on the power switch on the front panel and then wait until the internal temperature stabilizes.
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 .
5. Press  (Preset) to initialize.
6. Press .
7. Press  (SIGANA All) to perform calibration.
8. Press  (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 $-15 \text{ dBm} \pm 0.1 \text{ dB}$.
12. Input the signal output from the vector signal generator into the equipment.
13. Set as follows for the equipment.
 - Modulation: FM
14. Press  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 the equipment.
 - Modulation: ϕ M
18. Press  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 the equipment.
 - 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 the equipment to 400 MHz, and repeat Steps 13 through 24.
26. Set the frequency of the signal generator and the equipment 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

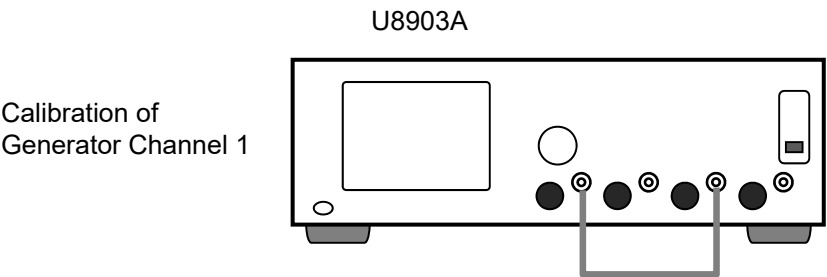


Figure 4.3.1-1 Connection to Calibrate Output Level of Audio Signal Generator (U8903A)

- (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

- Set Analyzer Channel 1 of the U8903A as below.
HPF: OFF
LPF: 80 kHz
Range: AUTO
Measurement Mode: AC
Detection Mode: RMS
- 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.

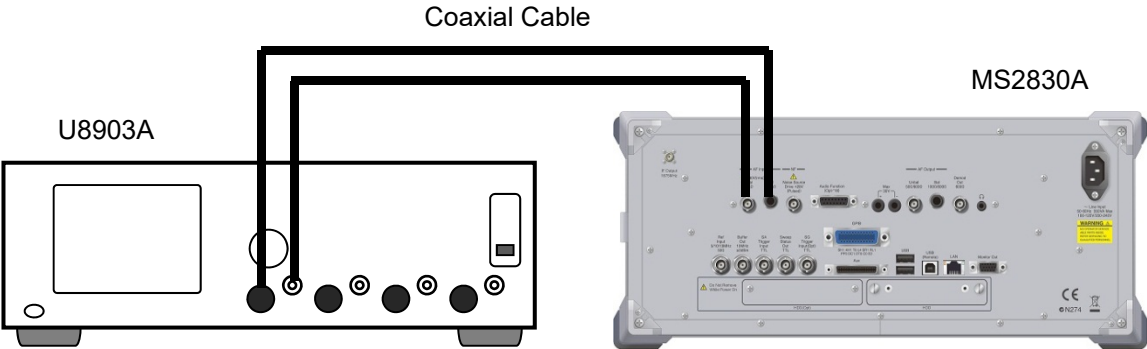


Figure 4.3.2-1 Connection for Input Level Accuracy Test

- (3) Test target standards

Table 4.3.2-1 Standard

Standard	Condition
$\pm 0.4\text{ dB}$	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 .
3. Press  (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  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 = $20 \times \log (\text{MS2830A Audio Analyzer measured value} / \text{U8903A set value})$
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.

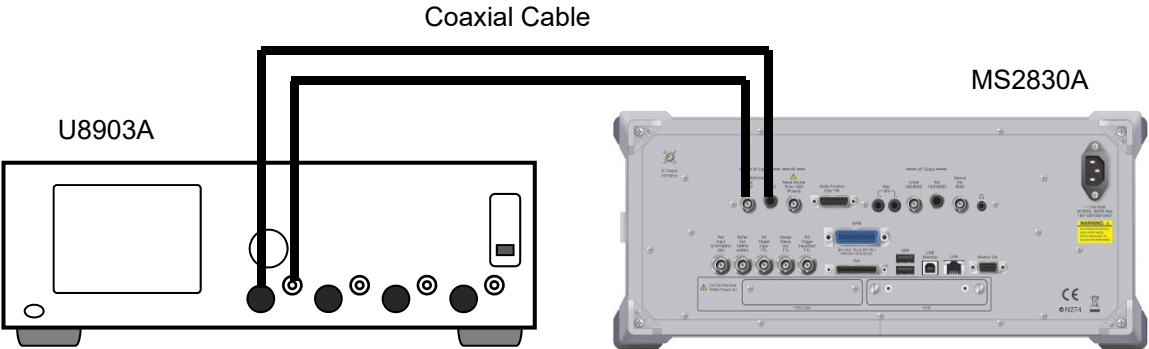



Figure 4.3.3-1 Connection of Input Distortion Test


- (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 .

3. Press  (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 .
2. Press  (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  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.

$$\text{Crosstalk} = -20 \times \log (\text{measured value}/3500)$$

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.

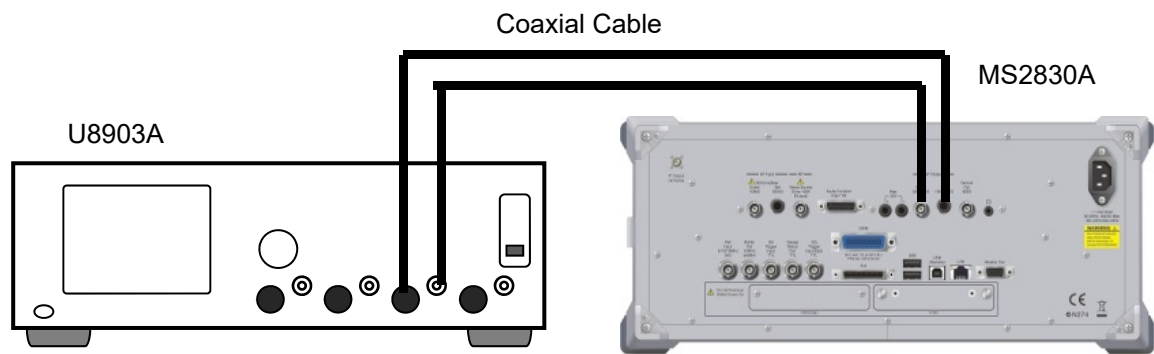


Figure 4.3.5-1 Connection for Output Level Accuracy Test

- (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 .
3. Press  (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.

$$\text{Output level accuracy} = 20 \times \log(\text{Measured value}/\text{Output level})$$
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.

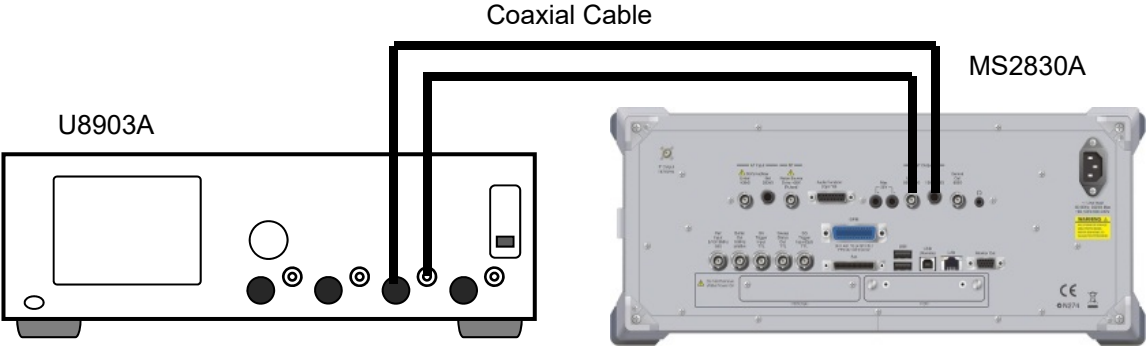




Figure 4.3.6-1 Connection for Total Harmonic Distortion + Noise Test

- (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 .
 3. Press  (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 ϕ M

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	5-2
5.2	Setting Title	5-2
5.3	Erasing Warmup Message	5-2

5.1 Selecting Other Functions


Pressing  (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  (Accessory) on the main function menu.
2. Press  (Title) to display the character string input screen. Select a character using the rotary knob, and enter it by pressing .
Enter the title by repeating this operation. When the title is entered, press  (Set).
3. Press  (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  (Accessory) on the main function menu.
2. Press  (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.	–

Table A-1 Error Messages (Cont'd)

Message	Description
Not available when AF Level Set Reference is Off.	–
Valid only when Mode is RX and AF Level Unit is Vrms.	–
Valid only when Mode is RX and AF Level Unit is dBμ.	–
Valid only when Mode is RX and AF Level Unit is dBV.	–
Valid only when Mode is RX and AF Level Unit is dBm.	–
Valid only when Mode is RX and AF Level Unit is W.	–

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%

Appendix B Default Value List

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 Meter	3500 Hz (Deviation Peak to Peak) 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
	ϕ M Modulation: 5 rad
Bottom Level	AM Modulation: 0.001%
	FM Modulation: 0.001 Hz
	ϕ M Modulation: 0.001 rad
Display Mode Setting	
Display Mode	ALL
Carrier Setup	
RF Power Unit	W
RF Frequency(Hz) Resolution	1 Hz
RF Power(W/mW) Resolution	0.01 W/mW
Modulation Setup	
Deviation Type	(Pk-Pk)/2
Distortion Type	Distortion
Deviation(Hz) Resolution	1 Hz
AF Level(Hz rms) Resolution	1 Hz rms
AF Level(dBr) Resolution	0.01 dBr
Distortion(%) Resolution	0.01%
<Audio Generator Function>	
Audio Generator Setting	
Waveform	Tones
Output Tone1	Off
Tone1 Freq	1000 Hz
Tone1 Level	1 mV

Appendix B Default Value List

	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 dB μ V (EMF)
	Output Unit	dB μ V (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

<Audio Analyzer Function>	AF2 Tone Deviation (FM)	500.0 Hz
	AF1 Tone Radian (ϕ M)	3.50 rad
	AF2 Tone Radian (ϕ M)	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 (ϕ M)	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 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 = %)

Appendix B Default Value List

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

