Anritsu Advancing beyond

Spectrum Master™

High Performance Handheld Spectrum Analyzer

MS2720T

9 kHz to 9 GHz, 13 GHz, 20 GHz

Introduction

From Anritsu, the inventor of the handheld spectrum analyzer first introduced in 1999, we are proud to introduce our 7th generation Spectrum Master MS2720T. The MS2720T represents the highest performance handheld spectrum analyzers available in the world as Anritsu pushes the envelope closer to benchtop quality. This generation introduces a touch screen, full-band tracking generators to 20 GHz, and best-in-class performance for dynamic range, DANL, phase noise, and sweep speed.

Spectrum and Interference Analyzer Highlights

- Measure: Occupied Bandwidth, Channel Power, ACPR, C/I, Field Strength, Spectral Emissions
- Measure Interference: Spectrogram, Signal Strength, RSSI
- Dynamic Range: > 106 dB in 1 Hz RBW
- DANL: –164 dBm in 1 Hz RBW
- Phase Noise: –112 dBc/Hz @ 10 kHz offset at 1 GHz
- Resolution Bandwidth (RBW): 1 Hz to 10 MHz
- PIM Hunting
- Full-band Tracking Generators: 9, 13, 20 GHz
- Full-band Preamplifiers standard
- Channel Scanner: scan up to 20 channels at once
- Burst Detect™ Sweep Mode: Sweep 1000x in 15 MHz span
- Coverage Mapping: plot RSSI on on-screen map
- Interference Mapping: on-screen mapping with triangulation
- Operation to +55 °C: full performance on AC or battery

Capabilities and Functional Highlights

Wireless Measurements

- GSM/GPRS/EDGE
- W-CDMA/HSPA+
- TD-SCDMA/HSPA+
- PIM Alert Application
- LTE/LTE-A FDD/TDD
- NB-IoT
- CDMA/EV-DO
- WiMAX Fixed/Mobile
- EMF Test
- Zero-span IF Output
- I/Q Waveform Capture
- Gated Sweep
- AM/FM/PM Demodulator
- High Accuracy Power Meter up to 26 GHz USB Sensors
- Three Hour Battery

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Definitions

Specifications	All specifications and characteristics apply to Revision 3 instruments under the following conditions, unless otherwise stated: • After 5 minutes of warm-up time, where the instrument is left in the ON state. • Sweep Mode set to Performance. • When using the internal reference signal.
Typical Specifications	Typical specifications are not tested and not warranted. They are generally representative of characteristic performance.
Nominal	Design parameters are not tested and not warranted.
Calibration Cycle	Recommended calibration cycle is 12 months.
Time Base Error	Input Frequency × Frequency Reference Error
	All specifications subject to change without notice. For the most current data sheet, please visit the Anritsu web site: www.anritsu.com

Spectrum Analyzer

Measurements

Smart Measurements	Field Strength (dBm/m^2, dBV/m, dBmV/m, dBµV/m, V/m, watt/m^2, dBW/m^2, A/m, dBA/m, or watt/cm^2) Occupied Bandwidth (measures 99 % to 1 % power channel of a signal, or N dB from center of signal) Channel Power (measures the total power in a specified bandwidth) ACPR (adjacent channel power ratio) Emission Mask (recall limit lines as emission mask) Spurious Emissions (measures up to 32 segments with independent setups and limits) C/I (carrier-to-interference ratio) AM/FM/SSB Demodulation (AM, wide/narrow FM, upper/lower SSB), (audio only) PIM Alert Application (available for download) PIM Hunting

Setup Parameters

Frequency	Center/Start/Stop, Span, Freq Step, Freq Offset, Signal Standard, Channel #, Channel Increment
Amplitude	Reference Level (RL), Scale, Attenuation Auto/Level, RL Offset, Units (dBm, dBV, dBmV, dBµV, Volt, watt, dBW, A, dBA), Pre-Amp On/Off, Detection (Peak, RMS/Avg, Negative Peak, Sample, Quasi-Peak)
Span	Span, Span Up/Down (1-2-5), Full Span, Zero Span, Last Span
Bandwidth	RBW, Auto RBW, VBW, Auto VBW, VBW/Avg Type (Linear, Log), RBW/VBW Ratio, Span/RBW Ratio
Impedance	50 Ω, 75 Ω; external pad required for 75 Ω operation

Sweep Functions

Sweep	Single/Continuous, Sweep Time, Gated Sweep (see Option 0090)
Sweep Mode	Fast (up to 100x faster than Performance), Performance, No FFT, Burst Detect (1000x Fast in 15 MHz span)
Triggers	Free Run, External, Video, IF Power, Force Trigger Once
Trigger Parameters	Delay, Level, Slope, Hysteresis, Holdoff (availability varies with trigger)

Trace Functions

Traces	Up to three Traces (A, B, C), View/Blank, Write/Hold, Trace A/B/C Operations
Trace A Operations	Normal, Max Hold, Min Hold, Average, # of Averages, (always the live trace)
Trace B Operations	A → B, B ← → C, Max Hold, Min Hold
Trace C Operations	A → C, B ← → C, Max Hold, Min Hold, A – B → C, B – A → C, Relative Reference (dB), Scale

Marker Functions

Markers	Markers 1-6 each with a Delta Marker, or Marker 1 Reference with Six Delta Markers, Marker Table (On/Off/Large), All Markers Off
Marker Types	Style (Fixed/Tracking), Noise Marker, Frequency Counter Marker
Marker Auto-Position	Peak Search, Next Peak (Right/Left), Peak Threshold %, Set Marker to Channel, Marker Frequency to Center, Delta Marker to Span, Marker to Reference Level
Marker Table	1-6 markers frequency and amplitude, plus delta markers frequency offset and amplitude

Limit Line Functions

Available Spans	> 0 Hz
Limit Lines	Upper/Lower, On/Off, Edit, Move, Envelope, Advanced, Limit Alarm, 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 Amplitude, Number of Points (2-41), Offset, Shape Square/Slope
Limit Line Advanced	Type (Absolute/Relative), Mirror, Save/Recall
Save on Event	When Limit Crossed

Frequency

Frequency Range	MS2720T-0709	MS2720T-0713	MS2720T-0720
(usable to 0 Hz)	9 kHz to 9 GHz	9 kHz to 13 GHz	9 kHz to 20 GHz
Tuning Resolution	1 Hz		
Frequency Reference	Aging: ± 0.1 x 10^{-6} per year; ± 1.0 x 10^{-6} per 10 years Accuracy: ± 0.3 x 10^{-6} (25 °C ± 25 °C) plus aging (see Option 31 for improved frequency reference accuracy)		
Auto-Sensing External Frequency Reference	1, 1.2288, 1.544, 2.048, 2.4576, 4.8, 4.9152, 5, 9.8304, 10, 13, 19.6608 (MHz)		
Sweep Time	7 µs to 3600 s in zero span		
Sweep Time Accuracy	± 2 % in zero span		

Bandwidth

Resolution Bandwidth (RBW)	1 Hz to 10 MHz in 1–3 sequence ± 10 % (–3 dB bandwidth)
Video Bandwidth (VBW)	1 Hz to 10 MHz in 1–3 sequence (–3 dB bandwidth)
RBW with Quasi-Peak Detection	200 Hz, 9 kHz, 120 kHz (–6 dB bandwidth)
VBW with Quasi-Peak Detection	Auto VBW is On, RBW/VBW = 1
VBW/Average Type	Linear/Log

Spectrum Analyzer (Continued)

Spectral Purity – SSB Phase Noise

Offset from 1 GHz	9 GHz Instrument		13 GHz to 20 GHz Instruments	
	Maximum	Typical	Maximum	Typical
10 kHz	–108 dBc/Hz	–112 dBc/Hz	–102 dBc/Hz	–106 dBc/Hz
100 kHz	–110 dBc/Hz	–115 dBc/Hz	–106 dBc/Hz	–110 dBc/Hz
1 MHz	–118 dBc/Hz	–123 dBc/Hz	–111 dBc/Hz	–116 dBc/Hz
10 MHz	–129 dBc/Hz	–133 dBc/Hz	–123 dBc/Hz	–129 dBc/Hz
Offset from 300 MHz				
1 kHz	–107 dBc/Hz	–111 dBc/Hz		
10 kHz	–112 dBc/Hz	–114 dBc/Hz		
62.5 kHz	–113 dBc/Hz	–115 dBc/Hz		
100 kHz	–114 dBc/Hz	–117 dBc/Hz		
1 MHz	–120 dBc/Hz	–122 dBc/Hz		
10 MHz	–128 dBc/Hz	–131 dBc/Hz		

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, 5.0 dB steps
Reference Level Offset	99.9 dB External Loss to 99.9 dB External Gain
Amplitude Units	Log Scale Modes: dBW, dBm, dBμW, dBV, dBmV, dBμV, dBA, dBmA, dBμA Linear Scale Modes: fV, nV, μV, mV, V, fW, pW, nW, μW, mW, W, pA, nA, μA, mA, A
Maximum Continuous Input	+30 dBm Peak typical, ± 50 VDC (≥ 1 0 dB Attenuation) +23 dBm Peak typical, ± 50 VDC (< 10 dB Attenuation) +13 dBm Peak typical, ± 50 VDC (Preamp = ON Option 713, 720; no extra limit for Option 709)

Amplitude Accuracy (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 Instrument	Maximum	Typical	Maximum	Typical
9 kHz to 100 kHz[a]	± 2.3 dB	± 0.5 dB	± 2.3 dB	± 0.5 dB
100 kHz to 7 GHz	± 1.3 dB	± 0.5 dB	± 2.3 dB	± 0.5 dB
> 7 GHz to 9 GHz	± 1.8 dB	± 0.5 dB	± 2.8 dB	± 0.5 dB
13/20 GHz Instruments				
100 kHz to 13 GHz	± 1.3 dB	± 0.5 dB	± 2.3 dB	± 0.5 dB
> 13 GHz to 18 GHz	± 2.3 dB	± 0.5 dB	± 3.3 dB	± 0.5 dB
> 18 GHz to 20 GHz	–	± 1.0 dB	–	± 1.0 dB

a. Values below 100 kHz are with the preamplifier turned off.

Displayed Average Noise Level (DANL) (RMS detection, VBW/Avg type = Log, Ref Level = –20 dBm for Preamp Off and –50 dBm for Preamp On, Auto Attenuator On, Performance Sweep Mode)

	Preamp = Off		Preamp = On	
9 GHz Instrument	Maximum	Typical	Maximum	Typical
10 MHz to 3 GHz	–146 dBm	–149 dBm	–160 dBm	–163 dBm
> 3 GHz to 8 GHz	–140 dBm	–143 dBm	–152 dBm	–155 dBm
> 8 GHz to 9 GHz	–	–138 dBm	–	–155 dBm
13 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 13 GHz	–136 dBm	–139 dBm	–156 dBm	–159 dBm
20 GHz Instrument				
> 13 GHz to 20 GHz	–136 dBm	–142 dBm	–155 dBm	–161 dBm

Spectrum Analyzer (Continued)

Spurs (0 dB input attenuation)

Residual Spurs (RF input terminated)	**Preamp = Off**	**Preamp = On**
< 13 GHz	–90 dBm, maximum	–100 dBm, maximum
13 to 20 GHz	–85 dBm, maximum	–100 dBm, maximum
	Maximum[a]	**Typical**
Input-Related Spurious (–30 dBm input)	–60 dBc	–70 dBc

a. Instrument centered on single signal, span < 1.7 GHz

Third-Order Intercept (TOI) (–20 dBm tones 100 kHz apart, 0 dB Attenuation Preamp OFF, Reference Level –20 dBm)

2.4 GHz	+14 dBm minimum (+11 dBm minimum for 9 GHz instruments with firmware V4.60 and higher)
50 MHz to 20 GHz	+20 dBm typical

P1dB

< 4 GHz	+5 dBm nominal
4 GHz to 20 GHz	+12 dBm nominal

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

50 MHz	–68 dBc maximum
< 4 GHz	–60 dBc typical
≥ 4 GHz	–75 dBc typical

VSWR (≥ 1 0 dB input attenuation)

9 GHz Instruments	
< 4 GHz	1.5:1 typical
4 GHz to 8 GHz	1.8:1 typical
13 GHz to 20 GHz Instruments	
< 20 GHz	1.5:1 typical
20 GHz	2.0:1 typical

High Accuracy Power Meter (Option 19) (requires external USB Power Sensor)

Amplitude	Maximum, Minimum, Offset, Relative On/Off, Units, Auto Scale
Average	# of Running Averages, Max Hold
Zero/Cal	Zero On/Off, Cal Factor (Center Frequency, Signal Standard)
Limits	Limit On/Off, Limit Upper/Lower

Power Sensor Model	MA24105A	MA24106A	MA24108A/18A/26A	MA24208A/18A	MA24330A/40A/50A
Description	Inline High Power Sensor	High Accuracy RF Power Sensor	Microwave USB Power Sensor	Microwave Universal USB Power Sensor	Microwave CW USB Power Sensor
Frequency Range	350 MHz to 4 GHz	50 MHz to 6 GHz	10 MHz to 8/18/26 GHz	10 MHz to 8/18 GHz	10 MHz to 33/40/50 GHz
Connector	Type N(f), 50 Ω	Type N(m), 50 Ω	Type N(m), 50 Ω (8/18 GHz) Type K(m), 50 Ω (26 GHz)	Type N(m), 50 Ω	Type K(m), 50 Ω (33/40 GHz) Type V(m), 50 Ω (50 GHz)
Dynamic Range	+3 dBm to +51.76 dBm (2 mW to 150 W)	–40 dBm to +23 dBm (0.1 µW to 200 mW)	–40 dBm to +20 dBm (0.1 µW to 100 mW)	–60 dBm to +20 dBm (1 nW to 100 mW)	–70 dBm to +20 dBm (0.1 nW to 100 mW)
Measurand	True-RMS	True-RMS	True-RMS, Slot Power, Burst Average Power	True-RMS, Slot Power, Burst Average Power	Average Power
Measurement Uncertainty	± 0.17 dB[a]	± 0.16 dB[b]	± 0.18 dB[c]	± 0.17 dB[d]	± 0.17 dB[e]
Data sheet (for complete specifications)	11410-00621	11410-00424	11410-00504	11410-00841	11410-00906

Notes:
a. Expanded uncertainty with K=2 for power measurements of a CW signal greater than +20 dBm with a matched load. Measurement results referenced to the input side of the sensor.
b. Total RSS measurement uncertainty (0 °C to 50 °C) for power measurements of a CW signal greater than –20 dBm with zero mismatch errors.
c. Expanded uncertainty with K=2 for power measurements of a CW signal greater than –20 dBm with zero mismatch errors.
d. Power uncertainty expressed with two sigma confidence level for CW measurement after zero operation. Includes calibration factor and linearity over temperature uncertainties, but not the effects of mismatch, zero set and drift, or noise.
e. Includes linearity over temperature uncertainties, but not the effects of calibration factor, mismatch, zero set and drift, and noise.

Tracking Generator (Options 809, 813, and 820)

Setup Parameters

Frequency	Center/Start/Stop, Span, Frequency Step, Frequency Offset, Signal Standard, Channel #, Channel Increment
Amplitude	Reference Level (RL), Scale, Attenuation Auto/Level, RL Offset, Units, Pre-Amp, Detection
Span	Span, Span Up/Down (1-2-5), Full Span, Zero Span, Last Span
Bandwidth	RBW, Auto RBW, VBW, Auto VBW, VBW/Average Type (Linear/Log), RBW/VBW Ratio, Span/RBW Ratio
Generator	On/Off, Output Power, Mode (CW/Tracking), Settings, Transmission Measurement
Tracking Generator Settings	External Gain/Loss, Power Statistics (On/Off)
Transmission Measurement Settings	Normalize (Off/On), Scale, Reference Position and Amplitude, Transmission Statistics and Offset
Maximum Continuous Input	+23 dBm, ± 50 VDC

Frequency

	Frequency Range
MS2720T-0809	100 kHz to 9 GHz
MS2720T-0813	100 kHz to 13 GHz
MS2720T-0820	100 kHz to 20 GHz
Frequency Accuracy	Aging: ± 0.1 x 10^{-6} per year; ± 1.0 x 10^{-6} per 10 years Accuracy: ± 0.3 x 10^{-6} (25 °C ± 25 °C) plus aging

Output Power

100 kHz to 20 GHz	–40 dBm to 0 dBm
Step Size	0.1 dB nominal
Dynamic Range	
9 GHz Instrument	> 110 dB typical 100 kHz to 7 GHz
	> 100 dB typical > 7 GHz to 9 GHz
13 GHz and 20 GHz Instruments	> 100 dB typical 100 kHz to 12 GHz
	> 80 dB typical > 12 GHz to 20 GHz

Level Accuracy (At least 30 minute warm-up after 1 hour non-operating at 15 to 35 °C ambient, excludes load VSWR effects)

Frequency Range	**20 °C to 30 °C (after 30 minute warm-up)**		**0 °C to 50 °C (after 60 minute warm-up)**	
	Maximum	Typical	Maximum	Typical
100 kHz to 9 GHz	± 1.5 dB	± 0.5 dB	± 2.0 dB	± 1.0 dB
> 9 GHz to 13 GHz	± 1.6 dB	± 1.0 dB	± 2.1 dB	± 1.5 dB
> 13 GHz to 18 GHz	± 2.0 dB	± 1.0 dB	± 2.5 dB	± 1.5 dB

VSWR

100 kHz to 5 GHz	2:1 typical
> 5 GHz to 20 GHz	4:1 typical

Interference Analyzer (Option 25)

Measurements

Spectrum	Field Strength Occupied Bandwidth Channel Power Adjacent Channel Power (ACPR) AM/FM/SSB Demodulation (Wide/Narrow FM, Upper/Lower SSB), (audio out only) Carrier-to-Interference ratio (C/I)
Spectrogram	Collect data up to 72 hours
Signal Strength	Gives visual and aural indication of signal strength
Received Signal Strength Indicator (RSSI)	Collect data up to 168 hours (one week)
Interference Mapping	Draw multiple bearings of signal strength from GPS location on on-screen map Pan and Zoom on-screen maps Support for Anritsu MA2700A Handheld Interference Hunter
Impedance	50 Ω, 75 Ω; external pad required for 75 Ω operation

Channel Scanner (Option 27)

General

Number of Channels	1 to 20 Channels (Power Levels)
Measurements	Graph/Table, Max Hold (On/5 s/Off), Frequency/Channel, Current/Maximum, Dual Color
Scanner	Scan Channels, Scan Frequencies, Scan Custom List, Scan Script Master™
Amplitude	Reference Level, Scale
Custom Scan	Number of Channels, Signal Standard & Channel, Frequency, Bandwidth
Frequency Range	9 kHz to 9, 13, 20 GHz
Frequency Accuracy	± 10 Hz + time base error
Measurement Range	–110 dBm to +30 dBm
Impedance	50 Ω, 75 Ω; external pad required for 75 Ω operation

Coverage Mapping (Option 431)

Measurements

Indoor Mapping	RSSI, ACPR
Outdoor Mapping	RSSI, ACPR

Setup Parameters

Mode	Spectrum Analyzer
Frequency	Center, Span (ACPR only), Freq Step, Signal Standard, Channel #, Channel Increment
Amplitude	Reference Level (RL), Attenuation Auto/Level, RL Offset, Pre-Amp On/Off, Detection
Span	RSSI Mode: Zero Span ACPR Mode: Span, Span Up/Down (1-2-5), Full Span, Last Span
BW	RBW, Auto RBW, VBW, Auto VBW, RBW/VBW Ratio, Span/RBW Ratio
Measurement Setup	RSSI: Mapping color thresholds ACPR: Main Ch BW, Adj Ch BW, Ch Spacing, Adjacent Ch dB Offset, Thresholds for Good and Poor main channel levels
Mapping Colors	RSSI: Dark Green (Excellent), Light Green (Very Good), Yellow (Good), Orange (Fair), Dark Red (Poor) ACPR: Dark Green (Good), Yellow (between Good and Poor), Dark Red (Poor)
Point Distance or Time Setup	Repeat Type: Time (100 ms to 16 s), Distance (1 m to 10,000 m) Distance Units: m, ft
Save Points Map	Save KML, JPEG, Tab Delimited
Recall Points Map	Recall Map, Recall KML Points only, Recall KML Points with Map, Recall Default Grid
Map Types	Outdoor (GPS embedded), Indoor (non-GPS embedded). Import maps using the Anritsu easyMap Tools. Zoomable (.azm) maps are usable, but cannot be zoomed.

Electromagnetic Field Test (Option 444)

Measurements

Setup	Limit lines, axis dwell time, measurement time, auto-logging, measurement units, trace display
Spectrum Analyzer	Field strength is measured
LTE OTA, TD-LTE OTA	P-SS, S-SS, and RS are measured and displayed based on each Cell ID received
W-CDMA OTA	P-CPICH signals are measured and displayed for each Scrambling Code measured
Units	Spectrum Analyzer: dBm/m^2, dBV/m, dBmV/m, dBuV/m, V/m, W/m^2, dBW/m^2, A/m, dBA/m, W/cm^2 LTE OTA, TD-LTE OTA, W-CDMA OTA: dBm/m^2, V/m, W/m^2
Results	Maximum, minimum, and average of all measurements conducted
Display	Measurement status, number of measurements taken, pass/fail indicators

Frequency Range

Supported Antenna	
2000-1800-R	9 kHz to 300 MHz

Modes where EMF Measurements available

Spectrum Analyzer
LTE (both FDD and TDD Modes, Option 883)
W-CDMA (Option 881)

GPS Receiver (Option 31) (requires external GPS antenna, sold separately)

Setup	On/Off, Antenna Voltage 3.3 V/5.0 V, GPS Info
GPS Time/Location Indicator	UTC Time, Latitude, Longitude, and Altitude on display (UTC Time and Altitude on GPS Info display) UTC Time, Latitude, Longitude, and Altitude with trace storage
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} for 3 days after GPS lock, 0 °C to 50 °C ambient temperature (GPS Antenna disconnected)
Connector	SMA, female

Gated Sweep (Option 90)

Mode	Spectrum Analyzer, Sweep
Trigger	External TTL, IF Level
IF Trigger Level	–80 dBm to +25 dBm typical
Setup	Gated Sweep (On/Off) Gate Polarity (Rising, Falling) Gate Delay (0 ms to 10 ms typical) Gate Length (1 µs to 65 ms typical) Gate View Settings: Zero Span Time , Zero Span RBW, Zero Span VBW

Zero Span IF Output (Option 89)

Mode	Spectrum Analyzer/Span/Zero Span
Center Frequency	140 MHz nominal (varies up to ±10 kHz nominal with center frequency and IF bandwidth)
Output Level	–25 dBm typical, for signals at below reference levels, with Auto Attenuation. Maximum –10 dBm typical.
Reference Level	–57 dBm to +30 dBm (Preamp Off) –87 dBm to –40 dBm (Preamp On)
IF Bandwidths	Up to 30 MHz (3 dB bandwidth)
Connector	BNC female

I/Q Waveform Capture (Option 24)

Mode	Spectrum Analyzer
Capture Mode	Single or Continuous
Trigger	Free Run, External (Rising/Falling), Delay
Maximum Capture Length	800 ms
Maximum Sample Rate	40 MHz
Maximum Signal Bandwidth	32 MHz

Secure Data (Option 7)

Set at Factory	Save measurement files on external USB flash drive only Internal memory is permanently disabled

AM/FM/PM Signal Analyzer (Option 509)

Measurements

Display Type	RF Spectrum (AM/FM/PM)	Audio Spectrum (AM)	Audio Spectrum (FM/PM)	Audio Waveform (AM)	Audio Waveform (FM/PM)	Summary (AM)	Summary (FM/PM)
Graphic Display	Power (dBm) vs. Frequency	Depth (%) vs. Modulation Frequency	Deviation (kHz/rad) vs. Modulation Frequency	Depth (%) vs. Time	Deviation (kHz/rad) vs. Time	None	None
Numerical Displays	Carrier Power Carrier Frequency Occupied BW	AM Rate RMS Depth (Pk-Pk)/2 Depth SINAD* THD* Distortion/Total Vrms*	FM/PM Rate RMS Deviation (Pk-Pk)/2 Deviation SINAD* THD* Distortion/Total Vrms*	AM Rate RMS Depth (Pk-Pk)/2 Depth SINAD* THD* Distortion/Total Vrms*	FM/PM Rate RMS Deviation (Pk-Pk)/2 Deviation SINAD* THD* Distortion/Total Vrms*	RMS Depth Peak + Depth Peak – Depth (Pk-Pk)/2 Depth Carrier Power Carrier Frequency Occupied Bandwidth AM Rate SINAD* THD* Distortion/Total Vrms*	RMS Deviation Peak + Deviation Peak – Deviation (Pk-Pk)/2 Deviation Carrier Power Carrier Frequency Occupied Bandwidth FM/PM Rate SINAD* THD* Distortion/Total Vrms*

* Requires sine wave modulation

Setup Parameters

Frequency	Center Freq, Span, Freq Step, Signal Standard, Channel, Channel Increment, Set (measured) Carrier Freq to Center
Amplitude Setup	Scale, Power Offset, Adjust Range
Measurements	RF Spectrum, Audio Spectrum (demodulated), Audio Waveform (demodulated), Summary, Coverage Mapping (Option 431 required), Audio Demod (AM/FM only)
Measurement Setup	All Measurements: Demod Type (AM, FM, PM), IFBW, Auto IFBW, Squelch Units, Distortion Measurements (Sinewave or Broadcast)
	RF Spectrum: OBW Method, OBW %, OBW dBC
	Audio Spectrum: Span, Scale, Squelch Power
	Audio Waveform: Sweep Time, Scale, Squelch Power
	Summary: Average count, Squelch Power
	Coverage Mapping: Measurement (SINAD, Carrier Power, Multiple), Thresholds, Point Distance/Time
	Audio Demod: Demod Type (AM, USB, LSB, Wideband FM, Narrowband FM), Volume, Squelch
Mapping Colors	Dark Green (Excellent), Light Green (Very Good), Orange (Good), Yellow (Fair), Dark Red (Poor)
Marker	Six markers with Delta for each, Peak Search, Marker Freq to Center, Marker to Ref Lvl, Marker Table

RF and Modulation Measurements

AM	Modulation Rate: ± 1 Hz (< 100 Hz), ± 2 % (> 100 Hz)
	Depth: ± 5 % for (Modulation rates 10 Hz to 100 kHz)
FM	Modulation Rate: ± 1 Hz (< 100 Hz); ± 2 % (100 Hz to 100 kHz)
	Deviation Accuracy: ± 5 % (100 Hz to 100 kHz)**
PM	Modulation Rate: ± 1 Hz (< 100 Hz); ± 2 % (100 Hz to 100 kHz)
	Deviation Accuracy: ± 5 % (deviation 0 to 93 Rad, rate 10 Hz to 5 kHz)**
IF Bandwidth	1 kHz to 300 kHz in 1-3 sequence
Frequency Span	RF Spectrum: 10 kHz to 10 MHz
	Audio Spectrum: 2 kHz, 5 kHz, 10 kHz, 20 kHz, 70 kHz, 140 kHz
RBW/VBW	30
Span/RBW	100
Sweep Time	50 µs to 50 ms (Audio Waveform)
**	IFBW must be greater than 95 % occupied BW

GSM/GPRS/EDGE Signal Analyzer (Option 880)

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail
Channel Spectrum Channel Power Occupied Bandwidth Burst Power Average Burst Power Frequency Error Modulation Type BSIC (NCC, BCC) Multi-channel Spectrum Power vs. Time (Frame/Slot) Channel Power Occupied Bandwidth Burst Power Average Burst Power Frequency Error Modulation Type BSIC (NCC, BCC)	Phase Error EVM Origin Offset C/I Modulation Type Magnitude Error BSIC (NCC, BCC)	There are no additional OTA Measurements RF and Demodulation Measurements can be made OTA	View Pass/Fail Limits GSM, EDGE Available Measurements Channel Power Occupied Bandwidth Burst Power Average Burst power Frequency Error Phase Error EVM Origin Offset C/I Magnitude Error Script Master™

Setup Parameters

GSM/EDGE Select	Auto, GSM, EDGE
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous, Trigger Sweep
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screen	Overall Measurements

RF Measurements

Frequency Error	± 10 Hz + time base error, 99 % confidence level
Occupied Bandwidth	Bandwidth within which lies 99 % of the power transmitted on a single channel
Burst Power Error	± 1.5 dB, ± 1 dB typical, (–50 dBm to +20 dBm)

Demodulation Measurements

GMSK Modulation Quality (RMS Phase)	
Measurement Accuracy	± 1 °
Residual Error (GSMK)	1 °
8 PSK Modulation Quality (EVM)	
Measurement Accuracy	± 1.5 %
Residual Error (8 PSK)	2.5 %

W-CDMA/HSPA+ Signal Analyzer (Option 881)

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail
Band Spectrum Channel Spectrum Channel Power Occupied Bandwidth Peak-to-Average Power Spectral Emission Mask Single carrier ACLR Multi-carrier ACLR RF Summary	Code Domain Power Graph P-CPICH Power Channel Power Noise Floor EVM Carrier Feed Through Peak Code Domain Error Carrier Frequency Frequency Error Control Channel Power Abs/Rel/Delta Power CPICH, P-CCPCH S-CCPCH, PICH P-SCH, S-SCH HSPA+ Power vs. Time Constellation Code Domain Power Table Code, Status EVM, Modulation Type Power, Code Utilization Power Amplifier Capacity Codogram Modulation Summary	Scrambling Code Scanner (Six) Scrambling Codes CPICH E_c/I_o E_c Pilot Dominance OTA Total Power Multipath Scanner (Six) Six Multipaths Tau Distance RSCP Relative Power Multipath Power	View Pass/Fail Limits All, RF, Demod Available Measurements Max Output Power Frequency Error EVM CPICH Occupied Bandwidth Spectral Mask ACLR PCDE P-CCPCH S-CCPCH Code Spread 3 PICH Code 128 Test Models 1 (16), (32), (64) 2 3 (16), (32) 4 (+CPICH), (-CPICH) 5 (2 HS), (4 HS), (8 HS)

Setup Parameters

Scrambling Code, Threshold	Auto, Manual
User Selectable	Scrambling Code, S-CCPCH Spread, S-CCPCH Code, PICH Code, Threshold, Max Amp Power, CPICH Power, Frequency Error Average
Maximum Spreading Factor	256, 512
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/watts)
Marker	Six Markers, Table On/Off
Sweep	Single/Continuous, Trigger Sweep
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

RF Measurements

RF Channel Power Accuracy	± 1.25 dB, ± 0.7 dB typical, (temperature range 15 °C to 35 °C)
Occupied Bandwidth Accuracy	± 100 kHz
Adjacent Channel Leakage Ratio (ACLR)	–54 dB/-59 dB ± 0.8 dB @ 5 MHz/10 MHz offset, typical, 824 MHz to 894 MHz, 1710 MHz to 2170 MHz –54 dB/-57 dB ± 1.0 dB @ 5 MHz/10 MHz offset, typical, 2300 MHz to 2700 MHz

Demodulation Measurements

W-CDMA Modulations	QPSK, QPSK-DTX (Codecs: AMR 4.75, 5.9, 7.4, 12.2 kbps, DTX 7.4, 12.2 kbps)
HSPA+ Modulations	QPSK, 16 QAM, 64 QAM
Frequency Error	± 10 Hz + time base error, 99 % confidence level
EVM Accuracy	± 2.5 %, 6 % ≤ EVM ≤ 25 %
Residual EVM	2.5 % typical
Code Domain Power	± 0.5 dB for code channel power > –25 dB, 16, 32, 64 DCPH (test model 1), 16, 32 DCPH (test model 2, 3)
CPICH (dBm) Accuracy	± 0.8 dB typical

Over-the-Air (OTA) Measurements

Scrambling Code Scanner	Six strongest Scrambling Codes
Multipath Scanner	Multipath power of six signals relative to strongest pilot

TD-SCDMA/HSPA+ Signal Analyzer (Option 882)

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail
Channel Spectrum Channel Power Occupied Bandwidth Left Channel Power Left Channel Occ B/W Right Channel Power Right Channel Occ B/W Power vs. Time Six Slot Powers Channel Power (RRC) DL-UL Delta Power UpPTS Power DwPTS Power On/Off Ratio Slot Peak-to-Average Power Spectral Emission RF Summary	Code Domain Power/Error (QPSK/8 PSK/16 QAM/64 QAM) Slot Power DwPTS Power Noise Floor Frequency Error Tau Scrambling Code EVM Peak EVM Peak Code Domain Error CDP Marker Modulation Summary	Code Scan (32) Scrambling Code Group Tau E_c/I_o DwPTS Power Pilot Dominance Tau Scan (Six) Sync-DL# Tau E_c/I_o DwPTS Power Pilot Dominance Record Run/Hold	View Pass/Fail Limits All, RF, Demod Available Measurements Occupied Bandwidth Channel Power Channel Power RCC On/Off Ratio Peak-to-Average Ratio Frequency Error EVM Peak EVM Peak Code Domain Error Tau Noise Floor

Setup Parameters

Slot Selection	Auto, 0-6
Trigger	Trigger Type (No Trigger/GPS/External), External Trigger (Rising/Falling), Tau Offset
SYNC-DL Code	Auto, 0-31
Scrambling/Midamble Code	Auto, 0-127
Maximum Users	Auto, 2, 4, 6, 8, 10, 12, 14, 16
Measurement Speed	Fast, Normal, Slow
User Selectable	Uplink Switch Point, Number of Carriers (1, 3), Tau Offset
Demodulation Type	Auto, QPSK, 8 PSK, 16 QAM, 64 QAM
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/watts)
Sweep	Hold/Run, Trigger Sweep
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

RF Measurements

RF Channel Power Accuracy (RRC)	± 1.5 dB, ± 1.0 dB typical, (slot power –40 dBm to +10 dBm)
Frequency Error	± 10 Hz + time base error, in the presence of a downlink slot

Demodulation Measurements

Supported Modulation	QPSK, 8 PSK, 16 QAM, 64 QAM
Residual EVM (rms)	3 % typical, P-CCPH Slot Power > –50 dBm
PN Offset	Within 1 x 64 chips
Pilot Power Accuracy	± 1.0 dB typical
Timing Error (Tau) for Dominant SYNC-DL	± 0.2 µs (external trigger)
Spreading Factor	1, 16

Over-the-Air (OTA) Measurements

Code Scanner	32 Sync Codes and associated Scrambling Code Groups
Tau Scanner	Six strongest Sync Codes
Auto Save	Yes
GPS Tagging and Logging	Yes

LTE/LTE-A FDD/TDD Signal Analyzers (Option 883 and 886)

LTE/LTE-A FDD Measurements

RF	Modulation	Over-the-Air (OTA)	Pass/Fail
Channel Spectrum Channel Power Occupied Bandwidth ACLR Spectral Emission Mask Category A or B (Opt 1) RF Summary	Power vs. Resource Block (RB) RB Power (PDSCH) Active RBs, Utilization % Channel Power, Cell ID OSTP, Frame EVM by modulation Constellation QPSK, 16 QAM, 64 QAM 256 QAM Demod (Option 886) Modulation Results Ref Signal Power (RS) Sync Signal Power (SS) EVM – rms, peak, max hold Frequency Error – Hz, ppm Carrier Frequency Cell ID Control Channel Power Bar Graph or Table View RS, P-SS, S-SS PBCH, PCFICH, PHICH, PDCCH Total Power (Table View) EVM per Control Channel Tx Time Alignment Modulation Summary Includes EVM by modulation Antenna Icons Detects active antennas (1 or 2)	Scanner Cell ID (Group, Sector) S-SS, RSRP, RSRQ, SINR Dominance Modulation Results – On/Off Auto Save – On/Off Tx Test Scanner RS Power of MIMO antennas (2x2, 4x4) Cell ID, Average Power Delta Power (Max-Min) Graph of Antenna Power Modulation Results – On/Off Mapping On-screen S-SS, RSRP, RSRQ, or SINR Scanner Modulation Results – Off eMBMS Test Cell ID, RSRP Carrier Aggregation Up to 5 component carriers (CC1 to CC5) CP, MIMO status, RS & SS Power, EVM, Frequency Error, Time Alignment Error, Cell ID	View Pass/Fail Limits All, RF, Modulation Available Measurements Channel Power Occupied Bandwidth ACLR Frequency Error Carrier Frequency Dominance EVM peak, rms Frame EVM, rms Frame EVM by mod type RS, SS Power RS EVM P-SS, S-SS, Power, EVM PBCH, PCFICH, PHICH, PDCCH Power, EVM Cell, Group, Sector ID OSTP Tx Time Alignment

Setup Parameters

Frequency	E-UTRA Bands 1 - 14, 17 - 21, 23 - 32, 66A (tunable 10 MHz to 4.0 GHz) Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Bandwidth (MHz)	1.4, 3, 5, 10, 15, 20
Span (MHz)	Auto, 1.4, 3, 5, 10, 15, 20, 30
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous
EVM Mode	Auto, PBCH only, Max Hold
Cyclic Prefix (CP)	Auto, Normal, Extended
Sync Type	Normal (SS), RS/Cell ID
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

LTE/LTE-A FDD RF Measurements

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +10 dBm)

LTE/LTE-A FDD Modulation Measurements

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/LTE-A FDD Over-the-Air (OTA) Measurements

Scanner	Six strongest signals if present Auto Save – Sync Signal power and Modulation Results with GPS information
Tx Test	Scanner – Three strongest signals if present RS Power – Strongest signal
Mapping	Map On-screen S-SS, RSRP, RSRQ, or SINR of Cell ID with strongest signal Scanner – three strongest signals if present Save and Export Mapping data: KML, MTD (tab delimited)
Carrier Aggregation	Up to 5 component carriers specified (CC1 to CC5) Automatic detection of CP and MIMO status for each active CC RS Power & RS Delta Power, SS Power, EVM (peak and rms), Freq Error (Hz & ppm), TAE, Cell ID
Evolved Multimedia Broadcast Multicast Services (eMBMS) Test	Reports the Cell ID and measures the Received Signal Received Power (RSRP)

LTE/LTE-A FDD/TDD Signal Analyzers (Option 883 and 886) (Continued)

LTE/LTE-A TDD Measurements

RF	Modulation	Over-the-Air (OTA)	Pass/Fail
Channel Spectrum Channel Power Occupied Bandwidth Power vs. Time Frame View Sub-Frame View Total Frame Power DwPTS Power Transmit Off Power Cell ID Timing Error ACLR Spectral Emission Mask Category A or B (Opt 1) RF Summary	Power vs. Resource Block (RB) RB Power (PDSCH) Active RBs, Utilization % Channel Power, Cell ID OSTP, Frame EVM by modulation Constellation QPSK, 16QAM, 64QAM 256 QAM Demod (Option 886) Modulation Results Ref Signal Power (RS) Sync Signal Power (SS) EVM – rms, peak, max hold Frequency Error – Hz, ppm Carrier Frequency Cell ID Control Channel Power Bar Graph or Table View RS, P-SS, S-SS PBCH, PCFICH, PHICH, PDCCH Total Power (Table View) EVM per Control Channel Tx Time Alignment Modulation Summary Includes EVM by modulation Antenna Icons Detects active antennas (1/2)	Scanner Cell ID (Group, Sector) S-SS, RSRP, RSRQ, SINR Dominance Modulation Results – On/Off Auto Save - On/Off Tx Test Scanner RS Power of MIMO antennas (2x2, 4x4) Cell ID, Average Power Delta Power (Max-Min) Graph of Antenna Power Modulation Results – On/Off Mapping On-screen S-SS, RSRP, RSRQ, or SINR Scanner Modulation Results – Off Carrier Aggregation Up to 5 component carriers (CC1 to CC5) CP, MIMO status, RS & SS Power, EVM, Frequency Error, Time Alignment Error, Cell ID	View Pass/Fail Limits All, RF, Modulation Available Measurements Channel Power Occupied Bandwidth ACLR Frequency Error Carrier Frequency Dominance EVM peak, rms Frame EVM, rms Frame EVM by mod type RS, SS Power RS EVM P-SS, S-SS, Power, EVM PBCH, PCFICH, PHICH, PDCCH Power, EVM Cell, Group, Sector ID OSTP Tx Time Alignment Frame Power DwPTS Power Transmit Off Power Timing Error

Setup Parameters

Frequency	E-UTRA bands 33 - 44 (tunable 10 MHz to 4.0 GHz) Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Bandwidth (MHz)	1.4, 3, 5, 10, 15, 20
Span (MHz)	Auto, 1.4, 3, 5, 10, 15, 20, 30
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous, Trigger Sweep
EVM Mode	Auto, PBCH only, Max Hold
Cyclic Prefix (CP)	Auto, Normal, Extended
Trigger	No Trigger/Ext Trigger, Rising/Falling
Uplink/Downlink Configuration	0 to 6
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

LTE/LTE-A TDD RF Measurements

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –30 dBm to +10 dBm)

LTE/LTE-A TDD Modulation Measurements

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 –30 dBm to +10 dBm)

LTE/LTE-A TDD Over-the-Air (OTA) Measurements

Scanner	Six strongest signals if present Auto Save – Sync Signal power and Modulation Results with GPS information
Tx Test	Scanner – Three strongest signals if present RS Power – Strongest signal
Mapping	Map On-screen S-SS, RSRP, RSRQ, or SINR of Cell ID with strongest signal Scanner – three strongest signals if present Save and Export Mapping data: KML, MTD (tab delimited)
Carrier Aggregation	Up to 5 component carriers specified (CC1 to CC5) Automatic detection of CP and MIMO status for each active CC RS Power & RS Delta Power, SS Power, EVM (peak and rms), Freq Error (Hz & ppm), TAE, Cell ID

NB-IoT Analyzer (Option 887) (requires Option 9)

Measurements

NB-IoT Mode	Guard Band, Standalone

RF Measurements

Summary Screen	Carrier Frequency
	Channel Power
	Occupied Bandwidth
	NPSS Power
	NSSS Power
	NPBCH Power
	NPDCCH or NPDSCH Power
	Cell ID
	RSRP
	RSRQ
	SINR
	Spectral Emission Mask Pass/Fail
Channel Spectrum	Spans supported: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz, 30 MHz
Spectral Emission Mask	Mask Type: NB-IoT Fixed
	Summary Table Off/On (Mask Segment; Start, Stop, Peak Frequencies; Power; Power Margin; RBW; Status)
Save/Recall	Measurement (.iot), Setup (.stp), Screen Shots (.jpg) to Internal or External Memory

CDMA/EV-DO Signal Analyzer (Option 884)

CDMA Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail
Channel Spectrum Channel Power Occupied Bandwidth Peak-to-Average Power Spectral Emission Mask Single Carrier ACPR Multi-carrier ACPR RF Summary	Code Domain Power Graph Pilot Power Channel Power Noise Floor Rho Carrier Feed Through Tau RMS Phase Error Frequency Error Abs/Rel/ Power Pilot Page Sync Q Page Code Domain Power Table Code Status Power Multiple Codes Code Utilization Modulation Summary	Pilot Scanner (Nine) PN E_c/I_o Tau Pilot Power Channel Power Pilot Dominance Multipath Scanner (Six) E_c/I_o Tau Channel Power Multipath Power Limit Test – 10 Tests Averaged Rho Adjusted Rho Multipath Pilot Dominance Pilot Power Pass/Fail Status	View Pass/Fail Limits All, RF, Modulation Available Measurements Channel Power Occupied Bandwidth Peak-to-Average Power Spectral Mask Test Frequency Error Channel Frequency Pilot Power Noise Floor Rho Carrier Feed Through Tau RMS Phase Error Code Utilization Measured PN Pilot Dominance Multipath Power

CDMA Setup Parameters

PN Setup	PN Trigger (No Trigger, GPS, External), PN Search Type (Auto, Manual), PN Offset
Walsh Codes	64, 128
Measurement Speed	Fast, Normal, Slow
External Trigger Polarity	Rising, Falling
Number of Carriers	1 to 5
Carrier Bandwidth (MHz)	1.23, 1.24, 1.25
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/watts)
Sweep	Single/Continuous, Trigger Sweep
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

CDMA RF Measurements

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +20 dBm)

CDMA Demodulation Measurements

Frequency Error	± 10 Hz + time base error, 99 % confidence level (in slow mode)
Rho Accuracy	± 0.005, for Rho > 0.9
Residual Rho	> 0.995, typical, > 0.99 maximum, (RF input –50 dBm to +20 dBm)
PN Offset	1 x 64 chips
Pilot Power Accuracy	± 1.0 dB typical, relative to channel power
Tau	± 0.5 µs typical, ± 1.0 µs maximum

CDMA Over-the-Air (OTA) Measurements

Pilot Scanner	Nine strongest pilots
Multipath Scanner	Multipath power of six signals relative to strongest pilot
Limit Test	Average of ten tests compared to limit

CDMA/EV-DO Signal Analyzer (Option 884) (Continued)

EV-DO Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail
Channel Spectrum Channel Power Occupied Bandwidth Peak-to-Average Power Power vs. Time Pilot & MAC Power Channel Power Frequency Error Idle Activity On/Off Ratio Spectral Emission Mask Single Carrier ACPR Multi-carrier ACPR RF Summary	MAC Code Domain Power Graph Pilot & MAC Power Channel Power Frequency Error Rho Pilot Rho Overall Data Modulation Noise Floor MAC Code Domain Power Table Code Status Power Code Utilization Data Code Domain Power Active Data Power Data Modulation Rho Pilot Rho Overall Maximum Data CDP Minimum Data CDP Modulation Summary	Pilot Scanner (Nine) PN E_c/I_o Tau Pilot Power Channel Power Pilot Dominance Mulitpath Scanner (Six) E_c/I_o Tau Channel Power Multipath Power	View Pass/Fail Limits All, RF, Modulation Available Measurements Channel Power Occupied Bandwidth Peak-to-Average Power Carrier Frequency Frequency Error Spectral Mask Noise Floor Pilot Power RMS Phase Error Tau Code Utilization Measured PN Pilot Dominance Mulitpath Power

Setup Parameters

PN Setup	PN Trigger (No Trigger, GPS, External), PN Search Type (Auto, Manual), PN Offset
Walsh Codes	64, 128
Measurement	Speed Fast, Normal, Slow
External Trigger Polarity	Rising, Falling
Slot Type	Auto, Active, Idle
Number of Carriers	1 to 5
Carrier Bandwidth (MHz)	1.23, 1.24, 1.25
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/watts)
Sweep	Single/Continuous, Trigger Sweep
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

EV-DO RF Measurements

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +20 dBm)

EV-DO Demodulation Measurements

EV-DO Compatibility	Rev 0 and Rev A
Frequency Error	± 10 Hz + time base error, 99 % confidence level
Rho Accuracy	± 0.01, for Rho > 0.9
Residual Rho	> 0.995 typical, > 0.99, maximum (RF input –50 dBm to +20 dBm)
PN Offset	Within 1 x 64 chips
Pilot Power Accuracy	± 1.0 dB typical, relative to channel power
Tau	± 0.5 µs typical, ± 1.0 µs maximum

EV-DO Over-the-Air (OTA) Measurements

Pilot Scanner	Nine strongest pilots
Multipath Scanner	Multipath power of six signals relative to strongest pilot

WiMAX Fixed/Mobile Signal Analyzer (Option 885)

WiMAX Fixed Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail
Channel Spectrum Channel Power Occupied Bandwidth Power vs. Time Channel Power Preamble Power Data Burst Power Crest Factor ACPR RF Summary	Constellation RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error Carrier Frequency Base Station ID Spectral Flatness Adjacent Subcarrier Flatness EVM vs. Subcarrier/Symbol RCE EVM Frequency Error Carrier Frequency Base Station ID Sector ID (Mobile) Modulation Summary	There are no additional OTA Measurements RF and Demodulation Measurements can be made OTA	View Pass/Fail Limits All, RF, Modulation Available Measurements Channel Power Occupied Bandwidth Burst Power Preamble Power Crest Factor Frequency Error Carrier Frequency EVM RCE Base Station ID

Setup Parameters

Bandwidth (MHz)	1.25, 1.50, 2.50, 3.50, 5.00, 5.50, 6.00, 7.00, 10.00
Cyclic Prefix Ratio (CP)	1/4, 1/8, 1/16, 1/32
Span (MHz)	5, 10, 15, 20
Frame Length (ms)	2.5, 5.0, 10.0
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous, Trigger Sweep
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

WiMAX Fixed RF Measurements (temperature range 15 °C to 35 °C)

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +20 dBm)

WiMAX Fixed Demodulation Measurements (temperature range 15 °C to 35 °C)

Frequency Error	7×10^{-8} plus time base error, 99 % confidence level
Residual EVM (rms)	3 % typical, 3.5 % maximum (RF Input –50 dBm to +20 dBm)

WiMAX Fixed/Mobile Signal Analyzer (Option 885) (Continued)

WiMAX Mobile Measurements[1]

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail
Channel Spectrum Channel Power Occupied Bandwidth Power vs. Time Channel Power Preamble Power Downlink Burst Power Uplink Burst Power ACPR Spectral Emission Mask RF Summary	Constellation RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error CINR Base Station ID Sector ID Spectral Flatness Adjacent Subcarrier Flatness EVM vs. Subcarrier/Symbol RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error CINR Base Station ID Sector ID DL-MAP (Tree View) Modulation Summary	Channel Power Monitor Preamble Scanner (Six) Preamble Relative Power Cell ID Sector ID PCINR Dominant Preamble Base Station ID Auto Save - On/Off	View Pass/Fail Limits All, RF, Modulation Available Measurements Channel Power Occupied Bandwidth Downlink Burst Power Uplink Burst Power Preamble Power Crest Factor Frequency Error Carrier Frequency EVM RCE Sector ID

Setup Parameters

Zone Type	PUSC
DL-MAP Auto Decoding	Convolutional Coding (CC), Convolutional Turbo Coding (CTC)
Bandwidths (MHz)	3.50, 5.00, 7.00, 8.75, 10.00
Cyclic Prefix Ratio (CP)	1/8
Span (MHz)	5, 10, 20, 30
Frame Lengths (ms)	5, 10
Demodulation	Auto, Manual, FCH
Frequency	Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous, Trigger Sweep
Save/Recall	Setup, Measurement, Screen Shots (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

WiMAX Mobile RF Measurements (temperature range 15 °C to 35 °C)

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +20 dBm)

WiMAX Mobile Demodulation Measurements (temperature range 15 °C to 35 °C)

Frequency Error	2×10^{-8} plus time base error, 99 % confidence level
Residual EVM (rms)	2.5 % typical, 3.0 % maximum (RF Input –50 dBm to +20 dBm)

WiMAX Mobile Over-the-Air (OTA) Measurements

Channel Power Monitor	Over time (one week), measurement time interval 1 s to 60 s
Preamble Scanner	Six Strongest Preambles
Auto Save	Yes
GPS Tagging and Logging	Yes

1. Mobile WiMAX conforms to IEEE Std. 802.16e-2005, WiMAX Forum® Air Interface - Mobile System Profile - Release 1.0 Certified, System Profiles according to WMF-T24-001-R010v07.

General Specifications

Setup Parameters

System	Status (Temperature, Battery Info, S/N, Firmware Version, Installed Options), Self Test, Application Self Test, GPS (see Option 31), Name, Date and Time, Ethernet Configuration, Volume
System Options	Display (Brightness, Auto Dim, Blank, Default, Black & White, Night Vision, High Contrast, Invert Black & White) Language (English, French, German, Spanish, Chinese, Japanese, Korean, Italian, Russian, Portuguese) Reset (Factory Defaults, Master Reset, Update Firmware) Share Center Frequency and Power (All Modes or Not Shared) Power-On (via Power Switch or when DC is Applied)
File	Save As, Save Measurement, Save, Save On Event, Recall Measurement, Recall, Copy, Delete
Save/Recall	Setups, Measurements, Screen Shots JPEG (save only), Limit Lines, Spurious Emissions Mask, Mapping results (for options with mapping), including KML with or without altitude, tab-delimited
Delete	By File Type, All, Selected
Internal Trace/Setup Memory	> 40,000 single-trace measurements; > 500 Spectrograms, each with 156 traces (with Option 25)
External Trace/Setup Memory	Limited by size of USB Flash Drive

Connectors

RF In	9 GHz to 20 GHz Instruments: Type N, female, 50 Ω
RF Out	9 GHz to 20 GHz Instruments: Type N, female, 50 Ω
GPS	SMA Female
External Power	5.5 mm barrel connector, 12 to 14.5 VDC, < 5.0 A
Ethernet	RJ45, 10/100 Mbps, connect to PC or LAN for remote access
USB Interface	Two Type A, Connect FAT32 formatted Flash Drive and Power Sensor; 5-pin mini-B, Connect to PC for data transfer
Headset Jack	3.5 mm 3-wire headset jack
External Reference In	BNC, female, 50 Ω, Maximum Input +10 dBm
External Reference Out	BNC, female, 50 Ω, 10 MHz
External Trigger	BNC, female, 50 Ω, TTL-compatible levels, Maximum Input +5 VDC
IF Out	BNC, female, 50 Ω, 140 MHz (nominal)

Display and Keyboard

Display	8.4 inch Touchscreen, 800 x 600 Resolution
Pixel Defects	No more than five defective pixels (99.9989% good pixels)
Keyboard	Backlit (Red for Night Vision, White for all other display modes)

Battery

Type	Li-Ion
Battery Operation	3 hour operation, typical
Battery Charging Limits	0 °C to +45 °C, Relative Humidity ≤ 80 %

Regulatory Compliance

European Union	EMC 2014/30/EU, EN 61326-1:2013;CISPR 11/EN 55011, IEC/EN 61000-4-2/3/4/5/6/8/1;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-REM-A21+-0004
Canada	ICES-1(A)/NMB-1(A)

Environmental

MIL-PRF-28800F Class 2

Operating Temperature Range	–10 °C to 55 °C
Storage Temperature Range	–40 °C to 71 °C
Maximum Relative Humidity	95 % RH at 40 °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 One-year warranty on battery

Size and Weight

Size	315 mm x 211 mm x 77 mm, (12.4 in x 8.3 in x 3.0 in)
Weight	3.7 kg to 4.4 kg (8.1 lb to 9.8 lb) depending on Frequency Option and Tracking Generator

easyTest Tools™ (for your PC)

Instrument Modes

Spectrum Analyzer
Interference Analyzer
Channel Scanner
AM/FM/PM Analyzer

Commands

Display Image	Allows putting a custom image on the instrument screen
Recall Setup	Places the instrument into a known state; auto-advance to next command available
Prompt	Displays instructional messages on the instrument screen; timed advance to next command available; instrument users can be allowed or disallowed from making setup adjustments
Save	Allows automatic or manual saving of traces; auto-advance to next command available

easyMap Tools™ (create instrument-compatible maps on your PC)

Outdoor Maps

On-Line Sources	Google Maps, Cloud Made Open-Source Maps
Pan & Zoom Mode	AZM map file format allows pan and zoom on-instrument
Legacy Mode	MAP format is compatible with older firmware
Geo-Referenced	Works with instrument based GPS
Map Conversion	Convert scanned maps to geo-referenced

Indoor Maps

Sources	Scanned images in JPG, JPEG, JPE, JFIF, GIF, TIF, TIFF, PNG

General

Color Filter	Grayscale, High Contrast
Coverage	Worldwide
Zoom Levels	16 total zoom levels, 7 available in any one map
Map Size	Less than 1 MB to over 1 GB

Master Software Tools (for your PC)

Measurement Viewing

Display	Modify display settings, including scale
Spectrum Traces	Add, delete, and modify limit lines and markers. Overlay traces.
Spectrum Analyzer Measurements	Field Strength, Occupied Bandwidth, Channel Power, ACPR, Emission Mask, C/I[1]
Interference Analyzer Measurements	Spectrograms, Signal Strength Meter, RSSI[2]
Non-Spectrum Measurements	Hi Accuracy Power Meter, Channel Scanner, GSM, WCDMA/HSPA, LTE, TD-LTE, TD-SCDMA, CDMA, EV-DO, Fixed WiMAX, Mobile WiMAX, Screen captures (JPEGs)

1. Spurious Emissions results viewable in a browser
2. Coverage Mapping and Interference Mapping files viewable in spreadsheet, Google Earth, or Google Maps

Database Management

Full Trace Retrieval	Retrieve all traces from instrument into one PC directory (limited to approximately 15,000 files)
Trace Catalog	Index all traces in selected folder & subfolder on PC into one catalog
Trace Rename Utility	Rename measurement traces
Group Edit	Titles, subtitles, plot scaling, markers and limit lines, simultaneously on similar files

Data Analysis

Trace Math and Smoothing	Compare multiple traces
Measurement Calculator	Translate into other units

Report Generation

Report Generator	Includes GPS, power level, and measurements
Edit Graph	Change scale, limit lines, and markers
Report Format	Create reports in HTML
Export Measurements	Export measurements or entire folders to *.jpg or *.csv format
Notes	Annotate measurements

Mapping (GPS required on instrument)

Spectrum Analyzer Mode	MapInfo
LTE Mode	Google Earth, Google Maps

Master Software Tools (Continued)

Spectrogram (Spectrum Monitoring for Interference Analysis and Spectrum Clearing)

Source	Recorded Spectrogram or multiple spectrum traces
Folder Spectrogram	2D View creates a composite file of multiple traces
Available Displays	Spectrogram, Peak Power vs. Time, Variation in Total Power vs. Time, Peak Frequency vs. Time, Number of Traces Saved vs. Time (useful with Save on Limit Exceeded), Maximum/Average/Minimum Power vs. Time
	File Filter (Violations over limit lines or deviations from averages)
	Playback
Display Functions per Trace	Markers, GPS location altitude and time (when recorded), instrument time
	Filename per trace for Folder Spectrogram
Export to Video	Create AVI file of 2D Spectrogram for management review/reports
Export to 3D Spectrogram	Views (Set Threshold, Markers)
	- 3D (Rotate X, Y, Z Axis, Level Scale, Signal ID)
	- 2D (Frequency or Time Domain, Signal ID)
	- Top Down
	Playback (Frequency and/or Time Domain)

List/Parameter Editors

Antennas, Cables, Signal Standards	Modify instrument's Antenna, Cable, and Signal Standard List
Pass/Fail	Create, download, or edit Signal Analysis Pass/Fail Limits
Script Master	Create Script Master files for GSM/WCDMA or Channel Scanner
Languages	Modify non-English language menus
Mobile WiMAX	DL-MAP Parameters

Connectivity

Connections	Connect to PC using USB, LAN, or Direct Ethernet connection
Network Search	Find all Anritsu handheld instruments on local network
Download	Download measurements and live traces to PC for storage and analysis
Upload	Upload measurements and other files from PC to instrument
Remote Access Tool	Remote control and monitoring of instrument (via Ethernet port) over the Internet
Export	Measurements can be saved in various formats, depending on the measurement type, including JPEG, CSV, and Anritsu DAT format
Printing	Print individual or all measurement screens

Web Remote Control

Control	Full instrument control through a browser – all instrument functions except power switch and rotary knob
Connections	RJ45 Ethernet jack
	Third party Wi-Fi router
Protocol	HTTP/TCP/IP
Physical Layer	Cat 5 Cable, Wi-Fi router compatible
Software Required	HTML 5 Compliant Browser – Newer versions of Chrome, Firefox, Internet Explorer and others
Operating System	iOS, Windows, Linux, Android operating systems that can host the HTML 5 Compliant browser
Remote Hardware	PCs, Tablets, and Smart Phones with Ethernet or Wi-Fi connections and a HTML 5 Compliant browser
Download	Individual instrument files downloaded via browser
	Multiple instrument files and directories zipped and downloaded via browser
	Screen capture capability
Display Modes	Normal: All modes & displays supported
	Fast: Spectrum traces update faster (up to 5 updates per second)
Password	The instrument can be password protected
	Passwords may be used to manage who is controlling the instrument
Users/Instruments	One user/device can view and control many instruments

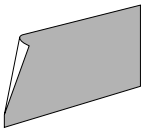
Programmable Remote Control

Functionality	Many instrument functions are programmable. See the Programming Manual for details.
Programming Language	Standard Commands for Programmable Instruments (SCPI)
Interfaces	USB, LAN
Available Drivers	LabView. Visit NI.com for driver.

Ordering Information – Instrument Options

Part Number	Description
MS2720T	Spectrum Master (requires Option 709, 713, 720)
MS2720T-0709	Frequency Range 9 kHz to 9 GHz
MS2720T-0713	Frequency Range 9 kHz to 13 GHz
MS2720T-0720	Frequency Range 9 kHz to 20 GHz
MS2720T-0809	9 GHz Tracking Generator (requires Option 709)
MS2720T-0813	13 GHz Tracking Generator (requires Option 713)
MS2720T-0820	20 GHz Tracking Generator (requires Option 720)
MS2720T-0025	Interference Analyzer (Option 31 is recommended)
MS2720T-0027	Channel Scanner
MS2720T-0431	Coverage Mapping (requires Option 31 for full functionality)
MS2720T-0444	EMF Measurements (requires Anritsu Isotropic Antenna)
MS2720T-0509	AM/FM/PM Measurements (Option 431 required for full functionality)
MS2720T-0024	I/Q Waveform Capture (requires Option 9)
MS2720T-0089	Zero-Span IF Output
MS2720T-0090	Gated Sweep
MS2720T-0019	High Accuracy Power Meter (requires USB Power Sensor, sold separately)
MS2720T-0009	Demodulation Hardware
MS2720T-0880	GSM/GPRS/EDGE Measurements (requires Option 9)
MS2720T-0881	W-CDMA/HSPA+ Measurements (requires Option 9, Option 31 recommended)
MS2720T-0882	TD-SCDMA/HSPA+ Measurements (requires Option 9, Option 31 required for full functionality)
MS2720T-0883	LTE/LTE-A FDD/TDD Measurements (requires Option 9, Option 31 required for full functionality)
MS2720T-0886	LTE 256 QAM Demodulation (requires Option 883)
MS2720T-0887	NB-IoT Measurements (requires Option 9)
MS2720T-0884	CDMA/EV-DO Measurements (requires Option 9, Option 31 required for full functionality)
MS2720T-0885	WiMAX Fixed/Mobile Measurements (requires Option 9, Option 31 required for full functionality)
MS2720T-0007	Secure Data Operation
MS2720T-0031	GPS Receiver (requires GPS Antenna, sold separately)
MS2720T-0098	Standard Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate.
MS2720T-0099	Premium Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate, test report, and uncertainty data.

Standard Accessories (included with instrument)

Accessory	Description
	2000-1685-R Soft Carrying Case
	2000-1691-R Stylus with Coiled Tether
	633-75 Rechargeable Li-Ion Battery, 7500 mAh
	40-187-R AC-DC Adapter with AC power cord (country dependent)
	2000-1797-R Touchscreen Protective Film, 8.4 in (one-factory-installed, one spare)

Accessory	Description
	2000-1371-R Ethernet Cable, 7 ft/213 cm
	3-2000-1498 USB A/5-pin mini-B Cable, 10 ft
	806-141-R Automotive Power Adapter, 12 VDC, 60 W
	Certificate of Calibration and Conformance

USB Power Sensors (for complete ordering information, see the respective data sheets of each sensor)

Accessory	Description
	MA24330A Microwave CW USB Power Sensor, 10 MHz to 33 GHz, +20 dBm
	MA24340A Microwave CW USB Power Sensor, 10 MHz to 40 GHz, +20 dBm
	MA24350A Microwave CW USB Power Sensor, 10 MHz to 50 GHz, +20 dBm
	MA24208A Microwave Universal USB Power Sensor, 10 MHz to 8 GHz, +20 dBm to –60 dBm
	MA24218A Microwave Universal USB Power Sensor, 10 MHz to 18 GHz, +20 dBm to –60 dBm
	MA24106A High Accuracy RF Power Sensor, 50 MHz to 6 GHz, +23 dBm to –40 dBm

Accessory	Description
	MA24108A Microwave USB Power Sensor, 10 MHz to 8 GHz, +20 dBm to –40 dBm
	MA24118A Microwave USB Power Sensor, 10 MHz to 18 GHz, +20 dBm to –40 dBm
	MA24126A Microwave USB Power Sensor, 10 MHz to 26 GHz, +20 dBm to –40 dBm
	MA24103A/MA24105A Inline Peak Power Sensor 25 MHz to 1 GHz, +3 dBm to +51.76 dBm 350 MHz to 4 GHz, +3 dBm to +51.76 dBm
	MA25100A RF Power Indicator

Optional Accessories

Backpack and Transit Case

Accessory	Description
	67135 Anritsu Backpack (for Handheld Instrument and PC)
	760-243-R Large Transit Case with Wheels and Handle 56 cm x 45.5 cm x 26.5 cm (22.07" x 17.92" x 10.42")
	760-286-R Compact Transit Case with Wheels and Handle 55.6 cm x 35.5 cm x 22.9 cm (21.89" x 13.98" x 9.01")
	760-261-R Large Transit Case with Wheels and Handle 63.1 cm x 50 cm x 30 cm (24.83" x 19.69" x 11.88"), space for MA2700A, antennas, filters, instrument inside soft case, and other interference hunting accessories/tools
	760-262-R Transit Case for MA2700A, holds several Yagi antennas and filters/port extender 96.8 x 40.6 x 15.5 cm (38.12" x 16.00" x 6.12")
	760-271-R Transit Case for Portable Directional Antennas and Port Extender 52.4 cm x 42.8 cm x 20.6 cm (20.62" x 16.87" x 8.12") (for 2000-1777-R, 2000-1778-R, 2000-1779-R, 2000-1798-R)

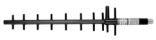
Miscellaneous Accessories

Accessory	Description
	2000-1374-R External Dual Charger for Li-Ion Batteries
	MA2700A Handheld Interference Hunter (For full specifications, refer to the MA2700A Technical Data Sheet 11410-00692)
	MA25401A Atomic Clock External 10 MHz Frequency Reference (see MA25401A Technical Data Sheet, PN: 11410-01134 for details)
	2000-2149-R EMI Near-Field Probe Kit, 100 kHz to 3 GHz Requires 1092-172-R Type N to BNC Adapter and 1 m BNC to BNC Cable (sold separately) (For full specifications, refer to the Near-Field Probe Set User Guide 10580-00347)

GNSS (GPS) Antennas (active)

Accessory	Description
	2000-2185-R Magnet Mount, SMA(m) with 3 m (9.8 ft) cable, requires 2.7 VDC or 5 VDC
	2000-1652-R Magnet Mount, SMA(m) with 0.3 m (1 ft) cable, requires 3.3 VDC or 5 VDC
	2000-1760-R Miniature Antenna, SMA(m), requires 2.5 VDC to 3.7 VDC

Directional Antennas

Accessory	Description
	2000-1411-R 824 MHz to 896 MHz, N(f), 12.3 dBi, Yagi
	2000-1412-R 885 MHz to 975 MHz, N(f), 12.6 dBi, Yagi
	2000-1413-R 1710 MHz to 1880 MHz, N(f), 12.3 dBi. Yagi
	2000-1414-R 1850 MHz to 1990 MHz, N(f), 11.4 dBi, Yagi
	2000-1415-R 2400 MHz to 2500 MHz, N(f), 14.1 dBi, Yagi
	2000-1416-R 1920 MHz to 2170 MHz, N(f), 14.3 dBi, Yagi
	2000-1659-R 698 MHz to 787 MHz, N(f), 10.1 dBi, Yagi
	2000-1660-R 1425 MHz to 1535 MHz, N(f), 14.3 dBi, Yagi
	2000-2107-R Log Periodic, 20 MHz to 8.5 GHz

Accessory	Description
	2000-1726-R 2500 MHz to 2700 MHz, N(f), 14.1 dBi, Yagi
	2000-1798-R Port Extender, DC to 6 GHz
	2000-1748-R Log Periodic, 1 to 18, N(f), 6 dBi, typical
	2000-1777-R 9 kHz to 20 MHz, N(f) (requires port extender 2000-1798-R when used with MA2700A)
	2000-1778-R 20 MHz to 200 MHz, N(f) (requires port extender 2000-1798-R when used with MA2700A)
	2000-1779-R 200 MHz to 500 MHz, N(f) (requires port extender 2000-1798-R when used with MA2700A)
	2000-1812-R Portable Yagi Antenna, 450 MHz to 512 MHz, N(f), 7.1 dBi
	2000-1825-R Portable Yagi Antenna, 380 MHz to 430 MHz, N(f), 7.1 dBi

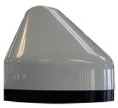
Multiband Dipole Antenna

Accessory	Description
	2000-2183-R 617 MHz to 5000 MHz, N(m), 0.5 to 3.7 dBi, Dipole Antenna

Omni Directional Antennas (requires 1091-27-R SMA(f) to N(m) or 1091-172-R BNC(f) to N(m) adapter)

Accessory	Description
	2000-1751-R 698 MHz to 960 MHz, 1710 MHz to 2100 MHz, 2500 MHz to 2700 MHz, SMA(m), 2 dB, typical, 50 Ω
	2000-1361-R 2400 MHz to 2500 MHz, 5000 MHz to 6000 MHz, SMA(m), 50 Ω
	2000-1487-R Telescoping Whip Antenna, BNC

Mag Mount and Broadband Antennas

Accessory	Description
	2000-2200-R 20 MHz to 21000 MHz, N(f), 50 Ω, Broadband Antenna
	2000-1647-R Cable 1: 698 MHz to 1200 MHz, 2 dBi peak gain, 1700 MHz to 2700 MHz, 5 dBi peak gain, N(m), 50 Ω, 10 ft Cable 2: 3000 MHz to 6000 MHz, 5 dBi peak gain, N(m), 50 Ω, 10 ft Cable 3: GPS 26 dB gain, SMA(m), 50 Ω, 10 ft

Accessory	Description
	2000-1648-R 1700 MHz to 6000 MHz, 3 dBi peak gain, N(m), 50 Ω, 10 ft
	2000-1946-R Cable 1: 617 MHz to 960 MHz, 3 dBi peak gain, 1710 MHz to 3700 MHz, 4 dBi peak gain, N(m), 50 Ω, 10 ft Cable 2: 3000 MHz to 6000 MHz, 5 dBi peak gain, N(m), 50 Ω, 10 ft Cable 3: GPS 26 dB gain, SMA(m), 50 Ω, 10 ft

Isotropic Antennas

Accessory	Description
	2000-1800-R H-Field, 9 kHz to 300 MHz

Bandpass Filters

Accessory	Description
	2000-1734-R 699 MHz to 715 MHz, N(m) and N(f), 50 Ω
	2000-1735-R 776 MHz to 788 MHz, N(m) and N(f), 50 Ω
	2000-1736-R 815 MHz to 850 MHz, N(m) and N(f), 50 Ω
	2000-1737-R 1711 MHz to 1756 MHz, N(m) and N(f), 50 Ω
	2000-1738-R 1850 MHz to 1910 MHz, N(m) and N(f), 50 Ω
	2000-1739-R 880 MHz to 915 MHz, N(m) and N(f), 50 Ω
	2000-1740-R 1710 MHz to 1785 MHz, N(m) and N(f), 50 Ω
	2000-1741-R 1920 MHz to 1980 MHz, N(m) and N(f), 50 Ω
	2000-1742-R 832 MHz to 862 MHz, N(m) and N(f), 50 Ω
	2000-1743-R 2500 MHz to 2570 MHz, N(m) and N(f), 50 Ω
	2000-1799-R 2305 MHz to 2320 MHz, N(m) and N(f), 50 Ω

Precision Adapters

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

Accessory	Description
	34NFNF50 N(f) to N(f), DC to 18 GHz, 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
	71693-R Ruggedized Adapter, K(f) to N(f), 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. 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

Attenuators

Accessory	Description
	1010-128-R 40 dB, 150 W, DC to 3 GHz, N(m) to N(f)
	3-1010-122 20 dB, 5 W, DC to 12.4 GHz, N(m) to N(f)
	3-1010-123 30 dB, 50 W, DC to 8.5 GHz, N(m) to N(f)
	3-1010-124 40 dB, 100 W, DC to 8.5 GHz, N(f) to N(m), Uni-directional

Accessory	Description
	42N50-20 20 dB, 5 W, DC to 18 GHz, N(m) to N(f)
	42N50A-30 30 dB, 50 W, DC to 18 GHz, N(m) to N(f)
	1010-127-R 30 dB, 150 W, DC to 3 GHz, N(m) to N(f)

Phase-Stable Test Port Cables, Armored

(recommended for use with tightly spaced connectors and other general purpose applications

Accessory	Description
	15NNF50-1.5C 1.5 m, DC to 6 GHz, N(m) to N(f), 50 Ω
	15NN50-1.5C 1.5 m, DC to 6 GHz, N(m) to N(m), 50 Ω
	15NNF50-3.0C 3.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω
	15NN50-3.0C 3.0 m, DC to 6 GHz, N(m) to N(m), 50 Ω
	15NNF50-5.0C 5.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω
	15NN50-5.0C 5.0 m, DC to 6 GHz, N(m) to N(m), 50 Ω

Accessory	Description
	15NDF50-1.5C 1.5 m, DC to 6 GHz GHz, N(m) to 7/16 DIN(f), 50 Ω
	15ND50-1.5-C 1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω

Phase-Stable Test Port Cables, Armored w/Reinforced Grip

(recommended for cable & antenna line sweep applications)

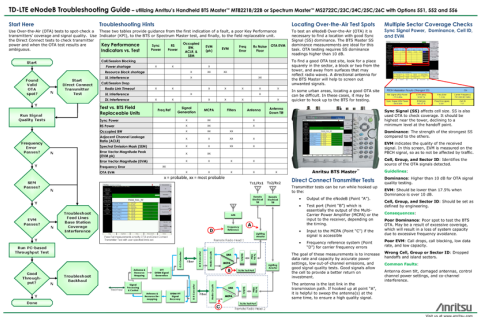
Accessory	Description
	15RDN50-1.5-R 1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω
	15RDFN50-1.5-R 1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 Ω
	15RDN50-3.0-R 3.0 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω
	15RDFN50-3.0-R 3.0 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 Ω

Accessory	Description
	15RNFN50-1.5-R 1.5 m, DC to 6 GHz, N(m) to N(f), 50 Ω
	15RNFN50-3.0-R 3.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω

Manuals (soft copy included at www.anritsu.com)

Part Number	Description
10100-00065	Product Information, Compliance, and Safety
10580-00340	Spectrum Master User Guide
10580-00349	Spectrum Analyzer Measurement Guide
10580-00339	Tracking Generator Measurement Guide
10580-00240	Power Meter Measurement Guide
10580-00234	3GPP Signal Analyzer Measurement Guide
10580-00235	3GPP2 Signal Analyzer Measurement Guide
10580-00236	WiMAX Signal Analyzer Measurement Guide
10580-00341	Spectrum Master Programming Manual
10580-00342	Spectrum Master Maintenance Manual
10580-00455	EMF Measurement Guide

Troubleshooting Guides (soft copy at www.anritsu.com)



Part Number	Description
11410-00551	Spectrum Analyzers
11410-00472	Interference
11410-00466	GSM/GPRS/EDGE Base Stations
11410-00566	LTE eNodeB
11410-00615	TD-LTE eNodeB
11410-00463	W-CDMA/HSPA+ Base Stations
11410-00465	TD-SCDMA/HSPA+ Base Stations
11410-00467	cdmaOne/CDMA2000 1X Base Stations
11410-00468	CDMA2000 1xEV-DO Base Stations
11410-00469	Mobile WiMAX Base Stations
11410-00470	Fixed WiMAX Base Stations

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