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

1GHz

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, single carrier, 28 GHz (meas.)

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 (standard)
                       510 MHz (option), 1 GHz (option)
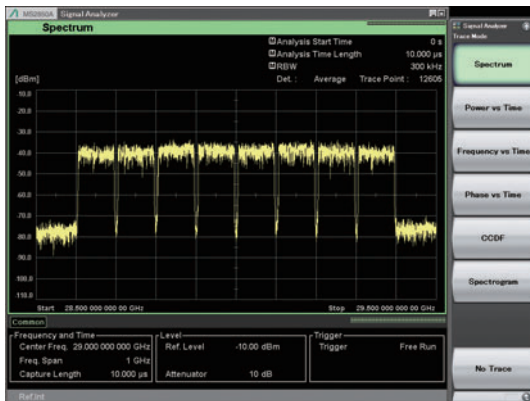
Spectrum of eight 100 MHz bandwidth carriers at 29 GHz center frequency

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. means value measured as design stage but not guaranteed specification
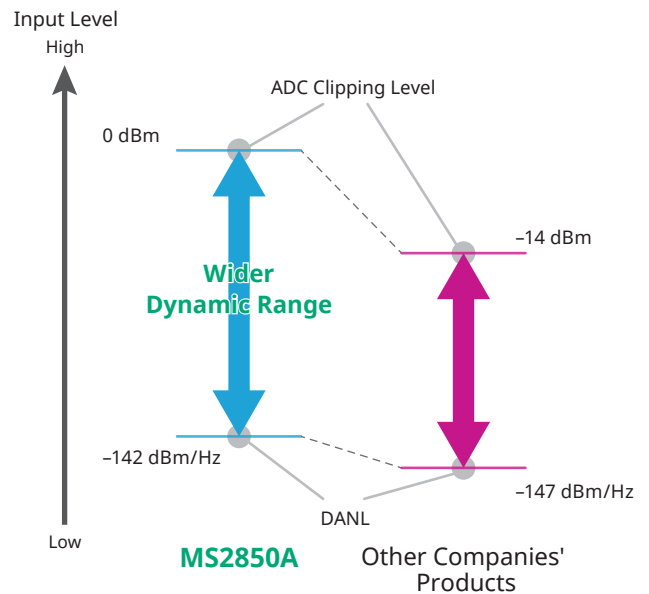
The measurement dynamic range widens if the ADC clipping level is high even when the DANL is quite high.

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 ≤ Frequency < 4.2 GHz: −60 dBc (nom.)
  4.2 GHz ≤ Frequency ≤ 44.5 GHz: −70 dBc (nom.)

4

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.

Standard		Model/Name	Channel Bandwidth (1CC)	Multi Carrier Measurement
V5G (Verizon 5GTF)		Pre-Standard CP-OFDM Downlink MX285051A-001 Pre-Standard CP-OFDM Uplink MX285051A-051	Up to 100 MHz	Support
5G NR (3GPP TS 38.211)	sub-6 GHz	NR TDD sub-6 GHz Downlink MX285051A-011 NR TDD sub-6 GHz Uplink MX285051A-061 NR FDD sub-6 GHz Downlink MX285051A-031 NR FDD sub-6 GHz Uplink MX285051A-081	Up to 100 MHz	Downlink only (Up to 2 carriers)
	mmWave	NR TDD mmWave Downlink MX285051A-021 NR TDD mmWave Uplink MX285051A-071	Up to 400 MHz	Downlink only (Up to 8 carriers)

All-in-One V5G/5G NR (sub-6 GHz/mmWave) Coverage

Adding the MS2850A software option provides support for both V5G and 5G NR (sub-6 GHz/mmWave).
The MX285051A software measures the RF characteristics of both downlink and uplink signals proposed for applications ranging from 5G demonstration tests to actual 5G NR use.

Frequency Setting Range:
  100 MHz to 32 GHz (with MS2850A-047 installed)
  100 MHz to 44.5 GHz (with MS2850A-046 installed)

Excellent EVM Performance for Applications Ranging from R&D to Manufacturing

The residual EVM performance in combination with the MS2850A is better than 1%[1], helping minimize the measuring instrument effect and improving the quality of 5G wireless systems at lower equipment cost

Easy Operability Improves Measurement and Test Efficiency

The one-button Auto Range function optimizes the complex built-in attenuator settings required for more accurate EVM measurement.

Basic Screen (EVM vs. Subcarrier)

More Efficient R&D and Manufacturing

Evaluation and manufacturing are more efficient thanks to fast collection of measurement results. Measurement speeds are about 10% faster (at 10 averaging) than the V5G software.

Multicarrier Analysis and Batch Measurement at 1 GHz[2]

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.

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

Timing Difference Measurement[3]

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.
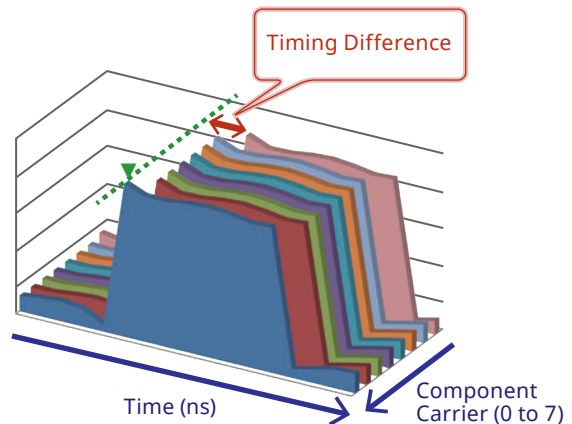
*1: At 100 MHz, single carrier, 28 GHz (meas.)
*2: Supported using MX285051A-001/021/051
*3: Supported using MX285051A-001/011/021/031/051

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)
External Mixer (Harmonic, 26.5 GHz to 325 GHz)
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*			✓
Modulation Analysis (5G, LTE, etc.)			✓
Phase Noise Measurement			✓
Noise Figure (NF) Measurement			✓
mmWave-band Spectrum Measurement using External Mixer Connection (sold separately)	✓	✓	✓

*: Connected to USB power sensor sold separately

Signal Analyzer MS2850A Functions

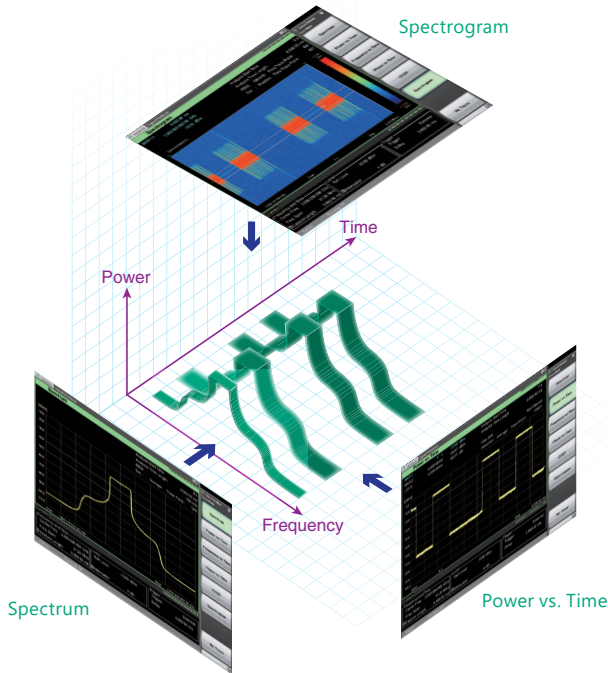## Signal Analyzer Functions (Standard)

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

Spectrogram

Time

Power

Frequency

Spectrum

Power vs. Time

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.)

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.

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.

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.

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.

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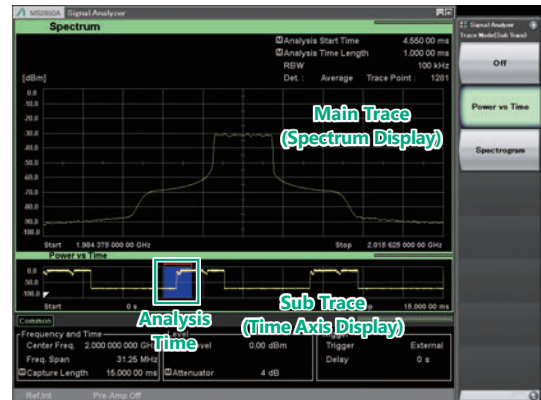-trace) and frequency axis (main trace) is useful for visually confirming when spectrum waveform distortion components (adjacent channel components, etc.) occur in the time domain.

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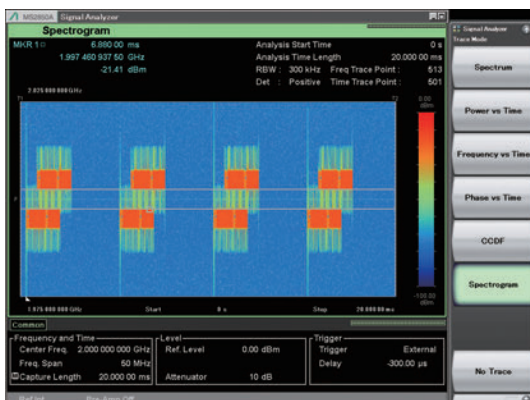
APD (Amplitude Probability Density):
The APD display indicates the probability distribution of transient power

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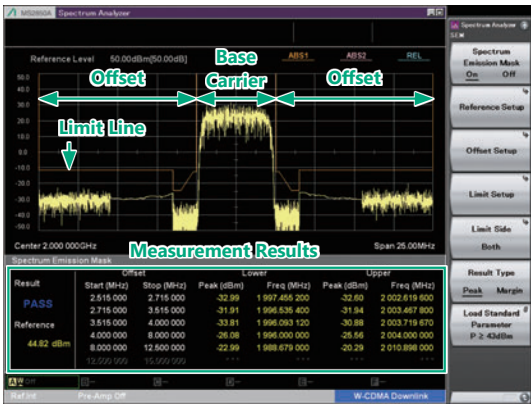
Measurement Results
- Peak power (or margin) at offset
- Each peak frequency

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
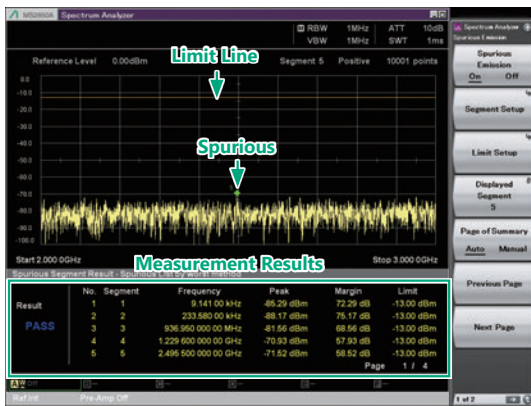
Multi-marker & Marker List

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.
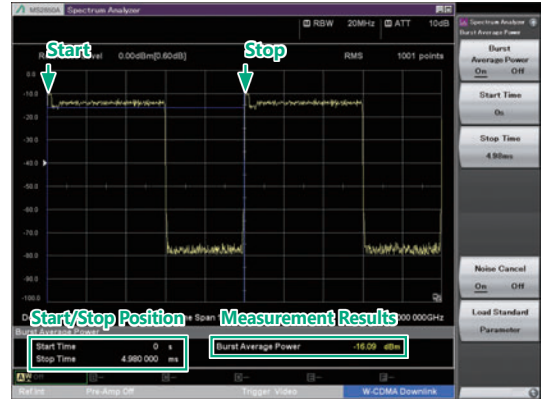
Highest 10 Markers

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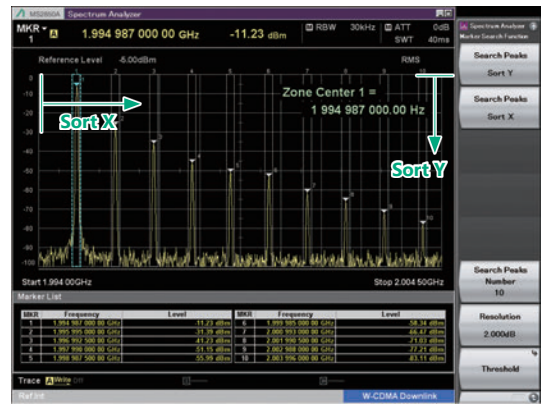
Gate View

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.
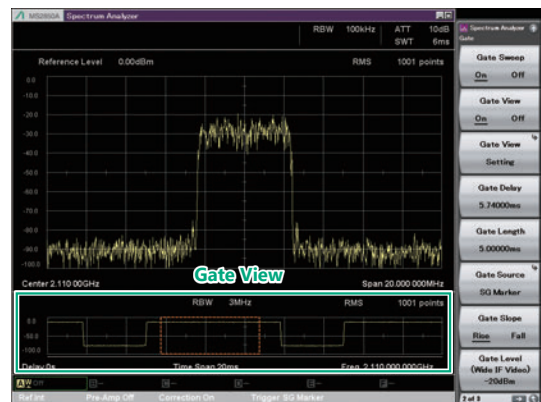
Signal Analyzer MS2850A Functions

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)**

External Interface for High Speed Data Transfer PCIe (MS2850A-053)
External Interface for High Speed Data Transfer USB3.0 (MS2850A-054)

The digitized data captured by the main unit is transferred at high speed to the PC, helping improve development efficiency and lower production costs.
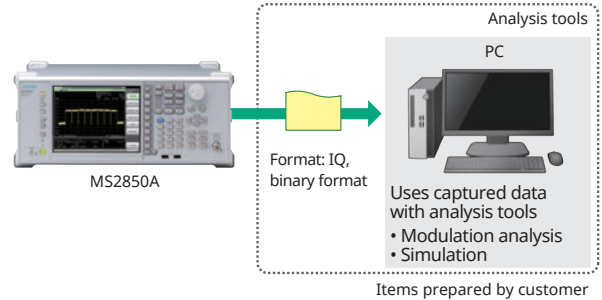
IQ Data Transfer Speed (Reference Value)
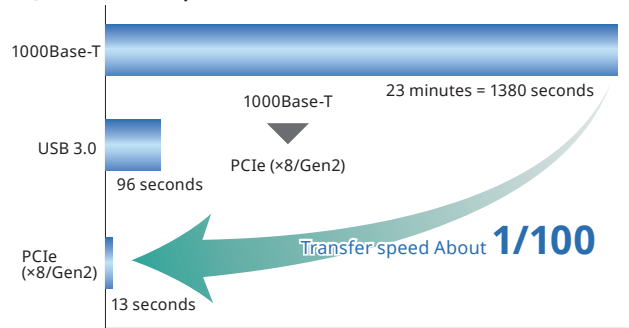
Time required to transfer 32 GB* of IQ data
*: MS2850A maximum IQ data transfer size
Equivalent to about 3 seconds of digitized data at Span: 1 GHz

Noise Floor Reduction (MS2850A-051)

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

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

High Performance Waveguide Mixer/External Mixers (Harmonic Mixers)

Two types of mixer can be connected to the MS2850A series (32 GHz/44.5 GHz models) 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, High Performance Waveguide Mixer are ideal for analyzing the true spectrum of millimeter-wave-band transmitters due to its excellent wide dynamic range.

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

The widest analysis bandwidth of MS2850A is 510 MHz when connecting MS2850A to MA2806A/MA280808A.

Features
- Wide dynamic range based on excellent minimum sensitivity and P1dB performance
- Image-response-free measurement of wideband signals plus high IF frequency and PS function
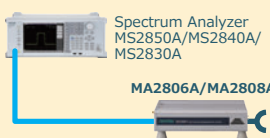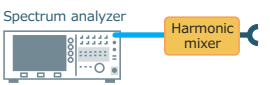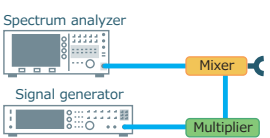
MA2808A

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 MS2850A series (32 GHz/44.5 GHz models) the display average noise performance level is excellent at –150 dBm/Hz (meas.)* at 75 GHz.
Due to this wide dynamic range, the MA2806A and MA2808A support evaluation of the true spurious performance of wider-band, millimeterwave wireless transmitters as well as various types of millimeter-wave equipment that cannot be evaluated accurately using conventional harmonic-mixer and down-converter methods.
Connection to the MS2850A series (32 GHz/44.5 GHz models) 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 MS2850A series for reflection in the measured values.

*: Value measured at design but not guaranteed specification.

Measurement Method Performance Comparison

Measurement Method	Product Selection Points				
	Min. Sensitivity	Image Response	P1dB	System Config	Mixer Conversion Loss Calibration
Anritsu Solution Spectrum Analyzer MS2850A/MS2840A/MS2830A MA2806A/MA2808A	✔ Good	✔ Far	✔ High	✔ Simple	✔ No Need
Harmonic Mixer Spectrum analyzer Harmonic mixer	▬ Bad *1	▬ Very Close *2	✔ High	✔ Simple	✔ No Need *4
Down Converter Spectrum analyzer Mixer Signal generator Multiplier	✔ Good	✔✔ Very Far	▬ Low *3	▬ Complex	▬ Need *5

*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

Signal Analyzer MS2850A Functions

High Performance Waveguide Mixer/External Mixers (Harmonic Mixers)

External Mixers (Harmonic Mixers)

Connecting the MS2850A to the MA2740C/MA2750C series of External Mixers (Harmonic Mixers) supports spectrum measurements up to 325 GHz with low costs.

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

MS2850A-046/047

DUT

1st Local Output
Connector: SMA-J, 50Ω (nom.)
Local Signal Output: 5 GHz to 10 GHz
IF Signal Frequency: 1.875 GHz
Operating LO level range: +10 to +18 dBm

SMA Cable
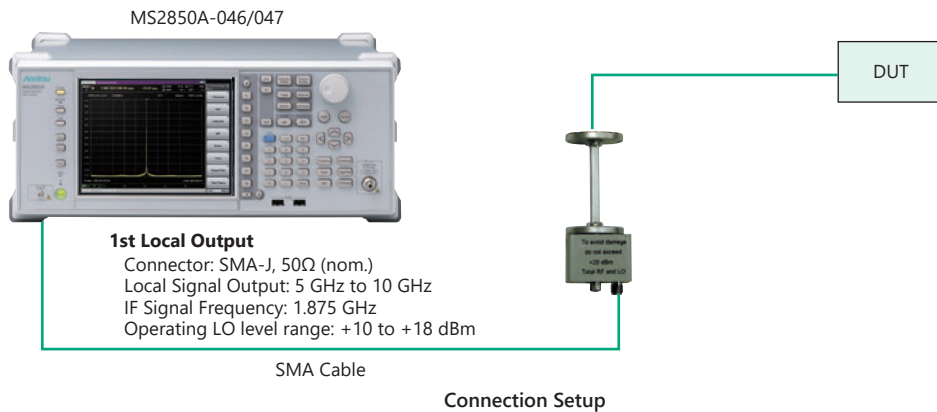
Connection Setup

FFT Analysis in Millimeter Wave Band

The signal-analyzer functions can be used by connecting either the High-Performance Waveguide mixer or an external mixer. This helps improve troubleshooting efficiency when confirming transient phenomena, such as a degraded spectrum that cannot be captured using a sweep-type spectrum analyzer.

Additionally, MS2850A supports down converting signals up to a maximum bandwidth of 2.5 GHz through IF out port. This can be used as down convertor when performing modulation analysis by digitizing with an oscilloscope, etc.

	Maximum Bandwidth set by MS2850A	Maximum Bandwidth as Down Converter
High Performance Waveguide Mixer MA2806A/MA2808A	510 MHz[1]	510 MHz[1]
External Mixer MA2740C/MA2750C Series	1 GHz	2.5 GHz

*1: The widest analysis bandwidth of MS2850A is 510 MHz.

Measurement image: Down convert signals with 80 GHz center frequency and 2.5 GHz[2] bandwidth to 1.95 GHz

MS2850A-046/047

DUT

Center Frequency
80 GHz

Bandwidth 2.5 GHz

IF Output:
1.95 GHz

Oscilloscope

1.95 GHz

Bandwidth 2.5 GHz[2]
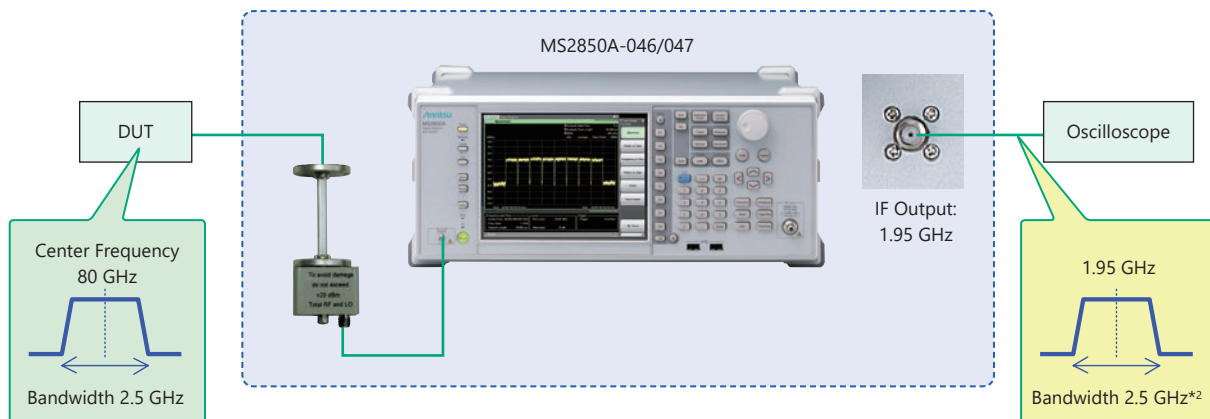
*2: When using external mixer bands (MA2740C/MA2750C Series), or using internal micro frequency bands (Band; 3 to 9) with Microwave Preselector Bypass
   MS2850A-067: On

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)
NR TDD sub-6 GHz Downlink (MX285051A-011)
NR TDD sub-6 GHz Uplink (MX285051A-061)
NR FDD sub-6 GHz Downlink (MX285051A-031)
NR FDD sub-6 GHz Uplink (MX285051A-081)
NR TDD mmWave Downlink (MX285051A-021)
NR TDD mmWave Uplink (MX285051A-071)
This software is for measuring the RF Tx characteristics of 5G base stations and terminals.

Vector Signal Analysis Software (MX269017A)
APSK Analysis (MX269017A-001)
Higher-Order QAM Analysis (MX269017A-011)
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, π/4 DQPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 2FSK, 4FSK, 2ASK, 4ASK, H-CPM, MSK

The software options as below are required.

Option	Modulation
MX269017A-001	16APSK, 32APSK
MX269017A-011	512QAM, 1024QAM, 2048QAM

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.

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

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
Tx Total Power	dBm		✓	Displays total power of all carriers
Tx Power Flatness	dB		✓	Displays maximum power difference between carriers
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	✓	✓

Signal Analyzer MS2850A Functions

Software Options

5G Standard Measurement Software (Base License)	**MX285051A**		
NR TDD sub-6 GHz Downlink	**MX285051A-011**	**NR TDD sub-6 GHz Uplink**	**MX285051A-061**
NR FDD sub-6 GHz Downlink	**MX285051A-031**	**NR FDD sub-6 GHz Uplink**	**MX285051A-081**
NR TDD mmWave Downlink	**MX285051A-021**	**NR TDD mmWave Uplink**	**MX285051A-071**

The 5G measurement software are installed in the MS2850A for developing and manufacturing 5G radio equipment.
They support analyses of both uplink and downlink signals used by the sub-6 GHz and mmWave bands in the 5G NR standards by specifying combinations of multiple component carriers (up to 400 MHz) and subcarrier spacing.

Features
● **All-in-one sub-6 GHz and mmWave Coverage**
Both 5G NR sub-6 GHz and mmWave are covered by installing the MX285051A options.
Setting Frequency Ranges: 100 MHz to 32 GHz (with MS2850A-047 installed), 100 MHz to 44.5 GHz (with MS2850A-046 installed)

Supported Measurement Functions

Supported Software	Modulation Analysis	Carrier Aggregation Analysis	Power vs. Time
NR TDD sub-6 GHz Downlink MX285051A-011	✓	✓	✓
NR FDD sub-6 GHz Downlink MX285051A-031	✓	✓	—
NR FDD mmW Downlink MX285051A-021	✓	✓	✓
NR TDD sub-6 GHz Uplink MX285051A-061	✓	—	—
NR FDD sub-6 GHz Uplink MX285051A-081	✓	—	—
NR FDD mmW Uplink MX285051A-071	✓	—	—

● **Easy operability for higher measurement/test efficiency**
• The Phy channel can be measured simply by specifying the measured test model.

Easy physical channel setting by selecting test model name

Auto-detect function eliminates setting problems

In addition to the 3GPP-defined TDD Configuration, the TDD Configuration signal in actual use can be measured easily using the auto-detect function

• The one-button Auto Range function optimizes the complex built-in attenuator settings, required for more accurate EVM measurement.

• This function makes it easy to measure Channel Power, OBW, ACLR and SEM.
The measurement software calls Signal Analyzer function and the measurement performed according to the handed over parameter settings.

• Power vs. Time measurements are supported.
Off power and Transient period measurements are supported in both sub-6 GHz and mmWave that are required for 3GPP TS 38.141-1/2 specified Transient On/Off Power.
The measurement results are displayed with Power vs. Time graph.

Signal Analyzer MS2850A Functions

Software Options

● **All-at-Once Measurement and Analysis of 8 CCs max in 1-GHz Analysis Bandwidth**

Combined use with the Analysis Bandwidth Extension to 1 GHz option (MS2850A-034) supports all-at-once measurement of up to 8 CCs (8 carriers × 100 MHz). Since this eliminates individual measurement of multiple component carriers, the characteristics of single carriers can be evaluated in shorter times.

Additionally, all-at-once measurement of all carriers not only supports EVM and frequency error measurements for each carrier but also enables time difference measurements for each carrier.

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

All-at-One Multi-carrier Measurement Software

Supported Software	Analysis Bandwidth Extension Option	Channel Bandwidth	Max. Component Carrier Count
NR TDD sub-6 GHz Downlink MX285051A-011 NR FDD sub-6 GHz Downlink MX285051A-031	Not installed (Max. Analysis Bandwidth: 255 MHz) MS2850A-033 (Max. Analysis Bandwidth: 510 MHz) MS2850A-034 (Max. Analysis Bandwidth: 1 GHz)	5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz	2
NR TDD mmW Downlink MX285051A-021	Not installed (Max. Analysis Bandwidth: 255 MHz)	50 MHz	5
		100 MHz	2
		200 MHz	1
	MS2850A-033 (Max. Analysis Bandwidth: 510 MHz)	50 MHz	8
		100 MHz	5
		200 MHz	2
		400 MHz	1
	MS2850A-034 (Max. Analysis Bandwidth: 1 GHz)	50 MHz	8
		100 MHz	8
		200 MHz	4
		400 MHz	2

Signal Analyzer MS2850A Functions

Software Options

Numeric Results

Name	Unit	Modulation Analysis	Carrier Aggregation Analysis	Power vs. Time	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 (External Trigger)	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 Quad Error	deg.	✓			Displays IQ Quadrature Error
Downlink					
P-SS	%, dB, dBm	✓			Displays average EVM (rms) and maximum EVM (peak) as well as S-SS · average power (dBm) for each PHY channel
S-SS		✓			
PBCH		✓			
DM-RS (PBCH)		✓			
PDSCH		✓			
DM-RS (PDSCH)		✓			
PDCCH		✓			
DM-RS (PDCCH)		✓			
Cell ID	—	✓			Displays Cell ID
OFDM Symbol Tx Power	—	✓			Displays OSTP
On Power	dBm, W			✓	Displays average On power
Off Power	dBm, W			✓	Displays average Off power
On/Off Ratio	dB			✓	Display On/Off power ratio
Power	dBm			✓	Displays Block Tx power
Ramp up	μs			✓	Displays signal rise time (only On sections)
Ramp down	μs			✓	Displays signal fall time (only On sections)
Uplink					
PUSCH	%, dB, dBm	✓			Displays average EVM (rms) and maximum EVM (peak) as well as S-SS · average power (dBm) for each PHY channel
DM-RS (PUSCH)		✓			

Graph Displays

Name	Modulation Analysis	Carrier Aggregation Analysis	Power vs. Time
Constellation	✓		
EVM vs. Subcarrier	✓		
EVM vs. Symbol	✓		
Spectral Flatness (Amplitude/Phase)	✓		
Power vs. RB	✓	✓	
EVM vs. RB	✓	✓	
Summary	✓	✓	
Power vs. Time			✓

Signal Analyzer MS2850A Functions

Software Options

Standard	3GPP TS 38.211 (2019-06)					
Model/Name	NR TDD sub-6 GHz Downlink MX285051A-011	NR FDD sub-6 GHz Downlink MX285051A-031	NR TDD mmW Downlink MX285051A-021	NR TDD sub-6 GHz Uplink MX285051A-061	NR FDD sub-6 GHz Uplink MX285051A-081	NR TDD mmW Uplink MX285051A-071
Measurement Frequency Range	800 MHz to 5 GHz	400 MHz to 6 GHz	28 GHz	800 MHz to 5 GHz	400 MHz to 6 GHz	28 GHz
Frequency Range	100 MHz to 32 GHz (MS2850A-047) 100 MHz to 44.5 GHz (MS2850A-046)					
Test Model	NR-FR1-TM1.1, NR-FR1-TM1.2, NR-FR1-TM2, NR-FR1-TM2a, NR-FR1-TM3.1, NR-FR1-TM3.1a, NR-FR1-TM3.2, NR-FR1-TM3.3		NR-FR2-TM1.1, NR-FR2-TM2, NR-FR2-TM3.1	—		
Subcarrier Spacing (SCS)	15 kHz, 30 kHz, 60 kHz		60 kHz, 120 kHz	15 kHz, 30 kHz, 60 kHz		60 kHz, 120 kHz
Channel Bandwidth	5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz		50, 100, 200, 400 MHz	5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz		50, 100, 200, 400 MHz
Modulation	CP-OFDM QPSK, 16QAM, 64QAM, 256QAM, Auto			CP-OFDM/DFT-S-OFDM PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM, Auto		
Measurement Channel	SS-Block, PDSCH, PDCCH, PT-RS for PDSCH			PUSCH, PT-RS for PUSCH		
Component Carrier — Maximum Number of CCs	2	2	8	1	1	1
Component Carrier — Channel Bandwidth of each CC	to 100 MHz	to 100 MHz	50, 100 MHz	to 100 MHz	to 100 MHz	to 400 MHz

RB Number Table

The channel bandwidth is defined in accordance with SCS and RB.

		NR TDD/FDD sub-6 GHz DL/UL Channel Bandwidth [MHz] (1CC)												
		5	10	15	30	20	25	40	50	60	70	80	90	100
SCS [kHz]	15	25	52	79	160	106	133	216	270	N.A	N.A	N.A	N.A	N.A
	30	11	24	38	78	51	65	106	133	162	189	217	245	273
	60	N.A	11	18	24	31	38	51	65	79	93	107	121	135

		NR TDD mmWave DL/UL Channel Bandwidth [MHz] (1CC)			
		50	100	200	400
SCS [kHz]	60	66	132	264	N.A
	120	32	66	132	264

Channel Bandwidth

The maximum channel bandwidth is determined by the Analysis Bandwidth option.

		Maximum Analysis Bandwidth
MS2850A	Standard	255 MHz
	MS2850A-033	510 MHz
	MS2850A-034	1 GHz

Signal Analyzer MS2850A Functions

Software Options

5G Standard Measurement Software (Base License)	**MX285051A**
NR TDD sub-6 GHz Downlink	**MX285051A-011**
NR TDD sub-6 GHz Uplink	**MX285051A-061**

Specifications

Signal Analyzer		MS2850A	
Option		NR TDD sub-6 GHz Downlink MX285051A-011	NR TDD sub-6 GHz Uplink MX285051A-061
Electrical Characteristics	Target Signals	TS 38.211 Sub-6 GHz compliant downlink signal	TS 38.211 Sub 6-GHz compliant uplink signal
	Channel Bandwidth	Subcarrier Spacing / Channel Bandwidth: **15 kHz**: 5 MHz (RB: 25), 10 MHz (RB: 52), 15 MHz (RB: 79), 20 MHz (RB: 106), 25 MHz (RB: 133), 30 MHz (RB: 160), 40 MHz (RB: 216), 50 MHz (RB: 270) **30 kHz**: 5 MHz (RB: 11), 10 MHz (RB: 24), 15 MHz (RB: 38), 20 MHz (RB: 51), 25 MHz (RB: 65), 30 MHz (RB: 78), 40 MHz (RB: 106), 50 MHz (RB: 133), 60 MHz (RB: 162), 70 MHz (RB: 189), 80 MHz (RB: 217), 90 MHz (RB: 245), 100 MHz (RB: 273) **60 kHz**: 10 MHz (RB: 11), 15 MHz (RB: 18), 20 MHz (RB: 24), 25 MHz (RB: 31), 30 MHz (RB: 38), 40 MHz (RB: 51), 50 MHz (RB: 65), 60 MHz (RB: 79), 70 MHz (RB: 93), 80 MHz (RB: 107), 90 MHz (RB: 121), 100 MHz (RB: 135)	
	Capture Time	1 to 2 Frame	
	Frequency Setting Range	MS2850A-047: 100 MHz to 32 GHz MS2850A-046: 100 MHz to 44.5 GHz	
	Measurement Frequency Range	800 MHz to 5 GHz	
Modulation/ Frequency Measurement	Measurement Level Range	−10 to +30 dBm (Preamp Off, or Preamp not installed) −30 to +10 dBm (Preamp On)	
	Carrier Frequency Measurement Accuracy	At 18°C to 28°C, After calibration, EVM = 1% (rms) signal 1 Frame at downlink signal Only 1 carrier of 100 MHz width (Subcarrier Spacing: 30 kHz) or 50 MHz width (Subcarrier Spacing: 15 kHz) at center frequency ± (Accuracy of reference frequency × carrier frequency + 10) Hz	At 18°C to 28°C, After calibration, EVM = 1% (rms) signal 1 Frame at uplink signal Only 1 carrier of 100 MHz width (Subcarrier Spacing: 30 kHz) or 50 MHz width (Subcarrier Spacing: 15 kHz) at center frequency ± (Accuracy of reference frequency × carrier frequency + 10) Hz
	Residual Vector Error	At 18°C to 28°C, After calibration 1 Frame at downlink signal Only 1 carrier of 100 MHz width (Subcarrier Spacing: 30 kHz) or 50 MHz width (Subcarrier Spacing: 15 kHz) at center frequency ≤1.0%	At 18°C to 28°C, After calibration 1 Frame at uplink signal Only 1 carrier of 100 MHz width (Subcarrier Spacing: 30 kHz) or 50 MHz width (Subcarrier Spacing: 15 kHz) at center frequency ≤1.0%
Amplitude Measurement	Measurement Level Range	−10 to +30 dBm (Preamp Off, or Preamp not installed) −30 to +10 dBm (Preamp On)	
	Tx Power Measurement Accuracy (This is found from root sum of squares (RSS) of absolute amplitude accuracy and in-band frequency characteristics of main frame.)	At 18°C to 28°C, After calibration, Input attenuator ≥10 dB Input signal within measurement level range and below value set at Input Level Only 1 carrier at center frequency (see table below)	
Waveform Display		Constellation, EVM vs. Subcarrier, EVM vs. Symbol, Spectral Flatness, Power vs. RB, EVM vs. RB, Power vs. Time (NR TDD sub-6 GHz Downlink MX285051A-011)	
Digitize Function	Function Overview	Supports output of captured waveform data to internal storage or external storage	
	Waveform Data	Format: I, Q (32 bit floating point binary format) Level: Assumes as $\sqrt{(I^2 + Q^2)} = 1$ for 0 dBm input Level accuracy: Same as absolute amplitude accuracy and in-band frequency characteristics of the signal analyzer	
	Replay Function	Analyzes traces of saved waveform data Format: I, Q (32 bit floating point binary format) Sampling Rate: (see table below)	
Power vs. Time Measurement	Displayed Average Noise	This is calculated up to 5 GHz from the Display Average Noise Level for the signal analyzer with MS2850A-033/034 option installed at no signal input and an ambient temperature range of 18°C to 28°C when Wide Dynamic Range = On, Noise Correction = On, Pre-AMP = On. −95 dBm/MHz (nominal)	—

Tx Power Measurement Accuracy:

Frequency Range	Preamp Off, or without Preamp	Preamp On
800 MHz ≤ Frequency < 4 GHz	±0.74 dB (nom.)	±1.27 dB (nom.)
4 GHz ≤ Frequency < 4.2 GHz	±1.48 dB (nom.)	±2.11 dB (nom.)
4.2 GHz ≤ Frequency ≤ 5 GHz	±1.45 dB (nom.)	±1.94 dB (nom.)

Replay Function Sampling Rate:

Channel Bandwidth	Without MS2850A-033	With MS2850A-033
≤100 MHz	162.5 MHz	162.5 MHz

Signal Analyzer MS2850A Functions

Software Options

5G Standard Measurement Software (Base License)	**MX285051A**
NR FDD sub-6 GHz Downlink	**MX285051A-031**
NR FDD sub-6 GHz Uplink	**MX285051A-081**

Specifications

Signal Analyzer		MS2850A	
Option		NR FDD sub-6 GHz Downlink MX285051A-031	NR FDD sub-6 GHz Uplink MX285051A-081
Electrical Characteristics	Target Signals	TS 38.211 Sub-6 GHz compliant downlink signal	TS 38.211 Sub 6-GHz compliant uplink signal
	Channel Bandwidth	Subcarrier Spacing / Channel Bandwidth: 15 kHz — 5 MHz (RB: 25), 10 MHz (RB: 52), 15 MHz (RB: 79), 20 MHz (RB: 106), 25 MHz (RB: 133), 30 MHz (RB: 160), 40 MHz (RB: 216), 50 MHz (RB: 270); 30 kHz — 5 MHz (RB: 11), 10 MHz (RB: 24), 15 MHz (RB: 38), 20 MHz (RB: 51), 25 MHz (RB: 65), 30 MHz (RB: 78), 40 MHz (RB: 106), 50 MHz (RB: 133), 60 MHz (RB: 162), 70 MHz (RB: 189), 80 MHz (RB: 217), 90 MHz (RB: 245), 100 MHz (RB: 273); 60 kHz — 10 MHz (RB: 11), 15 MHz (RB: 18), 20 MHz (RB: 24), 25 MHz (RB: 31), 30 MHz (RB: 38), 40 MHz (RB: 51), 50 MHz (RB: 65), 60 MHz (RB: 79), 70 MHz (RB: 93), 80 MHz (RB: 107), 90 MHz (RB: 121), 100 MHz (RB: 135)	
	Capture Time	1 to 2 Frame	
	Frequency Setting Range	MS2850A-047: 100 MHz to 32 GHz MS2850A-046: 100 MHz to 44.5 GHz	
	Measurement Frequency Range	400 MHz to 6 GHz	
Modulation/ Frequency Measurement	Measurement Level Range	−10 to +30 dBm (Preamp Off, or Preamp not installed) −30 to +10 dBm (Preamp On)	
	Carrier Frequency Measurement Accuracy	At 18°C to 28°C, After calibration, EVM = 1% (rms) signal 1 Frame at downlink signal Only 1 carrier of 100 MHz (Subcarrier Spacing: 30 kHz) width or 50 MHz (Subcarrier Spacing: 15 kHz) width at center frequency However, Only 1 carrier of 25 MHz (Subcarrier Spacing: 15 kHz, 30 kHz, 60 kHz) width at 400 MHz≤ frequency < 800 MHz ± (Accuracy of reference frequency × carrier frequency + 10) Hz	At 18°C to 28°C, After calibration, EVM = 1% (rms) signal 1 Frame at uplink signal Only 1 carrier of 100 MHz (Subcarrier Spacing: 30 kHz) width or 50 MHz (Subcarrier Spacing: 15 kHz) width at center frequency However, Only 1 carrier of 25 MHz (Subcarrier Spacing: 15 kHz, 30 kHz, 60 kHz) width at 400 MHz≤ frequency < 800 MHz ± (Accuracy of reference frequency × carrier frequency + 10) Hz
	Residual Vector Error	At 18°C to 28°C, After calibration, EVM = 1% (rms) signal 1 Frame at downlink signal Only 1 carrier of 100 MHz (Subcarrier Spacing: 30 kHz) width or 50 MHz (Subcarrier Spacing: 15 kHz) width at center frequency However, Only 1 carrier of 25 MHz (Subcarrier Spacing: 15 kHz, 30 kHz, 60 kHz) width at 400 MHz ≤ frequency < 800 MHz ≤1.0%	At 18°≤ to 28°C, After calibration, EVM = 1% (rms) signal 1 Frame at uplink signal Only 1 carrier of 100 MHz (Subcarrier Spacing: 30 kHz) width or 50 MHz (Subcarrier Spacing: 15 kHz) width at center frequency However, Only 1 carrier of 25 MHz (Subcarrier Spacing: 15 kHz, 30 kHz, 60 kHz) width at 400 MHz ≤ frequency < 800 MHz ≤1.0%
Amplitude Measurement	Measurement Level Range	−10 to +30 dBm (Preamp Off, or Preamp not installed) −30 to +10 dBm (Preamp On)	
	Tx Power Measurement Accuracy (This is found from root sum of squares (RSS) of absolute amplitude accuracy and in-band frequency characteristics of main frame.)	At 18°C to 28°C, After calibration, Input attenuator ≥10 dB Input signal within measurement level range and below value set at Input Level Only 1 carrier at center frequency	

Tx Power Measurement Accuracy table:

Frequency Range	Preamp Off, or without Preamp	Preamp On
400 MHz ≤ Frequency < 800 MHz	±0.72 dB (nom.)	±1.14 dB (nom.)
800 MHz ≤ Frequency < 4 GHz	±0.74 dB (nom.)	±1.27 dB (nom.)
4 GHz ≤ Frequency < 4.2 GHz	±1.45 dB (nom.)	±2.11 dB (nom.)
4.2 GHz ≤ Frequency ≤ 6 GHz	±1.45 dB (nom.)	±1.94 dB (nom.)

Waveform Display		Constellation, EVM vs. Subcarrier, EVM vs. Symbol, Spectral Flatness, Power vs. RB, EVM vs. RB, Power vs. Time (NR TDD sub-6 GHz Downlink MX285051A-011)	
Digitize Function	Function Overview	Supports output of captured waveform data to internal storage or external storage	
	Waveform Data	Format: I, Q (32 bit floating point binary format) Level: Assumes as $\sqrt{(I^2 + Q^2)} = 1$ for 0 dBm input Level accuracy: Same as absolute amplitude accuracy and in-band frequency characteristics of the signal analyzer	
	Replay Function	Analyzes traces of saved waveform data Format: I, Q (32 bit floating point binary format) Sampling Rate:	

Replay Function Sampling Rate table:

Channel Bandwidth	Without MS2850A-033	With MS2850A-033
≤100 MHz	162.5 MHz	162.5 MHz

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Signal Analyzer MS2850A Functions

Software Options

5G Standard Measurement Software (Base License)	**MX285051A**
NR TDD mmWave Downlink	**MX285051A-021**
NR TDD mmWave Uplink	**MX285051A-071**

Specifications

Signal Analyzer		MS2850A	
Option		NR TDD mmWave Downlink MX285051A-021	NR TDD mmWave Uplink MX285051A-071
Electrical Characteristics	Target Signals	TS 38.211 mmWave compliant downlink signal	TS 38.211 mmWave compliant uplink signal
	Channel Bandwidth	**Subcarrier Spacing / Channel Bandwidth** 60 kHz — 50 MHz (RB: 66), 100 MHz (RB: 132), 200 MHz (RB: 264) 120 kHz — 50 MHz (RB: 32), 100 MHz (RB: 66), 200 MHz (RB: 132), 400 MHz (RB: 264)	
	Capture Time	1 to 2 Frame	
	Frequency Setting Range	MS2850A-047: 100 MHz to 32 GHz MS2850A-046: 100 MHz to 44.5 GHz	
Modulation/ Frequency Measurement	Measurement Level Range	−15 to +30 dBm (Preamp Off, or Preamp not installed) −30 to +10 dBm (Preamp On)	
	Carrier Frequency Measurement Accuracy	At 18°C to 28°C, After calibration, EVM = 2% (rms) signal 1 Frame at downlink signal Only 1 carrier of 100 MHz width at center frequency setting of 28 GHz ± (Accuracy of reference frequency × carrier frequency + 10) Hz	At 18°C to 28°C, After calibration, EVM = 2% (rms) signal 1 Frame at uplink signal Only 1 carrier of 100 MHz width at center frequency setting of 28 GHz ± (Accuracy of reference frequency × carrier frequency + 10) Hz
	Residual Vector Error	At 18°C to 28°C, After calibration 1 Frame at downlink signal Only 1 carrier of 100 MHz width at center frequency setting of 28 GHz ≤2.0%	At 18°C to 28°C, After calibration 1 Frame at uplink signal Only 1 carrier of 100 MHz width at center frequency setting of 28 GHz ≤2.0%
Amplitude Measurement	Measurement Level Range	−15 to +30 dBm (Preamp Off, or Preamp not installed) −30 to +10 dBm (Preamp On)	
	Tx Power Measurement Accuracy (This is found from root sum of squares (RSS) of absolute amplitude accuracy and in-band frequency characteristics of main frame.)	At 18°C to 28°C, After calibration, Input attenuator ≥10 dB Input signal within measurement level range and below value set at Input Level Only 1 carrier of 100 MHz width at center frequency	

Frequency Range	Preamp Off, or without Preamp	Preamp On
26.5 GHz < Frequency ≤ 40 GHz	±2.54 dB (nom.)	±3.74 dB (nom.)

Waveform Display	Constellation, EVM vs. Subcarrier, EVM vs. Symbol, Spectral Flatness, Power vs. RB, EVM vs. RB, Power vs. Time (NR TDD mmW Downlink MX285051A-021)	
Digitize Function — Function Overview	Supports output of captured waveform data to internal storage or external storage	
Digitize Function — Waveform Data	Format: I, Q (32 bit floating point binary format) Level: Assumes as $\sqrt{(I^2 + Q^2)} = 1$ for 0 dBm input Level accuracy: Same as absolute amplitude accuracy and in-band frequency characteristics of the signal analyzer	
Digitize Function — Replay Function	Analyzes traces of saved waveform data Format: I, Q (32 bit floating point binary format) Sampling Rate:	

Channel Bandwidth	Without MS2850A-033	With MS2850A-033
≤100 MHz	162.5 MHz	162.5 MHz
>100 MHz	325 MHz	650 MHz

Power vs. Time Measurement	Displayed Average Noise	This is calculated up to 5 GHz from the Display Average Noise Level for the signal analyzer with MS2850A-033/034 option installed at no signal input and an ambient temperature range of 18°C to 28°C when Wide Dynamic Range = On, Noise Correction = On, Pre-AMP = On. −86.2 dBm/MHz (nominal)	—

Signal Analyzer MS2850A Key Layout

Front Panel
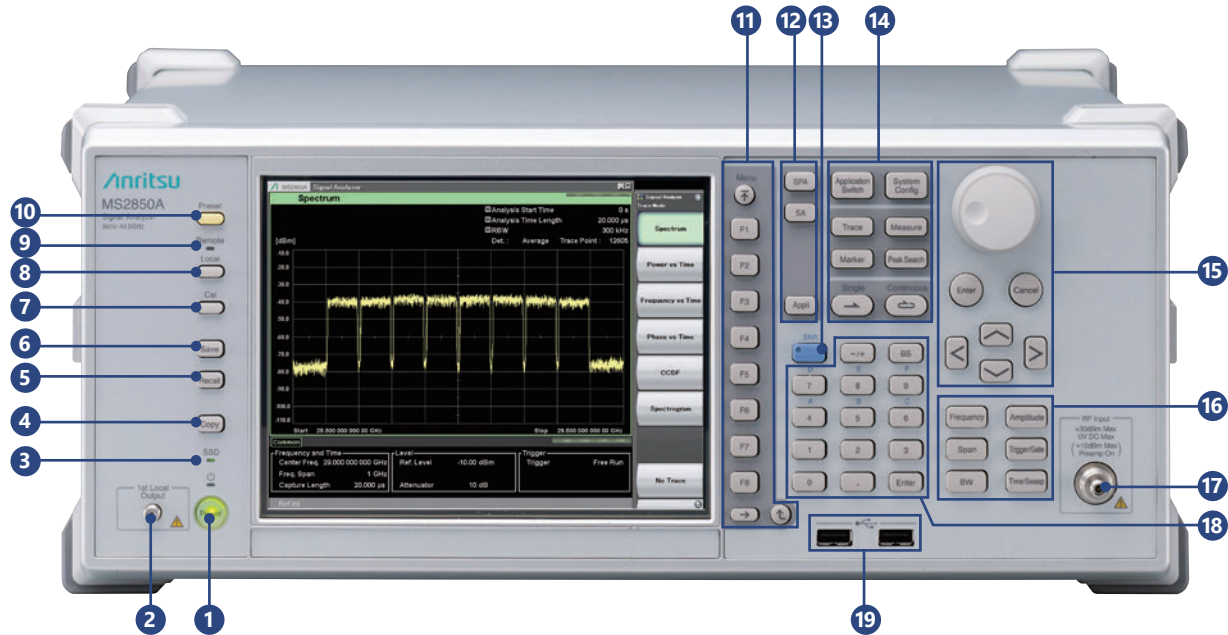
1 Power switch
Press to switch between the standby state in which AC power is supplied and the Power On state in which the MS2850A is under operation. The Power lamp lights up orange in the standby state, and lights up green in the Power On state. Press the power switch for a reasonably long duration (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
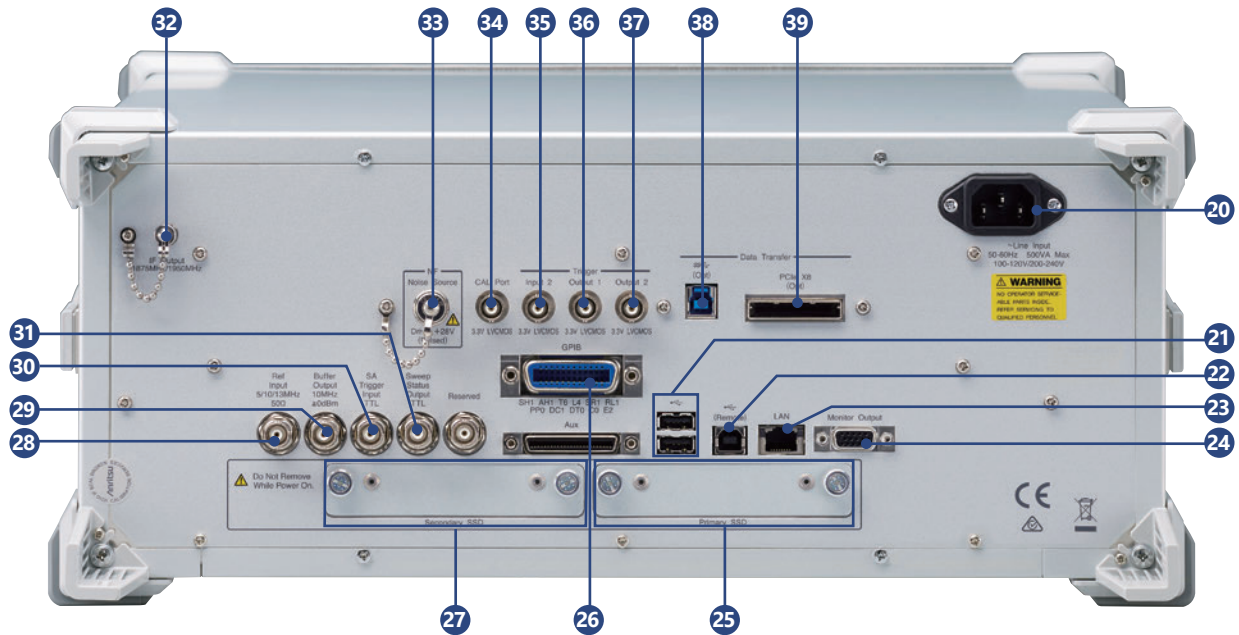
20 AC inlet
Used for supplying power.

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
USB3.0 Type-B connector for data transfer.
Used when MS2850A-054 option equipped.

39 PCIe X8 Connector
PCIe (X8/Gen2) connector for data transfer.
Used when MS2850A-053 option equipped.

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	MS2850A-046 (44.5 GHz model)	MS2850A-047 (32 GHz model)	MS2850A-032 (standard install)	MS2850A-033	MS2850A-034	MS2850A-010	MS2850A-017	MS2850A-067 (standard install)	MS2850A-068	MS2850A-072	MS2850A-076	MS2850A-051	MS2850A-011	MS2850A-053	MS2850A-054	MS2850A-182
MS2850A-032	Analysis Bandwidth 255 MHz	—	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-072	Extended Specifications	Yes	✓	✓														
MS2850A-076	Low Second Harmonic Distortion	Yes	✓	✓														
MS2850A-051	Noise Floor Reduction	Yes	✓	✓														
MS2850A-011	Secondary Storage Device	Yes	✓	✓														
MS2850A-053	External Interface for High Speed Data Transfer PCIe	Yes	✓	✓														
MS2850A-054	External Interface for High Speed Data Transfer USB3.0	Yes	✓	✓														
MS2850A-182	CPU/Windows10 Upgrade Retrofit*	Yes	✓	✓														

*: Replace the MS2850A CPU board with Windows Embedded Standard 7 (Windows 7) and upgrade the operating system to Windows 10 IoT Enterprise LTSC2019.
Windows 7 is installed in MS2850A units ordered until August 2020.
Windows 10 is installed in MS2850A units ordered from September 2020 and has a label indicating C2 attached near the serial number.

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-001/011/021/031 051/061/071/081
MX285051A-001	Pre-Standard CP-OFDM Downlink	✓	✓	U	U	Require MX285051A
MX285051A-051	Pre-Standard CP-OFDM Uplink	✓	✓	U	U	Require MX285051A
MX285051A-011	NR TDD sub-6 GHz Downlink	✓	✓			Require MX285051A
MX285051A-061	NR TDD sub-6 GHz Uplink	✓	✓			Require MX285051A
MX285051A-031	NR FDD sub-6 GHz Downlink	✓	✓			Require MX285051A
MX285051A-081	NR FDD sub-6 GHz Uplink	✓	✓			Require MX285051A
MX285051A-021	NR TDD mmWave Downlink	✓	✓	U	U	Require MX285051A
MX285051A-071	NR TDD mmWave 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	✓	✓			
MX269017A-001	APSK Analysis	✓	✓			Require MX269017A
MX269017A-011	Higher-Order QAM Analysis	✓	✓			Require MX269017A

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
$\pm 1 \times 10^{-7}$/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, 20 MHz, 31.25 MHz
  (1 Hz to 10 Hz: Can not be set when Span 0 Hz
   31.25 MHz: Can be set when Span 0 Hz only)

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 MHz ≤ Frequency < 4.2 GHz	−60 dBc (nom.)
4.2 GHz ≤ Frequency ≤ 44.5 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 MHz ≤ Analysis Bandwidth ≤ 62.5 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	−125 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		±0.7 dB (nom.)
20 GHz		±1.0 dB (nom.)
28 GHz	CF ±500 MHz	±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 ≤ 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)

EU Standards (CE Marking)
EMC: 2014/30/EU, EN61326-1, EN61000-3-2
LVD: 2014/35/EU, EN61010-1
RoHS: 2011/65/EU, EN50581

OS
Windows 10 (64 bits)

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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.

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 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
	Main Frame
MS2850A	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-072	Extended Specifications
MS2850A-076	Low Second Harmonic Distortion
MS2850A-051	Noise Floor Reduction
MS2850A-011	Secondary Storage Device
MS2850A-053	External Interface for High Speed Data Transfer PCIe
MS2850A-054	External Interface for High Speed Data Transfer USB3.0
	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-172	Extended Specifications Retrofit
MS2850A-176	Low Second Harmonic Distortion Retrofit
MS2850A-151	Noise Floor Reduction Retrofit
MS2850A-111	Secondary Storage Device Retrofit
MS2850A-153	External Interface for High Speed Data Transfer PCIe Retrofit
MS2850A-154	External Interface for High Speed Data Transfer USB3.0 Retrofit
MS2850A-182	CPU/Windows10 Upgrade Retrofit
MS2850A-282	CPU/Windows10 Upgrade Retrofit
	Software Options
	DVD-ROM with License and Operation manuals
MX285051A	5G Standard Measurement Software (Base License) (Requires MX285051A-001 and/or 011/021/031/051/061/071/081)
MX285051A-001	Pre-Standard CP-OFDM Downlink (Requires MX285051A)
MX285051A-051	Pre-Standard CP-OFDM Uplink (Requires MX285051A)
MX285051A-011	NR TDD sub-6 GHz Downlink (Requires MX285051A)
MX285051A-061	NR TDD sub-6 GHz Uplink (Requires MX285051A)
MX285051A-031	NR FDD sub-6 GHz Downlink (Requires MX285051A)
MX285051A-081	NR FDD sub-6 GHz Uplink (Requires MX285051A)
MX285051A-021	NR TDD mmWave Downlink (Requires MX285051A)
MX285051A-071	NR TDD mmWave 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
MX269017A-001	APSK Analysis (Requires MX269017A)
MX269017A-011	Higher-Order QAM Analysis (Requires MX269017A)
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
	Manuals
	Following operation manuals provided as hard copy and written in English.
W3920AE	MS2850A Operation Manual (Mainframe Operation)
W2851AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Mainframe Remote Control)
W3335AE	MS2830A/MS2840A/MS2850A Operation Manual (Signal Analyzer Function Operation)
W2853AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Signal Analyzer Function Remote Control)
W3336AE	MS2830A/MS2840A/MS2850A Operation Manual (Spectrum Analyzer Function Operation)
W2855AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Spectrum Analyzer Function Remote Control)
W3117AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Phase Noise Measurement Function Operation)
W3118AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Phase Noise Measurement Function Remote Control)
W3655AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Noise Figure Measurement Function Operation)
W3656AE	MS2690A/MS2691A/MS2692A/MS2830A/MS2840A and MS2850A Operation Manual (Noise Figure Measurement Function Remote control)
W3950AE	MS2850A-053/MS2850A-054 Operation Manual (External Interface for High Speed Data Transfer)
W3922AE	MX285051A/MX269051A Operation Manual
W3924AE	MX285051A-011/MX269051A-011/MX285051A-021/ MX285051A-061/MX269051A-061/MX285051A-071 Operation Manual (Operation)
W3925AE	MX285051A-011/MX269051A-011/MX285051A-021/ MX285051A-061/MX269051A-061/MX285051A-071 Operation Manual (Remote Control)
W4035AE	MX285051A-031/MX285051A-081 Operation Manual (Operation)
W4036AE	MX285051A-031/MX285051A-081 Operation Manual (Remote Control)
W3098AE	MX269011A Operation Manual (Operation)
W3099AE	MX269011A Operation Manual (Remote Control)
W3060AE	MX269012A Operation Manual (Operation)
W3061AE	MX269012A Operation Manual (Remote Control)
W3100AE	MX269013A Operation Manual (Operation)
W3101AE	MX269013A Operation Manual (Remote Control)
W3044AE	MX269015A Operation Manual (Operation)
W3045AE	MX269015A Operation Manual (Remote Control)
W3305AE	MX269017A Operation Manual (Operation)
W3306AE	MX269017A Operation Manual (Remote Control)
W3014AE	MX269020A Operation Manual (Operation)
W3064AE	MX269020A Operation Manual (Remote Control)
W3015AE	MX269021A Operation Manual (Operation)
W3065AE	MX269021A Operation Manual (Remote Control)
W3209AE	MX269022A Operation Manual (Operation)
W3210AE	MX269022A Operation Manual (Remote Control)
W3521AE	MX269023A Operation Manual (Operation)
W3522AE	MX269023A Operation Manual (Remote Control)

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
	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)

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)
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)
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
B0635A	Rack Mount Kit (EIA)
B0657A	Rack Mount Kit (JIS)
B0636C*	Carrying Case (Hard type, with casters)
B0671A*	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)
Z1957A	Installation Kit
	(required when retrofitting options or installing software)
	External Interface for High Speed Data Transfer
U0088A	PCIe Host Adapter
J1749A	PCIe x8 Cable (2 m)
J1749B	PCIe x8 Cable (5 m)

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

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

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.
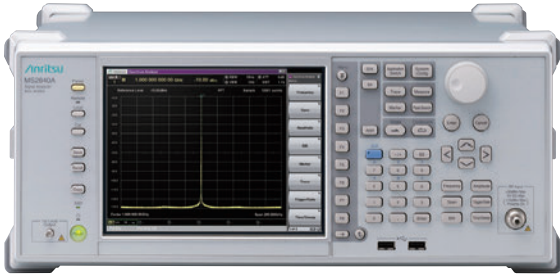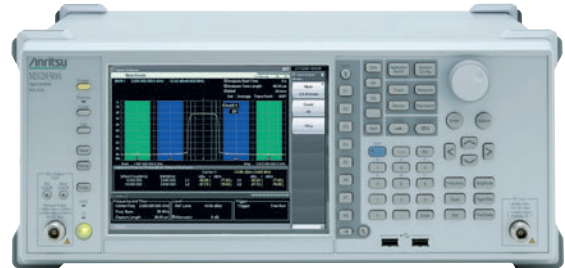

Features

- 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, ΦM, 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, ΦM, 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

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Астана (7172)727-132
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Брянск (4832)59-03-52
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