

**Anritsu** envision : ensure

# Spectrum Master™

## Ultraportable Spectrum Analyzer

### MS2760A

9 kHz to 32 GHz, 44 GHz, 50 GHz, 70 GHz, 90 GHz, 110 GHz



## Introduction

From Anritsu, the inventor of the handheld spectrum analyzer first introduced in 1999, we are proud to introduce our first generation MS2760A Spectrum Master – Ultraportable Spectrum Analyzer. By utilizing Anritsu's patented shockline nonlinear transmission line (NLTL) technology, the MS2760A shatters the cost, size, and performance barriers associated with traditional large form-factor instruments to more efficiently advance technology development. The MS2760A is truly pocket sized, but big on performance with industry leading dynamic range, sweep speed, and amplitude accuracy.

Its ultraportable size enables direct connect to almost any DUT, eliminating the need for lossy, expensive cables or antennas. The MS2760A is the world's first handheld millimeter-wave spectrum analyzer to provide continuous coverage from 9 kHz up to 110 GHz, positioning it perfectly for growing millimeter-wave applications like 5G, 802.11ad, satellite communications, automotive radar, and more. The MS2760A is USB-powered and controlled from a Windows-based PC, laptop, or tablet, making it uniquely flexible for use in the lab, on the manufacturing floor, or in the field.

## Spectrum Analyzer Highlights

- Measure: Channel Power, Adjacent Channel Power, Occupied Bandwidth
- Spectrum and Spectrogram Displays
- External 10 MHz Frequency Reference
- External TTL Trigger Input
- Resolution Bandwidth (RBW): 1 Hz to 3 MHz
- Phase Noise: -116 dBc/Hz @ 1 GHz
- Up to Six Traces, Three Trace Detectors, 12 Markers
- Dynamic Range: > 103 dB from 6.15 GHz up to 110 GHz
- DANL: as low as -136 dBm

## US Patents

The MS2760A is protected by the following US patents: 6,894,581; 7,683,633; 8,417,189; 9,287,604

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**Definitions**

All specifications and characteristics apply to Revision 1 instruments under the following conditions, unless otherwise stated:

- After 5 minutes of warm-up time, where the instrument is left in the ON state
- When using the internal reference signal

Typical Specifications    Typical specifications are not tested and not warranted. They are generally representative of characteristic performance. The following models have typical specifications in the following ranges:  
 MS2760A-0044: 40 GHz to 44 GHz typical.  
 MS2760A-0070: 67 GHz to 70 GHz typical.

Calibration Cycle        Recommended calibration cycle is 12 months.

Time Base Error         Input Frequency × Frequency Reference Error

All specifications subject to change without notice. For the most current data sheet, please visit [www.anritsu.com](http://www.anritsu.com)



## Spectrum Analyzer

### Smart Measurements

Channel Power	Measures the total power in a specified bandwidth
Occupied Bandwidth	Measures 99 % to 1 % power channel of a signal
Adjacent Channel Power	Measures channel power of the adjacent channel

### Setup Parameters

Frequency	Center/Start/Stop, Frequency Step, Frequency Offset
Span	Span, Span Up/Down, Full Span, Last Span
Bandwidth	RBW, Auto RBW, VBW, Auto VBW, VBW/RBW, Span/RBW, VBW Log/Lin Averaging
Amplitude	Reference Level, Scale / Division, Ref Level Offset

### Sweep Functions

Sweep	Single/Continuous, Restart, Sweep Once, Sweep to N
Capture Time	0s to 10s

### Trace Functions

Traces	Up to six traces
Trace Type	Clear / Write, Trace Average, Max Hold, Min Hold, Rolling Average, Rolling Max Hold, Rolling Min Hold
Trace Mode	Active, Hold / View, Blank
Detector Type per Trace	Peak, RMS / Avg, Negative

### Spectrogram

Spectrogram Position	Selectable from Top, Bottom, or Full Screen
Trace Time Cursor	Time cursor to recall historical trace data by trace number or time
Color Setup	Set Color Top/Bottom Range, Set Color Reference Hue

### Marker Functions

Markers	Up to 12 Markers
Marker Mode	Normal, Delta, Fixed
Delta Marker	Relative to any Normal or Fixed Marker
Marker Trace	Assign Marker to any Trace
Peak Search	Peak Search, Next Peak, Next Peak Left, Next Peak Right, Next Point Left, Next Point Right
Peak Search Setup	Peak Threshold, Peak Excursion
Marker →	Mkr → Center, Mkr → Ref Level

### Limit Line Functions

Limit Setup	Upper/Lower, Limit On/Off, Limit Alarm On/Off, Set Default Limit Line, Absolute/Relative, Mirror On/Off
Limit Line Edit	Frequency, Amplitude, Add Point, Add Vertical, Delete Point, Next Point Left/Right
Limit Line Move	To Current Center Frequency, By dB or Hz, To Marker 1, Offset from Marker 1
Limit Line Envelope	Create Envelope, Update Envelope, Points (41 max), Offset, Shape Square/Slope

### Frequency

Frequency Range	(usable to 0 Hz)
MS2760A-0032	9 kHz to 32 GHz
MS2760A-0044	9 kHz to 44 GHz
MS2760A-0050	9 kHz to 50 GHz
MS2760A-0070	9 kHz to 70 GHz
MS2760A-0090	9 kHz to 90 GHz
MS2760A-0110	9 kHz to 110 GHz
Tuning Resolution	1 Hz
Internal 10 MHz Frequency Reference	Aging: ±1.0 ppm/year Accuracy: ±0.2 ppm (25 °C ± 25 °C) + aging
Frequency Span	10 Hz to maximum frequency range of instrument

### Bandwidth

Resolution Bandwidth (RBW)	1 Hz to 3 MHz
Video Bandwidth (VBW)	1 Hz to 3 MHz
VBW/Average Type	Linear / Log
RBW Filters	Flat Top, Nuttall

### Amplitude Ranges

Dynamic Range	> 103 dB typical at 70 GHz, 2/3 (TOI - DANL) in 1 Hz RBW
Display Range	1 dB to 15 dB/div in 1 dB steps, ten divisions displayed
Reference Level Range	-120 dBm to +30 dBm
Amplitude Units	dBm
Maximum Safe Level Input	+30 dBm CW, ±10 VDC



**Spectrum Analyzer** (continued)

**Image Response** The MS2760A employs unique software algorithms to minimize image responses that may appear under certain use cases when wideband modulated and multi-tone signals are being analyzed.

Offset	Spectral Purity – SSB Phase Noise (dBc/Hz, 20 °C to 30 °C)							
	1 GHz (typical)	6 GHz (maximum)	6 GHz (typical)	30 GHz (maximum)	30 GHz (typical)	60 GHz (maximum)	60 GHz (typical)	
1 kHz	-100	-80	-88	-66	-74	-60	-69	
10 kHz	-110	-95	-104	-81	-88	-75	-84	
100 kHz	-116	-95	-104	-81	-88	-75	-84	

**Spurs**

Residual Spurs	maximum (dBm)	typical (dBm)
10 MHz to 70 GHz	-85	-95
> 70 MHz to 90 GHz	-84	-95
> 90 MHz to 110 GHz	-81	-95
Input-related Spurious (-10 dBm CW input)		
28 MHz	-50 dBc @ 70 MHz	
35 MHz	-50 dBc @ 133 MHz	
770 MHz	-35 dBc @ 3430 MHz, 4970 MHz, 7630 MHz	
910 MHz	-35 dBc @ 4970 MHz, 6790 MHz	
All other input frequencies	<-60 dBc	

**Amplitude Accuracy**

Frequency	20 °C to 30 °C (after 30 minute warm-up)		0 °C to 50 °C (after 60 minute warm-up)	
	maximum (dB)	typical (dB)	maximum (dB)	typical (dB)
9 kHz to 644 MHz	±1.3	±0.5	±2.0	±0.5
> 644 MHz to 40 GHz	±1.8	±0.5	±3.0	±1.0
> 40 GHz to 70 GHz	±2.0	±0.5	±3.0	±1.0
> 70 GHz to 90 GHz	±2.2	±0.5	±3.0	±1.0
> 90 GHz to 110 GHz	±2.5	±0.5	±3.0	±1.0

**Displayed Average Noise Level (DANL)** (RMS detection, VBW/Avg type = Log, IF Gain On)

Frequency	maximum (dBm)	typical (dBm)
10 MHz to 644 MHz	-131	-134
> 644 MHz to 4 GHz	-136	-140
> 4 GHz to 40 GHz	-131	-134
> 40 GHz to 70 GHz	-128	-132
> 70 GHz to 90 GHz	-127	-130
> 90 GHz to 110 GHz	-124	-127

**Third-Order Intercept (TOI)** (typical, 0 dBm tones 1 MHz apart, 0 dBm reference level)

2 GHz	+35 dBm
18 GHz	+35 dBm
62 GHz	+25 dBm

**Second Harmonic Distortion** (at 1 GHz input)

0 dBm Input	-50 dBc maximum
-20 dBm Input	-60 dBc maximum

**Input Match** (typical)

Frequency	K Connector		V Connector		W Connector	
	VSWR	Return Loss	VSWR	Return Loss	VSWR	Return Loss
9 kHz to 12.4 GHz	1.29:1	18 dB	1.29:1	18 dB	1.29:1	18 dB
> 12.4 GHz to 26.5 GHz	1.67:1	12 dB	1.43:1	15 dB	1.67:1	12 dB
> 26.5 GHz to 40 GHz	1.67:1	12 dB	1.58:1	13 dB	1.67:1	12 dB
> 40 GHz to 50 GHz	1.67:1	12 dB	1.67:1	12 dB	1.67:1	12 dB
> 50 GHz to 70 GHz	-	-	2.10:1	9 dB	2.10:1	9 dB
> 70 GHz to 110 GHz	-	-	-	-	2.10:1	9 dB

**External Trigger**

Source	External, Free Run, Auto Trigger (0 s to 5 s)
Delay	0 ms to 1670 ms
Holdoff	0 ms to 5000 ms
Slope	Rising, Falling, Both

## General Specifications

<b>Setup Parameters</b>		
System Status	Connected Port, Model, Serial Number, Software Version, Frequency, Options	
Preset	Preset Traces, Preset Markers, Preset Limit Lines, Preset Meas Setup, Preset All	
Save/Recall	Save As, Save (Measurement, Set-up PNG, Limit Line), Recall, Save on Event (Crossing Limit, Sweep Complete, Save at Interval)	
<b>Connectors</b>		
RF In	32 GHz and 44 GHz Instruments: K Connector (2.92 mm), male 50 $\Omega$ 50 GHz and 70 GHz Instruments: V Connector (1.85 mm), male 50 $\Omega$ 90 GHz and 110 GHz Instruments: W Connector (1.0 mm), male 50 $\Omega$	
USB Interface	USB 3.0, Type C Connector	
External Reference In	MCX(f), 50 $\Omega$ , 10 MHz	
External Trigger In	MCX(f), 50 $\Omega$ , TTL Levels	
<b>Computer Requirement</b>		
Display Resolution	16:9 / 16:10 Aspect Ratio (>1280 x 720 / 1280 x 800)	
Operating System	Windows® 7, 8.1, 10	
Recommended Minimum Configuration	Quad Core i7 fourth generation or higher CPU, 16 GB RAM, 128 GB Data Storage, USB 3.0	
<b>Regulatory Compliance</b>		
	(not including Windows Tablet/Laptop/PC)	
European Union	EMC 2014/30/EU, EN 61326:2013, CISPR 11/EN 55011, IEC/EN 61000-4-2/3/4/5/6/8/11 Low Voltage Directive 2014/35/EU Safety EN 61010-1:2010 RoHS Directive 2011/65/EU	
Australia and New Zealand	RCM AS/NZS 4417:2012	
South Korea	KCC-REM-A21-0004	
<b>Environmental</b>		
	MIL-PRF-28800F Class 3 (not including Windows Tablet/Laptop/PC)	
Operating Temperature Range	0 °C to 50 °C	
Storage Temperature Range	-40 °C to 71 °C	
Maximum Relative Humidity	95 % RH at 30 °C, non-condensing	
Vibration, Sinusoidal	5 Hz to 55 Hz	
Vibration, Random	10 Hz to 500 Hz	
Half Sine Shock	30 g <sub>n</sub>	
Altitude	4600 meters, operating and non-operating	
Explosive Atmosphere	MIL-PRF-28800F Section 4.5.6.3 MIL-STD-810G, Method 511.5, Procedure 1	
<b>Warranty</b>		
Duration	Standard three-year warranty	
<b>Size and Weight</b> (not including Windows Tablet/Laptop/PC)		
Size	155 mm x 84 mm x 27 mm (6.1 in x 3.3 in x 1.1 in)	
Weight	255 g (9.0 oz)	

## Ordering Information

## Models and Options

Model Number	Description
MS2760A-0032	Ultraportable Spectrum Master, Frequency Range 9 kHz to 32 GHz
MS2760A-0044	Ultraportable Spectrum Master, Frequency Range 9 kHz to 44 GHz
MS2760A-0050	Ultraportable Spectrum Master, Frequency Range 9 kHz to 50 GHz
MS2760A-0070	Ultraportable Spectrum Master, Frequency Range 9 kHz to 70 GHz
MS2760A-0090	Ultraportable Spectrum Master, Frequency Range 9 kHz to 90 GHz
MS2760A-0110	Ultraportable Spectrum Master, Frequency Range 9 kHz to 110 GHz
Option Number	
MS2760A-0032-0098	
MS2760A-0044-0098	
MS2760A-0050-0098	Standard Calibration (ISO/IEC 17025 and ANSI/NCSL Z540-1)
MS2760A-0070-0098	
MS2760A-0090-0098	
MS2760A-0110-0098	
MS2760A-0032-0099	
MS2760A-0044-0099	
MS2760A-0050-0099	Premium Calibration (ISO/IEC 17025 and ANSI/NCSL Z540-1 plus test data)
MS2760A-0070-0099	
MS2760A-0090-0099	
MS2760A-0110-0099	

## Standard Accessories (Included with instrument)

Part Number	Description
2300-1859-R	USB 3.0 Type C to Type A Cable
2300-1605-R	BNC(m) to MCX(m) Cable (qty 2)
	Certificate of Calibration and Conformance

Manuals (available at [www.anritsu.com](http://www.anritsu.com))

Part Number	Description
10580-00427	User Guide

## Optional Accessories

## Coaxial Adapters



Part Number	Description
2000-1880-R	DC to 18 GHz, N(m) to V(f), 50 $\Omega$
2000-1881-R	DC to 18 GHz, N(f) to V(f), 50 $\Omega$
34VFK50	DC to 40 GHz, V(f) to K(m), 50 $\Omega$
34VFKF50	DC to 40 GHz, V(f) to K(f), 50 $\Omega$
34VV50	DC to 65 GHz, V(m) to V(m), 50 $\Omega$
34VVF50	DC to 65 GHz, V(f) to V(m), 50 $\Omega$
34VVF50	DC to 65 GHz, V(f) to V(f), 50 $\Omega$
34WV50	Precision Adapter, DC to 65 GHz, W1(m) to V(m), 50 $\Omega$
34WVF50	Precision Adapter, DC to 65 GHz, W1(m) to V(f), 50 $\Omega$
34WVF50	Precision Adapter, DC to 65 GHz, W1(f) to V(m), 50 $\Omega$
34WVF50	Precision Adapter, DC to 65 GHz, W1(f) to V(f), 50 $\Omega$
33WW50	W1(m) to W1(m)
33WWF50	W1(m) to W1(f)
33WVF50	W1(f) to W1(f)

## Precision Fixed Attenuators



Part Number	Description
41KB-3	DC to 26.5 GHz, 1W, 3 dB, K(m) to K(f)
41KB-6	DC to 26.5 GHz, 1W, 6 dB, K(m) to K(f)
41KB-10	DC to 26.5 GHz, 1W, 10 dB, K(m) to K(f)
41KB-20	DC to 26.5 GHz, 1W, 20 dB, K(m) to K(f)
41KC-3	DC to 40 GHz, 1W, 3 dB, K(m) to K(f)
41KC-6	DC to 40 GHz, 1W, 6 dB, K(m) to K(f)
41KC-10	DC to 40 GHz, 1W, 10 dB, K(m) to K(f)
41KC-20	DC to 40 GHz, 1W, 20 dB, K(m) to K(f)
41V-3	DC to 65 GHz, 1W, 3 dB, V(m) to V(f)
41V-6	DC to 65 GHz, 1W, 6 dB, V(m) to V(f)
41V-10	DC to 65 GHz, 1W, 10 dB, V(m) to V(f)
41V-20	DC to 65 GHz, 1W, 20 dB, V(m) to V(f)

## Precision Waveguide Coaxial Adapters (right angle)



Part Number	Description
35WR42KF	18 GHz to 26.5 GHz, WR42 to K(f)
35WR28KF	26.5 GHz to 40 GHz, WR28 to K(f)
35WR22VF	33 GHz to 50 GHz, WR22 to V(f)
35WR19VF	40 GHz to 60 GHz, WR19 to V(f)
35WR15VF	50 GHz to 65 GHz, WR15 to V(f)
35WR10WF	75 GHz to 110 GHz, WR10 to W1(f)
SC7442	60 GHz to 90 GHz, WR12 to W1(f)

## Optional Accessories (continued)

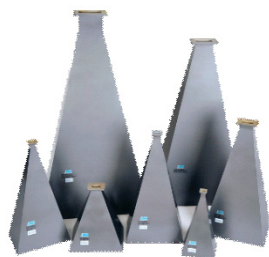
## Waveguide to Coaxial End Launch Adapters (straight through)



Part Number	Description
2000-1889-R	17.6 GHz to 26.7 GHz, WR42 to K(f)
2000-1890-R	26.4 GHz to 40.1 GHz, WR28 to K(f)
1091-460-R	17.6 GHz to 26.7 GHz, WR42 to V(f)
1091-459-R	26.4 GHz to 40.1 GHz, WR28 to V(f)
1091-458-R	33.0 GHz to 50.1 GHz, WR22 to V(f)
1091-457-R	39.3 GHz to 59.7 GHz, WR19 to V(f)
1091-456-R	49.9 GHz to 67.0 GHz, WR15 to V(f)
1091-402-R	49.9 GHz to 75.8 GHz, WR15 to W1(f)
1091-401-R	60.5 GHz to 92.0 GHz, WR12 to W1(f)
1091-400-R	73.8 GHz to 110 GHz, WR10 to W1(f)



**Directional Horn Antennas**



Part Number	Description
2000-1867-R	17.6 GHz to 26.7 GHz, WR42, 25 dBi gain
2000-1868-R	26.4 GHz to 40.1 GHz, WR28, 25 dBi gain
2000-1869-R	33.0 GHz to 50.1 GHz, WR22, 25 dB gain
2000-1870-R	39.3 GHz to 59.7 GHz, WR19, 25 dBi gain
2000-1871-R	49.9 GHz to 75.8 GHz, WR15, 25 dBi gain
2000-1872-R	60.0 GHz to 90.0 GHz, WR12, 25 dBi gain
2000-1873-R	75.0 GHz to 110.0 GHz, WR10, 25 dBi gain

**Test Port Cables (Armored, Semi-rigid)**



Part Number	Description
3670K50-1	DC to 40 GHz, K(f) to K(m), 30.5 cm (1 ft)
3670K50-2	DC to 40 GHz, K(f) to K(m), 61.0 cm (2 ft)
3670V50A-1	DC to 70 GHz, V(f) to V(m), 30.5 cm (1 ft)
3670V50A-2	DC to 70 GHz, V(f) to V(m), 61.0 cm (2 ft)
3671W1-50-1	DC to 110 GHz, Flexible, W1(f) to W1(m), 10 cm
3671W1-50-2	DC to 145 GHz, Flexible, W1(f) to W1(m), 13 cm
3671W1-50-3	DC to 145 GHz, Flexible, W1(f) to W1(m), 16 cm

**USB Cable Extender**



Model Number	Description
2000-1888-R	USB 3.0 Powered Cable Extender, 10 m, (32 ft) (up to two can be used in series for a total length of 20 m)

## Training at Anritsu

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