Product Brochure

Anritsu envision : ensure

Signal Analyzer

MS2830A Microwave

MS2830A-044: 9 kHz to 26.5 GHz
MS2830A-045: 9 kHz to 43 GHz
« MS2830A-040: 9 kHz to 3.6 GHz* »
« MS2830A-041: 9 kHz to 6 GHz* »
« MS2830A-043: 9 kHz to 13.5 GHz* »

*: See MS2830A-040/041/043 catalog

Excellent Eco Product

The Signal Analyzer MS2830A-044/045 includes a spectrum analyzer function with upper frequency limits of 26.5 GHz and 43 GHz. Combining it with the High Performance Waveguide Mixer or the External Mixer MA2740C/MA2750C series supports measurements up to 325 GHz. It supports measurements of Tx characteristics, including adjacent channel leakage power, spectrum mask, and frequency counter, as well as spurious measurements requiring a wide dynamic range.
Installing the bandwidth analysis option up to 125 MHz adds signal analyzer functions for checking phenomena that are hard to check using a spectrum analyzer, such as frequency vs. time, phase vs. time, spectrogram, and CCDF. In addition, optional measurement software supports modulation analysis. Moreover, installing a preselector bypass option enables use of the signal analyzer and modulation analysis functions up to 26.5 GHz/43 GHz (MS2830A-044/045). Finally, it can be customized to support a range of application-specific measurements.

- Installing a microwave-band preamp supports measurement of weaker signals.
- Using the 1st local signal output as an external mixer supports measurement of high-frequency signals up to 325 GHz.
- Using the 1st IF signal output as a down converter supports analysis in combination with external equipment.

Frequency option	MS2830A-040*1	MS2830A-041*1	MS2830A-043*1	MS2830A-044	MS2830A-045
Frequency range	9 kHz to 3.6 GHz	9 kHz to 6 GHz	9 kHz to 13.5 GHz	9 kHz to 26.5 GHz	9 kHz to 43 GHz
Aging rate	±1 × 10^{-7}/day (Standard) ±1 × 10^{-8}/day (MS2830A-002) ±1 × 10^{-10}/month (MS2830A-001)			±1 × 10^{-8}/day (Standard) ±1 × 10^{-10}/month (MS2830A-001)	
Start time/Characteristics	5 minutes, ±5 × 10^{-7} (Standard) 5 minutes, ±5 × 10^{-8} (MS2830A-002) 7 minutes, ±1 × 10^{-9} (MS2830A-001)			5 minutes, ±5 × 10^{-8} (Standard) 7 minutes, ±1 × 10^{-9} (MS2830A-001)	
Phase noise	Frequency: 500 MHz, Spectrum Analyzer mode				
1 kHz offset	–109 dBc/Hz (MS2830A-066)			—	
10 kHz offset	–118 dBc/Hz (MS2830A-066)			—	
100 kHz offset	–115 dBc/Hz (Standard) –133 dBc/Hz (MS2830A-066)			–115 dBc/Hz (Standard)	
1 MHz offset	–133 dBc/Hz (Standard) –148 dBc/Hz (MS2830A-066) (nom.)			–133 dBc/Hz (Standard)	
Displayed average noise level (DANL)	Spectrum Analyzer mode without options				
Frequency: 500 MHz	–153 dBm/Hz				
Frequency: 2 GHz	–151 dBm/Hz			–150 dBm/Hz	
Frequency: 5 GHz		–146 dBm/Hz		–144 dBm/Hz	
Frequency: 12 GHz			–142 dBm/Hz	–151 dBm/Hz	
Frequency: 25 GHz				–146 dBm/Hz	
Frequency: 40 GHz					–144 dBm/Hz
Attenuator range/step	0 to 60 dB/2 dB step				0 to 60 dB/10 dB step
Total absolute amplitude accuracy	Unlike normal Total Level Accuracy, this includes frequency characteristics, attenuator switching error and linearity error. Since it gives an instinctive impression of measurement instrument error, it lowers the risk of measurement errors.				
Frequency :500 MHz, 2 GHz	±0.5 dB				
Frequency: 5 GHz, 12 GHz	±1.8 dB				
Frequency: 25 GHz				±3.0 dB	
Frequency: 40 GHz					±3.0 dB
Resolution bandwidth	1 Hz to 3 MHz (1-3 sequence), 5, 10, 20*8, 31.25 MHz*8, 50 kHz [Spectrum Analyzer mode]				
Analysis bandwidth	10 MHz (MS2830A-006) 31.25 MHz (MS2830A-005) 62.5 MHz (MS2830A-077)*9 125 MHz (MS2830A-078)*9				10 MHz (MS2830A-006) 31.25 MHz (MS2830A-009) 62.5 MHz (MS2830A-077)*9 125 MHz (MS2830A-078)*9
Additional functions					
Vector signal generator	✓ (MS2830A-020/021)			—	
Low phase noise performance*2	✓ (MS2830A-066)			—	
Phase noise measurement function	✓ (MS2830A-010)				
Noise figure measurement function	✓ (MS2830A-017)				
BER measurement function	✓ (MS2830A-026)				
Preamplifier*3	✓ (MS2830A-008)				
Microwave preamplifier*4	—			✓ (MS2830A-068)	
Microwave preselector bypass*5	—			✓ (MS2830A-067)	
External mixer 1st local signal output*6	—			✓ (Standard)	
1st IF signal output*7	—			✓ (Standard)	

∗1: See catalog for MS2830A-040/041/043.
∗2: Phase noise improved for <3.6 GHz.
∗3: Frequency range: 100 kHz to 3.6 GHz (MS2830A-040)
100 kHz to 6 GHz (excluding MS2830A-040)
∗4: Frequency range: 100 kHz to 26.5 GHz (MS2830A-044),
100 kHz to 43 GHz (MS2830A-045)
∗5: Frequency range: 4 GHz to 26.5 GHz (MS2830A-044),
4 GHz to 43 GHz (MS2830A-045)
∗6: Connector: SMA-J, 50Ω, Local signal: 5 GHz to 10 GHz
∗7: Connector: SMA-J, 50Ω, Frequency: 1.875 GHz
∗8: Can be set when with MS2830A-005. Can not be set when with MS2830A-009.

∗9: Signal Analyzer Mode Frequency Setting Range
With MS2830A-077/078, With MS2830A-067, >31.25 MHz bandwidth
300 MHz to 26.5 GHz [MS2830A-044]
300 MHz to 43 GHz [MS2830A-045]
With MS2830A-077/078, Without MS2830A-067, >31.25 MHz bandwidth
300 MHz to 3.6 GHz [MS2830A-040]
300 MHz to 6 GHz [MS2830A-041]
300 MHz to 13.5 GHz [MS2830A-043]
300 MHz to 6 GHz [MS2830A-044]
300 MHz to 6 GHz [MS2830A-045]

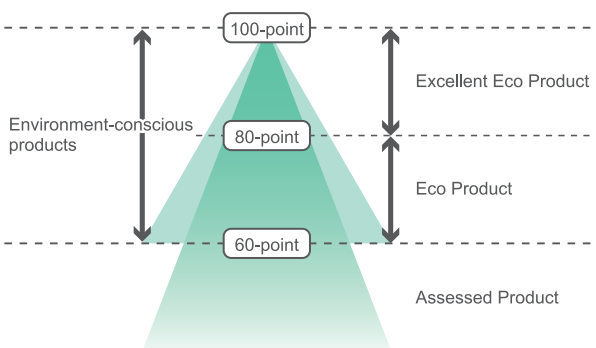
Eco-friendly
Anritsu uses two eco product marks indicating environment-friendly products as follows:

Excellent eco product:
80+ score and satisfies excellent eco product requirements

Eco product:
60+ score and satisfies eco product requirements

Resource saving/reduction of manufacturing load
Reduction of toxins
Reduction of logistics load
Reduction of usage load
Reduction of disposal load

Excellent Eco Product



Key Features

Basic Performance/Functions

■ Frequency Range
MS2830A-044: 9 kHz to 26.5 GHz
MS2830A-045: 9 kHz to 43 GHz

■ Measures up to 325 GHz using High Performance Waveguide Mixer and External Mixer
Frequency Range:
26.5 GHz to 325 GHz (External Mixer)
50 GHz to 90 GHz (High Performance Waveguide Mixer)
Built-in connector to connect High Performance Waveguide Mixer and External Mixer (MS2830A-044/045)
- Connector: SMA-J, 50 Ω
- Local Signal Output: 5 GHz to 10 GHz
- IF Signal Frequency: 1.875 GHz

■ Excellent Dynamic Range*1:
159 dB (at 25 GHz)
TOI*2: ≥+13 dBm
DANL*3: –146 dBm/Hz
157 dB (at 40 GHz)
TOI: ≥+13 dBm (nom.)
DANL: –144 dBm/Hz

■ Preamp up to 43 GHz
→ MS2830A-068/168: Microwave Preamplifier
DANL*3: –156 dBm/Hz (at 25 GHz)*4
DANL*3: –150 dBm/Hz (at 40 GHz)*4

■ Total Level Accuracy:
±0.5 dB (300 kHz ≤ f < 4 GHz)
±3.0 dB (13.8 GHz < f ≤ 40 GHz)

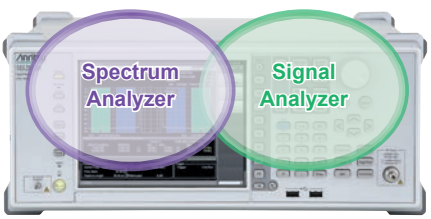
■ Used as Wideband Down Converter
Built-in IF Output Function (MS2830A-044/045)
- Connector: SMA-J, 50 Ω
- IF Output Frequency: 1.875 GHz
- IF Output Bandwidth: 1 GHz (3 dB Bandwidth, nom.)*5
- Gain: –10 dB (nom.)

■ Improved Level Linearity

■ Reference Oscillator
Pre-installed Reference Oscillator
Aging Rate: ±1 × 10^{-7}/year, ±1 × 10^{-8}/day
Start-up Characteristics: ±5 × 10^{-8} (5 minutes after power-on)
Rubidium Reference Oscillator (MS2830A-001)
Aging Rate: ±1 × 10^{-10}/month
Start-up Characteristics: ±1 × 10^{-9} (7 minutes after power-on)

■ Versatile Built-in Functions
- Channel Power
- Occupied Bandwidth
- Adjacent Channel Leakage Power
- Spectrum Emission Mask*4
- Spurious Emission*4
- Burst Average Power
- Frequency Counter*4
- AM Depth*6
- FM Deviation*6
- Multi-marker & Marker List
- Highest 10 Markers
- Limit Line*4
- 2-tone 3rd-order Intermodulation Distortion*4
- Annotation Display (On/Off)
- Power Meter*7
- Phase Noise*8
- Noise Figure*9

■ Low-power Consumption
MS2830A-044/045: 190 VA (nom.)



Signal Analyzer Functions

■ Analysis Bandwidth
MS2830A-006: 10 MHz max.
(20 MHz max. sampling rate = 50 ns resolution, ADC resolution 16 bits)
MS2830A-005*10, MS2830A-009*11: 31.25 MHz max.
(50 MHz max. sampling rate = 20 ns resolution, ADC resolution 16 bits)
MS2830A-077*12: 62.5 MHz max.
(100 MHz max. sampling rate = 10 ns resolution, ADC resolution 14 bits)
MS2830A-078*13: 125 MHz max.
(200 MHz max. sampling rate = 5 ns resolution, ADC resolution 14 bits)

Note: An image response is received when setting the bandwidth to more than 31.25 MHz. This can be used when not inputting a signal frequency outside the MS2830A analysis bandwidth (125 MHz max.). The Signal Analyzer series MS2690A/91A/92A is recommended for other measurement purposes.

■ Capture Function
Saves analysis Span × Time signal to internal memory and writes to hard disk. Up to 100 Msamples per measurement saved to internal memory.
Example: Span 1 MHz: Max. capture time 50 s
Span 10 MHz: Max. capture time 5 s
Span 100 MHz: Max. capture time 0.5 s

■ Replay Function
Reads saved data and replays using signal analyzer function.
Example:
1. Data sharing between R&D and manufacturing
2. Later laboratory bench-top analysis of on-site signals

■ Measurement with Sub-trace Display
Split screen displaying both main and sub-traces at same time to check errors
Main: Spectrum, Frequency vs. Time, Power vs. Time, Phase vs. Time, CCDF/APD, Spectrogram
Sub: Power vs. Time, Spectrogram

■ Supports 125 MHz Wideband Measurements up to 43 GHz
→ MS2830A-067: Microwave Preselector Bypass
→ MS2830A-078*13: Analysis Bandwidth Extension to 125 MHz
Bypassing preselector improves RF frequency characteristics and in-band frequency characteristics. Supports modulation analysis and signal analyzer measurements for signals up to 43 GHz.

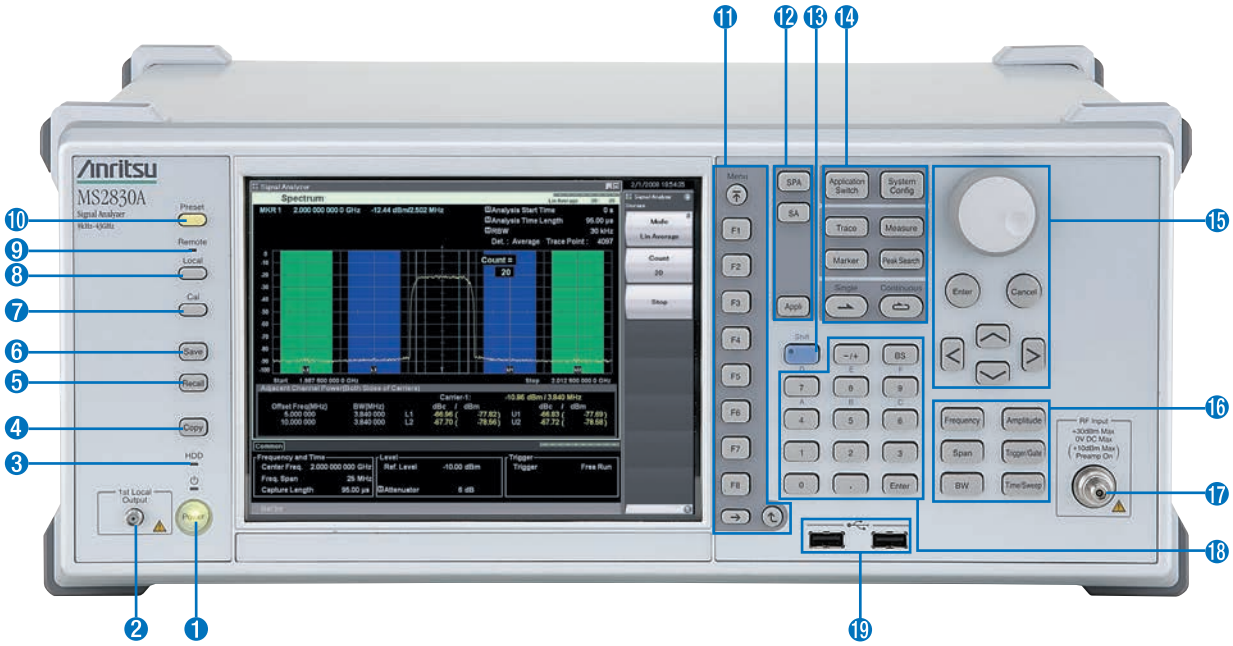
BER Measurement Function (MS2830A-026)

This option measures BER using Data/Clock/Enable demodulated at the DUT.

Input Bit Rate: 100 bps to 10 Mbps
Input Level: TTL Level

∗1: Difference between TOI and DANL as simple guide
∗2: TOI (Third Order Intercept)
∗3: DANL (Displayed Average Noise Level)
∗4: Spectrum Analyzer Functions
∗5: When using external mixer bands, or using internal micro frequency bands (Band; 3 to 9) with Microwave Preselector Bypass option: On
∗6: Signal Analyzer functions (requires MS2830A-005/006/009/077/078)
∗7: Power Meter Function (use USB power sensors)
∗8: Phase Noise Measurement Function (requires MS2830A-010)
∗9: Noise Figure Measurement Function (Requires MS2830A-017)
[Use Noise Sources (Noisecom, NC346 series)]
∗10: MS2830A-005 can be installed in MS2830A-044.
Requires MS2830A-006.
∗11: MS2830A-009 can be installed in MS2830A-045.
Requires MS2830A-006.
Cannot be set the RBW to more than 10 MHz in spectrum analyzer function.
∗12: Requires MS2830A-006 and MS2830A-005 (for MS2830A-044).
Requires MS2830A-006 and MS2830A-009 (for MS2830A-045).
∗13: Requires MS2830A-006, MS2830A-005 and MS2830A-077 (for MS2830A-044).
Requires MS2830A-006, MS2830A-009 and MS2830A-077 (for MS2830A-045).

Panel Layout



❶ Power switch
Press to switch between the standby state in which AC power is supplied and the Power On state in which the MS2830A is under operation. The Power lamp lights up orange in the standby state, and lights up green in the Power On state. Press the power switch for a reasonably long duration (for about two seconds).

❷ 1st Local Output connector
Installed in main frame with MS2830A-044/045 and supplies local signal and bias current to External Mixer and High Performance Waveguide Mixer and receives frequency-converted IF signals

❸ HDD lamp
Lights up when the MS2830A internal hard disk is being accessed.

❹ Copy key
Press to capture a screen image from the display and save it to a file.

❺ Recall key
Press to recall a parameter file.

❻ Save key
Press to save a parameter file.

❼ Cal key
Press to display the calibration execution menu.

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

❾ Remote lamp
Lights up when the MS2830A is in a remote control state.

❿ Preset key
Resets parameters to their initial settings.

⓫ Function keys
Used for selecting or executing function menu displayed on the right of the screen. The function menu contents are provided in multiple pages and layers.

⓬ Application key
Press to switch between applications.

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

⓮ Main function keys 2
Used to set or execute main functions of the MS2830A. Executable functions vary depending on the application currently selected.

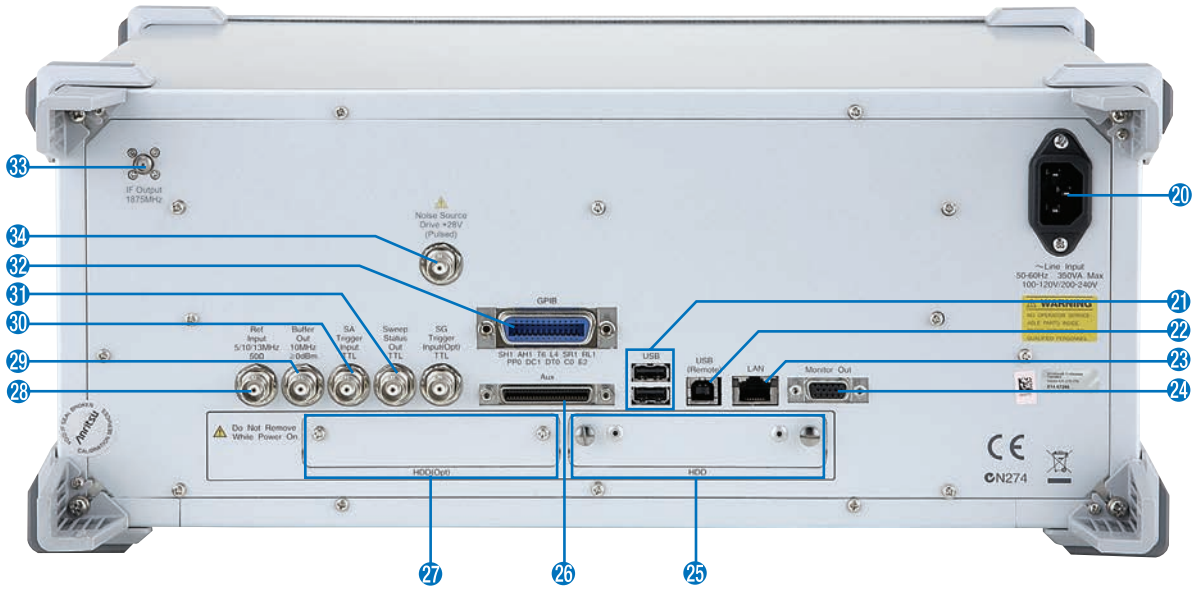
⓯ Rotary knob/Cursor keys/Enter key/Cancel key
The rotary knob and cursor keys are used to select display items or change settings.

⓰ Main function keys 1
Used to set or execute main functions of the MS2830A. Executable functions vary depending on the application currently selected.

⓱ RF Input connector
Inputs an RF signal.
N-J, 50 Ω (MS2830A-044)
K-J, 50 Ω (MS2830A-045)

⓲ Numeric keypad
Used to enter numbers on parameter setup screens.

⓳ USB connector (type A)
Used to connect a USB keyboard or mouse or the USB memory supplied with the MS2830A.



20 AC inlet
Used for supplying power.

21 USB connectors (type A)
Used to connect a USB keyboard or mouse or the USB memory supplied with the MS2830A.

22 USB connector (type B)
Used when controlling the MS2830A externally via USB.

23 LAN (Ethernet) connector
Used for connecting to a personal computer or for Ethernet connection.

24 Monitor Out connector
Used for connection with an external display.

25 HDD slot
This is a hard disk slot.

26 AUX connector (For MS2830A-026)
Composite connector for BER measurement function options with BER measurement Clock, Data, and Enable inputs. Converted to BNC using AUX Conversion Adaptor*.

*: The J1556A AUX Conversion Adapter is a standard accessory supplied with the MS2830A-026 BER Measurement Function.

27 HDD slot for options
This is a hard disk slot for the options.

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

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

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

31 Sweep Status Out connector
Outputs a signal that is enabled when an internal measurement is performed or measurement data is obtained.

32 GPIB connector
Used when controlling the MS2830A externally via GPIB.

33 IF Output connector
Installed in main frame with MS2830A-044/045 to monitor output of internal IF signal
Connector: SMA-J, 50 Ω
IF Output Frequency: 1.875 GHz

34 Noise Source Drive connector
This is available when the MS2830A-017/117 is installed.
Supply (+28 V) of the Noise Source Drive.

Basic Performance

Dynamic Range

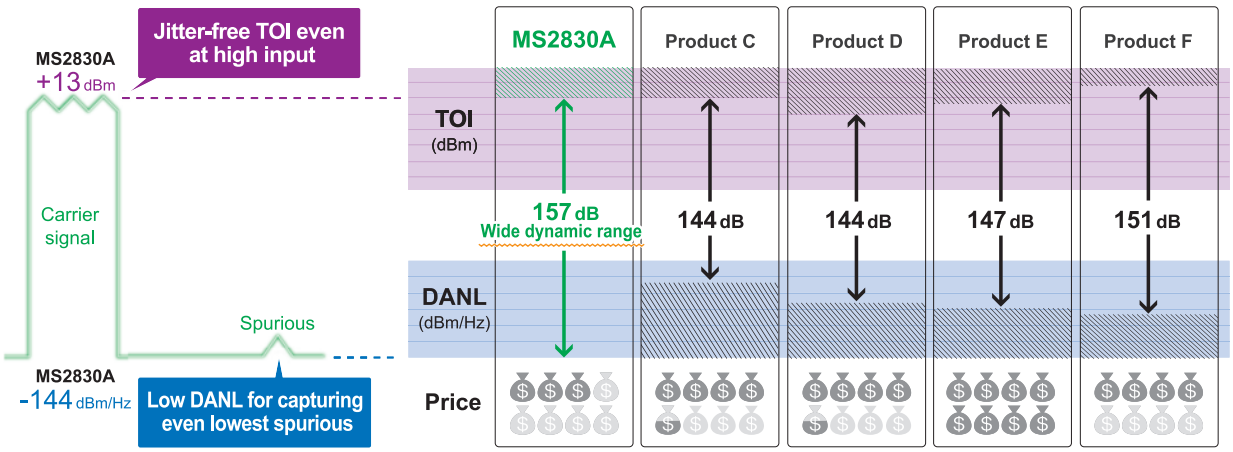
Dynamic Range*1: 159 dB (at 25 GHz)
TOI*2: ≥+13 dBm (6 GHz < f ≤ 26.5 GHz)
DANL*3: –146 dBm/Hz (18.3 GHz < f ≤ 34 GHz)
Dynamic Range: 157 dB (at 40 GHz)
TOI: ≥+13 dBm (nom., 26.5 GHz < f ≤ 40 GHz)
DANL: –144 dBm/Hz (34 GHz < f ≤ 40 GHz)

∗1: Difference between TOI and DANL as simple guide.
∗2: TOI (Third Order Intercept)
∗3: DANL (Displayed Average Noise Level)

Dynamic range is a key specification for spectrum analyzers. Low displayed average noise level (DANL) as well as high TOI are important too. Low TOI may cause distortion with high-level carrier signals. Inserting an attenuator can lower the carrier level but this has the effect of lowering the level of weak spurious, making it hard to measure.

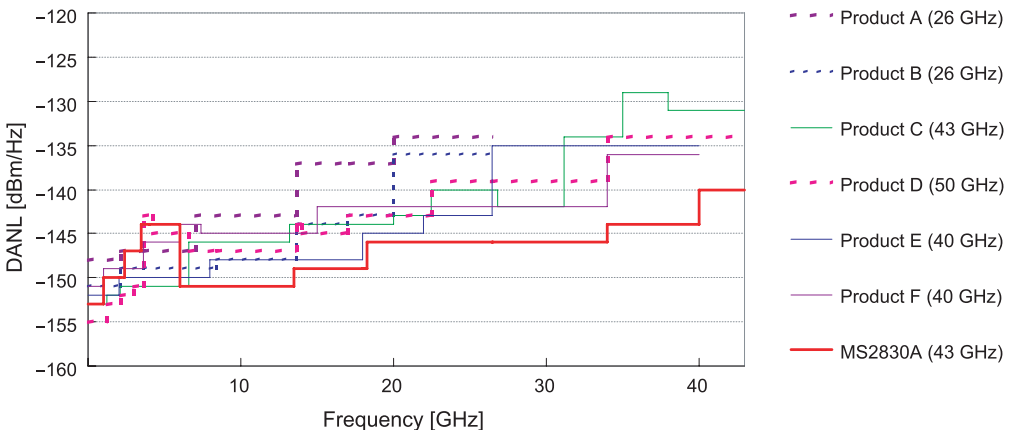
The MS2830A has an excellent dynamic range supporting true performance measurements of devices, such as base stations, requiring wideband measuring instruments.

Dynamic Range Comparison Image (at 40 GHz)

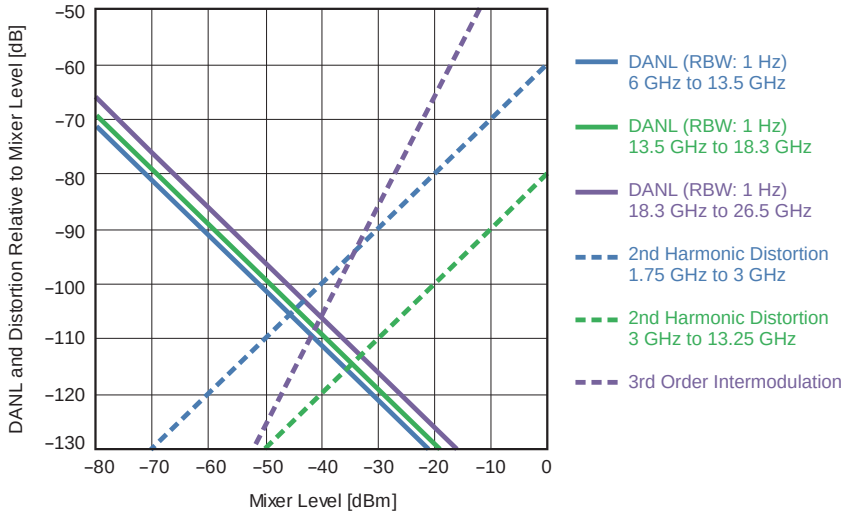


DANL Comparison

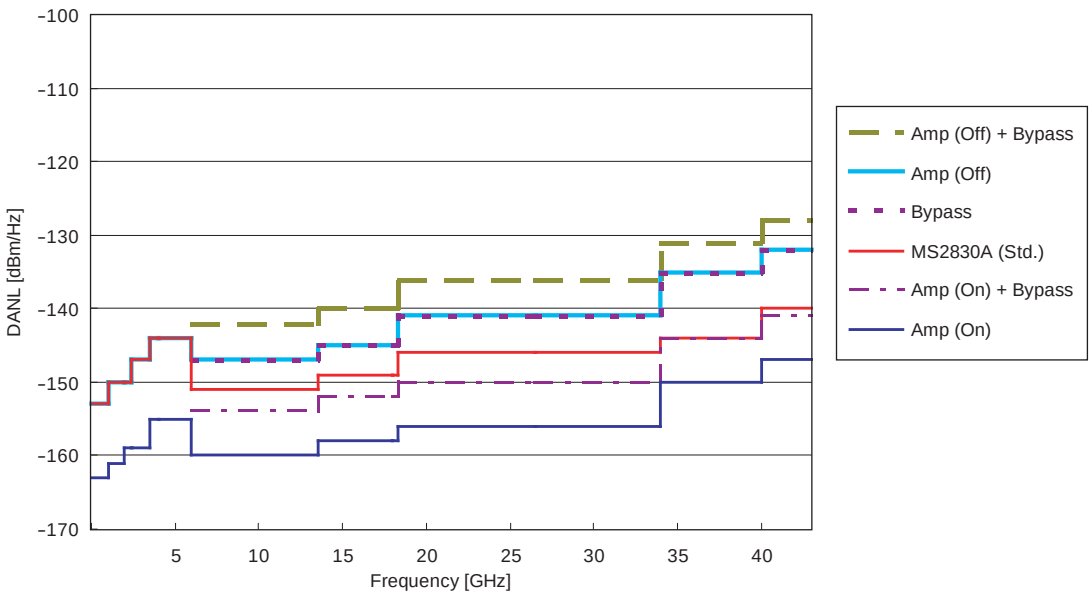
With Preamp, without Preselector bypass



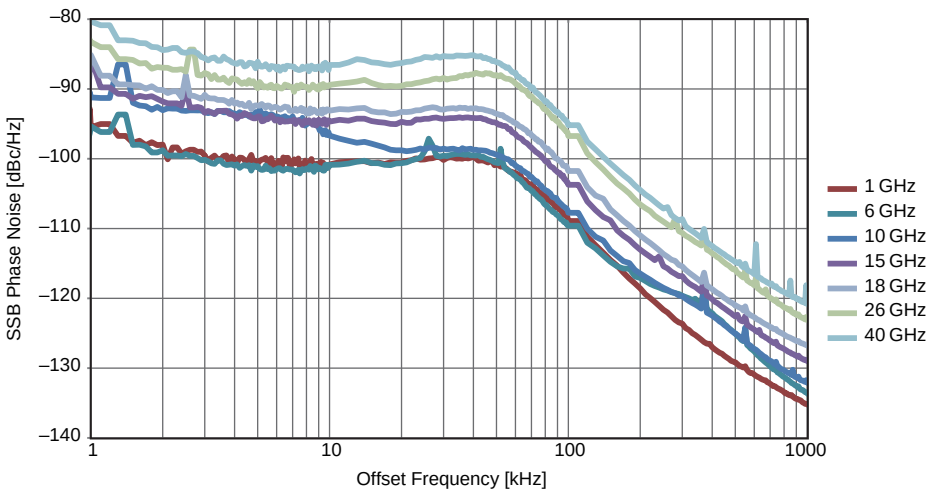
Distortion Characteristics (Spectrum Analyzer)



DANL (MS2830A-045)
Amp (Preamplifier: MS2830A-068), Bypass (Preselector Bypass: MS2830A-067/009)



Example: SSB Phase Noise (Spectrum Analyzer/Signal Analyzer Common)

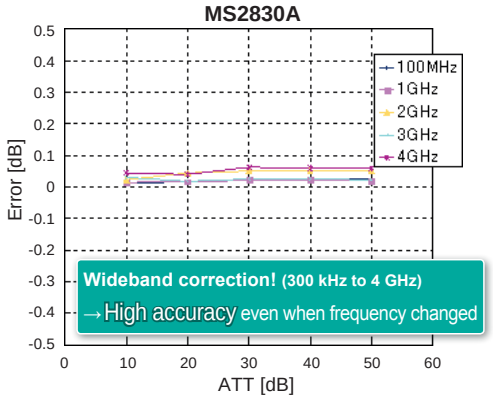


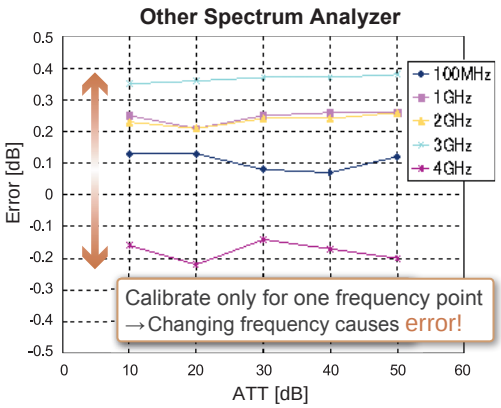
Total Level Accuracy

±0.5 dB (300 kHz ≤ f <4 GHz)
±1.8 dB (4 GHz ≤ f ≤ 13.8 GHz)
±3.0 dB (13.8 GHz < f ≤ 40 GHz)

The absolute level accuracy in most spectrum analyzer catalogs does not include frequency characteristics, linearity, and attenuator switching error.
However, the MS2830A Total Level Accuracy in the catalog includes the above three errors.
Even when changing the frequency and attenuator, stable measurement is assured in the specified error range.

Example: Level Error Comparison with Different Level Calibration Method





The MS2830A total level accuracy includes:
- **Frequency characteristics**
- **Linearity**
- **Attenuator switching error**

The absolute amplitude accuracy specifications of other spectrum analyzers excludes:
- **Frequency characteristics**
- **Linearity**
- **Attenuator switching error**

Preamp up to 43 GHz: MS2830A-068 Microwave Preamplifier

DANL: –156 dBm/Hz (at 25 GHz)
–150 dBm/Hz (at 40 GHz)

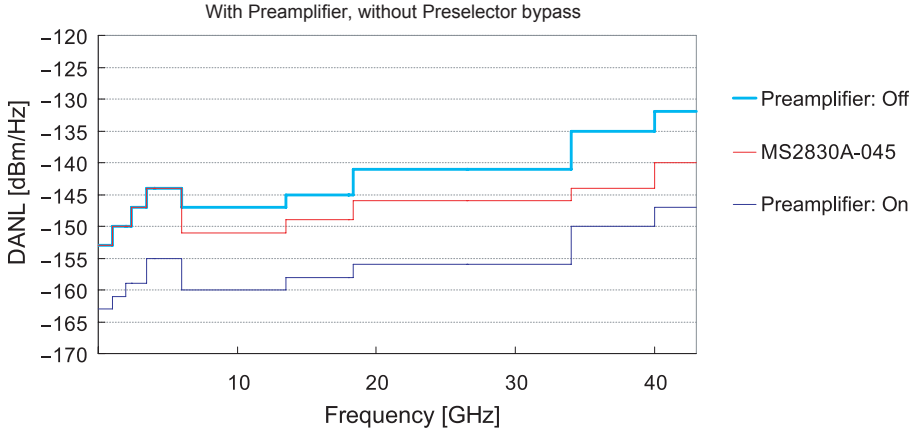
Installing the Microwave Preamplifier (MS2830A-068) amplifies signals before the mixer to improve the spectrum analyzer and signal analyzer sensitivity. This is recommended when measuring low-level signals, such as noise and interference signals.

Frequency range: 100 kHz to 26.5 GHz (MS2830A-044)
100 kHz to 43 GHz (MS2830A-045)

∗: Simultaneous installation with MS2830A-008 not supported

DANL Change by MS2830A-045 (43 GHz) Preamplifier (MS2830A-068)

With Preamplifier, without Preselector bypass



Measure Up To 325 GHz using High Performance Waveguide Mixer and External Mixer

High Performance Waveguide Mixer MA2806A and MA2808A Targeting Spectrum Analysis for Wider-Band Millimeter-Wave Wireless Transmitters

The High Performance Waveguide Mixer MA2806A and MA2808A are new mixers for connection to the Signal Analyzer MS2830A with frequency option 044 or option 045. It has the good features of both a harmonic mixer and a down converter and is ideal for spectrum analysis of millimeter-wave (50 GHz to 90 GHz-band) wireless transmitters now being used for future wider-band applications, such as wireless backhaul, automotive radar, etc.

High Performance Waveguide Mixer (MA2806A and MA2808A)

Model	Name	Frequency Band	Frequency Range	Waveguide Flange	Waveguide Size
MA2806A	High Performance Waveguide Mixer (50 to 75 GHz)	V band	50 GHz to 75 GHz	UG-385/U	WR15
MA2808A	High Performance Waveguide Mixer (60 to 90 GHz)	E band	60 GHz to 90 GHz	UG-387/U	WR12

Specifications in back of this catalog

MA2808A

Features

- Wide dynamic range based on excellent minimum sensitivity and P1dB performance
- Image-response-free measurement of wideband signals plus high IF frequency and PS function*1

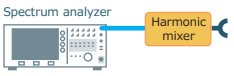
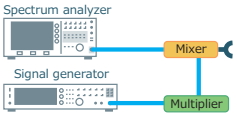
The MA2806A and MA2808A have a dedicated multiplier, amplifier, bandpass filter, etc., supporting an excellent conversion loss of at least 10 dB better than conventional harmonic mixers, as well as P1dB performance exceeding 0 dBm. When used in combination with the MS2830A, the display average noise performance level is excellent at –150 dBm/Hz (meas)*2 at 75 GHz. Due to this wide dynamic range, the MA2806A and MA2808A support evaluation of the true spurious performance of wider-band, millimeter-wave wireless transmitters as well as various types of millimeter-wave equipment, such as automotive radar, wireless backhaul and gigabit wireless LAN (IEEE 802.11ad/WiGig) etc., that cannot be evaluated accurately using conventional harmonic-mixer and down-converter methods.

Moreover, by using the high IF frequency (1.875 GHz) of the MS2830A, spectrum mask measurements can be made over a wide measurement span with no impact from image-response effects. Spectrum mask measurements require measurement over a wider measurement span than the bandwidth of the signal to be measured. For example, when using the MA2806A and MA2808A to measure a signal with a bandwidth of 1 GHz, no image response occurs in a wide measurement span covering 6.5 GHz. Moreover, no image response occurs in a measurement span of 5.5 GHz for a signal with a bandwidth of 2 GHz. Additionally, use of the newly developed PS function*1 supports image-response-free measurements over a measurement span of up to 7.5 GHz, irrespective of the measured signal bandwidth.

Connection to the MS2830A is as easy as simply connecting a cable to the IF port. Conversion loss data saved in a USB memory stick is loaded into the MS2830A for reflection in the measured values.

∗1: Patent pending as of October 2015
∗2: Value measured at design but not guaranteed specification.

Performance Comparison of Measurement Method

Measurement Method	Product Selection Points				
	Min. Sensitivity	Image Response	P1dB	System Config	Mixer Conversion Loss Calibration
Anritsu Solution 	✓ Good	✓ Far	✓ High	✓ Simple	✓ No Need
Harmonic Mixer  	*1 — Bad	*2 — Very Close	✓ High	✓ Simple	*4 ✓ No Need
Down Converter  	✓ Good	✓✓ Very Far	*3 — Low	— Complex	*5 — Need

∗1: High noise floor level and narrow dynamic range due to high mixer conversion order
∗2: Low IF frequency depending on spectrum analyzer causes occurrence of image response generated in measurement range
∗3: Narrow dynamic range due to mixer P1dB performance of only –10 to –5 dBm
∗4: Different calibration procedure depending on spectrum analyzer used
∗5: Requires mixer conversion loss data for measurement range because any IF frequency can be set

Ordering Information

Model No.	Name		Notes
	– Main frame –		
MA2806A	High Performance Waveguide Mixer (50 to 75 GHz)		Waveguide (WR15, UG-385/U)
MA2808A	High Performance Waveguide Mixer (60 to 90 GHz)		Waveguide (WR12, UG-387/U)
	– Standard accessories –		
Z1922A	MA2806A USB Memory:	1 pc	Saved conversion loss data (For MA2806A)
Z1923A	MA2808A USB Memory:	1 pc	Saved conversion loss data (For MA2808A)
Z1625A	AC Adapter:	1 pc	100 V(ac) to 120 V(ac)/200 V(ac) to 240 V(ac), 50 Hz/60 Hz
	Power Cord:	1 pc	
J1692B	Coaxial Cord, 1 m:	1 pc	SMA-P · SUCOFLEX104PE · SMA-P, DC to 18 GHz, 50Ω

Minimum Recommended Configuration

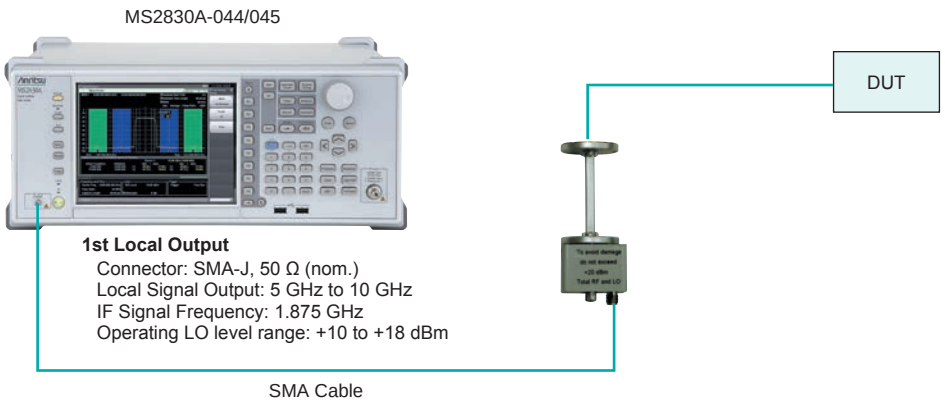
Model No.	Name	Notes
MS2830A	Signal Analyzer	Main unit
MS2830A-044	26.5 GHz Signal Analyzer	Select upper frequency Select one of MS2830A-044 or MS2830A-045 options
MS2830A-045	43 GHz Signal Analyzer	
MA2806A	High Performance Waveguide Mixer (50 to 75 GHz)	Select mixer model Select one of MA2806A or MA2808A
MA2808A	High Performance Waveguide Mixer (60 to 90 GHz)	

External Mixers (MA2740C/MA2750C Series)

The MA2740C/MA2750C series of External Mixers (Harmonic Mixers) supports spectrum measurements up to 325 GHz with high sensitivity and fewer LO harmonic order because these mixers output 1st local signals from 5 GHz to 10 GHz.

Model	Name	Frequency Band	Frequency Range	LO Harmonic Order	Mixing Mode	Conversion Loss* (dB)	Waveguide Flange	Wave Guide Size
MA2741C	External Mixer	A Band	26.5 GHz to 40 GHz	4	+	23	MIL-DTL-3922/54-003	WR28
MA2742C	External Mixer	Q Band	33 GHz to 50 GHz	5	+	26	MIL-DTL-3922/67D-006	WR22
MA2743C	External Mixer	U Band	40 GHz to 60 GHz	6	+	28	MIL-DTL-3922/67D-007	WR19
MA2744C	External Mixer	V Band	50 GHz to 75 GHz	8	+	32	MIL-DTL-3922/67D-008	WR15
MA2745C	External Mixer	E Band	60 GHz to 90 GHz	9	+	36	MIL-DTL-3922/67D-009	WR12
MA2746C	External Mixer	W Band	75 GHz to 110 GHz	11	+	39	MIL-DTL-3922/67D-010	WR10
MA2747C	External Mixer	F Band	90 GHz to 140 GHz	14	+	40	MIL-DTL-3922/67D-M08	WR08
MA2748C	External Mixer	D Band	110 GHz to 170 GHz	17	+	45	MIL-DTL-3922/67D-M06	WR06
MA2749C	External Mixer	G Band	140 GHz to 220 GHz	22	+	50	MIL-DTL-3922/67D-M05	WR05
MA2750C	External Mixer	Y Band	170 GHz to 260 GHz	26	+	65	MIL-DTL-3922/67D-M04	WR04
MA2751C	External Mixer	J Band	220 GHz to 325 GHz	33	+	70	MIL-DTL-3922/67D-M03	WR03

∗: The Conversion loss is a typical value near the center frequency of each band but is not a guaranteed specification.

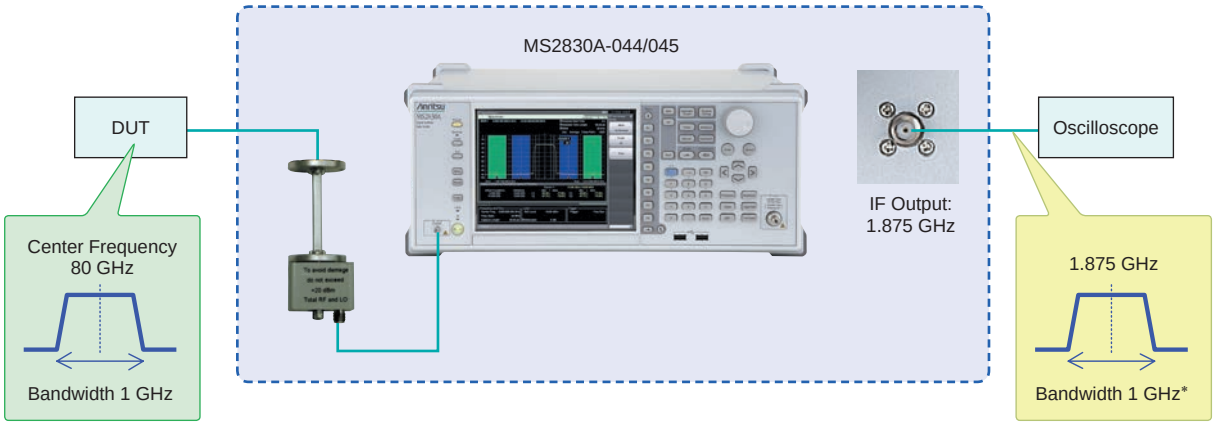


Connection Setup

Used as Wideband Down Converter: IF Output Frequency 1.875 GHz

Since IF Out supports a high frequency of 1.875 GHz, 1 GHz* wideband signals can be down converted. This can be used for down converting when performing modulation analysis by digitizing with an oscilloscope, etc.

Measurement image: Down convert signals with 80 GHz center frequency and 1 GHz* bandwidth to 1.875 GHz



*: When using external mixer bands (MA2740C/MA2750C Series), or using internal micro frequency bands (Band; 3 to 9) with Microwave Preselector Bypass option: On

Supports 125 MHz Wideband Measurements up to 43 GHz

MS2830A-067 Microwave Preselector Bypass + MS2830A-078* Analysis Bandwidth Extension to 125 MHz

*: Requires MS2830A-006, MS2830A-005 and MS2830A-077 (for MS2830A-044).
Requires MS2830A-006, MS2830A-009 and MS2830A-077 (for MS2830A-045).

Supports wideband analysis with high frequencies
Frequency range: 4 GHz to 26.5 GHz (MS2830A-044, Frequency band mode: Normal)
4 GHz to 43 GHz (MS2830A-045, Frequency band mode: Normal)
Installing the Microwave Preselector Bypass supports signal analyzer measurement functions in the above frequency range.
Adding the measurement software permits modulation analysis and is very useful for designing and inspecting high-frequency devices.

Example: MX269017A Vector Modulation Analysis Software

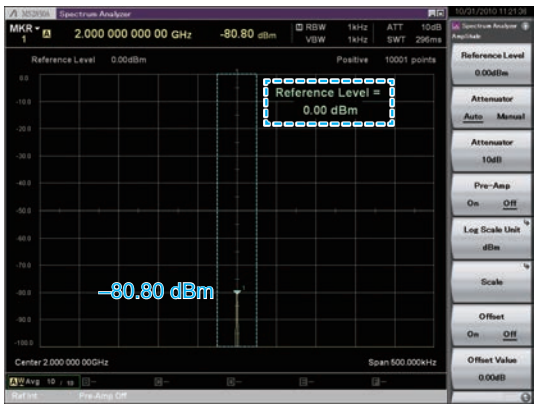
- **Modulation method**
  BPSK, QPSK, O-QPSK, π/4 DQPSK, 8PSK, 16QAM, 64QAM, 2FSK, 4FSK, 256QAM*1
- **Filter**
  Nyquist, Root Nyquist, None, Gaussian, ARIB STD-T98, Inverse Rect, Inverse Gaussian, Half-sine, User Defined
- **Symbol rate (Upper limit depends on analysis bandwidth 10/31.25/62.5/125 MHz)**
  0.1 k to 2.5 M/6.25 M/12.5 M/25 M symbol/s*2
  0.1 k to 5 M/12.5 M/25 M/50 M symbol/s*3
  0.1 k to 5 M/35 M/70 M/140 M symbol/s*4
  0.1 k to 1.25 M/3.125 M/6.25 M/12.5 M symbol/s*5

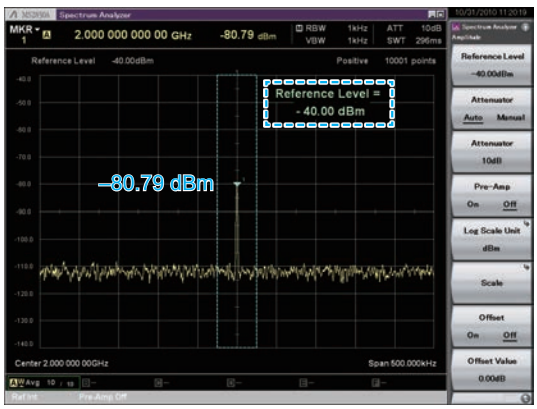
*1: 256QAM available with Non-Format
*2: When 2FSK and 4FSK
*3: When Frame Formatted and xxPSK, xxQAM
*4: When Non-Formatted and xxPSK, xxQAM
*5: When O-QPSK

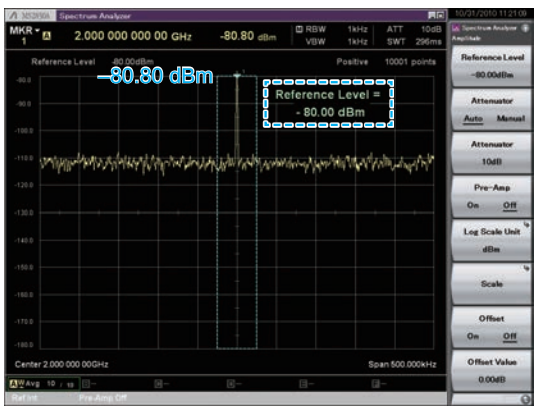
Improved Level Linearity

Conventional spectrum analyzers use an analog IF and log amp to achieve good level accuracy at points near the log scale reference level, but the accuracy degrades at points that are further away. The MS2830A uses a digital IF instead of a log amp, which supports measurements with excellent accuracy at any point.

Example: Level Stability by Switching Reference Level







Level Linearity

The MS2830A total level accuracy is better than that of conventional spectrum analyzers but sometimes a power meter is used when wanting to measure with even higher accuracy. However, use of a power meter narrows the dynamic range and errors may also occur easily when switching the power range. Since a power meter has no frequency selection, the total power of the input signal is measured. In other words, the power of the target frequency components cannot be separated out. Measurement can be performed with a wide dynamic range after checking the MS2830A level measurement reference value with a power meter.

The MS2830A total level accuracy includes:

- **Frequency characteristics**
- **Linearity**
- **Attenuator switching error**

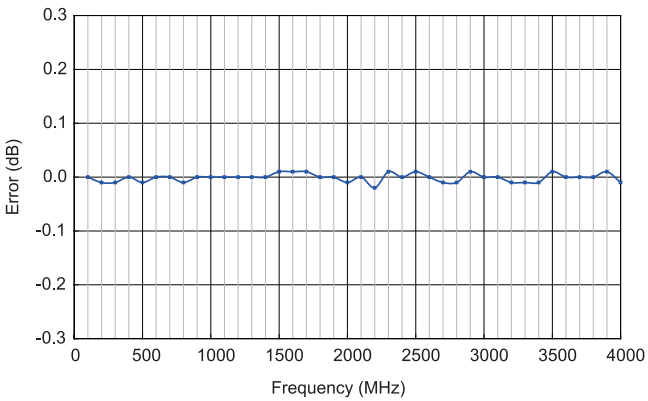
And supports excellent:

- **Log scale stability**

Dual Sweep Speed: Normal/Fast

When sweep time is set to [Auto], Normal (normal sweep) or Fast mode (high-speed sweep) can be set. The Fast mode sweeps six times faster than the Normal mode.

Example of Sweep Mode Switch Error: (CW –10 dBm input)
Level Error when Switching from Normal to Fast



Low Consumption Power, Excellent Eco Product

The MS2830A meets Anritsu “Excellent eco products” standard for environment-friendly products. It cuts consumed power by 50% compared to conventional models.

Power Consumption:

≤350 VA (including all options)
190 VA (nom., MS2830A-044 only, 26.5 GHz*1)
190 VA (nom., MS2830A-045 only, 43 GHz*1)

∗1: Excluding other options

Resolution Bandwidth (RBW)

Setting Range

Spectrum Analyzer:

1 Hz to 3 MHz (1-3 sequence),
500 Hz, 50 kHz, 2 MHz, 5 MHz, 10 MHz, 20 MHz*2,
31.25 MHz*2, *3, 200 Hz (6 dB)*4, 9 kHz (6 dB)*4,
120 kHz (6 dB)*4, 1 MHz (Impulse)*4

Spectrum trace in signal analyzer mode:

1 Hz to 1 MHz (1-3 sequence)*5
1 Hz to 3 MHz (1-3 sequence)*6
1 Hz to 10 MHz (1-3 sequence)*7

When monitoring two adjacent signals, the frequency resolution can be increased by reducing the resolution bandwidth (RBW). This also has the effect of reducing the noise level. Conversely, to confirm level variations of 20-MHz band signals such as LTE, set the RBW to 31.25 MHz.

∗2: Can be set when with MS2830A-005. Can not be set when with MS2830A-009.
∗3: Instead of Gaussian filter, 31.25 MHz RBW uses filter with flat top characteristics above 31.25 MHz.
∗4: When MS2830A-016 installed.
∗5: Without MS2830A-077/078, or Bandwidth: ≤31.25 MHz
∗6: With MS2830A-077, Bandwidth: >31.25 MHz
∗7: With MS2830A-078, Bandwidth: >31.25 MHz

Gate Sweep

Gate sweep executes sweeping only for the length of time specified by the gate length, starting from when the trigger condition is met. A delay time until sweeping starts after the trigger condition is met can be set using trigger delay.

- The gate source can be selected from the following
  - Wide IF video trigger
  - External trigger
  - Frame trigger
- Setting range and resolution for gate delay
  - Setting range: 0 to 1 s
  - Resolution: 20 ns
- Setting range and resolution for gate length
  - Setting range: 50 µs to 1 s
  - Resolution: 20 ns

Trigger Function

Trigger sweep executes sweeping using the specified trigger condition as the start point.

- Video trigger:
  Trigger sweeping starts in synchronization with the rise or fall of the waveform. A trigger level indicator showing the trigger level is displayed on the screen.
- Wide IF video trigger:
  An IF signal with a wide passing band of about 5 MHz is detected, and sweeping starts in synchronization with either the rise or fall of the detected signal.
- External trigger:
  Sweeping starts in synchronization with the rise or fall of the signal input via the Trigger Input connector.
- Frame trigger:
  An equipment-internal trigger signal is used to generate a trigger and start the sweep. The generation period (Period) and offset time (Offset) for the trigger signal can be set. It is also possible to resynchronize the trigger signal with either the Wide IF Video signal or an external trigger.

Three Built-in External Interfaces

The built-in Gigabit Ethernet, USB2.0, and GPIB interfaces support remote operation.

GPIB: IEEE488.2, Rear panel, IEEE488 bus connector
Interface functions: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2
Ethernet: 10/100/1000BASE-T, Rear panel, RJ-45
USB (B): USB2.0, Rear panel, USB-B connector

Saving Measurement Results

Measurement results can be saved to internal hard disk or external USB memory. Screen dumps and trace data can be saved too.

- Screen dump file type
  - BMP
  - PNG
- The color of the screen hard copy can be set as follows:
  - Normal (same as screen display)
  - Reverse
  - Monochrome
  - Reversed Monochrome

Signal Analyzer: Basic Performance/Functions

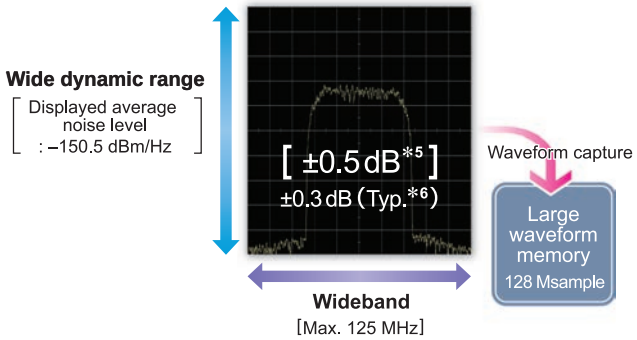
Wide bandwidth × High Accuracy FFT Analysis

Analysis Bandwidth

MS2830A-006: 10 MHz max.
(20 MHz max. sampling rate = 50 ns resolution, ADC resolution 16 bits)
MS2830A-005*1, MS2830A-009*2: 31.25 MHz max.
(50 MHz max. sampling rate = 20 ns resolution, ADC resolution 16 bits)
MS2830A-077*3: 62.5 MHz max.
(100 MHz max. sampling rate = 10 ns resolution, ADC resolution 14 bits)
MS2830A-078*4: 125 MHz max.
(200 MHz max. sampling rate = 5 ns resolution, ADC resolution 14 bits)

Note: An image response is received when setting the bandwidth to more than 31.25 MHz. This can be used when not inputting a signal frequency outside the MS2830A analysis bandwidth (125 MHz max.). The Signal Analyzer series MS2690A/91A/92A is recommended for other measurement purposes.

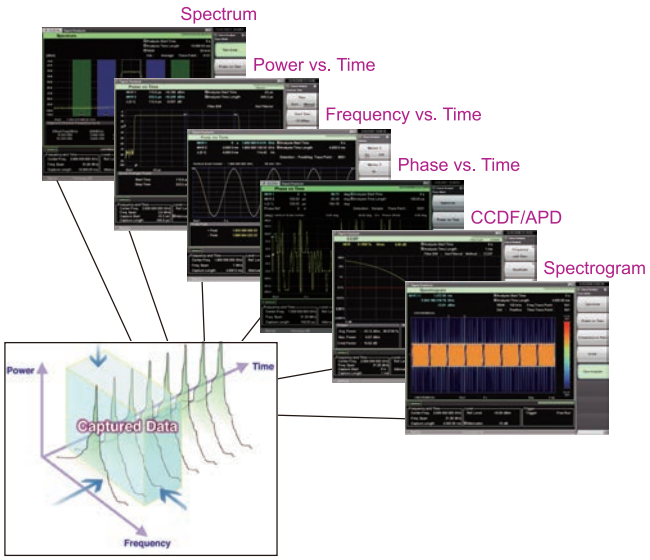
Based on the excellent level accuracy and wide dynamic range of the MS2830A, a signal with an FFT analysis bandwidth of up to 125 MHz can be captured with a level accuracy of ±0.3 dB.



∗1: MS2830A-005 can be installed in MS2830A-044. Requires MS2830A-006.
∗2: MS2830A-009 can be installed in MS2830A-045. Requires MS2830A-006.
∗3: Requires MS2830A-006 and MS2830A-005 (for MS2830A-044).
Requires MS2830A-006 and MS2830A-009 (for MS2830A-045).
∗4: Requires MS2830A-006, MS2830A-005 and MS2830A-077 (for MS2830A-044).
Requires MS2830A-006, MS2830A-009 and MS2830A-077 (for MS2830A-045).
∗5: 300 kHz ≤ f < 4 GHz, Frequency band mode Normal.
∗6: Excluding Guard Band

Vector Signal Analysis (VSA) Function

Seamless signal capture and VSA analysis in multiple domains make it easy to evaluate burst-signal responses and capture degraded spectrum transients, etc., which cannot be checked by conventional sweep spectrum analyzers. This greatly improves design verification and troubleshooting efficiency.



Save Signals in Internal Memory

Max. Capture Time: 0.5 s to 2000 s
Max. Number of Samples: 100 Msamples

The “Analysis bandwidth × Analysis time” signal is held in internal memory and saved to hard disk.
Up to 100 Msamples of data can be saved to memory for one measurement. The frequency span determines the sampling rate. The following chart shows the maximum capture time per frequency span.

Span*	Sampling Rate	Capture Time	Max. Sampling Data
1 kHz	2 kHz	2000 s	4M
2.5 kHz	5 kHz	2000 s	10M
5 kHz	10 kHz	2000 s	20M
10 kHz	20 kHz	2000 s	40M
25 kHz	50 kHz	2000 s	100M
50 kHz	100 kHz	1000 s	100M
100 kHz	200 kHz	500 s	100M
250 kHz	500 kHz	200 s	100M
500 kHz	1 MHz	100 s	100M
1 MHz	2 MHz	50 s	100M
2.5 MHz	5 MHz	20 s	100M
5 MHz	10 MHz	10 s	100M
10 MHz	20 MHz	5 s	100M
25 MHz	50 MHz	2 s	100M
31.25 MHz	50 MHz	2 s	100M
50 MHz	100 MHz	500 ms	50M
62.5 MHz	100 MHz	500 ms	50M
100 MHz	200 MHz	500 ms	100M
125 MHz	200 MHz	500 ms	100M

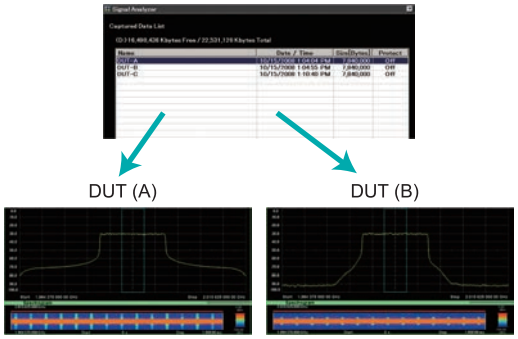
∗: With MS2830A-006: 1 kHz to 10 MHz
With MS2830A-005/006 (for MS2830A-044) or
MS2830A-006/009 (for MS2830A-045): 1 kHz to 31.25 MHz
With MS2830A-005/006/077 (for MS2830A-044) or
MS2830A-006/009/077 (for MS2830A-045): 1 kHz to 62.5 MHz
With MS2830A-005/006/077/078 (for MS2830A-044) or
MS2830A-006/009/077/078 (for MS2830A-045): 1 kHz to 125 MHz

Replay Function for Comparison Evaluation

This function reads saved data and replays it using the signal analyzer measurement function.

Examples:
1. Data sharing between separate R&D and manufacturing
2. Later laboratory bench-top analysis of on-site signals
3. Save data at shipment and re-verify if problem occurs

Captured Waveform Data: Selection Screen



Signal Analyzer: Trace

Spectrum

The Spectrum trace displays a graph with amplitude on the y-axis and frequency on the x-axis. The captured IQ data is FFT processed (fast Fourier transformed) and converted from the time domain to the frequency domain for display as a spectrum.

Power vs. Time

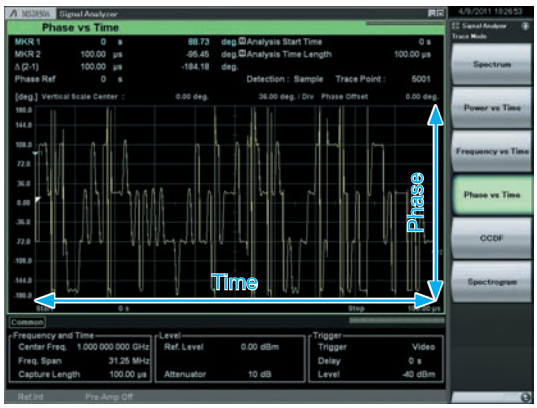
The Power vs. Time trace displays a graph with amplitude on the y-axis and time on the x-axis to confirm changes in power with time of measured signals.

Frequency vs. Time

The Frequency vs. Time trace displays a graph with frequency on the y-axis and time on the x-axis to confirm time variation of the measured signal frequency.

Phase vs. Time

The Phase vs. Time trace displays a graph with phase on the y-axis and time on the x-axis to confirm time variation of the measured signal phase.



CCDF*1/APD*2

The CCDF trace displays the power variation probability on the y-axis and power variation on the y-axis to confirm the CCDF and APD of measured signals.

∗1: CCDF (Complementary Cumulative Distribution Function)
∗2: APD (Amplitude Probability Density)

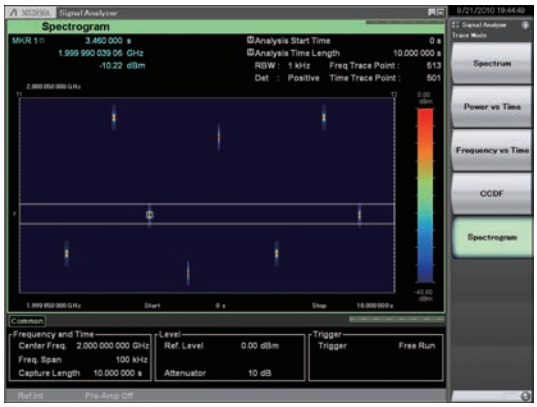
Measurement Results

- CCDF: The CCDF display indicates the cumulative distribution of transient power variations compared to average power.
- APD: The APD display indicates the probability distribution of transient power fluctuations compared to average power.

Signal Analyzer: Trace

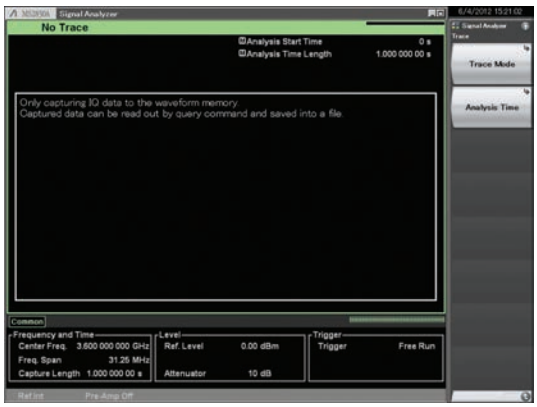
Spectrogram

The Spectrogram trace displays the level as color with frequency on the y-axis and time on the x-axis. The captured IQ data is FFT processed to confirm time variations in the continuous spectrum. It is useful for monitoring frequency hopping and transient signals.



No Trace

No Trace mode does not execute signal analysis. Therefore, “IQ data output” and “IQ data readout using remote commands” can be executed quickly without the need to wait for completion of analysis.

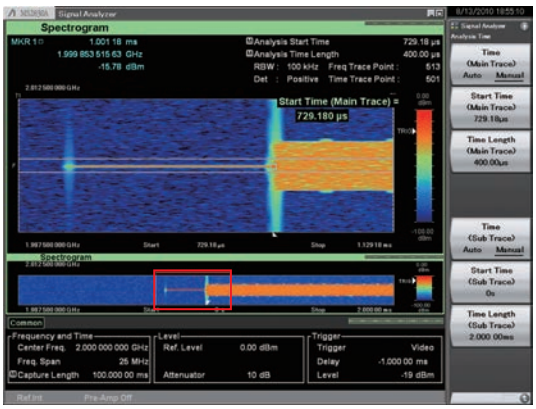


Measurement with Sub-trace Display

This function splits the screen into top and bottom halves; simultaneous display of the sub-trace supports easy monitoring of fault locations and transient phenomena.

Main: Spectrum, Frequency vs. Time, Power vs. Time, Phase vs. Time, CCDF/APD, Spectrogram
Sub: Power vs. Time, Spectrogram

The part of a previously captured long-term signal to be monitored can be selected (red part) on the sub-trace to display the problem part only on the main trace.



Signal Analyzer: Trace

Example: Sub-trace Display
Confirm analysis range in sub-trace, and target signal status on main trace.

Versatile Built-in Functions

Useful for Tx Characteristics Evaluation

The MS2830A is fully loaded with all the functions required for evaluating Tx characteristics. Tests can be performed simply and in accordance with standards using functions tailored to measurement contents.

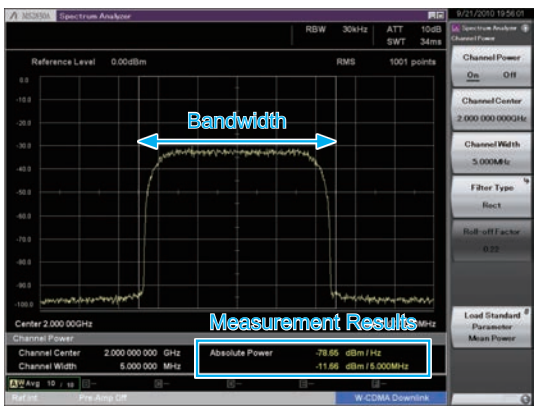
Measure Function	SPA*1	VSA*2
Channel Power	✓	✓
Occupied Bandwidth	✓	✓
Adjacent Channel Leakage Power	✓	✓
Spectrum Emission Mask	✓	
Burst Average Power	✓	✓
Spurious Emission	✓	
AM Depth		✓
FM Deviation		✓
FM CW		✓
Multi-marker & Marker List	✓	✓
Highest 10 Markers	✓	✓
Limit Line	✓	
Frequency Counter	✓	
2-tone 3rd-order Intermodulation Distortion	✓	
Annotation Display (On/Off)	✓	
Power Meter	Independent function*3	
Phase Noise	MS2830A-010	
Noise Figure	MS2830A-017*4	

∗1: SPA (Spectrum Analyzer)
∗2: VSA (Vector Signal Analyzer), requires MS2830A-005/006/009/077/078
∗3: Use USB Power Sensors
∗4: Use Noise Sources (Noisecom, NC346 series)

Channel Power

SPA VSA

This function measures channel bandwidth power. Three types of filters (Rect, Nyquist, Root Nyquist) can be selected.
Pre-installed templates for each standard support easy parameter setting.

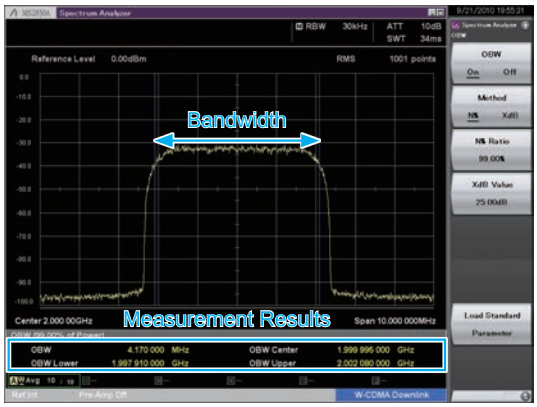


Measurement Results
- Absolute power per Hz in channel band
- Total power in channel band

Occupied Bandwidth

SPA VSA

Occupied bandwidth is measured by selecting either the N% or X-dB mode.
Pre-installed templates for each standard support easy parameter setting.

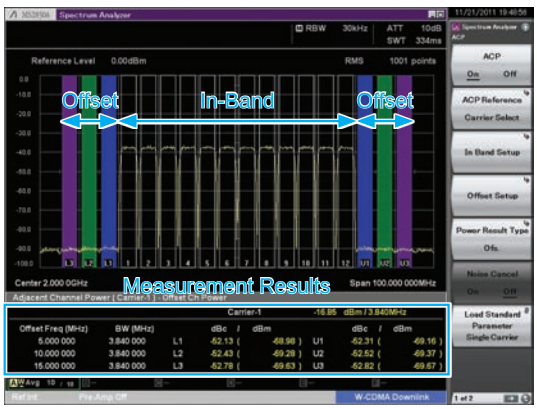


Measurement Results
- Bandwidth for specified conditions

Adjacent Channel Leakage Power

SPA VSA

This function measures carrier adjacent channel (offset) power (In-Band).
1 to 12 carriers can be set and switched instantaneously on-screen.
True ACLR performance is measured using the noise cancellation function to subtract main-frame noise from the measurement result.
Pre-installed templates for each standard support easy parameter setting.



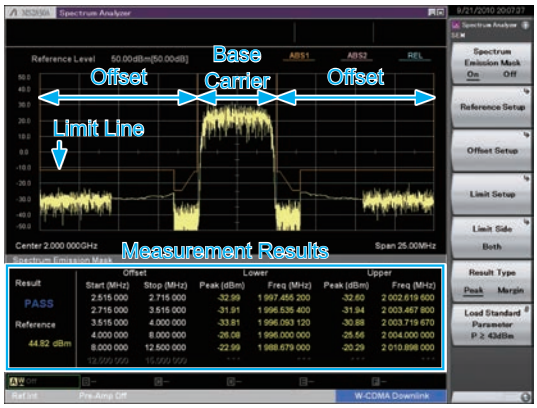
Measurement Results
- Absolute power of Offset channel
- Relative values in relation to reference power selected in ACP reference

Versatile Built-in Functions

Spectrum Emission Mask

SPA

This function splits the offset part into up to 12 segments; the measurement parameters and limit lines can be specified to measure the peak power and margin for each segment. The results are tabulated below the trace and marked PASS/FAIL. Pre-installed templates for each standard support easy parameter setting.



Measurement Results

- Peak power (or margin) at offset
- Each peak frequency

Burst Average Power

SPA VSA

The average power for the range specified by two markers is displayed in the time domain. Measurement only requires setting the measurement start and stop positions on the screen. True performance is measured using the noise cancellation function to subtract main-frame noise from the measurement result. Pre-installed templates for each standard support easy parameter setting.

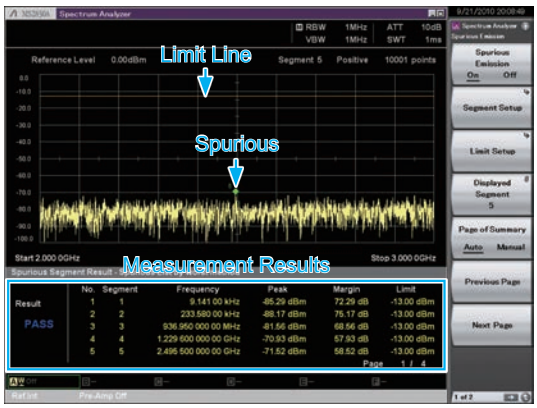
Measurement Results

- Average power of specified range

Spurious Emission

SPA

This function splits the frequency range into up to 20 segments for sweeping; the measurement parameters and limit lines can be specified to measure the peak power and margin for each segment. The results are tabulated below the trace and marked PASS/FAIL. In particular, all tests can be completed up to the final stage without an external PC because the zero-span capture function described in the technology compliance test is built-in.



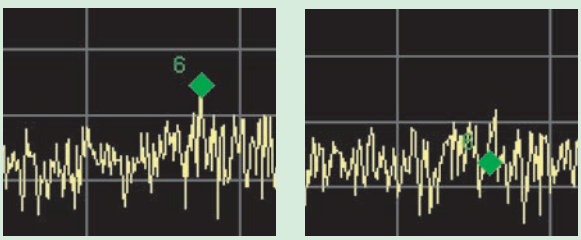
Measurement Results

- Each segment peak power and margin
- Each peak frequency

Example: Spurious Emission

The Japanese Radio Law governing measurement of spurious specifies searching for the peak level in the swept frequency segment using different parameter settings and then performing zero-span measurement of the found peak point. The MS2830A spurious measurement function not only performs the sweep search but also performs the zero-span measurement automatically as well, and displays the results of both. Using zero-span measurement, the search screen is displayed as is while zero-span measurement runs in the background and the result markers are plotted on the search screen. Time wasted by screen switching is reduced and the correlation with the search results can be seen at a glance.

Measurement Example



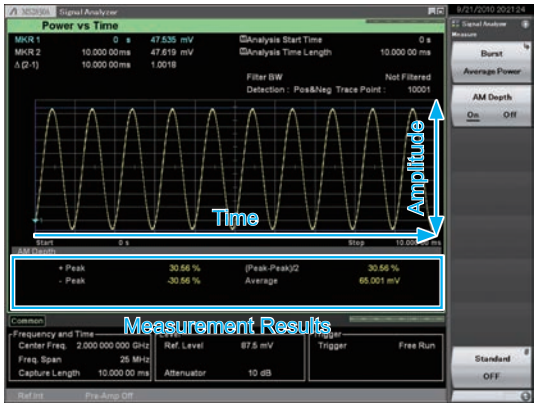
Search only | Search + Measurement

Versatile Built-in Functions

AM Depth

VSA

The Power vs. Time trace measurement function is used to confirm AM depth.
It measures the measured signal AM based on trace data at the displayed marker. When marker is Off, the whole range is measured.

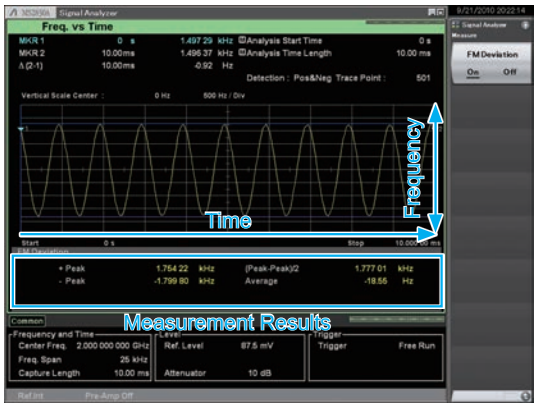


Measurement Results
■ +Peak, –Peak, (Peak-Peak)/2, Average

FM Deviation

VSA

The Frequency vs. Time trace measurement is used to confirm the FM deviation. It measures the maximum and minimum frequencies from trace data in the marker range. When marker is Off, the whole range is measured.



Measurement Results
■ +Peak, –Peak, (Peak-Peak)/2, Average

FM CW

VSA

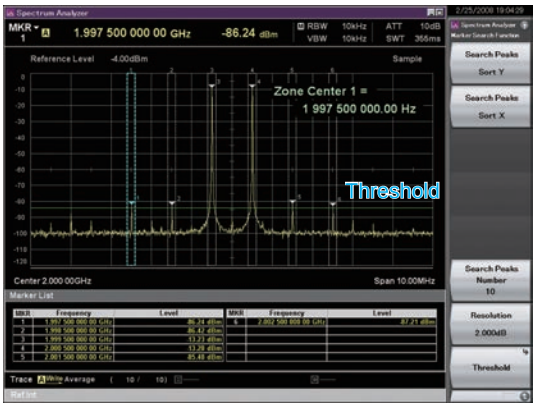
The Frequency vs. Time trace measurement is used to confirm the chirp signal characteristics such as chirp rate and frequency error.

Measurement Results
■ FM Error, Chirp Deviation, Chirp Rate, Chirp Time

Multi-marker & Marker List

SPA VSA

Up to 10 markers can be set for this function. Markers may be either a spot or a zone. Using a zone marker, the peak of a signal with an unstable variable frequency can be tracked and measured. Not only can the 10 markers be listed below the trace but the differences between markers can be calculated and displayed using the delta setting.

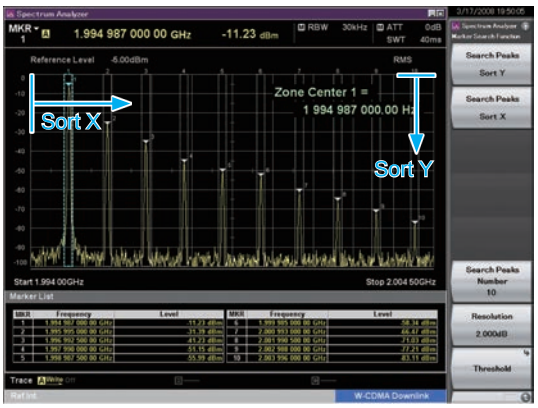


Measurement Results
■ Marker point frequency
■ Marker point power
■ Absolute power per Hz in marker bandwidth
■ Total power in marker bandwidth
■ Difference between any markers

Highest 10 Markers

SPA VSA

This function sets the threshold level and auto-detects peaks in the X (frequency) and Y (level/time) directions.



Measurement Results
■ Peak Search Y:
Sets up to 10 markers in order of peak level
■ Peak Search X:
Sets up to 10 markers in order of frequency (time) level

Limit Lines

SPA

Setting Limit Lines

Up to six types of Limit line can be set on the spectrum display (frequency domain).
In addition to setting the frequency and level of crossover points manually in sequence from the low frequency, after creating the right half of a line, the left half can be created by reversing and copying the right half, to set a symmetric limit line. Additionally, a Limit line that traces the measured waveform can be created using the Limit Envelope function. A margin can be set on the Limit line in the amplitude direction.

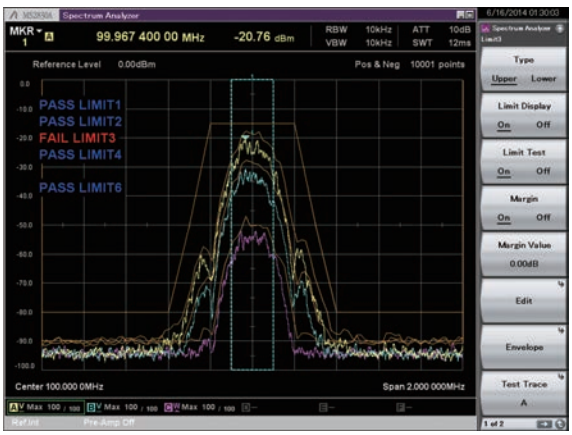
Evaluating using Limit Line Setting (Limit Test Function)

When the waveform is above or below the Limit line, it is evaluated automatically as PASS or FAIL. Evaluation is also possible with an added margin. The target evaluation line can be chosen from any of six types.

Auto-saving Waveform Data using Limit Line Setting (Save on Event Function)

When the waveform matches the evaluation conditions (Event), it can be saved automaticaly as a csv format file. Any one of the following five Event types can be selected.

(1) Limit Fail: Saves waveform file when evaluation result is Fail
(2) Limit Pass: Saves waveform file when evaluation result is Pass
(3) Margin Fail: Saves waveform file when evaluation result including margin is Fail
(4) Margin Pass: Saves waveform file when evaluation result including margin is Pass
(5) Sweep Complete: Saves waveform file at every measurement regardless of evaluation result



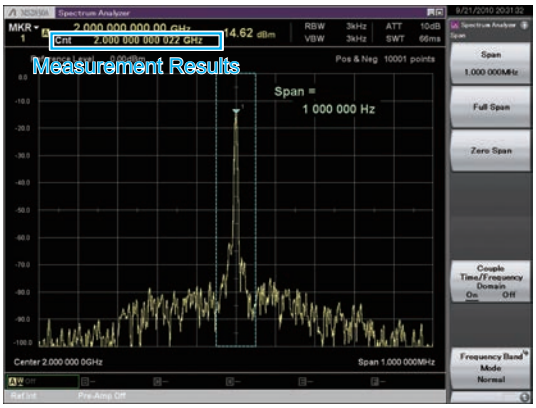
Example:
PASS/FAIL evaluation is performed by changing the input signal level.
The evaluation results for the five line types can be displayed simultaneously on one screen.

Line: Limit 1, Limit 2, Limit 3, Limit 4, Limit 5, Limit 6
Evaluation Type: Upper Limit, Lower Limit
Crossover (Point): 1 to 100
Margin: Set Margin line for each Limit 1, 2, 3, 4, 5, 6
Evaluation Result: PASS, FAIL
Result Save: Auto-save as csv format file

Frequency Counter

SPA

This function of the marker functions is used to measure CW frequencies.
Gate Time sets the measurement target time.



Measurement Results
■ Marker point frequency

2-tone 3rd-order Intermodulation Distortion

SPA

By inputting two different frequency CW signals (desired waves), two-tone third-order intermodulation distortion is generated close to the desired waves according to non-linear characteristics of Device Under Test (DUT). Then, Third Order Intercept (TOI) is calculated from the two-tone third-order intermodulation distortion.

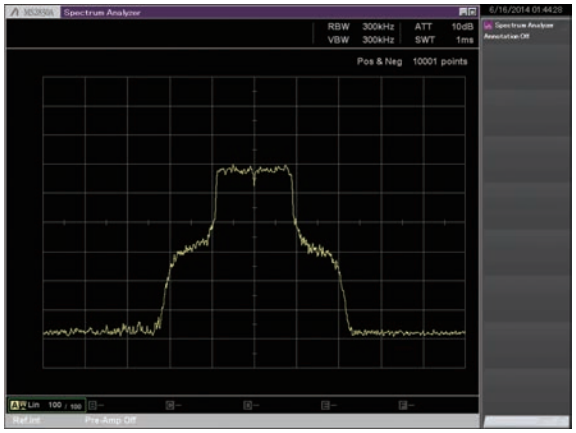
Measurement Results
■ TOI: [dBm]
■ Amplitude: [dBc]

Versatile Built-in Functions

Annotation Display

SPA

Screen annotations can be set to On or Off. Annotations about frequency, level, etc., are not displayed at the Off setting.



Power Meter

Power meter function can connect a USB power sensor to the MS2830A and read the measurement values.

Measurement Results

- Power: [dBm], [W]
- Relative power: [dB]

Compatible USB Power Sensors

Model	Frequency Range	Resolution	Dynamic Range
MA24104A*	600 MHz to 4 GHz	1 kHz	+3 to +51.76 dBm
MA24105A	350 MHz to 4 GHz	100 kHz	+3 to +51.76 dBm
MA24106A	50 MHz to 6 GHz	1 kHz	–40 to +23 dBm
MA24108A	10 MHz to 8 GHz	100 kHz	–40 to +20 dBm
MA24118A	10 MHz to 18 GHz	100 kHz	–40 to +20 dBm
MA24126A	10 MHz to 26 GHz	100 kHz	–40 to +20 dBm

∗: MA24104A has been discontinued.

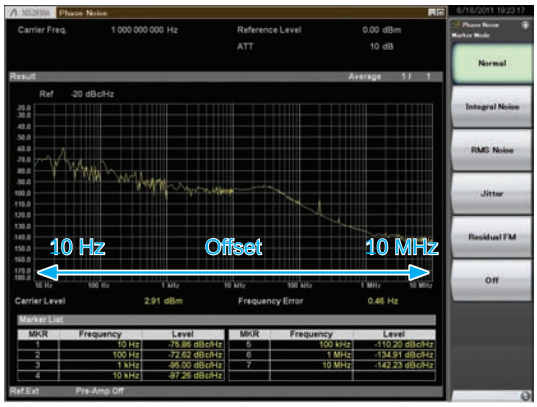
Installing the PowerXpert™

Installing the PowerXpert™ PC application software for the Anritsu USB Power Sensor in the MS2830A supports various measurement functions offered by PowerXpert™, as well as use of other USB power sensors by the MS2830A.

PowerXpert™ for the MS2830A can be downloaded from the MS2830A and MS2830A Microwave product pages at the Anritsu website. When using the PowerXpert™ software with a PC, download the latest version from the USB Power Sensor product page at the Anritsu website.

Phase Noise (MS2830A-010)

This function measures phase noise in the 10 Hz to 10 MHz frequency offset range.



Measurement Results

- Carrier level
- Error between set frequency and carrier frequency
- Marker point phase noise level

Noise Figure Measurement (MS2830A-017)

Noise Figure is measured with the measurement method of Y-factor method which uses a Noise Source.

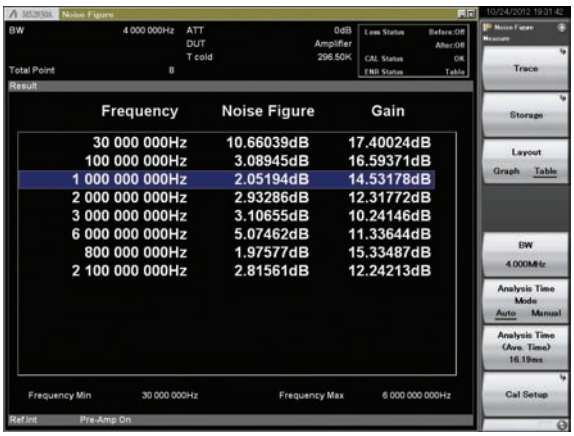
Frequency Mode: Fixed, List, Sweep
DUT Mode: Amplifier, Down Converter, Up Converter
Screen Layout: Graph, Table

Measurement Results Display

■ Graph/List/Spot

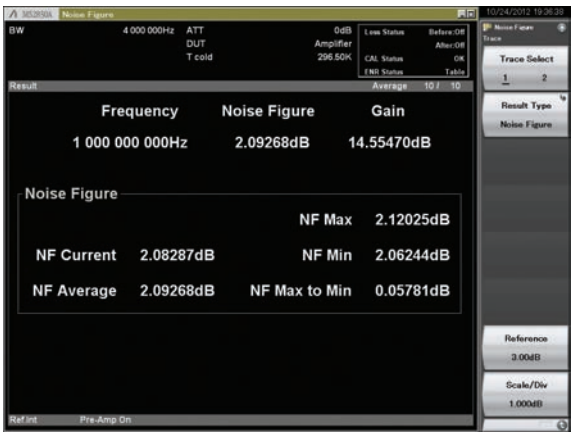
Displays measurement results for each trace (Trace1/Trace2).

- Noise Figure (NF) [dB]
- Noise Factor (F) [Linear]
- Gain
- Y-Factor: Power ratio when Noise Source is turned ON/OFF
- T effective: Effective noise temperature
- P Hot: Power measured when Noise Source is On.
- P Cold: Power measured when Noise Source is Off.



Measurement Result: Example of List display (Frequency Mode: List, Screen Layout: List)

Measurement Result: Example of Graph display (Frequency Mode: Sweep, Screen Layout: Graph)



Measurement Result: Example of Spot display (Frequency Mode: Fixed)

Versatile Built-in Functions

Noise Source
Supports noise sources from Noisecom NC346 series. NC346 series models and summary specifications are listed below.
See the NC346 series catalog and datasheet for detailed specifications.

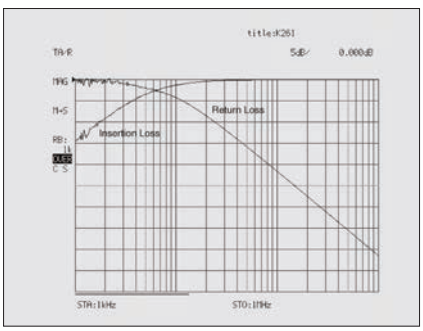
NC346 series summary specifications

Model	RF Connector	Frequency [GHz]	Output ENR [dB]	VSWR (maximum @ on/off) [GHz]				DC Offset	DC Block
				0.01 to 5	5 to 18	18 to 26.5	26.5 to 40		
NC346A	SMA (M)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346A Precision	APC3.5 (M)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346A Option 1	N (M)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346A Option 2	APC7	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346A Option 4	N (F)	0.01 to 18.0	5 to 7	1.15:1	1.25:1	—	—	No	Not required
NC346B	SMA (M)	0.01 to 18.0	14 to 16	1.15:1	1.25:1	—	—	No	Not required
NC346B Precision	APC3.5 (M)	0.01 to 18.0	14 to 16	1.15:1	1.25:1	—	—	No	Not required
NC346B Option 1	N (M)	0.01 to 18.0	14 to 16	1.15:1	1.35:1	—	—	No	Not required
NC346B Option 2	APC7	0.01 to 18.0	14 to 16	1.15:1	1.25:1	—	—	No	Not required
NC346B Option 4	N (F)	0.01 to 18.0	14 to 16	1.15:1	1.35:1	—	—	No	Not required
NC346D	SMA (M)	0.01 to 18.0	19 to 25*1	1.50:1	1.50:1	—	—	No	Not required
NC346D Precision	APC3.5 (M)	0.01 to 18.0	19 to 25*1	1.50:1	1.50:1	—	—	No	Not required
NC346D Option 1	N (M)	0.01 to 18.0	19 to 25*1	1.50:1	1.75:1	—	—	No	Not required
NC346D Option 2	APC7	0.01 to 18.0	19 to 25*1	1.50:1	1.50:1	—	—	No	Not required
NC346D Option 3	N (F)	0.01 to 18.0	19 to 25*1	1.50:1	1.75:1	—	—	No	Not required
NC346C	APC3.5 (M)	0.01 to 26.5	13 to 17	1.15:1	1.25:1	1.35:1	—	Yes*3	**Required***3
NC346E	APC3.5 (M)	0.01 to 26.5	19 to 25*1	1.50:1	1.50:1	1.50:1	—	Yes*3	**Required***3
NC346Ka	K (M)*2	0.10 to 40.0	10 to 17	1.25:1	1.30:1	1.40:1	1.50:1	Yes*3	**Required***3

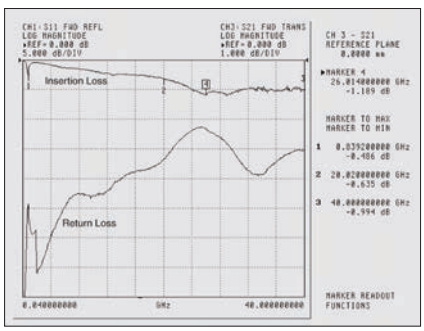
∗1: Flatness better than ±2 dB
∗2: Compatible with SMA and APC3.5
∗3: When using noise sources output by DC, always use in combination with a DC block.

Specifications outlines of recommended DC Blocks and Adapters

	Ordering		RF Connector	Frequency Range	VSWR
	Model	Name			
DC Block	J0805	DC Block, N type (MODEL 7003)	N (M)-N (F)	10 kHz to 18 GHz	1.35 (max.)
	J1555A	DC Block, SMA type (MODEL 7006-1)	SMA (M)-SMA (F)	9 kHz to 20 GHz	1.50 (9 kHz to 10 kHz) 1.50 (11 kHz to 20 kHz) 1.30 (20 kHz to 20 GHz)
	J1554A	DC Block, SMA type (MODEL 7006)	SMA (M)-SMA (F)	9 kHz to 26.5 GHz	1.50 (9 kHz to 20 kHz) 1.35 (20 kHz to 20 GHz) 1.70 (20 GHz to 26.5 GHz)
	K261	DC Block	K (M)-K (F)	10 kHz to 40 GHz	See figure (return loss) below
Adapter	J0004	Coaxial Adapter	N (M)-SMA (F)	DC to 12.4 GHz	≤1.08 (DC to 3 GHz) ≤1.11 (3 GHz to 6 GHz) ≤1.18 (6 GHz to 12.4 GHz)
	J1398A	N-SMA Adapter	N (M)-SMA (F)	DC to 26.5 GHz	≤1.05 (DC to 3 GHz) ≤1.07 (3 GHz to 6 GHz) ≤1.2 (6 GHz to 13.5 GHz) ≤1.3 (13.5 GHz to 20 GHz) ≤1.45 (20 GHz to 26.5 GHz)



Typical Low Frequency Insertion Loss measured on K261 over the range of 1 kHz to 1 MHz.



Insertion Loss and Return Loss measured on K261 over the range of 40 MHz to 40 GHz.

K261 DC Block Return Loss

Recommended DC blocks/Adaptor combinations for MS2830A/MS269xA series signal analyzer

	Model	Frequency Range	RF connector	Recommended DC Block Order Name	Recommended Adapter Order Name
MS2830A series	MS2830A-040	9 kHz to 3.6 GHz	N (F)	Not required	Not required
	MS2830A-041	9 kHz to 6 GHz	N (F)	Not required	Not required
	MS2830A-043	9 kHz to 13.5 GHz	N (F)	Not required	Not required
	MS2830A-044	9 kHz to 26.5 GHz	N (F)	J1554A	J1398A
	MS2830A-045	9 kHz to 43 GHz	K (F)	K261	Not required
MS269xA series	MS2690A	50 Hz to 6 GHz	N (F)	J1555A	J0004
	MS2691A	50 Hz to 13.5 GHz	N (F)	J1555A	J1398A
	MS2692A	50 Hz to 26.5 GHz	N (F)	J1554A	J1398A

BER Measurement Function (MS2830A-026): Basic Performance

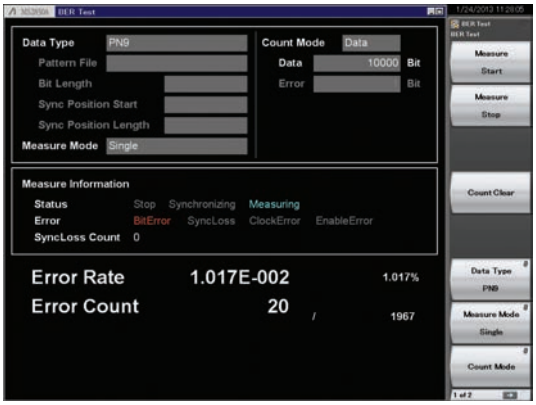
Convenient Built-in BER Measurement Function for Rx Evaluations

The MS2830A with the MS2830A-026 BER Measurement Function supports measurement up to 10 Mbps.
It supports Rx sensitivity tests by inputting the receiver-demodulated Data/Clock/Enable to the back of the MS2830A.

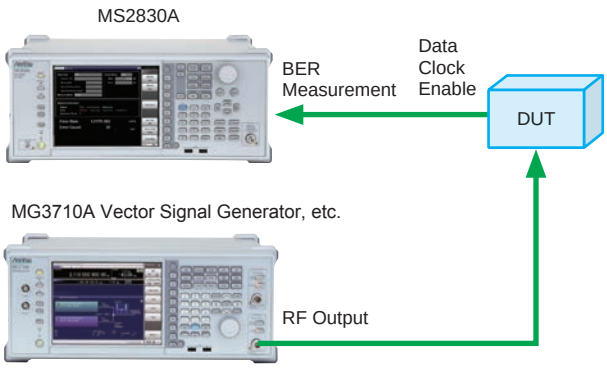
- Input Signal: Data, Clock, Enable (Polarity reversal supported)
- Input Bit Rate: 100 bps to 10 Mbps
- Input Level: TTL 3.3 V
- Connector: Rear panel, AUX connector*

  *: Can convert to BNC by connecting AUX conversion adapter (J1556A).

- Measured Patterns:
  PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, Alternate (0101…), PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix, UserDefine (4096 bits Max.)
- Measurable Bit Count: 1000 to 4294967295 bits (2^{32} – 1 bits)
- Measurable Error Bit Count: 1 to 2147483647 bits (2^{31} – 1 bits)
- Count Mode
  Data: Measures until specified Data count
  Error: Measures until specified Error count
- Measurement Mode
  Single: Measures specified measurement bit count once
  Continuous: Repeats Single measurement
  Endless: Continues measurement to upper limit of measurement bits



BER Measurement Function Main Screen



BER Measurement Setup Example (using external vector signal generator)

Excellent Expandability Platform (Hardware)

The versatility of the MS2830A series is tailored easily to the application by installing modules in expansion slots.

Basic Performance and Function Improvement

MS2830A-001/101 Rubidium Reference Oscillator/Retrofit
This option is a 10 MHz reference crystal oscillator with excellent frequency stability startup characteristics of ±1 × 10^{-9} at 7 minutes after power-on.

Aging Rate: ±1 × 10^{-10}/month
Start-up Characteristics: ±1 × 10^{-9} (7 minutes after power-on)

MS2830A-008/108 Preamplifier/Retrofit
This option is used to measure low-level signals, such as noise and interference signals.

Frequency Range: 100 kHz to 6 GHz

∗: Cannot be installed simultaneously with MS2830A-068/168

MS2830A-016/116 Precompliance EMI Function/Retrofit
This option adds an EMI measurement detection mode and RBW to the spectrum analyzer function. Both the detection mode used for CISPR standards (Quasi-Peak, CISPR-AVG, RMS-AVG) and RBW (200 Hz (6 dB), 9 kHz (6 dB), 120 kHz (6 dB), 1 MHz (Imp)) as well as conventional settings can be selected.

MS2830A-067/167 Microwave Preselector Bypass/Retrofit
Bypassing the preselector used for the microwave band improves RF frequency characteristics and in-band frequency characteristics.

∗: Add MS2830A-067 when using the signal analyzer measurement functions at bandwidth: >31.25 MHz and frequency: >6 GHz.

MS2830A-068/168 Microwave Preamplifier/Retrofit
This option is used to measure low-level signals, such as noise and interference signals.

Frequency Range: 100 kHz to 26.5 GHz (MS2830A-044)
100 kHz to 43 GHz (MS2830A-045)

∗: Cannot be installed simultaneously with MS2830A-008/108

Signal Analyzer Function and Performance Improvement

MS2830A-005/105
Analysis Bandwidth Extension to 31.25 MHz/Retrofit
This option extends the analysis bandwidth to 31.25 MHz.

∗: Requires MS2830A-006/106
Not supported by MS2830A-045 (43 GHz Signal Analyzer) — use MS2830A-009

MS2830A-006/106 Analysis Bandwidth 10 MHz/Retrofit
This option supports the VSA and digitize functions.

MS2830A-009/109
Bandwidth Extension to 31.25 MHz for Millimeter-wave/Retrofit
This option extends the MS2830A-045 (43 GHz Signal Analyzer) analysis bandwidth to 31.25 MHz.

∗: Requires MS2830A-006/106
Dedicated option for MS2830A-045 (43 GHz Signal Analyzer)
Cannot be set the RBW to more than 10 MHz in spectrum analyzer function.

MS2830A-077 Analysis Bandwidth Extension to 62.5 MHz
This option extends the analysis bandwidth to 62.5 MHz.

∗: Retrofit not supported.
Requires MS2830A-006 and MS2830A-005 (for MS2830A-044).
Requires MS2830A-006 and MS2830A-009 (for MS2830A-045).

MS2830A-078 Analysis Bandwidth Extension to 125 MHz
This option extends the analysis bandwidth to 125 MHz.

∗: Retrofit not supported.
Requires MS2830A-006, MS2830A-005 and MS2830A-077 (for MS2830A-044).
Requires MS2830A-006, MS2830A-009 and MS2830A-077 (for MS2830A-045).

Note: An image response is received when setting the bandwidth to more than 31.25 MHz. This can be used when not inputting a signal frequency outside the MS2830A analysis bandwidth (125 MHz max.). The Signal Analyzer series MS2690A/91A/92A is recommended for other measurement purposes.

Expansion Functions

MS2830A-010/110 Phase Noise Measurement Function/Retrofit
Phase Noise Measurements

Frequency Range: 10 MHz to main-frame upper limit frequency
Offset Frequency Range: 10 Hz to 10 MHz

MS2830A-011/111 2ndary HDD/Retrofit
This removable 2ndary HDD is installed in the HDD Option Slot of the MS2830A main frame to expand the user data storage space. It does not have the Windows OS installed. The MS2830A ships with it installed. Only one expansion HDD can be installed in the MS2830A.
It is useful when taking the instrument for calibration but the security of saved user data, such as measurement results, must be protected.

MS2830A-311 2ndary HDD Retrofit
This removable 2ndary HDD is installed in the HDD Option Slot of the MS2830A main frame to expand the user data storage space. It does not have the Windows OS installed.
It is useful when taking the instrument for calibration but the security of saved user data, such as measurement results, must be protected.

MS2830A-017/117 Noise Figure Measurement Function/Retrofit
Adds noise figure measurement function.
Noise Figure is measured with the measurement method of Y-factor method which uses a Noise Source.

MS2830A-026/126 BER Measurement Function/Retrofit
Adds BER measurement function.
It supports Rx sensitivity tests by inputting the receiver-demodulated Data/Clock/Enable to the back of the MS2830A.

Input Bit Rate: 100 bps to 10 Mbps

Future-proof Platform (Software*)

*: See each software catalog for more details.

Adding measurement software options to the signal analyzer assures that the modulation analysis and other functions will support all common current and future communications systems.

Measurement Software

Communications Systems	Model	Name	Addition to Main frame (✓: Can be installed, No: Cannot be installed)		Analysis Bandwidth Extension Option (✓: Required, ✓+: Function expansion, Space (no symbol): No specification)			
			Opt. 040/041/043	Opt. 044/045	Opt. 006	Opt. 005/009	Opt. 077	Opt. 078
LTE/LTE-Advanced (FDD)	MX269020A	LTE Downlink Measurement Software	✓	✓	✓	✓		
	MX269020A-001	LTE-Advanced FDD Downlink Measurement Software	✓	✓	✓	✓	✓+*1	✓+*1
	MX269021A	LTE Uplink Measurement Software	✓	✓	✓	✓		
	MX269021A-001	LTE-Advanced FDD Uplink Measurement Software	✓	✓	✓	✓	✓+	✓+
LTE/LTE-Advanced (TDD)	MX269022A	LTE TDD Downlink Measurement Software	✓	✓	✓	✓		
	MX269022A-001	LTE-Advanced TDD Downlink Measurement Software	✓	✓	✓	✓	✓+*1	✓+*1
	MX269023A	LTE TDD Uplink Measurement Software	✓	✓	✓	✓		
	MX269023A-001	LTE-Advanced TDD Uplink Measurement Software	✓	✓	✓	✓	✓+	✓+
W-CDMA/HSPA/ HSPA Evolution	MX269011A	W-CDMA/HSPA Downlink Measurement Software	✓	✓	✓			
	MX269012A	W-CDMA/HSPA Uplink Measurement Software	✓	✓	✓			
W-CDMA/HSPA (Downlink)	MX269030A	W-CDMA BS Measurement Software	✓	✓	✓			
TD-SCDMA	MX269015A	TD-SCDMA Measurement Software	✓	✓	✓			
CDMA2000	MX269024A	CDMA2000 Forward Link Measurement Software	✓	✓	✓			
	MX269024A-001	All Measure Function	✓	✓	✓			
1xEV-DO	MX269026A	EV-DO Forward Link Measurement Software	✓	✓	✓			
	MX269026A-001	All Measure Function	✓	✓	✓			
GSM/EDGE	MX269013A	GSM/EDGE Measurement Software	✓	✓	✓			
EDGE Evolution	MX269013A-001	EDGE Evolution Measurement Software	✓	✓	✓			
Multi-TDMA systems	MX269017A	Vector Modulation Analysis Software	✓	✓*2	✓	✓+*3	✓+*3	✓+*3
Analog Wireless	MX269018A	Analog Measurement Software	✓*4	No				
WLAN IEEE802.11a/b/g/n/j/p	MX269028A	WLAN (802.11) Measurement Software (Supports IEEE802.11n/11a/11b/11g/11j/11p)	✓	✓	✓	✓		
WLAN IEEE802.11ac (80 MHz)	MX269028A-001*5	802.11ac (80 MHz) Measurement Software	✓	✓	✓	✓	✓	✓
WLAN IEEE802.11a/b/g/n	MX283027A	Wireless Network Device Test Software	✓	✓				
WLAN	MX283027A-001	WLAN Test Software	✓	✓	✓	✓		
Bluetooth	MX283027A-002	*Bluetooth* Test Software	✓	✓	✓	✓		
Mobile WiMAX	MX269010A	Mobile WiMAX Measurement Software	✓	✓	✓	✓		

*1: The LTE-Advanced Carrier Aggregation measurement range varies as follows, depending on the Analysis Bandwidth Extension option configuration.

Main frame	Analysis Bandwidth Extension Option Configuration	Maximum Analysis Bandwidth (In-band carrier aggregation range)	Maximum Number of Bands	Maximum Number of Component Carriers
MS2830A	MS2830A-078 installed	125 MHz	1	5
	MS2830A-077 installed	31.25 MHz	3	5
	MS2830A-005/009 installed	31.25 MHz	3	5
MS269xA	MS269xA-078 installed	125 MHz	3	5
	MS269xA-077 installed	31.25 MHz	3	5
	Standard	31.25 MHz	3	5

*2: By the measurement of the narrowband signal, add MS2830A-066. (Channel bandwidth: x kHz to 100 kHz)
MS2830A-044/045 cannot be installed MS2830A-066.

*3: The Symbol Rate setting range varies as follows, depending on the option configuration.

	O-QPSK	FSK	Except FSK	
			Frame Formatted	Non-Formatted
MS2830A-078, 077, 005, 006 installed	0.1 ksps to 12.5 Msps	0.1 ksps to 25 Msps	0.1 ksps to 50 Msps	0.1 ksps to 140 Msps
MS2830A-077, 005, 006 installed	0.1 ksps to 6.25 Msps	0.1 ksps to 12.5 Msps	0.1 ksps to 25 Msps	0.1 ksps to 70 Msps
MS2830A-005, 006 installed	0.1 ksps to 3.125 Msps	0.1 ksps to 6.25 Msps	0.1 ksps to 12.5 Msps	0.1 ksps to 35 Msps
MS2830A-006 installed	0.1 ksps to 1.25 Msps	0.1 ksps to 2.5 Msps	0.1 ksps to 5 Msps	0.1 ksps to 5 Msps

*4: MS2830A-043 can implement only either MS2830A-020/021 or MS2830A-066.
By the system that MS2830A-066 is necessary, MS2830A-020/021 is not added to MS2830A-043.

*5: Requires MX269028A. The IEEE802.11ac measurement range varies as follows, depending on the Analysis Bandwidth Extension option configuration.

Model			Bandwidth of IEEE802.11ac signal				
Main frame	Measurement software	Analysis Bandwidth Extension Option Configuration	20 MHz	40 MHz	80 MHz	160 MHz	80 MHz + 80 MHz
MS2830A	MX269028A-001 (Only for MS2830A)	MS2830A-078 installed	✓	✓	✓*5-2		
		MS2830A-077 installed	✓	✓			
		MS2830A-005/009 installed	✓	✓			
MS269xA	MX269028A-002 (Only for MS269xA)	MS269xA-078 installed	✓	✓	✓	✓	✓*5-1
		MS269xA-077 installed	✓	✓			
		Standard	✓	✓			

*5-1: Measurement required for each carrier signal (80-MHz bandwidth)
*5-2: Measurement is only possible when the carrier signal (80-MHz bandwidth) is input due to the effect of the image response.

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Specifications

The specification is the value after 30-minute warm-up at a constant ambient temperature.
The specifications are defined under the following conditions unless otherwise specified.
Auto sweep time select: Normal, Auto sweep type rules: Sweep only, Switching speed mode: Best phase noise mode
Nominal values indicate expected performance or describe product performance. That is not covered by the product warranty.
Specifications above 26.5 GHz: MS2830A-045 only.

■ Signal Analyzer/Spectrum Analyzer

Frequency

<table>
<tr><td>Frequency Range</td><td>9 kHz to 26.5 GHz [MS2830A-044], 9 kHz to 43 GHz [MS2830A-045]</td></tr>
<tr><td>Frequency Bands</td><td>
<table>
<tr><th>Frequency range</th><th>Band</th><th>Mixer harmonics order (N)</th></tr>
<tr><td>9 kHz to 4 GHz</td><td>0</td><td>1</td></tr>
<tr><td>3.5 GHz to 4.4 GHz</td><td>1</td><td>1/2</td></tr>
<tr><td>4.3 GHz to 6 GHz</td><td>1</td><td>1</td></tr>
<tr><td>3.9 GHz to 8 GHz</td><td>3</td><td>1</td></tr>
<tr><td>7.9 GHz to 10.575 GHz</td><td>4</td><td>1</td></tr>
<tr><td>10.475 GHz to 12.2 GHz</td><td>5</td><td>2</td></tr>
<tr><td>12.1 GHz to 18.4 GHz</td><td>6</td><td>2</td></tr>
<tr><td>18.3 GHz to 26.6 GHz</td><td>7</td><td>4</td></tr>
<tr><td>26.5 GHz to 41.9 GHz</td><td>8</td><td>4</td></tr>
<tr><td>41.8 GHz to 43 GHz</td><td>9</td><td>8</td></tr>
</table>
</td></tr>
<tr><td>Frequency Setting Range</td><td>–100 MHz to 26.6 GHz [MS2830A-044]
–100 MHz to 43.1 GHz [MS2830A-045]
Setting resolution: 1 Hz</td></tr>
<tr><td>Pre-selector Range</td><td>
<table>
<tr><th>MS2830A-044</th><th>MS2830A-045</th><th></th></tr>
<tr><td>4 GHz to 26.5 GHz</td><td>4 GHz to 43 GHz</td><td>(Frequency band mode: Normal)</td></tr>
<tr><td>3.5 GHz to 26.5 GHz</td><td>3.5 GHz to 43 GHz</td><td>(Frequency band mode: Spurious)</td></tr>
</table>
</td></tr>
<tr><td>Internal Reference Oscillator</td><td>With MS2830A-044/045
23°C, Referenced to frequency at 24-hour after power-on
Start-up characteristics: ±5 × 10^{-7} (2 minutes after power-on), ±5 × 10^{-8} (5 minutes after power-on)
Aging rate: ±1 × 10^{-7}/year
Temperature stability: ±2 × 10^{-8} (5° to 45°C)
With MS2830A-001
23°C, Referenced to frequency at 24-hour after power-on
Start-up characteristics: ±1 × 10^{-9} (7 minutes after power-on)
Aging rate: ±1 × 10^{-10}/month
Temperature stability: ±1 × 10^{-9} (5° to 45°C)</td></tr>
<tr><td>SSB Phase Noise</td><td>18° to 28°C, 500 MHz, Spectrum Analyzer mode, Switching speed mode: Normal
–115 dBc/Hz (100 kHz offset)
–133 dBc/Hz (1 MHz offset)</td></tr>
</table>

Amplitude

<table>
<tr><td>Level Measurement Range</td><td>Without MS2830A-008/068, or Preamp: Off
DANL to +30 dBm
With MS2830A-008/068, Preamp: On
DANL to +10 dBm</td></tr>
<tr><td>Maximum Input Level</td><td>Without MS2830A-008/068, or Preamp: Off
Average total power: +30 dBm (Input attenuator: ≥10 dB)
DC voltage: ±0 Vdc
With MS2830A-008/068, Preamp: On
Average total power: +10 dBm (Input attenuator: 0 dB)
DC voltage: ±0 Vdc</td></tr>
<tr><td>Input Attenuator Range</td><td>With MS2830A-044
0 to 60 dB, 2 dB steps
With MS2830A-045
0 to 60 dB, 10 dB steps (ATT mode: Mechanical ATT only, or E-ATT combined mode, Stop frequency: ≥6 GHz)
0 to 10 dB, 10 dB steps/10 to 40 dB, 2 dB steps/40 to 60 dB, 10 dB steps (Attenuator mode: E-ATT combined mode, Stop frequency: <6 GHz)</td></tr>
<tr><td>Input Attenuator Switching Uncertainty</td><td>18° to 28°C, Referenced to 10 dB, ATT mode: Mechanical ATT only
Without MS2830A-008/068, or Preamp: Off
±0.2 dB (10 to 60 dB) (300 kHz ≤ f < 4 GHz, Frequency band mode: Normal)
(300 kHz ≤ f < 3.5 GHz, Frequency band mode: Spurious)
±0.75 dB (10 to 60 dB) (4 GHz ≤ f ≤ 13.8 GHz, Frequency band mode: Normal)
(3.5 GHz ≤ f ≤ 13.8 GHz, Frequency band mode: Spurious)
±0.8 dB (10 to 60 dB) (13.8 GHz < f ≤ 26.5 GHz)
±1.0 dB (10 to 60 dB) (26.5 GHz < f ≤ 40 GHz)
±1.0 dB (10 to 60 dB) (typ., 40 GHz < f ≤ 43 GHz)</td></tr>
</table>

■ Signal Analyzer/Spectrum Analyzer (continued)

Reference Level

Setting Range	Log scale: –120 to +50 dBm, or Equivalent level Linear scale: 22.4 µV to 70.7 V, or Equivalent level Setting resolution: 0.01 dB, or Equivalent level
Scale Units	Log scale: dBm, dBµV, dBmV, dBµV (emf), dBµV/m, V, W Linear scale: V
Linearity Error	Excluding the noise floor effect, Input level: ≤–10 dB (f: <30 MHz) ±0.07 dB (Mixer input level: ≤–20 dBm) ±0.10 dB (Mixer input level: ≤–10 dBm)
RF Frequency Characteristics	18° to 28°C, After Cal, Input attenuator: 10 dB Without MS2830A-008/068, or Preamp: Off Without MS2830A-067, or Microwave Preselector Bypass: Off, After preselector auto tune ±1.0 dB (9 kHz ≤ f < 300 kHz) ±0.35 dB (300 kHz ≤ f < 4 GHz, Frequency band mode: Normal) (300 kHz ≤ f < 3.5 GHz, Frequency band mode: Spurious) ±1.5 dB (4 GHz ≤ f ≤ 6 GHz, Frequency band mode: Normal) (3.5 GHz ≤ f ≤ 6 GHz, Frequency band mode: Spurious) ±1.5 dB (6 GHz < f ≤ 13.8 GHz) ±2.5 dB (13.8 GHz < f ≤ 26.5 GHz) ±2.5 dB (26.5 GHz < f ≤ 40 GHz) ±2.5 dB (typ., 40 GHz < f ≤ 43 GHz) With MS2830A-008, Preamp: On ±0.65 dB (300 kHz ≤ f < 4 GHz, Frequency band mode: Normal) (300 kHz ≤ f < 3.5 GHz, Frequency band mode: Spurious) ±1.8 dB (4 GHz ≤ f ≤ 6 GHz, Frequency band mode: Normal) (3.5 GHz ≤ f ≤ 4 GHz, Frequency band mode: Spurious) With MS2830A-068, or Preamp: On Without MS2830A-067, or Microwave Preselector Bypass: Off, After preselector auto tune ±0.65 dB (300 kHz ≤ f < 4 GHz, Frequency band mode: Normal) (300 kHz ≤ f < 3.5 GHz, Frequency band mode: Spurious) ±1.8 dB (4 GHz ≤ f ≤ 13.8 GHz, Frequency band mode: Normal) (3.5 GHz ≤ f ≤ 13.8 GHz, Frequency band mode: Spurious) ±2.5 dB (13.8 GHz < f ≤ 26.5 GHz) ±3.5 dB (26.5 GHz < f ≤ 40 GHz) ±3.5 dB (nom., 40 GHz < f ≤ 43 GHz)
1 dB Gain Compression	Without MS2830A-008/068, or Preamp: Off, At mixer input level ≥+3 dBm (300 MHz ≤ f ≤ 4 GHz) ≥–1 dBm (4 GHz < f ≤ 13.5 GHz) ≥–1 dBm (13.5 GHz < f ≤ 26.5 GHz) ≥–1 dBm (nom., 26.5 GHz < f ≤ 40 GHz) With MS2830A-068, Preamp: On, At preamp input level ≥–15 dBm (300 MHz ≤ f ≤ 4 GHz) ≥–21 dBm (4 GHz < f ≤ 13.5 GHz) ≥–21 dBm (13.5 GHz < f ≤ 26.5 GHz) ≥–21 dBm (nom., 26.5 GHz < f ≤ 40 GHz)

■ Signal Analyzer/Spectrum Analyzer (continued)

Spurious Responses

Second Harmonic Distortion

Without MS2830A-008/068, without MS2830A-067
Mixer input level: –30 dBm

Harmonic distortion	SHI	
≤–60 dBc	≥+30 dBm	(10 MHz ≤ f ≤ 300 MHz)
≤–65 dBc	≥+35 dBm	(300 MHz < f ≤ 1 GHz)
≤–65 dBc	≥+35 dBm	(1 GHz < f ≤ 2 GHz, Frequency band mode: Normal)
≤–65 dBc	≥+35 dBm	(1 GHz < f < 1.75 GHz, Frequency band mode: Spurious)

Mixer input level: –10 dBm

Harmonic distortion	SHI	
≤–70 dBc	≥+60 dBm	(2 GHz < f ≤ 3 GHz, Frequency band mode: Normal)
≤–70 dBc	≥+60 dBm	(1.75 GHz ≤ f ≤ 3 GHz, Frequency band mode: Spurious)
≤–90 dBc	≥+80 dBm	(3 GHz < f ≤ 13.25 GHz)
≤–90 dBc	≥+80 dBm	(13.25 GHz < f ≤ 21.5 GHz, nom.)

With MS2830A-068, Preamp: Off, or with MS2830A-067, Microwave Preselector Bypass: Off
Mixer input level: –30 dBm

Harmonic distortion	SHI	
≤–60 dBc	≥+30 dBm	(10 MHz ≤ f ≤ 300 MHz)
≤–65 dBc	≥+35 dBm	(300 MHz < f ≤ 1 GHz)
≤–65 dBc	≥+35 dBm	(1 GHz < f ≤ 2 GHz, Frequency band mode: Normal)
≤–65 dBc	≥+35 dBm	(1 GHz < f < 1.75 GHz, Frequency band mode: Spurious)

Mixer input level: –10 dBm

Harmonic distortion	SHI	
≤–70 dBc	≥+60 dBm	(2 GHz < f ≤ 3 GHz, Frequency band mode: Normal)
≤–70 dBc	≥+60 dBm	(1.75 GHz ≤ f ≤ 3 GHz, Frequency band mode: Spurious)
≤–70 dBc	≥+60 dBm	(2 GHz < f ≤ 3 GHz, Frequency band mode: Spurious)
≤–70 dBc	≥+60 dBm	(3 GHz < f ≤ 13.25 GHz)
≤–70 dBc	≥+60 dBm	(13.25 GHz < f ≤ 21.5 GHz, nom.)

With MS2830A-008/068, Preamp: On, with MS2830A-067, Microwave Preselector Bypass: Off
Preamp input level: –45 dBm

Harmonic distortion	SHI	
≤–50 dBc	≥+5 dBm	(10 MHz ≤ f ≤ 300 MHz)
≤–55 dBc	≥+10 dBm	(300 MHz < f ≤ 2 GHz)
≤–45 dBc	≥0 dBm	(2 GHz < f ≤ 13.25 GHz)
≤–40 dBc	≥–5 dBm	(13.25 GHz < f < 21.5 GHz, nom.)

SHI: Second harmonic intercept

Residual Responses

Frequency: ≥1 MHz, Input attenuator: 0 dB, 50Ω terminated
With MS2830A-077/078, except bandwidth setting: >31.25 GHz
≤–100 dBm (up to 1 GHz)
≤–90 dBm (typ., 1 GHz to 6 GHz)
≤–90 dBm (nom., 6 GHz to 13.5 GHz)
≤–90 dBm (nom., 13.25 GHz to 26.5 GHz)
≤–80 dBm (nom., 26.5 GHz to 40 GHz)

■ Spectrum Analyzer

Frequency

Span	Range: 0 Hz, 300 Hz to 26.5 GHz [MS2830A-044] 0 Hz, 300 Hz to 43 GHz [MS2830A-045] Resolution: 2 Hz Accuracy: ±0.2% (Sweep points: 10001)
Frequency Readout Accuracy	± (Display frequency × Frequency reference accuracy + Span frequency × Span accuracy + RBW × 0.05 + 2 × N + Span frequency/(Sweep points–1)) Hz N: Mixer harmonic order
Resolution Bandwidth (RBW)	Setting range: 1 Hz to 3 MHz (1-3 sequence), 500 Hz, 50 kHz, 2 MHz, 5 MHz, 10 MHz, 20 MHz, 31.25 MHz 1 Hz to 10 Hz: Can not be set when span: 0 Hz 31.25 MHz: Can be set when span: 0 Hz only 20 MHz, 31.25 MHz: Can be set when with MS2830A-005, Can not be set when with MS2830A-009 Selectivity (–60 dB/–3 dB): 4.5:1 (nom., 1 Hz to 10 MHz)
Resolution Bandwidth (CISPR RBW)	With MS2830A-016 Setting range: 200 Hz (6 dB), 9 kHz (6 dB), 120 kHz (6 dB), 1 MHz (Impulse)
Video Bandwidth (VBW)	1 Hz to 3 kHz (1-3 sequence), 5 kHz, 10 kHz to 10 MHz (1-3 sequence), Off VBW mode: Video average, Power average

Amplitude

Displayed Average Noise Level (DANL)	18° to 28°C, Detector: Sample, VBW: 1 Hz (Video average), Input attenuator: 0 dB Without MS2830A-067/068, Frequency band mode: Normal –120 dBm/Hz (9 kHz ≤ f < 100 kHz, nom.) –134 dBm/Hz (100 kHz) –134 dBm/Hz (100 kHz < f < 1 MHz, nom.) –144 dBm/Hz (1 MHz) –144 dBm/Hz (1 MHz < f < 10 MHz, nom.) –150 dBm/Hz (10 MHz ≤ f < 30 MHz, nom.) –153 dBm/Hz (30 MHz ≤ f < 1 GHz) –150 dBm/Hz (1 GHz ≤ f < 2.4 GHz) –147 dBm/Hz (2.4 GHz ≤ f ≤ 3.5 GHz) –144 dBm/Hz (3.5 GHz < f ≤ 4 GHz) –144 dBm/Hz (4 GHz < f ≤ 6 GHz) –151 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –149 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –146 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –146 dBm/Hz (26.5 GHz < f ≤ 34 GHz) [MS2830A-045] –144 dBm/Hz (34 GHz < f ≤ 40 GHz) [MS2830A-045] –140 dBm/Hz (40 GHz < f ≤ 43 GHz) [MS2830A-045] Without MS2830A-067, with MS2830A-068, Preamp: Off, Frequency band mode: Normal –120 dBm/Hz (9 kHz ≤ f < 100 kHz, nom.) –134 dBm/Hz (100 kHz) –134 dBm/Hz (100 kHz < f < 1 MHz, nom.) –144 dBm/Hz (1 MHz) –144 dBm/Hz (1 MHz < f < 10 MHz, nom.) –150 dBm/Hz (10 MHz ≤ f < 30 MHz, nom.) –153 dBm/Hz (30 MHz ≤ f < 1 GHz) –150 dBm/Hz (1 GHz ≤ f < 2.4 GHz) –147 dBm/Hz (2.4 GHz ≤ f ≤ 3.5 GHz) –144 dBm/Hz (3.5 GHz < f ≤ 4 GHz) –144 dBm/Hz (4 GHz < f ≤ 6 GHz) –147 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –145 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –141 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –141 dBm/Hz (26.5 GHz < f ≤ 34 GHz) [MS2830A-045] –135 dBm/Hz (34 GHz < f ≤ 40 GHz) [MS2830A-045] –132 dBm/Hz (40 GHz < f ≤ 43 GHz) [MS2830A-045] Without MS2830A-067, or Microwave Preselector Bypass: Off With MS2830A-068, Preamp: On, Frequency band mode: Normal –147 dBm/Hz (100 kHz, nom.) –156 dBm/Hz (1 MHz) –163 dBm/Hz (30 MHz ≤ f < 1 GHz) –161 dBm/Hz (1 GHz ≤ f < 2 GHz) –159 dBm/Hz (2 GHz ≤ f ≤ 3.5 GHz) –155 dBm/Hz (3.5 GHz < f ≤ 4 GHz) –155 dBm/Hz (4 GHz < f ≤ 6 GHz) –160 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –158 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –156 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –156 dBm/Hz (26.5 GHz < f ≤ 34 GHz) [MS2830A-045] –150 dBm/Hz (34 GHz < f ≤ 40 GHz) [MS2830A-045] –147 dBm/Hz (40 GHz < f ≤ 43 GHz) [MS2830A-045] With MS2830A-067: See Microwave Preselector Bypass (Displayed average noise level)

■ Spectrum Analyzer (continued)

Amplitude (continued)

Total Absolute Amplitude Accuracy* *: Total absolute amplitude accuracy is found from root sum of squares (RSS) of RF frequency characteristics, Linearity error, and Input attenuator switching uncertainty.	18° to 28°C, After Cal, Auto sweep time select: Normal, 30 Hz ≤ RBW ≤ 1 MHz, Detector: Positive, CW, Excluding the noise floor effect, and FFT runtime (Display: On) Without MS2830A-068, or Preamp: Off Input attenuator: ≥10 dB, Input level: ≤–10 dBm (f: <30 MHz), Mixer input level: ≤–10 dBm (f: ≥30 MHz) ±0.5 dB (300 kHz ≤ f < 4 GHz, Frequency band mode: Normal) (300 kHz ≤ f < 3.5 GHz, Frequency band mode: Spurious) ±1.8 dB (4 GHz ≤ f ≤ 6 GHz, Frequency band mode: Normal) (3.5 GHz ≤ f ≤ 4 GHz, Frequency band mode: Spurious) ±1.8 dB (6 GHz < f ≤ 13.8 GHz, Frequency band mode: Normal) (4 GHz < f ≤ 13.8 GHz, Frequency band mode: Spurious) ±3.0 dB (13.8 GHz < f ≤ 26.5 GHz) ±3.0 dB (26.5 GHz < f ≤ 40 GHz) ±3.5 dB (nom., 40 GHz < f ≤ 43 GHz) With MS2830A-068, Preamp: On Input attenuator: 10 dB, Preamp input level: ≤–30 dBm ±1.0 dB (300 kHz ≤ f < 4 GHz, Frequency band mode: Normal) (300 kHz ≤ f < 3.5 GHz, Frequency band mode: Spurious) ±1.8 dB (4 GHz ≤ f ≤ 6 GHz, Frequency band mode: Normal) (3.5 GHz ≤ f ≤ 4 GHz, Frequency band mode: Spurious) ±2.0 dB (6 GHz < f ≤ 13.8 GHz, Frequency band mode: Normal) (4 GHz < f ≤ 13.8 GHz, Frequency band mode: Spurious) ±3.0 dB (13.8 GHz < f ≤ 26.5 GHz) ±4.0 dB (26.5 GHz < f ≤ 40 GHz) ±4.0 dB (nom., 40 GHz < f ≤ 43 GHz)

Spurious Responses

2-tone 3rd-order Intermodulation Distortion	18° to 28°C, ≥300 kHz separation Without MS2830A-068, or Preamp: Off, Mixer input level: –15 dBm (1wave) ≤–54 dBc, TOI = +12 dBm (30 MHz ≤ f < 300 MHz) ≤–60 dBc, TOI = +15 dBm (300 MHz ≤ f < 3.5 GHz) ≤–58 dBc, TOI = +14 dBm (3.5 GHz ≤ f ≤ 6 GHz, Frequency band mode: Normal) ≤–56 dBc, TOI = +13 dBm (6 GHz < f ≤ 13.5 GHz) ≤–56 dBc, TOI = +13 dBm (13.5 GHz < f ≤ 26.5 GHz) ≤–56 dBc, TOI = +13 dBm (nom., 26.5 GHz < f ≤ 40 GHz) With MS2830A-068, Preamp: On Without MS2830A-067, Microwave Preselector Bypass: Off, Preamp input level: –45 dBm (1wave) ≤–73 dBc, TOI = –8.5 dBm (30 MHz ≤ f < 300 MHz) ≤–78 dBc, TOI = –6 dBm (300 MHz ≤ f ≤ 700 MHz) ≤–81 dBc, TOI = –4.5 dBm (700 MHz < f < 4 GHz, Frequency band mode: Normal) (700 MHz < f < 3.5 GHz, Frequency band mode: Spurious) ≤–78 dBc, TOI = –6 dBm (4 GHz ≤ f ≤ 6 GHz, Frequency band mode: Normal) (3.5 GHz ≤ f ≤ 4 GHz, Frequency band mode: Spurious) ≤–70 dBc, TOI = –10 dBm (6 GHz < f ≤ 13.5 GHz, Frequency band mode: Normal) (4 GHz < f ≤ 13.5 GHz, Frequency band mode: Spurious) ≤–70 dBc, TOI = –10 dBm (13.5 GHz < f ≤ 26.5 GHz) ≤–70 dBc, TOI = –10 dBm (nom., 26.5 GHz < f ≤ 40 GHz) TOI: Third-order intermodulation distortion
Image Responses	ATT mode: Mechanical ATT only, Frequency band mode: Normal Without MS2830A-067 ≤–70 dBc (10 MHz ≤ f < 4 GHz) ≤–55 dBc (4 GHz ≤ f ≤ 6 GHz) ≤–70 dBc (6 GHz < f ≤ 13.5 GHz) ≤–70 dBc (13.5 GHz < f ≤ 26.5 GHz) With MS2830A-067: See Microwave Preselector Bypass (Image responses)

Sweep

Sweep Mode	Continuous, Single
Sweep Time	Setting range: 1 ms to 1000 s (Span: ≥300 Hz) 1 µs to 1000 s (Span: 0 Hz)

■ Spectrum Analyzer (continued)

Waveform Display

Detector	Positive & Negative, Positive peak, Sample, Negative peak, RMS
CISPR Detector	Quasi-Peak, CISPR-AVG, RMS-AVG (with MS2830A-016)
Sweep (Trace) Point	5001, 10001 (span: >30 GHz) 1001, 2001, 5001, 10001 (500 MHz < span ≤ 30 GHz) 101, 201, 251, 401, 501, 1001, 2001, 5001, 10001 (100 MHz < span ≤ 500 MHz) (300 Hz ≤ span ≤ 100 MHz, Sweep time: > 10 s) 11, 21, 41, 51, 101, 201, 251, 401, 501, 1001, 2001, 5001, 10001 (300 Hz ≤ span ≤ 100 MHz, Sweep time: ≤ 10 s) (span: 0 Hz)
Scale	Log scale: 10 div/12 div, 0.1 to 20 dB/div (1-2-5 sequence) Linear scale: 10 div, 1 to 10%/div (1-2-5 sequence)
Trigger	Free run (Trigger off), Video, Wide IF video, External, Frame
Gate	Off, Wide IF video, External, Frame

Measure Function

Adjust Channel Power (ACP)		Reference: Span total, Carrier total, Both sides of carriers, Carrier select Adjust channel specifications: 3 channels × 2 (Normal mode), 8 channels × 2 (Advanced mode)
Burst Average Power		Displayed average power of specified interval at time domain
Channel Power		Measurement of absolute values: dBm, dBm/Hz
Occupied Bandwidth (OBW)		N% of power, X-dB down
Spectrum Emission Mask (SEM)		Decision to Pass/Fail at Peak/Margin measurement
Spurious Emission		Decision to Pass/Fail at Worst/Peaks measurement
Frequency Counter	Accuracy	Span: ≤1 MHz, RBW: 1 kHz, S/N: ≥50 dB, Gate time: ≥100 ms ± (Marker frequency × Frequency reference accuracy + (0.1 × N / Gate time [s] Hz) N: Mixer harmonic order
	Gate Time Setting	100 µs to 1 s
2-tone 3rd-order Intermodulation Distortion		Measures IM3 and TOI from two-tone signal

■ Signal Analyzer

Display waveform data, such as Spectrum, Power vs. Time captured at specific time

General

Trace Mode	Spectrum, Power vs. Time, Frequency vs. Time, Phase vs. Time, CCDF, Spectrogram, No trace
Analysis Bandwidth	Sets capture analysis bandwidth from center frequency 1 kHz to 10 MHz (1-2.5-5 sequence) (with MS2830A-006) 1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz (with MS2830A-005, or with MS2830A-009) 1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz, 50 MHz, 62.5 MHz (with MS2830A-077) 1 kHz to 25 MHz (1-2.5-5 sequence), 31.25 MHz, 50 MHz, 62.5 MHz, 100 MHz, 125 MHz (with MS2830A-078) ∗MS2830A-005 is not available when MS2830A-045 is installed.
Sampling Rate	Auto setting by conditions of analysis bandwidth 2 kHz to 20 MHz (1-2-5 sequence) (with MS2830A-006) 2 kHz to 50 MHz (1-2-5 sequence) (with MS2830A-005, or with MS2830A-009) 2 kHz to 100 MHz (1-2-5 sequence) (with MS2830A-077) 2 kHz to 200 MHz (1-2-5 sequence) (with MS2830A-078)
Capture Time	Without MS2830A-077/078, or ≤31.25 MHz bandwidth Setting capture time length Minimum capture time length: 2 µs to 50 ms (Determined according to analysis bandwidth) Maximum capture time length: 2 s to 2000 s (Determined according to analysis bandwidth) Setting mode: Auto, Manual With MS2830A-077, >31.25 MHz bandwidth Setting capture time length Minimum capture time length: 1 µs Maximum capture time length: 500 ms Setting mode: Auto, Manual With MS2830A-078, >31.25 MHz bandwidth Setting capture time length Minimum capture time length: 500 ns to 1 µs (Determined according to analysis bandwidth) Maximum capture time length: 500 ms Setting mode: Auto, Manual
Trigger	Free run (Trigger off), Video, Wide IF video, Frame, External
ADC Resolution	Without MS2830A-077/078, or ≤31.25 MHz bandwidth 16 bits

■ Signal Analyzer (continued)

Spectrum Displayed Function

Function Outline	Displayed spectrum of any time length and frequency range within captured waveform data
Analysis Time Length	Analysis start time: Sets analysis start time point from waveform data header Analysis time length: Sets analysis time length Setting mode: Auto, Manual
Frequency	Can be set center frequency and span at frequency range in waveform data
Frequency Setting	Without MS2830A-077/078, or ≤31.25 MHz bandwidth 0 MHz to 26.5 GHz [MS2830A-044] 0 MHz to 43 GHz [MS2830A-045] With MS2830A-077/078, without MS2830A-067, >31.25 MHz bandwidth 300 MHz to 6 GHz [MS2830A-044] 300 MHz to 6 GHz [MS2830A-045] With MS2830A-077/078, MS2830A-067, >31.25 MHz bandwidth 300 MHz to 26.5 GHz [MS2830A-044] 300 MHz to 43 GHz [MS2830A-045]
Resolution Bandwidth (RBW)	Without MS2830A-077/078, or ≤31.25 MHz bandwidth Setting range: 1 Hz to 1 MHz (1-3 sequence) Selectivity (–60 dB/–3 dB): 4.5:1 (nom.) With MS2830A-077, >31.25 MHz bandwidth Setting range: 1 Hz to 3 MHz (1-3 sequence) Selectivity (–60 dB/–3 dB): 4.5:1 (nom.) With MS2830A-078, >31.25 MHz bandwidth Setting range: 1 Hz to 10 MHz (1-3 sequence) Selectivity (–60 dB/–3 dB): 4.5:1 (nom.)
Total Absolute Amplitude Accuracy* *: Total absolute amplitude accuracy is found from root sum of squares (RSS) of RF frequency characteristics, Linearity error, and Input attenuator switching uncertainty.	18° to 28°C, After Cal, Input attenuator: ≥10 dB, RBW: Auto, Time detection: Average, Marker result: Integration or Peak (Accuracy), Center frequency, CW, Excluding the noise floor effect Without MS2830A-068, or Preamp: Off Input attenuator: ≥10 dB, Input level: ≤–10 dBm (f: <30 MHz), Mixer input level: ≤–10 dBm (f: ≥30 MHz) ±0.5 dB (300 kHz ≤ f < 4 GHz, Frequency band mode: Normal) (300 kHz ≤ f < 3.5 GHz, Frequency band mode: Spurious) ±1.8 dB (4 GHz ≤ f ≤ 6 GHz, Frequency band mode: Normal) (3.5 GHz ≤ f ≤ 4 GHz, Frequency band mode: Spurious) ±1.8 dB (6 GHz < f ≤ 13.8 GHz, Frequency band mode: Normal) (4 GHz < f ≤ 13.8 GHz, Frequency band mode: Spurious) ±3.0 dB (13.8 GHz < f ≤ 26.5 GHz) ±3.0 dB (26.5 GHz < f ≤ 40 GHz) ±3.5 dB (nom., 40 GHz < f ≤ 43 GHz) With MS2830A-068, Preamp: On Input attenuator: 10 dB, Preamp Input level: ≤–30 dBm ±1.0 dB (300 kHz ≤ f < 4 GHz, Frequency band mode: Normal) (300 kHz ≤ f < 3.5 GHz, Frequency band mode: Spurious) ±1.8 dB (4 GHz ≤ f ≤ 6 GHz, Frequency band mode: Normal) (3.5 GHz ≤ f ≤ 4 GHz, Frequency band mode: Spurious) ±2.0 dB (6 GHz < f ≤ 13.8 GHz, Frequency band mode: Normal) (4 GHz < f ≤ 13.8 GHz, Frequency band mode: Spurious) ±3.0 dB (13.8 GHz < f ≤ 26.5 GHz) ±4.0 dB (26.5 GHz < f ≤ 40 GHz) ±4.0 dB (nom., 40 GHz < f ≤ 43 GHz)
In-band Frequency Characteristics	18° to 28°C, Referenced to level at center frequency, Center frequency: ±10 MHz Without MS2830A-077/078, or ≤31.25 MHz bandwidth ±0.31 dB (30 MHz ≤ f ≤ 4 GHz, Frequency band mode: Normal) (30 MHz ≤ f < 3.5 GHz, Frequency band mode: Spurious)

■ Signal Analyzer (continued)

Spectrum Displayed Function (continued)

Displayed Average Noise Level (DANL)	Without MS2830A-067/068, Frequency band mode: Normal –131.5 dBm/Hz (100 kHz) –141.5 dBm/Hz (1 MHz) –150.5 dBm/Hz (30 MHz ≤ f < 1 GHz) –147.5 dBm/Hz (1 GHz ≤ f < 2.4 GHz) –144.5 dBm/Hz (2.4 GHz ≤ f ≤ 3.5 GHz) –141.5 dBm/Hz (3.5 GHz < f ≤ 4 GHz) –141.5 dBm/Hz (4 GHz < f ≤ 6 GHz) –148.5 dBm/Hz (6 GHz ≤ f ≤ 13.5 GHz) –146.5 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –143.5 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –143.5 dBm/Hz (26.5 GHz < f ≤ 34 GHz) –141.5 dBm/Hz (34 GHz < f ≤ 40 GHz) –137.5 dBm/Hz (40 GHz < f ≤ 43 GHz) Without MS2830A-067, with MS2830A-068, Preamp: Off, Frequency band mode: Normal –131.5 dBm/Hz (100 kHz) –141.5 dBm/Hz (1 MHz) –150.5 dBm/Hz (30 MHz ≤ f < 1 GHz) –147.5 dBm/Hz (1 GHz ≤ f < 2.4 GHz) –144.5 dBm/Hz (2.4 GHz ≤ f ≤ 3.5 GHz) –141.5 dBm/Hz (3.5 GHz < f ≤ 4 GHz) –141.5 dBm/Hz (4 GHz < f ≤ 6 GHz) –144.5 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –142.5 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –138.5 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –138.5 dBm/Hz (26.5 GHz < f ≤ 34 GHz) –132.5 dBm/Hz (34 GHz < f ≤ 40 GHz) –129.5 dBm/Hz (40 GHz < f ≤ 43 GHz) Without MS2830A-067, with MS2830A-068, Preamp: On, Frequency band mode: Normal –144.5 dBm/Hz (nom., 100 kHz) –153.5 dBm/Hz (1 MHz) –160.5 dBm/Hz (30 MHz ≤ f < 1 GHz) –158.5 dBm/Hz (1 GHz ≤ f < 2 GHz) –156.5 dBm/Hz (2 GHz ≤ f ≤ 3.5 GHz) –152.5 dBm/Hz (3.5 GHz < f ≤ 4 GHz) –152.5 dBm/Hz (4 GHz < f ≤ 6 GHz) –157.5 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –155.5 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –153.5 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –153.5 dBm/Hz (26.5 GHz < f ≤ 34 GHz) –147.5 dBm/Hz (34 GHz < f ≤ 40 GHz) –144.5 dBm/Hz (40 GHz < f ≤ 43 GHz) With MS2830A-067: See Microwave Preselector Bypass (Displayed average noise level)
Adjacent Channel Power (ACP)	Reference: Span total, Carrier total, Both sides of carriers, Carrier select Adjacent channel specifications: 3 channels × 2
Channel Power	Measurement of absolute values: dBm, dBm/Hz
Occupied Bandwidth (OBW)	N% of power, X-dB down

Power vs. Time Displayed Function

Function Outline	Displayed time changes of power for captured waveform data
Analysis Time Range	Analysis start time: Sets analysis start time position from beginning of waveform data Analysis time length: Sets analysis time length Setting mode: Auto, Manual
Resolution Bandwidth	Filter type: Rect, Gaussian, Nyquist, Root nyquist, Off, (Default: Off) Roll-off ratio: 0.01 to 1 (Set for Nyquist, Root nyquist) Filter frequency offset: Set center frequency of filter in wavelength data frequency band
AM Depth (Peak to Peak Measurement)	Measures with AM depth or marker function +Peak, –Peak, (P-P)/2, Average
Burst Average Power	Measures average power of burst signal

■ **Signal Analyzer** (continued)

Frequency vs. Time Displayed Function

Function Outline	Displayed frequency time fluctuations of input signal from captured waveform data
Analysis Time Range	Analysis start time: Sets analysis start time point from waveform data header Analysis time length: Sets analysis time length Setting mode: Auto, Manual
Operating Level Range	–17 to +30 dBm (Input attenuator: ≥10 dB)
Frequency (Vertical Axis)	Can be set center frequency and span at frequency range in waveform data Displayed frequency range: Selectable 1/25, 1/10, 1/5, 1/2 of analysis bandwidth Input frequency range: 10 MHz to 6 GHz
Frequency Readout Accuracy	Input level: –17 to +30 dBm, Span: ≤31.25 MHz, Scale: Span/25, CW input ± (Reference oscillator accuracy × Center frequency + Displayed frequency range × 0.01) Hz
FM Deviation (Peak to Peak Measurement)	Measures FM deviation or marker function +Peak, –Peak, (P-P)/2, Average

Phase vs. Time Displayed Function

Function Outline	Displayed phase time fluctuation of input signal from captured waveform data
Analysis Time Range	Analysis start time: Sets analysis start time point from waveform data header Analysis time length: Sets analysis time length Setting mode: Auto, Manual
Phase (Vertical Axis)	Display mode: Wrap, Unwrap Displayed phase range: 0.01 deg./div to 200 Gdeg./div Offset: –100 deg. to +100 Mdeg.

CCDF/APD Displayed Function

Function Outline	Displayed CCDF and APD of waveform date within a given length of time
Analysis Time Range	Analysis start time: Sets analysis start time point from waveform data header Analysis time length: Sets analysis time length Setting mode: Auto, Manual
Display	Displayed CCDF or APD as graphs Histogram resolution: 0.01 dB Value: Average power, Max. power, Crest factor
Resolution Bandwidth	Filter type: Rectangle, Off, (Default: Off) Filter frequency offset: Sets filter center frequency in frequency band of waveform data

Spectrogram Displayed Function

Function Outline	Displayed spectrogram for arbitrary time length in captured waveform data
Analysis Time Range	Analysis start time: Sets analysis start time point from waveform data header Analysis time length: Sets analysis time length Setting mode: Auto, Manual
Frequency	Can be set center frequency and span at frequency range in waveform data
Resolution Bandwidth (RBW)	Setting range: 1 Hz to 1 MHz (1-3 sequence) Selectivity (–60 dB/–3 dB): 4.5:1 (nom.)

Digitize Function

Function Outline	Captured waveform data saved to internal HDD or output to external devices
Waveform Data	Format: I, Q (each 32 bit, Float binary type) Level: 0 dBm input is $\sqrt{(I^2 + Q^2)} = 1$ Level accuracy: Same as signal analyzer absolute amplitude accuracy
External Output	Can be output to external PC via Ethernet

■ Signal Analyzer (continued)

Replay Function

Function Outline	Captured waveforms can be replayed again by using the VSA function to read saved digitize data
Conditions for Measurable Waveform Data	Format: I, Q (binary format) Combination of span, Sampling rate, and Minimum capture sample

Span	Sampling rate	Minimum capture sample
1 kHz	2 kHz	74000 (37 s)
2.5 kHz	5 kHz	160000 (32 s)
5 kHz	10 kHz	310000 (31 s)
10 kHz	20 kHz	610000 (30.5 s)
25 kHz	50 kHz	730000 (14.6 s)
50 kHz	100 kHz	730000 (7.3 s)
100 kHz	200 kHz	730000 (3.65 s)
250 kHz	500 kHz	730000 (1.46 s)
500 kHz	1 MHz	730000 (730 ms)
1 MHz	2 MHz	730000 (365 ms)
2.5 MHz	5 MHz	730000 (146 ms)
5 MHz	10 MHz	730000 (73 ms)
10 MHz	20 MHz	730000 (36.5 ms)
18.6 MHz	20 MHz	730000 (36.5 ms)
20 MHz	25 MHz	730000 (29.2 ms)
25 MHz	50 MHz	730000 (14.6 ms)
31.25 MHz	50 MHz	730000 (14.6 ms)
50 MHz	100 MHz	730000 (7.3 ms)
62.5 MHz	100 MHz	730000 (7.3 ms)
100 MHz	200 MHz	730000 (3.65 ms)
125 MHz	200 MHz	730000 (3.65 ms)

■ Connector

RF Input	18° to 28°C, Input attenuator: ≥10 dB With MS2830A-044 Connector: N-J (Front panel), 50Ω (nom.) VSWR : ≤1.2 (nom., 40 MHz ≤ f ≤ 3 GHz) ≤1.5 (nom., 3 GHz < f ≤ 6 GHz) ≤1.6 (nom., 6 GHz < f ≤ 13.5 GHz) ≤1.9 (nom., 13.5 GHz < f ≤ 26.5 GHz) With MS2830A-045 Connector: K-J (Front panel), 50Ω (nom.) VSWR : ≤1.2 (nom., 40 MHz ≤ f ≤ 3 GHz) ≤1.3 (nom., 3 GHz < f ≤ 6 GHz) ≤1.3 (nom., 6 GHz < f ≤ 13.5 GHz) ≤1.4 (nom., 13.5 GHz < f ≤ 26.5 GHz) ≤1.6 (nom., 26.5 GHz < f ≤ 40 GHz) ≤1.6 (Reference data, 40 GHz < f ≤ 43 GHz, V-K converter mounted and included)
External Reference Input	Connector: BNC-J (Rear panel), 50Ω (nom.) Frequency: 5, 10, 13 MHz Operating range: ±1 ppm Input level: –15 to +20 dBm, 50Ω (AC coupling)
Reference Signal Output	Connector: BNC-J (Rear panel), 50Ω (nom.) Frequency: 10 MHz Output level: ≥0 dBm (AC coupling)
Sweep Status Output	Connector: BNC-J (Rear panel) Output level: TTL level (High level at sweeping or waveform capture)
SA Trigger Input	Connector: BNC-J (Rear panel) Output level: TTL level
Noise Source Drive	This is available when the MS2830A-017/117 is installed. Supply (+28 V) of the noise source drive. Rear panel, BNC-J Output voltage: 28 ±0.5 V, Pulsed
External Controller	Control from external controller (excluding power-on/off)
Ethernet (10/100/1000BASE-T)	Connector: RJ-45 (Rear panel)
GPIB	IEEE488 bus connector (IEEE488.2, Rear panel) Interface function: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2
USB (B)	USB-B connector (USB2.0, Rear panel)
USB	USB-A connector (USB2.0, Front panel: 2 ports, Rear panel: 2 ports)
Monitor Output	Mini D-Sub 15 pin (Compatible with VGA, Rear panel)
AUX	50-pin (Correspond to DX10A-50S, Rear panel), Using extended input/output
IF Output*	Connector: SMA-J (Rear panel), 50Ω (nom.) Frequency: 1.875 GHz Gain: –10 dB (nom., Input attenuator: 0 dB, Input frequency: 10 GHz)
1st Local Output*	Connector: SMA-J (Front panel), 50Ω (nom.) Frequency: 5 GHz to 10 GHz (Local signal output), 1.875 GHz (IF frequency) Gain: –10 dB (nom., Input attenuator: 0 dB, Input frequency: 10 GHz)

*: With MS2830A-044/045 only

Display

Display	XGA-color LCD (Resolution: 1024 × 768), 8.4 inches (Diagonal: 213 mm)

General

Dimensions and Mass	426 (W) × 177 (H) × 390 (D) mm (excluding projections) ≤15 kg (excluding other options)
Power Supply	Power voltage: 100 V(ac) to 120 V(ac)/200 V(ac) to 240 V(ac) Frequency: 50 Hz/60 Hz Power consumption: 190 VA (nom., excluding other options)
Temperature Range	Operating: +5° to +45°C, Storage: –20° to +60°C
EMC	EN61326-1, EN61000-3-2

External Mixer Function (26.5 GHz to 325 GHz)

External Mixer*

Frequency
Frequency range: 26.5 GHz to 325 GHz
Frequency bands:

Model	Band	Frequency range	Mixer harmonics order (N)
MA2741C	A	26.5 GHz to 40 GHz	4+
MA2742C	Q	33 GHz to 50 GHz	5+
MA2743C	U	40 GHz to 60 GHz	6+
MA2744C	V	50 GHz to 75 GHz	8+
MA2745C	E	60 GHz to 90 GHz	9+
MA2746C	W	75 GHz to 110 GHz	11+
MA2747C	F	90 GHz to 140 GHz	14+
MA2748C	D	110 GHz to 170 GHz	17+
MA2749C	G	140 GHz to 220 GHz	22+
MA2750C	Y	170 GHz to 260 GHz	26+
MA2751C	J	220 GHz to 325 GHz	33+

Amplitude
Mixer conversion loss
Setting range: 0 to 99.9 dB
Maximum input level, Average noise level, Frequency response: Depends on external mixer
Input/Output
Applicable mixer: 2-port mixer only
Local frequency: 5 GHz to 10 GHz
IF frequency: 1.875 GHz

*: With MS2830A-044/045 only

MS2830A-001 Rubidium Reference Oscillator

Generates 10 MHz reference signal with higher frequency stability.

Frequency

Internal Reference Oscillator	See Signal Analyzer/Spectrum Analyzer (Internal reference oscillator)

MS2830A-006 Analysis Bandwidth 10 MHz

This option adds a function to analyze 10 MHz bandwidth.

MS2830A-005 Analysis Bandwidth Extension to 31.25 MHz

This option adds a function to analyze 31.25 MHz bandwidth. (Requires MS2830A-006)
MS2830A-005 is not available when MS2830A-045 is installed.

MS2830A-009 Bandwidth Extension to 31.25 MHz for Millimeter-wave

This option adds a function to analyze 31.25 MHz bandwidth (Requires MS2830A-006).
MS2830A-009 is available when MS2830A-045 is installed.
Cannot be set the RBW to more than 10 MHz in Spectrum Analyzer function.

■ MS2830A-008 Preamplifier

This option amplifies signal prior to mixer to enhance sensitivity.
Cannot install simultaneously with MS2830A-068.

Frequency

Frequency Range	100 kHz to 6 GHz

Amplitude

Level Measurement Range	See Signal Analyzer/Spectrum Analyzer (Level measurement range)
Maximum Input Level	See Signal Analyzer/Spectrum Analyzer (Maximum input level)
Displayed Average Noise Level (DANL)	See Spectrum Analyzer, Signal Analyzer (Displayed average noise level (DANL))
RF Frequency Characteristics	See Signal Analyzer/Spectrum Analyzer (RF frequency characteristics)
Input Attenuator Switching Uncertainty	See Signal Analyzer/Spectrum Analyzer (Input attenuator switching uncertainty)
Linearity Error	See Signal Analyzer/Spectrum Analyzer (Linearity error)
Second Harmonic Distortion	See Signal Analyzer/Spectrum Analyzer (Second harmonic distortion)
1 dB Gain Compression	See Signal Analyzer/Spectrum Analyzer (1 dB gain compression)
2-tone 3rd-order Intermodulation Distortion	See Spectrum Analyzer (2-tone 3rd-order intermodulation distortion)

■ MS2830A-010 Phase Noise Measurement Function

Displays the phase noise characteristics on a logarithmic scale

Frequency

Frequency Range	10 MHz to Upper frequency limit
Offset Frequency Range	10 Hz to 10 MHz
Marker Mode	Normal, Integral noise, RMS noise, Jitter, Residual FM

■ MS2830A-011 2ndary HDD

This option adds a Removable HDD for storing user data.

■ MS2830A-016 Precompliance EMI Function

Adds the detection mode and the resolution bandwidth for EMI measurement to the Spectrum Analyzer function.

Resolution Bandwidth (RBW)	Setting range: 200 Hz (6 dB), 9 kHz (6 dB), 120 kHz (6 dB), 1 MHz (Impulse)
Detector	Quasi-Peak, CISPR-AVG, RMS-AVG

■ MS2830A-017 Noise Figure Measurement Function*1

Frequency

Frequency Range	MS2830A-044: 30 MHz to 26.5 GHz MS2830A-045: 30 MHz to 40 GHz
Frequency Setting Range	MS2830A-044: 10 MHz to 26.5 GHz MS2830A-045: 10 MHz to 43 GHz

NF Measurement

Within the measurement range,
Attenuator = 0 dB*2

Measurement Range	– 20 to +40 dB
Instrument Uncertainty	ENR: 4 to 7 dB ±0.02 dB ENR: 12 to 17 dB ±0.025 dB ENR: 20 to 22 dB ±0.03 dB

Gain Measurement

Measurement Range	Within the frequency range –20 to +40 dB
Instrument Uncertainty	Within the measurement range ≤0.07

Resolution Bandwidth

Setting Range	100 kHz to 8 MHz

Connector

Noise Source	Connector: Rear panel, BNC-J Output voltage: 28 ±0.5 V, Pulsed

∗1: Recommending the NC346 Series noise sources by Noisecom company
∗2: Recommend to use Pre Amp

■ MS2830A-026 BER Measurement Function

Connector	AUX connector(Rear panel)* *: Can convert to BNC by connecting AUX Conversion Adapter (J1556A).
Input Level	TTL level
Input Signal	Data, Clock, Enable
Input Bit Rate	100 bps to 10 Mbps
Measured Patterns	PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, Alternate (0101 ...) PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix, User define (4096 bits max.)
Synchronization Establishing Condition	PN signal: PN stage × 2 bit error free At PNFix signal: PN stage × 2 bit error free, PN signal and sync establishment, establish sync with PNFix signal at PN stage error free from PNFix signal header bit ALL0, ALL1, Alternate (0101 ...): 10 bit error free UserDefine: 8 to 1024 bits (variable) error free Select header bit used at sync detection
Re-synchronization Judgment Condition	x/y (Resynchronization at detection of x-bit error in y bits) y … Measured bit count: Select from 500 bits, 5000 bits, 50000 bits x … Number of error bits in y bits: Setting range 1 to y/2
Measured Bit Count	$\leq 2^{32} - 1$ bits
Measured Error Bit Count	$\leq 2^{31} - 1$ bits
Measurement End Conditions	Measured bit count, Measured error bit count
Auto Re-synchronization Function	Can be toggled on and off
Operation at Resync.	Select from Count clear, and Count keep
Measurement Mode	Single, Endless, Continuous
Display	Status, Error, Error rate, Error count, SyncLoss count, Measured bit count
Polarity Inversion Function	Supports polarity reversal for Data, Clock, Enable
Clear Measurement Function	At BER measurement, hold sync status, clears measured value and measures from 0

■ MS2830A-068 Microwave Preamplifier

This option amplifies signal prior to mixer to enhance sensitivity.
Cannot install simultaneously with MS2830A-008.
When MS2830A-168 is added to MS2830A (with MS2830A-008), only MS2830A-168 becomes available.

Frequency

Frequency Range	100 kHz to 26.5 GHz [MS2830A-044] 100 kHz to 43 GHz [MS2830A-045]

Amplitude

Level Measurement Range	See Signal Analyzer/Spectrum Analyzer (Level measurement range)
Maximum Input Level	See Signal Analyzer/Spectrum Analyzer (Maximum input level)
Displayed Average Noise Level (DANL)	See Spectrum Analyzer, Signal Analyzer (Displayed average noise level (DANL))
RF Frequency Characteristics	See Signal Analyzer/Spectrum Analyzer (RF frequency characteristics)
Input Attenuator Switching Uncertainty	See Signal Analyzer/Spectrum Analyzer (Input attenuator switching uncertainty)
Linearity Error	See Signal Analyzer/Spectrum Analyzer (Linearity error)
Second Harmonic Distortion	See Signal Analyzer/Spectrum Analyzer (Second harmonic distortion)
1 dB Gain Compression	See Signal Analyzer/Spectrum Analyzer (1 dB gain compression)
2-tone 3rd-order Intermodulation Distortion	See Spectrum Analyzer (2-tone 3rd-order intermodulation distortion)

■ MS2830A-067 Microwave Preselector Bypass

Bypasses the preselector to improve the RF frequency characteristics and the in-band frequency characteristics.
Add MS2830A-067 when using the signal analyzer measurement functions at bandwidth: >31.25 MHz and frequency: >6 GHz.
When the preselector option is set to On, the image response elimination filter is bypassed.
Therefore, this function is not appropriate for spurious measurement to receive the image response.
Microwave Preselector Bypass: On (with MS2830A-067), Microwave Preselector Bypass: Off (with special directions)

Frequency

Frequency Range	4 GHz to 26.5 GHz [MS2830A-044] 4 GHz to 43 GHz [MS2830A-045]

Amplitude

Frequency Characteristics	18° to 28°C, After Cal, Input attenuator: 10 dB, Microwave Preselector Bypass: On Without MS2830A-068, Preamp: Off ±1.0 dB (6 GHz ≤ f ≤ 13.8 GHz, Frequency band mode: Normal) (4 GHz ≤ f ≤ 13.8 GHz, Frequency band mode: Spurious) ±1.5 dB (13.8 GHz < f ≤ 26.5 GHz) ±2.0 dB (26.5 GHz < f ≤ 40 GHz) ±2.0 dB (typ., 40 GHz < f ≤ 43 GHz) With MS2830A-068, Preamp: On ±1.8 dB (6 GHz ≤ f ≤ 13.8 GHz, Frequency band mode: Normal) (4 GHz ≤ f ≤ 13.8 GHz, Frequency band mode: Spurious) ±2.5 dB (13.8 GHz < f ≤ 26.5 GHz) ±3.0 dB (26.5 GHz < f ≤ 40 GHz) ±3.0 dB (nom., 40 GHz < f ≤ 43 GHz) ∗With MS2830A-067, Microwave Preselector Bypass: Off, see Signal Analyzer/Spectrum Analyzer (RF frequency characteristics)
Displayed Average Noise Level (DANL)	18° to 28°C, Detector: Sample, VBW: 1 Hz (Video average), Input attenuator: 0 dB Without MS2830A-068, Microwave Preselector Bypass: On, Off –147 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –145 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –141 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –141 dBm/Hz (26.5 GHz < f ≤ 34 GHz) –135 dBm/Hz (34 GHz < f ≤ 40 GHz) –132 dBm/Hz (40 GHz < f ≤ 43 GHz) With MS2830A-068, Preamp: Off, Microwave Preselector Bypass: On, Off –142 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –140 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –136 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –136 dBm/Hz (26.5 GHz < f ≤ 34 GHz) –131 dBm/Hz (34 GHz < f ≤ 40 GHz) –128 dBm/Hz (40 GHz < f ≤ 43 GHz) With MS2830A-068, Preamp: On, Microwave Preselector Bypass: On –154 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –152 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –150 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –150 dBm/Hz (26.5 GHz < f ≤ 34 GHz) –144 dBm/Hz (34 GHz < f ≤ 40 GHz) –141 dBm/Hz (40 GHz < f ≤ 43 GHz)
Image Responses	With MS2830A-067, Microwave Preselector Bypass: Off ≤–60 dBc (6 GHz < f ≤ 13.5 GHz) ≤–60 dBc (13.5 GHz < f ≤ 26.5 GHz) With MS2830A-067, Microwave Preselector Bypass: On Generated at the frequency at the distance of 1.875 GHz × 2 0 dBc (nom., 4 GHz ≤ f ≤ 26.5 GHz) 0 dBc (nom., 26.5 GHz < f ≤ 43 GHz)

■ MS2830A-077 Analysis Bandwidth Extension to 62.5 MHz

This option adds a function to analyze 62.5 MHz bandwidth.
MS2830A-044: Requires MS2830A-006 and MS2830A-005.
MS2830A-045: Requires MS2830A-006 and MS2830A-009.

■ MS2830A-078 Analysis Bandwidth Extension to 125 MHz

This option adds a function to analyze 125 MHz bandwidth.
MS2830A-044: Requires MS2830A-006, MS2830A-005 and MS2830A-077.
MS2830A-045: Requires MS2830A-006 MS2830A-009 and MS2830A-077

An image response is received when setting the bandwidth to more than 31.25 MHz.
This can be used when not inputting a signal frequency outside the MS2830A analysis bandwidth (125 MHz max.).
The Signal Analyzer series MS2690A/91A/92A is recommended for other measurement purposes.

General

Analysis Bandwidth	See Signal Analyzer (Analysis bandwidth)
Sampling Rate	See Signal Analyzer (Sampling rate)
Capture Time	See Signal Analyzer (Capture time)
ADC Resolution	With MS2830A-077/078, >31.25 MHz bandwidth 14 bits

Frequency

Frequency Setting	See Signal Analyzer/Spectrum display function (Frequency setting)
Resolution Bandwidth (RBW)	See Signal Analyzer/Spectrum display function(Resolution bandwidth (RBW))

Amplitude

Displayed Average Noise Level (DANL)	18° to 28°C, Input attenuator: 0 dB With MS2830A-077 or 078, >31.25 MHz bandwidth Without MS2830A-008/068, or with MS2830A-008/068, Preamp: Off –146.5 dBm/Hz (300 MHz ≤ f < 1 GHz) –143.5 dBm/Hz (1 GHz ≤ f < 2.4 GHz) –140.5 dBm/Hz (2.4 GHz ≤ f ≤ 3.5 GHz) –137.5 dBm/Hz (3.5 GHz < f ≤ 4 GHz) –137.5 dBm/Hz (4 GHz < f ≤ 6 GHz) With MS2830A-008/068, Preamp: ON –156.5 dBm/Hz (300 MHz ≤ f < 1 GHz) –154.5 dBm/Hz (1 GHz ≤ f < 2 GHz) –152.5 dBm/Hz (2 GHz ≤ f ≤ 3.5 GHz) –148.5 dBm/Hz (3.5 GHz < f ≤ 4 GHz) –148.5 dBm/Hz (4 GHz < f ≤ 6 GHz) 18° to 28°C, Input attenuator: 0 dB With MS2830A-077 or 078, with MS2830A-067, >31.25 MHz bandwidth Without MS2830A-068 –137.5 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –135.5 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –131.5 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –131.5 dBm/Hz (26.5 GHz < f ≤ 34 GHz) [MS2830A-045] –125.5 dBm/Hz (34 GHz < f ≤ 40 GHz) [MS2830A-045] –122.5 dBm/Hz (40 GHz < f ≤ 43 GHz) [MS2830A-045] With MS2830A-068, Preamp: Off –132.5 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –130.5 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –126.5 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –126.5 dBm/Hz (26.5 GHz < f ≤ 34 GHz) [MS2830A-045] –121.5 dBm/Hz (34 GHz < f ≤ 40 GHz) [MS2830A-045] –118.5 dBm/Hz (40 GHz < f ≤ 43 GHz) [MS2830A-045] With MS2830A-068, Preamp: On –147.5 dBm/Hz (6 GHz < f ≤ 13.5 GHz) –145.5 dBm/Hz (13.5 GHz < f ≤ 18.3 GHz) –143.5 dBm/Hz (18.3 GHz < f ≤ 26.5 GHz) –143.5 dBm/Hz (26.5 GHz < f ≤ 34 GHz) [MS2830A-045] –137.5 dBm/Hz (34 GHz < f ≤ 40 GHz) [MS2830A-045] –134.5 dBm/Hz (40 GHz < f ≤ 43 GHz) [MS2830A-045]

■ MS2830A-077 Analysis Bandwidth Extension to 62.5 MHz
MS2830A-078 Analysis Bandwidth Extension to 125 MHz (continued)

Amplitude (continued)

Image Response	With MS2830A-077/078, >31.25 MHz bandwidth Image response (occurs at frequency 200 MHz away): 0 dBc (nom., 300 MHz < f ≤ 43 GHz) With MS2830A-077/078, MS2830A-067, >31.25 MHz bandwidth Image response (occurs at frequency 1.875 GHz × 2 away): 0 dBc (nom., 6 GHz < f ≤ 43 GHz)
RF Frequency Characteristics	18° to 28°C, After Cal, Input attenuator: 10 dB, Frequency band mode: Normal, >31.25 MHz bandwidth Without MS2830A-008/068, or Preamp: Off ±0.35 dB (300 MHz ≤ f < 4 GHz) ±1.5 dB (4 GHz ≤ f ≤ 6 GHz) With MS2830A-008, Preamp: On ±0.65 dB (300 MHz ≤ f < 4 GHz) ±1.8 dB (4 GHz ≤ f ≤ 6 GHz) Without MS2830A-068, or Preamp: Off With MS2830A-067, Microwave Preselector Bypass: On ±1.0 dB (6 GHz ≤ f ≤ 13.8 GHz) ±1.5 dB (13.8 GHz < f ≤ 26.5 GHz) ±2.0 dB (26.5 GHz < f ≤ 40 GHz) ±2.0 dB (typ., 40 GHz < f ≤ 43 GHz) With MS2830A-068, or Preamp: On With MS2830A-067, Microwave Preselector Bypass: On ±1.8 dB (6 GHz ≤ f ≤ 13.8 GHz) ±2.5 dB (13.8 GHz < f ≤ 26.5 GHz) ±3.0 dB (26.5 GHz < f ≤ 40 GHz) ±3.0 dB (nom., 40 GHz < f ≤ 43 GHz)
Linearity Error	See Signal Analyzer/Spectrum Analyzer (Linearity error)

■ MA2806A High Performance Waveguide Mixer (50 to 75 GHz)
MA2808A High Performance Waveguide Mixer (60 to 90 GHz)

Electrical Characteristics

Model No.		MA2806A	MA2808A
Frequency Range		50 GHz to 75 GHz	60 GHz to 90 GHz
LO Amplitude Range		>+10 dBm	
Multipler		8	12
Conversion Loss*		<15 dB (typ.)	
1 dB Gain Compression (P1dB)*		>0 dBm (typ.)	
LO Leakage		<–30 dBm (nom.)	
RF Input VSWR		≤1.5 (nom.)	
IF/LO Port VSWR	1.875 GHz (IF)	≤2.0 (nom.)	
	5 GHz to 10 GHz (LO)	≤2.4 (nom.)	≤2.0 (nom.)
Maximum Input Level (CW)		+10 dBm	

∗: At assured performance temperature range

Interface

Model No.	MA2806A	MA2808A
RF	Waveguide (WR15, UG-385/U)	Waveguide (WR12, UG-387/U)
IF/LO	SMA-J	

General

Power Supply	100 V(ac) to 120 V(ac)/200 V(ac) to 240 V(ac), 50 Hz/60 Hz, 40 VA
Dimensions and Mass	134 (W) × 51 (H) × 229 (D) mm (excluding projections), <2 kg
Temperature Range	Assured performance range: +18° to +28°C Operating: +5° to +45°C (no condensation) Storage: –20° to +60°C (no condensation)
EMC	EN61326-1, EN61000-3-2

Typical (typ.): Performance not warranted. Must products meet typical performance.
Nominal (nom.): Values not warranted. Included to facilitate application of product.
Example: Performance not warranted. Data actually measured by randomly selected measuring instruments.

Options Configuration Guide

Options Configuration

Refer two table shown below about the hardware / software which each frequency model of MS2830A can implement.

Hardware

Frequency range (MS2830A-040/041/043/044/045) not upgradable.

✓ = Can be installed, No = Cannot be installed, R = Require, U = Upgrade

Opt.	Name	Retrofit	Addition to Main frame					Combination with "Opt." (Refer to the left line)																														
			040	041	043	044	045	001	002	005	006	009	077	078	008	010	011	311	016	017	018	020	021	022	026	052	027	028	029	066	067	068	088	189	180
001	Rubidium Reference Oscillator		✓	✓	✓	✓	✓		*9																											
002	High Stability Reference Oscillator		✓	✓	✓	No	No	*9																												
005	Analysis Bandwidth Extension to 31.25 MHz		✓	✓	✓	✓	No				R	No																							
006	Analysis Bandwidth 10 MHz		✓	✓	✓	✓	✓			U		U	U	U																					
009	Bandwidth Extension to 31.25 MHz for Millimeter-wave		No	No	No	No	✓		No	No	R										No	No	No	No			No	No	No	No			No	No	
077	Analysis Bandwidth Extension to 62.5 MHz	No	✓	✓	✓	✓	✓			*5	R	*5																							
078	Analysis Bandwidth Extension to 125 MHz	No	✓	✓	✓	✓	✓			*5	R	*5	R																							
008	Preamplifier		✓	✓	✓	*1	*1																									*1				
010	Phase Noise Measurement Function		✓	✓	✓	✓	✓																													
011	2ndary HDD		✓	✓	✓	✓	✓																													
311	2ndary HDD Retrofit		✓	✓	✓	✓	✓																													
016	Precompliance EMI Function		✓	✓	✓	✓	✓																													
017	Noise Figure Measurement Function		✓	✓	✓	✓	✓								U																	U				
018	Audio Analyzer*4		✓	✓	*7	No	No					No																			R	No	No			
020	3.6 GHz Vector Signal Generator		✓	✓	*2	No	No					No											No			*11				*2	No	No	No	No	
021	6 GHz Vector Signal Generator		✓	✓	*2	No	No					No										No				*11				*2	No	No	No	No	
022	Low Power Extension for Vector Signal Generator		✓	✓	✓	No	No					No										R									No	No	No	No	
026	BER Measurement Function		✓	✓	✓	✓	✓																													
052	Internal Signal Generator Control Function	*12	✓	✓	*2	No	No															*11								*2			*11		
027	ARB Memory Upgrade 256 MSa for Vector Signal Generator		✓	✓	✓	No	No					No										R									No	No	*3	*3	
028	AWGN		✓	✓	✓	No	No					No										R									No	No	*3	*3	
029	Analog Function Extension for Vector Signal Generator*4	*8	✓	✓	No	No	No					No										R		R						R	No	No	No	No	
066	Low Phase Noise Performance	No	✓	✓	*2	No	No					No										*2				*2					No	No			
067	Microwave Preselector Bypass		No	No	No	✓	✓		No												No	No	No	No			No	No	No	No			No	No	
068	Microwave Preamplifier		No	No	No	*1	*1		No						*1						No	No	No	No			No	No	No	No				No	No
088	3.6 GHz Analog Signal Generator*4		✓	✓	No	No	No					No										No	No	No		*11	*3	*3	No	R	No	No			U
189	Vector Function Extension for Analog Signal Generator Retrofit		✓	✓	No	No	No					No										No	No	No			*3	*3	No	R	No	No	R		
180	CPU/Windows 7 64 bit Upgrade Retrofit	*10	✓	✓	✓	✓	✓																													

∗1: Cannot be installed simultaneously MS2830A-008 and MS2830A-068/168. When MS2830A-168 is added to Signal Analyzer with MS2830A-008, only MS2830A-168 becomes effective.
∗2: MS2830A-043 can implement only either MS2830A-020/021 or MS2830A-066.
∗3: MS2830A-027 and MS2830A-028 are not used in analog signal generator (MS2830A-088/188).
After vector function (MS2830A-189) was added, the vector signal generator function can add MS2830A-027 and MS2830A-028.
∗4: Require MX269018A.
∗5: MS2830A-040/041/043/044 require MS2830A-005.
MS2830A-045 requires MS2830A-009.
∗6: An image response is received when setting the bandwidth to more than 31.25 MHz.
This can be used when not inputting a signal frequency outside the MS2830A analysis bandwidth (125 MHz max.).
The Signal Analyzer series MS2690A/91A/92A is recommended for other measurement purposes.
∗7: The MS2830A-018 can be installed with MS2830A-043 but cannot be installed simultaneously with a signal generator (MS2830A-088/020/021/029) because MS2830A-066 is required. Consequently, analog wireless Rx tests cannot be performed using the same main frame when the MS2830A-018 and MS2830A-043 are combined.
∗8: Please contact our sales representative when requesting retrofitting.
∗9: The Rubidium Reference Oscillator can be retrofitted to MS2830A-040/041/043 with installed High Stability Reference Oscillator.
In this case, the Rubidium Reference Oscillator is functional.
∗10: Replace current CPU board of MS2830A which Windows Embedded Standard 2009 (Windows XP) is installed (it was ordered until August 2016 approximately) and upgrade the operating system to Windows Embedded Standard 7 (Windows 7).
A seal labeled “C1” is affixed near the serial number label of MS2830A which is installed Windows 7.
∗11: Installing the MS2830A-052 requires any of the MS2830A-020/120, 021/121, or 088/188 options.
∗12: When retrofitting signal generator-linked functions (MS2830A-352), the license is delivered on an accessory DVD which is used to install the license in the MS2830A. It is not necessary to return the MS2830A to Anritsu for upgrading.

Software

✓ = Can be installed, No = Cannot be installed, R = Require, U = Upgrade

Model	Name	Addition to Main frame					Analysis Bandwidth					Note
		040	041	043	044	045	005	006	009	077	078	
MX269010A	Mobile WiMAX Measurement Software	✓	✓	✓	✓	No	R	R	No			
MX269011A	W-CDMA/HSPA Downlink Measurement Software	✓	✓	✓	✓	✓		R				
MX269012A	W-CDMA/HSPA Uplink Measurement Software	✓	✓	✓	✓	✓		R				
MX269013A	GSM/EDGE Measurement Software	✓	✓	✓	✓	✓		R				
MX269013A-001	EDGE Evolution Measurement Software	✓	✓	✓	✓	✓		R				Require MX269013A
MX269015A	TD-SCDMA Measurement Software	✓	✓	✓	✓	✓		R				
MX269017A	Vector Modulation Analysis Software	✓	✓	✓	*3	*3	U	R	*1	U	U	U: Upgrade of the phase noise performance (MS2830A-066) (Measured signal: Frequency <3.6 GHz, Bandwidth <1 MHz)
MX269018A	Analog Measurement Software	✓	✓	*2	No	No			No			Require MS2830A-066 and A0086B (See MX2690xxA series Measurement Software catalog for detail) Note) MS2830A-043 cannot implement a signal generator for Rx test (Because MS2830A-066 is required)
MX269020A	LTE Downlink Measurement Software	✓	✓	✓	✓	✓	R	R	*1			
MX269020A-001	LTE-Advanced FDD Downlink Measurement Software	✓	✓	✓	✓	✓	R	R	*1	U	U	Require MX269020A
MX269021A	LTE Uplink Measurement Software	✓	✓	✓	✓	✓	R	R	*1			
MX269021A-001	LTE-Advanced FDD Uplink Measurement Software	✓	✓	✓	✓	✓	R	R	*1	U	U	Require MX269021A
MX269022A	LTE TDD Downlink Measurement Software	✓	✓	✓	✓	✓	R	R	*1			
MX269022A-001	LTE-Advanced TDD Downlink Measurement Software	✓	✓	✓	✓	✓	R	R	*1	U	U	Require MX269022A
MX269023A	LTE TDD Uplink Measurement Software	✓	✓	✓	✓	✓	R	R	*1			
MX269023A-001	LTE-Advanced TDD Uplink Measurement Software	✓	✓	✓	✓	✓	R	R	*1	U	U	Require MX269023A
MX269024A	CDMA2000 Forward Link Measurement Software	✓	✓	✓	✓	✓		R				
MX269024A-001	All Measure Function	✓	✓	✓	✓	✓		R				Require MX269024A
MX269026A	EV-DO Forward Link Measurement Software	✓	✓	✓	✓	✓		R				
MX269026A-001	All Measure Function	✓	✓	✓	✓	✓		R				Require MX269026A
MX269028A	WLAN (802.11) Measurement Software	✓	✓	✓	✓	✓	R	R	*1			
MX269028A-001	802.11ac (80 MHz) Measurement Software	✓	✓	✓	✓	✓	R	R	*1	R	R	Only for MS2830A. Require MX269028A
MX269030A	W-CDMA BS Measurement Software	✓	✓	✓	✓	✓		R				
MX283027A	Wireless Network Device Test Software	↓	↓	↓	↓	↓	↓	↓	↓			
MX283027A-001	WLAN Test Software	✓	✓	✓	✓	✓	R	R	*1			Require MX283027A*4
MX283027A-002	*Bluetooth* Test Software	✓	✓	✓	✓	✓	R	R				Require MX283027A
MX283087A	TRX Sweep Calibration	✓	✓	✓	No	No	R	R				Require MS2830A-020/021 and MS2830A-022

∗1: MS2830A-045 cannot be installed MS2830A-005. Add MS2830A-009 in substitution for MS2830A-005.
∗2: MS2830A-043 can implement only either MS2830A-020/021 or MS2830A-066.
By the system that MS2830A-066 is necessary, MS2830A-020/021 is not added to MS2830A-043.
∗3: By the measurement of the narrowband signal, add MS2830A-066. (Channel bandwidth: x kHz to 100 kHz)
MS2830A-044/045 cannot be installed MS2830A-066.
∗4: MX283027A-001 includes MX269911A WLAN IQproducer (Cannot order MX283027A-001 and MX269911A at same time).

Ordering Information

Please specify the model/order number, name and quantity when ordering.
The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

Model/Order No	Name
	– Main frame –
MS2830A	Signal Analyzer
	– Standard accessories –
	Power Cord: 1 pc
P0031A	USB Memory (≥256 MB, USB2.0 Flash Driver): 1 pc
Z0541A	USB Mouse: 1 pc
	Install CD-ROM
	(Application software, instruction manual CD-ROM): 1 pc
	– Options –
MS2830A-044	26.5 GHz Signal Analyzer
MS2830A-045	43 GHz Signal Analyzer
MS2830A-001	Rubidium Reference Oscillator
MS2830A-005*1	Analysis Bandwidth Extension to 31.25 MHz
MS2830A-006	Analysis Bandwidth 10 MHz
MS2830A-008	Preamplifier
MS2830A-009*2	Bandwidth Extension to 31.25 MHz for Millimeter-wave
MS2830A-010	Phase Noise Measurement Function
MS2830A-011	2ndary HDD
MS2830A-016	Precompliance EMI Function
MS2830A-017	Noise Figure Measurement
MS2830A-026*3	BER Measurement Function (J1556A AUX Conversion Adapter as standard accessory)
MS2830A-067	Microwave Preselector Bypass
MS2830A-068	Microwave Preamplifier
MS2830A-077*4	Analysis Bandwidth Extension to 62.5 MHz
MS2830A-078*5	Analysis Bandwidth Extension to 125 MHz
MS2830A-311	2ndary HDD Retrofit
	– Retrofit options –
MS2830A-101	Rubidium Reference Oscillator Retrofit
MS2830A-105*1	Analysis Bandwidth Extension to 31.25 MHz Retrofit
MS2830A-106	Analysis Bandwidth 10 MHz Retrofit
MS2830A-108	Preamplifier Retrofit
MS2830A-109*2	Bandwidth Extension to 31.25 MHz for Millimeter-wave Retrofit
MS2830A-110	Phase Noise Measurement Function Retrofit
MS2830A-111	2ndary HDD Retrofit
MS2830A-116	Precompliance EMI Function Retrofit
MS2830A-117	Nose Figure Measurement Retrofit
MS2830A-126*3	BER Measurement Function Retrofit (J1556A AUX Conversion Adapter as standard accessory)
MS2830A-167	Microwave Preselector Bypass Retrofit
MS2830A-168	Microwave Preamplifier Retrofit
MS2830A-180*6	CPU/Windows 7 64 bit Upgrade Retrofit
	– Software options –
	CD-ROM with License and Operation manuals
MX269010A*7	Mobile WiMAX Measurement Software
MX269011A	W-CDMA/HSPA Downlink Measurement Software
MX269012A	W-CDMA/HSPA Uplink Measurement Software
MX269013A	GSM/EDGE Measurement Software
MX269013A-001	EDGE Evolution Measurement Software (Requires MX269013A)
MX269015A	TD-SCDMA Measurement Software
MX269017A	Vector Modulation Analysis Software
MX269020A	LTE Downlink Measurement Software
MX269020A-001	LTE-Advanced FDD Downlink Measurement Software (Requires MX269020A)
MX269021A	LTE Uplink Measurement Software
MX269021A-001	LTE-Advanced FDD Uplink Measurement Software (Requires MX269021A)
MX269022A	LTE TDD Downlink Measurement Software
MX269022A-001	LTE-Advanced TDD Downlink Measurement Software (Requires MX269022A)
MX269023A	LTE TDD Uplink Measurement Software
MX269023A-001	LTE-Advanced TDD Uplink Measurement Software (Requires MX269023A)
MX269024A	CDMA2000 Forward Link Measurement Software
MX269024A-001	All Measure Function (Requires MX269024A)
MX269026A	EV-DO Forward Link Measurement Software
MX269026A-001	All Measure Function (Requires MX269026A)
MX269028A	WLAN (802.11) Measurement Software
MX269028A-001	802.11ac (80 MHz) Measurement Software (For MS2830A. Requires MX269028A.)
MX269030A	W-CDMA BS Measurement Software
MX283027A	Wireless Network Device Test Software
MX283027A-001	WLAN Test Software (Requires MX283027A)
MX283027A-002	*Bluetooth* Test Software (Requires MX283027A)

Model/Order No	Name
	– Warranty service –
MS2830A-ES210	2 years Extended Warranty Service
MS2830A-ES310	3 years Extended Warranty Service
MS2830A-ES510	5 years Extended Warranty Service
	– Application parts –
	Following operation manuals provided as hard copy
W3334AE	MS2830A Operation Manual (Mainframe Operation)
W2851AE	MS2690A/MS2691A/MS2692A and MS2830A Operation Manual (Mainframe Remote Control)
W3335AE	MS2830A Operation Manual (Signal Analyzer Function Operation)
W2853AE	MS2690A/MS2691A/MS2692A and MS2830A Operation Manual (Signal Analyzer Function Remote Control)
W3336AE	MS2830A Operation Manual (Spectrum Analyzer Function Operation)
W2855AE	MS2690A/MS2691A/MS2692A and MS2830A Operation Manual (Spectrum Analyzer Function Remote Control)
W3117AE	MS2690A/MS2691A/MS2692A and MS2830A Operation Manual (Phase Noise Measurement Function Operation)
W3118AE	MS2690A/MS2691A/MS2692A and MS2830A Operation Manual (Phase Noise Measurement Function Remote Control)
W3655AE	MS2690A/MS2691A/MS2692A and MS2830A Operation Manual (Noise Figure Measurement Function Operation)
W3656AE	MS2690A/MS2691A/MS2692A and MS2830A Operation Manual (Noise Figure Measurement Function Remote control)
W3098AE	MX269011A Operation Manual (Operation)
W3099AE	MX269011A Operation Manual (Remote Control)
W3060AE	MX269012A Operation Manual (Operation)
W3061AE	MX269012A Operation Manual (Remote Control)
W3100AE	MX269013A Operation Manual (Operation)
W3101AE	MX269013A Operation Manual (Remote Control)
W3044AE	MX269015A Operation Manual (Operation)
W3045AE	MX269015A Operation Manual (Remote Control)
W3305AE	MX269017A Operation Manual (Operation)
W3306AE	MX269017A Operation Manual (Remote Control)
W3014AE	MX269020A Operation Manual (Operation)
W3064AE	MX269020A Operation Manual (Remote Control)
W3015AE	MX269021A Operation Manual (Operation)
W3065AE	MX269021A Operation Manual (Remote Control)
W3209AE	MX269022A Operation Manual (Operation)
W3210AE	MX269022A Operation Manual (Remote Control)
W3521AE	MX269023A Operation Manual (Operation)
W3522AE	MX269023A Operation Manual (Remote Control)
W3201AE	MX269024A Operation Manual (Operation)
W3202AE	MX269024A Operation Manual (Remote Control)
W3203AE	MX269026A Operation Manual (Operation)
W3204AE	MX269026A Operation Manual (Remote Control)
W3528AE	MX269028A Operation Manual (Operation)
W3529AE	MX269028A Operation Manual (Remote Control)
W2860AE	MX269030A Operation Manual (Operation)
W2861AE	MX269030A Operation Manual (Remote Control)
W3471AE	MX283027A Operation Manual (Operation)
W3473AE	MX283027A-001 Operation Manual (Operation)
W3474AE	MX283027A-001 Operation Manual (Remote Control)
W3516AE	MX283027A-002 Operation Manual (Operation)
W3517AE	MX283027A-002 Operation Manual (Remote Control)

∗1: MS2830A-005/105 is available when MS2830A-044 is installed.
Requires MS2830A-006/106.
∗2: MS2830A-009/109 is available when MS2830A-045 is installed.
Requires MS2830A-006/106
∗3: The J1556A Aux Conversion Adapter is a standard accessory supplied with MS2830A-026/126.
∗4: Retrofit not supported.
Requires MS2830A-006 and MS2830A-005 (for MS2830A-044).
Requires MS2830A-006 and MS2830A-009 (for MS2830A-045).
∗5: Retrofit not supported.
Requires MS2830A-006, MS2830A-005 and MS2830A-077 (for MS2830A-044).
Requires MS2830A-006, MS2830A-009 and MS2830A-077 (for MS2830A-045).
∗6: Replace the CPU board and upgrade the OS to Windows 7.
For details, refer to the Options Configuration Guide: Hardware item.
∗7: Can not be installed in MS2830A-045.

Model/Order No	Name
	– High Performance Waveguide Mixer –
MA2806A	High Performance Waveguide Mixer (50 to 75 GHz)
MA2808A	High Performance Waveguide Mixer (60 to 90 GHz)
	– Standard accessories –
Z1922A	MA2806A USB Memory (Saved conversion loss data, for MA2806A): 1 pc
Z1923A	MA2808A USB Memory (Saved conversion loss data, for MA2808A): 1 pc
Z1625A	AC Adapter: 1 pc Power Cord: 1 pc
J1692B	Coaxial Cord, 1 m (SMA-P · SUCOFLEX104PE · SMA-P, DC to 18 GHz, 50Ω): 1 pc
	– External Mixer –
MA2741C	External Mixer (26.5 GHz to 40 GHz)
MA2742C	External Mixer (33 GHz to 50 GHz)
MA2743C	External Mixer (40 GHz to 60 GHz)
MA2744C	External Mixer (50 GHz to 75 GHz)
MA2745C	External Mixer (60 GHz to 90 GHz)
MA2746C	External Mixer (75 GHz to 110 GHz)
MA2747C	External Mixer (90 GHz to 140 GHz)
MA2748C	External Mixer (110 GHz to 170 GHz)
MA2749C	External Mixer (140 GHz to 220 GHz)
MA2750C	External Mixer (170 GHz to 260 GHz)
MA2751C	External Mixer (220 GHz to 325 GHz)

Model/Order No	Name
K240B	Power Divider (K connector, DC to 26.5 GHz, 50Ω, K-J, 1 W max.)
MA1612A	Four-port Junction Pad (5 MHz to 3 GHz, N-J)
MP752A	Termination (DC to 12.4 GHz, 50Ω, N-P)
J1359A	Coaxial Adaptor (K-P · K-J, SMA)
J0576B	Coaxial Cord, 1 m (N-P · 5D-2W · N-P)
J0576D	Coaxial Cord, 2 m (N-P · 5D-2W · N-P)
J0127A	Coaxial Cord, 1 m (BNC-P · RG58A/U · BNC-P)
J0127B	Coaxial Cord, 2 m (BNC-P · RG58A/U · BNC-P)
J0127C	Coaxial Cord, 0.5 m (BNC-P · RG58A/U · BNC-P)
J0322A	Coaxial Cord, 0.5 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P)
J0322B	Coaxial Cord, 1 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P)
J0322C	Coaxial Cord, 1.5 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P)
J0322D	Coaxial Cord, 2 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P)
J0805	DC Block, N type (MODEL 7003) (10 kHz to 18 GHz, N-P · N-J)
J1554A	DC Block, SMA type (MODEL 7006) (9 kHz to 26.5 GHz, SMA-P · SMA-J)
J1555A	DC Block, SMA type (MODEL 7006-1) (9 kHz to 20 GHz, SMA-P · SMA-J)
K261	DC Block (10 kHz to 40 GHz, K-P · K-J)
J0004	Coaxial Adapter (DC to 12.4 GHz, 50Ω, N-P · SMA-J)
J1398A	N-SMA Adaptor (DC to 26.5 GHz, 50Ω, N-P · SMA-J)
34AKNF50	Ruggedized K-to-Type N Adapter (DC to 20 GHz, 50Ω, Ruggedized K-M · N-F, SWR: 1.5 (max.), Insertion Loss: 0.4 dB (max.))
J0911	Coaxial Cable, 1.0 m for 40 GHz (DC to 40 GHz, approx. 1 m, SF102A, 11K254/K254/1.0M)
J0912	Coaxial Cable, 0.5 m for 40 GHz (DC to 40 GHz, approx. 0.5 m, SF102A, 11K254/K254/0.5M)
41KC-3	Fixed Attenuator (DC to 40 GHz, 3 dB)
J1261A	Ethernet Cable (Shield type, Straight, 1 m)
J1261B	Ethernet Cable (Shield type, Straight, 3 m)
J1261C	Ethernet Cable (Shield type, Cross, 1 m)
J1261D	Ethernet Cable (Shield type, Cross, 3 m)
J0008	GPIB Cable, 2.0 m
J1556A*1	AUX Conversion Adapter (AUX → BNC, for vector signal generator option and BER measurement function option)
B0635A	Rack Mount Kit (EIA)
B0657A	Rack Mount Kit (JIS)
B0636C*2	Carrying Case (Hard type, with casters)
B0645A	Soft Carrying Case
B0671A*2	Front Cover for 1MW4U
MA24105A	Inline Peak Power Sensor (350 MHz to 4 GHz, with USB A to mini B cable)
MA24106A	USB Power Sensor (50 MHz to 6 GHz, with USB A to mini B Cable)
MA24108A	Microwave USB Power Sensor (10 MHz to 8 GHz, with USB A to Micro-B Cable)
MA24118A	Microwave USB Power Sensor (10 MHz to 18 GHz, with USB A to Micro-B Cable)
MA24126A	Microwave USB Power Sensor (10 MHz to 26 GHz, with USB A to Micro-B Cable)
Z0975A	Keyboard (USB)
Z1345A	Installation Kit (required when retrofitting options or installing software)

∗1: The J1556A AUX Conversion Adapter is not a standard accessory for the MS2830A-020/120/021/121 Vector Signal Generator Option.
The J1556A AUX Conversion Adapter is a standard accessory supplied with MS2830A-026/126 BER Measurement Function.

∗2: The B0636C Carrying Case includes a Front Panel Protective Cover (B0671A).

MA2808A

MA2806A/MA2808A
High Performance
Waveguide Mixer

J1556A
AUX Conversion Adapter

MA24106A
USB Power Sensor

MS2830A with Front Cover

B0671A
Front Cover for 1MW4U

B0636C
Carrying Case
(Hard type, with casters)

B0645A
Soft Carrying Case

Note:

Anritsu envision : ensure

Specifications are subject to change without notice.

• United States
Anritsu Company
1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

• Canada
Anritsu Electronics Ltd.
700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

• Brazil
Anritsu Eletronica Ltda.
Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - Sao Paulo - SP
Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• Mexico
Anritsu Company, S.A. de C.V.
Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

• United Kingdom
Anritsu EMEA Ltd.
200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

• France
Anritsu S.A.
12 avenue du Québec, Bâtiment Iris 1- Silic 612,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

• Germany
Anritsu GmbH
Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

• Italy
Anritsu S.r.l.
Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

• Sweden
Anritsu AB
Kistagången 20B, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

• Finland
Anritsu AB
Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

• Denmark
Anritsu A/S
Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

• Russia
Anritsu EMEA Ltd.
Representation Office in Russia
Tverskaya str. 16/2, bld. 1, 7th floor.
Moscow, 125009, Russia
Phone: +7-495-363-1694
Fax: +7-495-935-8962

• Spain
Anritsu EMEA Ltd.
Representation Office in Spain
Edificio Cuzco IV, Po. de la Castellana, 141, Pta. 5
28046, Madrid, Spain
Phone: +34-915-726-761
Fax: +34-915-726-621

• United Arab Emirates
Anritsu EMEA Ltd.
Dubai Liaison Office
902, Aurora Tower,
P O Box: 500311- Dubai Internet City
Dubai, United Arab Emirates
Phone: +971-4-3758479
Fax: +971-4-4249036

• India
Anritsu India Private Limited
2nd & 3rd Floor, #837/1, Binnamangla 1st Stage,
Indiranagar, 100ft Road, Bangalore - 560038, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

• Singapore
Anritsu Pte. Ltd.
11 Chang Charn Road, #04-01, Shriro House
Singapore 159640
Phone: +65-6282-2400
Fax: +65-6282-2533

• P.R. China (Shanghai)
Anritsu (China) Co., Ltd.
Room 2701-2705, Tower A,
New Caohejing International Business Center
No. 391 Gui Ping Road Shanghai, 200233, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

• P.R. China (Hong Kong)
Anritsu Company Ltd.
Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P.R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

• Japan
Anritsu Corporation
8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan
Phone: +81-46-296-6509
Fax: +81-46-225-8359

• Korea
Anritsu Corporation, Ltd.
5FL, 235 Pangyoyeok-ro, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13494 Korea
Phone: +82-31-696-7750
Fax: +82-31-696-7751

• Australia
Anritsu Pty. Ltd.
Unit 20, 21-35 Ricketts Road,
Mount Waverley, Victoria 3149, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

• Taiwan
Anritsu Company Inc.
7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

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Printed on Recycled Paper

Printed in Japan 21/OCT/2016 ddcm/CDT Catalog No. MS2830A-044/045-E-A-1-(18.00)