Anritsu Advancing beyond

Signal Analyzer

MS2840A

MS2840A-044: 9 kHz to 26.5 GHz
MS2840A-046: 9 kHz to 44.5 GHz
« MS2840A-040: 9 kHz to 3.6 GHz* »
« MS2840A-041: 9 kHz to 6.0 GHz* »

-123 dBc/Hz
Close-in Phase Noise
Measurement Frequency 1 GHz
10 kHz offset

-157 dBm/Hz (meas.)
Displayed Average Noise Level
Measurement Frequency 40 GHz

*: Refer to the separate brochure "MS2840A-040/041" .

Excellent Eco Product

As Pure

As Diamond

The Pure Signal Analyzer

MS2840A

The Pure Signal Analyzer

Excellent Phase Noise Performance using New Synthesizer Design

Based on more than 120 years of technological excellence,
Anritsu has built a new synthesizer design into the MS2840A,
offering never-seen-before, high, close-in phase noise performance.

For R&D, Manufacturing and Maintenance of Wireless Equipment, Radar and Transmitter Device

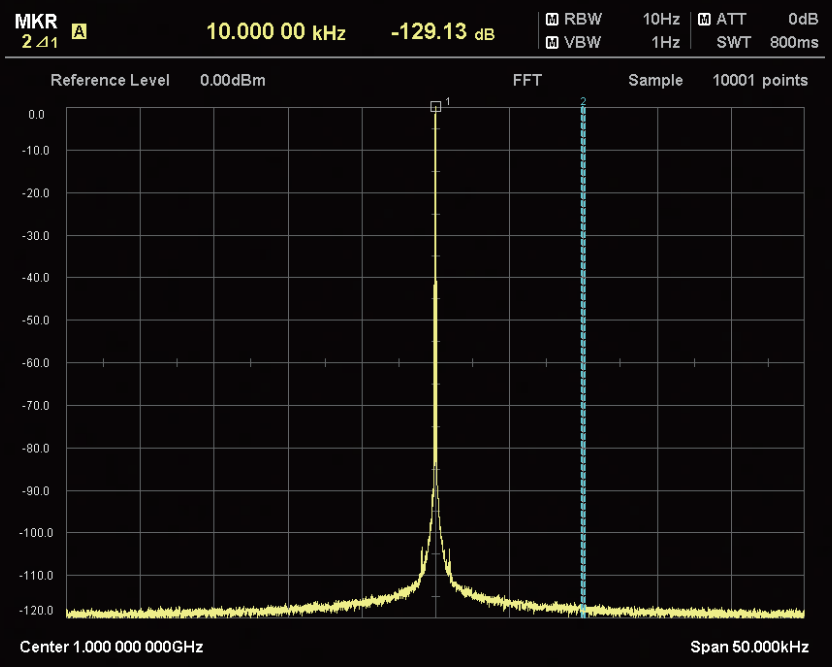
The MS2840A series (26.5 GHz/44.5 GHz models) with high, close-in phase-noise-performance spectrum and signal analyzers is ideal for developing, manufacturing and maintaining radio and radar equipment as well as transmitters, etc., at every measurement frequency.


Anritsu
MS2840A
Signal Analyzer
9kHz-44.5GHz
Preset
Remote
Local
Cal
Save
Recall
Copy
SSD
1st Local Output
Power
MS2840A Spectrum Analyzer
MKR 1
1.000 000 000 00 GHz
0.63 dBm
RBW 10Hz
VBW 1Hz
ATT 0dB
SWT 800ms
Reference Level 0.00dBm
FFT
Sample 10001 points
Center 1.000 000 000GHz
Span 25.000kHz
Ref.Int
Pre-Amp Off
Spectrum Analyzer
Frequency
Span
Amplitude
BW
Marker
Trace
Trigger/Gate
Time/Sweep
1 of 2
Menu
SPA
SA
F1
F2
F3
F4
F5
F6
F7
F8
Appli
Shift

MS2840A

Better Than Expected Close-in Phase Noise Performance

Close-in Phase Noise Performance



Measurement Examples*1

Measurement Frequency 1GHz
10 kHz Offset

-123 dBc/Hz

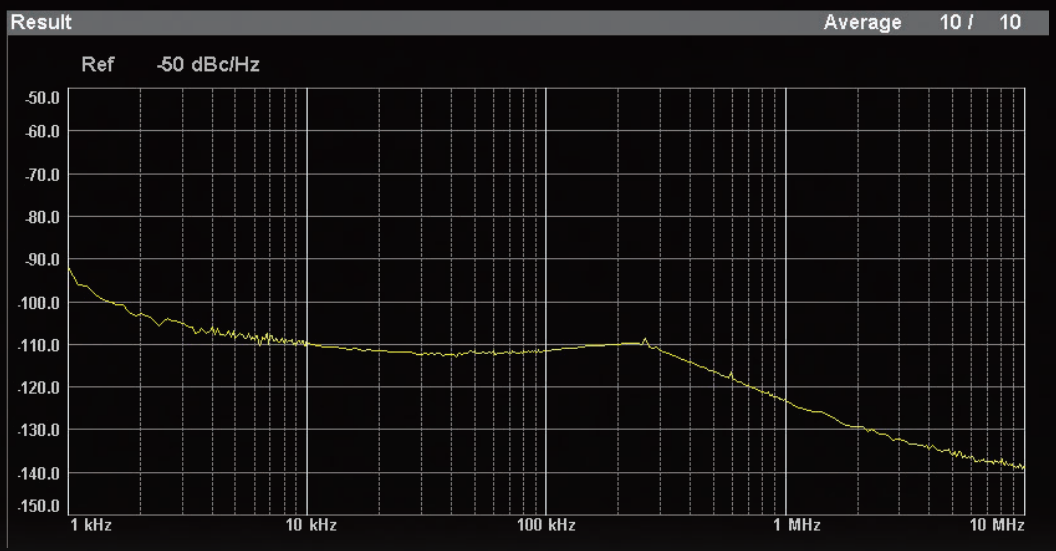
Measurement Frequency 40GHz
10 kHz Offset

-110 dBc/Hz

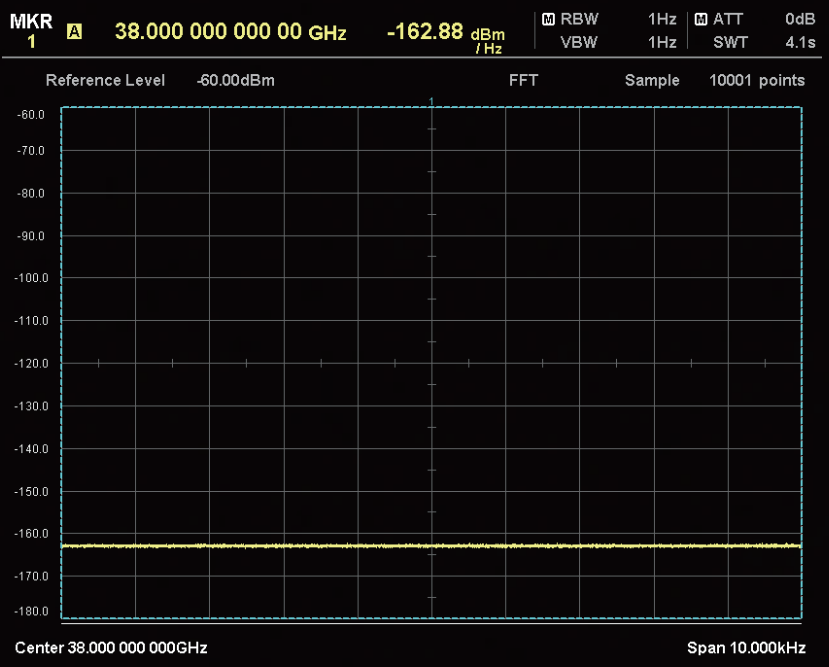
MS2840A series (26.5 GHz and 44.5 GHz models) has the excellent phase noise performance required for measuring narrowband wireless, wireless backhaul, etc.

Millimeter Wave Band Phase Noise Performance

Carrier Freq.	40 000 000 000 Hz	Reference Level	0.00 dBm
		ATT	0 dB



Display High Sensitivity Measurement in Micro and Millimeter Wave Bands



Measurement Examples*1

Displayed Average Noise Level

Measurement Frequency 26.5 GHz

-160 dBc/Hz*2

Measurement Frequency 40 GHz

-157 dBc/Hz*2

The MS2840A series (26.5 GHz and 44.5 GHz models) has excellent displayed average noise level (DANL) performance.

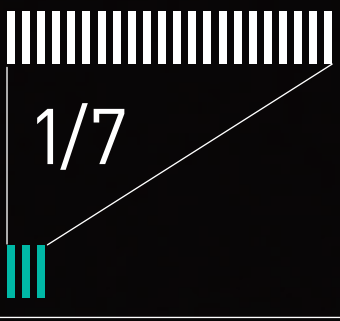
Faster Measurement Speed

With a built-in high-performance CPU and 8 GB of main memory, the MS2840A is much faster than its predecessor MS2830A, offering greatly improved averaging processing times for screen displays and much faster processing when displaying the results of signal analyzer and software analysis functions.

Spectrum Analyzer Functions (1000 averagings*3)

MS2830A*5

22 sec



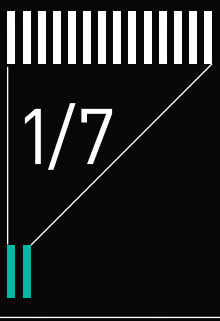
3 sec

MS2840A*5

Signal Analyzer Functions (Spctrogram Display*4)

MS2830A*5

14 sec



2 sec

MS2840A*5

*1: Actual data for measuring instrument selected at random; not guaranteed performance for all shipped instruments.

*2: Preamp: ON, MS2840A-046

*3: Measurement Conditions: 1 GHz Frequency/SPAN; 1 MHz RBW/VBW; 1 ms Sweep Speed

*4: Measurement Conditions: 1 GHz Frequency; 25 MHz SPAN; Signal Capture Time:10 ms

*5: MS2830A: Windows XP model
MS2840A: Windows 10 model as of March 2023

MS2840A

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Features

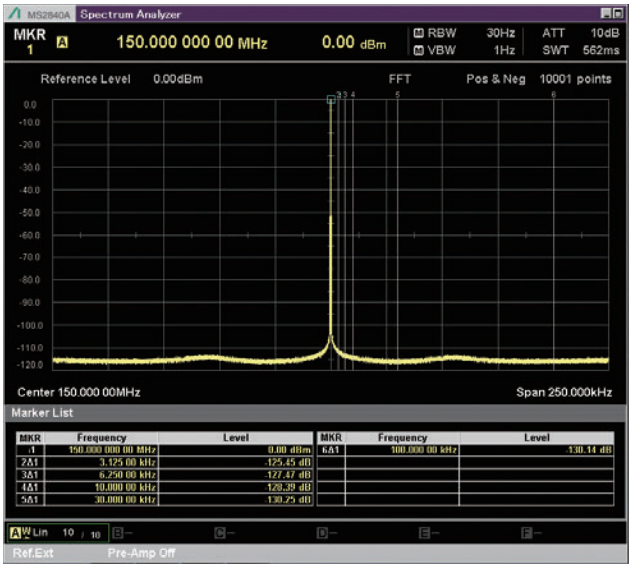
Better Than Expected Close-in Phase Noise Performance

Since 2000 most spectrum analyzers have been designed for mobile communications and the phase noise performance has been optimized for offset frequencies of several MHz. Consequently, customers requiring good close-in phase noise performance have been limited to a narrow choice of usable spectrum analyzers, causing problems.
This new MS2840A series (26.5 GHz/44.5 GHz models) has been designed with emphasis on offering a spectrum analyzer with excellent close-in phase noise performance at offset frequencies of just several kHz. This performance surpasses that of first-generation high-end spectrum analyzers and has sufficient margin for evaluating the close-in spurious of narrowband communications equipment in the short-wave, VHF, and UHF bands. Furthermore, this excellent phase noise performance proves its usefulness in the microwave and millimeter wave bands for evaluating microwave wireless equipment, aerospace equipment, weather radar, 79 GHz band automotive collision-prevention radar, and other devices requiring oscillator measurements. It supports measurements previously requiring large, expensive phase noise measuring instruments while offering excellent noise performance in a middle-price-range spectrum analyzer.

Close-in Phase Noise Performance
Specification at 1 GHz Measurement Frequency
(Spectrum Analyzer Function)

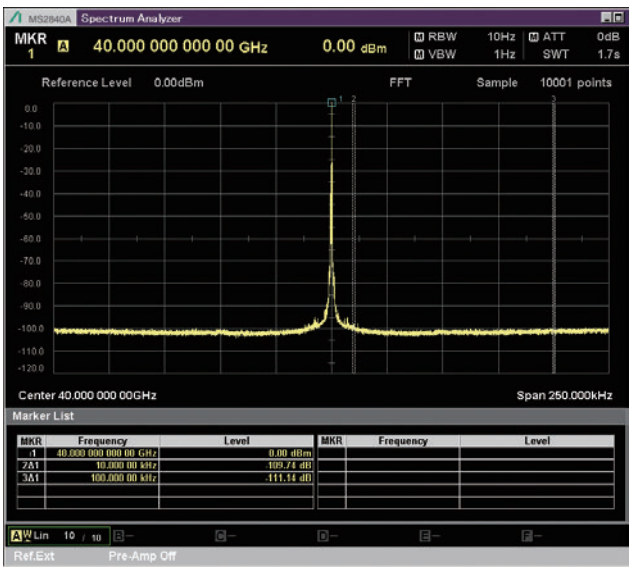
Carrier Offset	SSB Phase Noise
10 Hz	–80 dBc/Hz (nom.)
100 Hz	–92 dBc/Hz (nom.)
1 kHz	–117 dBc/Hz (nom.)
10 kHz	–123 dBc/Hz
100 kHz	–123 dBc/Hz
1 MHz	–135 dBc/Hz
10 MHz	–148 dBc/Hz (nom.)

Measurement Examples



Spectrum Display
150 MHz Measurement Frequency, Preamp Off

Phase Noise Measurement
150 MHz Measurement Frequency, Preamp Off



Spectrum Display
40 GHz Measurement Frequency, Preamp Off

Phase Noise Measurement
40 GHz Measurement Frequency, Preamp Off

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Features

High-Sensitivity Measurements in Microwave and Millimeter Wave Bands

The MS2840A has excellent display average noise level (DANL) as well as high dynamic range performance. When the built-in preamplifier is on, the DANL supports a high sensitivity measurement performance of better than –160 dBm/Hz in the frequency range from 0.03 GHz to 34 GHz.*1 This performance proves its usefulness in capturing low-level signals and antenna side lobes in test systems with large coupling losses, such as free-space propagation measurements at antenna coupling.

*1: 44.5 GHz (MS2840A-046)

Displayed Average Noise Level (DANL)

Spectrum Analyzer Function

Preamp: None, Microwave Preselector Bypass: None

Frequency	DANL		
	26 .5 GHz Model (MS2840A-044)	44 .5 GHz Model (MS2840A-046)	
		Without MS2840A-019	With MS2840A-019
30 MHz	–153 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
400 MHz	–153 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
1 GHz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz
3 GHz	–147 dBm/Hz	–147 dBm/Hz	–147 dBm/Hz
13 GHz	–151 dBm/Hz	–151 dBm/Hz	–150 dBm/Hz
20 GHz	–146 dBm/Hz	–146 dBm/Hz	–146 dBm/Hz
30 GHz	—	–146 dBm/Hz	–146 dBm/Hz
40 GHz	—	–144 dBm/Hz	–142 dBm/Hz
44 GHz	—	–140 dBm/Hz	–137 dBm/Hz

Preamp: On, Microwave Preselector Bypass: None

Frequency	DANL		
	26 .5 GHz Model (MS2840A-044)	44 .5 GHz Model (MS2840A-046)	
		Without MS2840A-019	With MS2840A-019
30 MHz	–166 dBm/Hz	–166 dBm/Hz	–166 dBm/Hz
400 MHz	–166 dBm/Hz	–166 dBm/Hz	–166 dBm/Hz
1 GHz	–164 dBm/Hz	–164 dBm/Hz	–164 dBm/Hz
3 GHz	–163 dBm/Hz	–163 dBm/Hz	–163 dBm/Hz
13 GHz	–163 dBm/Hz	–163 dBm/Hz	–163 dBm/Hz
20 GHz	–157 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz
30 GHz	—	–160 dBm/Hz	–159 dBm/Hz
40 GHz	—	–157 dBm/Hz	–156 dBm/Hz
44 GHz	—	–149 dBm/Hz	–149 dBm/Hz

Dynamic Range

Frequency	Dynamic Range	DANL/TOI
1 GHz	166 dB	Displayed Average Noise Level (DANL): –150 dBm/Hz Third Order Intercept (TOI): +16 dBm
20 GHz	159 dB	Displayed Average Noise Level (DANL): –146 dBm/Hz Third Order Intercept (TOI): +13 dBm
40 GHz	157 dB	Displayed Average Noise Level (DANL): –144 dBm/Hz Third Order Intercept (TOI): +13 dBm (nom.)

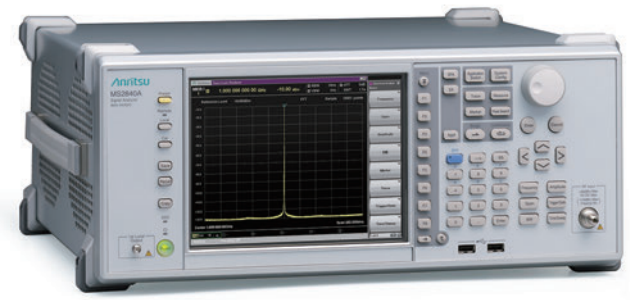
The dynamic range is assumed to be the simple difference between the TOI and DANL.

Noise Floor Reduction (MS2840A-051)

The Noise Floor Reduction (NFR) function increases the measurement accuracy for low-level signals. It subtracts the internal noise components (11 dB max. nominal) of the measuring instrument itself from the displayed measurement result.

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Functions

The Signal Analyzer MS2840A is available as two series with two models in each series: 26.5 GHz and 44.5 GHz, and 3.6 GHz and 6 GHz; different options can be installed in each series. The 26.5 GHz and 44.5 GHz models described in this brochure support various measurement functions required for evaluating the Tx characteristics of wireless and transmission devices.



Signal Analyzer
MS2840A

Standard Functions

Spectrum Analyzer
Signal Analyzer (31.25 MHz Analysis Bandwidth)
Power Meter (Connected to USB Power Sensor)

Options

Signal Analyzer (Analysis Bandwidth Expansion: 62.5 MHz, 125 MHz)
Built-in Preamplifier
Phase Noise Measurement
Precompliance EMI Measurement
Noise Figure Measurement
BER Measurement
Modulation Analysis
Extends frequency measured using external mixer

Optional Parts

USB Power Sensor

Typical Measurement Items for Evaluating Tx Characteristics (26.5 GHz and 44.5 GHz models)

✓: Supported

Supported Standard Functions/Options / Typical Measurement	Standard Functions			Options/Optional Parts
	Spectrum Analyzer	Signal Analyzer	Others	
Spectrum Trace	✓	✓		
Channel Power	✓	✓		
Occupied Bandwidth	✓	✓		
Adjacent Channel Leakage Power	✓	✓		
Spectrum Emission Mask	✓			
Burst Average Power	✓	✓		
Spurious Emission	✓			
AM Depth		✓		✓ Analog Measurement Software MX269018A
FM Deviation		✓		✓ Analog Measurement Software MX269018A
Multi-marker & Marker List	✓	✓		
Highest 10 Markers	✓	✓		
Limit Line	✓			
Frequency Counter	✓			
TOI	✓			
Hide Settings and Numeric Results	✓			
Power Meter Function (connected to USB Power Sensor)			✓	
Phase Noise Measurement				✓ Phase Noise Measurement Function MS2840A-010
EMI Measurement				✓ Precompliance EMI Function MS2840A-016
Vector Modulation Analysis (EVM, etc.)				✓ Vector Modulation Analysis Software MX269017A
Analog Modulation Analysis (AM/FM/ΦM) (FM Deviation, Demodulation Frequency, etc.)				✓ Analog Measurement Software MX269018A

Other Measurement Items (26.5 GHz and 44.5 GHz models)

✓: Supported

Supported Standard Functions/Options / Typical Measurement	Standard Functions			Options/Optional Parts
	Spectrum Analyzer	Signal Analyzer	Others	
Noise Figure Measurement				✓ Noise Figure Measurement Function MS2840A-017
BER Measurement				✓ BER Measurement Function MS2840A-026

Versatile Standard Functions

The built-in spectrum and signal analyzer functions can be used to evaluate the Tx characteristics of wireless devices and transmitters by running easy tests, etc., in accordance with specifications.

Measure Function	Spectrum Analyzer (Standard)	Signal Analyzer (Standard)
Spectrum Trace	✓	✓
Channel Power	✓	✓
Occupied Bandwidth	✓	✓
Adjacent Channel Leakage Power	✓	✓
Spectrum Emission Mask	✓	
Burst Average Power	✓	✓
Spurious Emission	✓	
AM Depth		✓
FM Deviation		✓
Multi-marker & Marker List	✓	✓
Highest 10 Markers	✓	✓
Limit Line	✓	
Frequency Counter	✓	
TOI	✓	
Hide Settings and Numeric Results	✓	

Power Meter Function (USB Power Sensor Connection)

Connecting the optional USB Power Sensor to the MS2840A supports Power and Relative Power measurements.

Compatible USB power sensors

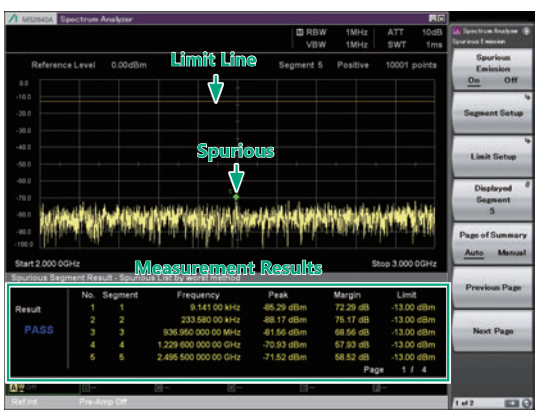
Model	Frequency Range	Dynamic Range
MA24104A*	600 MHz to 4 GHz	+3 to +51.76 dBm
MA24105A	350 MHz to 4 GHz	+3 to +51.76 dBm
MA24106A	50 MHz to 6 GHz	–40 to +23 dBm
MA24108A	10 MHz to 8 GHz	–40 to +20 dBm
MA24118A	10 MHz to 18 GHz	–40 to +20 dBm
MA24126A	10 MHz to 26 GHz	–40 to +20 dBm

Other power sensors, such as the USB Peak Power Sensor and Microwave CW USB Power Sensor, cannot use the Power Meter Function.

*: MA24104A has been discontinued.

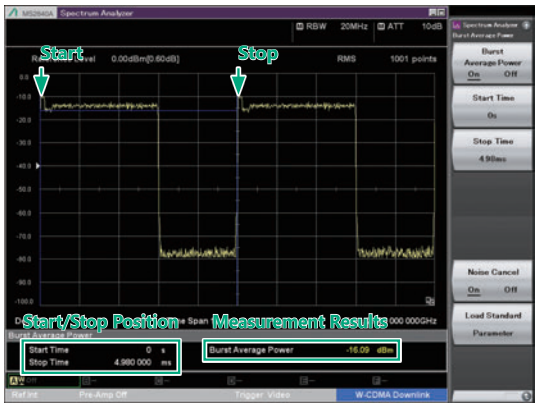
Spurious Emission

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.



Burst Average Power

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 unit noise from the measurement result.
Pre-installed templates for each standard support easy parameter setting.

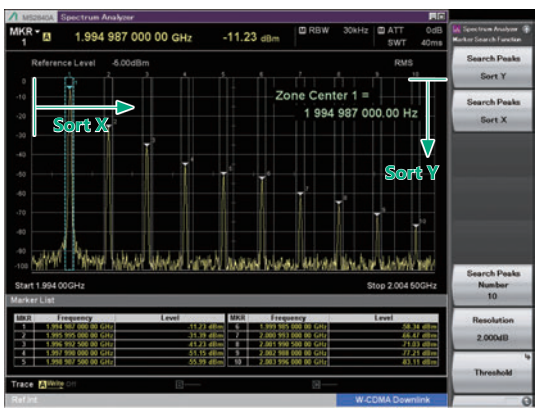


Multi-marker & Marker List

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.

Highest 10 Markers

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



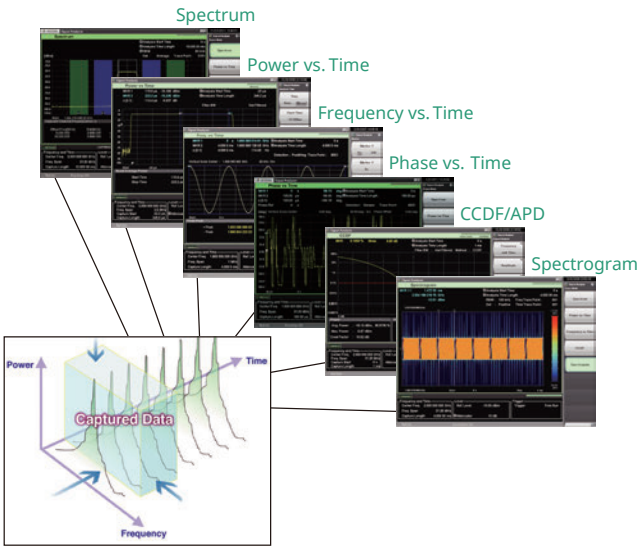
Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Functions

Signal Analyzer (Standard)

The MS2840A has a built-in 31.25 MHz bandwidth Fast Fourier Transformation (FFT) analysis function supporting multi-domain analysis of captured measured signals. Since it can capture phenomena such as spectrum transients that cannot be captured by conventional sweep-type spectrum analyzers, it improves the efficiency of troubleshooting. The analysis bandwidth can be expanded to either 62.5 MHz or 125 MHz as options.
In addition, add the Microwave Preselector Bypass (MS2840A-067) option when using the signal analyzer measurement function at a bandwidth of >31.25 MHz and a frequency of >6 GHz.

Measurement Functions

- Spectrum trace
- Frequency vs. Time
- CCDF/APD
- Power vs. Time
- Phase vs. Time
- Spectrogram



Analysis Bandwidth:

31.25 MHz (Standard)
50 MHz max. sampling rate = 20 ns resolution, ADC resolution 16 bits)
62.5 MHz (MS2840A-077)
(100 MHz max. sampling rate = 10 ns resolution, ADC resolution 14 bits)
125 MHz (MS2840A-077/078)
(200 MHz max. sampling rate = 5 ns resolution, ADC resolution 14 bits)

Max. Capture Time: 0.5 s to 2000 s

Max. Number of Samples: 100 Msamples

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 MS2840A analysis bandwidth (125 MHz max.).

Option

Analysis Bandwidth Extension to 62.5 MHz (MS2840A-077)
Extends analysis bandwidth to 62.5 MHz.

Analysis Bandwidth Extension to 125 MHz (MS2840A-078*)
Extends analysis bandwidth to 125 MHz.

*: Requires MS2840A-077.

Capture & Replay Function

Waveform data can be saved (captured) to the internal memory.
In addition, previously saved waveform data can be loaded (replayed) to reproduce result displays whenever necessary using measurement functions.

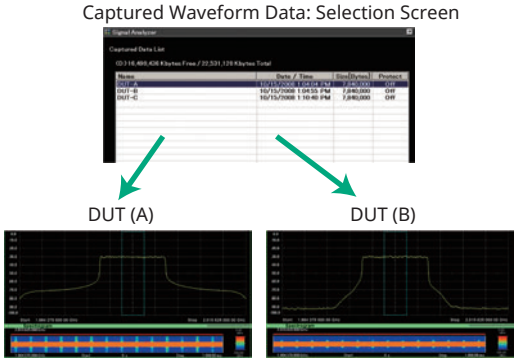
The following chart shows the maximum capture time per frequency span.

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

Replay Usage Examples

- Sharing data between development and manufacturing sections at separate locations
- Transferring signals captured onsite for later in-house analysis
- Saving product shipping data for later warranty-claim confirmation

Captured Waveform Data: Selection Screen



Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Functions

Signal Analyzer (Standard)

Spectrum trace

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.

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/APD

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.

CCDF (Complementary Cumulative Distribution Function):
The CCDF display indicates the cumulative distribution of transient power variations compared to average power.

APD (Amplitude Probability Density):
The APD display indicates the probability distribution of transient power.

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.

Other Measurement Functions

Phase Noise Measurement Function (MS2840A-010)

The excellent close-in phase noise performance of the MS2840A supports phase noise measurement of transmitters with a frequency offset range of 10 Hz to 10 MHz.

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

There are four measurement modes using different loop filters, which are switched to match the DUT.

Auto:
This mode switches automatically to the best loop filter for measuring the carrier signal close-in and wide-offset phase noise characteristics

Best Close-in:
This mode uses the best loop filter for measuring the carrier signal close-in phase noise characteristics.

Best Wide-offset:
This mode uses the best loop filter for measuring the carrier signal wide-offset phase noise characteristics.

Balance
This mode uses the loop filter with a good balance for measuring both close-in and wide-offset phase noise characteristics of the carrier signal.

Measurement Screen

Precompliance EMI Function (MS2840A-016)

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.

Noise Figure Measurement Function (MS2840A-017)

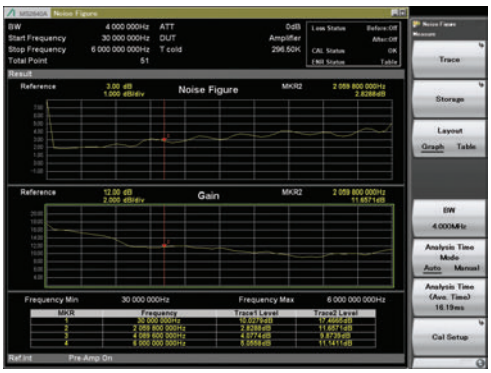
Noise Figure is measured with the measurement method of Y-factor method which uses a Noise Source.
The Noisecom NC346 series* of noise sources is supported.

*: Refer to the MS2840A Data Sheet for more details.
Operation is not guaranteed when using other noise sources.

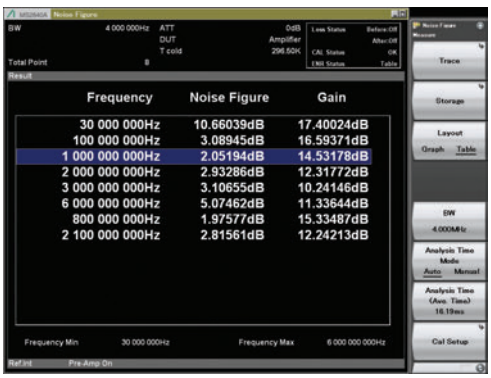
Frequency Range (Noise sauce): 0.01 GHz to 40.0 GHz
Frequency Mode: Fixed, List, Sweep
DUT Mode: Amplifier, Down Converter, Up Converter
Screen Layout: Graph, Table

Measurement Results Display
- Graph/List/Spot

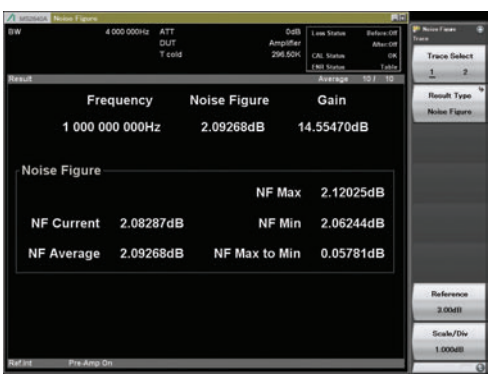
Displays measurement results for each trace (Trace1/Trace2).
- Noise Figure (NF) [dB]
- Noise Factor (F) [Linear]
- Gain
- Y-Factor: Power ratio when Noise Source is turned On/Off
- T effective: Effective noise temperature
- P Hot: Power measured when Noise Source is On.
- P Cold: Power measured when Noise Source is Off.



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



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



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

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Functions

Other Measurement Functions

BER Measurement Function (MS2840A-026)

The MS2840A with the BER Measurement Function MS2840A-026 supports measurement up to 10 Mbps.
It supports Rx sensitivity tests by inputting the receiver-demodulated Data/Clock/Enable to the back of the MS2840A.

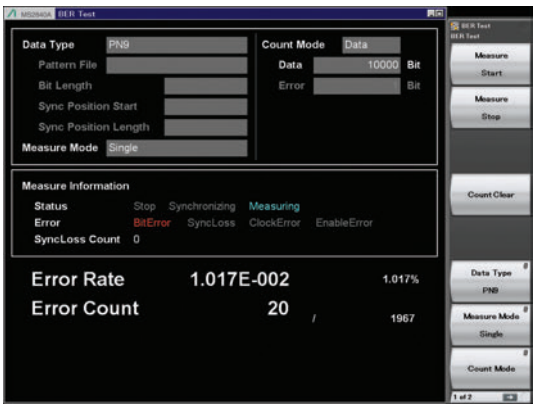
- Input Signal: Data, Clock, Enable (Polarity reversal supported)
- Input Bit Rate: 100 bps to 10 Mbps
- Input Level: TTL 3.3 V
- Connector: Rear panel, AUX connector*

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

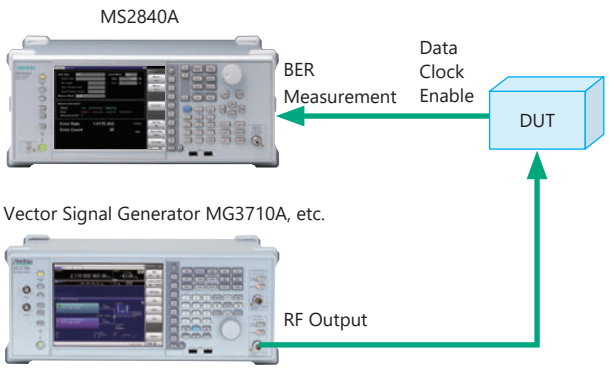
  PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, Alternate (0101...), PN9Fix, PN11Fix, PN15Fix, PN20Fix, PN23Fix, UserDefine (4096 bits max.)
- Measurable Bit Count: 1000 to 4294967295 bits (2^{32} – 1 bits)
- Measurable Error Bit Count: 1 to 2147483647 bits (2^{31} – 1 bits)
- Count Mode

  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)

Measurement Software Options

Vector Modulation Analysis Software (MX269017A)

This software measures the modulation accuracy, carrier frequency, Tx power, etc., for each type of digital radio.

Supported Modulation Methods

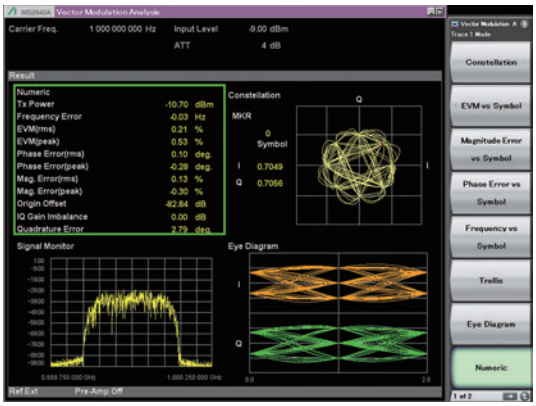
Standard
BPSK, QPSK, O-QPSK, π/4DQPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 2FSK, 4FSK, 2ASK, 4ASK, H-CPM*, MSK
*: Used for APCO-P25 Phase2 Inbound measurement

APSK Analysis (MX269017A-001)
16APSK, 32APSK

Higher-Order QAM Analysis (MX269017A-011)
512QAM, 1024QAM, 2048QAM

Frequency Setting Range

100 kHz to 44.5 GHz
(300 MHz to 6 GHz depending on measured symbol rate)



Measurement Screen

Analog Measurement Software (MX269018A)

When this software is installed in the MS2840A, the Tx performance (carrier frequency, Tx power, modulation rate/frequency deviation, demodulation frequency, demodulation signal distortion rate, etc.) of analog radios can be measured.

* The Audio Analyzer and Analog Signal Generator cannot be installed in the MS2840A.
* This software cannot be installed in the MS2830A 26.5 GHz/43 GHz models, but can be installed in the MS2840A 26.5 GHz/44.5 GHz models.

Supported Modulations

AM, FM, ΦM

Frequency Range

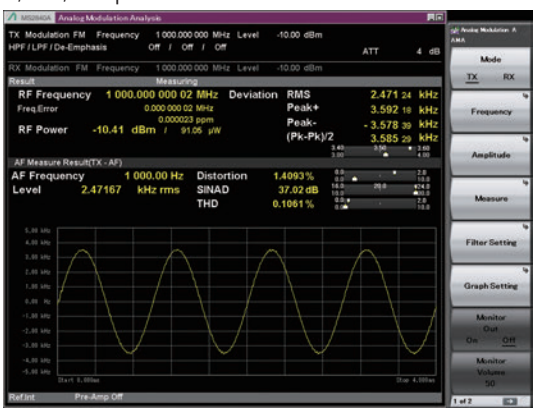
100 kHz to 2700 MHz
(At Wide Band FM measurement: 10 MHz to 2700 MHz)

Weighting Filter

CCITT, C-Message, CCIR 468, CCIR-ARM, A-Weighting

De-emphasis

25, 50, 75, 500, 750 µs



Measurement Screen

Refer to the MX2690xxA Series Measurement Software brochure for details.

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Functions

Measurement Software Options

External Mixer Connection Function MX284090A

Adding the External Mixer Connection Function MX284090A to a signal analyzer extends the frequency measured using either Eravant or VDI external mixers.

It supports spectrum analysis of wideband millimeter wave transmitters expected to be used in a wide application range, such as millimeter and automotive radar.

Eravant External Mixer

VDI External Mixer

Recommended Eravant or VDI External Mixers

Model	Name	Maker	Frequency Range	LO Multiplier
STC-N12-15-S1-IDP	V-Band Full Waveguide Band Down-Converter	Eravant	50 GHz to 75 GHz	8
WR12SAX-Z-M	Spectrum Analyzer Extender (SAX)	VDI	60 GHz to 90 GHz	12

Features

- Supports Image-Response Free Bandwidth ≤7.5 GHz with High IF and PS Function*1
- Easy Setup Using LO/IF Coaxial Cables
- Accessory USB Memory with Mixer Conversion Loss Data

Using the MS2840A with high IF supports spectrum mask measurement over a wide frequency span without any image-response effect. Furthermore, Anritsu's proprietary PS (Polarity Swap) supports image-response-free bandwidths of up to 7.5 GHz.

High-sensitivity measurement is supported because the number of required LO multipliers is reduced by the 1st Local signal 5 to 10 GHz high frequency band.

Setup between the MS2840A and external mixer is simple. Just connect a coaxial cable between the MS2840A 1st Local Output port and external mixer. The Mixer's unique conversion loss data is stored on the accessory USB memory provided with each mixer, and is applied to measured values simply by loading into the MS2840A.

*1: Patented

Frequency Expansion Range

The following frequency ranges can be selected to match the supported frequency range of an external mixer connected to the MS2840A.*2

*2: Only supported by MS2840A with installed External Mixer Connection Function MX284090A

Frequency Range	40 GHz to 60 GHz	50 GHz to 75 GHz	60 GHz to 90 GHz	75 GHz to 110 GHz	90 GHz to 140 GHz	110 GHz to 170 GHz
	120 GHz to 170 GHz	140 GHz to 220 GHz	150 GHz to 220 GHz	170 GHz to 260 GHz	220 GHz to 325 GHz	

Measurement Software Options/Other Options

Pulse Radar Measurement Function (MX284059B)

This function for the Signal Analyzer MS2840A (26.5/44.5 GHz models) facilitates automated measurement of key transmission evaluation items for radar maintenance and manufacturing inspections. The MS2840A itself performs measurement by controlling the USB Peak Power Sensor MX244xxA according to the target signal and measurement items to support a wide range of radar types.

- Supports wide pulse width range for S-, C-, X- and Ku-band meteorological, maritime, coastguard, aerospace, etc., radar
- Key Measurement Items: Tx Power, Tx Frequency, Pulse Width, Rise/Fall Time,Pulse Repetition Frequency, Frequency Deviation (for FM chirp), 40-dB Bandwidth, Emissions (Out-of-Band domain, Spurious domain), Occupied Bandwidth
- Supports short/long/multi-pulse conditions used by modern solid-state radar

Pulse Type

Non-FM Pulse Radar/FM Pulse Radar

Measurement Frequency Range

MS2840A-044: 300 MHz to 26,500 MHz
MS2840A-046: 300 MHz to 36,000 MHz

* Emissions measurement range is from 30 MHz to the upper limit of the main unit frequency.

Pulse Width

0.5 µs to 2000 µs (Without MX244xxA)

0.2 µs to 2000 µs (With MX244xxA)

Pulse Repetition interval

0.05 ms to 5.0 ms (PRF = 10 Hz to 20 kHz)

Rubidium Reference Oscillator (MS2840A-001)

This option is a 10-MHz reference crystal oscillator with excellent frequency stability startup characteristics of $\pm 1 \times 10^{-9}$ at 7 minutes after power-on.

Aging Rate: $\pm 1 \times 10^{-10}$/month, $\pm 1 \times 10^{-9}$/year
Start-up Characteristics: $\pm 1 \times 10^{-9}$ (7 minutes after power-on)

Preamplifier (MS2840A-008)

This option is for the 26.5 GHz/44.5 GHz models (MS2840A-044/046) and the 3.6 GHz/6 GHz models (MS2840A-040/041).
The gain of about 20 dB improves the Displayed Average Noise Level (DANL). This preamplifier is used to measure low-level signals such as noise and interference.

Frequency Range: 100 kHz to 6 GHz

26.5 GHz Microwave Preamplifier (MS2840A-069)

This option is for the 26.5 GHz model (MS2840A-044).
The gain of about 20 dB improves the Displayed Average Noise Level (DANL). This preamplifier is used to measure low-level signals, such as noise and interference.

Frequency Range: 100 kHz to 26.5 GHz

Microwave Preamplifier (MS2840A-068)

This option is for the 44.5 GHz model (MS2840A-046).
The gain of about 20 dB improves the Displayed Average Noise Level (DANL). This preamplifier is used to measure low-level signals, such as noise and interference.

Frequency Range: 100 kHz to 44.5 GHz

2ndary SSD (MS2840A-011)

This removable SSD is for storing user data.
It has no installed OS. It is shipped mounted in the Secondary SSD slot of the MS2840A main unit.

Removable SSD, Win10 (MS2840A-014)

This additional user-changeable SSD contains the same Windows OS and programs as the factory installed system SSD.
It supports a Windows 10 install for one specific MS2840A and is for use during service repair and calibration.

Microwave Preselector Bypass (MS2840A-067)

Bypassing the preselector used for the microwave band improves RF frequency characteristics and in-band frequency characteristics.
Add this option when the signal analyzer measurement function is set to a frequency band of >31.25 MHz and a frequency of >6 GHz.

2 dB Step Attenuator for Millimeter-wave (MS2840A-019)

This option is for the 44.5 GHz model (MS2840A-046).
The attenuator resolution is expanded to 2 dB (Standard resolution is 10 dB) and input level to internal mixer can be adjusted with high resolution. As a result, the radio test products using micro and millimeter wave which require wide dynamic range can be measured with a sufficient margin.

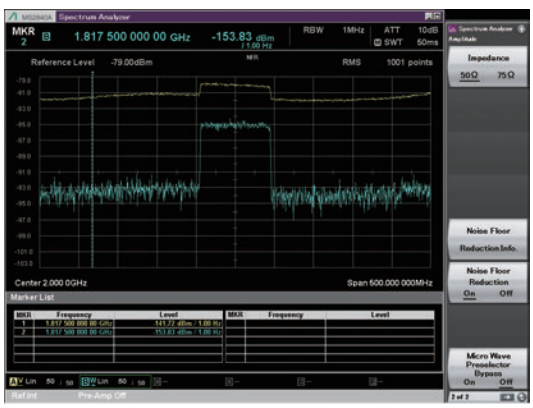
Noise Floor Reduction (MS2840A-051)

The Noise Floor Reduction (NFR) function increases the measurement accuracy for low-level signals. It subtracts the internal noise components (11 dB max. nominal) of the measuring instrument itself from the displayed measurement result.

<Main Applications>
- Spurious Emission
- Spectrum Mask
- Adjacent Channel Leakage Power (ACLR)
- Power ON/OFF ratio

Measurement times using the NFR function remain unchanged. The NFR function eliminates the procedure of measuring the instrument noise floor each time like using the earlier noise cancelling function. If the noise floor is measured once when an ambient temperature change affects the noise floor level, the NFR effect can be captured by the same operation as normal measurement, unless there is a change in these conditions.

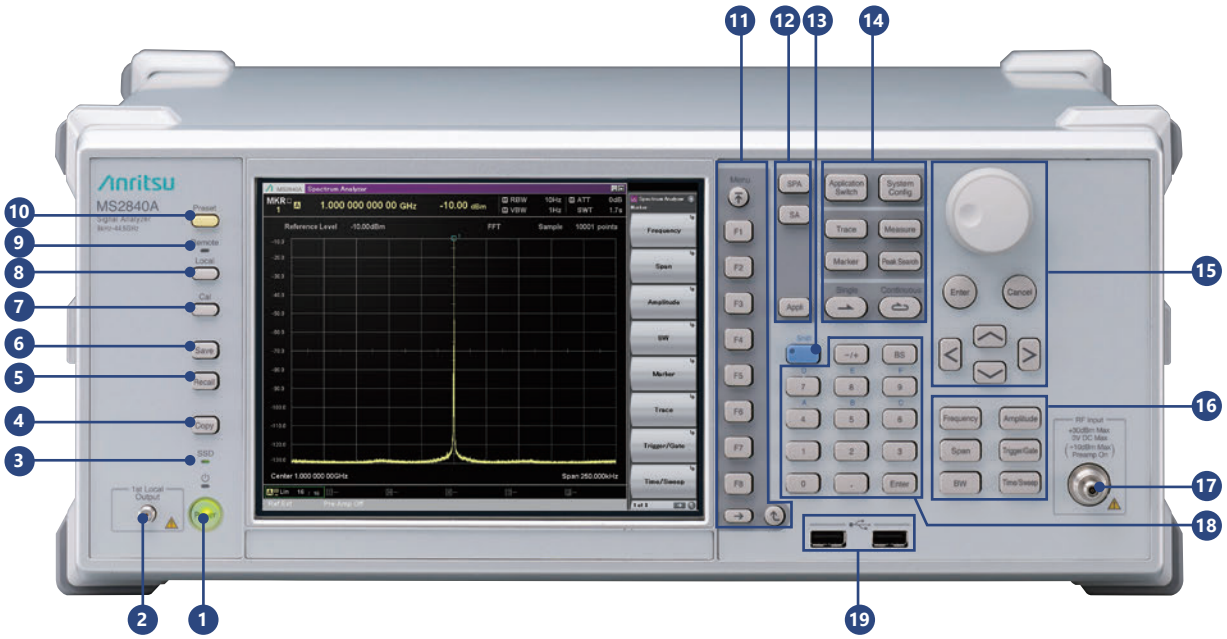
[Notes]
The NFR function is enabled only by the Spectrum Analyzer function.
The design value is nominal and is not a guaranteed specification.



Measurement Screen

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Key Layout

Front Panel



1 Power switch
Press to switch between the standby state in which AC power is supplied and the Power On state in which the MS2840A is under operation. The Power lamp lights up orange in the standby state, and lights up green in the Power On state. Press the power switch for a reasonably long duration (for about two seconds).

2 1st Local Output connector
Supplies local signal and bias current to external waveguide mixer and receives frequency-converted IF signals

3 SSD lamp
Lights when the MS2840A internal solid state drive is being accessed.

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

5 Recall key
Press to recall a parameter file.

6 Save key
Press to save a parameter file.

7 Cal key
Press to display the calibration execution menu.

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

9 Remote lamp
Lights up when the MS2840A is in a remote control state.

10 Preset key
Resets parameters to their initial settings.

11 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.

12 Application key
Press to switch between applications.

13 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.

14 Main function keys 2
Used to set or execute main functions of the MS2840A. Executable functions vary depending on the application currently selected.

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

16 Main function keys 1
Used to set or execute main functions of the MS2840A. Executable functions vary depending on the application currently selected.

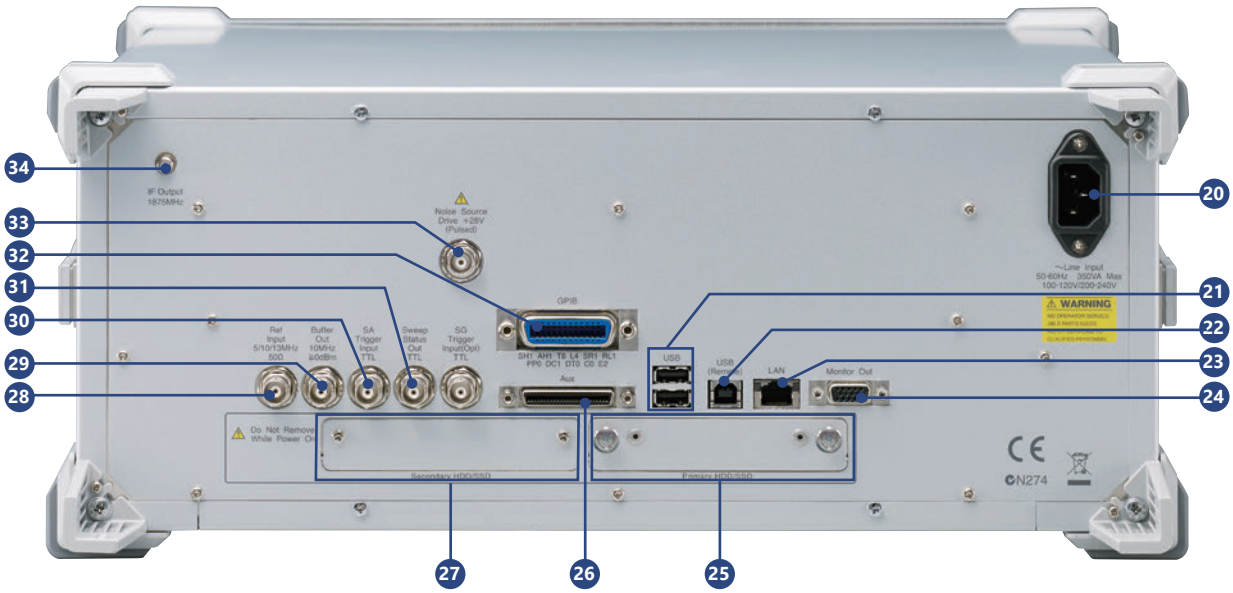
17 RF Input connector
Used for inputting RF signal.
N-J, 50Ω (MS2840A-044)
K-J, 50Ω (MS2840A-046)

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

19 USB connector (type A)
Used to connect a USB keyboard or mouse or the USB memory supplied with the MS2840A.

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Key Layout

Rear Panel



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 MS2840A.

22 USB connector (type B)
Used when controlling the MS2840A externally via USB.

23 LAN (Ethernet) connector
Used for connecting to personal computer to implement external control over LAN or for Ethernet connection.

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

25 Primary SSD slot
Slot for SSD for booting Windows OS and for saving data. Also supports Removable SSD, Win10 MS2840A-014/114 option.

26 AUX connector (For MS2840A-026)
Composite connector for BER measurement function options with BER measurement Clock, Data, and Enable inputs. Converted to BNC using AUX Conversion Adapter*.
*: The Aux Conversion Adapter J1556A is a standard accessory supplied with the BER Measurement Function MS2840A-026.

27 Secondary SSD slot
Slot for SSD for saving data. Also supports 2ndary SSD MS2840A-011/111 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 MS2840A, or for synchronizing the frequency of the MS2840A to that of other device.

29 Buffer Out connector
(reference frequency signal output connector)
Outputs the reference frequency signal (10 MHz) generated inside the MS2840A. It is used for synchronizing the frequencies between other devices and the MS2840A 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 MS2840A externally via GPIB.

33 Noise Source Drive connector
Supply (+28 V) of the Noise Source Drive.
This is available when the MS2840A-017/117 is installed.

34 IF Output connector
Monitor output of internal IF signal
Connector: SMA-J, 50Ω
IF Output Frequency: 1.8755 GHz

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Configurations

Configuration List

Model	Name	Remarks
MS2840A	Signal Analyzer	Analysis Bandwidth 31.25 MHz installed as standard
MS2840A-044	26.5 GHz Signal Analyzer	
MS2840A-046	44.5 GHz Signal Analyzer	
MS2840A-001	Rubidium Reference Oscillator	Option
MS2840A-077	Analysis Bandwidth Extension to 62.5 MHz	Option
MS2840A-078	Analysis Bandwidth Extension to 125 MHz	Option, requires MS2840A-077
MS2840A-008	Preamplifier	Option, Frequency Range: 100 kHz to 6 GHz
MS2840A-069	26.5 GHz Microwave Preamplifier	Option, For MS2840A-044, Frequency Range: 100 kHz to 26.5 GHz
MS2840A-068	Microwave Preamplifier	Option, For MS2840A-046, Frequency Range: 100 kHz to 44.5 GHz
MS2840A-010	Phase Noise Measurement Function	Option
MS2840A-011	2ndary SSD	Option
MS2840A-014	Removable SSD, Win10	Option
MS2840A-016	Precompliance EMI Function	Option
MS2840A-017	Noise Figure Measurement Function	Option
MS2840A-019	2 dB Step Attenuator for Millimeter-wave	Option, For MS2840A-046
MS2840A-026	BER Measurement Function	Option, AUX Conversion Adapter J1556A as standard accessory
MS2840A-051	Noise Floor Reduction	Option
MS2840A-067	Microwave Preselector Bypass	Option, Add this option when the signal analyzer measurement function is set to a frequency band of >31.25 MHz and a frequency of >6 GHz.

The following options are installed as standard and do not require separate orders when ordering the MS2840A-044.

Standard Software	MX269000A
Analysis Bandwidth 10 MHz	MS2840A-006
Bandwidth Extension to 31.25 MHz	MS2840A-005

The following options are installed as standard and do not require separate orders when ordering the MS2840A-046.

Standard Software	MX269000A
Analysis Bandwidth 10 MHz	MS2840A-006
Bandwidth Extension to 31.25 MHz for Millimeter Wave	MS2840A-009

List of Retrofit Options

The following hardware options can be retrofitted. Add to the retrofit options at ordering and also order the Z1932A Retrofit Kit.
The M2840A main unit must be returned to Anritsu for retrofitting hardware options.

Model	Name	Remarks
MS2840A-101	Rubidium Reference Oscillator Retrofit	
MS2840A-177	Analysis Bandwidth Extension to 62.5 MHz Retrofit	
MS2840A-178	Analysis Bandwidth Extension to 125 MHz Retrofit	Requires MS2840A-077 or -177
MS2840A-108	Preamplifier Retrofit	Frequency Range: 100 kHz to 6 GHz
MS2840A-169	26.5 GHz Microwave Preamplifier Retrofit	For MS2840A-044, Frequency Range: 100 kHz to 26.5 GHz
MS2840A-168	Microwave Preamplifier Retrofit	For MS2840A-046, Frequency Range: 100 kHz to 44.5 GHz
MS2840A-110	Phase Noise Measurement Function Retrofit	
MS2840A-111	2ndary SSD Retrofit	
MS2840A-114 MS2840A-214	Removable SSD, Win10 Retrofit	When retrofitting the MS2840A-114/214, the MS2840A main unit without the removed SSD can be returned to Anritsu. The CPU/Windows10 Upgrade Retrofit MS2840A-182/282 option is required when the MS2840A OS is not Windows 10.
MS2840A-116	Precompliance EMI Function Retrofit	
MS2840A-117	Noise Figure Measurement Function Retrofit	
MS2840A-119	2 dB Step Attenuator for Millimeter-wave Retrofit	Option, For MS2840A-046
MS2840A-126	BER Measurement Function Retrofit	AUX Conversion Adapter J1556A as standard accessory
MS2840A-151	Noise Floor Reduction Retrofit	Option
MS2840A-167	Microwave Preselector Bypass Retrofit	Add this option when the signal analyzer measurement function is set to a frequency band of >31.25 MHz and a frequency of >6 GHz.
MS2840A-182 MS2840A-282	CPU/Windows10 Upgrade Retrofit	

Option 2xx is the option for customers to upgrade at their nearest local service center outside Japan.

Software

The following software can be retrofitted. Add to the required software at ordering and also order the Z1932A Retrofit Kit.

Model	Name	Remarks
MX269017A	Vector Modulation Analysis Software	
MX269017A-001	APSK Analysis	Requires Vector Modulation Analysis Software MX269017A
MX269017A-011	Higher-Order QAM Analysis	Requires Vector Modulation Analysis Software MX269017A
MX269018A	Analog Measurement Software	Requires USB Audio A0086D
MX284059B	Pulse Radar Measurement Function	Unavailable to install simultaneously with MS2840A-069, MS2840A-068, MS2840A-067 (To keep a margin for spurious measurement) Requires MS2840A-019 when mounted on MS2840A-046
MX284090A	External Mixer Connection Function	Requires external mixer

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Configurations

Hardware Configuration

Frequency range (MS2840A-040/041/044/046) not upgradable.

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

Opt.	Name	Retrofit	Addition to Main unit				Combination with "Opt." (Refer to the left line)																														
			040 (3.6 GHz)	041 (6 GHz)	044 (26.5 GHz)	046 (44.5 GHz)	001	002	005 (standard install)	006 (standard install)	009 (standard install)	077	078	008	069	068	019	010	011	014	016	017	026	051	066	067	020	021	189	022	027	028	088	029	182
001	Rubidium Reference Oscillator	Yes	✓	✓	✓	✓		*5																											
002	High Stability Reference Oscillator	Yes	✓	✓	Equivalent function installed		*5				No				No	No	No								No										
005	Analysis Bandwidth Extension to 31.25 MHz	–	Standard install	Standard install	Standard install	No					No					No																		
006	Analysis Bandwidth 10 MHz	–	Standard install	Standard install	Standard install	Standard install																													
009	Bandwidth Extension to 31.25 MHz for Millimeter-wave	–	No	No	No	Standard install		No	No																No		No	No	No	No	No	No	No	No	No
077	Analysis Bandwidth Extension to 62.5 MHz*1	Yes	✓	✓	✓	✓																													
078	Analysis Bandwidth Extension to 125 MHz*1	Yes	✓	✓	✓	✓						R																							
008	Preamplifier	Yes	✓	✓	✓	✓									*6	*6																			
069	26.5 GHz Microwave Preamplifier	Yes	No	No	✓	No		No			No			*6		No									No		No	No	No	No	No	No	No	No	No
068	Microwave Preamplifier	Yes	No	No	No	✓		No		No				*6	No										No		No	No	No	No	No	No	No	No	No
019	2 dB Step Attenuator for Millimeter-wave	Yes	No	No	No	✓		No		No					No										No		No	No	No	No	No	No	No	No	No
010	Preamplifier	Yes	✓	✓	✓	✓																													
011	2ndary SSD	Yes	✓	✓	✓	✓																													
014	Removable SSD, Win10	Yes*7	✓	✓	✓	✓																													
016	Precompliance EMI Function	Yes	✓	✓	✓	✓																													
017	Noise Figure Measurement Function	Yes	✓	✓	✓	✓								U	U	U																			
026	BER Measurement Function	Yes	✓	✓	✓	✓																													
051	Noise Floor Reduction	Yes	✓	✓	✓	✓																													
066	Low Phase Noise Performance	Yes	✓	✓	No	No					No				No	No										No									
067	Microwave Preselector Bypass	Yes	No	No	✓	✓		No																	No		No	No	No	No	No	No	No	No	No
020	3.6 GHz Vector Signal Generator	Yes	✓	✓	No	No					No				No	No										No		No	No				No		
021	6 GHz Vector Signal Generator	Yes	✓	✓	No	No					No				No	No										No	No		No				No		
189	Vector Function Extension for Analog Signal Generator Retrofit	Yes	✓	✓	No	No					No				No	No										No	No	No		No			R	No	
022	Low Power Extension for Vector Signal Generator	Yes	✓	✓	No	No					No				No	No										No	R		No				No		
027	ARB Memory Upgrade 256 Msa for Vector Signal Generator*2	Yes	✓	✓	No	No					No				No	No										No		R							
028	AWGN*2	Yes	✓	✓	No	No					No				No	No										No		R							
088	3.6 GHz Analog Signal Generator*3	Yes	✓	✓	No	No					No				No	No										No	No	No		No				No	
029	Analog Function Extension for Vector Signal Generator*3	Yes	✓	✓	No	No					No				No	No										No	R		No	R			No		
182	CPU/Windows10 Upgrade Retrofit*4	Yes	✓	✓	✓	✓																													

*1: 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 MS2840A analysis bandwidth (125 MHz max.).
The Signal Analyzer MS2850A is recommended for other measurement purposes.

*2: The ARB Memory Upgrade 256 Msa for Vector Signal Generator (MS2840A-027) and AWGN (MS2840A-028) are non-functional in the Analog Signal Generator (MS2840A-029/088).

*3: Requires Analog Measurement Software (MX269018A).

*4: Replace the MS2840A CPU board with Windows Embedded Standard 7 (Windows 7) and upgrade the operating system to Windows 10 IoT Enterprise LTSC2019.
Windows 7 is installed in MS2840A units ordered until August 2020.
Windows 10 is installed in MS2840A units ordered from September 2020 and has a label indicating C2 attached near the serial number.

*5: The Rubidium Reference Oscillator can be retrofitted to the MS2840A-040/041 with installed High Stability Reference Oscillator.
In this case, the Rubidium Reference Oscillator is functional.

*6: The 26.5 GHz Microwave Preamplifier or Microwave Preamplifier can be retrofitted to the MS2840A-044/046 with installed Preamplifier.
In this case, the 26.5 GHz Microwave Preamplifier or Microwave Preamplifier are functional.

*7: The CPU/Windows10 Upgrade Retrofit MS2840A-182/282 option is required when the MS2840A OS is not Windows 10.

Software Configuration

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

Model	Name	Addition to Main unit				Analysis Bandwidth	
		040 (3.6 GHz)	041 (6 GHz)	044 (26.5 GHz)	046 (44.5 GHz)	077 (62.5 MHz)	078 (125 MHz)
MX269017A	Vector Modulation Analysis Software	✓	✓	✓	✓	✓	✓
MX269017A-001	APSK Analysis	✓	✓	✓	✓	✓	✓
MX269017A-011	Higher-Order QAM Analysis	✓	✓	✓	✓	✓	✓
MX269018A	Analog Measurement Software*	✓	✓	✓	✓		
MX284059B	Pulse Radar Measurement Function	No	No	✓	✓		
MX284090A	External Mixer Connection Function	No	No	✓	✓	✓	✓

*: Requires USB Audio A0086D

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Specifications

Refer to the MS2840A Data Sheet for more details.

Frequency Range

9 kHz to 26 .5 GHz (MS2840A-044)
9 kHz to 44 .5 GHz (MS2840A-046)

Extends Frequency Range By Using External Mixer

Standard connector for connecting external mixer
Connector: SMA-J, 50Ω
Local signal output: 5 GHz to 10 GHz
IF signal frequency: 1.8755 GHz

Aging Rate

$\pm 1 \times 10^{-7}$/year (standard)
$\pm 1 \times 10^{-10}$/month, $\pm 1 \times 10^{-9}$/year
(with Rubidium Reference Oscillator MS2840A-001 installed)

Maximum Input Level

Average total power: +30 dBm
(Input attenuator: ≥10 dB, Preamp: Off)

Resolution Bandwidth (RBW)

Spectrum Analyzer Function
Setting Range:
1 Hz to 3 MHz (1–3 sequence), 500 Hz, 50 kHz, 2 MHz, 5 MHz, 10 MHz, 20 MHz
[At Zero SPAN: 30 Hz to 3 MHz (1–3 sequence), 50 kHz, 5 MHz, 10 MHz, 20 MHz, 31.25 MHz]

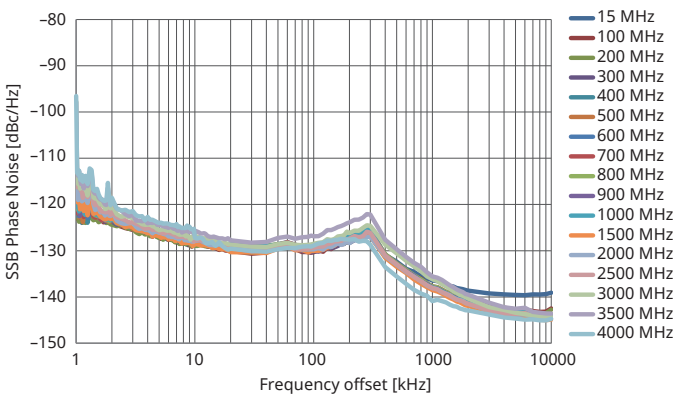
Video Bandwidth (VBW)

Spectrum Analyzer Function
Setting Range:
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

SSB Phase Noise

Spectrum Analyzer Function

Input Frequency	Carrier Offset	SSB Phase Noise
1 GHz	10 Hz	–80 dBc/Hz (nom.)
	100 Hz	–92 dBc/Hz (nom.)
	1 kHz	–117 dBc/Hz (nom.)
	10 kHz	–123 dBc/Hz
	100 kHz	–123 dBc/Hz
	1 MHz	–135 dBc/Hz
	10 MHz	–148 dBc/Hz (nom.)



Phase Noise Performance (meas.)

Displayed Average Noise Level (DANL)

Spectrum Analyzer Function

Preamp: None, Microwave Preselector Bypass: None

Frequency	DANL		
	26 .5 GHz Model (MS2840A-044)	44 .5 GHz Model (MS2840A-046)	
		Without MS2840A-019	With MS2840A-019
30 MHz	–153 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
400 MHz	–153 dBm/Hz	–153 dBm/Hz	–153 dBm/Hz
1 GHz	–150 dBm/Hz	–150 dBm/Hz	–150 dBm/Hz
3 GHz	–147 dBm/Hz	–147 dBm/Hz	–147 dBm/Hz
13 GHz	–151 dBm/Hz	–151 dBm/Hz	–150 dBm/Hz
20 GHz	–146 dBm/Hz	–146 dBm/Hz	–146 dBm/Hz
30 GHz	—	–146 dBm/Hz	–146 dBm/Hz
40 GHz	—	–144 dBm/Hz	–142 dBm/Hz
44 GHz	—	–140 dBm/Hz	–137 dBm/Hz

Preamp: On, Microwave Preselector Bypass: None

Frequency	DANL		
	26 .5 GHz Model (MS2840A-044)	44 .5 GHz Model (MS2840A-046)	
		Without MS2840A-019	With MS2840A-019
30 MHz	–166 dBm/Hz	–166 dBm/Hz	–166 dBm/Hz
400 MHz	–166 dBm/Hz	–166 dBm/Hz	–166 dBm/Hz
1 GHz	–164 dBm/Hz	–164 dBm/Hz	–164 dBm/Hz
3 GHz	–163 dBm/Hz	–163 dBm/Hz	–163 dBm/Hz
13 GHz	–163 dBm/Hz	–163 dBm/Hz	–163 dBm/Hz
20 GHz	–157 dBm/Hz	–160 dBm/Hz	–160 dBm/Hz
30 GHz	—	–160 dBm/Hz	–159 dBm/Hz
40 GHz	—	–157 dBm/Hz	–156 dBm/Hz
44 GHz	—	–149 dBm/Hz	–149 dBm/Hz

Noise Floor Reduction: On

It subtracts the internal noise components (11 dB max. nominal) of the measuring instrument itself from the displayed measurement result.

Total Absolute Amplitude Accuracy

Preamp: None
±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)
±3.5 dB (40 GHz ≤ f < 44.5 GHz, nom.)

The MS2840A supports level calibration over a wide range of 300 kHz to 4 GHz using its built-in level calibration oscillator.
The level accuracy standards include frequency characteristics, linearity and attenuator switching error. Consequently, the level including the above three errors can still be measured accurately even when the measurement frequency and built-in attenuator settings are changed.

2-tone 3rd-order Intermodulation Distortion

Preamp: None

Frequency	2-tone 3rd-order Intermodulation Distortion
1 GHz	≤–62 dBc (TOI = +16 dBm)
20 GHz	≤–56 dBc (TOI = +13 dBm)
40 GHz	≤–56 dBc (TOI = +13 dBm) (nom.)

Second Harmonic Distortion
Preamp: None, Microwave Preselector Bypass: None,
Frequency Band Mode: Spurious

Input Frequency	Harmonic Distortion	SHI	Mixer Input Level
400 MHz, 1 GHz	≤–65 dBc	≥+35 dBm	–30 dBm
3 GHz	≤–80 dBc	≥+70 dBm	–10 dBm
13 GHz	≤–90 dBc	≥+80 dBm	–10 dBm
20 GHz	≤–90 dBc (nom.)	≥+80 dBm (nom.)	–10 dBm

Analysis Bandwidth (Signal Analyzer Function)
31.25 MHz (Standard)
62.5 GHz (Option)
125 MHz (Option)

Connector
RF Input (Front panel)
N–J, 50Ω (nom.): 26.5 GHz model (MS2840A-044)
K–J, 50Ω (nom.): 44.5 GHz model (MS2840A-046)
IF Output (Rear panel)
SMA-J, 50Ω (nom.)
Frequency: 1.8755 GHz
Gain: –10 dB (nom., Input attenuator: 0 dB, Input frequency: 10 GHz)
1st Local Output (Front panel)
For external waveguide mixer
SMA-J, 50Ω (nom.)
Frequency: 5 GHz to 10 GHz (Local signal output)
1.8755 GHz (IF frequency)
Local output level: ≥ +10 dBm (typ.)
Bias current: Setting range 0.0 to 20.0 mA
Resolution 0.1 mA

Dimensions and Mass
426 (W) × 177 (H) × 390 (D) mm (excluding projections)
≤15.3 kg (with MS2840A-044 or 046 installed, excluding other options)

Power Supply
Power voltage: 100 V(ac) to 120 V(ac)/200 V(ac) to 240 V(ac)
Frequency: 50 Hz to 60 Hz
Power consumption: ≤350 VA (including all options)
220 VA (nom., with MS2840A-044 or 046 installed, excluding other options)

CE Marking
EMC: 2014/30/EU, EN61326-1, EN61000-3-2
LVD: 2014/35/EU, EN61010-1
RoHS: 2011/65/EU, (EU) 2015/863, EN IEC 63000: 2018

UKCA Marking
EMC: S.I. 2016 No.1091, EN 61326-1, EN61000-3-2
LVD: S.I. 2016 No.1101, EN 61010-1
RoHS: S.I. 2012 No.3032, EN IEC 63000:2018

OS
Windows 10 (64 bits)

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

Ordering Information

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models)

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 Unit
MS2840A	Signal Analyzer
	Standard Accessories
	Power Cord: 1 pc
P0031A	USB Memory (≥ 1GB): 1 pc
Z0541A	USB Mouse: 1 pc
	Install DVD-ROM (Application software, instruction manual DVD-ROM): 1 pc
	Options
MS2840A-044	26.5 GHz Signal Analyzer (General coaxial cables with N-connectors support frequencies up to 18 GHz. When measuring frequencies from 18 to 26.5 GHz, use the N-SMA Adapter J1398A to connect a coaxial cable with either a 3.5-mm connector or K-connector.)
MS2840A-046	44.5 GHz Signal Analyzer
MS2840A-001	Rubidium Reference Oscillator
MS2840A-077	Analysis Bandwidth Extension to 62.5 MHz
MS2840A-078	Analysis Bandwidth Extension to 125 MHz (Requires MS2840A-077)
MS2840A-008	Preamplifier
MS2840A-069	26.5 GHz Microwave Preamplifier (for MS2840A-044)
MS2840A-068	Microwave Preamplifier (for MS2840A-046)
MS2840A-010	Phase Noise Measurement Function
MS2840A-011	2ndary SSD
MS2840A-014	Removable SSD, Win10
MS2840A-016	Precompliance EMI Function
MS2840A-017	Noise Figure Measurement Function
MS2840A-019	2 dB Step Attenuator for Millimeter-wave (for MS2840A-046)
MS2840A-051	Noise Floor Reduction
MS2840A-026	BER Measurement Function (AUX Conversion Adapter J1556A as standard accessory)
MS2840A-067	Microwave Preselector Bypass
	Retrofit Options
MS2840A-101	Rubidium Reference Oscillator Retrofit
MS2840A-177	Analysis Bandwidth Extension to 62.5 MHz Retrofit
MS2840A-178	Analysis Bandwidth Extension to 125 MHz Retrofit (Requires MS2840A-077 or 177)
MS2840A-108	Preamplifier Retrofit
MS2840A-169	26.5 GHz Microwave Preamplifier Retrofit (for MS2840A-044)
MS2840A-168	Microwave Preamplifier Retrofit (for MS2840A-046)
MS2840A-110	Phase Noise Measurement Function Retrofit
MS2840A-111	2ndary SSD Retrofit
MS2840A-114*1	Removable SSD, Win10 Retrofit
MS2840A-214*1	Removable SSD, Win10 Retrofit
MS2840A-116	Precompliance EMI Function Retrofit
MS2840A-117	Noise Figure Measurement Function Retrofit
MS2840A-119	2 dB Step Attenuator for Millimeter-wave Retrofit (for MS2840A-046)
MS2840A-151	Noise Floor Reduction Retrofit
MS2840A-126	BER Measurement Function Retrofit (AUX Conversion Adapter J1556A as standard accessory)
MS2840A-167	Microwave Preselector Bypass Retrofit
MS2840A-182	CPU/Windows10 Upgrade Retrofit
MS2840A-282	CPU/Windows10 Upgrade Retrofit
	Software Options
	DVD-ROM with License and Operation manuals
MX269017A	Vector Modulation Analysis Software
MX269017A-001	APSK Analysis
MX269017A-011	Higher-Order QAM Analysis
MX269018A	Analog Measurement Software (Requires USB Audio A0086D)
MX284059B	Pulse Radar Measurement Function (for MS2840A-044/046)
MX284090A	External Mixer Connection Function (image-response-free bandwidth: 7.5 GHz)

Model/Order No.	Name
	Warranty Service
MS2840A-ES210	2 years Extended Warranty Service
MS2840A-ES310	3 years Extended Warranty Service
MS2840A-ES510	5 years Extended Warranty Service
	Manuals
	Following operation manuals provided as hard copy
W3812AE	MS2840A Operation Manual (Main Unit Operation)
W2851AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Main Unit Remote Control)
W3335AE	MS2830A/MS2840A/MS2850A Operation Manual (Signal Analyzer Function Operation)
W2853AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Signal Analyzer Function Remote Control)
W3336AE	MS2830A/MS2840A/MS2850A Operation Manual (Spectrum Analyzer Function Operation)
W2855AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Spectrum Analyzer Function Remote Control)
W3117AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Phase Noise Measurement Function Operation)
W3118AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Phase Noise Measurement Function Remote Control)
W3655AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Noise Figure Measurement Function Operation)
W3656AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Noise Figure Measurement Function Remote control)
W3305AE	MX269017A Operation Manual (Operation)
W3306AE	MX269017A Operation Manual (Remote Control)
W3555AE	MX269018A Operation Manual (Operation)
W3556AE	MX269018A Operation Manual (Remote Control)
W4101AE	MX284059B Operation Manual

The following options are installed as standard and do not require separate orders when ordering the MS2840A-044.

Standard Software	MX269000A
Analysis Bandwidth 10 MHz	MS2840A-006
Bandwidth Extension to 31.25 MHz	MS2840A-005

The following options are installed as standard and do not require separate orders when ordering the MS2840A-046.

Standard Software	MX269000A
Analysis Bandwidth 10 MHz	MS2840A-006
Bandwidth Extension to 31.25 MHz for Millimeter Wave	MS2840A-009

Option 2xx is the option for customers to upgrade at their nearest local service center outside Japan.

Requires Installation Kit Z1932A when retrofitting options or installing software.

The instruction manuals are published on our website except some.

*1: The CPU/Windows10 Upgrade Retrofit MS2840A-182/282 option is required when the MS2840A OS is not Windows 10.

Ordering Information

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models)

Model/Order No.	Name
	Application Parts
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.))
J1398A	N-SMA Adaptor (DC to 26.5 GHz, 50Ω, N-P · SMA-J)
J0004	Coaxial Adapter (DC to 12.4 GHz, 50Ω, N-P · SMA-J)
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)
J0912	Coaxial Cable, 0.5 m for 40 GHz (DC to 40 GHz, approx. 0.5 m, SF102A, 11K254/K254/0.5M)
J0805	DC Block, N type (MODEL 7003) (10 kHz to 18 GHz, N-P · N-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)
K240B	Power Divider (K connector, DC to 26.5 GHz, 50Ω, K-J, 1 W max.)
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	AUX Conversion Adapter (AUX → BNC, for vector signal generator option and BER measurement function option, standard accessory with BER Measurement Function MS2840A-026)
A0086D	USB Audio (for MX269018A)
B0635A	Rack Mount Kit (EIA)
B0657A	Rack Mount Kit (JIS)
B0636C*2	Carrying Case (Hard type, with casters)
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)
MA24406A*3	USB Peak Power Sensor (50 MHz to 6 GHz, with USB A (m) to USB B cable, for MX284059B)
MA24418A*3	USB Peak Power Sensor (50 MHz to 18 GHz, with USB A (m) to USB B (m) cable, for MX284059B)
MA24440A*3	USB Peak Power Sensor (50 MHz to 40 GHz, with USB A (m) to USB B (m) cable, for MX284059B)
Z0975A	Keyboard (USB)
Z1932A	Installation Kit

*2: The Carrying Case B0636C includes the Front Panel Protective Cover (B0671A).
*3: The USB Peak Power Sensor MA244xxA cannot use the MS2840A Power Meter function.

Recommended External Mixer

Model/Order No.	Name
	Eravant External Mixer
STC-N12-15-S1-IDP*4	V-Band Full Waveguide Band Down-Converter
	VDI External Mixer
WR12SAX-Z-M*4	Spectrum Analyzer Extender (SAX)

*4: To order, enquire directly to Eravant or VDI distributors.

Ordering Information

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models)

Ruggedized K-to-Type N Adapter
34AKNF50

This adapter converts the MS2840A-046 RF Input connector (K-J) to N-J. It is used by attachment to the MS2840A main unit.

Carrying Case B0636C
(Hard type, with casters)

Front Cover for 1MW4U B0671A

USB Power Sensor MA24118A

Signal Analyzer MS2840A series (26.5 GHz/44.5 GHz models) Related Products

Signal Analyzer MS2830A

9 kHz to 3.6 GHz/6 GHz/13.5 GHz/26.5 GHz/43 GHz

This middle-range multi-function signal analyzer/spectrum analyzer has excellent cost performance.

Features

- Various measurement software for modulation analysis of digital (LTE/LTE-Advanced, WLAN, etc.) and analog (FM, ΦM, AM) devices.
- Built-in vector signal generator and analog signal generator options for all-in-one evaluations of digital and analog transmitters using Noise Factor (NF) measurement function, BER measurement function, audio analyzer, etc.
- Built-in vector signal generator for reproducing on-site waveform measurement environment using capture and playback functions.

Signal Analyzer MS2850A

9 kHz to 32 GHz/44.5 GHz

The MS2850A is a spectrum analyzer/signal analyzer with 1 GHz (max.) analysis bandwidth and frequency range of 9 kHz to either 32 GHz or 44.5 GHz. The MS2850A contributes to reducing cost in R&D and manufacturing for micro/millimeter-wave and wideband communications systems, such as 5G and satellite communication. The MS2850A is available with built-in 5G Measurement Software and it has 1 GHz (max.) analysis bandwidth, excellent amplitude/phase flatness and high measurement dynamic range. Moreover, it realizes shortening of measurement time by analyzing modulation bandwidth 800 MHz signal (1 carrier 100 MHz × 8 carriers) simultaneously.

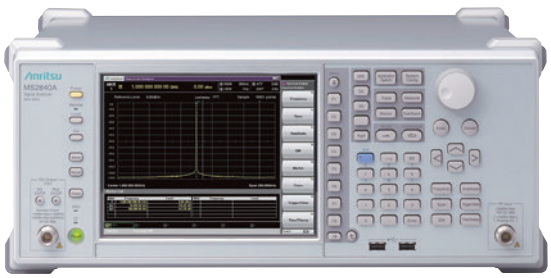
Features

- Analysis bandwidth:
  255 MHz (Standard), 510 MHz (Option), 1 GHz (Option)
- EVM performance: <1% (100 MHz bandwidth of 5G single carrier at Center Frequency: 28 GHz)
- Phase flatness performance: (±500 MHz at Center Frequency: 28 GHz)
  In-band Frequency Characteristics: ±1.2 dB (nom.)
  In-band Phase Linearity: 5 deg. p-p (nom.)
- Measurement applications (option):
  5G measurement, LTE/LTE-Advanced, Vector Modulation, etc.

Signal Analyzer MS2840A (3.6 GHz/6 GHz models)

9 kHz to 3 .6 GHz/6 GHz

The MS2840A (3.6 GHz/6 GHz models) is a mid-range spectrum analyzer/signal analyzer with excellent multi-functions and narrow-band performance.



Features

- Same excellent phase noise performance and display average noise level (DANL) as 26.5 GHz/44.5 GHz models
- Same phase noise performance as high-end instruments with installation of unique Low Phase Noise option
- Supports installation of vector signal generator and analog signal generator for all- in-one TRx tests of digital and analog wireless equipment using combined noise figure (NF) measurement and BER measurement functions
- Reproduces onsite radio-wave environment using vector signal generator Capture & Playback function

Anritsu Advancing beyond

Specifications are subject to change without notice.

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