Technical Data Sheet

Anritsu envision : ensure

Spectrum Master™

Compact Handheld Spectrum Analyzer

MS2712E
9 kHz to 4 GHz

MS2713E
9 kHz to 6 GHz

Introduction

Anritsu introduces its next generation compact handheld Spectrum Analyzers to meet the needs for portability. Whether it is for spectrum monitoring, broadcast proofing, interference analysis, RF and microwave measurements, or Wi-Fi and wireless network measurements, the Spectrum Master is the ideal instrument for making fast and reliable measurements.

Spectrum Analyzer Highlights

- Measurements: Occupied Bandwidth, Channel Power, ACPR, C/I
- Interference Analyzer: Spectrogram, Signal Strength, RSSI, Mapping
- Dynamic Range: > 102 dB in 1 Hz RBW
- DANL: –162 dBm in 1 Hz RBW
- Phase Noise: –100 dBc/Hz max @ 10 kHz offset at 1 GHz
- Frequency Accuracy: < ± 50 ppb with GPS On
- Traces: Normal, Max Hold, Min Hold, Average, # of Averages
- Detectors: Peak, Negative, Sample, Quasi-peak, and true RMS
- Markers: 6, each with a Delta Marker, or 1 Reference with 6 Deltas
- Limit Lines: up to 41 segments with one-button envelope creation
- Trace Save-on-Event: crossing limit line or sweep complete

Capabilities and Functional Highlights

- LTE/LTE-A FDD/TDD; MIMO (2x2, 4x4)
- Narrow-Band Internet of Things (NB-IoT)
- CDMA, EV-DO
- GSM/EDGE
- W-CDMA/HSPA+
- TD-SCDMA/HSPA+
- Fixed, Mobile WiMAX
- EMF Test
- ISDB-T, ISDB-T SFN
- PIM Alert Application
- PIM Hunting
- DVB-T/H, DVB-T/H SFN
- Gated Sweep
- Tracking Generator
- Internal Preamplifier standard
- Internal Bias-Tee
- Internal Power Meter
- High Accuracy Power Meter
- Up to 50 GHz Power Sensors
- GPS tagging of saved traces
- Channel Scanner
- < 5 minute warm-up time
- 3 hour battery operation time
- New Fast Sweep Speed Mode
- On-Screen Coverage Mapping
- Touchscreen keyboard
- USB or Ethernet data transfer
- Increase throughput by automating repetitive or operator intensive tasks via Ethernet or USB. Remote programming is available via Ethernet or USB.
- Master Software Tools™
- Line Sweep Tools™
- easyTest Tools™
- Web Remote Control with Ethernet

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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 (uses antenna calibration tables to measure dBm/m^2, dBmV/m, dBV/m, dBµV/m, Volt/m, Watt/m^2, dBW/m^2, A/m, dBA/m and Watt/cm^2) Occupied Bandwidth (measures 99 % to 1 % power channel of a signal) Channel Power (measures the total power in a specified bandwidth) ACPR (Adjacent Channel Power Ratio) AM/FM/SSB Demodulation (wide/narrow FM, USB and LSB), (audio out only) C/I (carrier-to-interference ratio) Emission Mask Coverage Mapping (requires Option 431) PIM Alert Application (available for download) PIM Hunting

Setup Parameters

Frequency	Center/Start/Stop, Span, Frequency Step, Signal Standard, Channel #, Channel Increment
Amplitude	Reference Level (RL), Scale, Attenuation Auto/Level, RL Offset, Pre-Amp On/Off, Detection
Span	Span, Span Up/Down (1-2-5), Full Span, Zero Span, Last Span
Bandwidth	RBW, Auto RBW, VBW, Auto VBW, RBW/VBW, Span/RBW
File	Save, Save-on-Event, Recall, Copy, Delete
Save	Setups, Measurements, Screen Shots (JPEG), Limit Lines, Spurious Emission Mask
Save-on-Event	Crossing Limit Line, Sweep Complete, Save-then-Stop, Clear All
Recall	Setups, Measurements, Limit Lines, Spurious Emission Mask
Copy	Selected file or files to internal/external memory (USB)
Delete	Selected file or files from internal/external memory (USB)
Application Options	Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)

Sweep Functions

Sweep	Single/Continuous, Sweep Mode (Fast, Performance, No FFT), Reset, Detection, Minimum Sweep Time, Trigger Type, Gated Sweep (see Option 90)
Detection	Peak, RMS, Negative, Sample, Quasi-peak
Triggers	Free Run, External, Video, Change Position, Manual

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), 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 amplitude and offset

Limit Line Functions

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, Points (41 max), Offset, Shape Square/Slope
Limit Line Advanced	Type (Absolute/Relative), Mirror, Save/Recall

Frequency

Frequency Range	9 kHz to 4 GHz (MS2712E), 9 kHz to 6 GHz (MS2713E) (tunable to 0 Hz)
Tuning Resolution	1 Hz
Frequency Reference	Aging: ± 1.0 ppm/year Accuracy: ± 1.5 ppm (25 °C ± 25 °C) + aging, < ± 50 ppb with GPS On
Frequency Span	10 Hz to 4 GHz including zero span (MS2712E), 10 Hz to 6 GHz including zero span (MS2713E)
Sweep Time	Minimum 100 ms, 7 µs to 3600 s in zero span
Sweep Time Accuracy	± 2 % in zero span

Bandwidth

Resolution Bandwidth (RBW)	1 Hz to 3 MHz in 1–3 sequence ± 10% (1 MHz max in zero-span) (–3 dB bandwidth)
Video Bandwidth (VBW)	1 Hz to 3 MHz in 1–3 sequence (–3 dB bandwidth) (auto or manually selectable)
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

Spectrum Analyzer (continued)

Spectral Purity

SSB Phase Noise @ 1 GHz	–100 dBc/Hz, –110 dBc/Hz typical @ 10 kHz offset –105 dBc/Hz, –112 dBc/Hz typical @ 100 kHz offset –115 dBc/Hz, –121 dBc/Hz typical @ 1 MHz offset

Amplitude Ranges

Dynamic Range	> 102 dB (2.4 GHz), 2/3 (TOI-DANL) in 1 Hz RBW
Measurement Range	DANL to +26 dBm (≥ 50 MHz) DANL to 0 dBm (< 50 MHz)
Display Range	1 dB to 15 dB/div in 1 dB steps, ten divisions displayed
Reference Level Range	–150 dBm to +30 dBm
Attenuator Range	0 dB to 55 dB in 5 dB steps
Maximum Continuous Input	+30 dBm
Amplitude Units	Log Scale Modes: dBW, dBm, dBµW, dBV, dBmV, dBµV, dBA, dBmA, dBµA Linear Scale Modes: nV, µV, mV, V, kV, nW, µW, mW, W, kW, nA, µA, mA, A

Amplitude Accuracy

9 kHz to 100 kHz	± 2.0 dB typical (Preamp Off)
100 kHz to 4.0 GHz	± 1.25 dB, ± 0.5 dB typical
> 4.0 GHz to 6 GHz	± 1.50 dB, ± 0.5 dB typical

Displayed Average Noise Level (DANL)

	Preamp Off (Reference Level –20 dBm)		Preamp On (Reference Level –50 dBm)	
(RBW = 1 Hz, 0 dB attenuation)	Maximum	Typical	Maximum	Typical
10 MHz to 2.4 GHz	–141 dBm	–146 dBm	–157 dBm	–162 dBm
> 2.4 GHz to 4 GHz	–137 dBm	–141 dBm	–154 dBm	–159 dBm
> 4 GHz to 5 GHz	–134 dBm	–138 dBm	–150 dBm	–155 dBm
> 5 GHz to 6 GHz	–126 dBm	–131 dBm	–143 dBm	–150 dBm

Spurs

Residual Spurious	< –90 dBm (RF input terminated, 0 dB input attenuation, > 10 MHz)
Input-Related Spurious	< –75 dBc (0 dB attenuation, –30 dBm input, span < 1.7 GHz, carrier offset > 4.5 MHz)
Exceptions, typical	< –70 dBc @ <2.5 GHz, with 2072.5 MHz Input < –68 dBc @ F1 – 280 MHz with F1 Input < –70 dBc @ F1 + 190.5 MHz with F1 Input < –52 dBc @ 7349 – (2F2) MHz, with F2 Input, where F2 < 2437.5 MHz < –55 dBc @ 190.5 ± (F1/2) MHz, F1 < 1 GHz

Third-Order Intercept (TOI)

	Preamp Off (–20 dBm tones 100 kHz apart, 10 dB attenuation)
800 MHz	+16 dBm
2400 MHz	+20 dBm
200-2200 MHz	+25 dBm, typical
> 2.2 GHz to 5.0 GHz	+28 dBm, typical
> 5.0 GHz to 6.0 GHz	+33 dBm, typical

Second Harmonic Distortion

	Preamp Off, 0 dB input attenuation, –30 dBm input
50 MHz	–56 dBc
> 50 MHz to 200 MHz	–60 dBc, typical
> 200 MHz to 3000 MHz	–70 dBc, typical

VSWR

2:1, typical

20 MHz BW Demod (Option 9) (required for all signal analyzers except AM/FM/PM Signal Analyzer, Option 509)

Bias-Tee (Option 10)

Setup	On/Off, Voltage, Current (Low/High)
Voltage Range	+12 V to +32 V
Current (Low/High)	250 mA/450 mA, 1 A surge for 100 ms
Resolution	0.1 V

Coverage Mapping (Option 431) (requires Option 31)

Measurements

Indoor Mapping	RSSI, ACPR
Outdoor Mapping	RSSI, ACPR

Setup Parameters

Frequency	Center/Start/Stop, Span, Freq Step, Signal Standard, Channel #, Channel Increment
Amplitude	Reference Level (RL), Scale, Attenuation Auto/Level, RL Offset, Pre-Amp On/Off, Detection
Span	Span, Span Up/Down (1-2-5), Full Span, Zero Span, Last Span
BW	RBW, Auto RBW, VBW, Auto VBW, RBW/VBW, Span/VBW
Measurement Setup	ACPR, RSSI
Point Distance / Time Setup	Repeat Type Time Distance
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

Electromagnetic Field Measurements (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: dBm/m^2, V/m, W/m^2 W-CDMA OTA: dBm/m^2, V/m, W/m^2, % of Limit (V/m), % of Limit (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
2000-1792-R	30 MHz to 3 GHz
2000-1791-R	700 MHz to 6 GHz

EMF Measurement Modes	Spectrum Analyzer LTE OTA (Option 883) TD-LTE OTA (Option 883) W-CDMA OTA (Option 881)

Ethernet Connectivity (formerly Option 413)

Connector	RJ45
LAN Speed	10 Mbps
Mode	Static, DHCP
Static IP settings	IP address Subnet Mask IP Gateway
Remote Control	Remote capability provided with Web Remote Control and SCPI programming
Data Upload	With Line Sweep Tools through Ethernet connection

Interference Analyzer (Option 25)

Measurements

Spectrum	Field Strength Occupied Bandwidth Channel Power Adjacent Channel Power Ratio (ACPR) AM/FM/SSB Demodulation (Wide/Narrow FM, Upper/Lower SSB - audio out only) Carrier-to-Interference ratio (C/I)
Spectrogram	Collect data up 72 hours
Signal Strength	Gives visual and aural indication of signal strength
Received Signal Strength Indicator	Collect data up to 168 hours (one week)
Signal ID	Up to 12 signals Center Frequency Bandwidth Signal Type (FM, GSM, W-CDMA, CDMA, Wi-Fi) Closest Channel Number Number of Carriers Signal-to-Noise Ratio (SNR) > 10 dB
Interference Mapping	Draw multiple bearings of signal strength from GPS location on on-screen map Pan and Zoom on-screen maps Support for MA2700A Handheld Interference Hunter (see Optional Accessories)
Application Options	Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)

GPS Receiver (Option 31) (antenna sold separately)

General

Setup	On/Off, Antenna Voltage 3.3/5.0 V, GPS Info
GPS Time/Location Indicator	Time, Latitude, Longitude and Altitude on display Time, Latitude, Longitude and Altitude with trace storage
High Frequency Accuracy	Spectrum Analyzer, Interference Analyzer, CW Signal Analyzers < ± 50 ppb with GPS On, GPS antenna connected, 3 minutes after satellite lock in selected mode
Connector	SMA, Female

Tracking Generator (Option 20)

Setup Parameters

Measure Set-up	Off/On, Output Power, Reset Sweep, Insertion Loss, Abs Max, Min, Avg (On/Off)
Insertion Loss Set-up	Normalize (Off/On), Rel Reference, Rel Scale, Transmission, Min, Avg (Off, On) RL Offset
Frequency Range	500 kHz to 4.0 GHz (MS2712E), 500 kHz to 6.0 GHz (MS2713E)
Output Power Range	–50 dBm to 0 dBm
Step Size	0.1 dB nominal
Output Flatness	± 1.0 dB max ± 0.3 dB typical using field calibration, relative to spectrum analyzer input with ≥ 3 dB attenuator
Zero Span Behavior	CW Output
Output Connector	Type N female, 50 Ω
Damage Level	+ 23 dBm ± 50 VDC (limited dv/dt)

Channel Scanner (Option 27)

General

Number of Channels	1 to 20 Channels
Measurements	Graph/Table, Max Hold (On/5 s/Off), Freq/Channel, Current/Max, Single/Dual Color
Scanner	Scan Channels, Scan Frequencies, Scan Customer List, Scan Script Master™
Amplitude	Reference Level, Scale
Custom Scan	Signal Standard, Channel, # of Channels, Channel Step Size, Custom Scan
Frequency Range	9 kHz to 4 GHz (MS2712E), 9 kHz to 6 GHz (MS2713E)
Frequency Accuracy	± 10 Hz + Time base error
Measurement Range	–110 dBm to +26 dBm
Application Options	Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)

Gated Sweep (Option 90)

General

Mode	Spectrum Analyzer, Sweep
Trigger	External TTL
Setup	Gated Sweep (On/Off) Gate Polarity (Rising, Falling) Gate Delay (0 ms to 65 ms typical) Gate Length (1 µs to 65 ms typical) Zero Span Time

Power Meter (Option 29)

General

Frequency	Center/Start/Stop, Span, Frequency Step, Signal Standard, Channel #, Full Band
Amplitude	Maximum, Minimum, Offset, Relative On/Off, Units, Auto Scale
Average	Acquisition Fast/Med/Slow, # of Running Averages
Limits	Limit On/Off, Limit Upper/Lower
Frequency Range	10 MHz to 4 GHz (MS2712E), 10 MHz to 6 GHz (MS2713E)
Span	1 kHz to 100 MHz
Display Range	–140 dBm to +30 dBm, ≤ 40 dB span
Measurement Range	–120 dBm to +26 dBm
Offset Range	0 dB to +100 dB (External Gain or Loss)
VSWR	2:1 typical
Maximum Power	+30 dBm without attenuator
Accuracy	Same as Spectrum Analyzer
Application Options	Impedance (50 Ω, 75 Ω, Other)

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.

LTE/LTE-A Signal Analyzers (Options 883 and 886)[1]

Measurements

RF	Modulation	Over-the-Air (OTA)	Pass/Fail (User Editable)
Channel Spectrum Channel Power Occupied Bandwidth Power vs. Time (TDD only) 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 256QAM 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 Power, RSRP, RSRQ, SINR Dominance Modulation Results – On/Off Auto Save - On/Off Tx Test Scanner RS Power of MIMO antennas (FDD: 2x2, 4x4) (TDD: 2x2, 4x4) Cell ID, Average Power Delta Power (Max-Min) Graph of Antenna Power Modulation Results – On/Off Mapping On-screen S-SS Power, 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 (TDD only) DwPTS Power (TDD only) Transmit Off Power (TDD only) Timing Error (TDD only)

Setup Parameters

Frequency	E-UTRA FDD bands 1 – 14, 17 – 21, 23 – 32, 66A (tunable 10 MHz to 4.0 GHz) E-UTRA TDD 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
Cyclic Prefix (CP)	Auto, Normal, Extended
EVM Mode	Auto, PBCH only, Max Hold
Sync Type	Normal (SS), RS/Cell ID
Trigger	No Trigger/Ext Trigger, Rising/Falling (TDD Only)
Uplink/Downlink Configuration	0 to 6 (TDD Only)
Save/Recall	Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

LTE/LTE-A RF Measurements

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +10 dBm) ± 1.5 dB, ± 1.0 dB typical, (RF input –30 dBm to +10 dBm)

LTE/LTE-A Modulation Measurements

Frequency Error	± 10 Hz + time base error, 99 % confidence level
Residual EVM (rms) (FDD only)	2.0% typical (E-UTRA Test Model 3.1, RF Input –50 dBm to +10 dBm) for BW ≤ 10 MHz 2.5% typical (E-UTRA Test Model 3.1, RF Input –50 dBm to +10 dBm) for BW > 10 MHz
Residual EVM (rms) (TDD only)	2.0% typical (E-UTRA Test Model 3.1, RF Input –30 dBm to +10 dBm) for BW ≤ 10 MHz 2.5% typical (E-UTRA Test Model 3.1, RF Input –30 dBm to +10 dBm) for BW > 10 MHz

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

Scanner	Six strongest signals if present Auto Save — Sync Signal Power and Modulation Results with GPS tagging information
Tx Test	Scanner — three strongest signals if present RS Power — strongest signal
Mapping	Map On-screen S-SS Power, 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

1. Requires Option 9; requires Option 31 for full functionality.

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

GSM/EDGE Signal Analyzer (Option 880)[1]

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail (User Editable)
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 Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements

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

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 (temperature range 15 °C to 35 °C)

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

1. Requires Option 9.

W-CDMA/HSPA+ Signal Analyzer (Option 881)[1]

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail (User Editable)
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 Script Master™ 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 Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

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

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 (temperature range 15 °C to 35 °C)

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, 16QAM, 64QAM
Frequency Error	± 10 Hz + time base error, 99% confidence level
EVM Accuracy	± 2.5 %, 6% ≤ EVM ≤ 25%
Residual EVM	3.25% 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

1. Requires Option 9; Option 31 recommended.

CDMA Signal Analyzer (Option 884)[1]

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail (User Editable)
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

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 Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

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)

Demodulation (temperature range 15 °C to 35 °C)

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

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

1. Requires Option 9; requires Option 31 for full functionality.

EV-DO Signal Analyzer (Option 884)[1]

Measurements

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

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 Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

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)

Demodulation (temperature range 15 °C to 35 °C)

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

Over-the-Air (OTA) Measurements

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

1. Requires Option 9; requires Option 31 for full functionality.

Fixed WiMAX Signal Analyzer (Option 885)[1]

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail (User Editable)
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 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 Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

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)

Demodulation (temperature range 15 °C to 35 °C)

Frequency Error	0.07 ppm + time base error, 99 % confidence level
Residual EVM (rms)	3 % typical, 3.5 % maximum (RF Input –50 dBm to +20 dBm)

1. Requires Option 9; requires Option 31 for full functionality.

Mobile WiMAX[1] Signal Analyzer (Option 885)

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail (User Editable)
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)
Bandwidth (MHz)	3.50, 5.00, 7.00, 8.75, 10.00
Cyclic Prefix Ratio (CP)	1/8
Span (MHz)	5, 10, 20, 30
Frame Length (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 Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

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)

Demodulation (temperature range 15 °C to 35 °C)

Frequency Error	0.02 ppm + time base error, 99 % confidence level
Residual EVM (rms)	2.5 % typical, 3.0 % maximum, (RF Input –50 dBm to +20 dBm)

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 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.

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

Measurements

RF	Demodulation	Over-the-Air (OTA)	Pass/Fail (User Editable)
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/8PSK/16QAM/64QAM) 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, 8PSK, 16QAM, 64QAM
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 Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

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

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 (temperature range 15 °C to 35 °C)

Supported Modulation	QPSK, 8PSK, 16QAM, 64QAM
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 Logging	Yes

ISDB-T Signal Analyzer (Options 30, 79, 32)[1]

Measurements

ISDB-T RF (Option 30)	ISDB-T Signal Analysis (Option 30)	ISDB-T BER Analysis (Option 79)	ISDB-T SFN Analysis (Option 32)
Signal Power Channel Power Termination Voltage Open Terminal Voltage Field Strength Spectrum Monitor Channel Power Zone Center Channel Zone Center Frequency Spectrum Mask Mask (Standard A) Japan Mask (Standard B) Japan Mask (Critical) Brazil Mask (Sub-critical) Brazil Mask (Non-critical) Brazil Phase Noise Spurious Emissions	Constellation (w/zoom) Layer A, B, C, TMCC Sub-carrier MER Delay Profile (w/zoom) Frequency Response Measured Data Frequency Frequency Offset MER (Total, Layer A/B/C, TMCC, AC1) Modulation (Layer A/B/C) Mode, GI Sub-carrier MER w/marker Delay w/marker Frequency Response w/marker	Layer A, Layer B, Layer C BER and Error Count per Layer Before RS Before Viterbi PER and Error Count per Layer MPEG Bit Rate per Layer TMCC Information per Layer Modulation Code Rate Interleave Segments Channel Power Mode, GI Signal Sync Status ASI Out	Impulse Response (w/zoom) In-band Spectrum Measured Data Channel Power Delay DU Ratio Power Field Strength

ISDB-T Measurement Modes

Custom	User specified measurements and setup parameters
Easy	User specified measurements. Some setup parameters are automatically set or detected.
Batch	User specified measurements and channels for automatic measurement, and display and storage of results

Setup Parameters

Channel Map	UHF (Japan), UHF (Brazil), IF (37.15 MHz), None
Channel	13 to 62 (Japan), 14 to 69 (Brazil)
Frequency	35 MHz to 806 MHz
Bandwidths	6 MHz, 8 MHz
Partial Reception	Recognized when layer A segment count is 1
One-Seg	On: synchronizes with single segment transmission (Bandwidth 6 MHz only) Off: synchronizes with normal 13 segment signal
Pre-amp	On, Off
Reference Level Setting	–25 dBm to +20 dBm/5 dB steps (Preamp Off), –50 dBm to –10 dBm/10 dB steps (Preamp On)

ISDB-T Digital Video Measurements (Option 30)

Channel Power Accuracy	± 2 dB (RF input –84 dBm to –10 dBm)
Frequency Lock Range	± 90 kHz
Frequency Offset Accuracy	± (measurement frequency x reference frequency accuracy) ± 0.3 Hz
Residual MER	≥ 42 dB, typical (Preamp Off, Reference level: –20 dBm) ≥ 37 dB, typical (Preamp On, Reference level: –50 dBm)
Sub-carrier MER Display Range	± 2.785 MHz from center frequency (Bandwidth 6 MHz) ± 3.714 MHz from center frequency (Bandwidth 8 MHz)
Delay Profile Resolution	0.12 µs (Bandwidth 6 MHz) 0.09 µs (Bandwidth 8 MHz)
Frequency Response Resolution	1 kHz, 0.1 dB
Phase Noise Range	–40 dBc/Hz to –140 dBc/Hz
Spurious Emissions Search Range	5 MHz to 5x input signal frequency

ISDB-T BER Measurements (Option 79) (operating temperature range 0 °C to 40 °C)

BER Measurement Display per Layer	Rate and Error count: Before Viterbi, Before RS
PER Measurement Display per Layer	Rate and Error count
TMCC Information Display per Layer	Modulation, Code Rate, Interleave, Number of segments
ASI Output	BNC-J 75 Ω

ISDB-T SFN Measurements (Option 32)

Delay Profile Display Range	–1008 µs to +1008 µs (Bandwidth 6 MHz)
Delay Wave Estimated Level Accuracy	± 2.5 dB typical (–10 dBm to –79 dBm)
DU Ratio Accuracy	± 1 dB typical (–10 dBm to –70 dBm)
In-band Spectrum Range	± 2.74 MHz (Mode 2), ± 2.76 MHz (Mode 3) (Bandwidth 6 MHz)

1. For full specifications, refer to the Digital Broadcast Analysis Options Technical Data Sheet 11410-00624.

DVB-T/H Signal Analyzer (Options 64, 57, 78)[1]

Measurements

DVB-T/H RF (Option 64)	DVB-T/H Signal Analysis (Option 64)	DVB-T/H BER Analysis (Option 57)	DVB-T/H SFN Analysis (Option 78)
Signal Power Channel Power Termination Voltage Open Terminal Voltage Field Strength Spectrum Monitor Channel Power Zone Center Channel Zone Center Frequency Shoulder Attenuation Channel Power Zone Center Channel Zone Center Frequency Lower Shoulder Attenuation Upper Shoulder Attenuation	Composite or Individual Views Constellation Impulse Response (w/zoom) Carrier MER (w/zoom) Freq Response (composite view only) Measured Data Mode, GI Modulation Hierarchy Freq Offset Channel Power MER (Total/Data/TPS) TPS Warning Message TPS Info Interleave Type Cell ID Code Rate (HP/LP) Time Slicing (HP/LP) MPE-FEC (HP/LP)	BER Before RS Before Viterbi PER (Packet) Channel Power MER (Quick) Bit Rate TPS Info Length Indicator Mode, GI Modulation Hierarchy Interleave Type Cell ID Code Rate Time Slicing MPE-FEC TPS Warning Message ASI Out	Impulse Response (w/zoom) Inband Spectrum Measured Data Channel Power Delay DU Ratio Power Field Strength

Setup Parameters

Channel Map	UHF (Australia), UHF (Europe), VHF (Europe), None
Channel	28 to 69 (Australia), 21 to 69 (Europe), 5 to 12 (Europe)
Frequency Offset	± 166.666 kHz, ± 333.333 kHz, ± 499.999 kHz, None
Frequency	30 MHz to 2.8 GHz when Channel Map is None
Bandwidth	5*, 6*, 7, 8 MHz (* not available for BER measurements)
Pre-amp	On, Off
Reference Level	–25 dBm to +20 dBm/5 dB steps (Preamp Off), –50 dBm to –10 dBm/10 dB steps (Preamp On)

DVB-T/H Digital Video Measurements (Option 64)

Channel Power Accuracy	± 2 dB, (RF input –84 dBm to –10 dBm)
Frequency Lock Range	± 90 kHz
Frequency Offset Accuracy	± (measurement frequency x reference frequency accuracy) ± 0.3 Hz
Residual MER	≥ 42 dB (Preamp Off, Reference Level: –20 dBm) ≥ 37 dB (Preamp On, Reference Level: –50 dBm)
Impulse Response Resolution	0.11 µs (Bandwidth: 8 MHz), 0.1 dB
Carrier MER Marker	Carrier Number, Offset Frequency and MER
Composite View	Simultaneous display of Constellation (Data and TPS), Impulse Response, Carrier MER and Frequency Response

DVB-T/H BER Measurements (Option 57)

Bit Count Setting	Range 1E+6 to 1E+12
Service Type	In Service: BER measurement of normal in-service data traffic Simultaneous BER measurement Before Viterbi and Before RS error correction Out of Service: BER measurement of a PRBS23 data sequence BER measurement point can be selected Before Viterbi, Before RS or After RS
TPS Information	Length indicator, Mode, GI, Modulation, Hierarchy, Inner Interleave, Cell ID, Code Rate, Time Slicing, MPE-FEC
ASI Output	BNC-J 75 Ω

DVB-T/H SFN Measurements (Option 78)

Impulse Response Display Range	–896 µs to +896 µs (Bandwidth 8 MHz)
Resolution	0.11 µs (33 m) (Bandwidth 8 MHz)
Marker	Delay time, relative level (DU ratio), power and field strength or termination voltage
Inband Spectrum Range	± 3.804 MHz (Bandwidth 8 MHz)

1. For full specifications, refer to the Digital Broadcast Analysis Options Technical Data Sheet 11410-00624.

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 Bandwidth	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 Depth (Pk-Pk)/2 Depth SINAD* THD* Distortion/Total Vrms*	RMS Depth (AM) Peak + Depth Peak – Depth (Pk-Pk)/2 Depth Carrier Power Carrier Frequency Occupied Bandwidth AM Rate SINAD* THD* Distortion/Total Vrms*	RMS Deviation (FM/PM) Peak + Depth Peak – Depth (Pk-Pk)/2 Depth Carrier Power Carrier Frequency Occupied Bandwidth AM Rate SINAD* THD* Distortion/Total Vrms*

* Requires Sinewave modulation

Setup Parameters

Frequency	Center Freq, Span, Freq Step, Signal Standard, Channel, Channel Increment, Set Carrier Freq
Amplitude	Scale, Power Offset, Adjust Range
Setup	Demod Type (AM, FM, PM), IFBW, Auto IFBW
Measurements	RF Spectrum AM/FM/PM, Audio Spectrum (AM/FM/PM), Audio Waveform (AM/FM/PM), Summary (AM/FM/PM), Average
Marker	On/Off, Delta, Peak Search, Marker Freq to Center, Marker to Ref Lvl, Marker Table, All Markers Off

Specifications

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, IFBW must be greater than 95 % occupied BW)
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, IFBW must be greater than 95 % occupied BW)
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)

General Specifications

System Parameters	System	Status (Temperature, Battery Info, Serial Number, Firmware Version, Options Installed) Self Test, Application Self Test GPS (see Option 31)
	System Options	Name, Date and Time, Brightness, Volume Language (English, French, German, Spanish, Chinese, Japanese, Korean, Italian, Russian, Portuguese) Reset (Factory Defaults, Master Reset, Update Firmware)
	Internal Trace/Setup Memory	2,000 Traces, 2,000 Setups
	External Trace/Setup Memory	Limited by size of USB Flash drive
	Mode Switching	Auto-Stores/Recalls most recently used Setup Parameters in the Mode
File Management		
	File Types	Vary with measurement mode
	File	Save, Recall, Copy, Delete
	Save	Setups, Measurements, Screen Shots (JPEG)
	Recall	Setups, Measurements
	Copy	Selected file or files to internal/external memory (USB)
	Delete	Selected file or files from internal/external memory (USB)
	File Sort Method	By Name/Date/Type, Ascend/Descend
Connectors	RF Out	Type N, female, 50 Ω
	RF Out Damage Level	23 dBm, ± 50 VDC
	RF In	Type N, female, 50 Ω
	RF In Damage Level	+33 dBm peak, ± 50 VDC, Maximum Continuous Input (≥ 10 dB attenuation)
	GPS	SMA(f)
	External Power	5.5 mm barrel connector, 11.0 to 14.5 VDC, < 4.0 Amps
	USB Interface (2)	Type A, Connect USB Flash Drive and Power Sensor
	USB Interface	5-pin mini-B, Connect to PC for data transfer
	Ethernet Interface	RJ45 connector for Ethernet 10-Base T
	Headset Jack	3.5 mm mini-phone plug
	External Reference In	BNC, female, 50 Ω, Maximum Input +10 dBm, 1 MHz, 5 MHz, 10 MHz, 13 MHz
	External Trigger/Clock Recovery	BNC, female, 50 Ω, Maximum Input ± 5 VDC
	RF over Fiber	SFP/SFP+ compatible socket (available with Option 759)
Display	Type	Resistive Touchscreen
	Size	8.4 inch daylight viewable color LCD
	Resolution	800 x 600
	Pixel Defects	No more than five defective pixels (99.9989% good pixels)
Battery	Type	Li-Ion
	Battery Operation	3.0 hours, typical
	Battery Charging Limits	0 °C to +45 °C, Relative Humidity ≤ 80 %
Regulatory Compliance		
	European Union	EMC 2014/30/EU, EN 61326:2013, CISPR 11/EN 55011, IEC/EN 61000-4-2/3/4/5/6/8/11 Low Voltage Directive 2014/35/EU Safety EN 61010-1:2010 RoHS Directive 2011/65/EU
	Australia and New Zealand	RCM AS/NZS 4417:2012
	South Korea	KCC-REM-A21-0004
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
ESD	RF Port Center Pin	Withstands up to ± 15 kV
Size and Weight		
	Size	273 mm x 199 mm x 91 mm (10.7 in x 7.8 in x 3.6 in)
	Weight	3.45 kg (7.6 lb)
Warranty	Duration	Standard three-year warranty (one-year warranty on battery)

Line Sweep Tools (for your PC)

Trace Capture		
	Browse to Instrument	View and copy traces from the test equipment to your PC using Windows Explorer
	Open Legacy Files	Open DAT files captured with Hand Held Software Tools v6.61
	Open Current Files	Open VNA or DAT files
	Capture plots To	The Line Sweep Tools screen, DAT files, Database, or JPEG
Traces	Trace Types	Return Loss, VSWR, DTF-RL, DTF-VSWR, Cable Loss, and Smith Chart
	Trace Formats	DAT, VNA, CSV, PNG, BMP, JPG, HTML, Data Base, and PDF
Report Generation		
	Report Generator	Includes GPS location along with measurements
	Report Format	Create reports in HTML or PDF format
	Report Setup	Report Title, Company, Prepared for, Location, Date and Time, Filename, Company logo
	Trace Setup	1 trace Portrait Mode, 2 Trace Portrait Mode, 1 Trace Landscape Mode
Trace Validation	Presets	7 presets allow “one click” setting of up to 6 markers and one limit line
	Marker Controls	6 regular Markers, Marker Peak, Marker valley, Marker between, and frequency entry
	Delta Markers	6 Delta markers
	Limit Line	Enable and drag or value entry. Also works with presets
	Next Trace Button	Next Trace and Previous trace arrow keys allow quick switching between traces
Tools	Cable Editor	Allows creation of custom cable parameters
	Distance to Fault	Converts a Return Loss trace to a Distance to Fault trace
	Measurement Calculator	Converts Real, Imaginary, Magnitude, Phase, RL, VSWR, Rho, and Transmit power
	Signal Standard Editor	Creates new band and channel tables
	Renaming Grid	36 user definable phrases for creation of file names, trace titles, and trace subtitles
Connectivity	Connections	Ethernet, USB cable, USB Memory Stick

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
Connectivity	Connections	Ethernet, USB cable, USB Memory Stick

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, MapPoint
Mobile WiMAX OTA, LTE OTA Options	Google Earth, Google Maps, MapInfo

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
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 – Google Chrome, Mozilla Firefox
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 connection and an HTML 5-compliant browser
Download	Individual instrument files downloaded via browser Multiple instrument files and directories zipped and downloaded via browser File downloads are not supported by iOS 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, Ethernet
Available Drivers	LabView. Visit NI.com for driver

Ordering Information – Options

MS2712E	MS2713E	Description
9 kHz to 4 GHz	9 kHz to 6 GHz	Spectrum Analyzer
Options	**Options**	
MS2712E-0010	MS2713E-0010	Bias-Tee
MS2712E-0009	MS2713E-0009	20 MHz Bandwidth Demod
MS2712E-0031	MS2713E-0031	GPS Receiver (requires GPS Antenna)
MS2712E-0019	MS2713E-0019	High-Accuracy Power Meter (requires External Power Sensor)
MS2712E-0029	MS2713E-0029	Power Meter
MS2712E-0025	MS2713E-0025	Interference Analyzer (Option 31 recommended)
MS2712E-0027	MS2713E-0027	Channel Scanner
MS2712E-0431	MS2713E-0431	Coverage Mapping (requires Option 31)
MS2712E-0444	MS2713E-0444	EMF Measurements (requires Anritsu Isotropic Antenna)
MS2712E-0090	MS2713E-0090	Gated Sweep
MS2712E-0020	MS2713E-0020	Tracking Generator
MS2712E-0509	MS2713E-0509	AM/FM/PM Analyzer
MS2712E-0880	MS2713E-0880	GSM/GPRS/EDGE Measurements (requires Option 9)
MS2712E-0881	MS2713E-0881	W-CDMA/HSPA+ Measurements (requires Option 9; Option 31 recommended)
MS2712E-0882	MS2713E-0882	TD-SCDMA/HSPA+ Measurements (requires Option 9; requires Option 31 for full functionality)
MS2712E-0883	MS2713E-0883	LTE/LTE-A FDD/TDD Measurements (requires Option 9; requires Option 31 for full functionality)
MS2712E-0886	MS2713E-0886	LTE 256QAM Demodulation (Requires Option 883)
MS2712E-0887	MS2713E-0887	NB-IoT Measurements (requires Option 9)
MS2712E-0884	MS2713E-0884	CDMA/EV-DO Measurements (requires Option 9; requires Option 31 for full functionality)
MS2712E-0885	MS2713E-0885	WiMAX Fixed/Mobile Measurements (requires Option 9; requires Option 31 for full functionality)
MS2712E-0030	MS2713E-0030	ISDB-T Digital Video Measurements (requires Option 9)
MS2712E-0032	MS2713E-0032	ISDB-T SFN Measurements (requires Option 9)
MS2712E-0079	MS2713E-0079	ISDB-T BER Measurements (requires Options 9 and 30. Cannot be ordered with Option 759)
MS2712E-0064	MS2713E-0064	DVB-T/H Digital Video Measurements (requires Option 9)
MS2712E-0078	MS2713E-0078	DVB-T/H SFN Measurements (requires Option 9)
MS2712E-0057	MS2713E-0057	DVB-T/H BER Measurements (requires Option 64. Cannot be ordered with Option 759)
MS2712E-0098	MS2713E-0098	Standard Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate.
MS2712E-0099	MS2713E-0099	Premium Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate, test report, and uncertainty data.

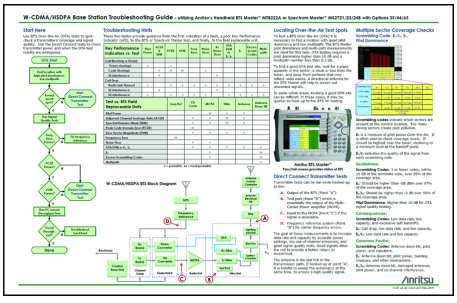
Standard Accessories (included with instrument)

Part Number	Description
2000-1371-R	Ethernet Cable, 7 ft (213 cm)
2000-1654-R	Soft Carrying Case
2000-1691-R	Stylus with Coiled Tether
2000-1797-R	Touchscreen Protective Film, 8.4 in
633-75	Rechargeable Li-Ion Battery, 7500 mAh
40-187-R	AC-DC Adapter
806-141-R	Automotive Power Adapter, 12 VDC, 60 W
3-2000-1498	USB 2.0 A/Mini-B (5-pin) Cable, 10 ft (305 cm)

Manuals (available at www.anritsu.com)

Part Number	Description
10100-00065	Product Information, Compliance, and Safety
10580-00251	Spectrum Master User Guide
10580-00349	Spectrum Analyzer Measurement Guide
10580-00234	3GPP Signal Analyzer Measurement Guide
10580-00235	3GPP2 Signal Analyzer Measurement Guide
10580-00236	WiMAX Signal Analyzer Measurement Guide
10580-00237	Digital TV Measurement Guide
10580-00240	Power Meter Measurement Guide
10580-00455	EMF Measurement Guide
10580-00256	Programming Manual

Troubleshooting Guides (available 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 Testing
11410-00615	TD-LTE eNodeB Testing
11410-00463	W-CDMA/HSDPA Base Stations
11410-00465	TD-SCDMA/HSDPA Base Stations
11410-00467	cdmaOne/CDMA2000 1X Base Stations
11410-00468	CDMA2000 1xEV-DO Base Stations
11410-00470	Fixed WiMAX Base Stations
11410-00469	Mobile WiMAX Base Stations

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

Model Number	Description
MA24105A	Inline Peak Power Sensor, 350 MHz to 4 GHz, +3 dBm to +51.76 dBm
MA24106A	RF USB Power Sensor, 50 MHz to 6 GHz, +23 dBm
MA24108A	Microwave USB Power Sensor, 10 MHz to 8 GHz, +20 dBm
MA24118A	Microwave USB Power Sensor, 10 MHz to 18 GHz, +20 dBm
MA24126A	Microwave USB Power Sensor, 10 MHz to 26 GHz, +20 dBm
MA24208A	Microwave Universal USB Power Sensor, 10 MHz to 8 GHz, +20 dBm
MA24218A	Microwave Universal USB Power Sensor, 10 MHz to 18 GHz, +20 dBm
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
MA25100A	RF Power Indicator

Optional Accessories

Directional Antennas

Part Number	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
2000-1715-R	Directional Antenna, 698 MHz to 2500 MHz, N(f), gain of 2 dBi to 10 dBi, typical
2000-1726-R	Antenna, 2500 MHz to 2700 MHz, N(f), 14.1 dBi, Yagi
2000-1747-R	Antenna, Log Periodic, 300 MHz to 7000 MHz, N(f), 5.1 dBi, typical
2000-1748-R	Antenna, Log Periodic, 1 GHz to 18 GHz, N(f), 6 dBi, typical
2000-1777-R	Portable Directional Antenna, 9 kHz to 20 MHz, N(f)
2000-1778-R	Portable Directional Antenna, 20 MHz to 200 MHz, N(f)
2000-1779-R	Portable Directional Antenna, 200 MHz to 500 MHz, N(f)
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

GPS Antennas

Part Number	Description
2000-1528-R	GPS Antenna, SMA(m) with 5 m (15 ft) cable, 3 dBi gain, requires 5 VDC
2000-1652-R	GPS Antenna, SMA(m) with 0.3 m (1 ft) cable, 5 dBi gain, requires 3.3 VDC or 5 VDC
2000-1760-R	GPS Antenna, SMA(m), 25 dB gain, 2.5 VDC to 3.7 VDC

Portable Antennas

Part Number	Description
2000-1200-R	806 MHz to 866 MHz, SMA(m), 50 Ω
2000-1473-R	870 MHz to 960 MHz, SMA(m), 50 Ω
2000-1035-R	896 MHz to 941 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1030-R	1710 MHz to 1880 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1474-R	1710 MHz to 1880 MHz with knuckle elbow (1/2 wave)
2000-1031-R	1850 MHz to 1990 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1475-R	1920 MHz to 1980 MHz and 2110 MHz to 2170 MHz, SMA(m), 50 Ω
2000-1032-R	2400 MHz to 2500 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1361-R	2400 MHz to 2500 MHz, 5000 MHz to 6000 MHz, SMA(m), 50 Ω
2000-1636-R	Antenna Kit (Consists of: 2000-1030-R, 2000-1031-R, 2000-1032-R, 2000-1200-R, 2000-1035-R, 2000-1361-R, and carrying pouch)
2000-1751-R	Dipole, 698-960/1710-2170/2500-2700 MHz, SMA(m), 2 dBi, typical, 50 Ω

Isotropic Antennas

Part Number	Description
2000-1791-R	Isotropic Antenna, 700 MHz to 6000 MHz, N(m)
2000-1792-R	Isotropic Antenna, 30 MHz to 3000 MHz, N(m)
2000-1800-R	Isotropic Antenna, 9 kHz to 300 MHz, N(m)

Mag Mount and Broadband Antennas

Part Number	Description
2000-1616-R	20 MHz to 21000 MHz, N(f), 50 Ω
2000-1645-R	694 MHz to 894 MHz, 3 dBi peak gain 1700 MHz to 2700 MHz, 3 dBi peak gain, N(m), 50 Ω, 10 ft
2000-1646-R	750 MHz to 1250 MHz, 3 dBi peak gain, 1650 MHz to 2700 MHz, 5 dBi peak gain
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
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
2000-1648-R	1700 MHz to 6000 MHz, 3 dBi peak gain, N(m), 50 Ω, 10 ft

Filters

Part Number	Description
1030-114-R	806 MHz to 869 MHz, N(m) to SMA(f), 50 Ω
1030-109-R	824 MHz to 849 MHz, N(m) to SMA(f), 50 Ω
1030-110-R	880 MHz to 915 MHz, N(m) to SMA(f), 50 Ω
1030-111-R	1850 MHz to 1910 MHz, N(m) to SMA(f), 50 Ω
1030-112-R	2400 MHz to 2484 MHz, N(m) to SMA(f), 50 Ω
1030-105-R	890 MHz to 915 MHz, N(m) to N(f), 50 Ω
1030-106-R	1710 MHz to 1790 MHz, N(m) to N(f), 50 Ω
1030-107-R	1910 MHz to 1990 MHz, N(m) to N(f), 50 Ω
1030-149-R	High Pass, 150 MHz, N(m) to N(f), 50 Ω
1030-150-R	High Pass, 400 MHz, N(m) to N(f), 50 Ω
1030-151-R	High Pass, 700 MHz, N(m) to N(f), 50 Ω
1030-152-R	Low Pass, 200 MHz, N(m) to N(f), 50 Ω
1030-153-R	Low Pass, 550 MHz, N(m) to N(f), 50 Ω
1030-155-R	2500 MHz to 2700 MHz, N(m) to N(f), 50 Ω
1030-178-R	1920 MHz to 1980 MHz, N(m) to N(f), 50 Ω
1030-179-R	777 MHz to 798 MHz, N(m) to N(f), 50 Ω
1030-180-R	2500 MHz to 2570 MHz, N(m) to N(f), 50 Ω
2000-1684-R	791 MHz to 821 MHz, N(m) to N(f), 50 Ω
2000-1734-R	Bandpass Filter, 699 MHz to 715 MHz, N(m) and N(f), 50 Ω
2000-1735-R	Bandpass Filter, 776 MHz to 788 MHz, N(m) and N(f), 50 Ω
2000-1736-R	Bandpass Filter, 815 MHz to 850 MHz, N(m) and N(f), 50 Ω
2000-1737-R	Bandpass Filter, 1711 MHz to 1756 MHz, N(m) and N(f), 50 Ω
2000-1738-R	Bandpass Filter, 1850 MHz to 1910 MHz, N(m) and N(f), 50 Ω
2000-1739-R	Bandpass Filter, 880 MHz to 915 MHz, N(m) and N(f), 50 Ω
2000-1740-R	Bandpass Filter, 1710 MHz to 1785 MHz, N(m) and N(f), 50 Ω
2000-1741-R	Bandpass Filter, 1920 MHz to 1980 MHz, N(m) and N(f), 50 Ω
2000-1742-R	Bandpass Filter, 832 MHz to 862 MHz, N(m) and N(f), 50 Ω
2000-1743-R	Bandpass Filter, 2500 MHz to 2570 MHz, N(m) and N(f), 50 Ω
2000-1799-R	Bandpass Filter, 2305 MHz to 2320 MHz, N(m) and N(f), 50 Ω
2000-1911-R	Bandpass Filter, 703 MHz to 748 MHz, N(m) and N(f), 50 Ω
2000-1912-R	Bandpass Filter, 788 MHz to 798 MHz, N(m) and N(f), 50 Ω
2000-1925-R	Bandpass Filter, 663 MHz to 698 MHz, N(m) and N(f), 50 Ω
2000-1926-R	Bandpass Filter, 776 MHz to 806 MHz, N(m) and N(f), 50 Ω

Attenuators

Part Number	Description
3-1010-122	20 dB, 5 W, DC to 12.4 GHz, N(m) to N(f)
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)
3-1010-123	30 dB, 50 W, DC to 8.5 GHz, N(m) to N(f)
1010-127-R	30 dB, 150 W, DC to 3 GHz, N(m) to N(f)
3-1010-124	40 dB, 100 W, DC to 8.5 GHz, N(m) to N(f), Uni-directional
1010-121-R	40 dB, 100 W, DC to 18 GHz, N(m) to N(f), Uni-directional
1010-128-R	40 dB, 150 W, DC to 3 GHz, N(m) to N(f)

Phase-Stable Test Port Cables, Armored w/ Reinforced Grip (Recommended for cable & antenna line sweep applications)

Part Number	Description
15RNFN50-1.5-R	1.5 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15RDFN50-1.5-R	1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 Ω
15RDN50-1.5-R	1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 Ω
15RNFN50-3.0-R	3.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15RDFN50-3.0-R	3.0 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

Phase-Stable Test Port Cables, Armored (recommended for use with tightly spaced connectors and other general purpose applications)

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

Adapters

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

Precision Adapters

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

NEON® MA8100A Signal Mapper

Model Number	Description
MA8100A-001	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 1 year NEON Software License with 1 year of maintenance and support and 1 year of Cloud Service.
MA8100A-003	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 3 year NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service.
MA8100A-005	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 5 year NEON Software License with 5 years of maintenance and support and 5 years of Cloud Service.
MA8100A-100	NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes Perpetual NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service.
2300-606	Perpetual NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service. Part number can also be used to order a perpetual license after a limited term license has expired.
2300-612	Renewal of 1 year NEON Software License with 1 year of maintenance and support and 1 year of Cloud Service.
2300-613	Renewal of 3 year NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service.
2300-614	Renewal of 5 year NEON Software License with 5 years of maintenance and support and 5 years of Cloud Service.
2000-1852-R	NEON Tracking Unit (includes USB cable and belt clip, Worldwide version)
2000-2015-R	NEON Tracking Unit (includes USB cable and belt clip, Japan version)
2000-1853-R	Belt clip (for NEON Tracking Unit)

Miscellaneous Accessories

Part Number	Description
2000-1374-R	External Dual Charger for Li-Ion Batteries
633-75	Rechargeable Li-Ion Battery, 7500 mAh
2000-1689-R	EMI Near Field Probe Kit
MA2700A	Handheld Interference Hunter (For full specifications, refer to the MA2700A Technical Data Sheet 11410-00692)
2000-1884-R	PIM Hunter™ Test Probe (For full specifications, refer to the 2000-1884-R Technical Data Sheet 11410-00999)
2000-1691-R	Stylus with Coiled Tether
2000-1797-R	Touchscreen Protective Film, 8.4 in
2000-1798-R	Port Extender, DC to 6 GHz, N(m) to N(f)
MA25401A	Atomic Clock External 10 MHz Frequency Reference (see 11410-01134 for details)
66864	Rack Mount Kit, Master Platform

Backpack and Transit Case

Part Number	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")
760-261-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, several Yagi antennas and filters
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)
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")

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