Anritsu Advancing beyond

Remote Spectrum Monitor™

High-Performance RF Spectrum Monitor

MS27201A

9 kHz to 9/20/43.5 GHz

Introduction

Anritsu is proud to introduce the world's most advanced Remote Spectrum Monitor (RSM). With frequency coverage up to 43.5 GHz, the new Remote Spectrum Monitor MS27201A completely redefines the standards for remote spectrum monitors, setting another new industry benchmark for performance and accuracy. The new MS27201A is the culmination of over 60 years of microwave test and measurement equipment development, using the very latest technologies to deliver accuracy and precision in measurements previously reserved only for benchtop instruments.

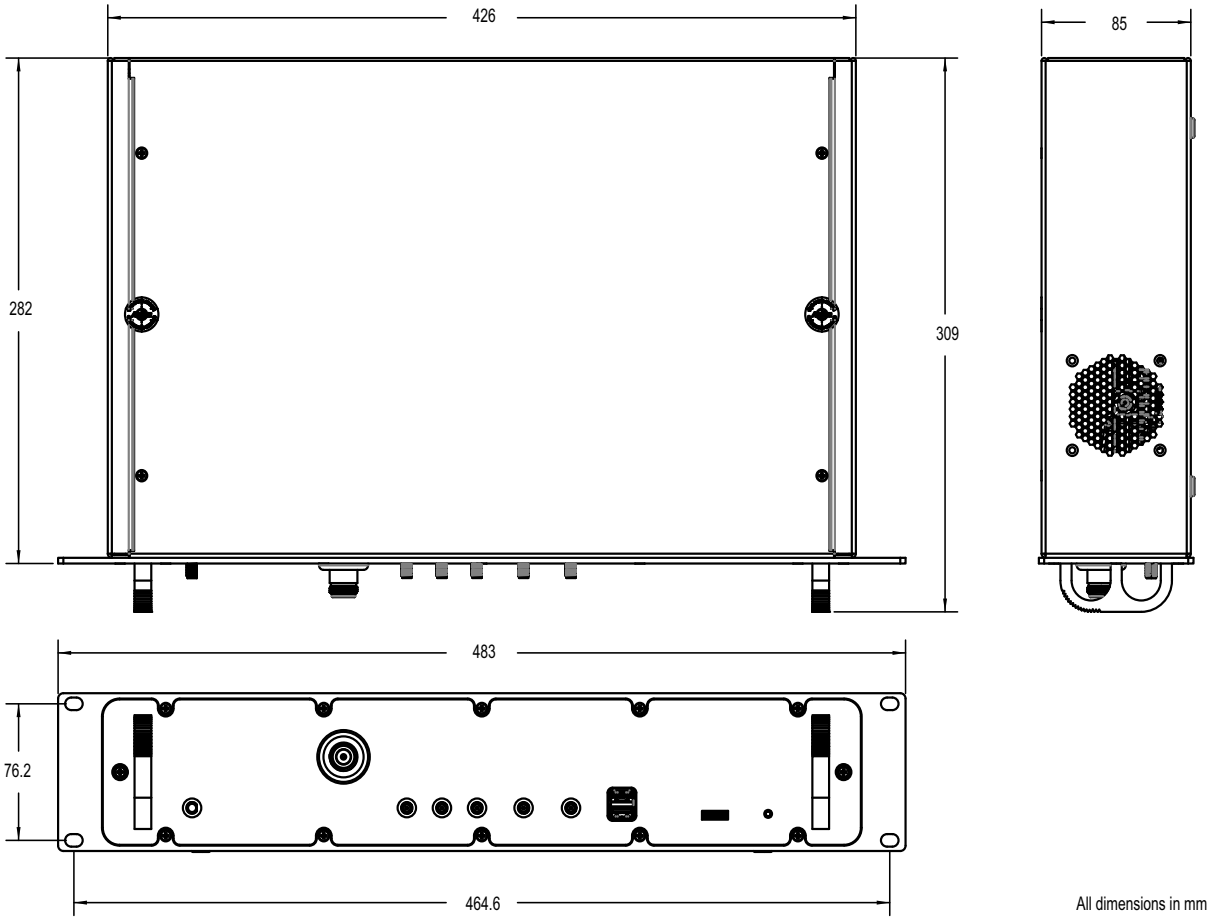
Specification Highlights

- Modulation Bandwidth: up to 110 MHz
- Dynamic Range: > 106 dB in 1 Hz RBW
- DANL: –164 dBm in 1 Hz RBW
- Phase Noise: –106 dBc/Hz @ 10 kHz offset at 1 GHz
- Resolution Bandwidth (RBW): 1 Hz up to 10 MHz
- Full-band Preamplifiers
- Operation to +55 °C

Capabilities and Functional Highlights

Wireless Measurements

- Spectrogram
- Field Strength
- Occupied Bandwidth
- Channel Power
- Adjacent Channel Power
- Spectral Emissions Mask
- 5GNR and LTE Analysis options
- IQ Waveform Capture/Streaming
- Signal Strength and RSSI
- GNSS (GPS, GLONASS, Galileo)
- USB 3.0
- PC GUI application as standard for remote control
- Compatible with vision PC spectrum monitoring software application



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Definitions

Specifications	All specifications and characteristics apply under the following conditions, unless otherwise stated: • After 10 minutes of warm-up time, where the instrument is left in the ON state. • When using internal reference signal.
Typical Performance	Typical specifications are not tested and are not warranted. They are generally representative of characteristic performance.
Nominal Performance	Nominal specifications are design parameters; they are not tested and are not warranted.
Uncertainty	A coverage factor of x1 is applied to the measurement uncertainties to facilitate comparison with other industry analyzers.
Time Base Error	Input Frequency × Frequency Reference Error
Calibration Cycle	Calibration is within the recommended 12 month period
	All specifications in this data sheet are subject to change without notice. For the most current data sheet, please visit the Anritsu web site: www.anritsu.com

Standard Spectrum Analyzer Features

Smart Measurements

Field Strength	Measures field strength in dBm/m^2 or dBW/m^2
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
Spectral Emission Mask	Standards based limits for wireless emissions

Setup Parameters

Frequency	Center/Start/Stop, Frequency Step, Frequency Offset
Span	Span (Manual/Increment 1, 2, 5), Full Span, Last Span, Zero Span
Amplitude	Reference Level (Manual/Auto and Offset), Scale/Division, Y-Axis Unit (dBm, dBW, dBµV), Pre Amp, Attenuation (Auto/Manual)
Bandwidth	RBW/VBW (Auto/Manual), VBW Type (Linear/Logarithmic), RBW:VBW Ratio, SPAN:RBW Ratio

Sweep Functions

Sweep	Single/Continuous, Restart, Sweep Once, Sweep to N
Sweep Points	10 to 10,001 (1001 in zero span)
Sweep Time	60 ns to 3600 s in zero span
Sweep Time Accuracy	±2 % in zero span

Trace Functions

Traces	Up to Six Traces
Trace Type	Clear/Write, Average (2 to 1000), 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
Trace Record	Record live samples with manual tagging to internal or external storage
Trace Playback	Play recorded samples from internal or external storage; set playback interval
CSV Logging	Record live or playback traces in CSV format for post processing

Trigger Functions (zero span only)

Sources	Free Run, Video, External 1, External 2, Periodic
Settings	Level, Delay, Holdoff, Slope, Hysteresis

Spectrogram

Number of Lines	142
Trace Time/Position Cursor	Up to Six Cursors (display historical trace data by trace position or time)
Color Setup	Set Color Top/Bottom Range, Set Color Reference Hue

Marker Functions

Markers	Up to 12 Markers
Marker Measurements	Power, Frequency, Time (Spectrogram)
Marker Mode	Normal, Delta, Fixed
Delta Marker	Relative to any Normal or Fixed Marker
Marker Function	None, Noise, Counter Marker (1 Hz, 100 mHz, 10 mHz, 1 mHz resolutions), Quasi-Peak (per CISPR 16-1-1)
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
Marker Table	Up to 12 Markers Showing Marker Mode, Function, Trace, Frequency, Amplitude, Delta Frequency & Offset

Limit Line Functions

Limit Setup	Upper/Lower, Limit On/Off, Limit Alarm On/Off, Set Default Limit Line, Absolute/Relative, Mirror On/Off, Default Limit
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

Spectrum Analyzer Performance

Frequency (usable to 0 Hz)

MS27201A-0709	9 kHz to 9 GHz (Option 709)
MS27201A-0720	9 kHz to 20 GHz (Option 720)
MS27201A-0743	9 kHz to 43.5 GHz (Option 743)
Tuning Resolution	1 Hz
Span	10 Hz to max frequency
Frequency Reference	Internal, GPS, External
Internal Frequency Reference	Aging: ± 1.0 x 10^{-6} per 10 years Accuracy: ± 0.3 x 10^{-6} (25 °C ± 25 °C) plus aging (see "GPS Receiver (Option 31)" on page 7 for improved accuracy)
External Frequency Reference	10 MHz, 0 dBm to +10 dBm

Bandwidth

Analysis Bandwidth	20 MHz (standard) or 110 MHz (Option 104)
Resolution Bandwidth (RBW)	1 Hz to 10 MHz (in RTSA, minimum RBW varies by span, max is 40 MHz)
Video Bandwidth (VBW)	0.1 Hz to 10 MHz
CISPR Bandwidth	Resolution bandwidth when using Quasi-Peak marker function: 200 Hz, 9 kHz, and 120 kHz
VBW/Average Type	Linear/Log

Spectral Purity – SSB Phase Noise

Offset from 1 GHz GHz	Maximum	Typical
10 kHz	–102 dBc/Hz	–106 dBc/Hz
100 kHz	–106 dBc/Hz	–110 dBc/Hz
1 MHz	–111 dBc/Hz	–116 dBc/Hz
10 MHz	–123 dBc/Hz	–129 dBc/Hz

Spurs (0 dB input attenuation)

Residual Spurs (RF input terminated)	Preamp = Off	Preamp = On
< 14 GHz	–90 dBm, maximum	–100 dBm, maximum
14 to 20 GHz	–85 dBm, maximum	–100 dBm, maximum
> 20 to 32 GHz	–80 dBm, maximum	–100 dBm, maximum
> 32 to 43.5 GHz	–80 dBm, maximum	–95 dBm, maximum
Input-Related Spurious (–30 dBm input)	Maximum[a]	Typical
	–60 dBc	–70 dBc

a. Instrument centered on single signal, span < 1.7 GHz, 0 dB input attenuation.

Amplitude Ranges

Dynamic Range	>106 dB minimum at 2.4 GHz, 2/3 (TOI-DANL) in 1 Hz RBW
Measurement Range	DANL to +30 dBm
Display Range	1 to 15 dB/div in 1 dB steps, ten divisions displayed
Reference Level Range	–150 dBm to +30 dBm
Attenuator Resolution	0 to 65 dB, 5 dB steps
Reference Level Offset	99.9 dB external loss to 99.9 dB external gain
Amplitude Units	dBm, dBm/m^2, dBW/m^2
Maximum Continuous Input	+30 dBm peak typical, ± 50 VDC (≥ 10 dB attenuation) +23 dBm peak typical, ± 50 VDC (< 10 dB attenuation) +10 dBm peak typical, ± 50 VDC (preamp = On)

Amplitude Accuracy (10 dB attenuation, -50 dBm ≤ input signal ≤ -10 dBm, 1 kHz RBW, auto-coupled, excluding effects of VSWR, noise, and spurs)

	20 °C to 30 °C (after 30 minute warm-up)		–10 °C to 55 °C (after 60 minute warm-up)	
9 GHz and 20 GHz Instruments	Maximum	Typical	Maximum	Typical
9 kHz to 14 GHz	± 1.3 dB	± 0.5 dB	± 2.0 dB	± 0.5 dB
> 14 GHz to 18 GHz	± 1.3 dB	± 0.5 dB	± 2.0 dB	± 0.5 dB
> 18 GHz to 20 GHz	–	± 1.0 dB	–	± 1.0 dB
43.5 GHz Instruments				
9 kHz to 14 GHz	± 1.3 dB	± 0.5 dB	± 2.0 dB	± 0.5 dB
> 14 GHz to 20 GHz	± 1.3 dB	± 0.5 dB	± 2.0 dB	± 0.5 dB
> 20 GHz to 43.5 GHz	± 1.8 dB	± 0.5 dB	± 2.5 dB	± 0.5 dB

Displayed Average Noise Level (DANL) (RMS detection, VBW/Avg type = Log, reference level = –20 dBm for preamp Off and –50 dBm for preamp On, auto attenuation On)

	Preamp = Off		Preamp = On	
9 GHz to 20 GHz Instruments	Maximum	Typical	Maximum	Typical
10 MHz to 4 GHz	–145 dBm	–148 dBm	–161 dBm	–164 dBm
> 4 GHz to 9 GHz	–142 dBm	–145 dBm	–159 dBm	–162 dBm
> 9 GHz to 14 GHz	–136 dBm	–139 dBm	–156 dBm	–159 dBm
> 14 GHz to 20 GHz	–138 dBm	–144 dBm	–156 dBm	–161 dBm
43.5 GHz Instruments				
10 MHz to 4 GHz	–145 dBm	–148 dBm	–161 dBm	–164 dBm
> 4 GHz to 9 GHz	–142 dBm	–145 dBm	–159 dBm	–162 dBm
> 9 GHz to 14 GHz	–136 dBm	–139 dBm	–156 dBm	–159 dBm
> 14 GHz to 20 GHz	–138 dBm	–142 dBm	–156 dBm	–159 dBm
> 20 GHz to 32 GHz	–135 dBm	–140 dBm	–154 dBm	–159 dBm
> 32 GHz to 43.5 GHz	–135 dBm	–140 dBm	–152 dBm	–154 dBm

Third-Order Intercept (TOI) (–20 dBm tones 2 MHz apart, 0 dB input attenuation, preamp OFF, reference level –20 dBm)

2.4 GHz	+14 dBm minimum
50 MHz to 20 GHz	+20 dBm typical
> 20 GHz to 32 GHz	+15 dBm typical
> 32 GHz to 43.5 GHz	+20 dBm typical

P1dB (nominal)

< 4 GHz	+5 dBm
4 GHz to 20 GHz	+12 dBm
> 20 GHz to 32 GHz	+7 dBm
> 32 GHz to 43.5 GHz	+12 dBm

Second Harmonic Distortion (0 dB input attenuation, –30 dBm input)

50 MHz	–64 dBc maximum
≤ 4 GHz	–72 dBc typical
> 4 GHz	–75 dBc typical

VSWR (≥ 10 dB input attenuation)

≤ 20 GHz	1.5:1 typical
> 20 GHz to 43.5 GHz	2.0:1 typical

GPS Receiver (Option 31)

Supported Satellite Systems	GNSS (includes GPS, GLONASS, Galileo)
Setup	On/Off, Antenna Voltage 3.3 V/5.0 V, GPS Info
Anritsu Antennas	2000-1528-R GPS antenna (requires +5 VDC) 2000-1652-R GPS antenna (requires +3.3 VDC or +5 VDC) 2000-1760-R GPS antenna (requires +2.5 VDC to +3.7 VDC)
GPS Time/Location Indicator	UTC Time, Latitude, Longitude, and Altitude on display (UTC Time and Altitude on GPS Info display)
High Frequency Accuracy	< ± 2.5 x 10^{-8} with GPS On, 3 minutes after satellite lock in selected mode (GPS antenna connected) < ± 5.0 x 10^{-8} 24 hour holdover accuracy, 0 °C to 50 °C ambient temperature (GPS antenna disconnected)
Connector	SMA(f), 50 Ω,

Zero Span IF Output (Option 89)

Mode	Spectrum Analyzer/Zero Span only
Center Frequency	325 MHz (nominal, FFT capture BW ≤ 32 MHz) 300 MHz (nominal, FFT capture BW > 32 MHz, requires Option 103 or 104)
Output Level	–4 dBm (nominal, –20 dBm input level, 0 dB input attenuation, preamp Off, 10 MHz input frequency) Spectrum is inverted in certain input RF bands.
Reference Level	–57 dBm to +30 dBm (Preamp Off) –87 dBm to –40 dBm (Preamp On)
IF Bandwidth	≤32 MHz; ≤110 MHz with Option 103 or 104
Rise Time	<20 ns
Connector	SMA(f), 50 Ω

Gated Sweep (Option 90)

Gate Source	GPS
Frame Time	1 s, 20 ms, 10 ms
Gate Delay	up to 200 ms
Gate Length	1 µs up to 200 ms
Power vs. Time, Display Length	100 µs to 200 ms

IQ Waveform Capture (Option 124/126)

(Option 126 is non-export controlled and limits depth to 8 or 10 bits when bandwidth is 110 MHz)

IQ Capture

Mode	Spectrum Analyzer
Capture Mode	Single or Continuous
Trigger	Free Run, External (Rising/Falling), Interval, Level
Trigger Settings	Delay
Maximum Sample Rate[a]	200 MHz
Maximum Signal Bandwidth[a]	110 MHz
Bit Resolution	8, 10, 16, or 32-bit
Total Capture Memory	2 GB

IQ Capture Time Typical Maximum

Signal Bandwidth	IQ Sample Rate	IQ Bit Resolution				Mode[a]	
(MHz)	(MSPS)	32 bit	16 bit	10 bit	8 bit	SPA	RTSA
110	200	1.34 s	2.68 s	4.29 s	5.37 s	x	x
100	122.88	2.18 s	4.37 s	6.99 s	8.74 s	x	
80	100	2.68 s	5.37 s	8.59 s	10.74 s	x	x
74	92.16	2.91 s	5.83 s	9.32 s	11.65 s	x	
50	61.44	4.37 s	8.74 s	13.98 s	17.48 s	x	
40	50	5.37 s	10.74 s	17.18 s	21.47 s	x	x
36	46.08	5.83 s	11.65 s	18.64 s	23.3 s	x	
25	30.72	8.74 s	17.48 s	27.96 s	34.95 s	x	
20	25	10.74 s	21.47 s	34.36 s	42.95 s	x	x
18	23.04	11.65 s	23.30 s	37.28 s	46.6 s	x	
12	15.36	17.48 s	34.95 s	55.92 s	1.17 min	x	
10	12.5	21.47 s	42.95 s	1.15 min	1.43 min	x	x
6	7.68	34.95 s	1.17 min	1.86 min	2.33 min	x	
5	6.25	42.95 s	1.43 min	2.29 min	2.86 min	x	x
3	3.84	1.17 min	2.33 min	3.73 min	4.66 min	x	
2.5	3.125	1.43 min	2.86 min	4.58 min	5.73 min	x	x
1.5	1.92	2.33 min	4.66 min	7.46 min	9.32 min	x	
1.25	1.5625	2.86 min	5.73 min	9.16 min	11.45 min	x	x
0.28	0.36	12.43 min	24.86 min	39.77 min	49.71 min	x	
0.036	0.045	99.42 min	198.84 min	318.15 min	397.68 min	x	

a. Option Dependent: Standard Analysis Bandwidth up to 20 MHz, Option 103 up to 50 MHz, Option 104 up to 110 MHz.

IQ Waveform Streaming (Option 125/127) (requires Option 124 or 126: Option 127 is non-export controlled and limits streams to 100 MHz BW or less.)

Bit Resolution	8, 10, 16, or 32-bit
Ethernet Port	Maximum gapless bandwidth depends on network transfer speed
USB Port	Requires USB 3.0 solid state drive.
	Device formatted as external file system (ext4) maximum gapless streaming bandwidth: 8 bit: 100 MHz bandwidth, 122.88 MSPS sample rate 10 bit: 80 MHz BW, 100 MSPS sample rate 16 bit: 50 MHz BW, 61.44 MSPS 32 bit: 25 MHz BW, 30.72 MSPS
	Device formatted as extensible file allocation table file system (exFAT) maximum gapless streaming bandwidth: 8 bit: 50 MHz bandwidth, 61.44 MSPS sample rate 10 bit: 36 MHz BW, 46.08 MSPS sample rate 16 bit: 25 MHz BW, 30.72 MSPS 32 bit: 12 MHz BW, 15.36 MSPS

LTE FDD/TDD Signal Analyzer (Option 883)

General

Frequency Range	10 MHz to 43.5 GHz (option dependent)
Channel Bandwidth (MHz)	1.4, 3, 5, 10, 15, 20
Amplitude	Auto Range, Reference Level, Scale/Division, Reference Level Offset
Input Signal Range	–76 dBm to +10 dBm (≤20 GHz) –72 dBm to +10 dBm (>20 GHz)
Sweep	Single/Continuous
MIMO Antenna Setup	Auto, Antenna 1, 2, 3, or 4

LTE Demodulation Summary

PCI Summary Measurements	Physical Cell ID, Sector ID, Cell Group, Frequency Error, Time Offset, Cyclic Prefix, Status of Primary Synchronization Signal (PSS), MIMO Time Alignment Error, Resource Block Power
Signal Power Measurements (dBm)	Physical Broadcast Channel Power (PBCH), Sync Signal (SS), Reference Signal (RS), OFDM Symbol Transmit Power (OSTP)
Error Vector Magnitude Measurements (%)	Physical Broadcast Channel (QPSK), Physical Downlink Shared Channel (QPSK), PDSCH (16-QAM/64-QAM/256-QAM)
Demod Summary View	PCI, Sector ID, Cell Group, Frequency Error, Time Offset, Cyclic Prefix, Sync Status, Power (PBCH, SS, RS), EVM (PBCH(QPSK), PDSCH (QPSK, 16-QAM, 64-QAM, 256-QAM)
Time Alignment Error (TAE) View	PCI, Sector ID, Cell Group, Frequency Error, Time Offset, Cyclic Prefix, Sync Status, TAE between each antenna pair, Power (RS, SS), EVM (RMS, PEAK)
Resource Block View	PCI, Sector ID, Cell Group, Frequency Error, Time Offset, Cyclic Prefix, Sync Status, RB (number of active RBs, Utilization, OSTP), EVM (QPSK, 16-QAM, 64-QAM, 256-QAM)
Setup Parameters	Antenna (Auto/1/2/3/4), Cyclic Prefix (Auto/Normal/Extended), Duplex Type (FDD/TDD), UL/DL Config (TDD only), CFI (Auto/CFI1/CFI2/CFI3)
RS Power Accuracy	± 1.0 dB typical (RF input –50 dBm to +10 dBm)
Frequency Error	± 10 Hz + time base error (99 % confidence level)
Residual EVM (rms)	2.0 % typical (E-UTRA Test Model 3.1, RF Input –50 dBm to +10 dBm)

LTE Multi PCI

Measurements	Multiple Physical Cell IDs, Secondary Sync Signal Power (S-SS), Reference Signal Received Power (RSRP), Reference Signal Received Quality (RSRQ), Signal to Interference and Noise Ratio (SINR), Average Error Vector Magnitude (EVM), Peak EVM, Frequency Error (Hz and PPM), Dominance
Graph Displays	PCI, SINR, RSRP, RSRQ, SS Power
Setup Parameters	Cyclic Prefix (Auto/Normal/Extended), Duplex Type (FDD/TDD), UL/DL Config (TDD only), CFI (Auto/CFI1/CFI2/CFI3)

Channel Power

Measurements	Total Channel Power, Total Power Spectral Density (PSD), Limit Test (Power and PSD)
Setup Parameters	Integration Bandwidth, PSD Units (Hz/MHz), Power Limit (dBm), PSD Limit (dBm/Hz)
RF Channel Power Accuracy	±1 dB typical (–50 dBm to +10 dBm)

Channel Spectrum

Measurements	Occupied Bandwidth (OBW), Total Power, Occupied Bandwidth, Limit Test (OBW)
Setup Parameters	OBW Power (%/dB), OBW Limit (Hz), Method (%/x dB)

Carrier Aggregation

PCI Measurements	Physical-layer Cell ID (PCI), RS Power, EVM (% rms), Frequency Error (Hz)
Setup Parameters	Carrier Count (up to eight), Antenna (Auto/1/2/3/4), Cyclic Prefix (Auto/Normal/Extended), Duplex Type (FDD/TDD)

Control Channel

PCI Summary Measurements	Physical Cell ID, Sector ID, Cell Group, Frequency Error, Time Offset, Cyclic Prefix, Status of Primary Synchronization Signal (PSS)
Power Measurements	Reference Signal (RS), P-Primary Synchronization Signal (P-SS), Secondary Synchronization Signal (S-SS), Physical Broadcast Channel (PBCH), Physical Control Format Indicator Channel (PCFICH), Physical Hybrid Automatic Repeat Request Indicator Channel (PDCCH), Physical Downlink Control Channel (PDCCH), Total Power per Resource Element and Power (dBm/watts), EVM (%)
Setup Parameters	Antenna (Auto/1/2/3/4), Cyclic Prefix (Auto/Normal/Extended), Duplex Type (FDD/TDD), UL/DL Config (TDD only), NG (1/6, 1/2, 1, 2)

Constellation

Measurements	Constellation Display of PBCH or PDSCH
Setup Parameters	Antenna (Auto/1/2/3/4), Cyclic Prefix (Auto/Normal/Extended), Duplex Type (FDD/TDD), UL/DL Config (TDD only), CFI (Auto/CFI1/CFI2/CFI3), Modulation (PBCH/PDSCH), Data Format (All/QPSK/16-QAM/64-QAM/256-QAM)

Frame Power

Measurements	Power vs. Time Display, Power of Frame, Sub-Frame, Slot (0 and 1), Uplink and Downlink Pilot Time Slots (DwPTS and UpPTS), Transmit Off Power
Setup Parameters	Analysis (Frame/Subframe/Slot), SSF Config (Auto/0-9), Sub-Frame (0-9), Slot (1/2) Antenna (Auto/1/2/3/4), Cyclic Prefix (Auto/Normal/Extended), Duplex Type (FDD/TDD), UL/DL Config (TDD only), NG (1/6, 1/2, 1, 2)

5GNR FDD/TDD Signal Analyzer (Option 888)

General

Frequency Range	10 MHz to 43.5 GHz (option dependent)
Band Configuration	Manual or selectable Band #, Absolute Radio Frequency Channel Number (ARFCN), Global Synchronization Raster Channel (GSCN), Channel Bandwidth (5 MHz to 100 MHz in steps of 5 MHz), SSB Offset, Subcarrier Spacing (15, 30, 120, 240 kHz), Mapping Pattern (Auto, P1, P2), Auto SSB Detect
Auto SSB Detect	Searches 3GPP defined GSCN raster
Amplitude	Auto Range, Reference Level, Scale/Division, Reference Level Offset, Attenuation Level (Auto/Manual), Preamp
Input Signal Range	–76 dBm to +10 dBm (≤20 GHz) –72 dBm to +10 dBm (>20 GHz)
Sweep	Single/Continuous, Sweep Once

5GNR Demod Summary

Multi-Beam Measurements	Physical-layer Cell ID, Beam Index, Sector ID, Cell Group, Frequency Error, Time Offset, SS-RSRP (dBm), SS-RSRQ (dB), SS-SINR (dB), Sync and Demod Status Indicators, Beam Power (dBm)
Single-Beam Measurements	Physical Cell ID, Sector ID, Cell Group, Frequency Error, Time Offset, SS-RSRP (dBm), SS-RSRQ (dB), SS-SINR (dB), Sync and Demod Status Indicators, Block Measurements (PSS, SSS, PBCH, PBCH-DMRS), Average EVM, Peak EVM (@ subcarrier/symbol), Beam Power (dBm)
Views	Multi Beam (up to 64), Single Beam
Setup Parameters	SINR Threshold (dB), Duplex Type (FDD/TDD)
RSRP Accuracy	± 1.0 dB typical
Residual EVM (rms)	2.0 % typical
Frequency Error	< ± 2.0E-8 + time base error, typical

5GNR Multi PCI

Measurements	Multiple Physical-layer Cell IDs, Beam Index, SS-RSRP (dBm), SS-RSRQ (dB), SS-SINR (dB), SS-EVM (%) Beam Power (dBm)
Views	Multi PCI Beam Scanner (up to 64 beams), Table
Setup Parameters	SINR Threshold (dB), Duplex Type (FDD/TDD)

5GNR RF EIRP

Measurements	EIRP (Active, Horizontal/Vertical, Sum), Upper/Lower Limit Test
Views	Normal (RF spectrum), Quick View (summary)
Setup Parameters	Save (Horizontal/Vertical), Reset Sum, RX Antenna Gain, Distance to Antenna, Units (Meters/Feet), Upper/Lower Limit Test, RX Cable Loss

5GNR RF Occupied Bandwidth

Measurements	Occupied Bandwidth, Total Power, x dB Bandwidth, Tx Frequency Error, Limit Test
View	Normal (RF Spectrum)
Setup Parameters	Method: OBW Power (% and X dB), OBW Limit Test

5GNR RF Channel Power

Measurements	Total Channel Power, Total PSD, Limit Test
View	Normal (RF Spectrum)
Setup Parameters	Integration Bandwidth, PSD Units, Power and PSD Limit Tests
RF Channel Power Accuracy	± 1 dB typical (–76 dBm to +10 dBm)

5GNR Carrier Aggregation

Component Carriers	Up to Eight Component Carriers
PCI Measurements	Sync status (PSS), Physical-layer Cell ID (PCI), RSRP Max, EVM (% rms), Frequency Error (Hz), Time Offset
Setup Parameters	Carrier Count (up to 8), Duplex Type (FDD/TDD)

5GNR Constellation

Measurements	Constellation Display of PBCH
Setup Parameters	Modulation (QPSK), Data Format (PBCH), Beam Select, Reference Points

General Specifications

Setup Parameters	
Date and Time	Date and Time settings, Time Zone settings, Time synced to Internet/GPS
Languages	English
Screen Shot Settings	Image capture size, Image header/footer
Option Configuration	Enable options using file (USB)
GPS	see "GPS Receiver (Option 31)" on page 7
Ethernet	Ethernet (IP4 & IP6 formats), Type (DHCP, factory set to static IP address 10.0.0.2)
Reset	Factory Reset, Delete All User Files, Delete System Files, Master Reset, Diagnostics
Diagnostics	Self Test, Service Tools, exportable event and system error logs
Save/Recall	Measurement Setup, Screenshot Image (.PNG), Export Measurement data (Text, CSV), Location
File Management	Save, Copy, Paste, Delete, Create New Folder, Set File Name and File Type, Rename
Connectors	
RF In	MS27201A-0709, -0720: Type N(f), 50 Ω MS27201A-0743: Ruggedized Type K(m), 50 Ω
GPS	SMA(f), 50 Ω,
External Power	5.5 mm barrel connector, 13.5 to 17.5 VDC, 5.0 A max
Ethernet Interface	RJ45 connector for Ethernet 10/100/1000 Mbps (connect to PC or LAN for remote access)
USB Interface	USB 3 Type A x2
External Reference In	SMA(f), 50 Ω, maximum input +10 dBm
External Reference Out	SMA(f), 50 Ω, 10 MHz
External Trigger	SMA(f), 50 Ω, TTL-compatible levels, maximum input +5 VDC
IF Out	SMA(f), 50 Ω
DC Bias Voltage	SMA(f), Setup: On/Off, Voltage, Trip Reset Voltage Range: +1 V to +34 V, Resolution: 0.1 V Max Current: 1 A, Max Power: 15 W
Regulatory Compliance	
European Union	EMC 2014/30/EU, EN 61326-1:2013, CISPR 11/EN 55011, IEC/EN 61000-4-3/4/5/6/8/11 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
Canada	ICES-3(A)/NMB-3(A)
United States	FCC ID: SQG-60SIPT
Environmental	MIL-PRF-28800F Class 2
Operating Temperature Range	–10 °C to 55 °C
Storage Temperature Range	–51 °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_n
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
Warranty	
Duration	Standard three-year warranty
Size and Weight	
Size	426 mm x 282 mm x 85 mm, (16.8 in x 11.1 in x 3.3 in)
Weight	MS27201A-0709, -0714, -0720: 5.06 kg (11.15 lb) MS27201A-0743, -0754: 5.4 kg (11.9 lb)

Programmable Remote Control

Functionality	Full instrument programming control (except power on/off) via Ethernet connectivity. See the Programming Manual for details.
Programming Language	Standard Commands for Programmable Instruments (SCPI)
Interfaces	Ethernet

MA25424A IQ Data Converter (requires Options 124 and 125 or Options 126 and 127)

IQ Streaming (used for streaming IQ data components of a waveform from the MS27201A Data Out port to an IQC5000)

Shipping Contents	MA25424A Module PCIe OCuLink I/O Data Cable USB 3.0 Type A to Type C Cable
Mode	Spectrum Analyzer
Input Ports	Data In (PCIe), USB (for power)
Output Port	IEEE 1284-C, 50 pin
Data Throughput	200 MSPS @ 16 bit max
Power Consumption	3.33 W (USB 3.0)

Warranty

Duration	Standard three-year warranty

Size and Weight

Size	128.3 mm x 33.43 mm x 88.86 mm
Weight	377 g (including cables)

Ordering Information – Instrument Options

Part Number	Description
MS27201A	Remote Spectrum Monitor (Requires Option 709, 720, or 743)
Options	
MS27201A-0709	Frequency Range 9 kHz to 9 GHz
MS27201A-0720	Frequency Range 9 kHz to 20 GHz
MS27201A-0743	Frequency Range 9 kHz to 43.5 GHz
MS27201A-0031	GPS Receiver (requires GPS antenna, sold separately)
MS27201A-0883	LTE FDD/TDD Measurements (requires GPS option MS27201A-0031)
MS27201A-0888	5GNR FDD/TDD Measurements (requires GPS option MS27201A-0031)
MS27201A-0089	Zero Span IF Output
MS27201A-0090	Gated Sweep
MS27201A-0104	110 MHz Analysis Bandwidth
MS27201A-0124	IQ Waveform Capture
MS27201A-0125	IQ Waveform Streaming (requires Option 124, MA25424A recommended)
MS27201A-0126	IQ Waveform Capture (non-export controlled)
MS27201A-0127	IQ Waveform Streaming (non-export controlled, requires Option 126, MA25424A recommended)
MS27201A-0128	Vector Signal Analysis enabled (requires option 124 or 126)
MS27201A-0400	Vision Monitor Enabled
MS27201A-0407	Vision High-Speed Port Scanner Enabled
MS27201A-xxxx-0098	Standard Calibration to ISO17025 and ANSI/NCSL Z540-1 (xxxx is the frequency option number)
MS27201A-xxxx-0099	Premium Calibration to ISO17025 and ANSI/NCSL Z540-1 plus test data (xxxx is the frequency option number)
Supported Software	
MX280005A	Vector Signal Analysis PC software
MX280001A	Remote Spectrum Monitor Vision Software
MS27201A	Remote Spectrum Monitor PC Software

Standard Accessories (included with instrument)

Accessory	Description
	40-204-R AC/DC Power Supply
	806-442-R SMA(m) to BNC(m) cable, 1 m (qty 1)
	Certificate of Calibration and Conformance

Accessory	Description
	2000-1371-R Ethernet Cable, 2 m
	2000-2054-R SMA(m) to BNC(f) Adapter (qty 3)

Optional Accessories

Miscellaneous Accessories

Accessory	Description
	MA25424A I/Q Data Converter Module Includes: 2000-2030-R PCIe OCuLink I/O Data Cable 2000-1859-R USB 3.0 Type A to Type C Cable

Accessory	Description
	MA25101A IQ Streaming PCIe Kit Includes: PCIe Card with mounting hardware 2000-2030-R PCIe OCuLink I/O Data Cable

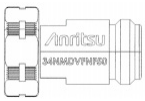
GPS Antennas (active)

Accessory	Description
	2000-1528-R Magnet Mount, SMA(m) with 5 m (16.4 ft) cable, requires 5 VDC
	2000-1652-R Magnet Mount, SMA(m) with 0.3 m (1 ft) cable, requires 3.3 VDC or 5 VDC

Accessory	Description
	2000-1760-R Miniature Antenna, SMA(m), requires 2.5 VDC to 3.7 VDC

Precision Adapters

Accessory	Description
	34NN50A N(m) to N(m), DC to 18 GHz, 50 Ω
	34NFNF50 N(f) to N(f), DC to 18 GHz, 50 Ω

Accessory	Description
	34NMDVFNF50 NMD, V(f) to N(f), DC to 18 GHz, 50 Ω
	71693-R Ruggedized K(f) to N(f), DC to 18 GHz, 50 Ω

Test Port Cables (Armored, Semi-rigid)

Accessory	Description
	3670K50A-1 K(f) to K(m), 30.48 cm
	3670K50A-2 K(f) to K(m), 60.96 cm

Fixed Attenuators

Accessory	Description	Accessory	Description
	41KB-3 DC to 26.5 GHz, 1 W, 3 dB, K(m) to K(f)		43KC-3 DC to 26.5 GHz, 1 W, 3 dB, K(m) to K(f)
	41KB-6 DC to 26.5 GHz, 1 W, 6 dB, K(m) to K(f)		43KC-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)		43KC-10 DC to 26.5 GHz, 1 W, 10 dB, K(m) to K(f)
	41KB-20 DC to 26.5 GHz, 1W, 20 dB, K(m) to K(f)		43KC-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-10 DC to 40 GHz, 1 W, 10 dB, K(m) to K(f)
	41KC-6 DC to 40 GHz, 1W, 6 dB, K(m) to K(f)		41KC-20 DC to 40 GHz, 1W, 20 dB, K(m) to K(f)

Coaxial Adapters

Accessory	Description	Accessory	Description
	34VFK50A DC to 43.5 GHz, V(f) to K(m), 50 Ω		2000-1880-R DC to 18 GHz, N(m) to V(f), 50 Ω
	34VFKF50A DC to 43.5 GHz, V(f) to K(f), 50 Ω		2000-1881-R DC to 18 GHz, N(f) to V(f), 50 Ω
	34VV50 DC to 65 GHz, V(m) to V(m), 50 Ω		K222B DC to 40 GHz, K(f) to K(f), 50 Ω
	34VVF50 DC to 65 GHz, V(f) to V(m), 50 Ω		34VFVF50 DC to 65 GHz, V(f) to V(f), 50 Ω

Adapters

Accessory	Description
	1091-26-R SMA(m) to N(m), DC to 18 GHz, 50 Ω
	1091-27-R SMA(f) to N(m), DC to 18 GHz, 50 Ω
	1091-80-R SMA(m) to N(f), DC to 18 GHz, 50 Ω
	1091-81-R SMA(f) to N(f), DC to 18 GHz, 50 Ω
	1091-172-R BNC(f) to N(m), DC to 1.3 GHz, 50 Ω
	1091-417-R N(m) to QMA(f), DC to 6 GHz, 50 Ω
	1091-418-R N(m) to QMA(m), DC to 18 GHz, 50 Ω

Accessory	Description
	510-102-R N(m) to N(m), DC to 11 GHz, 50 Ω, 90 degrees right angle
	510-90-R 7/16 DIN(f) to N(m), DC to 7.5 GHz, 50 Ω
	510-91-R 7/16 DIN(f) to N(f), DC to 7.5 GHz, 50 Ω
	510-92-R 7/16 DIN(m) to N(m), DC to 7.5 GHz, 50 Ω
	510-93-R 7/16 DIN(m) to N(f), DC to 7.5 GHz, 50 Ω
	510-96-R 7/16 DIN(m) to 7/16 DIN (m), DC to 7.5 GHz, 50 Ω
	510-97-R 7/16 DIN(f) to 7/16 DIN (f), DC to 7.5 GHz, 50 Ω

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