

Anritsu Advancing beyond

Remote Spectrum Monitor

High-Performance RF Spectrum Monitor

MS27201A

9 kHz to 9 GHz, 14 GHz, 20 GHz, 26.5 GHz, 32 GHz, 43.5 GHz, 54 GHz



Introduction

Anritsu is proud to introduce the world's most advanced Remote Spectrum Monitor (RSM). With frequency coverage up to 54 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 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.

Instrument Highlights

- Modulation Bandwidth: up to 150 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
- RTSA with 2.05µs POI
- Resolution Bandwidth (RBW): 1 Hz up to 10 MHz
- Full-band Preamplifiers
- Operation to +55 °C
- GNSS (GPS, GLONASS, Galileo, BeiDou)

Capabilities and Functional Highlights

- 5G NR FDD and TDD Analyzer
- Real-Time Spectrum Analyzer
- LTE FDD and TDD Analyzer
- Pulse Profile Measurements
- Spectrogram
- Field Strength
- Occupied Bandwidth
- Channel Power
- Adjacent Channel Power
- AM/FM Audio Demodulation
- Multi-language Support
- Zero Span IF Output
- Gated Sweep
- Spectral Emissions Mask
- Signal Strength and RSSI
- Carrier Aggregation
- Carrier-to-Interference
- Total Harmonic Distortion (THD)
- IQ Waveform Capture/Streaming
- Signal Strength and RSSI
- USB 3.0
- PC GUI application as standard for remote control
- Compatible with vision PC spectrum monitoring software application
- Built-in PDF Report Generator
- WCDMA FDD Signal Analyzer
- Channel Scanner

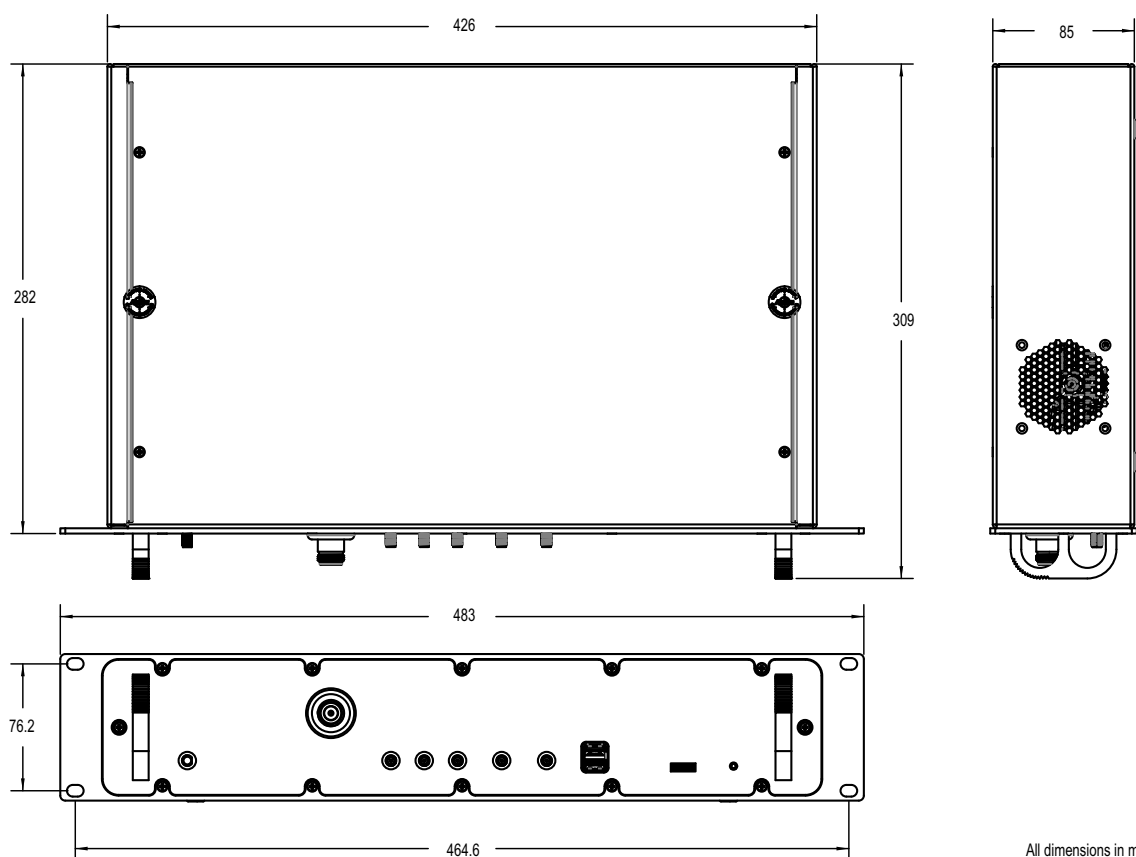


Table of Contents

Introduction	2
Definitions	3
Spectrum Analyzer Performance	4
Spectrum Analyzer Features	6
Secure Data (Option 7)	7
Secure Communication (Option 17)	7
Channel Scanner (Option 27)	7
GNSS Receiver (Option 31)	7
Zero Span IF Output (Option 89)	8
Gated Sweep (Option 90)	8
IQ Waveform Capture (Option 124/126)	8
IQ Waveform Streaming (Option 125/127)	9
Real-Time Spectrum Analyzer (Option 199)	10
Pulse Analyzer (Option 421)	11
AM/FM Modulation Measurement (Option 509)	12
WCDMA FDD Signal Analyzer (Option 871)	13
LTE FDD/TDD Signal Analyzer (Option 883)	14
5G NR FDD/TDD Signal Analyzer (Option 888)	16
General Specifications	17
Anritsu Remote Tool	18
Programmable Remote Control	18
MA25424A IQ Data Converter	18
MA25101A IQ Streaming PCIe Kit	19
Ordering Information – Instrument Options	20
Standard Accessories	21
Related Manuals	21
Optional Accessories	21

Definitions

Specifications	All specifications and characteristics apply under the following conditions, unless otherwise stated: • Over the 25 ± 5 °C temperature range. • After 10 minutes of warm-up time, where the instrument is left in the ON state. • When using the 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.
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

Spectrum Analyzer Performance

Frequency (usable to 0 Hz)			
	MS27201A-0709	9 kHz to 9 GHz (Option 709)	
	MS27201A-0714	9 kHz to 14 GHz (Option 714)	
	MS27201A-0720	9 kHz to 20 GHz (Option 720)	
	MS27201A-0726	9 kHz to 26.5 GHz (Option 726)	
	MS27201A-0732	9 kHz to 32 GHz (Option 732)	
	MS27201A-0743	9 kHz to 43.5 GHz (Option 743)	
	MS27201A-0754	9 kHz to 54 GHz (Option 754)	
	Tuning Resolution	1 Hz	
	Span	10 Hz to max frequency	
	Frequency Reference	Internal, GNSS, External	
	Internal Frequency Reference	Aging: $\pm 1.0 \times 10^{-6}$ per 10 years Accuracy: $\pm 3.0 \times 10^{-7}$ (-10 °C $\pm$ 55 °C) plus aging (see "GNSS Receiver (Option 31)" on page 7 for improved accuracy)	
	External Frequency Reference	10 MHz, 10 dBm to +10 dBm	
Bandwidth			
	Analysis Bandwidth	22 MHz (standard), 55 MHz (Option 103), 120 MHz (Option 104), 150 MHz (Option 105)	
	RTSA Bandwidth	22 MHz (standard), 55 MHz (Option 103), 120 MHz (Option 104), 150 MHz (Option 105)	
	Resolution Bandwidth (RBW)	1 Hz to 10 MHz (in RTSA, minimum RBW varies by span, max is 40 MHz), 1 Hz to 40 MHz in zero span	
	RBW Selectivity	4:1 nominal (–60 dB / –3 dB)	
	Video Bandwidth (VBW)	0.1 Hz to 10 MHz, 1 Hz to 40 MHz in zero span	
	CISPR Bandwidth	Resolution bandwidth when using Quasi-Peak marker function: 200 Hz, 9 kHz, and 120 kHz	
	VBW/Average Type	Linear/Log	
Sweep			
	Manual Sweep	Maximum sweep time is 3600 s (1 hour)	
	Sweep Points	10 to 10,001 (1001 in zero span)	
	Sweep Rate (non-zero span)	15 GHz/s typical (full span, RBW = VBW = 3 MHz)	
Zero Span			
	Sweep Time	60 ns to 3600 s in zero span	
	Sweep Time Accuracy	$\pm 2\%$ in zero span	
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 54 GHz	–80 dBm, maximum	–95 dBm, maximum
	Input-Related Spurious (–30 dBm input)	–60 dBc typical	
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
(26.5 GHz to 54 GHz)				
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
> 43.5 GHz to 54 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
100 kHz to 10 MHz		-145 dBm		-159 dBm
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
26.5 GHz to 54 GHz Instruments				
100 kHz to 10 MHz		-145 dBm		-159 dBm
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
> 43.5 GHz to 54 GHz	-130 dBm	-134 dBm	-147 dBm	-151 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 < 9 GHz	+15 dBm typical
9 GHz to 20 GHz	+20 dBm typical
> 20 GHz to 32 GHz	+11 dBm typical
> 32 GHz to 54 GHz	+15 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 54 GHz	+12 dBm

Second Harmonic Distortion (0 dB input attenuation -30 dBm input)

50 MHz	-75 dBc maximum
< 10 GHz	-80 dBc typical
≥ 10 GHz	-75 dBc typical

VSWR (≥ 10 dB input attenuation)

≤ 20 GHz	1.5:1 typical
> 20 GHz to 54 GHz	2.0:1 typical

Spectrum Analyzer Features

Smart Measurements

Field Strength	Measures field strength in dBm/m ² , dBW/m ² , dBV/m, dBmV/m, dBμV/m, dBA/m, V/m, W/m ² , W/cm ² , A/m) with antenna gain vs. frequency plot
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 the power in two upper and two lower adjacent channels
Spectral Emission Mask	Standards based limits for wireless emissions
Carrier-to-Interference (C/I)	Measures the ratio of power (dB) in an RF carrier to the interference power in the channel
Burst Power Average	Measures average power between two time markers in zero span
Total Harmonic Distortion (THD)	Measures THD of seven harmonics relative to fundamental frequency

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, dBV, dBmV, dBμV, dBA, V, W, A), Preamp (On/Off), Attenuation (Auto/Manual), Attenuation Level, Impedance (50 Ω, 75 Ω, other), Custom IMP Loss, Field Strength, Gestures
Bandwidth	RBW/VBW (Auto/Manual), VBW Type (Linear/Logarithmic), RBW:VBW Ratio, SPAN:RBW Ratio
Sweep	Continuous on/off, Restart, Sweep Once, Sweep to N, Auto/Manual Time, Points Gated Sweep (see “Gated Sweep (Option 90)” on page 8)

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 Math	T1-T2, T2-T1 (when T5 and T6 are selected)
Trace Mode	Active, Hold/View, Blank
Detector Type per Trace	Peak, RMS/Avg, Negative, Sample, Normal
Trace Normalize	On/Off (defines a 0 dB reference trace)
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

Trigger Input Sources (zero span only)	Free Run, GNSS/Internal, Video, External1/2
Trigger Output	Enables GPS 1 PPS output
Settings	Timestamps (on/off), Level, Time Interval, Delay, Holdoff, Periodic, Slope (Rising/Falling), Hysteresis Refer to Section “IQ Waveform Capture (Option 124/126)” on page-8 for IQ Trigger Functions

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, Frequency Mode (Absolute/Relative) Amplitude Mode (Absolute/Relative)
Limit Line Edit	Frequency, Relative Frequency, Amplitude, Relative Amplitude, Add Point, Add Vertical, Add Gap, Delete Point, Next Point Left/Right
Limit Line Move	Center, X-Offset (Hz), Left, Right, Y-Offset, Up, Down, To Marker 1, Marker 1 Offset (dB)
Limit Line Envelope	Select Envelope (Upper/Lower), Set Envelope, Envelope Points (2-41), Amplitude Offset, Shape (Square/Slope)

Secure Data (Option 7)

For highly secure data handling requirements, this software option prevents the storing of measurement setup or data information onto any internal file storage location. Instead, setup and measurement information is stored ONLY to the external USB memory location. A simple factory preset prepares the Remote Spectrum Monitor for transportation while the USB memory remains behind in the secure environment. The Remote Spectrum Monitor cannot be switched between secure and non-secure operation by the user once configured for secure data operation. With this option enabled, the user can also choose to blank the frequency, amplitude and bandwidth values displayed on the screen by turning on Secure Display toggle included in Advanced settings of the instrument. Note that the SCPI command interface won't be supported when Option 7 is installed and installing secure communication Option 17 is required to enable the SCPI interface.

Secure Communication (Option 17)

When connecting the instrument to a network, Option 17 creates a secure tunnel. Ports will be closed, and data encrypted as shown in the table below. Security certificates can be loaded onto the instrument to establish a secure connection. Remote access to the MS27201A ports can be password protected.

Compatible Software Anritsu Remote and Report Tools (ARRT)
MX280007A Mobile InterferenceHunter™ (MIH)

PORT	SERVICE	DEFAULT STATE	WITH OPTION 17
21 (tcp)	ftp	Open	Closed
80 (tcp)	http	Open	Closed
111 (tcp)	rpcbind	Open	Open
443 (tcp)	https	Open	Open
8001 (tcp)	vcom-tunnel	Open	Closed
8002 (tcp)	vcom-tunnel	Closed	Open (encrypted)
9001 (tcp)	tor-orport	Open	Closed
9002 (tcp)	dynamid	Open	Closed
9003 (tcp)	tor-orport	Closed	Open (encrypted)
9004 (tcp)	dynamid	Closed	Open (encrypted)
24001 (tcp)	med-fsp-rx	Open	Closed
24002 (tcp)	med-fsp-rx	Closed	Open (encrypted)
111 (udp)	rpcbind	Open	Open
123 (udp)	ntp	Open	Open
5353 (udp)	Zeroconf	Open/Filtered	Open

Channel Scanner (Option 27)

Number of Channels	1 to 60
Frequency Range	9 kHz to 54 GHz
Frequency Accuracy	$\pm 3.0 \times 10^{-7}$
Measurement Range	-160 dBm to +30 dBm
Amplitude	Reference Level (Manual/Auto and Offset), Scale/Division, Preamp (On/Off), Attenuation (Auto/Manual), Y-Axis Unit (dBm, dBW, dBV, dBuV, dBA, V, W, A), Attenuation Level, Impedance (50 Ω , 75 Ω , other), Custom IMP Loss, Field Strength
Scan	Continuous (on/off), Scan Once
Measure	View: Bar Chart, Strip Chart, Mapping, Start Measure, Select Points (on/off), Clear Points, Compare Measure on/off
Setup Parameters	Bar Chart/Strip Chart: Add Channels Signal Standard: Start Channel, Channel Step Size, Channel Span, Channel Count, Index, Dwell Time, Upper Limit, Lower Limit Frequency Range: Channel Name, Start Frequency, Channel Spacing, Channel Span, Channel Count, Index, Dwell Time, Upper Limit, Lower Limit Custom: Channel Name, Center Frequency, Channel Span, Index, Dwell Time, Upper Limit, Lower Limit Mapping: Add Channels, Map Type (Outdoor, Indoor), Map Mode (RSSI, Channel Power, Spectral Density), Repeat Type (Time, Distance), Time (1 to 60 s max), Distance, Distance Unit (Meters, Feet), Best Channel (on/off), Selected Channel (0 to 59), Mapping Device (with Option 7 only), Color Setup: Excellent, Very Good, Good, Fair, Poor

GNSS Receiver (Option 31) (Requires GNSS antenna, sold separately)

Supported Satellite Systems	GNSS (includes combinations of GPS, GLONASS, Galileo, Beidou)
Setup	On/Off, Antenna Voltage 3.3 V/5.0 V, GPS/GNSS Info
Anritsu Antennas	2000-2185-R GNSS (GPS) antenna (requires 2.7 VDC or 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/GNSS Info	UTC Time, Latitude, Longitude, and Altitude on display
High Frequency Accuracy	$< \pm 2.5 \times 10^{-8}$ with GNSS On, 3 minutes after satellite lock in selected mode (GPS antenna connected) $< \pm 5.0 \times 10^{-8}$ 24 hour holdover accuracy, -10 °C to 55 °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 $\leq$ 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	$\leq$ 32 MHz; $\leq$ 110 MHz with Option 103 or 104
Rise Time	<20 ns
Connector	SMA(f), 50 Ω

Gated Sweep (Option 90)

Gate Source	GNSS (GPS), External 1/2
Trigger Slope	Rising/Falling
Frame Time	1 s, 20 ms, 10 ms
Gate Delay	Up to 200 ms
Gate Length	1 μ s up to 200 ms
Power vs. Time, Display Length	100 μ s 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, RTSA
Capture Mode	Single, Continuous, Streaming
Capture Settings	Capture Length, Time Stamps (on/off), Save to File (Automatic/Normal), Save Capture, File Name Prefix Capture Signing (on/off), Storage Device (Internal/USB)
Trigger Source	Free Run, External 1/2, Video
Trigger Settings	Time Stamps (on/off), Level, Delay (negative in RTSA mode only), Time Interval, Slope (Rising/Falling), Hysteresis
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 (MHz)	IQ Sample Rate (MSPS)	IQ Bit Resolution				Mode ^a	
		32 bit	16 bit	10 bit	8 bit	SPA	RTSA
150	200	1.34 s	2.68 s	4.29 s	5.37 s	x	x
120	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 55 MHz, Option 104 up to 120 MHz and Option 105 up to 150 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 BW, 122.88 MSPS sample rate
	10 bit: 80 MHz BW, 100 MSPS sample rate
	16 bit: 50 MHz BW, 61.44 MSPS sample rate
	32 bit: 25 MHz BW, 30.72 MSPS sample rate
	Device formatted as extensible file allocation table system (exFAT) with 32 MB allocation unit size
	Maximum gapless streaming bandwidth:
	8 bit: 100 MHz BW, 122.88 MSPS sample rate
	10 bit: 74 MHz BW, 92.16 MSPS sample rate
	16 bit: 50 MHz BW, 61.44 MSPS sample rate
	32 bit: 25 MHz BW, 30.72 MSPS sample rate
Data Out Port	Gapless streaming of 110 MHz bandwidth at 16-bit resolution or 100 MHz bandwidth at 32-bit resolution (requires MA25101A IQ Streaming PCIe kit and compatible PC)
	Stream to Bird IQC5000B at 16-bit resolution only, full bandwidth/sample rate (requires MA25424A receiver)

Real-Time Spectrum Analyzer (Option 199)

Setup Parameters

Frequency	Center/Start/Stop, Frequency Step, Frequency Offset Gestures (Drag Center Frequency (on/off), Pinch Span (on/off)) Span, Full Span (max span: 22 MHz standard, 55 MHz with Option 103, 120 MHz with Option 104, 150 MHz with Option 105)				
Amplitude	Reference Level (Manual/Auto and Offset), Scale/Division, Y-Axis Unit (dBm, dBW, dBV, dBmV, dBμV, dBA), Preamp, Attenuation (Auto/Manual), Gestures				
Bandwidth	RBW (span dependent), Auto RBW, Span:RBW Ratio				
Probability of Intercept	Analysis Bandwidth	Density Resolution	Span	RBW	POI
	22 MHz (Standard)	Normal High	22 MHz	10 MHz	2.520 μs 4.420 μs
	55 MHz (Opt. 103)	Normal High	55 MHz	25 MHz	2.055 μs 3.950 μs
	120 MHz (Opt. 104)	Normal High	120 MHz	40 MHz	2.055 μs 3.950 μs
	150 MHz (Opt. 105)	Normal High	150 MHz	40 MHz	2.055 μs 3.950 μs
Setup	Show Density (on/off), Auto Scale (on/off), Density Scale Top/Bottom (100% max), Density Res (Normal, High)				
Density Color	Set Color Top/Bottom Range, Auto Scale				
Persistence	Infinite or Variable from 0 to 10 s				
Acquisition Time	50 ms to 5 s				
FFT Rate	527,000 FFT/s (normal resolution), 263,000 FFT/s (high resolution)				
Minimum Detectable Signal	5 ns				

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, T1-T2, T2-T1
Trace Mode	Active, Hold/View, Blank
Detector Type per Trace	Peak, Sample, Negative, Normal
Trace Record	Record live samples with manual tagging to internal or external storage (only applies to trace and not for spectral density graphic)
Trace Playback	Play recorded samples from internal or external storage; set playback interval (only applies to trace and not for spectral density graphic)
CSV Logging	Record live or playback traces in CSV format for post processing

Sweep Functions

Sweep	Single/Continuous, Sweep Once
-------	-------------------------------

Spectrogram

Number of Lines	142
Trace Time/Position Cursor	Up to Six Cursors (display historical trace data by trace position or time)
Cursor State	Active, Hold/View, Blank
Color Setup	Color Scale Top/Bottom Range, Reference Hue, Preset Setup

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
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, Frequency Mode (Absolute/Relative), Amplitude Mode (Absolute/Relative)
Limit Line Edit	Frequency, Amplitude, Add Point, Add Vertical, Add Gap, Delete Point, Next Point Left/Right
Limit Line Move	Center, X-Offset, Left, Right, Y-offset, Up, Down, Marker Offset, To Marker 1
Limit Line Envelope	Select Envelope (Upper/Lower), Envelope Points (41 max), Amplitude Offset, Shape (Square/Slope), Set Envelope

Trigger Functions

Source	Free Run, Video, External1/2
Settings	Timestamps (on/off), Level, Time Interval, Delay, Holdoff, Periodic, Slope (Rising/Falling), Hysteresis
	Refer to Section "IQ Waveform Capture (Option 124/126)" on page-8 for IQ Trigger Functions

Pulse Analyzer (Option 421)

Pulse Measurements	(in accordance with <i>IEEE Standard for Transitions, Pulses, and Related Waveforms</i> (181-2011, section 5.2.1))
Power Measurements	Average power, Peak power, Wave Average, Peak Wave Average, Pulse Average
Pulse Characteristics	Duration, Center, Tilt, Period, Off Time, Duty Factor, Frequency
First Transition Characteristics	Transition Duration, Duration Instant, Low Reference Instant, High Reference Instant, Pre Transition Overshoot, Post Transition Overshoot, Pre Transition Undershoot, Post Transition Undershoot
Second Transition Characteristics	Transition Duration, Duration Instant, Low Reference Instant, High Reference Instant
Pulse View Settings	Pulse Analyzer (enables pulse analyzer measurements above), Pulse Viewer (removes pulse analyzer measurements and enables standard marker measurements)
Rise Time	(trace averages set to 100; RBW:VBW = 1) 30 ns, 40 MHz RBW (Option 104) 60 ns, 25 MHz RBW (Option 103) 100 ns, 10 MHz RBW (Standard)

DANL and dynamic range are the same as the ["Spectrum Analyzer Performance"](#).

Setup Parameters

Frequency	Center Frequency, Frequency Step, Frequency Offset
Amplitude	Reference Level (Manual/Auto and Offset), Scale/Division, Y-Axis Unit (dBm, dBW, dBV, dBmV, dBμV, dBA), Preamp On/Off, Attenuation (Auto/Manual)
Bandwidth	RBW/VBW (Auto/Manual), VBW Type (Linear/Logarithmic), RBW:VBW Ratio, SPAN:RBW Ratio
Pulse Setup	Pulse Level Type (Auto/User), Pulse Type (Positive/Negative), User TOP (S2), User BOTTOM (S1), Pulse Reference High (%), Pulse Reference Low (%), Pulse Duration Reference (0.2-99.9%), Simulation, Display

Trace Functions

Traces	Up to Six Traces
Trace Type	Clear/Write, Min Hold, Max Hold, Average, Rolling Max Hold, Rolling Min Hold, Rolling Average
Trace Mode	Active, Hold/View, Blank
Detector Type per Trace	Peak, Negative, Sample

Sweep Functions

Sweep	Single/Continuous, Restart, Sweep Once, Sweep to N, Sweep Time
Sweep Points	1001
Sweep Time	60 ns to 3600 s
Sweep Time Accuracy	±2%

Marker Functions (enabled only in Pulse Viewer)

Markers	Up to 12 Markers
Marker Measurements	Time, Amplitude
Marker Mode	Normal, Delta, Fixed
Delta Marker	Relative to any Normal or Fixed Marker
Marker Function	None, Noise
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, Time, Amplitude, Delta Time & Offset

Trigger Functions

Trigger Sources	Free Run, Video, External 1/2
Trigger Settings	Level, Delay, Holdoff, Periodic, Slope (Rising/Falling), Hysteresis
Trigger Jitter	20 ns

Pulse Simulation Provides visual and measurement data of simulated pulse types.

Waveform Types	Single Positive, Single Negative, Train, Double
Settings	Simulation (ON/OFF) Amplitude (High and Low), Period (0 s-3600 s), Duty Factor (0.01-1)

Pulse Display

Settings	Ref High (On/Off), Duration Ref (On/Off), Post-T Over (On/Off), Post-T Under (On/Off), Pre-T Over (On/Off), Pre-T Under (On/Off), S2 High (On/Off), S1 Low (On/Off), HRI First/Second, LRI First/Second, DI First/Second (On/Off)
----------	---

AM/FM Modulation Measurement (Option 509) (Spectrum Analyzer, RTSA)**AM Measurements**

AM Depth	0% to 100%, $\pm 2\%$ accuracy, typical
AM Bandwidth	20 kHz
AM Standards	Standard AM, Upper/Lower Sideband suppressed carrier
SINAD	0 to 60 dB, nominal based on 1 kHz modulating tone
THD	-60 dB, using up to 10 harmonics of 1 kHz modulating tone
Demodulated AM Spectrum	Frequency Scale, 0 to 24 kHz
Audio Time Domain	5 s or auto zoomed
Graphs	Audio Spectrum (Log AM depth percentage vs frequency), RF Spectrum Audio Time Domain (Linear AM depth percentage vs time), Audio Results
Audio Results	Signal Power (dBm), Carrier Frequency, RMS Depth, (Peak-to-peak)/2 Depth, Peak Positive/Peak Negative Depth, SINAD (dB), Upper/Lower AM Depth, THD (dB)
Setup	Demodulation Frequency, Demodulation Marker (on/off), Marker Tracked (1 to 12), Zoomed Time Graph (on/off), Modulation (AM, USB, LSB), Audio (on/off), Volume (on/off), Record Duration (1 to 100000 S), Record, Squelch Level (-120 to 30 dBm)

FM Measurements

FM Bandwidth	96 kHz (wide)
FM Deviation	Up to 75 kHz with 2% accuracy, ± 1 kHz typical
SINAD	0 to 60 dB, nominal based on 1 kHz modulating tone
THD	-75 to 0 dB, using up to 10 harmonics of 1 kHz modulating tone
Demodulated FM Spectrum	Wideband: 96 kHz full span, 20 kHz zoomed Narrowband: 25 kHz, 24 kHz (audio spectrum) 12.5 kHz, 14 kHz (audio spectrum) 6.25 kHz, 6 kHz (audio spectrum)
Audio Time Domain	5 s or auto zoomed
Graphs	Audio Spectrum (Log FM deviation vs frequency), RF Spectrum Audio Time Domain (Linear FM deviation vs time), Audio Results
Audio Results	Signal Power (Hz), Carrier Frequency, Upper/Lower Deviation, RMS FM deviation, (Peak-to-peak)/2 Deviation, SINAD, Total Harmonic Distortion (THD), Left/Right RDS deviation, Pilot Deviation
Setup	Demodulation Frequency, Demodulation Marker (on/off), Marker Tracked (1 to 12), Zoomed Audio Graph (on/off), Zoomed Time Graph (on/off), Modulation (FM Narrowband (6.25, 12.5, 25 kHz), FM Wideband), Audio (on/off), Volume (on/off), Record Duration (1 to 100000 S), Record, Squelch Level (-120 to 30 dBm)

WCDMA FDD Signal Analyzer (Option 871)

General		
Frequency Range	10 MHz to 54 GHz (option dependent)	
Channel Bandwidth (MHz)	5	
Amplitude	Auto Range on/off, Reference Level (Manual/Auto), Scale/Division, Y Axis Unit, Attenuation Level (Auto/Manual), Reference Level Offset, Preamp on/off	
Input Signal Range	-80 dBm to +10 dBm	
Sweep	Sweep Once/Continuous, Hold (On/Off), Restart Averaging, Gated Sweep (Channel Power and OBW)	
WCDMA		
Demod Summary View	Sync: Primary Scrambling Code, Code Group, Frequency Error, Time Offset, Status Frequency Error: Count, Average, STD Deviation, Minimum, Maximum Code Domain Power: Absolute, relative and Δ CPICH values of Channel Power (CHP), power of common pilot channel (P-CPICH), Primary Common Control Physical Channel (P-CCPCH), Secondary Common Control Physical Channel (S-CCPCH), Paging Indicator Channel (PICH) Code Domain EVM: power of common pilot channel (P-CPICH)	
Summary Table View	Carrier Frequency, Frequency error/Average frequency error, Channel Power, Occupied BW, P-CPICH EVM, P-CPICH Power, P-CCPCH Power, S-CCPCH Power, PICH Power, Scrambling Code	
WCDMA Adjacent Channel Power		
Upper/Lower Measurements	Channel (Main, Adjacent, Alternate) Absolute, Relative, Limit (dBm)	
Setup Parameters	Channel Spacing, Main/Adjacent/Alternate Integration Bandwidth, Limit Type (Absolute/Relative), Limits (On/Off), Main/Adjacent/Alternate Channel Limit	
WCDMA Channel Power		
Measurements	Total Channel Power, Total Power Spectral Density (PSD), Limit Test (CH Power and PSD)	
Setup Parameters	Integration Bandwidth, PSD Units (Hz/MHz), Power Limit (dBm), PSD Limit (dBm/Hz)	
WCDMA Spectral Emission Mask (SEM)		
Measurements	Segment, RBW, Peak Power, Peak Frequency, Mask Name, Reference Channel Power and Channel BW	
Setup Parameters	Select Mask, Import Mask, Export Mask, Reference Channel Bandwidth, Auto Max Power (on/off), Manual Max Power	
WCDMA Occupied Bandwidth		
Measurements	Occupied BW, Total Power, Value, Limit, OBW Center Frequency, Left Edge and Right Edge	
Setup Parameters	% OBW Power, X DB, OBW Limit (on/off), Method (percent/X dB)	

LTE FDD/TDD Signal Analyzer (Option 883)

General		
Frequency Range	10 MHz to 54 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, Mobile Network Code (MNC), Mobile Country Code (MCC)	
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)	
Summary Table View	Carrier Frequency, Frequency error, Channel Power, RS Power, Occupied BW and Physical Cell ID	
Setup Parameters	Integration Bandwidth (Summary Table view only), 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), DSS Detect (on/off), SSB Offset, Frequency Error Type (Summary Table view only): Current, Average, Auto Detect SSB	
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)	
LTE 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)	
LTE Channel Spectrum		
Measurements	Occupied Bandwidth (OBW), Total Power, Occupied Bandwidth, Limit Test (OBW)	
Setup Parameters	OBW Power (%/dB), OBW Limit (Hz), Method (%/x dB)	
LTE Carrier Aggregation		
Measurements	Carrier, Physical-layer Cell ID (PCI), RSRP, RSRQ, SINR, EVM (% RMS), Frequency Error (Hz), Bandwidth (BW), Center Frequency, Antennas	
Setup Parameters	Carrier, Carrier Count (up to eight), Antenna (Auto/0/1/2/3), Cyclic Prefix (Auto/Normal/Extended), Duplex Type (FDD/TDD)	
LTE 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 (PDCCCH), Physical Downlink Control Channel (PDCCCH), 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)	
LTE Adjacent Channel Power		
Upper/Lower Measurements	Channel (Main, Adjacent, Alternate) Absolute, Relative, Limit (dBm)	
Setup Parameters	Channel Spacing, Main/Adjacent/Alternate Integration Bandwidth, Limit Type (Absolute/Relative), Limits (On/Off), Main/Adjacent/Alternate Channel Limit	

LTE Spectral Emission Mask (SEM)

Measurements	Segment, RBW, Peak Power, Peak Frequency, Mask Name, Reference Channel Power and Channel BW
Setup Parameters	Select Mask, Import Mask, Export Mask, Reference Channel Bandwidth, Auto Max Power (on/off), Manual Max Power

LTE 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)

LTE UL/DL Interference

Display	Frame/Subframe power against time plus gated uplink or downlink RF spectrum on single screen
Measurements	Physical Cell ID, Sector ID, Cell Group, Frequency Error, Time Offset, Cyclic Prefix, Status of Primary Synchronization Signal (PSS)
Sub-Frame Power Measurements	Sub-Frame, Slot (0 and 1), Total Frame Power, Uplink and Downlink Pilot Time Slots (DwPTS and UpPTS), and Transmit Off Power
Setup Parameters	Analysis (Frame/Subframe/Slot), SSF Config (Auto/0-9/Invalid), Sub-Frame (0-9), Slot (0/1) Antenna (Auto/0/1/2/3), Gated Spec Type (Uplink, Downlink, Guard Period, All, None), Gated Duration (Frame, Coupled), Time Level Offset, Frame Start Time (Auto, Sync Once, UTC, Custom), Frame Time Offset, Cyclic Prefix (Auto/Normal/Extended), Duplex Type (FDD/TDD), UL/DL Config (TDD only), NG (1/6, 1/2, 1, 2)

5G NR FDD/TDD Signal Analyzer (Option 888)**General**

Frequency Range	10 MHz to 54 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), Preamplifier
Input Signal Range	-76 dBm to +10 dBm (≤ 20 GHz) -72 dBm to +10 dBm (> 20 GHz)
Sweep	Single/Continuous, Sweep Once

5G NR Summary

Multi-Beam Measurements	Physical-layer Cell ID, Beam Index, Sector ID, Mobile Network Code (MNC), Mobile Country Code (MCC), Cell Group, Frequency Error, Time Offset (μ s), Status, SS-RSRP (dBm), SS-RSRQ (dB), SS-SINR (dB), SS-RSSI (dB), Sync and Demod Status Indicators
Single-Beam Measurements	Physical Cell ID, Sector ID, Cell Group, Frequency Error, Time Offset, Status, Count, Average, Standard Deviation, Minimum, Maximum, SS-RSRP (dBm), SS-RSRQ (dB), SS-SINR (dB), SS-RSSI, Sync and Demod Status Indicators, Block Measurements (PSS, SSS, PBCH, PBCH-DMRS), Average EVM, Peak EVM (@ subcarrier/symbol), Beam Power (dBm)
Summary Table View	Carrier Frequency, Frequency Error, Channel Power, SS-RSRP, Occupied BW, Physical Cell ID, Sync and Demod Status Indicators
Views	Multi Beam (up to 64), Single Beam, Summary Table
Setup Parameters	Integration Bandwidth (Summary Table view only), SINR Threshold (dB), Duplex Type (FDD/TDD), GMC Offset (μ s), Distance to Antenna (m), Distance Unit (m/ft), Frequency Error Type (Summary Table view only): Current, Average
RSRP Accuracy	± 1.0 dB typical
Residual EVM (rms)	2.0 % typical
Frequency Error	$< \pm 2.0 \times 10^{-8}$ + time base error, typical

5G NR 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)

5G NR 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

5G NR 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

5G NR 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)

5G NR Spectral Emission Mask (supported in normal spectrum analyzer mode)

Measurements	Segment, RBW, Peak PWR, Peak Freq
Setup Parameters	Select Mask, Import Mask, Export Mask, REF CH BW, Auto Max PWR, Manual Max PWR

5G NR Adjacent Channel Power (supported in normal spectrum analyzer mode)

Measurements	Channel, Absolute, Relative, Limit
Setup Parameters	Channel Spacing, Main Integ BW, ADJ Integ BW, ALT Integ BW, Limit Type, Limits, Main CH Limit, ADJ CH Limit, ALT CH Limit

5G NR Carrier Aggregation

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

5G NR Constellation

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

5G NR UL/DL Interference

Display	Frame/Subframe power against time plus gated uplink or downlink RF spectrum on single screen
Measurements	Physical Cell ID, Sector ID, Cell Group, Frequency Error, Time Offset, Status of Primary Synchronization Signal (PSS), Total Frame Power
Sub-Frame Power Measurements	Sub-Frame, Slot (0 and 1)
Setup Parameters	Analysis (Frame/Subframe/Slot), Sub-Frame (0-9), Slot (0 to 15), Gated Spec Type (Uplink, Downlink, Flexible, All, None), Gated Duration (Frame, Coupled), Time Level Offset, Frame Start Time (Auto, Sync Once, UTC, UTC+3 ms, UTC-2 ms, Custom), Frame Time offset, Frame Structure (A/B1/B2/Custom), Special Slot Type (Type 1/2), Frame Setup (Frame Structure, Pattern Number, Uplink Slots Pattern 1/2, Downlink Slots Pattern 1/2, Uplink Symbols Pattern 1/2, Downlink Symbols Pattern 1/2, Trans Periodicity Pattern 1/2), Cyclic Prefix (Normal), Duplex Type (FDD/TDD)

General Specifications

Setup Parameters

Display	Brightness adjustment, Auto screen dimming shutoff timer (on/off), Color schemes (Default, Light, Black on White, Night Vision), Shortcuts (Hide Shortcuts On/Off)
Date and Time	Date and Time settings (Automatic, Manual), Time Zone settings, Time synced to Internet/GNSS
Language	English, Spanish, Chinese-simplified, Japanese, French, Korean
Display	Theme: Color schemes (Default, Light, Black on White, Night Vision), Shortcuts (Hide Shortcuts On/Off)
Screenshot	Capture Region (Graphs Only, Entire Application), Color (Printable, Standard), Annotations (Header, Footer) File naming (Automatic Timestamp, Manual), Directory
Options	Installed Options, Available Options, Install Options from web, Enable options using file (USB)), Save Config
GNSS (GPS)	See "GNSS Receiver (Option 31)" on page 7
Ethernet	Ethernet (IP4 & IP6 formats), Type (DHCP, Static IP)
Port Setup	Bias Voltage On/Off, Voltage, Info, Ref/Trig: Port 0 (Ref In), Port 1 (Ref Out, Trig In) Port 2 (Trig In, GPS 1 PPS Trig Out)
Advanced	RF Safe Mode on/off, SCPI Errors on/off, Share Center Frequency on/off, Secure Display on/off, Remote Lock on/off, Set Remote Password, Add Custom Certificate, Save Public Key and Certificate Information
Instrument Memory	8 GB of which nominally 1.5 GB is allocated to the operating system. Available memory to users is nominally 6.5 GB. Available memory is accessed by user saving of: screen images, trace files, setup files, digital maps, IQ captures, audio files and report files.

File Menu

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

Diagnostics Menu

Event Log (Export File), Self Test, Service (Enable Service Mode)

Tools Menu

IQ Streaming, Discovery Tool, PDF Reports

Report Generator

PDF Reports	Creates detailed measurement reports on the instrument
Report Contents	Free form text fields to identify and locate the site of measurements, company logo image Cable and Antenna analyzer trace files, instrument screen captures and site photographs
Report Format	PDF and HTML

Connectors

RF In	MS27201A-0709, -0714, -0720: Type N(f), 50 Ω MS27201A-0726, -0732, -743: Ruggedized Type K(m), 50 Ω MS27201A-0754: Ruggedized Type V(m), 50Ω
GPS	SMA(f), 50 Ω,
External Power	5.5 mm barrel connector, 14 to 16 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	Two USB 3 Type A (supports file transfer and IQ capture/streaming)
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 (see "Zero Span IF Output (Option 89)" on page 8)
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 61000-4-2/3/4/5/6/8/11 Low Voltage Directive 2014/35/EU Safety EN 61010-1:2010 RoHS Directive 2011/65/EU + 2015/863
United Kingdom	EMC SI 2016/1091; BS EN 55011 & BS 61000-4-2/3/4/5/6/8/11 Consumer Protection (Safety) SI 2016/1101; BS EN 61010-1:2010 Environmental Protection SI 2012/3032; 2011/65/EU & 2015/863
Australia and New Zealand	RCM AS/NZS 4417:2012
South Korea	KCC-R-R-A2)+-1006
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: 6.4 kg (14.10 lb) MS27201A-0726, -0732, -0743, -0754: 6.74 kg (14.85 lb)

Anritsu Remote Tool

Functionality	Free MS27201A Anritsu Remote and Report Tools (ARRT) software download from www.anritsu.com Full instrument graphical user interface control from a PC with simulated hardware support for on-screen measurement analysis Anritsu Remote Tool software compatible with Windows® 10 and 11; 32 or 64 bit operating systems
Interfaces	Ethernet

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)

MA25101A IQ Streaming PCIe Kit (requires Option 125 or Option 127)

IQ Streaming (used for streaming IQ data components of a waveform from the MS27201A Data Out port to a PC)		
Shipping Contents	PCIe Computer Card with mounting hardware PCIe OCuLink I/O Data Cable	
Software	MX280005A IQ Signal Master™ Vector Modulation Analysis Software (download from www.anritsu.com)	
Mode	Spectrum Analyzer and RTSA	
Input Ports	Data In (PCIe) (use PC Ethernet for instrument control and low speed IQ data streaming)	
PCIe Standard	PCIe Gen 3, 4 lanes	
Data Rate	Max Peak rate: 18 Gb/s Typical: 6.4 Gb/s (for typical PC configuration and system overhead), 110 MHz Capture BW @ 16 bits max	
Warranty	Duration	90 days warranty

Ordering Information – Instrument Options

**Part Number Description**

MS27201A Remote Spectrum Monitor (Requires Option 709, 714, 720, 726, 732, 743 or 754)

Options

MS27201A-0709	Frequency Range 9 kHz to 9 GHz
MS27201A-0714	Frequency Range 9 kHz to 14 GHz
MS27201A-0720	Frequency Range 9 kHz to 20 GHz
MS27201A-0726	Frequency Range 9 kHz to 26.5 GHz
MS27201A-0732	Frequency Range 9 kHz to 32 GHz
MS27201A-0743	Frequency Range 9 kHz to 43.5 GHz
MS27201A-0754	Frequency Range 9 kHz to 54 GHz
MS27201A-0006	Remove Wi-Fi and Bluetooth
MS27201A-0007	Secure Data
MS27201A-0017	Secure Communication
MS27201A-0027	Channel Scanner
MS27201A-0031	GNSS Receiver (Requires GNSS antenna, sold separately)
MS27201A-0089	Zero Span IF Output
MS27201A-0090	Gated Sweep
MS27201A-0103	55 MHz Analysis Bandwidth
MS27201A-0104	120 MHz Analysis Bandwidth
MS27201A-0105	150 MHz Analysis Bandwidth
MS27201A-0124	IQ Waveform Capture (Includes MX280005A IQ Signal Master base feature set)
MS27201A-0125	IQ Waveform Streaming (Includes MX280005A IQ Signal Master base feature set) (Requires Option 124)
MS27201A-0126	IQ Waveform Capture (Includes MX280005A IQ Signal Master base feature set) (Non-Export Controlled)
MS27201A-0127	IQ Waveform Capture (Includes MX280005A IQ Signal Master base feature set) (Requires Option 126, Non-Export Controlled)
MS27201A-0128	Enable Vector Signal Analysis (Requires Option 124 or 126)
MS27201A-0199	Real-Time Spectrum Analysis (RTSA)
MS27201A-0400	Enable Vision Monitor
MS27201A-0401	Enable Vision Locate (Requires Option 400)
MS27201A-0407	Enable Vision High-Speed Port Scanner
MS27201A-0421	Pulse Analyzer
MS27201A-0509	AM/FM Modulation Measurements
MS27201A-0871	WCDMA FDD Measurements (Requires Option 31)
MS27201A-0883	LTE FDD/TDD Measurements (Requires Option 31)
MS27201A-0888	5G NR FDD/TDD Measurements (Requires Option 31)
MS27201A-xxxx-0097	Accredited Calibration to ISO17025 and ANSI/NCSL Z540-1 (xxxx is the frequency option number)
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 data (xxxx is the frequency option number)

Supported PC Software

MX280005A	IQ Signal Master™ Vector Modulation Analysis
MX280007A	Mobile InterferenceHunter
MX280001A	Vision™ Monitor
ARRT	Anritsu Remote and Report Tools

Standard Accessories (included with instrument)

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

Accessory	Description
	2000-1371-R Ethernet Cable, 2 m
	2000-2156-R SMA(m) to BNC(f) Adapter (qty 3)

Related Manuals (available at www.anritsu.com)

Part Number	Description
10100-00064	Product Information, Compliance, and Safety
10580-00480	Remote Spectrum Monitor User Guide
10580-00481	Remote Spectrum Monitor Programming Manual
10580-00447	Spectrum Analyzer Measurement Guide Zero Span IF Output (Option 89) Gated Sweep (Option 90) AM/FM Modulation Measurement (Option 509)
10580-00448	RTSA Measurement Guide (Option 199)
10580-00449	5GNR Measurement Guide (Option 888) Gated Sweep (Option 90)
10580-00450	LTE Measurement Guide (Option 883) Gated Sweep (Option 90)
10580-00451	Pulse Analyzer Measurement Guide (Option 421)
10580-00490	IQ Capture/Streaming Measurement Guide (Options 124/126 and Options 125/127)
10580-00501	WCDMA Measurement Guide (Option 871)
10580-00504	Channel Scanner Measurement Guide (Option 27)

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		MA25101A IQ Streaming PCIe Kit Includes: PCIe Card with mounting hardware 2000-2030-R PCIe OCuLink I/O Data Cable
GNSS (GPS) Antennas (active)		Accessory	Description
	2000-2185-R Magnet Mount, SMA(m) with 3 m (9.8 ft) cable, requires 2.7 VDC to 5 VDC		2000-1760-R Miniature Antenna, SMA(m), requires 2.5 VDC to 3.7 VDC
	2000-1652-R Magnet Mount, SMA(m) with 0.3 m (1 ft) cable, requires 3.3 VDC to 5 VDC		

Precision Adapters**Accessory****Description**

34NN50A
N(m) to N(m), DC to 18 GHz, 50 Ω



34NFN50
N(f) to N(f), DC to 18 GHz, 50 Ω

Accessory**Description**

34NMDVFN50
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

Technical Data

Fixed Attenuators	
Accessory	Description
	41KB-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)
	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)
Coaxial Adapters	
Accessory	Description
	34VFK50A DC to 43.5 GHz, V(f) to K(m), 50 Ω
	34VFKF50A DC to 43.5 GHz, V(f) to K(f), 50 Ω
	34VV50 DC to 65 GHz, V(m) to V(m), 50 Ω
	34VVF50 DC to 65 GHz, V(f) to V(m), 50 Ω

Remote Spectrum Monitor

Accessory	Description
	43KC-3 DC to 26.5 GHz, 1 W, 3 dB, K(m) to K(f)
	43KC-6 DC to 26.5 GHz, 1W, 6 dB, K(m) to K(f)
	43KC-10 DC to 26.5 GHz, 1 W, 10 dB, K(m) to K(f)
	43KC-20 DC to 26.5 GHz, 1W, 20 dB, K(m) to K(f)
	41KC-10 DC to 40 GHz, 1 W, 10 dB, K(m) to K(f)
	41KC-20 DC to 40 GHz, 1W, 20 dB, K(m) to K(f)
Accessory	Description
	2000-1880-R DC to 18 GHz, N(m) to V(f), 50 Ω
	2000-1881-R DC to 18 GHz, N(f) to V(f), 50 Ω
	K222B DC to 40 GHz, K(f) to K(f), 50 Ω
	34VVF50 DC to 65 GHz, V(f) to V(f), 50 Ω

Adapters Accessory	Description	Accessory	Description
	1091-26-R SMA(m) to N(m), DC to 18 GHz, 50 Ω		510-102-R N(m) to N(m), DC to 11 GHz, 50 Ω , 90 degrees right angle
	1091-27-R SMA(f) to N(m), DC to 18 GHz, 50 Ω		510-90-R 7/16 DIN(f) to N(m), DC to 7.5 GHz, 50 Ω
	1091-80-R SMA(m) to N(f), DC to 18 GHz, 50 Ω		510-91-R 7/16 DIN(f) to N(f), DC to 7.5 GHz, 50 Ω
	1091-81-R SMA(f) to N(f), DC to 18 GHz, 50 Ω		510-92-R 7/16 DIN(m) to N(m), DC to 7.5 GHz, 50 Ω
	1091-172-R BNC(f) to N(m), DC to 1.3 GHz, 50 Ω		510-93-R 7/16 DIN(m) to N(f), DC to 7.5 GHz, 50 Ω
	1091-417-R N(m) to QMA(f), DC to 6 GHz, 50 Ω		510-96-R 7/16 DIN(m) to 7/16 DIN (m), DC to 7.5 GHz, 50 Ω
	1091-418-R N(m) to QMA(m), DC to 18 GHz, 50 Ω		510-97-R 7/16 DIN(f) to 7/16 DIN (f), DC to 7.5 GHz, 50 Ω

Training at Anritsu

Anritsu has designed courses to help you stay up to date with technologies important to your job. For available training courses, visit: www.anritsu.com and search for training and education.



• United States

Anritsu Americas Sales Company

490 Jarvis Drive, Morgan Hill, CA 95037-2809, U.S.A.
Phone: +1-800-Anritsu (1-800-267-4878)

• Canada

Anritsu Electronics Ltd.

Americas Sales and Support

490 Jarvis Drive, Morgan Hill, CA 95037-2809, U.S.A.
Phone: +1-800-Anritsu (1-800-267-4878)

• Brazil

Anritsu Elettronica Ltda.

Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - Sao Paulo - SP, Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• Mexico

Anritsu Company, S.A. de C.V.

Blvd Miguel de Cervantes Saavedra #169 Piso 1,
Col. Granada, Mexico, Ciudad de Mexico,
11520, MEXICO
Phone: +52-55-4169-7104

• United Kingdom

Anritsu EMEA Limited

900 Capability Green,
Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

• France

Anritsu SA

12 avenue du Québec, Immeuble Goyave,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50

• Germany

Anritsu GmbH

Nemetschek Haus, Konrad-Zuse-Platz 1,
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

• Italy

Anritsu S.R.L.

Spaces Eur Arte, Viale dell'Arte 25, 00144 Roma, Italy
Phone: +39-6-509-9711

• Sweden

Anritsu AB

Kistagången 20 B, 2 tr, 164 40 Kista, Sweden
Phone: +46-8-534-707-00

• Finland

Anritsu AB

Technopolis Aviapolis, Teknobulevardi 3-5 (D208.5.),
FI-01530 Vantaa, Finland
Phone: +358-20-741-8100

• Denmark

Anritsu A/S

c/o Regus Winghouse, Ørestads Boulevard 73, 4th
floor,
2300 Copenhagen S, Denmark
Phone: +45-7211-2200

• Spain

Anritsu EMEA Ltd.

Representation Office in Spain

Calle Manzanares 4, Primera planta, 28005
Madrid, Spain
Phone: +34-91-572-6761

• Austria

Anritsu Pty Ltd

Am Belvedere 10, A-1100 Vienna, Austria
Phone: +43-(0)1-717-28-710

• United Arab Emirates

Anritsu EMEA Ltd.

Anritsu A/S

Office No. 164, Building 17, Dubai Internet City
P.O. Box - 501901, Dubai, United Arab Emirates
Phone: +971-4-3758479

• India

ANRITSU INDIA PRIVATE LIMITED

6th Floor, Indique ETA, No.38/4, Adjacent to EMC2,
Doddanekundi, Outer Ring Road,
Bengaluru - 560048, India
Phone: +91-80-6728-1300
Fax: +91-80-6728-1301

• Singapore

ANRITSU PTE LTD

1 Jalan Kilang Timor, #07-04/06 Pacific Tech Centre
Singapore 159303
Phone: +65-6282-2400
Fax: +65-6282-2533

• Vietnam

ANRITSU COMPANY LIMITED

16th Floor, Peakview Tower, 36 Hoang Cau Street,
O Cho Dua Ward, Dong Da District, Hanoi, Vietnam
Phone: +84-24-3201-2730
Fax: +84-24-3201-2740

• P.R. China (Shanghai)

Anritsu (China) Co., Ltd.

Room 2701-2705, Tower A, New Caohejing
International Business Center No. 391 Gui Ping Road
Shanghai, 200233, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

• P.R. China (Hong Kong)

ANRITSU COMPANY LIMITED

Unit 1302, 13th Floor, New East Ocean Center,
No.9 Science Museum Road, TsimShaTsui East,
Kowloon, Hong Kong
Phone: +852-2301-4980
Fax: +852-2301-3545

• Japan

Anritsu Corporation

8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016
Japan
Phone: +81-46-296-6509
Fax: +81-46-225-8352

• South Korea

Anritsu Corporation, Limited

8F, A TOWER, 20, Gwacheondaero 7-gil, Gwacheon-si,
Gyeonggi-do, 13840, Republic of Korea
Phone: +82-2-6259-7300
Fax: +82-2-6259-7301

• Australia

Anritsu Pty. Ltd.

Unit 20, 21-35 Ricketts Road,
Mount Waverley, Victoria 3149, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

• Taiwan

ANRITSU COMPANY, INC.

7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

List Revision Date: 20250812