

Anritsu envision : ensure

Signal Analyzer

MS2850A

MS2850A-047: 9 kHz to 32 GHz

MS2850A-046: 9 kHz to 44.5 GHz



**Analysis
Bandwidth**

1 GHz

**EVM
Performance**

<1 %

A Signal Analyzer for Building the Future

Analysis Bandwidth

1 GHz

Cut R&D Costs 1 GHz Analysis Bandwidth Signal Analyzer

The 1 GHz analysis bandwidth supports wider-band microwave and millimeter-wave communications while high flatness performance facilitates multicarrier signal analysis.

With lower costs and higher measurement accuracy, the MS2850A is ideal for R&D and manufacturing of wideband next-generation communications systems, such as 5G mobile and broadcast satellites.

EVM Performance

<1%

Wide Dynamic Range for Higher Wideband Signal Measurement Accuracy

The measurement dynamic range is better than 140 dB^{*1} at a 1 GHz analysis bandwidth. This performance is equivalent to <1% EVM performance which is considered Peak-to-Peak of modulation waveform at measurement of a single 5G carrier (100 MHz wide)^{*2}.

With its wide dynamic range, the MS2850A increases the reliability of next-generation, wideband communications systems.

^{*1}: Difference between ADC Clipping level and DANL

^{*2}: At 100 MHz bandwidth 64QAM xPDSCH



MS2850A

For Developing Broadband Communications,
including 5G Mobile and Broadcast Satellite Communications

- 5G (Base Stations, Small Cells, Mobiles, Wireless Backhaul, etc.)
- Aerospace (High-throughput Broadcast Satellites, Terrestrial Monitoring Equipment, Wideband Transponders, etc.)
- Other Microwave and Millimeter-wave Wideband Communications Systems
- Academic Research

Signal Analyzer MS2850A Features

Main Frame Functions/Performance

The Signal Analyzer MS2850A is a spectrum analyzer/signal analyzer with a maximum analysis bandwidth of 1 GHz and a frequency range of 9 kHz to either 32 GHz or 44.5 GHz. Its high cost-performance helps cut rising R&D and manufacturing CAPEX costs in future deployments of microwave and millimeter-wave wideband communications systems.

1 GHz Analysis Bandwidth

The 1 GHz analysis bandwidth supports wider bands for microwave and millimeter-wave communications systems, such as 5G mobile and broadcast satellites.

The signal analyzer function using FFT (Fast Fourier transform) analysis supports spectrum displays, spectrogram displays, and applications where frequency and phase change with elapsed time. In addition, frequency bands required for 5G measurements are covered and all-in-one evaluation of multicarrier signals is supported by the 5G measurement software.

Analysis Bandwidth: 255 MHz (reference)
510 MHz (option), 1 GHz (option)



Spectrum of eight 100 MHz bandwidth carriers at 29 GHz center frequency

Excellent Flatness Performance

The amplitude and phase flatness performance*¹ over a wide analysis bandwidth of 1 GHz exceed that of other signal analyzers*². With this performance, the MS2850A supports high-accuracy amplitude and phase measurements for each carrier in wideband communications systems, such as 5G mobile, to play a key role in improving the quality of radio communications equipment.

Center Frequency: 28 GHz, at Center Frequency ± 500 MHz
In-band Frequency Characteristics: ± 1.2 dB (nom.)
In-band Phase Linearity: 5 deg. p-p (nom.)

*¹: Stipulated as In-band Frequency Characteristics and In-band Phase Linearity in Anritsu specifications
*²: Anritsu test at May 2017

Wide Dynamic Range

High ADC*³ Clipping Level

Wide Measurement Dynamic Range at Difference from DANL*⁴

The MS2850A has a high ADC clipping level over an analysis bandwidth of 1 GHz. This performance can be used to obtain a wider difference from the DANL, which rises when inputting the actual signal input level and inputting a wideband signal when using an attenuator.

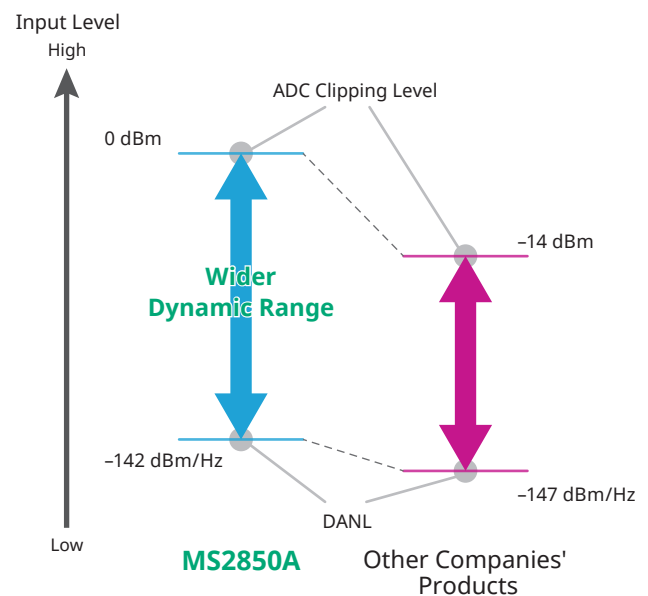
This wide dynamic range performance helps obtain more accurate EVM values at measurement of 5G signals. For example, in the 28 GHz band, the measured dynamic range at the difference between the ADC clipping level and DANL is better than 140 dB (ref.).

Center Frequency: 28 GHz
ADC Clipping Level: 0 dBm*⁵ (CW)
DANL: -142 dBm/Hz*⁵
Dynamic Range: 142 dB (ref.)

*³: Analog to Digital Converter

*⁴: Displayed Average Noise Level

*⁵: meas. value measured as design stage but not guaranteed specification



The measurement dynamic range widens if the ADC clipping level is high even when the DANL is quite high.

High SFDR (Spurious Free Dynamic Range)

-70 dBc at 1 GHz Analysis Bandwidth

The MS2850A suppresses spurious generation due to ADC over the 1 GHz analysis bandwidth, assuring a wide measurement dynamic range at wideband signal analysis.

SFDR

800 MHz \leq Frequency < 4.2 GHz: -60 dBc (nom.)

4.2 GHz \leq Frequency ≤ 44.5 GHz: -70 dBc (nom.)

Signal Analyzer MS2850A Features

5G Measurement Software

Dedicated software for 5G measurements can be installed in the Signal Analyzer MS2850A, and detailed and accurate measurements are backed by the high-performance 1 GHz (max.) analysis bandwidth and high measurement dynamic range.

Name/Model

5G Standard Measurement Software (Base License) MX285051A
Pre-Standard CP-OFDM Downlink MX285051A-001
Pre-Standard CP-OFDM Uplink MX285051A-051

Measurement Items

Numeric Results

- Frequency Error
- Tx Power
- EVM
- Origin Offset
- Timing Difference

Graph Results

- Constellation
- EVM vs. Subcarrier
- Spectral Flatness (Amplitude)
- Spectral Flatness (Phase)
- EVM vs. RB



Basic Screen (EVM vs. Subcarrier)

High EVM Performance due to MS2850A Wide Dynamic Range (EVM: <1%)

Combining the 5G analysis software with the MS2850A offers an EVM performance of <1% at measurement of a 5G single carrier (100 MHz wide, 28 GHz)*¹.

And even wider dynamic range performance is achieved over the difference between the MS2850A high ADC clipping level (0 dBm*²) and DANL.

Result			
xPDSCH EVM (rms)	---	Frequency Error	-0.05 Hz
QPSK	---	Transmit Power	0.000 ppm
16QAM	---	Total EVM (rms)	0.84 %
64QAM	0.84 %	Total EVM (peak)	4.05 %
xPDSCH EVM (peak) / Subcarrier / Symbol	---	Symbol Number	462
QPSK	---	Subcarrier Number	303
16QAM	---	Origin Offset	-72.97 dB
64QAM	3.50 % 795 / 567		

Single Carrier EVM Measurement Example (Numeric Results)

Multicarrier Analysis and Batch Measurement at 1 GHz

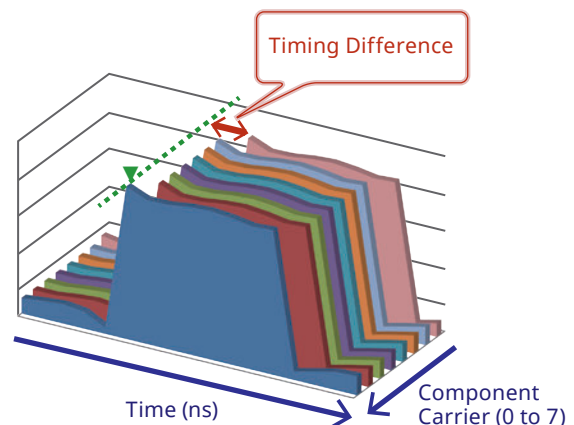
The 5G measurement software uses the 1 GHz analysis bandwidth of the MS2850A to support batch (all-at-once) measurement of all 5G signal carriers (8 carriers × 100 MHz wide). The characteristics of each single carrier can be evaluated quickly at the same time without needing to measure each single carrier separately.

	Frequency Error	Transmit Power	EVM (rms)	EVM (peak)	Timing Difference
CC0 (Ref)	0.34 Hz	-14.27 dBm	1.55 %	7.22 %	0.0 ns
CC1	0.32 Hz	-15.03 dBm	1.73 %	7.60 %	-0.8 ns
CC2	0.15 Hz	-13.20 dBm	1.48 %	7.44 %	0.8 ns
CC3	0.59 Hz	-13.59 dBm	1.41 %	7.22 %	-0.8 ns
CC4	0.49 Hz	-13.66 dBm	1.40 %	5.98 %	0.0 ns
CC5	0.74 Hz	-13.56 dBm	1.34 %	5.56 %	0.0 ns
CC6	0.64 Hz	-14.02 dBm	1.39 %	6.32 %	0.8 ns
CC7	0.27 Hz	-14.39 dBm	1.56 %	7.42 %	0.8 ns

Batch (All-at-Once) Carrier Measurements (Numeric Results)

Timing Difference Measurement

Batch (all-at-once) measurement of all carriers not only supports EVM and frequency error measurements for each carrier, but also supports timing difference measurements for each carrier.



High-Accuracy Measurement due to MS2850A Amplitude and Phase Flatness

The amplitude and phase flatness performance of the MS2850A over the wide analysis bandwidth of 1 GHz (max.) exceed that of other signal analyzers. For example, suppressing the measuring instrument error enables phase adjustment of each path in an antenna array.

MS2850A Specifications

- Offset Frequency: At Center Frequency ± 500 MHz
- In-band frequency characteristics (Amplitude flatness): ± 1.2 dB (nom.)
- In-band phase linearity (Phase flatness): 5° p-p (nom.)

*1: at 100 MHz bandwidth 64QAM xPDSCH

*2: meas. means value measured as design stage but not guaranteed specification

Signal Analyzer MS2850A Functions



Signal Analyzer MS2850A

The Signal Analyzer MS2850A has the analysis bandwidth and excellent flatness performance required for R&D and manufacturing of next-generation wideband communications systems. In addition to versatile basic functions for more convenient testing, it also has useful troubleshooting functions, such as Capture&Replay and sub-trace displays.

Standard Functions

Signal Analyzer (Analysis Bandwidth: 255 MHz)
Spectrum Analyzer

Option Functions

Signal Analyzer (Analysis Bandwidth: 510 MHz, 1 GHz)
Built-in Preamp
Low Second Harmonic Distortion
Phase Noise Measurement
Noise Figure (NF) Measurement
Modulation Analysis (5G, LTE, W-CDMA, etc.)

Application Parts

High Performance Waveguide Mixer (50 GHz to 90 GHz)*1
External Mixer (Harmonic, 26.5 GHz to 325 GHz)*1
USB Power Sensor

Typical Measurement Items and Functions

✓: Supported

Measurement Function/Item	Signal Analyzer	Spectrum Analyzer	Option/Application Part
Spectrum Display	✓	✓	
Power/Frequency/Phase vs. Time Display	✓		
Capture & Replay	✓		
CCDF/APD Display	✓		
Spectrogram Display	✓		
Sub-trace Display	✓		
Gate View (at Gate Sweep)		✓	
Channel Power	✓	✓	
Occupied Bandwidth	✓	✓	
Adjacent Channel Leakage Power	✓	✓	
Burst Average Power	✓	✓	
Multi-marker & List Display	✓	✓	
Highest 10 Markers	✓	✓	
Spectrum Emission Mask		✓	
Limit Line		✓	
Frequency Counter		✓	
Two-Signal Tertiary Distortion (TOI)		✓	
Power Meter*2			✓
Modulation Analysis (5G, LTE, etc.)			✓
Phase Noise Measurement			✓
Noise Figure (NF) Measurement			✓
mmWave-band Spectrum Measurement using External Mixer Connection (sold separately)*1	✓*1	✓*1	✓*1

*1: To be released in near future

*2: Connected to USB power sensor sold separately

Signal Analyzer MS2850A Functions

Signal Analyzer Functions (Standard)

Analysis Bandwidth

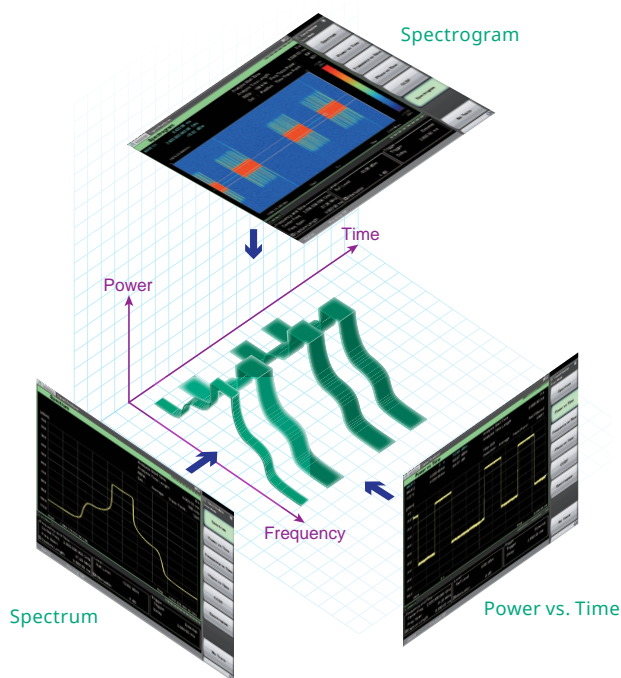
Analysis Bandwidth	Frequency Measurement Range
255 MHz (standard)	100 MHz to 32 GHz/44.5 GHz
510 MHz (option)	100 MHz to 32 GHz/44.5 GHz
1 GHz (option)	4.2 GHz to 32 GHz/44.5 GHz

Multiple Display Modes at FFT Analysis

The MS2850A has a built-in 255 MHz analysis bandwidth FFT analysis function. The measured signal is captured for display in various domains. Troubleshooting efficiency is greatly improved because phenomena such as spectrum transients that cannot be monitored by sweep-type spectrum analyzers can be observed. The analysis bandwidth can be extended optionally to 510 MHz and 1 GHz.

Display Mode

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



High Dynamic Range Performance

Analysis of wideband signals of 1 GHz does not simply require a signal analyzer with a wide analysis bandwidth. Accurate signal capture and analysis requires securing good dynamic range performance.

With a high ADC clipping level*¹ and low DANL, the MS2850A achieves a dynamic range of better than 140 dB*² at a center frequency of 28 GHz. Additionally, the SFDR (Spurious Free Dynamic Range) performance is an excellent -70 dBc at an analysis bandwidth of 1 GHz. As a result, the MS2850A is ideal for accurately capturing and analyzing the true performance next-generation wideband communications systems.

Dynamic Range: 142 dB (Center Frequency 28 GHz, CW, ref.)

ADC Clipping Level* ¹	0 dBm* ²
DANL	-142 dBm/Hz* ²

SFDR:

800 MHz to 4.2 GHz	-60 dBc (nom.)
4.2 GHz to 44.5 GHz	-70 dBc (nom.)

*1: Mixer level (CW) for using ADC at full scale

*2: meas. means value measured as design stage but not guaranteed specification

Capture & Replay Function

Waveform data can be saved (captured) in the internal memory for later display and replay. The causes of problems can be resolved quickly and easily because the display mode can be switched during replay.

Maximum capture times for each frequency span

Span	Sampling Rate	Max. Capture Time
50 MHz	81.25 MHz	48 s
100 MHz	162.5 MHz	24 s
255 MHz	325 MHz	12 s
510 MHz	650 MHz	6 s
1000 MHz	1300 MHz	3 s

Refer to the MS2850A data sheet for details.

Excellent Phase and Amplitude Flatness Performance

The phase-array antenna performs electronic scanning to control the phase of the parallel antenna elements because the mean width of the antenna directivity will become wider than expected if the phase of each antenna element is not the same. Consequently, the signal analyzer must be able to measure phase with high accuracy. Additionally, excellent amplitude characteristics are required at evaluation of communications using wideband signals, such as 5G mobile.

The MS2850A has excellent phase and amplitude flatness over a wide analysis bandwidth of 1 GHz.

Center Frequency 28 GHz, at Center Frequency ± 500 MHz

In-band Frequency Characteristics (Amplitude Flatness)	± 1.2 dB (nom.)
In-band Phase Linearity (Phase Flatness)	5° p-p (nom.)

Signal Analyzer MS2850A Functions

Signal Analyzer Functions (Standard)

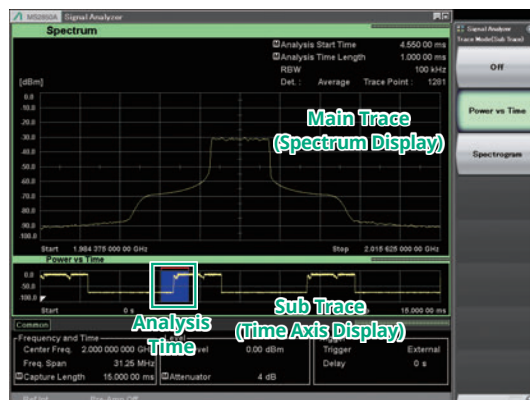
Spectrum Display

This function graphically displays the amplitude on the y-axis and the frequency on the x-axis. The captured IQ data are FFT-processed, and the time-domain data are converted to the frequency domain to display the spectrum. This is useful for confirming spectrum transients that cannot be monitored using spectrum analyzer functions.



Sub-trace Display

This function is useful for checking the spectrum while changing the analysis time period arbitrarily (blue display) such as when confirming burst signal rise and fall times. Simultaneous display of the time axis (sub-trace) and frequency axis (main trace) is useful for visually confirming when spectrum waveform distortion components (adjacent channel components, etc.) occur in the time domain.



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.



CCDF/APD

The CCDF trace displays the power variation probability on the y-axis and power variation on the x-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.

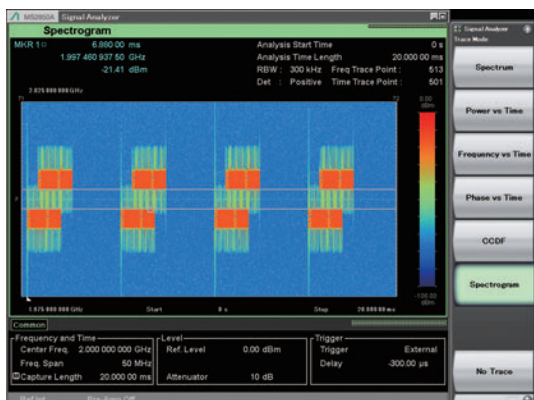
APD (Amplitude Probability Density):

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.

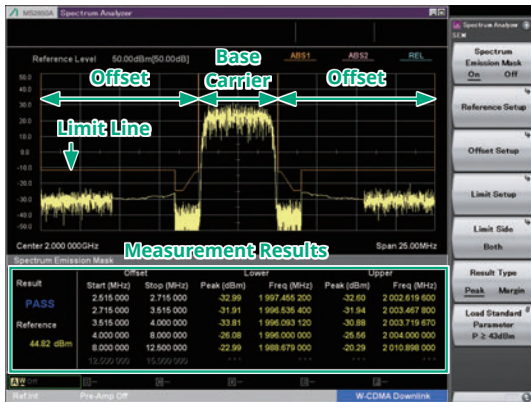


Signal Analyzer MS2850A Functions

Versatile Built-in Functions

Spectrum Emission Mask

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

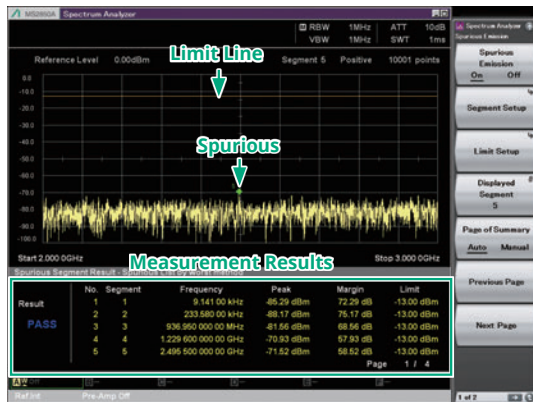


Measurement Results

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

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.



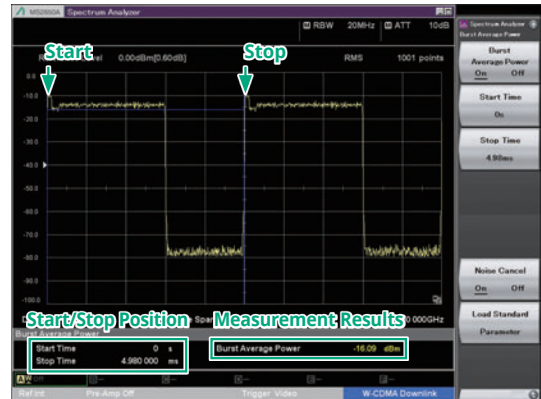
Multi-marker & Marker List

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.



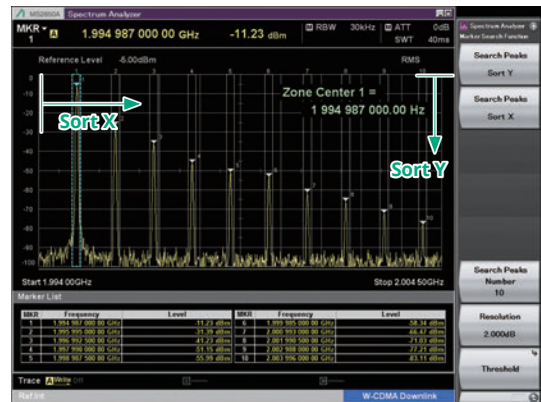
Burst Average Power

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.



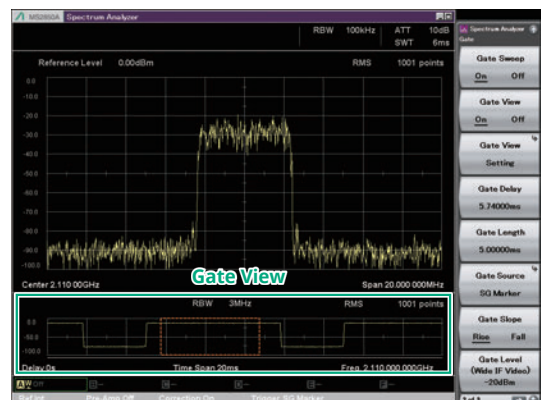
Highest 10 Markers

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



Gate View

For efficient gate sweeping when sweeping only the burst-signal on period, the spectrum analyzer functions include an auxiliary screen (Gate View) to display the gate sweep section.



Signal Analyzer MS2850A Functions

Hardware Standard Functions/Options/Application Parts

Microwave Preselector Bypass (Standard Function)

Passing the input signal through a preselector removes generated spurious at microwave and mmWave band measurements. However, in this case, the signal passband width is restricted and the flatness of the in-band frequency characteristics is degraded, both of which can adversely affect FFT analysis and modulation analysis times. As a result, adding a preselector bypass improves the in-band frequency characteristics and supports analysis up to wide bandwidths of 44.5 GHz.

2 dB Step Attenuator (Standard Function)

The built-in attenuator can be set with a resolution of 2 dB and the level of the input signal to the mixer can be adjusted with high resolution to make best use of the MS2850A dynamic range.

Phase Noise Measurement Function (MS2850A-010)

Phase noise can be measured over a frequency offset of 10 Hz to 10 MHz. The local and remote phase noise vs the carrier signal can each be measured by automatically switching to the best filter.



Measurement Screen

Secondary Storage Device (MS2850A-011)

This removable SSD extends the main unit internal storage capacity to save even more large digitized data files from wideband signals. Removability makes data transfer and exchange easy. The OS is not installed on this SSD and the MS2850A is shipped with the secondary SSD installed in the secondary SSD slot.

Noise Figure Measurement Function (MS2850A-017)

This option measures the noise figure according to the Y-Factor rule using a noise source. The NoiseCom Inc. NC346 series of noise sources* is supported.

*: Refer to the MS2850A data sheet for details.



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

Microwave Preamplifier (MS2850A-068)

With a 20 dB gain, this option improves DANL. It is useful for measuring low-level signals such as noise and interference as well as for measurements via antennas with large path losses.

Frequency Range: 100 kHz to 32 GHz (with MS2850A-047)
100 kHz to 44.5 GHz (with MS2850A-046)

Low Second Harmonic Distortion (MS2850A-076)

Installation of this option is recommended when measuring secondary harmonics at an input frequency range of 2 GHz to 22.25 GHz. Installing this option upgrades the MS2850A secondary harmonic distortion performance.

Input Frequency	Harmonic Upper: when installed (Lower: when not installed)	SHI* Upper: when installed (Lower: when not installed)
2 GHz to 3 GHz	-80 dBc (-70 dBc)	+70 dBm (+60 dBm)
3 GHz to 22.25 GHz	-90 dBc (-70 dBc)	+80 dBm (+60 dBm)

* SHI: Second Harmonic Intercept

USB Power Sensor (Sold Separately)

Connecting this sensor to the MS2850A supports power and absolute power measurements.

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.

Signal Analyzer MS2850A Functions

Software Options

Measurement software options are provided with modulation analysis functions supporting various communications methods. For details refer to the MX2690xxA Series, MX2830xxA Series, MX2850xxA Series Measurement Software brochure.

W-CDMA/HSPA Downlink Measurement Software (MX269011A)

This software is for measuring the RF Tx characteristics of W-CDMA/HSDPA/HSPA Evolution base stations.

W-CDMA/HSPA Uplink Measurement Software (MX269012A)

This software is for measuring the RF Tx characteristics of W-CDMA/HSUPA/HSPA Evolution terminals.

GSM/EDGE Measurement Software (MX269013A)

EDGE Evolution Measurement Software (MX269013A-001)

This software is for measuring the RF Tx characteristics of GSM/EDGE (EGPRS) and EDGE Evolution (EGPRS2) base stations and terminals.

TD-SCDMA Measurement Software (MX269015A)

This software is for measuring the RF Tx characteristics of TD-SCDMA base stations and terminals. It supports multiple modulation methods, including ASK, FSK, QPSK, QAM, etc.

LTE Downlink Measurement Software (MX269020A)

LTE-Advanced FDD Downlink Measurement Software (MX269020A-001)*

LTE TDD Downlink Measurement Software (MX269022A)

LTE-Advanced TDD Downlink Measurement Software (MX269022A-001)*

This software is for measuring the RF Tx characteristics of LTE/LTE-Advanced base stations.

LTE Uplink Measurement Software (MX269021A)

LTE-Advanced FDD Uplink Measurement Software (MX269021A-001)*

LTE TDD Uplink Measurement Software (MX269023A)

LTE-Advanced TDD Uplink Measurement Software (MX269023A-001)*

This software is for measuring the RF Tx characteristics of LTE/LTE-Advanced terminals.

5G Standard Measurement Software (Base License) (MX285051A)

Pre-Standard CP-OFDM Downlink (MX285051A-001)

Pre-Standard CP-OFDM Uplink (MX285051A-051)

This software is for measuring the RF Tx characteristics of 5G base stations and terminals.

Vector Signal Analysis Software (MX269017A)*

This software is for measuring the RF Tx characteristics of base stations and terminals using various digital wireless methods.

Supported Modulation Technologies

BPSK, QPSK, O-QPSK, $\pi/4$ DQPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 2FSK, 4FSK, 2ASK, 4ASK, H-CPM, MSK

★: To be released in near future

Signal Analyzer MS2850A Functions

Software Options

5G Standard Measurement Software (Base License)	MX285051A
Pre-Standard CP-OFDM Downlink	MX285051A-001
Pre-Standard CP-OFDM Uplink	MX285051A-051

The MX285051A-001 and MX285051A-051 software packages are for measuring the RF characteristics of CP-OFDM modulation downlink and uplink signals expected to be used for 5G demonstration tests and test operations. The following two measurements are supported.

Single Carrier Measurement

This function analyzes a 100 MHz band carrier to display the constellation, frequency error, Tx power, modulation accuracy (EVM), etc.

Multicarrier Measurement (Supported by MX285051A-001)

Combination with the Analysis Bandwidth Extension to 1 GHz MS2850A-034 option supports batch (all-at-once) analysis of up to eight 100 MHz band carriers to display the frequency error for each carrier, Tx power, EVM, timing difference, etc.

Analysis Bandwidth	Batch Analysis Carrier Count
255 MHz (standard)	2
510 MHz (option)	5
1 GHz (option)	8

Numeric Results

Name	Unit	Single Carrier Measurement	Multicarrier Measurement*	Remarks
Common				
Frequency Error	Hz, ppm	✓	✓	Displays frequency error
Transmit Power	dBm	✓	✓	Displays Tx power
Total EVM (rms/peak)	%, dB	✓	✓	Displays EVM rms/peak values
Origin Offset	dB	✓		Displays Origin Offset value
Time Offset	ns	✓		Displays time offset between Frame header and trigger in ns units Displays Trigger Switch = On only when using external trigger
Timing Difference	ns		✓	Displays timing difference between reference carrier and each carrier
Symbol Clock Error	ppm	✓		Displays Symbol Clock Error
IQ Skew	ns	✓		Displays IQ Skew
IQ Imbalance	dB	✓		Displays IQ Imbalance in dB units
IQ Quadrature Error	deg.	✓		Displays IQ Quadrature Error
Downlink				
xPDSCH EVM (rms/peak)	%, dB	✓		Displays EVM rms/peak values for QPSK/16QAM/64QAM
P-SS	%, dB, dBm	✓		Displays average EVM (rms) and maximum EVM (peak) as well as average power (dBm) for each PHY channel
S-SS		✓		
E-SS		✓		
BRS		✓		
xPBCH		✓		
xPDSCH		✓		
xPDCCH		✓		
UE-RS (xPDSCH)		✓		
UE-RS (xPDSCH)		✓		
Uplink				
xPUSCH EVM (rms/peak)	%, dB	✓		Displays EVM rms/peak value for QPSK/16QAM/64QAM
xPUSCH	%, dB, dBm	✓		Displays average EVM (rms) and maximum EVM (peak) as well as average power (dBm) for each PHY channel
DM-RS (xPUSCH)		✓		

Graph Displays

Name	Single Carrier Measurement	Multicarrier Measurement*
Constellation	✓	
EVM vs. Subcarrier	✓	
EVM vs. Symbol	✓	
Spectral Flatness (Amplitude/Phase)	✓	
Power vs. RB	✓	✓
EVM vs. RB	✓	✓
Summary	✓	✓

★: Multicarrier measurement supported by MX285051A-001

Signal Analyzer MS2850A Functions

Single Carrier Measurement

Constellation

The frequency error for all sub-carriers, Tx power, EVM, etc., are displayed together on a constellation graph. Since peak values can be displayed simultaneously with mean values, the randomness of characteristics can be evaluated by comparing both values. Characteristics can be confirmed easily using the many intuitive graph displays.



Multi Carrier Measurement

EVM vs. RB

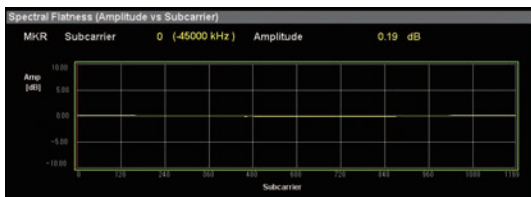
Power vs. RB

Up to eight carriers can be analyzed at once as a batch to display the EVM and power for each resource block in the sub-frame section as a gradation. Since the power boosting applied to each resource block and the location of the degraded EVM caused by in-band interference can be monitored and compared visually for each carrier, this function plays a key role at R&D troubleshooting.



Spectral Flatness

Graphs of the amplitude and phase for each sub-carrier are displayed for all symbols in a specified measurement region.



Summary

Various data, such as the frequency error, Tx power, EVM, etc., can be analyzed at once as a batch for each carrier, which is useful for measuring the timing difference with other carriers based on a specified carrier.

CC0 (Ref.)	Frequency Error	Transmit Power	EVM (rms)	EVM (peak)	Timing Difference
CC0 (Ref.)	0.34 Hz	-14.27 dBm	1.55 %	7.22 %	0.0 ns
CC1	0.32 Hz	-15.03 dBm	1.73 %	7.60 %	-0.8 ns
CC2	0.16 Hz	-13.20 dBm	1.48 %	7.44 %	0.8 ns
CC3	0.59 Hz	-13.59 dBm	1.41 %	7.22 %	-0.8 ns
CC4	0.49 Hz	-13.66 dBm	1.40 %	5.96 %	0.0 ns
CC5	0.74 Hz	-13.56 dBm	1.34 %	5.56 %	0.0 ns
CC6	0.64 Hz	-14.02 dBm	1.39 %	6.32 %	0.8 ns
CC7	0.27 Hz	-14.39 dBm	1.56 %	7.42 %	0.8 ns

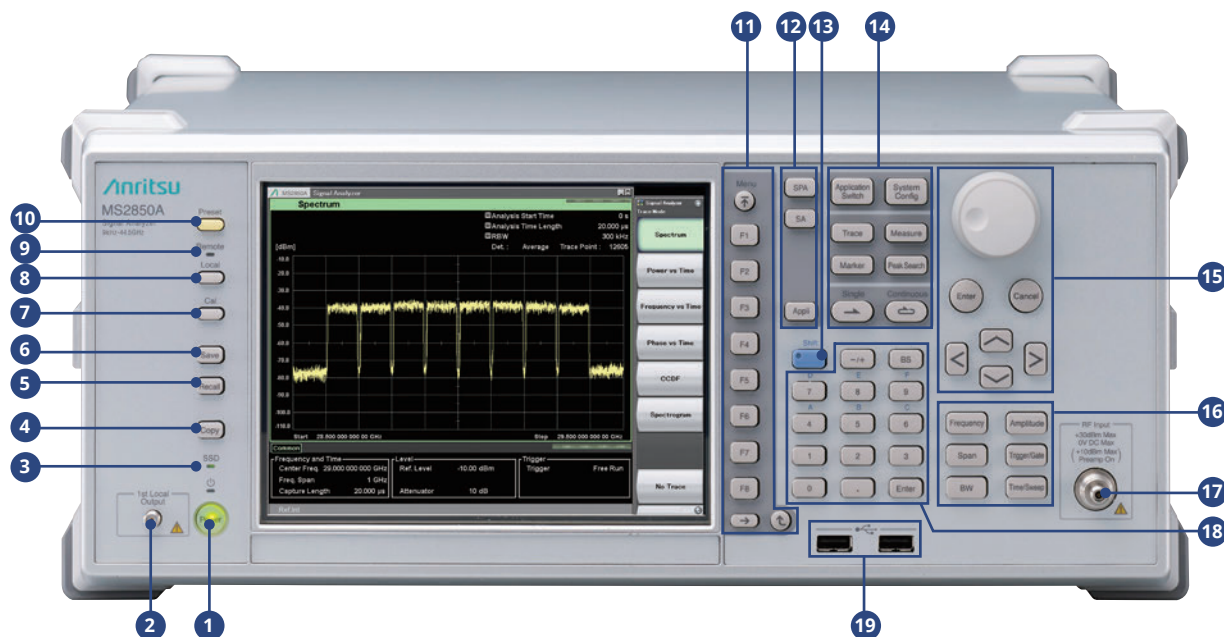
Summary

Various data, such as the EVM and power for each channel (SS, xPDSCH, xPUSCH, xPDCCH), are tabulated.

Channel	Avg EVM (rms)	Max EVM (peak)	EVMSubcarrierSymbol	Avg Power
P-SS	0.96 %	2.67 %	612 0	-17.900 dBm
S-SS	0.95 %	1.90 %	647 0	-17.911 dBm
E-SS	0.90 %	2.06 %	521 360	-17.806 dBm
BRS	0.87 %	2.98 %	1183 4	-7.527 dBm
xPBCH	0.96 %	2.83 %	926 12	-10.539 dBm
xPDSCH	0.84 %	3.50 %	795 567	-4.926 dBm
UE-RS(xPDSCH)	0.52 %	1.70 %	32 30	-10.949 dBm
xPDCCH	0.87 %	2.80 %	364 238	-9.860 dBm
UE-RS(xPDCCH)	1.10 %	4.06 %	303 462	-14.806 dBm

Signal Analyzer MS2850A 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 MS2850A 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

Reserved for future function expansion

3 SSD lamp

Lights when the MS2850A 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 MS2850A 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 MS2850A. 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 MS2850A. Executable functions vary depending on the application currently selected.

17 RF Input connector

Used for inputting RF signal.

K-J, 50Ω

Maximum input level:

+30 dBm (Continuous wave average power,

Input attenuator: ≥10 dB, Preamp: Off)

18 Numeric keypad

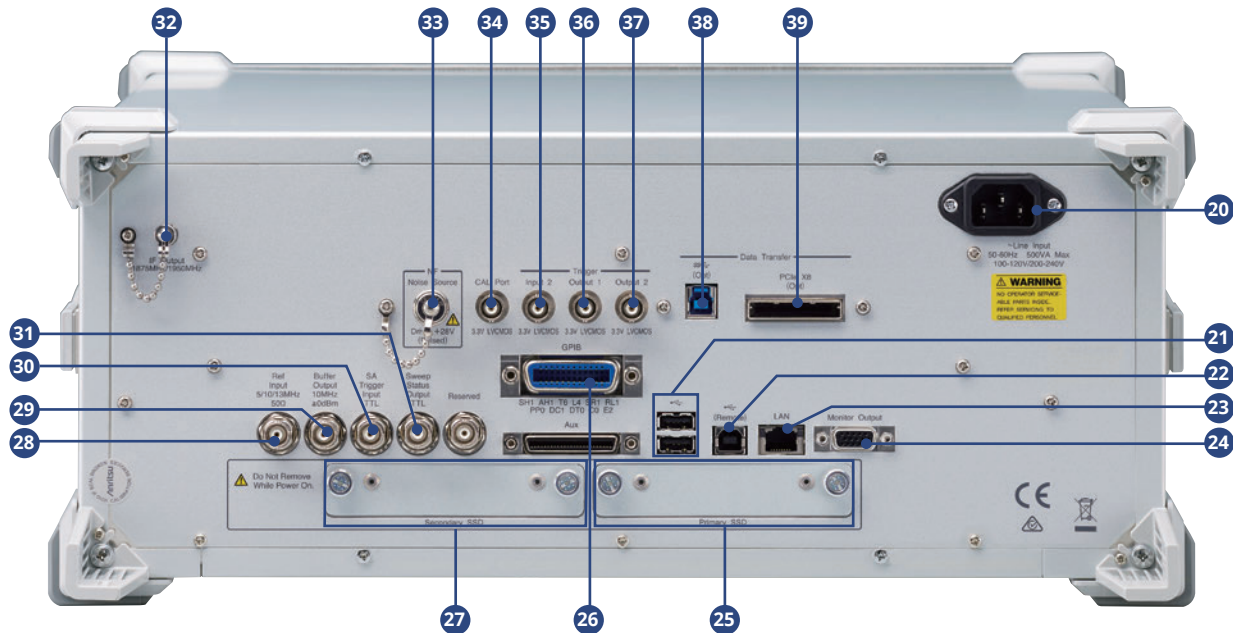
Used to enter numbers on parameter setup screens.

19 USB connector (type A)

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

Signal Analyzer MS2850A 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 USB memory.

22 USB connector (type B)

Used when controlling the MS2850A 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

This is a solid state drive slot.

26 GPIB connector

Used when controlling the MS2850A externally via GPIB.

27 Secondary SSD slot

This is a solid state drive slot for 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 MS2850A, or for synchronizing the frequency of the MS2850A to that of other device.

29 Buffer Out connector (reference frequency signal output connector)

Outputs the reference frequency signal (10 MHz) generated inside the MS2850A. It is used for synchronizing the frequencies between other devices and the MS2850A 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 IF Output connector

Monitor output of internal IF signal
Connector: SMA-J, 50Ω
IF Output Frequency: 1875 MHz, 1950 MHz

33 Noise Source Drive connector

Supply (+28 V) of the Noise Source Drive.
Requires installation of MS2850A-017/117.

34 CAL Port Connector

Reserved for Future Use

35 Trigger Input 2 Connector

BNC connector for input of external trigger signal (3.3 V LVCMOS) for spectrum analyzer and signal analyzer applications

36 Trigger Output 1 Connector

BNC Connector for output of trigger signal (3.3 V LVCMOS)

37 Trigger Output 2 Connector

BNC connector for output of trigger signal (3.3 V LVCMOS)

38 USB 3.0 Connector

Reserved for future use

39 PCIe X8 Connector

Reserved for future use

Signal Analyzer MS2850A Configurations

Hardware Configuration

Frequency range (MS2850A-046/047) not upgradable.

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

Option	Name	Retrofit	Addition to Main frame		Combination with "Option" (Refer to the left line)									
			MS2850A-046 (44.5 GHz model)	MS2850A-047 (32 GHz model)	MS2850A-032 (standard install)	MS2850A-033	MS2850A-034	MS2850A-011	MS2850A-017	MS2850A-067 (standard install)	MS2850A-068	MS2850A-076	MS2850A-010	
MS2850A-032	Analysis Bandwidth 255 MHz	—	Standard install	Standard install	<div></div>									
MS2850A-033	Analysis Bandwidth Extension to 510 MHz	Yes	✓	✓	<div></div>									
MS2850A-034	Analysis Bandwidth Extension to 1 GHz	Yes	✓	✓	<div></div>	R	<div></div>							
MS2850A-010	Phase Noise Measurement Function	Yes	✓	✓				<div></div>						
MS2850A-017	Noise Figure Measurement Function	Yes	✓	✓				<div></div>	<div></div>		U			
MS2850A-067	Microwave Preselector Bypass	—	Standard install	Standard install						<div></div>				
MS2850A-068	Microwave Preamplifier	Yes	✓	✓							<div></div>			
MS2850A-076	Low Second Harmonic Distortion	Yes	✓	✓							<div></div>	<div></div>		
MS2850A-011	Secondary Storage Device	Yes	✓	✓								<div></div>	<div></div>	

Software Configuration

Option	Name	Addition to Main frame ✓ = Can be installed		Analysis Bandwidth option U = Upgrade		Note
		MS2850A-046 (44.5 GHz model)	MS2850A-047 (32 GHz model)	MS2850A-033 (510 MHz)	MS2850A-034 (1 GHz)	
MX285051A	5G Standard Measurement Software (Base License)	✓	✓	U	U	This license can't be used alone. Require MX285051A-001/051
MX285051A-001	Pre-Standard CP-OFDM Downlink	✓	✓	U	U	Require MX285051A
MX285051A-051	Pre-Standard CP-OFDM Uplink	✓	✓	U	U	Require MX285051A
MX269011A	W-CDMA/HSPA Downlink Measurement Software	✓	✓			
MX269012A	W-CDMA/HSPA Uplink Measurement Software	✓	✓			
MX269013A	GSM/EDGE Measurement Software	✓	✓			
MX269013A-001	EDGE Evolution Measurement Software	✓	✓			Require MX269013A
MX269015A	TD-SCDMA Measurement Software	✓	✓			
MX269020A	LTE Downlink Measurement Software	✓	✓			
MX269020A-001*	LTE-Advanced FDD Downlink Measurement Software	✓	✓			Require MX269020A
MX269021A	LTE Uplink Measurement Software	✓	✓			
MX269021A-001*	LTE-Advanced FDD Uplink Measurement Software	✓	✓			Require MX269021A
MX269022A	LTE TDD Downlink Measurement Software	✓	✓			
MX269022A-001*	LTE-Advanced TDD Downlink Measurement Software	✓	✓			Require MX269022A
MX269023A	LTE TDD Uplink Measurement Software	✓	✓			
MX269023A-001*	LTE-Advanced TDD Uplink Measurement Software	✓	✓			Require MX269023A
MX269017A*	Vector Modulation Analysis Software	✓	✓			

*: To be released in near future

Signal Analyzer MS2850A Specifications

Common Signal Analyzer and Spectrum Analyzer Specifications

Refer to the MS2850A Data Sheet for detailed specifications.

Frequency Range

9 kHz to 32 GHz (MS2850A-047)
9 kHz to 44.5 GHz (MS2850A-046)

Signal Analyzer Functions (at >31.25 MHz Analysis Bandwidth)

800 MHz to 32 GHz (MS2850A-047)
800 MHz to 44.5 GHz (MS2850A-046)

Frequency Setting Range

Spectrum Analyzer Function

-100 MHz to 32.5 GHz (MS2850A-047)
-100 MHz to 45 GHz (MS2850A-046)

Signal Analyzer Function

Analysis Bandwidth ≤ 31.25 MHz

0 MHz to 32 GHz (MS2850A-047)
0 MHz to 44.5 GHz (MS2850A-046)

31.25 < Analysis Bandwidth ≤ 510 MHz

100 MHz to 32 GHz (MS2850A-047)
100 MHz to 44.5 GHz (MS2850A-046)

Analysis Bandwidth = 1 GHz

4.2 GHz to 32 GHz (MS2850A-047)
4.2 GHz to 44.5 GHz (MS2850A-046)

RF Input Connector (Front Panel)

K-J, 50Ω (nom.)

Aging Rate

±1 × 10⁻⁷/year

Max. Input Level

CW Average Power: +30 dBm
(Input Attenuator: ≥10 dB, Preamp: Off)

Attenuator

0 to 60 dB, 2 dB steps

Phase Noise

Spectrum Analyzer Function

Input Frequency	Frequency Offset	SSB 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.)

Total Level Accuracy

Preamp: None, Microwave Preselector Bypass: Off
±0.5 dB (300 kHz ≤ Frequency < 4 GHz)
±1.8 dB (4 GHz ≤ Frequency ≤ 13.8 GHz)
±3.0 dB (13.8 GHz < Frequency ≤ 40 GHz)
±3.5 dB (40 GHz < Frequency < 44.5 GHz, nom.)

Secondary Harmonic Distortion

Spectrum Analyzer Function

Signal Analyzer Function (Analysis Bandwidth: ≤31.25 MHz)

Preamp: None

Low Second Harmonic Distortion: Yes

Microwave Preselector Bypass: Off

Frequency Band Mode: Spurious

Input Frequency	Harmonic	SHI	Mixer Input Level
1 GHz	≤-65 dBc	≥+35 dBm	-30 dBm
4 GHz, 13 GHz	≤-90 dBc	≥+80 dBm	-10 dBm
20 GHz	≤-90 dBc (nom.)	≥+80 dBm (nom.)	-10 dBm

Signal Analyzer MS2850A Specifications

Spectrum Analyzer Function

RBW (Resolution Bandwidth)

Setting Range:

1 Hz to 3 MHz (1-3 sequence), 500 Hz, 50 kHz, 2 MHz, 5 MHz, 10 MHz
(1 Hz to 10 Hz: Can not be set when Span 0 Hz)

VBW (Video Bandwidth)

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

DANL (Display Average Noise Level)

Preamp: None

Low Second Harmonic Distortion: Yes

Microwave Preselector Bypass: On

Frequency	DANL
1 GHz	-150 dBm/Hz
4 GHz	-144 dBm/Hz
13 GHz	-146 dBm/Hz
20 GHz	-140 dBm/Hz
28 GHz	-140 dBm/Hz
39 GHz	-136 dBm/Hz
44 GHz	-130 dBm/Hz (nom.)

Two-Signal Tertiary Distortion

Preamp: None

Frequency	Two-Signal Tertiary Distortion
1 GHz	≤ -62 dBc (TOI = +16 dBm)
4 GHz	≤ -60 dBc (TOI = +15 dBm)
13 GHz, 20 GHz	≤ -56 dBc (TOI = +13 dBm)
28 GHz, 39 GHz	≤ -56 dBc (TOI = +13 dBm) (nom.)

Signal Analyzer Function

Analysis Bandwidth

255 MHz (standard)

510 MHz (option)

1 GHz (option)

Display Functions (Trace Mode)

Spectrum, Power vs. Time, Frequency vs. Time, Phase vs. Time,
CCDF, Spectrogram

ADC Resolution

Analysis Bandwidth ≤ 31.25 MHz: 16 bits

Analysis Bandwidth > 31.25 MHz: 12 bits

SFDR (Spurious Free Dynamic Range)

Analysis Bandwidth > 31.25 MHz

Frequency Range	SFDR
$800 \text{ MHz} \leq \text{Frequency} < 4.2 \text{ GHz}$	-60 dBc (nom.)
$4.2 \text{ GHz} \leq \text{Frequency} \leq 44.5 \text{ GHz}$	-70 dBc (nom.)

RBW (Resolution Bandwidth)

Spectrum Display

Setting Range:

Analysis Bandwidth ≤ 31.25 MHz: 1 Hz to 1 MHz (1-3 sequence)

$50 \text{ MHz} \leq \text{Analysis Bandwidth} \leq 62.5 \text{ MHz}$:

3 kHz to 3 MHz (1-3 sequence)

Analysis Bandwidth ≥ 100 MHz: 10 kHz to 10 MHz (1-3 sequence)

DANL (Display Average Noise Level)

Analysis Bandwidth > 31.25 MHz

Frequency	Preamp: None	Preamp: On
1 GHz	-141 dBm/Hz	-160 dBm/Hz
4 GHz	-138 dBm/Hz	-157 dBm/Hz
13 GHz	-140 dBm/Hz	-155 dBm/Hz
20 GHz	-135 dBm/Hz	-152 dBm/Hz
28 GHz	-135 dBm/Hz	-150 dBm/Hz
39 GHz	-132 dBm/Hz	-146 dBm/Hz
44 GHz	-128 dBm/Hz (nom.)	-138 dBm/Hz (nom.)

In-band Frequency Characteristics (Amplitude Flatness)

Analysis Bandwidth > 31.25 MHz

Frequency	Frequency Offset	In-band Frequency Characteristic
13 GHz	CF ± 500 MHz	± 0.7 dB (nom.)
20 GHz		± 1.0 dB (nom.)
28 GHz		± 1.2 dB (nom.)
39 GHz, 44 GHz		± 1.25 dB (nom.)

In-band Phase Linearity (Phase Flatness)

Analysis Bandwidth > 31.25 MHz

Preamp: None

Offset Frequency \leq Center Frequency ± 500 MHz

Center Frequency	In-band Phase Linearity
13 GHz, 20 GHz, 28 GHz, 39 GHz	5° p-p (nom.)
44 GHz	6° p-p (nom.)

Signal Analyzer MS2850A Specifications

General Specifications

Dimensions and Mass

426 (W) × 177 (H) × 390 (D) mm (excluding protrusions)
 ≤21 kg (with MS2850A-046 or 047 and other options installed)

Power

Power voltage: 100 V(ac) to 120 V(ac)/200 V(ac) to 240 V(ac)
 Frequency: 50 Hz/60 Hz
 Power Consumption:
 ≤500 VA (with all options installed)
 320 VA (nom.) (with MS2850A-047 or 046 and MS2850A-067/
 068/032/033/034 installed, but excluding other options)

OS

Windows 7 (64 bit)

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 All other product names, models, services trademarks are trademarks or registered trademarks of their respective owners.

5G Measurement Software

Refer to the MX2690xxA Series, MX2830xxA Series, MX2850xxA Series Measurement Software brochure for the specification details.

Pre-Standard CP-OFDM Downlink MX285051A-001

Measured Signals

TS V5G.211 Downlink Signals

Channel Bandwidth

With MS2850A-032 installed: 100 MHz × 2 carriers max.
 With MS2850A-033 installed: 100 MHz × 5 carriers max.
 With MS2850A-034 installed: 100 MHz × 8 carriers max.

At 6 or more carriers, can only measure at center frequency of 5 GHz or more

Measurement Level Range

-15 to +30 dBm (Preamp Off or not installed)
 -30 to +10 dBm (Preamp On)

Pre-Standard CP-OFDM Uplink MX285051A-051

Measured Signals

TS V5G.211 Uplink Signals

Channel Bandwidth

100 MHz (1 carrier only)

Measurement Level Range

-15 to +30 dBm (Preamp Off or not installed)
 -30 to +10 dBm (Preamp On)

(typ.): Performance not guaranteed; value satisfied by majority of instruments

(nom.): Performance not guaranteed; reference value at use

(meas.): Performance not guaranteed; example of data from randomly chosen instrument

Signal Analyzer MS2850A 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	Model/Order No.	Name
MS2850A	Main Frame Signal Analyzer		Manuals Following operation manuals provided as hard copy and written in English.
P0031A	Standard accessories Power Cord: 1 pc	W3920AE	MS2850A Operation Manual (Mainframe Operation)
Z0541A	USB Memory (≥1 GB): 1 pc	W2851AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Mainframe Remote Control)
	USB Mouse: 1 pc	W3335AE	MS2830A/MS2840A/MS2850A Operation Manual (Signal Analyzer Function Operation)
	Install DVD-ROM (Application software, instruction manual DVD-ROM): 1 pc	W2853AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Signal Analyzer Function Remote Control)
MS2850A-047	Options 32 GHz Signal Analyzer	W3336AE	MS2830A/MS2840A/MS2850A Operation Manual (Spectrum Analyzer Function Operation)
MS2850A-046	44.5 GHz Signal Analyzer	W2855AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Spectrum Analyzer Function Remote Control)
MS2850A-033	Analysis Bandwidth Extension 510 MHz	W3117AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Phase Noise Measurement Function Operation)
MS2850A-034	Analysis Bandwidth Extension 1 GHz	W3118AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Phase Noise Measurement Function Remote Control)
MS2850A-010	Phase Noise Measurement Function	W3655AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Noise Figure Measurement Function Operation)
MS2850A-017	Noise Figure Measurement Function	W3656AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Noise Figure Measurement Function Remote control)
MS2850A-068	Microwave Preamplifier	W3922AE	MX285051A Operation Manual (Operation)
MS2850A-076	Low Second Harmonic Distortion	W3924AE	MX285051A-001/MX285051A-051 Operation Manual (Operation)
MS2850A-011	Secondary Storage Device	W3925AE	MX285051A-001/MX285051A-051 Operation Manual (Remote Control)
MS2850A-133	Retrofit options Analysis Bandwidth Extension 510 MHz Retrofit	W3098AE	MX269011A Operation Manual (Operation)
MS2850A-134	Analysis Bandwidth Extension 1 GHz Retrofit	W3099AE	MX269011A Operation Manual (Remote Control)
MS2850A-110	Phase Noise Measurement Function Retrofit	W3060AE	MX269012A Operation Manual (Operation)
MS2850A-117	Noise Figure Measurement Function Retrofit	W3061AE	MX269012A Operation Manual (Remote Control)
MS2850A-168	Microwave Preamplifier Retrofit	W3100AE	MX269013A Operation Manual (Operation)
MS2850A-176	Low Second Harmonic Distortion Retrofit	W3101AE	MX269013A Operation Manual (Remote Control)
MS2850A-111	Secondary Storage Device Retrofit	W3044AE	MX269015A Operation Manual (Operation)
MX285051A	Software options DVD-ROM with License and Operation manuals	W3045AE	MX269015A Operation Manual (Remote Control)
MX285051A-001	5G Standard Measurement Software (Base License) (Requires MX285051A-001 and/or 051)	W3305AE	MX269017A Operation Manual (Operation)
MX285051A-051	Pre-Standard CP-OFDM Downlink (Requires MX285051A)	W3306AE	MX269017A Operation Manual (Remote Control)
MX269011A	Pre-Standard CP-OFDM Uplink (Requires MX285051A)	W3014AE	MX269020A Operation Manual (Operation)
MX269012A	W-CDMA/HSPA Downlink Measurement Software	W3064AE	MX269020A Operation Manual (Remote Control)
MX269013A	W-CDMA/HSPA Uplink Measurement Software	W3015AE	MX269021A Operation Manual (Operation)
MX269013A-001	GSM/EDGE Measurement Software	W3065AE	MX269021A Operation Manual (Remote Control)
MX269013A-001	EDGE Evolution Measurement Software (Requires MX269013A)	W3209AE	MX269022A Operation Manual (Operation)
MX269015A	TD-SCDMA Measurement Software	W3210AE	MX269022A Operation Manual (Remote Control)
MX269017A*	Vector Modulation Analysis Software	W3521AE	MX269023A Operation Manual (Operation)
MX269020A	LTE Downlink Measurement Software	W3522AE	MX269023A Operation Manual (Remote Control)
MX269020A-001*	LTE-Advanced FDD Downlink Measurement Software (Requires MX269020A)		
MX269021A	LTE Uplink Measurement Software		
MX269021A-001*	LTE-Advanced FDD Uplink Measurement Software (Requires MX269021A)		
MX269022A	LTE TDD Downlink Measurement Software		
MX269022A-001*	LTE-Advanced TDD Downlink Measurement Software (Requires MX269022A)		
MX269023A	LTE TDD Uplink Measurement Software		
MX269023A-001*	LTE-Advanced TDD Uplink Measurement Software (Requires MX269023A)		
MS2850A-ES210	Warranty service 2 years Extended Warranty Service		
MS2850A-ES310	3 years Extended Warranty Service		
MS2850A-ES510	5 years Extended Warranty Service		

★: To be released in near future

The following options are installed as standard and do not require separate orders when ordering the MS2850A-046/047.

Standard Software	MX269000A
Analysis Bandwidth 255 MHz	MS2850A-032
Microwave Preselector Bypass	MS2850A-067

Requires Installation Kit Z1957A when retrofitting options or installing software.

The instruction manuals are published on our website except some.

Signal Analyzer MS2850A Ordering Information

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

★: To be released in near future



Ruggedized K-to-Type N Adapter
34AKNF50

This adapter converts the MS2850A-046 RF Input connector (K-J) to N-J. It is used by attachment to the MS2850A main unit.



Carrying Case B0636C
(Hard type, with casters)



Front Cover for 1MW4U B0671A

Model/Order No.	Name
34AKNF50	Application Parts 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.)) Power Divider (K connector, DC to 26.5 GHz, 50Ω, K-J, 1 W max.) Four-port Junction Pad (5 MHz to 3 GHz, N-J) Termination (DC to 12.4 GHz, 50Ω, N-P) Coaxial Adaptor (K-P · K-J, SMA) Coaxial Cord, 1 m (N-P · 5D-2W · N-P) Coaxial Cord, 2 m (N-P · 5D-2W · N-P) Coaxial Cord, 1 m (BNC-P · RG58A/U · BNC-P) Coaxial Cord, 2 m (BNC-P · RG58A/U · BNC-P) Coaxial Cord, 0.5 m (BNC-P · RG58A/U · BNC-P) Coaxial Cord, 0.5 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P) Coaxial Cord, 1 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P) Coaxial Cord, 1.5 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P) Coaxial Cord, 2 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P) DC Block, N type (MODEL 7003) (10 kHz to 18 GHz, N-P · N-J) DC Block, SMA type (MODEL 7006) (9 kHz to 26.5 GHz, SMA-P · SMA-J) DC Block, SMA type (MODEL 7006-1) (9 kHz to 20 GHz, SMA-P · SMA-J) DC Block (10 kHz to 40 GHz, K-P · K-J) Coaxial Adapter (DC to 12.4 GHz, 50Ω, N-P · SMA-J) N-SMA Adaptor (DC to 26.5 GHz, 50Ω, N-P · SMA-J) Coaxial Cable, 1.0 m for 40 GHz (DC to 40 GHz, approx. 1 m, SF102A, 11K254/K254/1.0M) Coaxial Cable, 0.5 m for 40 GHz (DC to 40 GHz, approx. 0.5 m, SF102A, 11K254/K254/0.5M) Fixed Attenuator (DC to 40 GHz, 3 dB) Ethernet Cable (Shield type, Straight, 1 m) Ethernet Cable (Shield type, Straight, 3 m) Ethernet Cable (Shield type, Cross, 1 m) Ethernet Cable (Shield type, Cross, 3 m) GPIB Cable, 2.0 m Rack Mount Kit (EIA) Rack Mount Kit (JIS) Carrying Case (Hard type, with casters) Front Cover for 1MW4U Inline Peak Power Sensor (350 MHz to 4 GHz, with USB A to mini B cable) USB Power Sensor (50 MHz to 6 GHz, with USB A to mini B cable) Microwave USB Power Sensor (10 MHz to 8 GHz, with USB A to Micro-B cable) Microwave USB Power Sensor (10 MHz to 18 GHz, with USB A to Micro-B cable) Microwave USB Power Sensor (10 MHz to 26 GHz, with USB A to Micro-B cable) Keyboard (USB) Installation Kit (required when retrofitting options or installing software)
K240B	
MA1612A	
MP752A	
J1359A	
J0576B	
J0576D	
J0127A	
J0127B	
J0127C	
J0322A	
J0322B	
J0322C	
J0322D	
J0805	
J1554A	
J1555A	
K261	
J0004	
J1398A	
J0911	
J0912	
41KC-3	
J1261A	
J1261B	
J1261C	
J1261D	
J0008	
B0635A	
B0657A	
B0636C*	
B0671A*	
MA24105A	
MA24106A	
MA24108A	
MA24118A	
MA24126A	
Z0975A	
Z1957A	

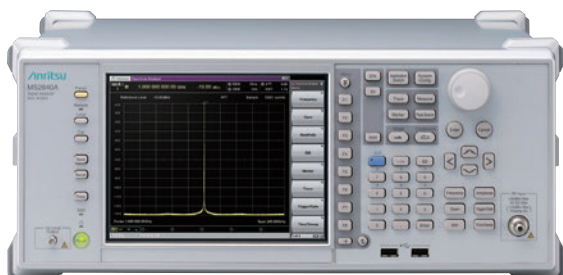
★: The Carrying Case B0636C includes the Front Panel Protective Cover (B0671A)

Signal Analyzer MS2850A Related Products

Signal Analyzer MS2840A

9 kHz to 3.6 GHz/6 GHz/26.5 GHz/44.5 GHz/325 GHz (with external mixer)
Analysis bandwidth: 31.25 MHz (Standard), Max. 125 MHz (Option)

The MS2840A is a mid-range spectrum analyzer/signal analyzer with excellent multi-functions and narrowband performance.



Features

- Dedicated low-phase-noise option for same phase noise performance as high-end instruments (3.6 GHz/6 GHz models).
- Monitor actual spectrum of mmWave transmitters and excellent phase noise performance and DANL using high-performance waveguide mixer (50 GHz to 90 GHz) (26.5 GHz/44.5 GHz models).
- Versatile measurement options including phase noise measurement function, vector modulation analysis, analog modulation (FM, Φ M, AM) analysis, built-in signal generator, noise figure (NF) measurement, Noise Floor Reduction.
- High cost-performance substitute for aging high-end models.

Signal Analyzer MS2830A

9 kHz to 3.6 GHz/6 GHz/13.5 GHz/26.5 GHz/43 GHz/325 GHz (with external mixer)
Analysis bandwidth: 31.25 MHz (Standard), Max. 125 MHz (Option)

The MS2830A is a mid-range signal analyzer/spectrum analyzer with excellent versatility and cost-performance.



Features

- Both vector and analog signal generators can be built-in. All-in-one TRx evaluations of digital and analog radios are supported in combination with the BER measurement function, and built-in audio analyzer, etc. BER.
- Versatile measurement options include digital modulation analysis for LTE/LTE-Advanced, WLAN, etc., vector modulation analysis, analog modulation analysis (FM, Φ M, AM), NF measurements, internal signal generator tracking and more.
- The Capture&Playback function using the vector signal generator can replay the onsite radio-wave environment.

Signal Analyzer MS2690A/MS2691A/MS2692A

50 Hz to 6 GHz/13.5 GHz/26.5 GHz
Analysis bandwidth: 31.25 MHz (Standard), Max. 125 MHz (Option)

With excellent phase noise performance, dynamic range, and measurement level accuracy, this is a high-standard signal analyzer/spectrum analyzer.



Features

- The baseband can be extended to 6 GHz and the built-in calibration oscillator supports excellent measurement level accuracy and modulation accuracy from 50 Hz to 6 GHz.
- A vector signal generator can be installed. All-in-one TRx evaluations of digital radio are supported in combination with the BER measurement function, etc.
- Versatile measurement options include digital modulation analysis for LTE/LTE-Advanced, WLAN, etc., vector modulation analysis, NF measurements, and more.
- The Capture&Playback function using the vector signal generator can replay the onsite radio-wave environment.
- The compact design cuts the benchtop footprint.

Note:



Specifications are subject to change without notice.

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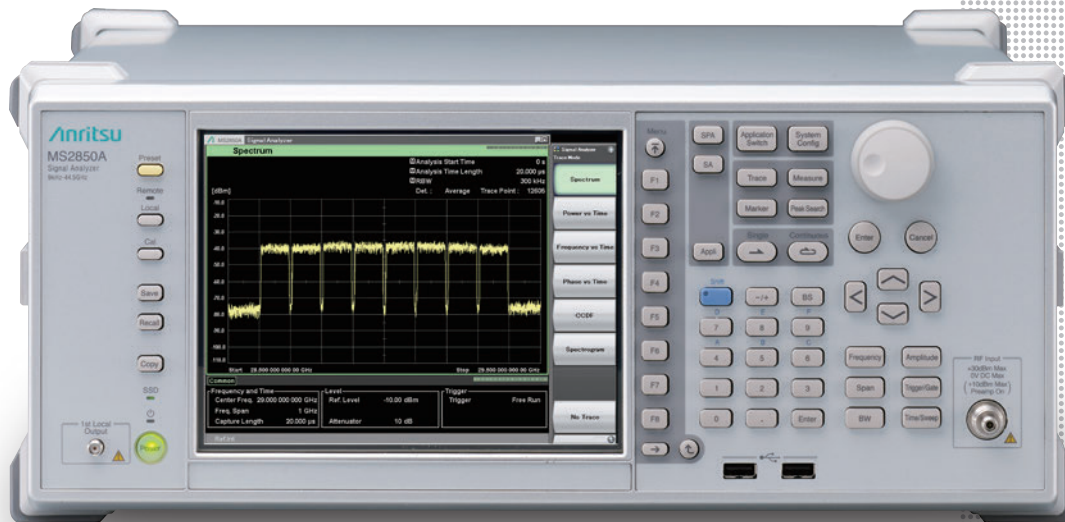
Anritsu envision : ensure

Signal Analyzer

MS2850A

MS2850A-047: 9 kHz to 32 GHz

MS2850A-046: 9 kHz to 44.5 GHz



Signal Analyzer MS2850A

This explains how to order the new MS2850A and MS2850A retrofit options and measurement software.
Follow the steps below to select the MS2850A configuration.
Functions marked "standard" are built-in. Options and measurement software can be added as necessary.

Steps for New Purchase

Step 1. Select Maximum Frequency Range (Required option; Frequency range not upgradeable.)

Outline	Option No.	Additional Information
Frequency range: 9 kHz to 32 GHz	MS2850A-047	Spectrum Analyzer/Signal Analyzer (Analysis Bandwidth 255 MHz)
Frequency range: 9 kHz to 44.5 GHz	MS2850A-046	

The following options are installed as standard and do not require separate orders when ordering the MS2850A-046/047.

Standard Software	MX269000 A
Analysis Bandwidth 255 MHz	MS2850A-032
Microwave Preselector Bypass	MS2850A-067

Step 2. Select Analysis Bandwidth

Outline	Option No.	Additional Information
Analysis Bandwidth 255 MHz	Standard	
Analysis Bandwidth Extension to 510 MHz	MS2850A-033	
Analysis Bandwidth Extension to 1 GHz	MS2850A-034	Requires MS2850A-033

Step 3. Add Measurement Software

Outline	Option No.	Additional Information
5G Standard Measurement Software (Base License)	MX285051A	This license can't be used alone. Requires MX285051A-001 and/or 051
Pre-Standard CP-OFDM Downlink	MX285051A-001	Requires MX285051A
Pre-Standard CP-OFDM Uplink	MX285051A-051	Requires MX285051A
W-CDMA/HSPA Downlink Measurement Software	MX269011A	
W-CDMA/HSPA Uplink Measurement Software	MX269012A	
GSM/EDGE Measurement Software	MX269013A	
EDGE Evolution Measurement Software	MX269013A-001	Requires MX269013A
TD-SCDMA Measurement Software	MX269015A	
Vector Modulation Analysis Software	MX269017A*	
LTE Downlink Measurement Software	MX269020A	
LTE-Advanced FDD Downlink Measurement Software	MX269020A-001*	Requires MX269020A
LTE Uplink Measurement Software	MX269021A	
LTE-Advanced FDD Uplink Measurement Software	MX269021A-001*	Requires MX269021A
LTE TDD Downlink Measurement Software	MX269022A	
LTE-Advanced TDD Downlink Measurement Software	MX269022A-001*	Requires MX269022A
LTE TDD Uplink Measurement Software	MX269023A	
LTE-Advanced TDD Uplink Measurement Software	MX269023A-001*	Requires MX269023A

★: To be released in near future

Step 4. Add Other Signal Analyzer Options

Outline	Option No.	Additional Information
Phase Noise Measurement Function	MS2850A-010	Adds frequency offset range 10 Hz to 10 MHz phase noise measurement.
Noise Figure Measurement Function	MS2850A-017	Adds Noise Figure Measurement function. Noise Figure is measured with the measurement method of Y-factor method which uses a Noise Source*. ★: Noisecom, NC346 series
Microwave Preamplifier	MS2850A-068	Increases level sensitivity from 100 kHz to 32 GHz/44.5GHz
Low Second Harmonic Distortion	MS2850A-076	This option improves DANL and second harmonic distortion over 4 GHz when Preamp is Off and Microwave Preselector Bypass is Off.
Secondary Storage Device	MS2850A-011	This removable secondary SSD is installed in the secondary SSD Option Slot of the MS2850A main frame to expand the user data storage space. It does not have the Windows OS installed. The MS2850A ships with it installed. Only one expansion SSD can be installed in the MS2850A.

Signal Analyzer MS2850A

Step 5. Add Accessories

Outline	Option No.	Additional Information
Inline Peak Power Sensor (350 MHz to 4 GHz)	MA24105A	Supports 350 MHz to 4 GHz and operates on Windows.
USB Power Sensor (50 MHz to 6 GHz)	MA24106A	Supports 50 MHz to 6 GHz and operates on Windows.
Microwave USB Power Sensor (10 MHz to 8 GHz)	MA24108A	Supports 10 MHz to 8 GHz and operates on Windows.
Microwave USB Power Sensor (10 MHz to 18 GHz)	MA24118A	Supports 10 MHz to 18 GHz and operates on Windows.
Microwave USB Power Sensor (10 MHz to 26 GHz)	MA24126A	Supports 10 MHz to 26 GHz and operates on Windows.
High Performance Waveguide Mixer (50 GHz to 75 GHz)	MA2806A*	It has the good features of both a harmonic mixer and a down converter and is ideal for spectrum analysis of millimeter-wave (50 GHz to 75 GHz) wireless transmitters now being used for future wider-band applications, such as IEEE 802.11ad W-LAN modules and wireless backhaul, etc.
High Performance Waveguide Mixer (60 GHz to 90 GHz)	MA2808A*	It has the good features of both a harmonic mixer and a down converter and is ideal for spectrum analysis of millimeter-wave (60 GHz to 90 GHz) wireless transmitters now being used for future wider-band applications, such as wireless backhaul, automotive radar, etc.
External Mixer (26.5 GHz to 40 GHz)	MA2741C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (33 GHz to 50 GHz)	MA2742C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (40 GHz to 60 GHz)	MA2743C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (50 GHz to 75 GHz)	MA2744C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (60 GHz to 90 GHz)	MA2745C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (75 GHz to 110 GHz)	MA2746C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (90 GHz to 140 GHz)	MA2747C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (110 GHz to 170 GHz)	MA2748C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (140 GHz to 220 GHz)	MA2749C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (170 GHz to 260 GHz)	MA2750C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.
External Mixer (220 GHz to 325 GHz)	MA2751C*	It is a harmonic mixer for spectrum analysis of millimeter-wave transmitters.

*: To be released in near future

Signal Analyzer MS2850A

Retrofit to Current MS2850A

Hardware Option Retrofit

The following hardware options can be retrofitted. Order the Z1957A Installation Kit as well.
The MS2850A must be returned to the Anritsu plant for hardware retrofitting.

Model/Order No.		Name	Reference Steps
Hardware Options	MS2850A-133	Analysis Bandwidth Extension to 510 MHz Retrofit	2
	MS2850A-134	Analysis Bandwidth Extension to 1 GHz Retrofit	
	MS2850A-110	Phase Noise Measurement Function Retrofit	4
	MS2850A-117	Noise Figure Measurement Function Retrofit	
	MS2850A-168	Microwave Preamplifier Retrofit	
	MS2850A-176	Low Second Harmonic Distortion Retrofit	
	MS2850A-111	Secondary Storage Device Retrofit	
Application Parts	Z1957A	Installation Kit (Required when retrofitting options or installing software)	—

Software Option Retrofit

The following software options can be retrofitted. Order the Z1957A Installation Kit as well.
The MS2850A does not require return to the Anritsu plant for software retrofitting.

Model/Order No.		Name	Reference Steps
Measurement Software	MX285051A	5G Standard Measurement Software (Base License)	3
	MX285051A-001	Pre-Standard CP-OFDM Downlink	
	MX285051A-051	Pre-Standard CP-OFDM Uplink	
	MX269011A	W-CDMA/HSPA Downlink Measurement Software	
	MX269012A	W-CDMA/HSPA Uplink Measurement Software	
	MX269013A	GSM/EDGE Measurement Software	
	MX269013A-001	EDGE Evolution Measurement Software	
	MX269015A	TD-SCDMA Measurement Software	
	MX269017A*	Vector Modulation Analysis Software	
	MX269020A	LTE Downlink Measurement Software	
	MX269020A-001*	LTE-Advanced FDD Downlink Measurement Software	
	MX269021A	LTE Uplink Measurement Software	
	MX269021A-001*	LTE-Advanced FDD Uplink Measurement Software	
	MX269022A	LTE TDD Downlink Measurement Software	
	MX269022A-001*	LTE-Advanced TDD Downlink Measurement Software	
	MX269023A	LTE TDD Uplink Measurement Software	
	MX269023A-001*	LTE-Advanced TDD Uplink Measurement Software	
Application Parts	Z1957A	Installation Kit (Required when retrofitting options or installing software)	—

*: To be released in near future

Software Update

Software is updated regularly to add new functions, improve performance and fix bugs.
Download the latest software from the following URL. Register before use.

Software Download Site URL

<https://my.anritsu.com>

Signal Analyzer MS2850A

Options Configuration Guide

Hardware Configuration

Frequency range (MS2850A-046/047) not upgradable.

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

Option	Name	Retrofit	Addition to Main frame		Combination with "Option" (Refer to the left line)									
			MS2850A-046 (44.5 GHz model)	MS2850A-047 (32 GHz model)	MS2850A-032 (standard install)	MS2850A-033	MS2850A-034	MS2850A-011	MS2850A-017	MS2850A-067 (standard install)	MS2850A-068	MS2850A-076	MS2850A-010	
MS2850A-032	Analysis Bandwidth 255MHz	—	Standard install	Standard install										
MS2850A-033	Analysis Bandwidth Extension to 510 MHz	Yes	✓	✓										
MS2850A-034	Analysis Bandwidth Extension to 1 GHz	Yes	✓	✓		R								
MS2850A-010	Phase Noise Measurement Function	Yes	✓	✓										
MS2850A-017	Noise Figure Measurement Function	Yes	✓	✓							U			
MS2850A-067	Microwave Preselector Bypass	—	Standard install	Standard install										
MS2850A-068	Microwave Preamplifier	Yes	✓	✓										
MS2850A-076	Low Second Harmonic Distortion	Yes	✓	✓										
MS2850A-011	Secondary Storage Device	Yes	✓	✓										

Software Configuration

Option	Name	Addition to Main frame ✓ = Can be installed		Analysis Bandwidth option U = Upgrade		Note
		MS2850A-046 (44.5 GHz model)	MS2850A-047 (32 GHz model)	MS2850A-033 (510 MHz)	MS2850A-034 (1 GHz)	
MX285051A	5G Standard Measurement Software (Base License)	✓	✓	U	U	This license can't be used alone. Require MX285051A-001/051
MX285051A-001	Pre-Standard CP-OFDM Downlink	✓	✓	U	U	Require MX285051A
MX285051A-051	Pre-Standard CP-OFDM Uplink	✓	✓	U	U	Require MX285051A
MX269011A	W-CDMA/HSPA Downlink Measurement Software	✓	✓			
MX269012A	W-CDMA/HSPA Uplink Measurement Software	✓	✓			
MX269013A	GSM/EDGE Measurement Software	✓	✓			
MX269013A-001	EDGE Evolution Measurement Software	✓	✓			Require MX269013A
MX269015A	TD-SCDMA Measurement Software	✓	✓			
MX269020A	LTE Downlink Measurement Software	✓	✓			
MX269020A-001*	LTE-Advanced FDD Downlink Measurement Software	✓	✓			Require MX269020A
MX269021A	LTE Uplink Measurement Software	✓	✓			
MX269021A-001*	LTE-Advanced FDD Uplink Measurement Software	✓	✓			Require MX269021A
MX269022A	LTE TDD Downlink Measurement Software	✓	✓			
MX269022A-001*	LTE-Advanced TDD Downlink Measurement Software	✓	✓			Require MX269022A
MX269023A	LTE TDD Uplink Measurement Software	✓	✓			
MX269023A-001*	LTE-Advanced TDD Uplink Measurement Software	✓	✓			Require MX269023A
MX269017A*	Vector Modulation Analysis Software	✓	✓			

✱: To be released in near future

Signal Analyzer MS2850A 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
MS2850A	Main Frame Signal Analyzer
	Standard accessories
P0031A	Power Cord: 1 pc
Z0541A	USB Memory (≥1 GB): 1 pc
	USB Mouse: 1 pc
	Install DVD-ROM (Application software, instruction manual DVD-ROM): 1 pc
	Options
MS2850A-047	32 GHz Signal Analyzer
MS2850A-046	44.5 GHz Signal Analyzer
MS2850A-033	Analysis Bandwidth Extension 510 MHz
MS2850A-034	Analysis Bandwidth Extension 1 GHz
MS2850A-010	Phase Noise Measurement Function
MS2850A-017	Noise Figure Measurement Function
MS2850A-068	Microwave Preamplifier
MS2850A-076	Low Second Harmonic Distortion
MS2850A-011	Secondary Storage Device
	Retrofit options
MS2850A-133	Analysis Bandwidth Extension 510 MHz Retrofit
MS2850A-134	Analysis Bandwidth Extension 1 GHz Retrofit
MS2850A-110	Phase Noise Measurement Function Retrofit
MS2850A-117	Noise Figure Measurement Function Retrofit
MS2850A-168	Microwave Preamplifier Retrofit
MS2850A-176	Low Second Harmonic Distortion Retrofit
MS2850A-111	Secondary Storage Device Retrofit
	Software options
MX285051A	DVD-ROM with License and Operation manuals
	5G Standard Measurement Software (Base License)
	(Requires MX285051A-001 and/or 051)
MX285051A-001	Pre-Standard CP-OFDM Downlink
	(Requires MX285051A)
MX285051A-051	Pre-Standard CP-OFDM Uplink (Requires MX285051A)
MX269011A	W-CDMA/HSPA Downlink Measurement Software
MX269012A	W-CDMA/HSPA Uplink Measurement Software
MX269013A	GSM/EDGE Measurement Software
MX269013A-001	EDGE Evolution Measurement Software
	(Requires MX269013A)
MX269015A	TD-SCDMA Measurement Software
MX269017A*	Vector Modulation Analysis Software
MX269020A	LTE Downlink Measurement Software
MX269020A-001*	LTE-Advanced FDD Downlink Measurement Software
	(Requires MX269020A)
MX269021A	LTE Uplink Measurement Software
MX269021A-001*	LTE-Advanced FDD Uplink Measurement Software
	(Requires MX269021A)
MX269022A	LTE TDD Downlink Measurement Software
MX269022A-001*	LTE-Advanced TDD Downlink Measurement Software
	(Requires MX269022A)
MX269023A	LTE TDD Uplink Measurement Software
MX269023A-001*	LTE-Advanced TDD Uplink Measurement Software
	(Requires MX269023A)
	Warranty service
MS2850A-ES210	2 years Extended Warranty Service
MS2850A-ES310	3 years Extended Warranty Service
MS2850A-ES510	5 years Extended Warranty Service

Model/Order No.	Name
	Application parts
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)
MA2806A*	High Performance Waveguide Mixer (50 to 75 GHz)
MA2808A*	High Performance Waveguide Mixer (60 to 90 GHz)
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)

★: To be released in near future

The following options are installed as standard and do not require separate orders when ordering the MS2850A-046/047.

Standard Software	MX269000A
Analysis Bandwidth 255 MHz	MS2850A-032
Microwave Preselector Bypass	MS2850A-067

Requires Installation Kit Z1957A when retrofitting options or installing software.

The instruction manuals are published on our website except some.

Note:



Specifications are subject to change without notice.

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