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# Remote Spectrum Monitors

For Remote RF Signal Monitoring

## MS27103A

9 kHz to 6 GHz

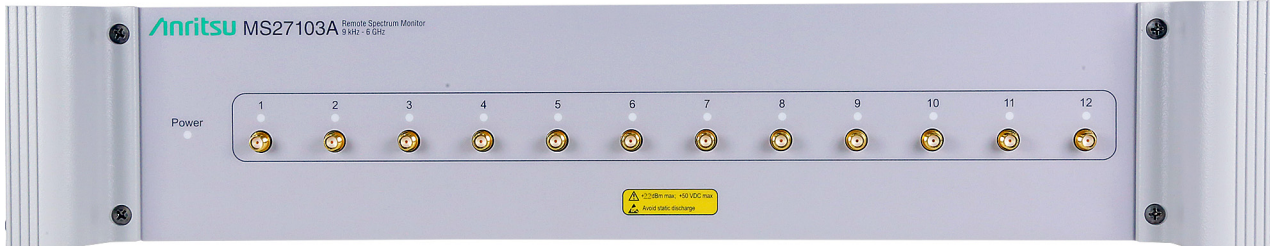


## Introduction

The MS27103A provides 12 RF Input ports as a standard configuration (24 RF Input ports are available with Option 424). This model is typically used with three or six sector BTS architectures, with multiple carriers per sector. A high speed switch is placed in the monitor to provide measurement capability for each RF input. A greater than 30 dB isolation is provided between each RF Input port to assure the integrity of the measurement.

## 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 and 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
- SpectraVision software optional for TETRA and Satellite measurements and Channel scanning
- AeroShield drone detection and tracking



MS27103A Remote Spectrum Monitor  
(front and rear sides shown, Option 110 replaces screw terminal with 3-pin AC line receptacle)

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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. All specifications subject to change without notice. For the most current data sheet, please visit the Anritsu web site: <a href="http://www.anritsu.com">www.anritsu.com</a>

## 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	
<b>Sweep Speed</b>		Typical (full span FTT mode)		
		10 kHz RBW	5 GHz/s	
		30 kHz RBW	12 GHz/s	
		3 MHz RBW	24 GHz/s	
<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)	
<b>Spectral Purity</b>		SSB Phase Noise @ 1 GHz	(-98 dBc/Hz) @ 10 kHz offset (-98 dBc/Hz) @ 100 kHz offset	
<b>Amplitude Ranges</b>		Dynamic Range	> 106 dB (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 300 kHz to 6 GHz, < 10 dB attenuation 9 kHz to 6 GHz, preamp on	
			+22 dBm <sup>a</sup> , $\pm 50$ VDC +10 dBm <sup>a</sup> , $\pm 50$ VDC –10 dBm, $\pm 50$ VDC	
			a. For lower frequencies, derate maximum continuous input by 4 dB per decade	
<b>Amplitude Accuracy</b>		Attenuation $\leq 40$ dB, preamp off for frequencies less than 100 kHz		
		Port 1 (dB)	Ports 2 to 12 (dB, typical)	Option 424 (24 Ports) Ports 13 to 24 (dB, typical)
		9 kHz to 5 GHz	$\pm 2.5$	$\pm 3.0$
		> 5 GHz to 6 GHz	$\pm 3.0$	$\pm 3.5$
<b>Displayed Average Noise Level (DANL)</b>		RBW normalized to 1 Hz, 0 dB attenuation (Port 1 is specified. All other ports are typical and within 1 dB of the specified values)		
		Preamp Off, Reference Level –20 dBm		Preamp On, Reference Level –50 dBm
		Port 1 (dBm)	Typical (dBm)	Port 1 (dBm)
		10 MHz to 3.3 GHz	–140	–145
		> 3.3 GHz to 4.1 GHz	–133	–152
		> 4.1 GHz to 5 GHz	–130	–148
		> 5 GHz to 6 GHz	–115	–133
				–160
				–155
				–152
				–141
<b>Spurs</b>		Typical		
		Residual Spurious	RF input terminated, 0 dB input attenuation, preamp off (< –80 dBm), 10 MHz to 4.5 GHz (< –70 dBm), >4.5 GHz to 6.0 GHz	
			RF input terminated, 0 dB input attenuation, preamp on (< –95 dBm), 10 MHz to 5.0 GHz (< –88 dBm), 16 MHz to 18 MHz (< –85 dBm), >5.0 GHz to 6.0 GHz	
		Input-Related Spurious	< –60 dBc, 0 dB attenuation, –30 dBm input, carrier offset > 5 MHz	
<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	
<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)

<b>VSWR</b>	< 2.5:1 typical	
<b>Signal Processing</b>		
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	

<b>Antenna Port Isolation</b>		Typical
≤ 3 GHz	> 40 dB	
> 3 GHz	> 30 dB	

<b>I/Q Recording Time</b> Typical						
Signal Bandwidth	Output Data Rate	I/Q Bit Resolution				
	MSPS	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	12 SMA(f) ports, 50 $\Omega$ 24 SMA(f) ports, 50 $\Omega$ (optional)
External Power	11 W, $\pm 20$ VDC to $\pm 70$ VDC (110/220 VAC optional)
Ethernet	One RJ45 connector for Gbit LAN, 2nd port optional for daisy chain
USB	Two USB Type A connectors
External Reference In	10 MHz, +10 dBm max, +5 VDC max, BNC(f)
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

### 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	480 mm x 90 mm x 300 mm (18.9 in x 3.5 in x 11.8 in)
Weight	12-port: 3.9 kg (8.9 lb) 24-port: 4.5 kg (9.9 lb)

### Warranty

Instrument	Standard three-year warranty
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Ordering Information

Standard Hardware

Model Number	Description
MS27103A	Spectrum Monitor with 12 SMA(f) Input Ports (requires frequency option below)

Hardware Options

Option Number	Description
MS27103A-0706	9 kHz to 6 GHz Frequency Range
MS27103A-0424	Expands Input Ports to 24 SMA(f)
MS27103A-0110	110/220 VAC Power Supply
MS27103A-0412	Two Ethernet Ports

Vision Software Options

Option Number	Description
MS27103A-0400	Vision Monitor Enabled
MS27103A-0401	Vision Locate Enabled (requires Option 400 above)
MS27103A-0407	Vision High-Speed Port Scanner Enabled
MS27103A-0479	Vision AM Demodulation/FM Deviation
MS27103A-0485	Vision Spectrum Occupancy (requires Option 400)
MS27103A-0486	Vision Coverage Mapping (requires Option 407)

AeroShield Software Options

Option Number	Description
MS27103A-0482	AeroShield RF Drone Detection and Tracking

SpectraVision Software Options

Option Number	Description
MS27103A-0464	SpectraVision TETRA Enabled
MS27103A-0467	SpectraVision Scanner Enabled
MS27103A-0471	SpectraVision Satellite Enabled
MS27103A-0472	SpectraVision Signal Identification and Analysis: Basic
MS27103A-0473	SpectraVision Signal Identification and Analysis: Advanced (requires Option 472)
MS27103A-0474	SpectraVision Power Monitoring Measurement

Standard Accessories (included with instrument)

Part Number	Description
2000-1371-R	Ethernet Cable, 2.13 m (7 ft)
2000-1528-R	GPS Antenna, SMA(m) with 5 m (15 ft) cable, 3 dBi gain, requires 5 VDC

Optional Accessories



Part Number	Description
760-287-R	Large Transit Case with Wheels and Handle

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