

**Anritsu** Advancing beyond

# Remote Spectrum Monitor

For Remote RF Signal Monitoring

## MS27101A

9 kHz to 6 GHz



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## Introduction

The Anritsu platform of spectrum monitors provides high performance real-time monitoring of the radio spectrum. Designed to be stable over time under continuous operation, the MS27101A monitor provides superior sweep speeds, high dynamic range, and low spurious levels for fast and accurate measurements. Applications include monitoring for interference, white space analysis, unlicensed transmission discovery, and signal coverage. The MS27101A is available as a single port RF-IN instrument with USB and Ethernet interfaces.

## Remote Spectrum Monitor Highlights

- Sweep rates up to 24 GHz/s
- Integrated web server to view, control, and conduct measurements via a web browser (Chrome or Firefox)
- Remote firmware updates
- Watchdog timer to insure long-term stability for remotely deployed monitors
- Low spurious signals for accurate signal discovery
- 20 MHz IF bandwidth
- Low power consumption <11 watts
- Integrated GPS receiver for monitoring location and time synchronization applications
- Gigabit Ethernet available for high speed communications
- Measurements: occupied bandwidth, channel power
- Interference analysis: spectrogram and signal strength
- Dynamic range: >106 dB normalized to 1 Hz BW
- Phase noise: -98 dBc/Hz @ 10 kHz offset at 1 GHz
- Frequency accuracy: <  $\pm 1.5$  ppm, <  $\pm 50$  ppb with GPS High Accuracy Mode
- IQ block mode and streaming with time stamping for time difference of arrival (TDOA) applications
- Remote control via SCPI commands
- Vision™ software optional for automated spectrum measurements, setting alarms, and geo-locating signal sources



MS27101A Spectrum Monitor

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Definitions

All specifications and characteristics apply under the following conditions, unless otherwise stated:

Warm-Up Time	After 10 minutes of warm-up time, where the instrument is left in the on state.
Temperature Range	Over the 23 °C ±5 °C temperature range.
Typical Performance	Typical specifications in parenthesis () describe performance that will be met by a minimum of 80% of all products. They do not include guard bands and are not warranted. Typical specifications that are not in parenthesis are not tested and not warranted. They are generally representative of the nominal characteristic performance.
Uncertainty	A coverage factor of k = 2 is applied to the measurement uncertainties to facilitate comparison with other industry monitors.

## Remote Spectrum Monitor

<b>Frequency</b>		Frequency Range	9 kHz to 6 GHz (tunable to 0 Hz)	
		Tuning Resolution	1 Hz	
		Frequency Reference	Accuracy: $\pm 1.5$ ppm ( $25\text{ }^{\circ}\text{C} \pm 25\text{ }^{\circ}\text{C}$ ) $\pm 1.0$ ppm/year aging < $\pm 50$ ppb with GPS on	
		Frequency Span	10 Hz to 6 GHz	
<hr/>				
<b>Sweep Speed</b>		Typical (full span FFT mode)		
		10 kHz RBW	5 GHz/s	
		30 kHz RBW	12 GHz/s	
		3 MHz RBW	24 GHz/s	
<hr/>				
<b>Bandwidth</b>		Resolution Bandwidth (RBW)	10 Hz to 3 MHz in 1–3 sequence (–3 dB bandwidth)	
		Video Bandwidth (VBW)	10 Hz to 3 MHz in 1–3 sequence (–3 dB bandwidth) (auto or manually selectable)	
<hr/>				
<b>Spectral Purity</b>		SSB Phase Noise @ 1 GHz	(-98 dBc/Hz) @ 10 kHz offset (-98 dBc/Hz) @ 100 kHz offset	
<hr/>				
<b>Amplitude Ranges</b>		Dynamic Range	> 106 dB at 2.4 GHz), 2/3 (TOI-DANL) in 1 Hz RBW	
		Measurement Range	DANL to Maximum Continuous Input	
		Reference Level Range	–150 dBm to +30 dBm	
		Attenuator Range	0 dB to 50 dB in 5 dB steps	
		Amplitude Units	Log Scale Modes: dBm, dB $\mu$ V	
		Maximum Continuous Input		
		100 MHz to 6 GHz, $\geq 10$ dB attenuation	+30 dBm <sup>a</sup> , $\pm 50$ VDC	
		300 kHz to 6 GHz, < 10 dB attenuation	+10 dBm <sup>a</sup> , $\pm 50$ VDC	
		9 kHz to 6 GHz, preamp on	–10 dBm, $\pm 50$ VDC	
			a. For lower frequencies, derate maximum continuous input by 6 dB per decade	
<hr/>				
<b>Amplitude Accuracy</b>		Attenuation $\leq 40$ dB, preamp off for frequencies less than 100 kHz		
		9 kHz to 6.0 GHz	$\pm 2.5$ dB	
<hr/>				
<b>Displayed Average Noise Level (DANL)</b>		RBW normalized to 1 Hz, 0 dB attenuation		
		Preamp Off, Reference Level –20 dBm		Preamp On, Reference Level –50 dBm
		Max (dBm)	Typical (dBm)	Typical (dBm)
		10 MHz to 3.3 GHz	–145	–162
		> 3.3 GHz to 4.1 GHz	–140	–159
		> 4.1 GHz to 5 GHz	–138	–156
		> 5 GHz to 6 GHz	–128	–146
<hr/>				
<b>Spurs</b>		Typical		
		Residual Spurious	(< –80 dBm) RF input terminated, 0 dB input attenuation, preamp off, > 10 MHz (< –95 dBm) RF input terminated, 0 dB input attenuation, preamp on, > 10 MHz (< –88 dBm) RF input terminated, 0 dB input attenuation, preamp on, 16 MHz to 18 MHz	
		Input-Related Spurious	< –60 dBc, 0 dB attenuation, –30 dBm input, carrier offset > 5 MHz	
<hr/>				
<b>Second Harmonic Distortion</b>		Typical; 0 dB attenuation, –30 dBm input		
		50 MHz	(–50 dBc)	
		> 50 MHz to 200 MHz	< –60 dBc	
		> 200 MHz to 3000 MHz	< –60 dBc	
<hr/>				
<b>Third-Order Intercept (TOI)</b>		Typical; preamp off, –20 dBm tones 100 kHz apart, 0 dB attenuation, reference level –20 dBm		
		800 MHz	(+7 dBm)	
		2400 MHz	(+17 dBm)	
		200 to 2200 MHz	(+10 dBm)	
		> 2.2 GHz to 5.0 GHz	(+8 dBm)	
		> 5.0 GHz to 6.0 GHz	(+14 dBm)	

**Remote Spectrum Monitor** (continued)

**VSWR** < 2.5:1 typical

**Signal Processing**

Data Types	I/Q time series: 8, 10, 16 or 24 bit resolution Spectrum trace: 100 to 4000 points
Data Transfer Modes	I/Q time series or spectrum trace in streaming or block mode
I/Q Data Streaming Rate	Gapless on 100Base-T network, Up to 2.6 MHz signal bandwidth
I/Q Data Time Stamp Resolution	8.7 ns

**I/Q Recording Time** Typical

Signal Bandwidth	Output Data Rate MSPS	I/Q Bit Resolution			
		24 bits	16 bits	10 bits	8 bits
20 MHz	76.25 / 3	1.3 s	2.5 s	3.8 s	5 s
13.3 MHz	76.25 / 4	1.7 s	3.4 s	5 s	6.7 s
6.67 MHz	76.25 / 8	3.4 s	6.7 s	10.1 s	13.4 s
2.67 MHz	76.25 / 20	8.4 s	16.8 s	25.2 s	33.6 s
1.33 MHz	76.25 / 40	16.8 s	33.6 s	50.4 s	1.12 min
667 kHz	76.25 / 80	33.6 s	1.12 min	1.68 min	2.24 min
267 kHz	76.25 / 200	1.4 min	2.8 min	4.2 min	5.6 min
133 kHz	76.25 / 400	2.8 min	5.6 min	8.39 min	11.19 min
66.7 kHz	76.25 / 800	5.6 min	11.19 min	16.79 min	22.38 min
26.7 kHz	76.25 / 2000	13.99 min	27.98 min	41.97 min	55.96 min
13.3 kHz	76.25 / 4000	27.98 min	55.96 min	1.4 h	1.87 h
6.67 kHz	76.25 / 8000	55.96 min	1.87 h	2.8 h	3.73 h
2.67 kHz	76.25 / 20000	2.33 h	4.66 h	6.99 h	9.33 h
1.33 kHz	76.25 / 40000	4.66 h	9.33 h	13.99 h	18.65 h

## General Specifications

### Setup Parameters

System Status	Temperature, Serial Number, Firmware Version, Options Installed, Self Test, Application Self Test, GPS
System Options	Name, Date and Time, Reset (Factory Defaults, Master Reset, Update Firmware)
Directory Management	Sort Method (Name/Type/Date), Ascend/Descend, Internal/USB, Copy
Internal Trace/Setup Memory	4 GB internal memory available for storing files
Mode Switching	Automatically stores/recalls most recently used setup parameters in the mode

### Connectors

RF In	Type N, female port, 50 $\Omega$
External Power	11 W, 5.5 mm barrel connector, 11 to 14 VDC
External Reference In	10 MHz, +10 dBm max, +5 VDC max, BNC(f)
Ethernet	1 RJ45 connector
USB	2 Type A interface connectors
GPS	SMA(f)

### Regulatory Compliance

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 applies to instruments with CE marking placed on the market after July 22, 2017
Australia and New Zealand	RCM AS/NZS 4417:2012
South Korea	KCC-REM-A21-0004
Canada	ICES-1(A)/NMB-1(A)

### Environmental

	MIL-PRF-28800F Class 3
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

### ESD

RF Input Pin	Withstands up to $\pm 4$ kV
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### Size and Weight

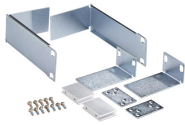
Size	216 mm x 45 mm x 368 mm (8.5 in x 1.75 in x 14.5 in)
Weight	2.78 kg (6.2 lb)

### Warranty

Instrument	Standard three-year warranty
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Ordering Information

Options



Model Number	Description
MS27101A	Spectrum Monitor with one RF IN Port (requires frequency option below)
Option Number	Description
MS27101A-0128	Vector Signal Analysis Enabled (use with MX280005A)
MS27101A-0706	9 kHz to 6 GHz Frequency Range
MS27101A-0001	Rack Mount Kit
MS27101A-0400	Vision Monitor Enabled
MS27101A-0401	Vision Locate Enabled (requires Option 400 above)
MS27101A-0407	Vision High-Speed Port Scanner Enabled
MS27101A-0479	Vision AM Demodulation/FM Deviation
MS27101A-0485	Vision Spectrum Occupancy (requires Option 400)
MS27101A-0486	Vision Coverage Mapping (requires Option 407)
MS27101A-0482	AeroShield RF Drone Detection and Tracking
MS27101A-0098	Standard Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate.
MS27101A-0099	Premium Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate, test report, and uncertainty data.

Accessories

Accessory Description



40-187-R  
AC/DC Power Supply, 1 m, 12 VDC Output (included with instrument)



2000-1528-R  
Magnet Mount, SMA(m) with 5 m (16.4 ft) cable, requires 5 VDC (included with instrument)

Accessory Description

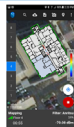
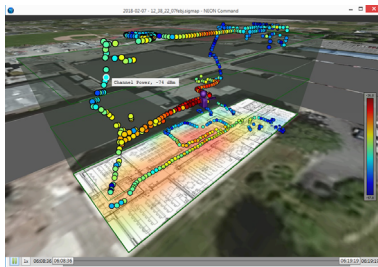


2000-1371-R  
Ethernet Cable, 2.13 m (7 ft) (included with instrument)



760-288-R  
Transit Case

NEON® MA8100A Signal Mapper



Model Number Description

MA8100A-000	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 1 year NEON Software License with 1 year of maintenance and support and 1 year of Cloud Service (PN: 2300-607).
MA8100A-001	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 1 year NEON Software License with 1 year of maintenance and support and 1 year of Cloud Service (PN: 2300-574).
MA8100A-003	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 3 year NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service (PN: 2300-575).
MA8100A-005	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 5 year NEON Software License with 5 years of maintenance and support and 5 years of Cloud Service (PN: 2300-576).
MA8100A-100	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes Perpetual NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service (PN: 2300-606).
2300-606	Perpetual NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service. Part number can also be used to order a perpetual license after a limited term license has expired.
2300-612	Renewal of 1 year NEON Software License with 1 year of maintenance and support and 1 year of Cloud Service.
2300-613	Renewal of 3 year NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service.
2300-614	Renewal of 5 year NEON Software License with 5 years of maintenance and support and 5 years of Cloud Service.
2000-1852-R	NEON Tracking Unit (includes USB cable and belt clip, Worldwide version)
2000-2015-R	NEON Tracking Unit (includes USB cable and belt clip, Japan version)
2000-1853-R	Belt clip (for NEON Tracking Unit)

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