Anritsu Advancing beyond

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 %

Excellent Eco Product

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, 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 Unit 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

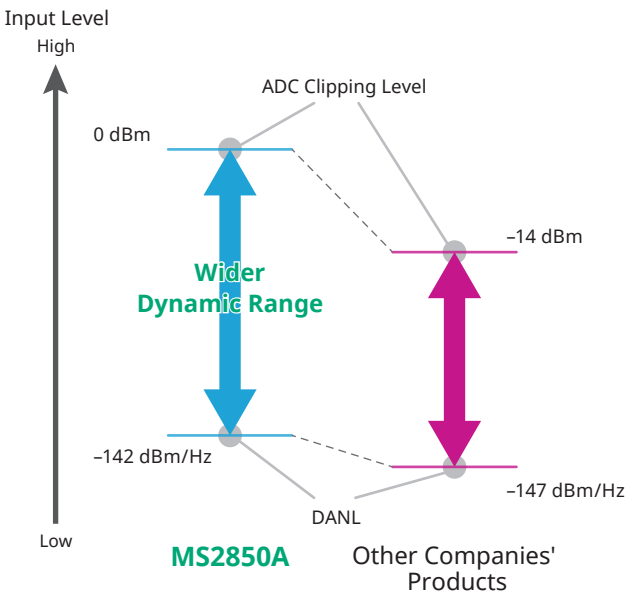
Wide Dynamic Range

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.)

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

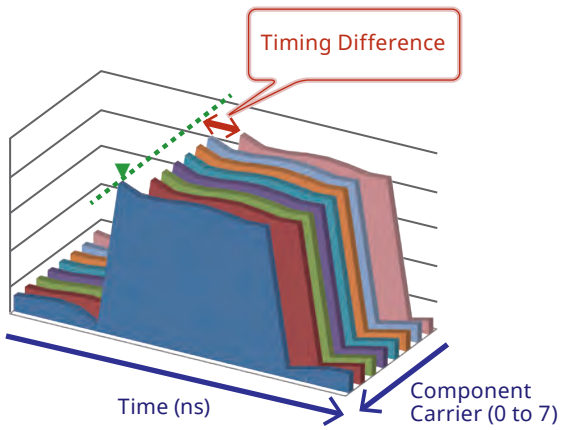
The 5G measurement software uses the 1 GHz analysis bandwidth of the MS2850A to support batch (all-at-once) measurement of all 5G signal carriers (8 carriers × 100 MHz wide). The characteristics of each single carrier can be evaluated quickly at the same time without needing to measure each single carrier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

	Frequency Error	Transmit Power	EVM (rms)	EVM (peak)	Timing Difference
CC0 (Ref.)	23.24 Hz	-19.98 dBm	1.24 %	5.47 %	0.0 ns
CC1	24.13 Hz	-20.02 dBm	1.15 %	5.24 %	0.0 ns
CC2	25.02 Hz	-20.29 dBm	1.13 %	4.89 %	0.0 ns
CC3	25.92 Hz	-20.54 dBm	1.18 %	4.99 %	0.0 ns
CC4	26.96 Hz	-20.25 dBm	1.35 %	6.19 %	0.0 ns
CC5	27.82 Hz	-20.06 dBm	1.03 %	4.53 %	-1.5 ns
CC6	28.69 Hz	-20.14 dBm	1.00 %	4.30 %	0.0 ns
CC7	29.57 Hz	-20.25 dBm	1.01 %	4.80 %	0.0 ns

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.)
Extends frequency measured using external mixer

Application Parts

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			✓

*: Connected to USB power sensor sold separately

Signal Analyzer MS2850A Functions

Signal Analyzer Functions (Standard)

Analysis Bandwidth

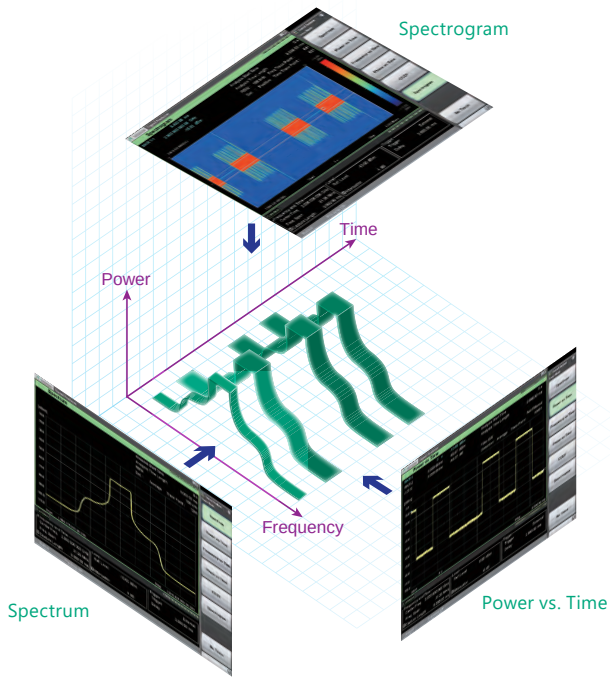
Analysis Bandwidth	Frequency Measurement Range
255 MHz (standard)	100 MHz to 32 GHz/44.5 GHz
510 MHz (option)	100 MHz to 32 GHz/44.5 GHz
1 GHz (option)	4.2 GHz to 32 GHz/44.5 GHz

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



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 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

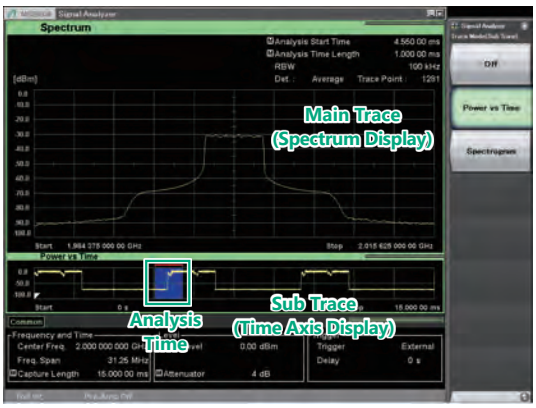
The Power vs. Time trace displays a graph with amplitude on the y-axis and time on the x-axis to confirm changes in power with time of measured signals.

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.

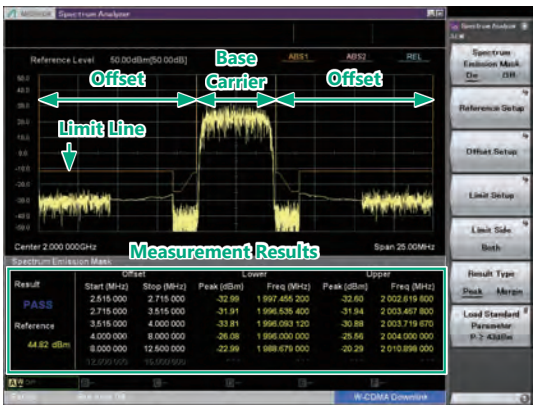
APD (Amplitude Probability Density):
The APD display indicates the probability distribution of transient power

Signal Analyzer MS2850A Functions

Versatile Built-in Functions

Spectrum Emission Mask

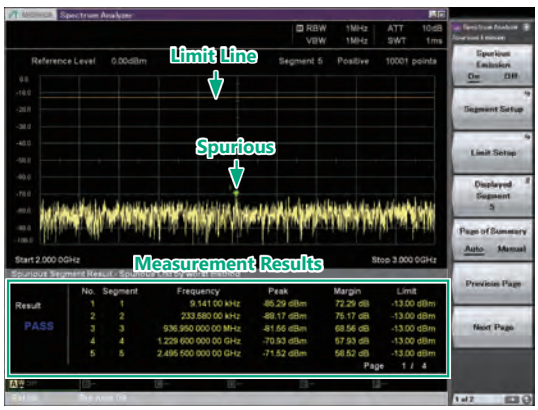
This function splits the offset part into up to 12 segments; the measurement parameters and limit lines can be specified to measure the peak power and margin for each segment. The results are tabulated below the trace and marked PASS/FAIL. Pre-installed templates for each standard support easy parameter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

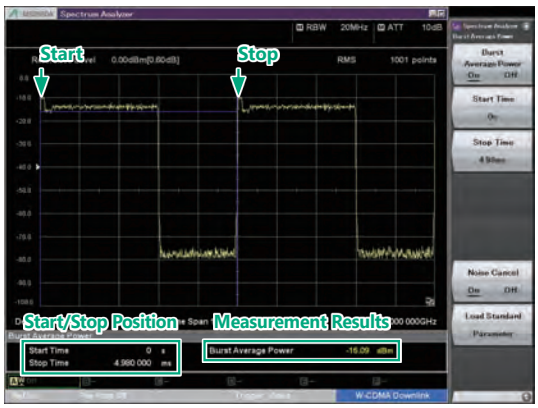


Multi-marker & Marker List

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.

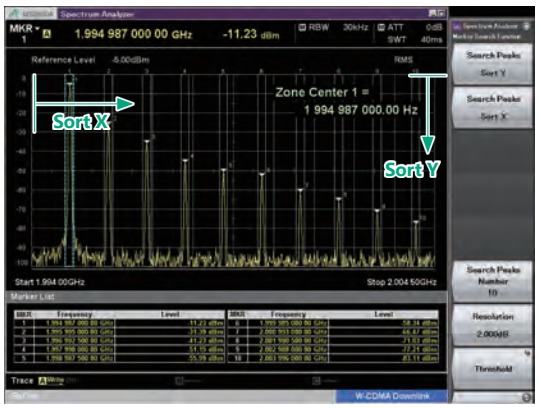
Burst Average Power

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



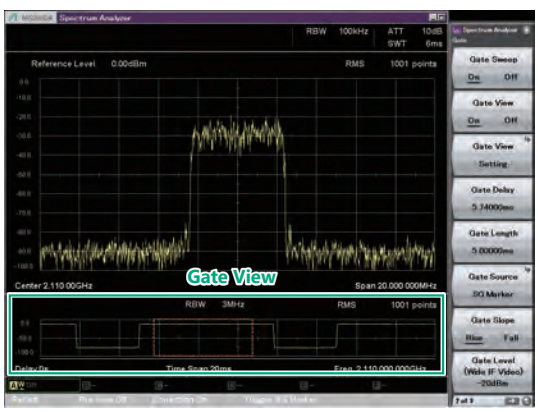
Highest 10 Markers

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.



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.

Removable SSD, Win10 (MS2850A-014)

This additional user-changeable SSD contains the same Windows OS and programs as the factory installed system SSD.

It supports a Windows 10 install for one specific MS2850A and is for use during service repair and calibration.

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.

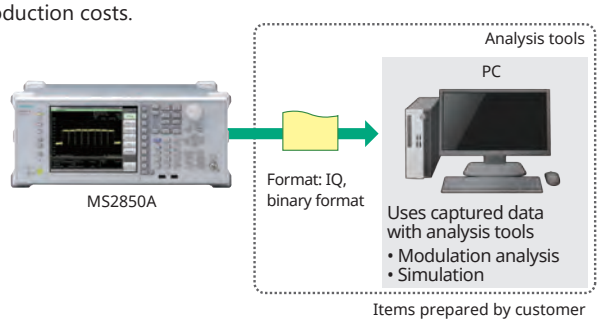
*: Refer to the MS2850A data sheet for details.
Operation is not guaranteed when using other noise sources.

Noise Floor Reduction (MS2850A-051)

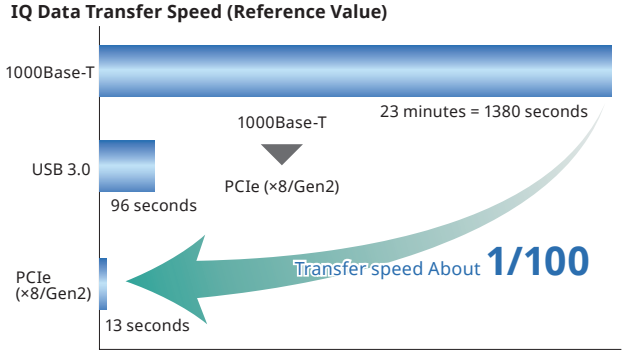
The Noise Floor Reduction (NFR) function increases the measurement accuracy for low-level signals. It subtracts the internal noise components (11 dB max. nominal) of the measuring instrument itself from the displayed measurement result.

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

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

Power Meter Function (USB Power Sensor Connection, Standard function)

Connecting the optional USB Power Sensor to the MS2850A supports Power and Relative Power measurements.

Compatible USB power sensors.

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

The Power Meter Function cannot be used by other sensors.

*: 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.

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

External Mixer Connection Function (MX284090A)
Measures wideband millimeter wave transmitters, such as millimeter wave and automotive radar, using external mixer function used by Eravant and VDI external mixers.

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

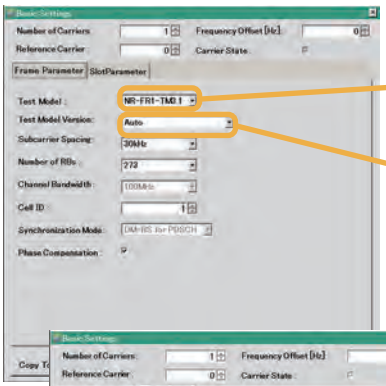
- **All-in-one sub-6 GHz and mmWave Coverage**

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

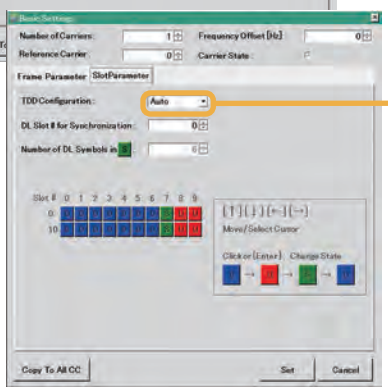
Supported Software	Modulation Analysis	Carrier Aggregation Analysis	Power vs. Time
NR TDD sub-6 GHz Downlink MX285051A-011	✓	✓	✓
NR FDD sub-6 GHz Downlink MX285051A-031	✓	✓	—
NR TDD mmW Downlink MX285051A-021	✓	✓	✓
NR TDD sub-6 GHz Uplink MX285051A-061	✓	—	—
NR FDD sub-6 GHz Uplink MX285051A-081	✓	—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

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



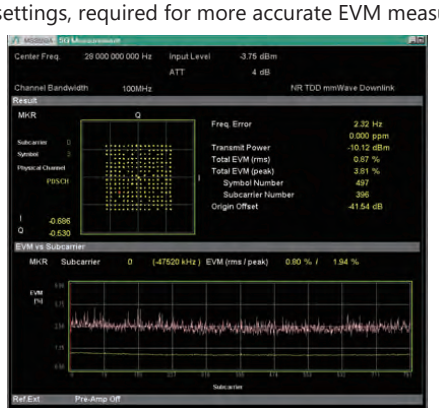
Easy physical channel setting by selecting test model name

Auto-detect function eliminates setting problems

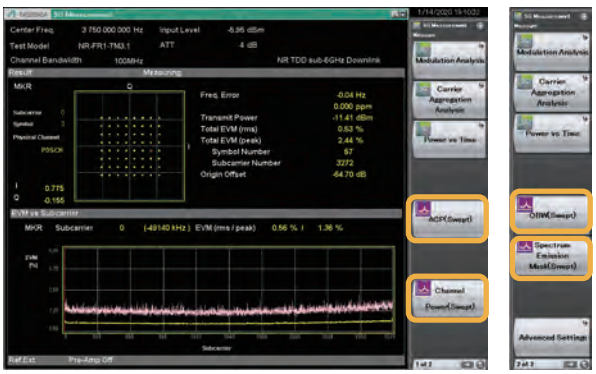


In addition to the 3GPP-defined TDD Configuration, the TDD Configuration signal in actual use can be measured easily using the auto-detect function

- 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.

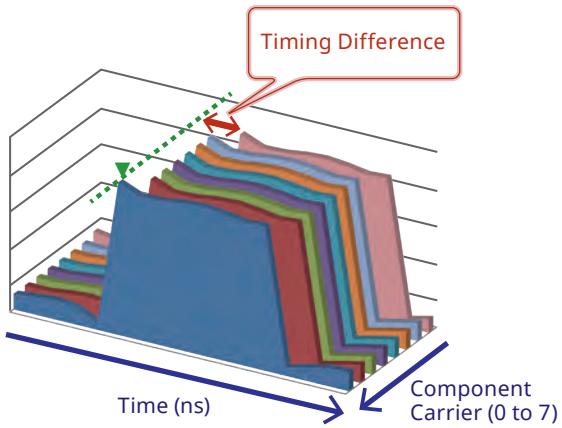
Software Options

• **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
	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

<table>
<tr><td colspan="2">Signal Analyzer</td><td colspan="2">MS2850A</td></tr>
<tr><td colspan="2">Option</td><td>NR TDD sub-6 GHz Downlink
MX285051A-011</td><td>NR TDD sub-6 GHz Uplink
MX285051A-061</td></tr>
<tr><td rowspan="4">Electrical Characteristics</td><td>Target Signals</td><td>TS 38.211 Sub-6 GHz compliant downlink signal</td><td>TS 38.211 Sub 6-GHz compliant uplink signal</td></tr>
<tr><td>Channel Bandwidth</td><td colspan="2"><table><tr><td>Subcarrier Spacing</td><td>Channel Bandwidth</td></tr><tr><td>15 kHz</td><td>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)</td></tr><tr><td>30 kHz</td><td>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)</td></tr><tr><td>60 kHz</td><td>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)</td></tr></table></td></tr>
<tr><td>Capture Time</td><td colspan="2">1 to 2 Frame</td></tr>
<tr><td>Frequency Setting Range</td><td colspan="2">MS2850A-047: 100 MHz to 32 GHz
MS2850A-046: 100 MHz to 44.5 GHz</td></tr>
<tr><td>Measurement Frequency Range</td><td colspan="2">800 MHz to 5 GHz</td></tr>
<tr><td rowspan="3">Modulation/ Frequency Measurement</td><td>Measurement Level Range</td><td colspan="2">–10 to +30 dBm (Preamp Off, or Preamp not installed)
–30 to +10 dBm (Preamp On)</td></tr>
<tr><td>Carrier Frequency Measurement Accuracy</td><td>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</td><td>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</td></tr>
<tr><td>Residual Vector Error</td><td>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%</td><td>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%</td></tr>
<tr><td rowspan="2">Amplitude Measurement</td><td>Measurement Level Range</td><td colspan="2">–10 to +30 dBm (Preamp Off, or Preamp not installed)
–30 to +10 dBm (Preamp On)</td></tr>
<tr><td>Tx Power Measurement Accuracy (This is found from root sum of squares (RSS) of absolute amplitude accuracy and in-band frequency characteristics of main unit.)</td><td colspan="2">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<table><tr><td>Frequency Range</td><td>Preamp Off, or without Preamp</td><td>Preamp On</td></tr><tr><td>800 MHz ≤ Frequency < 4 GHz</td><td>±0.74 dB (nom.)</td><td>±1.27 dB (nom.)</td></tr><tr><td>4 GHz ≤ Frequency < 4.2 GHz</td><td>±1.48 dB (nom.)</td><td>±2.11 dB (nom.)</td></tr><tr><td>4.2 GHz ≤ Frequency ≤ 5 GHz</td><td>±1.45 dB (nom.)</td><td>±1.94 dB (nom.)</td></tr></table></td></tr>
<tr><td colspan="2">Waveform Display</td><td colspan="2">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)</td></tr>
<tr><td rowspan="3">Digitize Function</td><td>Function Overview</td><td colspan="2">Supports output of captured waveform data to internal storage or external storage</td></tr>
<tr><td>Waveform Data</td><td colspan="2">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</td></tr>
<tr><td>Replay Function</td><td colspan="2">Analyzes traces of saved waveform data
Format: I, Q (32 bit floating point binary format)
Sampling Rate:<table><tr><td>Channel Bandwidth</td><td>Without MS2850A-033</td><td>With MS2850A-033</td></tr><tr><td>≤100 MHz</td><td>162.5 MHz</td><td>162.5 MHz</td></tr></table></td></tr>
<tr><td>Power vs. Time Measurement</td><td>Displayed Average Noise</td><td>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)</td><td>—</td></tr>
</table>

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

<table>
<tr><td colspan="2">Signal Analyzer</td><td colspan="2">MS2850A</td></tr>
<tr><td colspan="2">Option</td><td>NR FDD sub-6 GHz Downlink
MX285051A-031</td><td>NR FDD sub-6 GHz Uplink
MX285051A-081</td></tr>
<tr><td rowspan="4">Electrical Characteristics</td><td>Target Signals</td><td>TS 38.211 Sub-6 GHz compliant downlink signal</td><td>TS 38.211 Sub 6-GHz compliant uplink signal</td></tr>
<tr><td>Channel Bandwidth</td><td colspan="2"><table><tr><td>Subcarrier Spacing</td><td>Channel Bandwidth</td></tr><tr><td>15 kHz</td><td>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)</td></tr><tr><td>30 kHz</td><td>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)</td></tr><tr><td>60 kHz</td><td>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)</td></tr></table></td></tr>
<tr><td>Capture Time</td><td colspan="2">1 to 2 Frame</td></tr>
<tr><td>Frequency Setting Range</td><td colspan="2">MS2850A-047: 100 MHz to 32 GHz
MS2850A-046: 100 MHz to 44.5 GHz</td></tr>
<tr><td>Measurement Frequency Range</td><td colspan="2">400 MHz to 6 GHz</td></tr>
<tr><td rowspan="3">Modulation/ Frequency Measurement</td><td>Measurement Level Range</td><td colspan="2">–10 to +30 dBm (Preamp Off, or Preamp not installed)
–30 to +10 dBm (Preamp On)</td></tr>
<tr><td>Carrier Frequency Measurement Accuracy</td><td>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</td><td>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
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<tr><td>Residual Vector Error</td><td>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%</td><td>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%</td></tr>
<tr><td rowspan="2">Amplitude Measurement</td><td>Measurement Level Range</td><td colspan="2">–10 to +30 dBm (Preamp Off, or Preamp not installed)
–30 to +10 dBm (Preamp On)</td></tr>
<tr><td>Tx Power Measurement Accuracy (This is found from root sum of squares (RSS) of absolute amplitude accuracy and in-band frequency characteristics of main unit.)</td><td colspan="2">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<table><tr><td>Frequency Range</td><td>Preamp Off, or without Preamp</td><td>Preamp On</td></tr><tr><td>400 MHz ≤ Frequency < 800 MHz</td><td>±0.72 dB (nom.)</td><td>±1.14 dB (nom.)</td></tr><tr><td>800 MHz ≤ Frequency < 4 GHz</td><td>±0.74 dB (nom.)</td><td>±1.27 dB (nom.)</td></tr><tr><td>4 GHz ≤ Frequency < 4.2 GHz</td><td>±1.45 dB (nom.)</td><td>±2.11 dB (nom.)</td></tr><tr><td>4.2 GHz ≤ Frequency ≤ 6 GHz</td><td>±1.45 dB (nom.)</td><td>±1.94 dB (nom.)</td></tr></table></td></tr>
<tr><td colspan="2">Waveform Display</td><td colspan="2">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)</td></tr>
<tr><td rowspan="3">Digitize Function</td><td>Function Overview</td><td colspan="2">Supports output of captured waveform data to internal storage or external storage</td></tr>
<tr><td>Waveform Data</td><td colspan="2">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</td></tr>
<tr><td>Replay Function</td><td colspan="2">Analyzes traces of saved waveform data
Format: I, Q (32 bit floating point binary format)
Sampling Rate:<table><tr><td>Channel Bandwidth</td><td>Without MS2850A-033</td><td>With MS2850A-033</td></tr><tr><td>≤100 MHz</td><td>162.5 MHz</td><td>162.5 MHz</td></tr></table></td></tr>
</table>

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

<table>
<tr><td colspan="2">Signal Analyzer</td><td colspan="2">MS2850A</td></tr>
<tr><td colspan="2">Option</td><td>NR TDD mmWave Downlink
MX285051A-021</td><td>NR TDD mmWave Uplink
MX285051A-071</td></tr>
<tr><td rowspan="3">Electrical Characteristics</td><td>Target Signals</td><td>TS 38.211 mmWave compliant downlink signal</td><td>TS 38.211 mmWave compliant uplink signal</td></tr>
<tr><td>Channel Bandwidth</td><td colspan="2"><table><tr><td>Subcarrier Spacing</td><td>Channel Bandwidth</td></tr><tr><td>60 kHz</td><td>50 MHz (RB: 66), 100 MHz (RB: 132), 200 MHz (RB: 264)</td></tr><tr><td>120 kHz</td><td>50 MHz (RB: 32), 100 MHz (RB: 66), 200 MHz (RB: 132), 400 MHz (RB: 264)</td></tr></table></td></tr>
<tr><td>Capture Time</td><td colspan="2">1 to 2 Frame</td></tr>
<tr><td rowspan="3">Modulation/ Frequency Measurement</td><td>Frequency Setting Range</td><td colspan="2">MS2850A-047: 100 MHz to 32 GHz
MS2850A-046: 100 MHz to 44.5 GHz</td></tr>
<tr><td>Measurement Level Range</td><td colspan="2">–15 to +30 dBm (Preamp Off, or Preamp not installed)
–30 to +10 dBm (Preamp On)</td></tr>
<tr><td>Carrier Frequency Measurement Accuracy</td><td>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</td><td>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</td></tr>
<tr><td>Residual Vector Error</td><td>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%</td><td>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%</td></tr>
<tr><td rowspan="2">Amplitude Measurement</td><td>Measurement Level Range</td><td colspan="2">–15 to +30 dBm (Preamp Off, or Preamp not installed)
–30 to +10 dBm (Preamp On)</td></tr>
<tr><td>Tx Power Measurement Accuracy (This is found from root sum of squares (RSS) of absolute amplitude accuracy and in-band frequency characteristics of main unit.)</td><td colspan="2">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
<table><tr><td>Frequency Range</td><td>Preamp Off,
or without Preamp</td><td>Preamp On</td></tr><tr><td>26.5 GHz < Frequency ≤ 40 GHz</td><td>±2.54 dB (nom.)</td><td>±3.74 dB (nom.)</td></tr></table></td></tr>
<tr><td colspan="2">Waveform Display</td><td colspan="2">Constellation, EVM vs. Subcarrier, EVM vs. Symbol, Spectral Flatness, Power vs. RB, EVM vs. RB,
Power vs. Time (NR TDD mmW Downlink MX285051A-021)</td></tr>
<tr><td rowspan="3">Digitize Function</td><td>Function Overview</td><td colspan="2">Supports output of captured waveform data to internal storage or external storage</td></tr>
<tr><td>Waveform Data</td><td colspan="2">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</td></tr>
<tr><td>Replay Function</td><td colspan="2">Analyzes traces of saved waveform data
Format: I, Q (32 bit floating point binary format)
Sampling Rate:
<table><tr><td>Channel Bandwidth</td><td>Without MS2850A-033</td><td>With MS2850A-033</td></tr><tr><td>≤100 MHz</td><td>162.5 MHz</td><td>162.5 MHz</td></tr><tr><td>>100 MHz</td><td>325 MHz</td><td>650 MHz</td></tr></table></td></tr>
<tr><td>Power vs. Time Measurement</td><td>Displayed Average Noise</td><td>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)</td><td>—</td></tr>
</table>

Signal Analyzer MS2850A Functions

Software Options

External Mixer Connection Function MX284090A

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

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

Eravant External Mixer

VDI External Mixer

Recommended Eravant or VDI External Mixers

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

Features

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

Using the MS2850A with high IF supports spectrum mask measurement over a wide frequency span without any image-response effect. Furthermore, Anritsu's proprietary PS (Polarity Swap) supports image-response-free bandwidths of up to 7.5 GHz.

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

Setup between the MS2850A and external mixer is simple. Just connect a coaxial cable between the MS2850A 1st Local Output port and external mixer. The Mixer's unique conversion loss data is stored on the accessory USB memory provided with each mixer, and is applied to measured values simply by loading into the MS2850A.

*1: Patented

Frequency Expansion Range

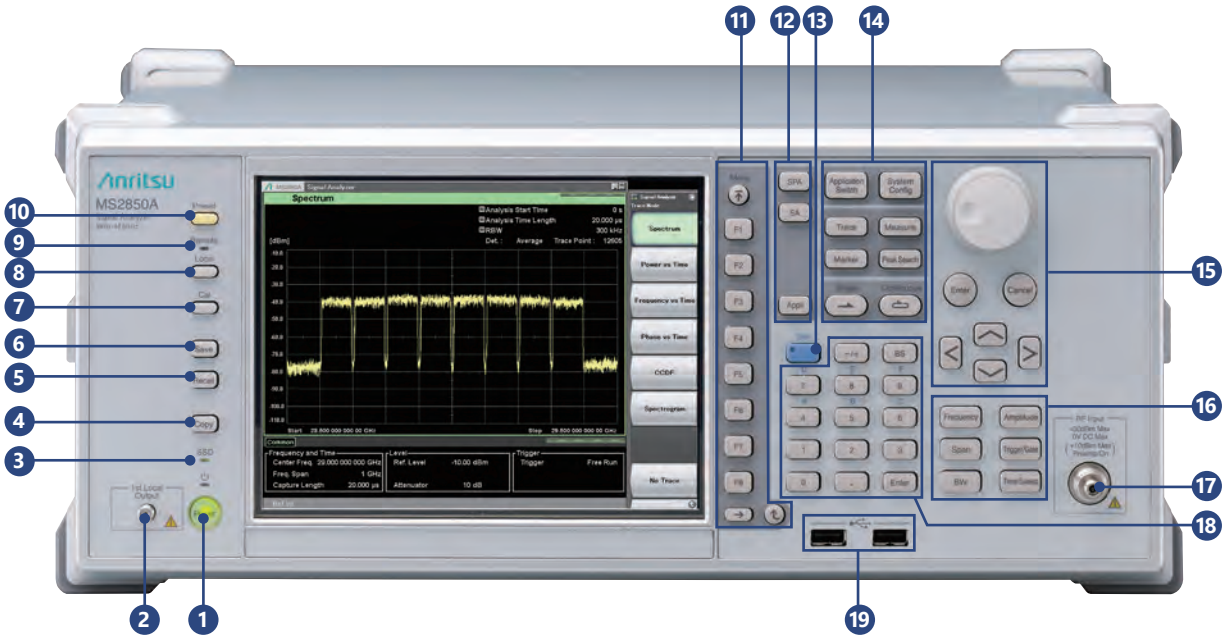
The following frequency ranges can be selected to match the supported frequency range of an external mixer connected to the MS2850A.*2

*2: Only supported by MS2850A with installed External Mixer Connection Function MX284090A

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

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
Supplies local signal and bias current to External Waveguide Mixer and receives frequency converted IF signals.

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.

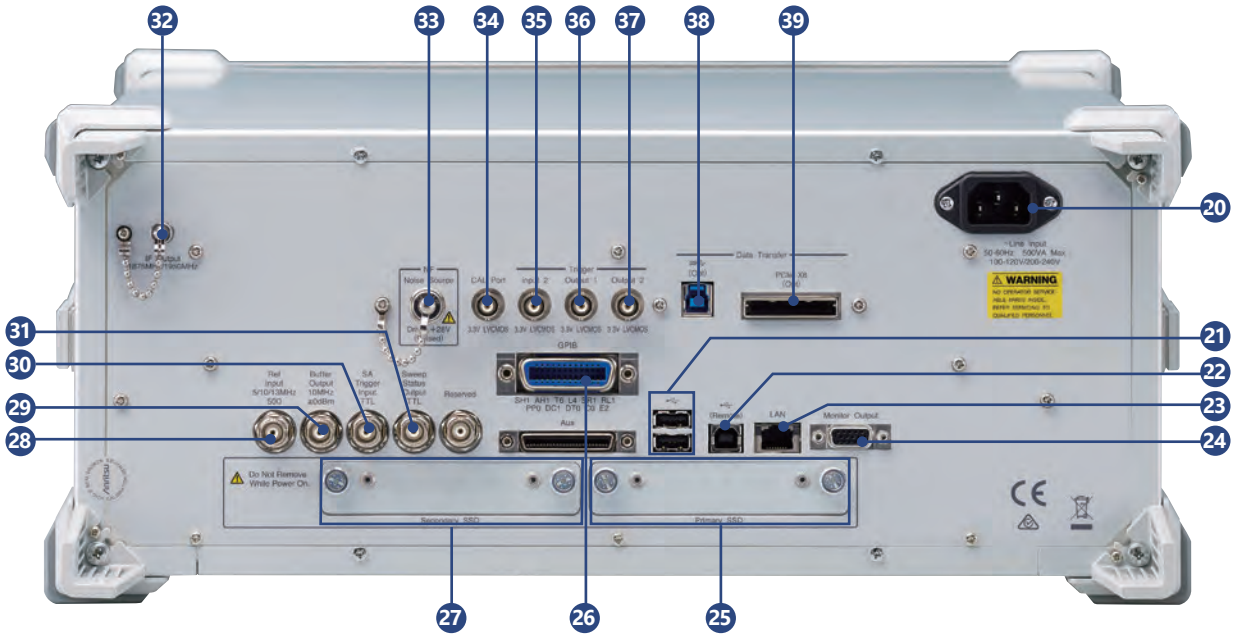
17 RF Input connector
Used for inputting RF signal.
K-J, 50Ω
Maximum input level:
+30 dBm (Continuous wave average power,
Input attenuator: ≥10 dB, Preamp: Off)

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
Slot for SSD for booting Windows OS and for saving data. Also supports Removable SSD, Win10 MS2850A-014/114 option.

26 GPIB connector
Used when controlling the MS2850A externally via GPIB.

27 Secondary SSD slot
Slot for SSD for saving data. Also supports 2ndary SSD MS2850A-011/111 options.

28 Ref Input connector
(reference frequency signal input connector)
Inputs an external reference frequency signal (5/10/13 MHz). It is used for inputting reference frequency signals with accuracy higher than that of those inside the 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	Addition to Main unit		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-010	MS2850A-017	MS2850A-067 (standard install)	MS2850A-068	MS2850A-072	MS2850A-076	MS2850A-051	MS2850A-011	MS2850A-014	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-014	Removable SSD, Win10	Yes*1	✓	✓															
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*2	Yes	✓	✓															

*1: The CPU/Windows10 Upgrade Retrofit MS2850A-182/282 option is required when the MS2850A OS is not Windows 10.

*2: 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 unit ✓ = 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. Requires any one of MX285051A-001/011/021/031/051/061/071/081
MX285051A-001	Pre-Standard CP-OFDM Downlink	✓	✓	U	U	Requires MX285051A
MX285051A-051	Pre-Standard CP-OFDM Uplink	✓	✓	U	U	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	✓	✓	U	U	Requires MX285051A
MX285051A-071	NR TDD mmWave Uplink	✓	✓	U	U	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
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
MX269017A	Vector Modulation Analysis Software	✓	✓			
MX269017A-001	APSK Analysis	✓	✓			Requires MX269017A
MX269017A-011	Higher-Order QAM Analysis	✓	✓			Requires MX269017A
MX284090A	External Mixer Connection Function	✓	✓	U	U	

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)

Extends Frequency Range By Using External Mixer

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

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	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 ≤ 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)

CE Marking

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

UKCA Marking

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

OS

Windows 10 (64 bits)

5G Measurement Software

Refer to the MX2690xxA Series, MX2830xxA Series, MX2840xxA 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 Unit
MS2850A	Signal Analyzer
	Standard Accessories
	Power Cord: 1 pc
P0031A	USB Memory (≥1 GB): 1 pc
Z0541A	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-014	Removable SSD, Win10
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-114*1	Removable SSD, Win10 Retrofit
MS2850A-214*1	Removable SSD, Win10 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 any one of MX285051A-001/011/021/031/051/061/071/081)
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)
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)
MX284090A	External Mixer Connection Function (image-response-free bandwidth: 7.5 GHz)

*1: The CPU/Windows10 Upgrade Retrofit MS2850A-182/282 option is required when the MS2850A OS is not Windows 10.

Model/Order No.	Name
	Warranty Service
MS2850A-ES210	2 years Extended Warranty Service
MS2850A-ES310	3 years Extended Warranty Service
MS2850A-ES510	5 years Extended Warranty Service
	Manuals
	Following operation manuals provided as hard copy and written in English.
W3920AE	MS2850A Operation Manual (Main Unit Operation)
W2851AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Main Unit Remote Control)
W3335AE	MS2830A/MS2840A/MS2850A Operation Manual (Signal Analyzer Function Operation)
W2853AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Signal Analyzer Function Remote Control)
W3336AE	MS2830A/MS2840A/MS2850A Operation Manual (Spectrum Analyzer Function Operation)
W2855AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Spectrum Analyzer Function Remote Control)
W3117AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Phase Noise Measurement Function Operation)
W3118AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Phase Noise Measurement Function Remote Control)
W3655AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Noise Figure Measurement Function Operation)
W3656AE	MS2690A/MS2691A/MS2692A and MS2830A/MS2840A/MS2850A Operation Manual (Noise Figure Measurement Function Remote control)
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)
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

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

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
	Application Parts
34AKNF50	Ruggedized K-to-Type N Adapter (DC to 20 GHz, 50Ω, Ruggedized K-M · N-F, SWR: 1.5 (max.), Insertion Loss: 0.4 dB (max.))
J1398A	N-SMA Adaptor (DC to 26.5 GHz, 50Ω, N-P · SMA-J)
J0004	Coaxial Adapter (DC to 12.4 GHz, 50Ω, N-P · SMA-J)
J1359A	Coaxial Adaptor (K-P · K-J, SMA)
J0576B	Coaxial Cord, 1 m (N-P · 5D-2W · N-P)
J0576D	Coaxial Cord, 2 m (N-P · 5D-2W · N-P)
J0127A	Coaxial Cord, 1 m (BNC-P · RG58A/U · BNC-P)
J0127B	Coaxial Cord, 2 m (BNC-P · RG58A/U · BNC-P)
J0127C	Coaxial Cord, 0.5 m (BNC-P · RG58A/U · BNC-P)
J0322A	Coaxial Cord, 0.5 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P)
J0322B	Coaxial Cord, 1 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P)
J0322C	Coaxial Cord, 1.5 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P)
J0322D	Coaxial Cord, 2 m (DC to 18 GHz), (SMA-P · 50Ω SUCOFLEX104 · SMA-P)
J0912	Coaxial Cable, 0.5 m for 40 GHz (DC to 40 GHz, approx. 0.5 m, SF102A, 11K254/K254/0.5M)
J0805	DC Block, N type (MODEL 7003) (10 kHz to 18 GHz, N-P · N-J)
J1555A	DC Block, SMA type (MODEL 7006-1) (9 kHz to 20 GHz, SMA-P · SMA-J)
K261	DC Block (10 kHz to 40 GHz, K-P · K-J)
K240B	Power Divider (K connector, DC to 26.5 GHz, 50Ω, K-J, 1 W max.)
41KC-3	Fixed Attenuator (DC to 40 GHz, 3 dB)
J1261A	Ethernet Cable (Shield type, Straight, 1 m)
J1261B	Ethernet Cable (Shield type, Straight, 3 m)
J1261C	Ethernet Cable (Shield type, Cross, 1 m)
J1261D	Ethernet Cable (Shield type, Cross, 3 m)
J0008	GPIB Cable, 2.0 m
B0635A	Rack Mount Kit (EIA)
B0657A	Rack Mount Kit (JIS)
B0636C*2	Carrying Case (Hard type, with casters)
B0671A*2	Front Cover for 1MW4U
MA24105A	Inline Peak Power Sensor (350 MHz to 4 GHz, with USB A to mini B cable)
MA24106A	USB Power Sensor (50 MHz to 6 GHz, with USB A to mini B cable)
MA24108A	Microwave USB Power Sensor (10 MHz to 8 GHz, with USB A to Micro-B cable)
MA24118A	Microwave USB Power Sensor (10 MHz to 18 GHz, with USB A to Micro-B cable)
MA24126A	Microwave USB Power Sensor (10 MHz to 26 GHz, with USB A to Micro-B cable)
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)

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

Recommended External Mixer

Model/Order No.	Name
STC-N12-15-S1-IDP*3	**Eravant External Mixer** V-Band Full Waveguide Band Down-Converter
WR12SAX-Z-M*3	**VDI External Mixer** Spectrum Analyzer Extender (SAX)

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

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)

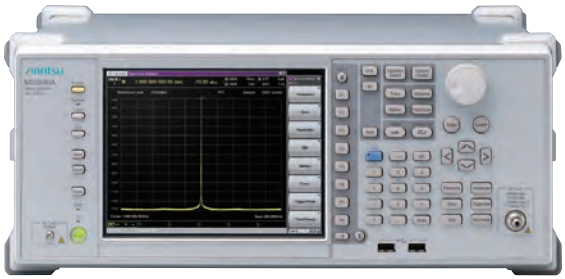
Front Cover for 1MW4U B0671A

Signal Analyzer MS2850A Related Products

Signal Analyzer MS2840A

9 kHz to 3.6 GHz/6 GHz/26.5 GHz/44.5 GHz
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).
- 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
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 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.

Note

Note

Anritsu Advancing beyond

Specifications are subject to change without notice.

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