Remote Spectrum Monitor
For Remote RF Signal Monitoring
MS27102A
9 kHz to 6 GHz
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 MS27102A 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 MS27102A features an IP67 rated outdoor enclosure designed for remote operations in the harshest of environments. The MS27102A is available as a single port RF-IN instrument with an option for two ports that enable the use of multiple antennas.

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: < ±1.5 ppm, < ±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
- AeroShield drone detection and tracking
Definitions

| 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: www.anritsu.com |
Remote Spectrum Monitor

**Frequency**
- **Frequency Range**: 9 kHz to 6 GHz (tunable to 0 Hz)
- **Tuning Resolution**: 1 Hz
- **Frequency Reference Accuracy**: ±1.5 ppm (25 °C ± 25 °C) ±1.0 ppm/year aging
  - < ±50 ppb with GPS on
- **Frequency Span**: 10 Hz to 6 GHz

**Sweep Speed**
- Typical (full span FFT mode)
  - 10 kHz RBW: 5 GHz/s
  - 30 kHz RBW: 12 GHz/s
  - 3 MHz RBW: 24 GHz/s

**Bandwidth**
- **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)

**Spectral Purity**
- **SSB Phase Noise @ 1 GHz**: (-98 dBc/Hz) @ 10 kHz offset
  - (-98 dBc/Hz) @ 100 kHz offset

**Amplitude Ranges**
- **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, dBµV

**Amplitude Accuracy**
- **Attenuation**: ≤ 40 dB, preamp off for frequencies less than 100 kHz
  - 9 kHz to 6.0 GHz: ± 2.5 dB

**Displayed Average Noise Level (DANL)**
- **Preamp Off, Reference Level**: -20 dBm
  - 10 MHz to 3.3 GHz: -145 dBm
  - > 3.3 GHz to 4.1 GHz: -140 dBm
  - > 4.1 GHz to 5 GHz: -138 dBm
  - > 5 GHz to 6 GHz: -128 dBm
- **Preamp On, Reference Level**: -50 dBm
  - 10 MHz to 3.3 GHz: -162 dBm
  - > 3.3 GHz to 4.1 GHz: -159 dBm
  - > 4.1 GHz to 5 GHz: -156 dBm
  - > 5 GHz to 6 GHz: -146 dBm

**Spurs**
- **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
- **Input-Related Spurious**: (< -60 dBc, 0 dB attenuation, ~30 dBm input, carrier offset > 5 MHz
- **Exceptions**: (< -60 dBc, input = 4140 MHz

**Second Harmonic Distortion**
- 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

**Third-Order Intercept (TOI)**
- 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

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PN: 11410-00847  Rev. P  MS27102A TDS
## Specifications

### Remote Spectrum Monitor (continued)

#### VSWR
- < 2.5:1 typical

#### Signal Processing

<table>
<thead>
<tr>
<th>Data Types</th>
<th>I/Q time series: 8, 10, 16 or 24 bit resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectrum trace</td>
<td>100 to 4000 points</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Transfer Modes</th>
<th>I/Q time series or spectrum trace in streaming or block mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/Q Data Streaming Rate</td>
<td>Gapless on 100Base-T network, Up to 2.6 MHz signal bandwidth</td>
</tr>
<tr>
<td>I/Q Data Time Stamp Resolution</td>
<td>8.7 ns</td>
</tr>
</tbody>
</table>

#### I/Q Recording Time

<table>
<thead>
<tr>
<th>Output Data Rate</th>
<th>I/Q Bit Resolution</th>
<th>Signal Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 bits</td>
<td>16 bits</td>
</tr>
<tr>
<td></td>
<td>76.25 / 3</td>
<td>2.5 s</td>
</tr>
<tr>
<td></td>
<td>76.25 / 4</td>
<td>3.4 s</td>
</tr>
<tr>
<td>6.67 MHz</td>
<td>76.25 / 8</td>
<td>6.7 s</td>
</tr>
<tr>
<td>2.67 MHz</td>
<td>76.25 / 20</td>
<td>16.8 s</td>
</tr>
<tr>
<td>1.33 MHz</td>
<td>76.25 / 40</td>
<td>33.6 s</td>
</tr>
<tr>
<td>667 kHZ</td>
<td>76.25 / 80</td>
<td>1.12 min</td>
</tr>
<tr>
<td>267 kHZ</td>
<td>76.25 / 200</td>
<td>1.4 min</td>
</tr>
<tr>
<td>133 kHZ</td>
<td>76.25 / 400</td>
<td>2.8 min</td>
</tr>
<tr>
<td>66.7 kHZ</td>
<td>76.25 / 800</td>
<td>5.6 min</td>
</tr>
<tr>
<td>26.7 kHZ</td>
<td>76.25 / 2000</td>
<td>13.99 min</td>
</tr>
<tr>
<td>13.3 kHZ</td>
<td>76.25 / 4000</td>
<td>27.98 min</td>
</tr>
<tr>
<td>6.67 kHZ</td>
<td>76.25 / 8000</td>
<td>55.96 min</td>
</tr>
<tr>
<td>2.67 kHZ</td>
<td>76.25 / 20000</td>
<td>2.33 h</td>
</tr>
<tr>
<td>1.33 kHZ</td>
<td>76.25 / 40000</td>
<td>4.66 h</td>
</tr>
</tbody>
</table>

#### Multiple RF Input Ports (Option 402, 404, and 406)

- (provides two, four, or six RF input ports)

<table>
<thead>
<tr>
<th>Amplitude Accuracy</th>
<th>Attenuation ≤ 40 dB, preamp off for frequencies less than 100 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>± 2.5 dB</td>
</tr>
<tr>
<td>&gt; 5 GHz to 6.0 GHz</td>
<td>± 3 dB</td>
</tr>
</tbody>
</table>

#### Displayed Average Noise Level (DANL)

<table>
<thead>
<tr>
<th>Preamp Off, Reference Level ~20 dBm</th>
<th>Preamp On, Reference Level ~50 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBW normalized to 1 Hz, 0 dB attenuation</td>
<td>Max (dBm)</td>
</tr>
<tr>
<td>10 MHz to 3.3 GHz</td>
<td>-140</td>
</tr>
<tr>
<td>&gt; 3.3 GHz to 4.1 GHz</td>
<td>-135</td>
</tr>
<tr>
<td>&gt; 4.1 GHz to 5 GHz</td>
<td>-133</td>
</tr>
<tr>
<td>&gt; 5 GHz to 6 GHz</td>
<td>-117</td>
</tr>
</tbody>
</table>

#### Antenna Port Isolation

<table>
<thead>
<tr>
<th>Antenna Port Isolation</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 3 GHz</td>
<td>&gt; 40 dB</td>
</tr>
<tr>
<td>&gt; 3 GHz</td>
<td>&gt; 30 dB</td>
</tr>
</tbody>
</table>

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MS27102A Remote Spectrum Monitor, rear panel connectors with Option 406

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MS27102A TDS
PN: 11410-00847 Rev. P

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## General Specifications

### Setup Parameters

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

### Connectors

<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF In</td>
<td>One type N, female port, 50 Ω</td>
</tr>
<tr>
<td></td>
<td>Two, four, or six type N, female ports, 50 Ω (Option 402, 404, or 406)</td>
</tr>
<tr>
<td>External Power</td>
<td>11 W, 11 V to 24 V, 3-pin IP67 power connector</td>
</tr>
<tr>
<td>Ethernet</td>
<td>1 RJ45 connector for Gbit LAN (ruggedized and weatherproof)</td>
</tr>
<tr>
<td>GPS</td>
<td>SMA(f)</td>
</tr>
</tbody>
</table>

### Regulatory Compliance

<table>
<thead>
<tr>
<th>Region</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Voltage Directive 2014/35/EU</td>
</tr>
<tr>
<td></td>
<td>Safety EN 61010-1:2010</td>
</tr>
<tr>
<td>Australia and New Zealand</td>
<td>RCM AS/NZS 4417:2012</td>
</tr>
<tr>
<td>South Korea</td>
<td>KCC-REM-A21-0004</td>
</tr>
</tbody>
</table>

### Environmental

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature Range</td>
<td>-40 ºC to 55 ºC</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>-51 ºC to 71 ºC</td>
</tr>
<tr>
<td>Maximum Relative Humidity</td>
<td>95 % RH at 30 ºC, non-condensing</td>
</tr>
<tr>
<td>Vibration, Sinusoidal</td>
<td>5 Hz to 55 Hz</td>
</tr>
<tr>
<td>Vibration, Random</td>
<td>10 Hz to 500 Hz</td>
</tr>
<tr>
<td>Half Sine Shock</td>
<td>30 gn</td>
</tr>
<tr>
<td>Altitude</td>
<td>4600 meters, operating and non-operating</td>
</tr>
<tr>
<td>Explosive Atmosphere</td>
<td>MIL-PRF-28800F, Section 4.5.6.3, MIL-STD-810G, Method 511.5, Procedure 1</td>
</tr>
</tbody>
</table>

### ESD

<table>
<thead>
<tr>
<th>Component</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Input Pin</td>
<td>Withstands up to ±4 kV</td>
</tr>
</tbody>
</table>

### Size and Weight

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>310 mm x 102 mm x 310 mm (12.2 in x 4.0 in x 12.2 in)</td>
</tr>
<tr>
<td>Weight</td>
<td>6.87 kg (15.2 lb)</td>
</tr>
</tbody>
</table>

### Warranty

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument</td>
<td>Standard three-year warranty</td>
</tr>
</tbody>
</table>
## Ordering Information

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS27102A</td>
<td>Spectrum Monitor with 1 RF IN Port (requires one frequency option)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Option Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS27102A-0706</td>
<td>9 kHz to 6 GHz Frequency Range</td>
</tr>
<tr>
<td>MS27102A-0402</td>
<td>2 RF IN Ports (2 front RF-In ports)</td>
</tr>
<tr>
<td>MS27102A-0404</td>
<td>4 RF IN Ports (2 front RF-In ports with 2 RF-in rear ports)</td>
</tr>
<tr>
<td>MS27102A-0406</td>
<td>6 RF IN Ports (2 front RF-In ports with 4 RF-in rear ports)</td>
</tr>
<tr>
<td>MS27102A-0400</td>
<td>Vision Monitor Enabled</td>
</tr>
<tr>
<td>MS27102A-0401</td>
<td>Vision Locate Enabled (requires Option 400 above)</td>
</tr>
<tr>
<td>MS27102A-0407</td>
<td>Vision High-Speed Port Scanner Enabled</td>
</tr>
<tr>
<td>MS27102A-0479</td>
<td>Vision AM Demodulation/FM Deviation</td>
</tr>
<tr>
<td>MS27102A-0485</td>
<td>Vision Spectrum Occupancy (requires Option 400)</td>
</tr>
<tr>
<td>MS27102A-0486</td>
<td>Vision Coverage Mapping (requires Option 407)</td>
</tr>
<tr>
<td>MS27102A-0482</td>
<td>AeroShield RF Drone Detection and Tracking</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-187-R</td>
<td>AC/DC Power Supply, 1 m, 12 VDC Output (included with instrument)</td>
</tr>
<tr>
<td>2000-1528-R</td>
<td>Magnet Mount GPS Antenna, SMA(m) with 5 m (16.4 ft) cable, requires 5 VDC (included with instrument)</td>
</tr>
<tr>
<td>760-285-R</td>
<td>Large Transit Case with Wheels and Handle</td>
</tr>
<tr>
<td>2000-1371-R</td>
<td>Ethernet Cable, 2.13 m (7 ft) (included with instrument)</td>
</tr>
<tr>
<td>2100-32-R</td>
<td>Power Adapter (included with instrument)</td>
</tr>
</tbody>
</table>
Training at Anritsu

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For the most recent specifications, visit: www.anritsu.com