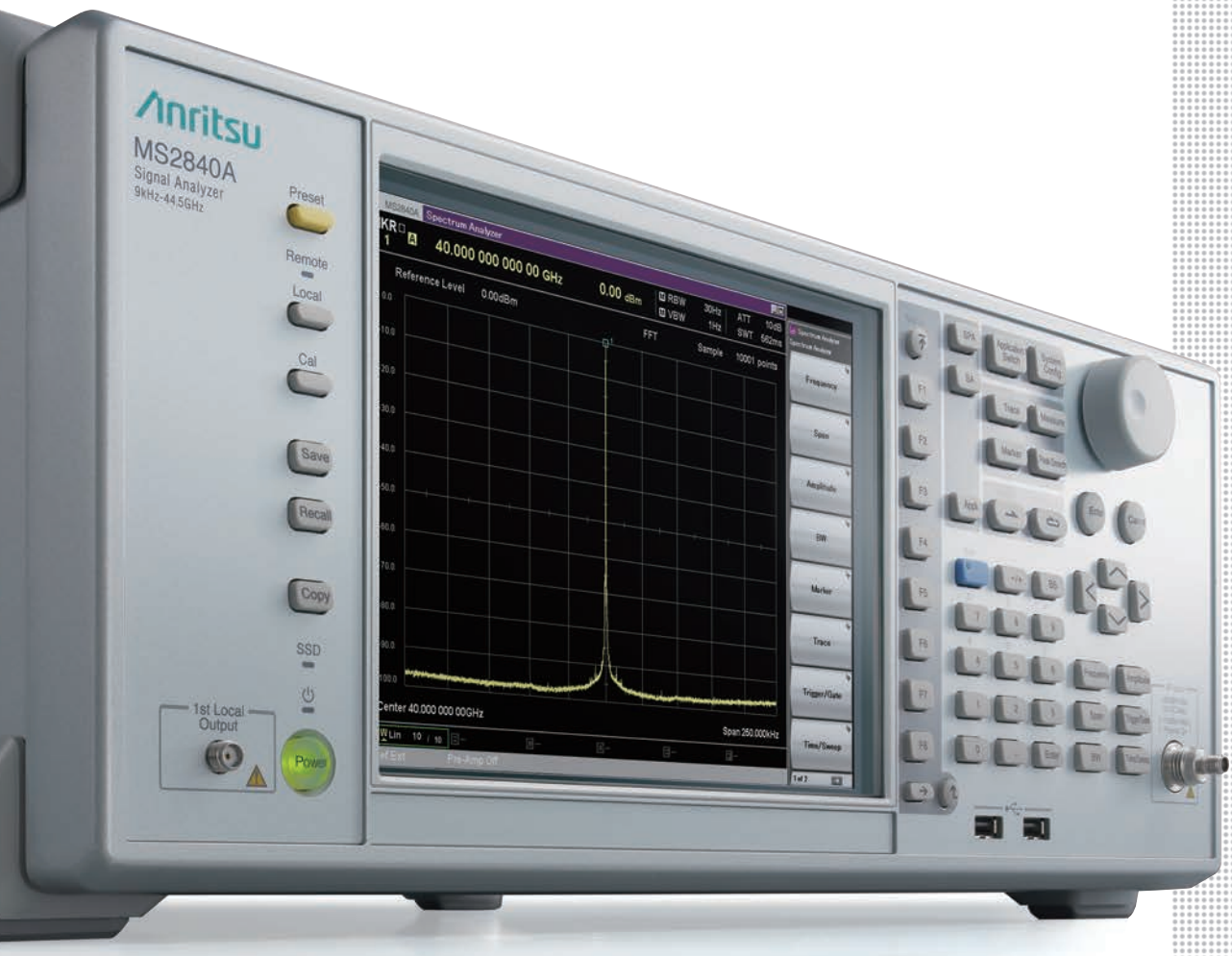
Anritsu envision:ensure

Signal Analyzer

MS2840A

MS2840A-046: 9 kHz to 44.5 GHz



-123 dBc/Hz

Close-in Phase Noise

Measurement Frequency 1 GHz
10 kHz offset

-100 dBc/Hz (meas.)

Millimeter Wave Band Close-in Phase Noise

Measurement Frequency 79 GHz
10 kHz offset

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 and Manufacturing of Wireless Equipment, Radar and Transmitter Device

The MS2840A close-in phase noise performance is –123 dBc/Hz (10 kHz offset) at a measurement frequency of 1 GHz. Additionally, this excellent fundamental performance is leveraged at millimeter-wave-band measurements (50 GHz to 90 GHz). With the High Performance Waveguide Mixer connected, an extremely high performance of –100 dBc/Hz (10 kHz offset, meas.*) is achieved at a measurement frequency of 79 GHz.

The MS2840A with high, close-in phase-noise-performance spectrum and signal analyzers is ideal for developing and manufacturing radio and radar equipment as well as transmitters, etc., at every measurement frequency.

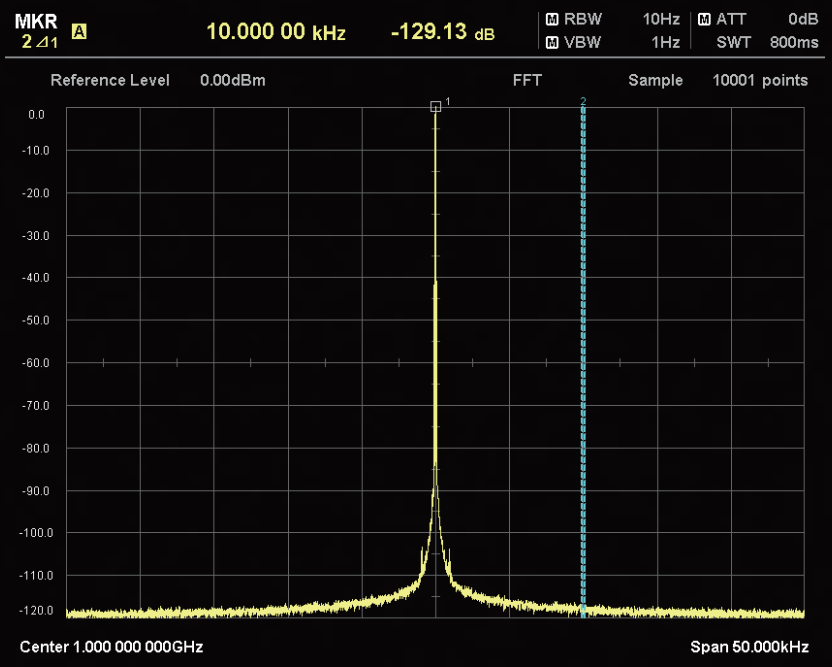
*: Value measured at design but not guaranteed specification.


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



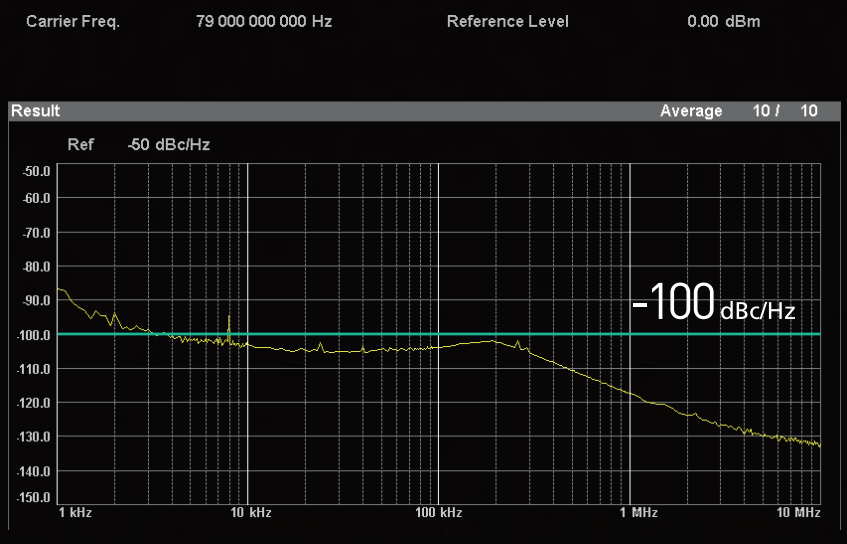
Measurement Examples*1

Measurement Frequency 1 GHz
10 kHz Offset

-123 dBc/Hz

The MS2840A has the excellent phase noise performance required for measuring narrowband wireless, wireless backhaul, etc.

Millimeter Wave Band Phase Noise Performance



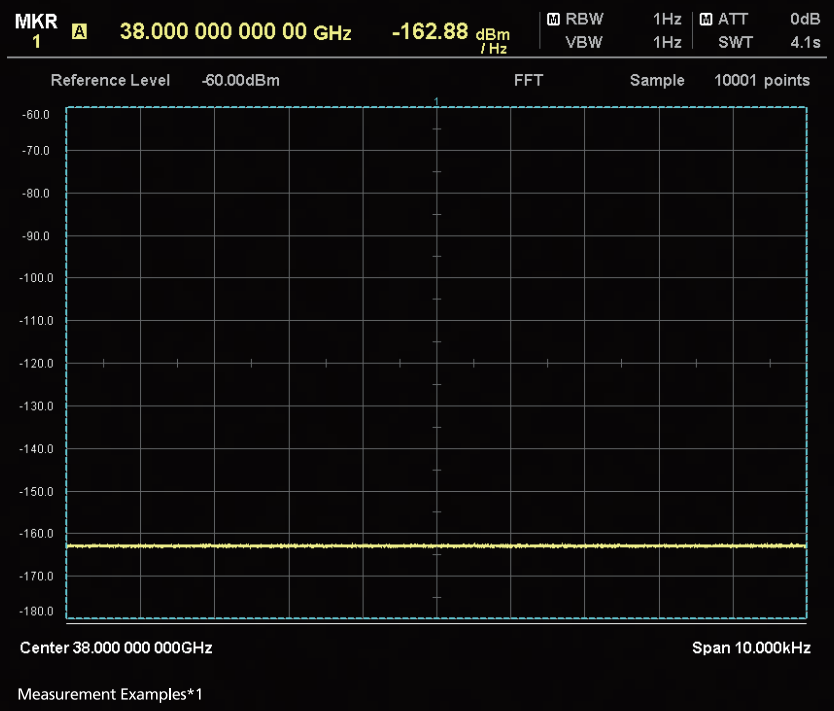
Measurement Examples*1

Measurement Frequency 79 GHz
10 kHz Offset

-100 dBc/Hz*1

High phase-noise performance is achieved even when the High Performance Waveguide Mixer (50 GHz to 90 GHz) is connected. For example, phase noise exceeding –100 dBc/Hz can be measured quickly at a measurement frequency of 79 GHz.

Display High Accuracy Measurement in Micro and Millimeter Wave Bands



Measurement Examples*1

Display Average Noise Level

Measurement Frequency 40GHz

-157 dBm/Hz*2

Measurement Frequency 75GHz

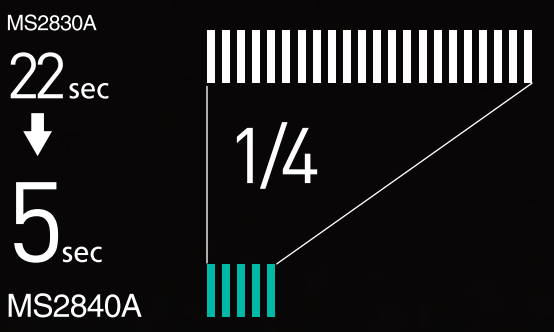
-150 dBm/Hz*1

The MS2840A has excellent display average noise level (DANL) performance. High-accuracy measurement is achieved using this excellent DANL even when the High Performance Waveguide Mixer (50 GHz to 90 GHz) is connected.

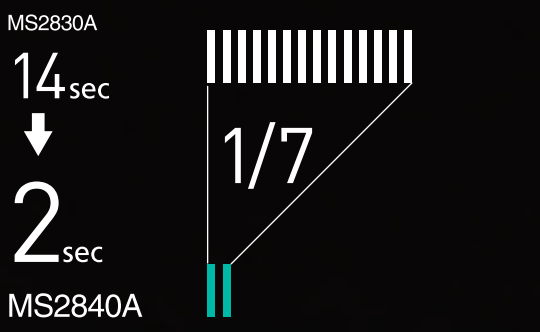
Faster Measurement Speed

The MS2840A has a much faster Intel Core i5-4400, 2.7 GHz than its predecessor MS2830A along with expanded main memory of 8 GB and uses an SSD for internal storage. As a result, the start-up time and measurement speed are greatly increased.

Spectrum Analyzer Functions (1000 averagings*3)



Signal Analyzer Functions (Spctrogram Display*4)



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

*2: Preamp: ON

*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

MS2840A

Better Than Expected Close-in Phase Noise Performance

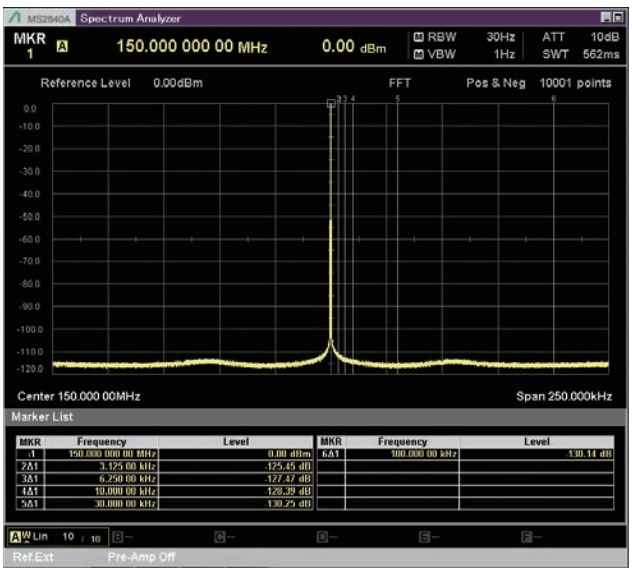
Since 2000 most spectrum analyzers have been designed for mobile communications and the phase noise performance has been optimized for offset frequencies of several MHz. Consequently, customers requiring good close-in phase noise performance have been limited to a narrow choice of usable spectrum analyzers, causing problems. This new MS2840A has been designed with emphasis on offering a spectrum analyzer with excellent close-in 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)

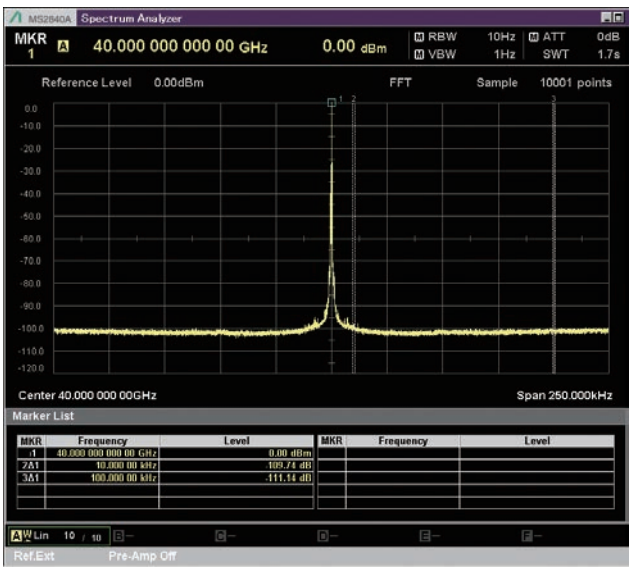
Carrier Offset	SSB Phase Noise
10 Hz	–80 dBc/Hz (nom.)
100 Hz	–92 dBc/Hz (nom.)
1 kHz	–117 dBc/Hz (nom.)
10 kHz	–123 dBc/Hz
100 kHz	–123 dBc/Hz
1 MHz	–135 dBc/Hz
10 MHz	–148 dBc/Hz (nom.)

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 Features

Better Than Expected Close-in Phase Noise Performance (High-Performance Waveguide Mixer)

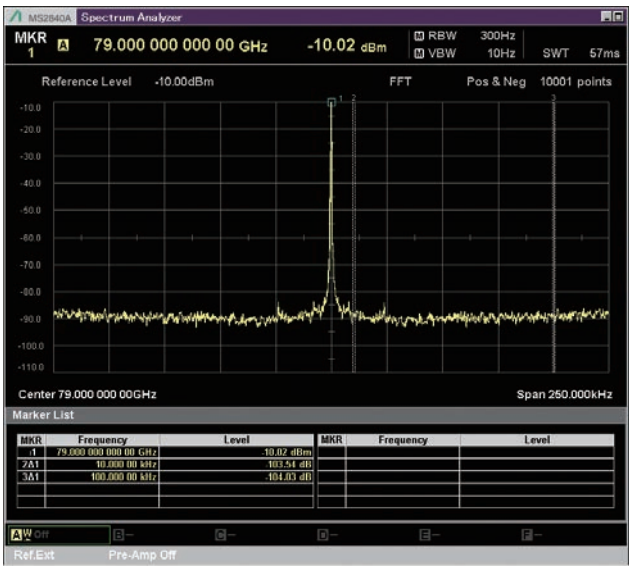
The MS2840A is supported by two types of mixer: the high-performance waveguide mixers (50 GHz to 90 GHz) for measurements in the millimeter wave band, and external harmonic mixers (26.5 GHz to 325 GHz). In particular, the high-performance waveguide mixers make maximum use of the excellent phase noise performance of the MS2840A to monitor the actual spectrum floor of millimeter-wave-band transmitters and oscillators, playing a key role in evaluating their phase noise performance.

MA2808A

High-Performance Waveguide Mixers

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

Measurement Examples



Spectrum Display
79 GHz Measurement Frequency
(Using High-Performance Waveguide Mixer MA2808A

Phase Noise Measurement
79 GHz Measurement Frequency
(Using High-Performance Waveguide Mixer MA2808A)

Signal Analyzer MS2840A Features

High-Sensitivity Measurements in Microwave and Millimeter Wave Bands

The MS2840A has excellent display average noise level (DANL) specifications. In particular, when the built-in preamplifier is on, it has a high sensitivity measurement performance of better than –160 dBm/Hz in the frequency range from 0.03 GHz to 34 GHz. Even when connected with either of the MA2806A and MS2808A high-performance waveguide mixers (50 GHz to 90 GHz), the MS2840A maintains a performance of –150 dBm/Hz (meas.*) at 75 GHz, supporting high-sensitivity measurements over a wide frequency range. 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.

Displayed Average Noise Level (DANL)

Spectrum Analyzer Function

Preamp: None

Frequency	DANL
30 MHz	–153 dBm/Hz
400 MHz	–153 dBm/Hz
1 GHz	–150 dBm/Hz
3 GHz	–147 dBm/Hz
13 GHz	–151 dBm/Hz
20 GHz	–146 dBm/Hz
30 GHz	–146 dBm/Hz
40 GHz	–144 dBm/Hz
44 GHz	–140 dBm/Hz

Preamp: On

Frequency	DANL
30 MHz	–166 dBm/Hz
400 MHz	–166 dBm/Hz
1 GHz	–164 dBm/Hz
3 GHz	–163 dBm/Hz
13 GHz	–163 dBm/Hz
20 GHz	–160 dBm/Hz
30 GHz	–160 dBm/Hz
40 GHz	–157 dBm/Hz
44 GHz	–149 dBm/Hz

Using High-Performance Waveguide Mixer MA2806A/MA2808A

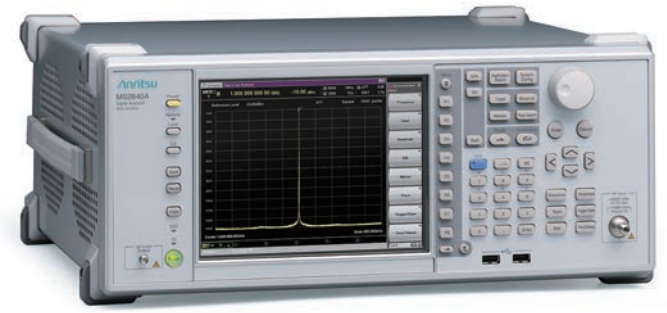
Frequency	DANL
75 GHz	–150 dBm/Hz (meas.*)

*: Value measured at design but not guaranteed specification.

Faster Measurement Speeds

With a built-in high-performance Intel Core i5-4400E, 2.7 GHz CPU and 8 GB of main memory supporting the 64-bit Windows 7 OS, 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.

Signal Analyzer MS2840A Functions



The Pure Signal Analyzer
MS2840A

Various convenient functions for measuring the Tx characteristics of wireless and transmitter devices are available as built-in standard functions and options listed below.

Standard Functions

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

Options

Phase Noise Measurement
Noise Figure Measurement
Modulation Analysis

Optional Parts

High Performance Waveguide Mixer (50 GHz to 90 GHz)
External Mixer (Harmonic Mixer, 26.5 GHz to 325 GHz)
USB Power Sensor

Typical Measurement Items for Evaluating Tx Characteristics

✓: 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	✓	✓		
Burst Average Power	✓			
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
Noise Figure Measurement				✓ Noise Figure Measurement Function MS2840A-017
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
Millimeter-wave Band Spectrum Measurement using Connected Mixer				✓ High Performance Waveguide Mixer MA2806A/MS2808A (50 GHz to 90 GHz) ✓ External Mixer (Harmonic Mixer) MA2740C/MA2750C series (26.5 GHz to 325 GHz)

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.

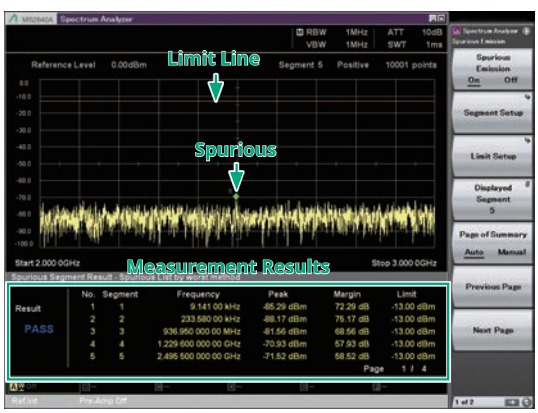
Compatible USB power sensors.

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

*: MA24104A has been discontinued.

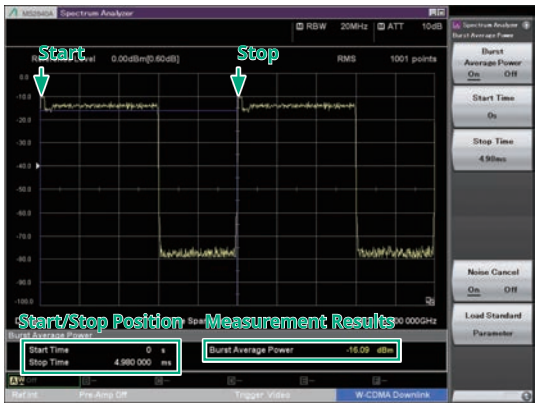
Spurious Emission

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.



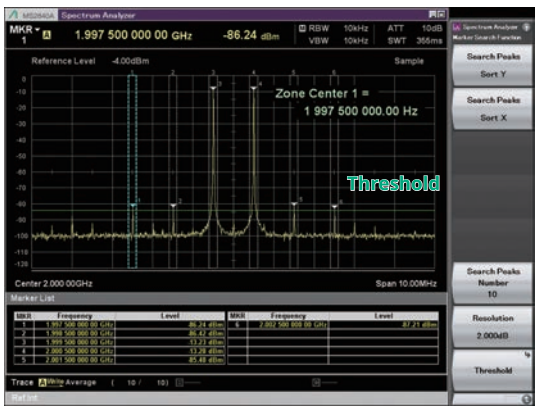
Burst Average Power

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



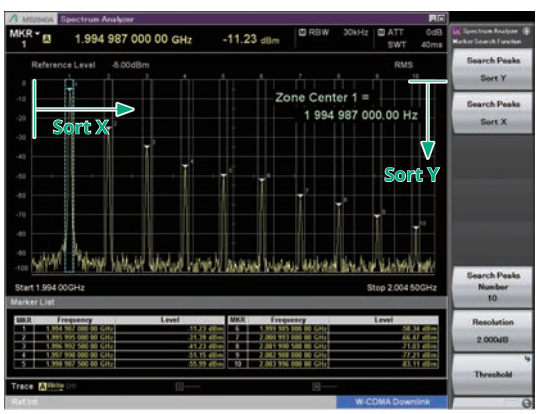
Multi-marker & Marker List

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.

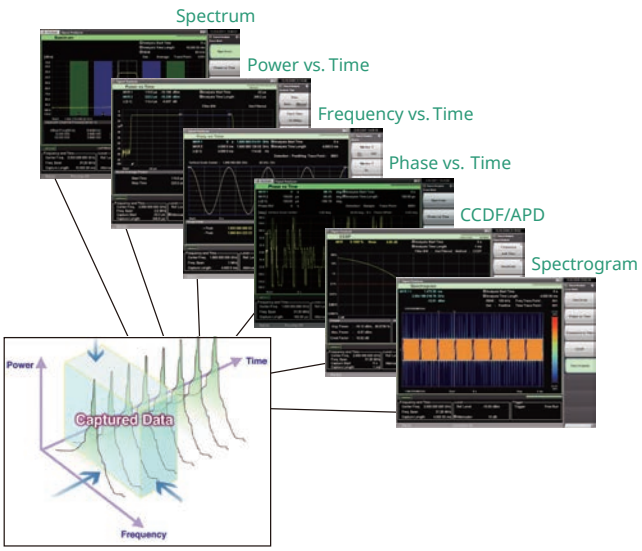


Signal Analyzer (Standard)

A function for evaluating burst-signal transient response characteristics plus a Fast Fourier Transform (FFT) function for the 31.25-MHz analysis bandwidth are built into the MS2840A-006/009 as standard to capture measured waveforms seamlessly and perform multi-domain analyses.
These functions are ideal for capturing degraded spectrum transients, and help troubleshoot faults that cannot be captured by a sweep spectrum analyzer (50 MHz max. sampling rate = 20 ns resolution, ADC resolution 16 bits)

Measurement Functions

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



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.

Max. Capture Time: 2 s to 2000 s
Max. Number of Samples: 100 Msamples

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

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 and also supports when connected to the High Performance Waveguide Mixer (MA2806A, MA2808A).

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

Noise Figure Measurement Function (MS2840A-017)

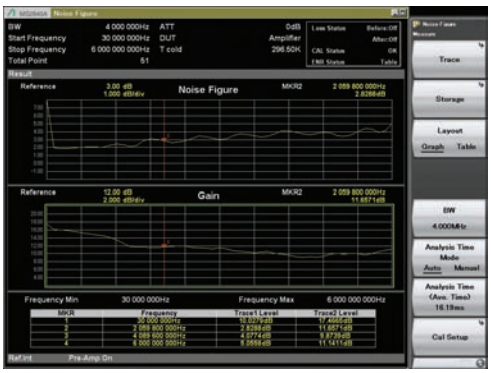
Noise Figure is measured with the measurement method of Y-factor method which uses a Noise Source.
The Noisecom NC346 series* of noise sources is supported.

*: Refer to the MS2840A Data Sheet for more details.

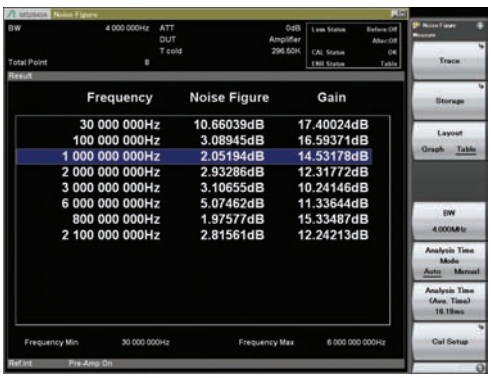
Frequency Range (Noise sauce): 0.01 GHz to 40.0 GHz
Frequency Mode: Fixed, List, Sweep
DUT Mode: Amplifier, Down Converter, Up Converter
Screen Layout: Graph, Table

Measurement Results Display
- Graph/List/Spot

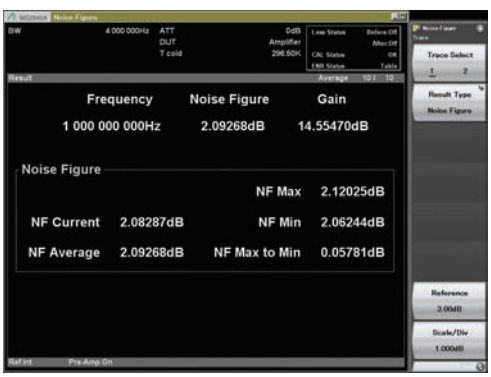
Displays measurement results for each trace (Trace1/Trace2).
- Noise Figure (NF) [dB]
- Noise Factor (F) [Linear]
- Gain
- Y-Factor: Power ratio when Noise Source is turned On/Off
- T effective: Effective noise temperature
- P Hot: Power measured when Noise Source is On.
- P Cold: Power measured when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

Measurement Software Option

Vector Modulation Analysis Software (MX269017A)

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

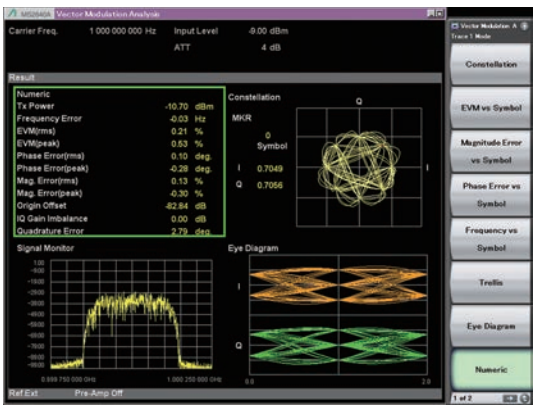
Supported Modulation Methods

BPSK, QPSK, O-QPSK, π/4DQPSK, 8PSK, 16QAM, 64QAM, 256QAM, 2FSK, 4FSK, 2ASK, 4ASK*1, H-CPM*2

*1: Supported for MS2840A soon
*2: Used for APCO-P25 Phase2 Inbound measurement

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.

Supported Modulations

AM, FM, ΦM

Frequency Range

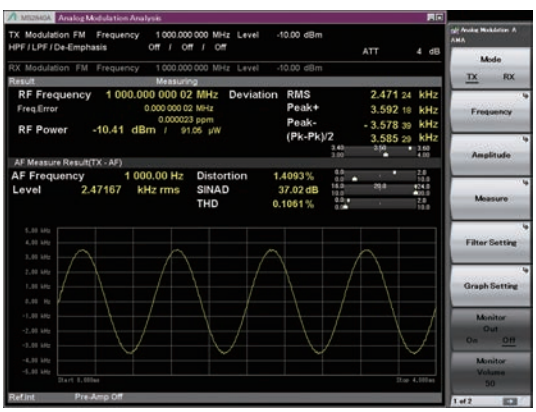
100 kHz to 2700 MHz
(At Wide Band FM measurement: 10 MHz to 2700 MHz)

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 catalog for details.

Built-in Preamplifier (Option)

This option increases the sensitivity by more than 20 dB to measure the noise, interference, etc., of low-level signals. The microwave-band preamp supports frequencies up to 44.5 GHz.

Microwave Preamplifier (MS2840A-068)

Frequency Range: 100 kHz to 44.5 GHz

Signal Analyzer MS2840A Functions

High Performance Waveguide Mixer/External Mixers (Harmonic Mixers)

Two types of mixer can be connected to the MS2840A for millimeter-wave-band measurements; spectrum measurements up to 325 GHz are supported using either a High-Performance Waveguide Mixer or an external harmonic mixer. In particular, the two High Performance Waveguide Mixer models are ideal for measuring wideband signals and the excellent phase noise performance of the MS2840A plays a key role in analyzing the true spectrum of millimeter-wave-band transmitters.

High Performance Waveguide Mixer MA2806A/MA2808A

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

MA2808A

Features

- Wide dynamic range based on excellent minimum sensitivity and P1dB performance
- High phase noise performance connected to MS2840A
- 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 MS2840A, 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.

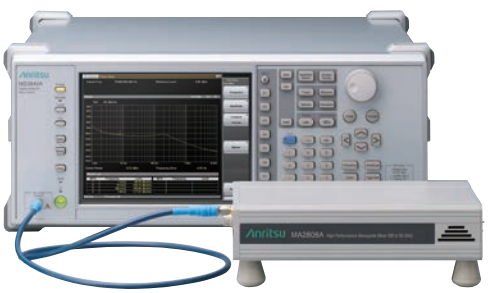
Moreover, by using the high IF frequency (1.875 GHz) of the MS2840A, spectrum mask measurements can be made over a wide measurement span with no impact from image-response effects. Spectrum mask measurements require measurement over a wider measurement span than the bandwidth of the signal to be measured. 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 supports image-response-free measurements over a measurement span of up to 7.5 GHz, irrespective of the measured signal bandwidth.

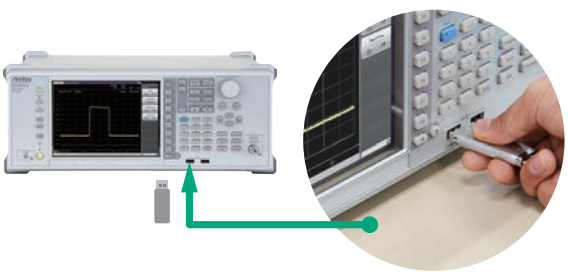
Additionally, connecting these mixers to the MS2840A supports measurements using its excellent high phase noise performance of –100 dBc/Hz in the 79-GHz band (10 kHz offset frequency, meas.*2) for evaluating the intrinsic phase noise performance of millimeter-waveband devices, such as automotive radar.

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
*2: Value measured at design but not guaranteed specification.

Phase Noise Measurement
79 GHz Measurement Frequency
(using High Performance Waveguide Mixer MA2808A)

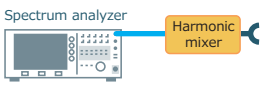
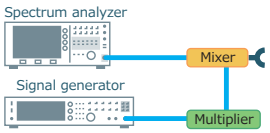

Simple Connection


Save mixer conversion loss data to USB memory

Signal Analyzer MS2840A Functions

High Performance Waveguide Mixer/External Mixers (Harmonic Mixers)

Measurement Method Performance Comparison

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

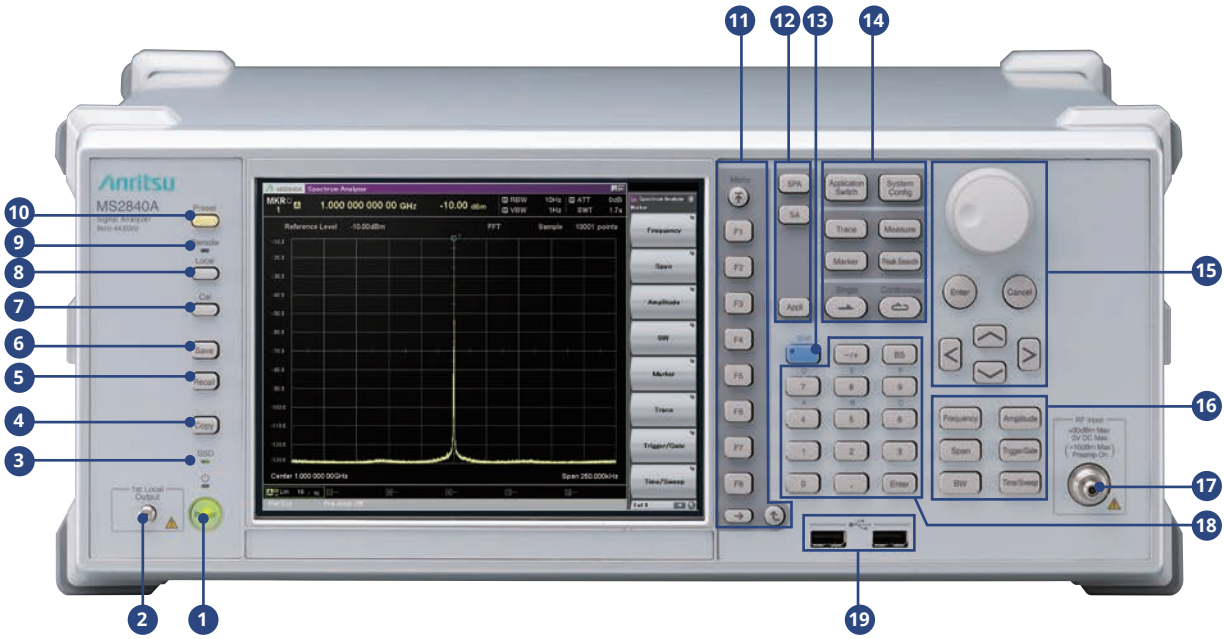
External Mixers (Harmonic Mixers)

The MA2740C/MA2750C series of external mixers (harmonic mixers) supports spectrum measurements up to 325 GHz with excellent cost performance.

Model	Name	Frequency Band	Frequency Range	Waveguide	Flange
MA2741C	External Mixer	A Band	26.5 GHz to 40 GHz	WR28	MIL-DTL-3922/54-003
MA2742C	External Mixer	Q Band	33 GHz to 50 GHz	WR22	MIL-DTL-3922/67D-006
MA2743C	External Mixer	U Band	40 GHz to 60 GHz	WR19	MIL-DTL-3922/67D-007
MA2744C	External Mixer	V Band	50 GHz to 75 GHz	WR15	MIL-DTL-3922/67D-008
MA2745C	External Mixer	E Band	60 GHz to 90 GHz	WR12	MIL-DTL-3922/67D-009
MA2746C	External Mixer	W Band	75 GHz to 110 GHz	WR10	MIL-DTL-3922/67D-010
MA2747C	External Mixer	F Band	90 GHz to 140 GHz	WR08	MIL-DTL-3922/67D-M08
MA2748C	External Mixer	D Band	110 GHz to 170 GHz	WR06	MIL-DTL-3922/67D-M06
MA2749C	External Mixer	G Band	140 GHz to 220 GHz	WR05	MIL-DTL-3922/67D-M05
MA2750C	External Mixer	Y Band	170 GHz to 260 GHz	WR04	MIL-DTL-3922/67D-M04
MA2751C	External Mixer	J Band	220 GHz to 325 GHz	WR03	MIL-DTL-3922/67D-M03

Signal Analyzer MS2840A 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 Mixer and High Performance 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.

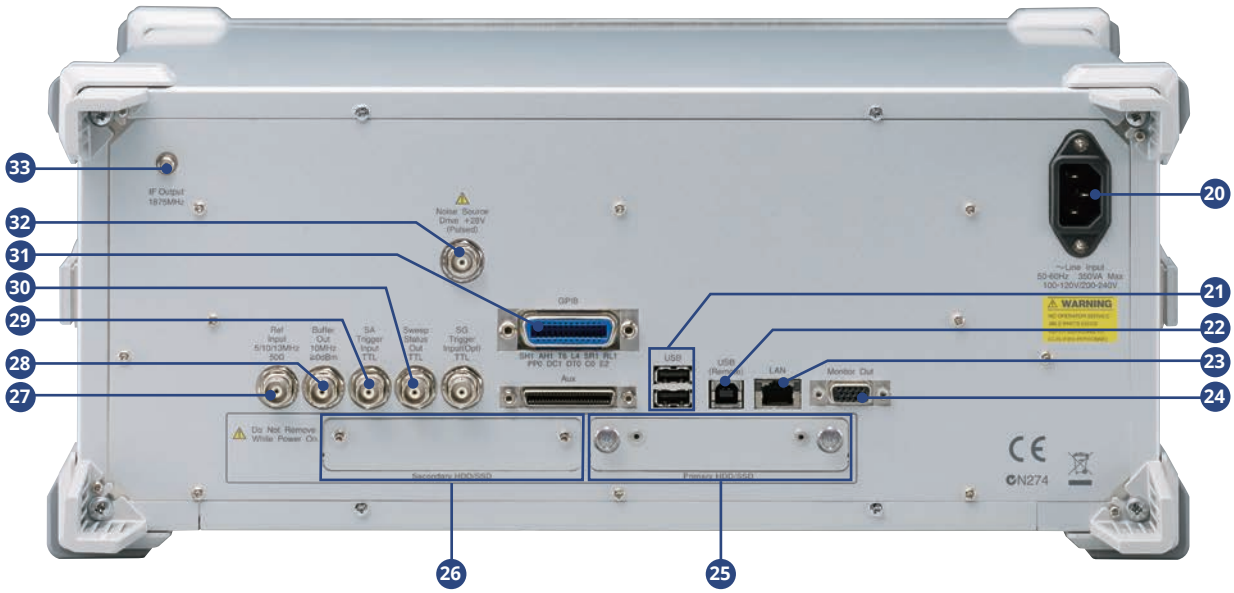
17 RF Input connector
Used for inputting RF signal.
K-J, 50Ω (MS2840A-046)

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 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 HDD/SSD slot
This is a hard disk and solid state drive slot.

26 Secondary HDD/SSD slot
This is a hard disk and solid state drive slot for options.

27 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.

28 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.

29 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.

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

31 GPIB connector
Used when controlling the MS2840A externally via GPIB.

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

33 IF Output connector
Monitor output of internal IF signal
Connector: SMA-J, 50Ω
IF Output Frequency: 1.875 GHz

Signal Analyzer MS2840A Configurations

Configuration List

Model	Name	Remarks
MS2840A	Signal Analyzer	The following options are installed as standard. Standard Software MX269000A Analysis Bandwidth 10 MHz MS2840A-006 Bandwidth Extension to 31.25 MHz for Millimeter-wave MS2840A-009
MS2840A-046	44.5 GHz Signal Analyzer	
MS2840A-010	Phase Noise Measurement Function	Option
MS2840A-017	Noise Figure Measurement Function	Option Microwave Preamplifier MS2840A-068 (or 168) recommended
MS2840A-068	Microwave Preamplifier	Option

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.
In addition, the MS2840A main unit must returned to the Anritsu plant for remodelling when retrofitting hardware options.

Model	Name	Remarks
MS2840A-110	Phase Noise Measurement Function Retrofit	
MS2840A-117	Noise Figure Measurement Function Retrofit	Microwave Preamplifier MS2840A-068 (or 168) recommended
MS2840A-168	Microwave Preamplifier Retrofit	

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	
MX269018A	Analog Measurement Software	Requires USB Audio A0086B

Mixer (External)

Model	Name	Remarks
MA2606A	High Performance Waveguide Mixer (50 to 75 GHz)	
MA2608A	High Performance Waveguide Mixer (60 to 90 GHz)	
MA2741C	External Mixer (26.5 to 40 GHz)	Harmonic Mixer
MA2742C	External Mixer (33 to 50 GHz)	Harmonic Mixer
MA2743C	External Mixer (40 to 60 GHz)	Harmonic Mixer
MA2744C	External Mixer (50 to 75 GHz)	Harmonic Mixer
MA2745C	External Mixer (60 to 90 GHz)	Harmonic Mixer
MA2746C	External Mixer (75 to 110 GHz)	Harmonic Mixer
MA2747C	External Mixer (90 to 140 GHz)	Harmonic Mixer
MA2748C	External Mixer (110 to 170 GHz)	Harmonic Mixer
MA2749C	External Mixer (140 to 220 GHz)	Harmonic Mixer
MA2750C	External Mixer (170 to 260 GHz)	Harmonic Mixer
MA2751C	External Mixer (220 to 325 GHz)	Harmonic Mixer

Signal Analyzer MS2840A Specifications

Refer to the MS2840A Data Sheet for more details.

Frequency Range

MS2840A-046: 9 kHz to 44.5 GHz

Aging Rate

$\pm 1 \times 10^{-7}$/year

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), 50 kHz, 5 MHz, 10 MHz
    [At Zero SPAN: 30 Hz to 3 MHz (1-3 sequence), 50 kHz, 5 MHz, 10 MHz]
Signal Analyzer Function
  Setting Range: 1 Hz to 1 MHz (1-3 sequence)

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.)

Displayed Average Noise Level (DANL)

Spectrum Analyzer Function
Preamp: None

Frequency	DANL
30 MHz	–153 dBm/Hz
400 MHz	–153 dBm/Hz
1 GHz	–150 dBm/Hz
3 GHz	–147 dBm/Hz
13 GHz	–151 dBm/Hz
20 GHz	–146 dBm/Hz
30 GHz	–146 dBm/Hz
40 GHz	–144 dBm/Hz
44 GHz	–140 dBm/Hz

Preamp: On

Frequency	DANL
30 MHz	–166 dBm/Hz
400 MHz	–166 dBm/Hz
1 GHz	–164 dBm/Hz
3 GHz	–163 dBm/Hz
13 GHz	–163 dBm/Hz
20 GHz	–160 dBm/Hz
30 GHz	–160 dBm/Hz
40 GHz	–157 dBm/Hz
44 GHz	–149 dBm/Hz

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)

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)
40 GHz	≤–56 dBc (TOI = +13 dBm) (nom.)

Second Harmonic Distortion

Preamp: None

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 install, MS2840A-006/009 function)

Connector

RF Input (Front panel)
  K-J, 50Ω (nom.)
IF Output (Rear panel)
  SMA-J, 50Ω (nom.)
  Frequency: 1.875 GHz
  Gain: –10 dB (nom., Input attenuator: 0 dB, Input frequency: 10 GHz)
1st Local Output (Front panel)
  For High Performance Waveguide Mixer and Harmonic Mixer
  SMA-J, 50Ω (nom.)
  Frequency: 5 GHz to 10 GHz (Local signal output)
    1.875 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-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 MS2840-046 installed, excluding other options)

OS

Windows 7 (64 bit)

High Performance Waveguide Mixer MA2806A/MA2808A Specifications

Frequency Range

MA2806A: 50 GHz to 75 GHz
MA2808A: 60 GHz to 90 GHz

Maximum Input Level (CW)

+10 dBm

Conversion Loss

<15 dB (typ.)

1 dB Gain Compression (P1dB)

>0 dBm (typ.)

Connector

MA2806A: RF: Waveguide (WR15, UG-385/U), IF/LO: SMA-J
MA2808A: RF: Waveguide (WR12, UG-387/U), IF/LO: SMA-J

Dimensions and Mass

134 (W) × 51 (H) × 229 (D) mm (excluding projections), <2 kg

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: 40 VA

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.

Signal Analyzer MS2840A 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
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-046	44.5 GHz Signal Analyzer
MS2840A-010	Phase Noise Measurement Function
MS2840A-017	Noise Figure Measurement Function
MS2840A-068	Microwave Preamplifier
	Retrofit options
MS2840A-110	Phase Noise Measurement Function Retrofit
MS2840A-117	Noise Figure Measurement Function Retrofit
MS2840A-168	Microwave Preamplifier Retrofit
	Software options
	DVD-ROM with License and Operation manuals
MX269017A	Vector Modulation Analysis Software
MX269018A*1	Analog Measurement Software
	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 (Mainframe Operation)
W2851AE	MS2690A/MS2691A/MS2692A/MS2830A and MS2840A Operation Manual (Mainframe Remote Control)
W3335AE	MS2830A/MS2840A Operation Manual (Signal Analyzer Function Operation)
W2853AE	MS2690A/MS2691A/MS2692A/MS2830A and MS2840A Operation Manual (Signal Analyzer Function Remote Control)
W3336AE	MS2830A/MS2840A Operation Manual (Spectrum Analyzer Function Operation)
W2855AE	MS2690A/MS2691A/MS2692A/MS2830A and MS2840A Operation Manual (Spectrum Analyzer Function Remote Control)
W3117AE	MS2690A/MS2691A/MS2692A/MS2830A and MS2840A Operation Manual (Phase Noise Measurement Function Operation)
W3118AE	MS2690A/MS2691A/MS2692A/MS2830A and MS2840A Operation Manual (Phase Noise Measurement Function Remote Control)
W3655AE	MS2690A/MS2691A/MS2692A/MS2830A and MS2840A Operation Manual (Noise Figure Measurement Function Operation)
W3656AE	MS2690A/MS2691A/MS2692A/MS2830A and MS2840A 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)

*1: Requires USB Audio A0086B

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 (Harmonic 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)

The following items are included as standard accessories for the MS2840A; they do not require ordering.

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

Signal Analyzer MS2840A Ordering Information

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.))
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)
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
A0086B	USB Audio (for MX269018A)
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)
Z1932A	Installation Kit (required when retrofitting options or installing software)

*2: The Carrying Case B0636C includes the Front Panel Protective Cover (B0671A).

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.

MA2808A

High Performance Waveguide Mixer
MA2806A/MA2808A

Carrying Case B0636C
(Hard type, with casters)

Soft Carrying Case B0645A

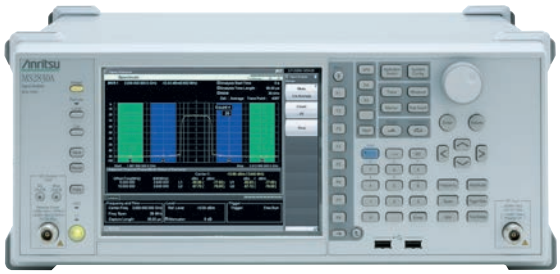
USB Power Sensor MA24106A

Signal Analyzer MS2840A 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.
- Like the MS2840A, frequency range expandable (≥325 GHz) up to millimeter-wave band by combined use with High Performance Waveguide Mixer and external mixer.

Signal Analyzer MS2690A/MS2691A/MS2692A

50 Hz to 6 GHz/13.5 GHz/26.5 GHz

This high-level signal analyzer/spectrum analyzer has excellent phase noise performance, dynamic range and measurement level accuracy.

Features

- Expandable to 6-GHz band with built-in calibration oscillator for excellent measurement level accuracy and modulation precision over frequency range from 50 Hz to 6 GHz.
- Various measurement software for LTE/LTE-Advanced, WLAN, etc.
- Built-in vector signal generator for all-in-one TRx evaluations of digital equipment using Noise Factor (NF) measurement function and BER measurement function.
- Built-in vector signal generator for reproducing on-site waveform measurement environment using capture and playback functions.
- Compact design with small footprint.

Note:

Note:

Anritsu envision : ensure

Specifications are subject to change without notice.

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