

**Anritsu** envision : ensure

# Signal Analyzer Spectrum Analyzer Selection Guide



# Anritsu Signal Analyzers/Spectrum Analyzers

Solve all your measurement needs with Anritsu's wide line-up of signal and spectrum analyzers, ranging from high-performance and multi-function, high-end models for R&D to handheld types for field use.

## Supported Frequencies (Bench-top Type)

Model/Name	Frequency Coverage						Remarks
	50 Hz	9 kHz	1 GHz	10 GHz	25 GHz	50 GHz	
Signal Analyzer MS2850A series							9 kHz to 32 GHz/44.5 GHz: 50 GHz to 90 GHz with high performance waveguide mixer 325 GHz maximum with harmonic mixer
Signal Analyzer MS2840A series							9 kHz to 3.6 GHz/6 GHz 9 kHz to 26.5 GHz/44.5 GHz: 50 GHz to 90 GHz with high performance waveguide mixer 325 GHz maximum with harmonic mixer
Signal Analyzer MS2830A series							9 kHz to 3.6 GHz/6 GHz/13.5 GHz 9 kHz to 26.5 GHz/43 GHz: 50 GHz to 90 GHz with high performance waveguide mixer 325 GHz maximum with harmonic mixer
Signal Analyzer MS2690A/91A/92A							50 Hz to 6 GHz/13.5 GHz/26.5 GHz

## Key Specifications

### Bench-top Type

Overview	MS2850A-047/046	MS2840A-040/041	MS2840A-044/046
Performance	◆◆◆◆	◆◆◆◆	◆◆◆◆
Frequency Range	9 kHz to 32 GHz/44.5 GHz (325 GHz)	9 kHz to 3.6 GHz/6 GHz	9 kHz to 26.5 GHz/44.5 GHz (325 GHz)
Phase Noise	-123 dBc/Hz	-133 dBc/Hz*1 (500 MHz, 10 kHz offset)	-123 dBc/Hz (1 GHz, 10 kHz offset)
TOI (1 GHz, without preamp)	+16 dBm	+16 dBm	+16 dBm
Displayed Average Noise	1 GHz, without preamp	-150 dBm/Hz	-151 dBm/Hz
	1 GHz, with preamp	-164 dBm/Hz	-165 dBm/Hz
	5 GHz, without preamp	-144 dBm/Hz	-146 dBm/Hz
Standard Attenuator Range/Step	60 dB/2 dB step	60 dB/2 dB step	60 dB/2 dB step (044), 10 dB step (046)
Overall Amplitude Accuracy	±0.5 dB	±0.5 dB	±0.5 dB
Resolution Bandwidth	SPA: 1 Hz to 10 MHz VSA: 1 Hz to 10 MHz*1	SPA: 1 Hz to 31.25 MHz VSA: 1 Hz to 10 MHz	SPA: 1 Hz to 31.25 MHz (044) 10 MHz (046) VSA: 1 Hz to 10 MHz
Standard Analysis Bandwidth	255 MHz	31.25 MHz	31.25 MHz
Optional Analysis Bandwidth (max.)	1 GHz	125 MHz*2	125 MHz*2
Maximum Digitize Time (10 MHz span)	5 sec.	5 sec.	5 sec.
Signal Generator Option	—	✓	—
Tracking Generator Option	—	—	—

\*1: Option

\*2: An image response is received when setting the bandwidth to more than 31.25 MHz.

This can be used when not inputting a signal frequency outside the MS2840A/MS2830A analysis bandwidth (125 MHz max.).

The Signal Analyzer series MS2690A/91A/92A is recommended for other measurement purposes.

\*3: Instead of changing the signal generator (SG) frequency to match the spectrum analyzer(SA) sweep, continuously synchronizing the frequency by using SG and SA can realize the function same as tracking generator.

### Supported Frequencies (Handheld Type)

Model/Name	Frequency Coverage							Remarks
	50 Hz	9 kHz	1 GHz	10 GHz	25 GHz	50 GHz	100 GHz	
Spectrum Master Ultraportable Spectrum Analyzer MS2760A								9 kHz to 32 GHz/44 GHz/50 GHz/70 GHz/ 90 GHz/110 GHz
Field Master Pro MS2090A								9 GHz/14 GHz/20 GHz/26.5 GHz/32 GHz/ 43.5 GHz/54 GHz
Spectrum Master MS2720T								9 kHz to 9 GHz/13 GHz/20 GHz/32 GHz/43 GHz
Spectrum Master MS2712E/13E								9 kHz to 4 GHz/6 GHz
Spectrum Master MS2711E								9 kHz to 3 GHz
BTS Master MT8220T								150 kHz to 7.1 GHz
Cell Master MT8213E								9 kHz to 6 GHz
Spectrum Monitor Module MS27100A								9 kHz to 6 GHz
Remote Spectrum Monitor MS27101A								9 kHz to 6 GHz
Remote Spectrum Monitor MS27102A								9 kHz to 6 GHz
Remote Spectrum Monitor MS27103A								9 kHz to 6 GHz

MS2830A-040/041/043	MS2830A-044/045	MS2690A/91A/92A
◆◆◆	◆◆◆	◆◆◆◆◆
9 kHz to 3.6 GHz/6 GHz/13.5 GHz	9 kHz to 26.5 GHz/43 GHz (325 GHz)	50 Hz to 6 GHz/13.5 GHz/26.5 GHz
-118 dBc/Hz*1 (500 MHz, 10 kHz offset)	-115 dBc/Hz (500 MHz, 100 kHz offset)	-116 dBc/Hz (2 GHz, 100 kHz offset)
+15 dBm	+15 dBm	+22 dBm
-151 dBm/Hz	-150 dBm/Hz	-155 dBm/Hz
-162 dBm/Hz	-161 dBm/Hz	-166 dBm/Hz
-146 dBm/Hz	-144 dBm/Hz	-152 dBm/Hz
60 dB/2 dB step	60 dB/2 dB step (044), 10 dB step (045)	60 dB/2 dB step
±0.5 dB	±0.5 dB	±0.5 dB
SPA: 1 Hz to 31.25 MHz*1 VSA: 1 Hz to 10 MHz*1	SPA: 1 Hz to 31.25 MHz*1 (044) 10 MHz (045) VSA: 1 Hz to 10 MHz*1	SPA: 30 Hz to 31.25 MHz VSA: 1 Hz to 10 MHz*1
—	—	31.25 MHz
125 MHz*2	125 MHz*2	125 MHz
5 sec.	5 sec.	5 sec. (standard) 4 hours (Option)
✓	—	✓
✓*3	—	—

# Key Specifications

## Handheld Type

Overview		MS2760A (32 GHz/44 GHz/50 GHz/ 70 GHz/90 GHz/110 GHz)	MS2090A (9 GHz/14 GHz/20 GHz/26.5 GHz/ 32 GHz/43.5 GHz/54 GHz)	MS2720T (13 GHz/20 GHz/ 32 GHz/43 GHz)	MS2720T (9 GHz)
Performance		◇◇◇◇◇	◇◇◇◇◇	◇◇◇◇◇	◇◇◇◇◇
Frequency Range		9 kHz to 110 GHz	9 kHz to 54 GHz	9 kHz to 43 GHz	9 kHz to 9 GHz
Phase Noise (1 GHz, 10 kHz offset)		-110 dBc/Hz (typical)	-102 dBc/Hz	-102 dBc/Hz	-108 dBc/Hz
TOI (without preamp)*1		+35 dBm	+20 dBm	+20 dBm	+20 dBm
Displayed Average Noise	1 GHz, without preamp	—	-148 dBm/Hz	-145 dBm/Hz	-146 dBm/Hz
	1 GHz, with preamp	-136 dBm/Hz	-164 dBm/Hz	-161 dBm/Hz	-160 dBm/Hz
	5 GHz, without preamp	—	-162 dBm/Hz	-142 dBm/Hz	-140 dBm/Hz
Standard Attenuator Range/Step		—	65 dB/5 dB step	65 dB/5 dB step	65 dB/5 dB step
Overall Amplitude Accuracy		±2.0 dB, ±0.5 dB (typical)	±1.3 dB (20 GHz)	±1.3 dB	±1.3 dB
Resolution Bandwidth		1 Hz to 3 MHz	1 Hz to 10 MHz	1 Hz to 10 MHz	1 Hz to 10 MHz
Standard Analysis Bandwidth		—	20 MHz	—	—
Optional Analysis Bandwidth		—	50 MHz or 100 MHz	20 MHz	20 MHz
Signal Generator Option		—	—	—	—
Tracking Generator Option		—	—	✓*3	✓*3
Battery		—	✓	✓	✓
Cable/Antenna Analyzer		—	—	—	—

\*1: Typical value. MS2760A: @ 2 GHz, Others: @ 1 GHz

\*2: Normalized to 1 Hz RBW

\*3: Available only 9 GHz, 13 GHz and 20 GHz models

## Remote Spectrum Monitor

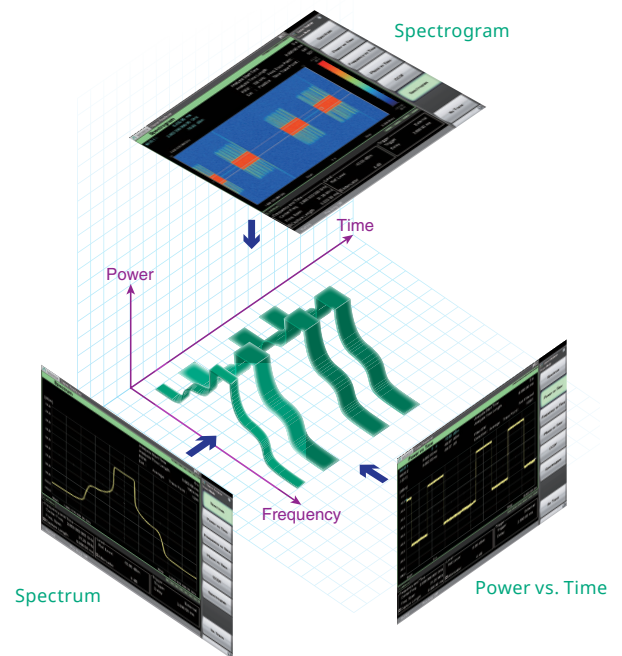
Overview		MS27100A	MS27101A	MS27102A	MS27103A
Performance		OEM model PCB	Compact ½ rack model	Weather-proof IP-67 enclosure model	12 (optionally 24) RF IN ports model
Frequency Range		9 kHz to 6 GHz	9 kHz to 6 GHz	9 kHz to 6 GHz	9 kHz to 6 GHz
Phase Noise (1 GHz, 10 kHz offset)		-99 dBc/Hz (typical)	-99 dBc/Hz (typical)	-99 dBc/Hz (typical)	-99 dBc/Hz (typical)
TOI (1 GHz, without preamp)		+10 dBm	+10 dBm	+10 dBm	+10 dBm
Displayed Average Noise*	1 GHz, without preamp	-145 dBm/Hz	-145 dBm/Hz	-145 dBm/Hz	-140 dBm/Hz
	1 GHz, with preamp	-162 dBm/Hz	-162 dBm/Hz	-162 dBm/Hz	-157 dBm/Hz
	5 GHz, without preamp	-138 dBm/Hz	-138 dBm/Hz	-138 dBm/Hz	-130 dBm/Hz
Standard Attenuator Range/Step		0 to 50 dB (5 dB step)	0 to 50 dB (5 dB step)	0 to 50 dB (5 dB step)	0 to 50 dB (5 dB step)
Overall Amplitude Accuracy		±2.5 dB	±2.5 dB	±2.5 dB	±2.5 to 3.5 dB
Resolution Bandwidth		10 Hz to 3 MHz	10 Hz to 3 MHz	10 Hz to 3 MHz	10 Hz to 3 MHz
Maximum Digitize Time (10 MHz span)		6.7 s	6.7 s	6.7 s	6.7 s

\*: Normalized to 1 Hz RBW

MS2712E/13E (4 GHz/6 GHz)	MS2711E (3 GHz)	MT8220T	MT8213E (6 GHz)
◇◇◇◇	◇◇◇	◇◇◇◇◇	◇◇◇◇
9 kHz to 6 GHz	9 kHz to 3 GHz	150 kHz to 7.1 GHz	9 kHz to 6 GHz
-100 dBc/Hz	-90 dBc/Hz	-100 dBc/Hz	-100 dBc/Hz
+25 dBm	+25 dBm	+8 dBm	+25 dBm
-141 dBm/Hz	-141 dBm/Hz* <sup>2</sup>	-137 dBm/Hz	-141 dBm/Hz
-157 dBm/Hz	-157 dBm/Hz* <sup>2</sup>	-161 dBm/Hz	-157 dBm/Hz
-134 dBm/Hz	-	-130 dBm/Hz	-134 dBm/Hz
55 dB/5 dB step	55 dB/5 dB step	65 dB/5 dB step	55 dB/5 dB step
±1.25 dB	±1.25 dB	±1.25 dB	±1.25 dB
1 Hz to 3 MHz	100 Hz to 3 MHz	1 Hz to 3 MHz	1 Hz to 3 MHz
-	-	20 MHz	20 MHz
20 MHz	-	-	-
-	-	✓	-
✓	✓	-	✓
✓	✓	✓	✓
-	-	✓	✓

### Vector Signal Analysis (VSA) Function

Seamless signal capture and VSA analysis in multiple domains make it easy to evaluate burst-signal responses and capture degraded spectrum transients, etc., which cannot be checked by conventional sweep spectrum analyzers. This greatly improves design verification and troubleshooting efficiency.



## SIGNAL ANALYZER

MS2690A/MS2691A/MS2692A 50 Hz to 6 GHz/13.5 GHz/26.5 GHz

### High Performance Signal Analyzer for Wireless Solutions

- Total level accuracy: ±0.3 dB (typ.)
- Dynamic range\*: 177 dB \*:(TOI - DANL)  
TOI: ≥ +22 dBm, DANL: -155 dBm/Hz
- Analysis bandwidth: 31.25 MHz (Standard), 125 MHz max. (Option)
- Modulation Analysis Software  
5G, LTE/LTE-Advanced, WiMAX, WLAN (IEEE802.11ac/a/b/g/n/j/p), GSM/GPRS/EDGE, W-CDMA/HSPA/HSPA Evolution, etc.



Signal Analyzer MS2690A/91A/92A has the excellent total level accuracy, dynamic range and performance of a high-end spectrum analyzer. Not only can it capture wideband signals but FFT technology supports multifunction signal analyses in both the time and frequency domains. Moreover, the built-in signal generator function outputs both continuous wave (CW) and modulated signals for use as a reference signal source.

## SIGNAL ANALYZER

MS2850A series (MS2850A-047/046) 9 kHz to 32 GHz/44.5 GHz (26.5 GHz to 325 GHz)

### Analysis Bandwidth up to 1 GHz Enabling 5G Mobile and Satellite Communications R&D/Manufacturing Development

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

The 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. It helps cut R&D and manufacturing costs for microwave and millimeter-wave wideband communications systems, such as 5G mobile and broadcast satellites.

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.



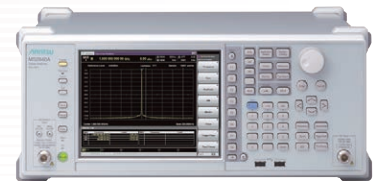
## SIGNAL ANALYZER

MS2840A series (MS2840A-040/041) 9 kHz to 3.6 GHz/6 GHz

### Top Class Phase Noise Performance at Middle-Price Range

- Phase Noise:  $-140$  dBc/Hz@150 MHz, 10 kHz offset (MS2840A-066, meas.)
  - $-138$  dBc/Hz@1 GHz, 10 kHz offset (MS2840A-066, meas.)
  - $-123$  dBc/Hz@1 GHz, 10 kHz offset (Standard)
- Analysis Bandwidth: 31.25 MHz (Standard), 125 MHz max. (Option)
- Measurement applications (options): Phase Noise Measurement, Noise Figure Measurement, Vector and Analog Modulation Analysis, BER Measurement

The MS2840A series of spectrum analyzers offers top-class phase noise performance in a middle-price -range model. In particular, installing the MS2840A-066 option in the MS2840A-040/041 supports excellent phase noise performance exceeding that of high-end models. In addition to applications in development and manufacturing of wireless equipment and Tx devices, the MS2840A-040/041 also offers cost-performance for fundamental future research and development, which could only be supported by top-class analyzers previously. It has a built-in signal analyzer function with a wide 31.25 MHz resolution bandwidth using FFT technology for versatile analyses in both the time and frequency domains, etc. Moreover, installing the internal vector signal generator and analog signal generator options provides all-in-one support for TRx measurements of wireless equipment.



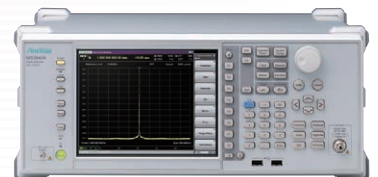
## SIGNAL ANALYZER

MS2840A series (MS2840A-044/046) 9 kHz to 26.5 GHz/44.5 GHz (26.5 GHz to 325 GHz)

### Excellent Phase Noise Performance Using New Synthesizer Design

- Phase Noise:  $-123$  dBc/Hz@1 GHz, 10 kHz offset
  - $-100$  dBc/Hz@79 GHz, 10 kHz offset (with high performance waveguide mixer, meas.)
- Support external high performance waveguide mixer (50 GHz to 90 GHz) or harmonic mixer (up to 325 GHz)
- Built-in pre-amplifier; 44.5 GHz max. (Option)
- Analysis Bandwidth: 31.25 MHz (Standard), 125 MHz max. (Option)
- Measurement applications (options): Phase Noise Measurement, Noise Figure Measurement, Vector Modulation Analysis and Analog Measurement (FM/ $\Phi$ M/AM)

The MS2840A-044/046 is a spectrum analyzer offering top-class phase noise performance in a middle-price-range model. This excellent phase noise performance supports measurement of wideband transmitters, such as VHF/UHF business radio, where the measurement instrument performance is key to measurement of close-in spurious, as well as measurement of microwave wireless backhaul, satellite, radar, etc. Connection to two available high-performance waveguide mixers covers both V-band (50 GHz to 75 GHz) and E-band (60 GHz to 90 GHz) measurements with the highest phase noise performance. Additionally, spectrum measurements up to 325 GHz are supported by connecting the External Mixer (Harmonic Mixer) MA2740C/MA2750C series.



## SIGNAL ANALYZER

MS2830A series (MS2830A-040/041/043) 9 kHz to 3.6 GHz/6 GHz/13.5 GHz

### Support Tx Test by Excellent SSB Performance\* Necessary for a Spurious Test and Various Modulation Analysis Software

- Total level accuracy:  $\pm 0.3$  dB (typ.) (300 kHz to 4 GHz)
- SSB Phase Noise:  $-109$  dBc/Hz@500 MHz, 1 kHz offset\*
  - $-118$  dBc/Hz@500 MHz, 10 kHz offset\*
  - $-133$  dBc/Hz@500 MHz, 100 kHz offset\*

\*: Required MS2830A-066
- Modulation Analysis: LTE/LTE-Advanced, Analog Modulation, Digital Modulation, etc.

The MS2830A series of spectrum analyzers is based on the concept of speed, high-performance, and low-cost, coupled with customization by installing signal analyzer, vector signal generator, and analog signal generator options. The optional signal analyzer function captures wideband signals for versatile analyses in the time and frequency domains using FFT technology. Adding options supports analysis of various modulation types as well as audio analyzer and NF measurement functions.



MS2830A-041

# SIGNAL ANALYZER



MS2830A Microwave series (MS2830A-044/045) 9 kHz to 26.5 GHz/43 GHz (26.5 GHz to 325 GHz)

## For the Development & Manufacturing of the Microwave Products. Spectrum Analyzer + Signal Analyzer

- Total level accuracy:  $\pm 0.3$  dB (typ.) (300 kHz to 4 GHz)
- Dynamic range\*: 159 dB@25 GHz \*:(TOI - DANL)  
TOI: +13 dBm@25 GHz  
DANL: -146 dBm/Hz@25 GHz
- SSB phase noise: -115 dBc/Hz@500 MHz, 100 kHz offset



MS2830A-045

The MS2830A-044/045 spectrum analyzer has an upper frequency limit of 26.5 GHz/43 GHz, which can be extended to 325 GHz using the high-performance waveguide mixer and external mixer. It can be customized to support various measurement applications.

- Confirming microwave signal frequency, phase, amplitude, instantaneous spectrum fluctuations, etc., in signal analyzer mode
- Measuring weak signals at microwave preamplifiers
- Measuring true spurious of increasingly wideband mm-Wave communications equipment using high IF (1.875 GHz) and high-performance waveguide mixer

# HIGH PERFORMANCE WAVEGUIDE MIXER

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

## Spectrum Analysis of Increasingly Wideband mm-Wave Transmitters

- Easy set-up with one coaxial cable connection to MS2850A/MS2840A/MS2830A signal analyzer
- Wide dynamic range using excellent minimum Rx sensitivity and P1dB performance
- High IF and PS Function (patent pending) eliminating Image response effects at wideband signal measurement
- High phase noise performance of -100 dBc/Hz@79 GHz with 10 kHz offset (meas.) at connection with MS2840A
- Easy loading of conversion loss data from accessory USB memory stick into MS2850A/MS2840A/MS2830A for reflection in the measurement values.



MA2808A

The MA2806A/MA2808A is a high-performance waveguide mixer for connection to the MS2850A-047/046, MS2840A-044/046 and MS2830A-044/045. With high dynamic range performance, it is ideal for evaluating the true spurious of increasingly wideband mm-Wave transmitters. Moreover, when used with the high IF\* of the MS2850A/MS2840A/MS2830A, it not only supports image-response-free measurements, but can also be used for spectrum mask measurements of wideband signals, such as automobile radar, over a wide measurement span. Using the newly developed, patent-pending, PS Function, supports measurements without image responses up to a measurement span of 7.502 GHz (MS2850A, MS2840A).

\*: MS2850A/MS2840A: 1.8755 GHz, MS2830A: 1.875 GHz

## Measurement Method Performance Comparison

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

\*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

# SPECTRUM MASTER™ Ultraportable Spectrum Analyzer

MS2760A 9 kHz to 32 GHz/44 GHz/50 GHz/70 GHz/90 GHz/110 GHz

## The Future of Performance and Affordability

- mmWave capabilities for 5G, wireless backhaul, IEEE 802.11ad, satcom, and more
- Ultraportable form factor enables measurements right at the device under test
- Measure: channel power, adjacent channel power, occupied bandwidth
- Patented NLTL technology provides >100 dB dynamic range
- -127 dBm/Hz DANL to 110 GHz (typical)
- Up to 6 traces, 3 trace detectors, and 12 markers



The Spectrum Master MS2760A is the world's first handheld millimeter-wave (mmWave) spectrum analyzer to provide continuous coverage from 9 kHz up to 110 GHz. With its basic spectrum measurement capabilities and ultraportable form factor, the Spectrum Master MS2760A is an ideal, affordable solution for: mmWave R&D and production testing; antenna alignment and transmitter testing of mmWave point-to-point 5G network radio systems; as well as 802.11ad/Wi-GIG, satellite communications, and automotive radar testing.

# SPECTRUM ANALYZER Field Master Pro™

MS2090A 9 kHz to 9/14/20/26.5/32/43.5/54 GHz

## The World's Highest Performance Handheld Spectrum Analyzer

- Continuous frequency coverage from 9 kHz to 54 GHz
- Analysis bandwidth: 100 MHz (Option)
- Demodulation: 5G NR, RF, and modulation quality plus SSB signal analysis
- RTSA bandwidth: 20 MHz to 100 MHz
- Designed to meet the challenges of a full range of wireless technologies in use today: 5G, wireless backhaul, aerospace/defense, satellite systems, and radar



The Field Master Pro MS2090A RF spectrum analyzer delivers performance never previously available in a compact, handheld instrument. With continuous frequency coverage from 8 kHz to 54 GHz, the Field Master Pro MS2090A is specifically designed to meet the challenges of a full range of other wireless technologies in use today, including: 5G, wireless backhaul, aerospace/defense, satellite systems, and radar.

# SPECTRUM MASTER

MS2720T 9 kHz to 9 GHz/13 GHz/20 GHz/32 GHz/43 GHz

## High-Performance, Compact Solution for Frequency Ranges up to 43 GHz

- Covers microwave band (9 kHz to 43 GHz)
- Dynamic Range: >106 dB\*<sup>1</sup>
- Options for various modulation analyses and RF measurements  
LTE, W-CDMA/HSDPA, CDMA2000, Mobile WiMAX
- Tracking Generator (Signal Source)\*<sup>2</sup>, Interference Analyzer, etc

\*<sup>1</sup>: 2/3 (TOI – DANL), RBW: 1 Hz, 2.4 GHz  
\*<sup>2</sup>: With 9 GHz/13 GHz/20 GHz models



The Spectrum Master MS2720T covers a frequency range from 9 kHz to 43 GHz with high-reproducibility measurements for various fields, including mobile base station registration inspection and microwave circuit maintenance.

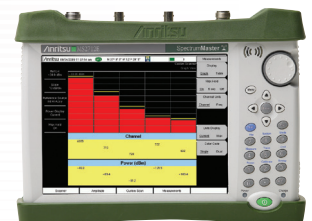
# SPECTRUM MASTER

MS2712E/MS2713E 9 kHz to 4 GHz/6 GHz (0 Hz settable)

## Integrated Solution Designed for Field Use

- Various measurement functions: Occupied Bandwidth, Channel Power, Field Strength
- Dynamic Range: >102 dB\*
- High Sensitivity Measurement: -162 dBm (typ.)
- Large, 8.4-inch bright touch screen
- Fast warm-up time of less than 5 minutes
- Continuous battery operation of more than 3 hours
- CPRI RF (Option)

\*: 2/3 (TOI – DANL), RBW: 1 Hz, 2.4 GHz



The Spectrum Master MS2712E/13E is a handheld spectrum analyzer with a full range of versatile functions for field measurements. In addition to spectrum analyzer functions, it also supports field strength measurements, interference wave adjustments, and modulation analyses functions for various systems. The easy-to-use, touchscreen GUI simplifies both operation and measurement.



## SPECTRUM MASTER

MS2711 E 9 kHz to 3 GHz

### Affordable, Integrated Solution Designed for Field Use

- Compact and lightweight (3.45 kg) with better than 3 hours of continuous battery operation
- Spurious, Occupied Bandwidth, Field Strength
- Tracking Generator: 500 kHz to 3.0 GHz
- Dynamic Range: >85 dB\*

\*: 2/3 (TOI - DANL), RBW: 100 Hz



The Spectrum Master MS2711E is a low-cost, high-performance handheld spectrum analyzer. In addition to general-purpose spectrum analyses, installing various measurement options, such as unwanted wave analysis and channel scanner functions, etc., support this powerful field measurement platform in a compact, lightweight, battery operated handheld case.

## BTS MASTER™

MT8220T 150 kHz to 7.1 GHz

### All-in-one Mobile Base Station Measurements

- Frequency Range: 150 kHz to 7.1 GHz (Spectrum Analyzer)  
400 MHz to 6 GHz (Cable and Antenna Analyzer)
- 2G, 3G, LTE Signal Analyzers
- Vector Signal Generator
- High Accuracy USB Power Meter
- Interference Analyzer with Interference Mapping, GPS
- CPRI RF (Option), PIM over CPRI (Option)
- Easy-to-use Touchscreen



The BTS Master MT8220T incorporates a spectrum analyzer, cable/antenna analyzer, and built-in power meter as the basic configuration with options supporting 2G, 3G, and LTE modulation analyses. Tests of Rx characteristics are also supported by installing the vector signal generator option.

## CELL MASTER™

MT8213E 9 kHz to 6 GHz

### Supports 2G, 3G, to LTE Modulation Analysis

- Frequency Range  
Spectrum Analyzer: 9 kHz to 6 GHz  
Cable and Antenna Analyzer: 2 MHz to 6 GHz
- 2G, 3G, LTE (Modulation Analysis Bandwidth: 20 MHz max.), WiMAX signal analyzers
- High Accuracy USB Power Meter
- Interference Analyzer with Interference Mapping, GPS
- Indoor and outdoor coverage mapping
- Easy-to-use Touchscreen
- CPRI RF (Option)



The Cell Master MT8213E incorporates a spectrum analyzer and cable/antenna analyzer as the basic configuration with options supporting 2G, 3G, LTE, and WiMax modulation analyses. In addition, it has all-in-one support for measurements such as cable and antenna VSWR, Distance To Fault (DTF), etc. The easy-to-use touchscreen with screen modes for various lighting environments helps improve work efficiency.

## SPECTRUM MONITOR MODULE

MS27100A 9 kHz to 6 GHz

### Identify and Mitigate Interference and Unlicensed/Illegal Signals

- OEM model designed for private labeling or integration into user enclosures
- Sweep speed up to 24 GHz/s
- 20 MHz instantaneous FFT bandwidth
- IQ capture & streaming
- Integrated preamp & GPS receiver
- Built-in web server



By monitoring spectrum on a continual bases, the Spectrum Monitor Module MS27100A facilitates the identification and removal of illegal or unlicensed interference signals in real time. Patterns of unwanted signal activity can also be examined, providing an efficient way to characterize and locate the source of the interference problem. The Spectrum Monitor Module MS27100A can also be used to characterize spectrum occupancy. Monitoring these frequencies provides the information needed to optimize spectrum for maximum utilization.

# REMOTE SPECTRUM MONITORS

MS27101A 9 kHz to 6 GHz

## Identify and Mitigate Interference and Unlicensed/Illegal Signals

- Sweep speed up to 24 GHz/s
- 20 MHz instantaneous FFT bandwidth
- IQ capture & streaming
- Integrated preamp & GPS receiver
- Built-in web server



Mitigate interference problems and identify illegal or unlicensed signal activity with the MS27101A. Designed for indoor use, perform frequency spectrum sweeps at rates up to 24 GHz/s to capture intermittent or pulsed signals. Perform multiple FFT captures of signals of interest, then store the data for later playback and analysis to identify unlicensed signals. Multiple devices can be deployed to extend the RF monitoring capabilities for geo-location of signals of interest. Vision software can then be used to geo-locate an interfering signal or illegal broadcast.

# REMOTE SPECTRUM MONITORS

MS27102A 9 kHz to 6 GHz

## Identify and Mitigate Interference and Unlicensed/Illegal Signals

- IP67 rated for outdoor deployments
- Sweep speeds up to 24 GHz/s
- 20 MHz instantaneous FFT bandwidth
- IQ block mode & streaming with time stamping
- Integrated GPS receiver & built-in web server



The MS27102A is an ideal solution to identify, mitigate, and remove illegal or unlicensed interference signals. Designed for remote outdoor applications, it is rated to the IP67 standard, being dust and water resistant, and each port on the unit is ruggedized and weatherized. Fast sweep speeds enable the detection of intermittent or pulsed signals. Perform multiple FFT captures of signals of interest, then store the data for later playback and analysis to identify unlicensed signals. Multiple devices can be deployed to extend the RF monitoring capabilities for geo-location of signals of interest. Vision software can then be used to geo-locate an interfering signal or illegal broadcast.

# REMOTE SPECTRUM MONITORS

MS27103A 9 kHz to 6 GHz

## Identify and Mitigate Interference and Unlicensed/Illegal Signals

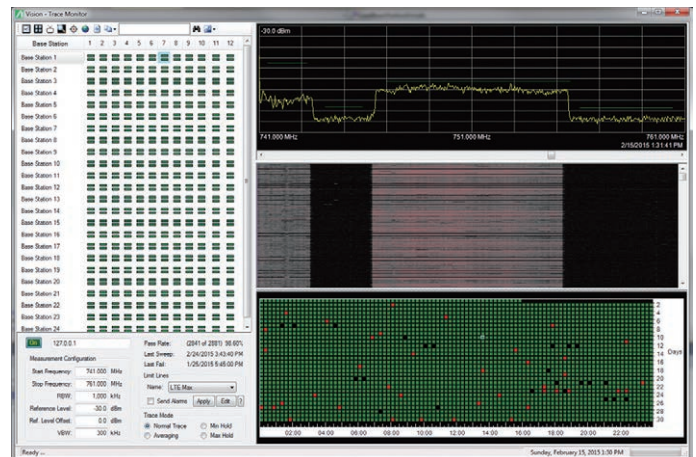
- 12 RF Input ports for use with multiple antennas (24 ports option available)
- Sweep speed up to 24 GHz/s
- 20 MHz instantaneous FFT bandwidth
- IQ capture & streaming
- Integrated preamp & GPS receiver
- Built-in web server



Capable of sweep rates up to 24 GHz/s, the MS27103A allows for the capture of many types of signals including periodic or transient transmissions as well as short "bursty" signals. The 20 MHz instantaneous FFT bandwidth provides the ability for wideband, real-time captures of signal activity for subsequent post-processing. IQ captures can be recorded both in block mode or streamed. A "save on event" feature is also provided to capture spectrum measurements only when certain user-settable thresholds are violated. This saves memory space since only signals of interest are captured and recorded.

## Vision™ Software MX280001A

The Vision dedicated remote spectrum monitoring software records long-term spectrum monitoring data as well as remote monitoring at multiple spectrum monitors. Captured data is displayed using graphs showing dates and times when limit lines have been exceeded. Options available for geo-location of signals (TDOA), coverage mapping, spectrum occupancy, and high-speed port scanners



# Application Charts

## Application Comparison Chart (Modulation Analysis)

Measurement Applications	Benchtop				Handheld					
	MS2850A series	MS2840A series	MS2830A series	MS2690A/91A/92A	MS2090A	MS2720T	MT8220T	MT8213E	MS2712E/13E	MS2711E
5G	✓			✓	✓*					
LTE	✓		✓	✓	✓*	✓*	✓*	✓*	✓*	
W-CDMA/HSPA	✓		✓	✓		✓*	✓*	✓*	✓*	
HSPA Evolution	✓		✓	✓						
GSM/EDGE			✓	✓		✓*	✓*	✓*	✓*	
EDGE Evolution			✓	✓						
CDMA2000			✓*	✓*		✓*	✓*	✓*	✓*	
1xEV-DO			✓*	✓*		✓*	✓*	✓*	✓*	
TD-SCDMA/HSDPA	✓		✓	✓		✓*	✓*	✓*	✓*	
Fixed WiMAX						✓*	✓*	✓*	✓*	
Mobile WiMAX						✓*	✓*	✓*	✓*	
WLAN			✓	✓						
Flexible Digital Modulation Analysis	✓	✓	✓	✓						
ISDB-T			✓	✓				✓	✓	
ISDB-Tmm/ ISDB-Tsb			✓	✓						
DVB-T/H								✓	✓	
Phase Noise	✓	✓	✓	✓						
Noise Figure	✓	✓	✓	✓						
AM/FM tune and listen						✓	✓	✓	✓	✓
AM/FM/PM Demodulator		✓	✓			✓			✓	✓
Audio Analyzer/Generator			✓							
CPRI RF							✓	✓	✓	

\*: Down link/Forward link only

## Signal Analyzer MS2850A series, MS2840A series, MS2830A series, MS2690A/91A/92A Recommended Model for Target Market

Market	DUT	Phase	MS2850A series	MS2840A series	MS2830A series	MS2690A/91A/92A
Cellular Base Stations - 3GPP LTE, W-CDMA/HSPA, GSM/EDGE ...	RF Devices/Modules	R&D, Production	✓✓			✓✓
	Base Stations	R&D	✓✓			✓✓
		Production	✓✓	✓✓*	✓✓	✓
Cellular Handsets - 3GPP LTE, W-CDMA/HSPA, GSM/EDGE. ...	RF Devices/Modules	R&D, Production	✓	✓✓*	✓✓	✓
	Handsets	R&D	✓	✓✓*	✓✓	✓
		Production	✓	✓✓*	✓✓	
WLAN	RF Devices/Modules	Production		✓*	✓	✓✓
Public/Service Communications				✓✓	✓✓	✓
Microwave Links			✓	✓✓	✓✓	✓✓
Other Communications			✓	✓	✓	✓✓
Broadcasting - ISDB-Tmm, ISDB-T, ISDB-Tsb					✓✓	✓
R&D			✓✓	✓	✓	✓✓
Education			✓	✓	✓✓	✓
Analog (FM/AM/ΦM)				✓	✓✓	

\*: Available for spectrum measurement without modulation analysis.

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