

Spectrum MasterTM

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
- CDMA, EV-DO
- GSM/EDGE
- W-CDMA/HSPA+
- TD-SCDMA/HSPA+
- Fixed, Mobile WiMAX
- EMF Test
- ISDB-T, ISDB-T SFN
- DVB-T/H, DVB-T/H SFN
- Gated Sweep
- Tracking Generator
- Internal Preamplifier standard
- Internal Bias-Tee
- Internal Power Meter
- High Accuracy Power Meter
- 4, 6, 8, 18, 26 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 & Optional Ethernet (Option 0411) for data transfer and instrument control
- Increase throughput by automating repetitive or operator intensive tasks via Ethernet or USB. Remote programming provided via Ethernet (Option 0411).
- Master Software Tools
- Line Sweep Tools



Spectrum MasterTM MS2712E Spectrum Analyzer featuring 8.4 inch Daylight Viewable Touchscreen
Compact Size: 273 mm x 199 mm x 91 mm (10.7 in x 7.8 in x 3.6 in), Lightweight: 3.45 kg (7.6 lb)

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Definitions

All specifications and characteristics apply under the following conditions, unless otherwise stated:	
Warm-Up Time	After 10 minutes of warm-up time, where the instrument is left in the ON state.
Temperature Range	Over the 23 °C ± 5 °C temperature range.
Reference Signal	When using internal reference signal.
Typical Performance	Typical specifications that are not in parenthesis are not tested and not warranted. They are generally representative of characteristic performance. Typical specifications in parenthesis () represent the mean value of measured units and do not include any guard-bands or uncertainties. They are not warranted.
Uncertainty	A coverage factor of x1 is applied to the measurement uncertainties to facilitate comparison with other industry handheld analyzers.
Calibration Cycle	Calibration is within the recommended 12 month period (residual specifications also require calibration kit calibration cycle adherence.) 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

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 0431)
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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, Recall, Delete, Directory Management
Save/Recall	Setups, Measurements, Limit Lines, Screen Shots (.jpg) (save only), Save-on-Event
Save-on-Event	Crossing Limit Line, Sweep Complete, Save-then-Stop, Clear All
Delete	Selected File, All Measurements, All Mode Files, All Content
Directory Management	Sort Method (Name/Type/Date), Ascend/Descend, Internal/USB, Copy, Format 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 0090)
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, 10 μs to 600 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 ($\geq$ 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	-120 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: dBm, dBV, dBmV, dBμV, dBW, dBmW, dBμW, 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	$\pm$ 2.0 dB typical (Preamp Off)
100 kHz to 4.0 GHz	$\pm$ 1.25 dB, $\pm$ 0.5 dB typical
> 4.0 GHz to 6 GHz	$\pm$ 1.50 dB, $\pm$ 0.5 dB typical

Displayed Average Noise Level (DANL)

(RBW = 1 Hz, 0 dB attenuation)	Preamp Off (Reference Level -20 dBm)		Preamp On (Reference Level -50 dBm)	
	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 $\pm$ (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

Bias-Tee (Option 0010)

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 0431)****Measurements**

Indoor Mapping	Outdoor Mapping
RSSI	RSSI
ACPR	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 Test (EMF) (Option 0444)****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

MS2712E	700 MHz to 4 GHz using 2000-1791-R antenna
MS2713E	700 MHz to 6 GHz using 2000-1791-R antenna

Supported Antennas

700 MHz to 6 GHz, Anritsu 2000-1791-R

Modes where EMF Measurements available

Spectrum Analyzer
 LTE OTA (Option 0546)
 TD-LTE OTA (Option 0556)
 W-CDMA OTA (Option 0035)

Ethernet Connectivity (Option 0411)

Connector	RJ45
LAN Speed	10 Mbps
Mode	Static, DHCP
Static IP settings	IP address Subnet Mask IP Gateway
Remote Control	Remote Access utility provided with Master Software Tools
Data Upload	With Line Sweep Tools through LAN connection

**Interference Analyzer (Option 0025)****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 to one week
Signal Strength	Gives visual and aural indication of signal strength
Received Signal Strength Indicator	Collect data up to 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	Triangulate location of interference with on-display maps

Application Options

Bias-Tee	On/Off
Impedance	50 Ω , 75 Ω , Other

GPS Receiver Option (Option 0031) (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 (Option 0020)****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*
Zero Span Behavior	CW Output
Output Connector	Type N female, 50 Ω
Damage Level	+ 23 dBm ± 50 VDC (limited dv/dt)

* Using field calibration, relative to spectrum analyzer input with ≥ 3 dB attenuator

**Channel Scanner (Option 0027)****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 0090)**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 μ s to 65 ms typical)
	Zero Span Time

20 MHz BW Demod (Option 0009)

Required for all signal analyzers except AM/FM/PM Signal Analyzer, Option 509

**Power Meter (Option 0029)****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 0019)** (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	PSN50	MA24105A	MA24106A	MA24108A/18A/26A
Description	High Accuracy RF Power Sensor	Inline High Power Sensor	High Accuracy RF Power Sensor	Microwave USB Power Sensor
Frequency Range	50 MHz to 6 GHz	350 MHz to 4 GHz	50 MHz to 6 GHz	10 MHz to 8/18/26 GHz
Connector	Type N(m), 50 Ω	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)
Dynamic Range	-30 dBm to +20 dBm (0.001 mW to 100 mW)	+3 dBm to +51.76 dBm (2 mW to 150 W)	-40 dBm to +23 dBm (0.1 μ W to 200 mW)	-40 dBm to +20 dBm (0.1 μ W to 100 mW)
VBW	100 Hz	100 Hz	100 Hz	50 kHz
Measurand	True-RMS	True-RMS	True-RMS	True-RMS, Slot Power, Burst Average Power
Measurement Uncertainty	± 0.16 dB ¹	± 0.17 dB ²	± 0.16 dB ¹	± 0.18 dB ³
Data sheet (for complete specifications)	11410-00414	11410-00621	11410-00424	11410-00504
Notes:	1. Total RSS measurement uncertainty (0 $^{\circ}$ C to 50 $^{\circ}$ C) for power measurements of a CW signal greater than -20 dBm with zero mismatch errors. 2. 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. 3. Expanded uncertainty with K = 2 for power measurements of a CW signal greater than -20 dBm with zero mismatch errors.			

 LTE/LTE-A Signal Analyzers (Options 0541, 0542, 0546, 0551, 0552, 0556)
Measurements

RF (Option 0541 FDD) (Option 0551 TDD)	Modulation (Option 0542 FDD) (Option 0552 TDD)	Over-the-Air (OTA) (Option 0546 FDD) (Option 0556 TDD)	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, 16 QAM, 64 QAM 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 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 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 Requires Option 0542 FDD/0552 TDD 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 – 28 (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 (FDD Only)
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 Signal Analyzers (Options 0541, 0542, 0546, 0551, 0552, 0556)** (Continued)**LTE/LTE-A RF Measurements (Options 0541, 0551)**

RF Channel Power Accuracy	± 1.5 dB, ± 1.0 dB typical, (RF input -50 dBm to +10 dBm) (Option 0541)
	± 1.5 dB, ± 1.0 dB typical, (RF input -30 dBm to +10 dBm) (Option 0551)

LTE/LTE-A Modulation Measurements (Options 0542, 0552)

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 (Options 0546, 0556)

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

**GSM/EDGE Signal Analyzers (Options 0040, 0041)****Measurements**

RF (Option 0040)	Demodulation (Option 0041)	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 (Option 0040) (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 (Option 0041) (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 %


W-CDMA/HSPA+ Signal Analyzers (Options 0044, 0065, 0035)
Measurements

RF (Option 0044)	Demodulation (Option 0065)	Over-the-Air (OTA) (Option 0035)	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_0 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 (Option 0044) (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 (Option 0065) (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, 16 QAM, 64 QAM
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 (Option 0035)

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



CDMA Signal Analyzers (Options 0042, 0043, 0033)

Measurements

RF (Option 0042)	Demodulation (Option 0043)	Over-the-Air (OTA) (Option 0033)	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 (Option 0042) (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)
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Demodulation (Option 0043) (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 (Option 0033)

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

 EV-DO Signal Analyzers (Options 0062, 0063, 0034)
Measurements

RF (Option 0062)	Demodulation (Option 0063)	Over-the-Air (OTA) (Option 0034)	Pass/Fail (User Editable)
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 Multipath 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 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
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 (Option 0062) (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)
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Demodulation (Option 0063) (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 (Option 0034)

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



Fixed WiMAX Signal Analyzers (Options 0046, 0047)

Measurements

RF (Option 0046)	Demodulation (Option 0047)	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 (Option 0046) (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)
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Demodulation (Option 0047) (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)


Mobile WiMAX Signal Analyzers (Options 0066, 0067, 0037)
Measurements

RF (Option 0066)	Demodulation (Option 0067)	Over-the-Air (OTA) (Option 0037)	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 (Option 0066) (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)
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Demodulation (Option 0067) (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 (Option 0037)

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

*These options conform 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 Analyzers (Options 0060, 0061, 0038)
Measurements

RF (Option 0060)	Demodulation (Option 0061)	Over-the-Air (OTA) (Option 0038)	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/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 Shot (JPEG - save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

RF Measurements (Option 0060) (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 (Option 0061) (Temperature range 15 °C to 35 °C)

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 (Option 0038)

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

**ISDB-T Measurements (Options 0030, 0079, 0032)**

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

Measurements

ISDB-T RF (Option 0030)	ISDB-T Signal Analysis (Option 0030)	ISDB-T BER Analysis (Option 0079)	ISDB-T SFN Analysis (Option 0032)
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 (Option 0030 only)

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 0030)

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 0079) (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 0032)

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)
Inband Spectrum Range	± 2.74 MHz (Mode 2), ± 2.76 MHz (Mode 3) (Bandwidth 6 MHz)

**DVB-T/H (Options 0064, 0057, 0078)**

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

Measurements

DVB-T/H RF (Option 0064)	DVB-T/H Signal Analysis (Option 0064)	DVB-T/H BER Analysis (Option 0057)	DVB-T/H SFN Analysis (Option 0078)
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
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 0064)

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 0057)

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 0078)

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)

*Not available for BER measurements



AM/FM/PM Signal Analyzers (Option 0509)

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), $\pm 2\%$ (> 100 Hz) Depth: $\pm 5\%$ for (Modulation rates 10 Hz to 100 kHz)
FM	Modulation Rate: ± 1 Hz (< 100 Hz); $\pm 2\%$ (100 Hz to 100 kHz) Deviation Accuracy: $\pm 5\%$ (100 Hz to 100 kHz)**
PM	Modulation Rate: ± 1 Hz (< 100 Hz); $\pm 2\%$ (100 Hz to 100 kHz) Deviation Accuracy: $\pm 5\%$ (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 μ s to 50 ms (Audio Waveform)

** IFBW must be greater than 95 % occupied BW

General Specifications

Setup Parameters

System	Status (Temperature, Battery Info, Serial Number, Firmware Version, Options Installed) Self Test, Application Self Test GPS (see Option 0031)
System Options	Name, Date and Time, Brightness, Volume Language (English, French, German, Spanish, Chinese, Japanese, Korean, Italian, Russian, User defined) Reset (Factory Defaults, Master Reset, Update Firmware)
File	Save, Recall, Delete, Directory Management
Save/Recall	Setups, Measurements, Screen Shots (.jpg) (save only)
Delete	Selected File, All Measurements, All Mode Files, All Content
Directory Management	Sort Method (Name/Type/Date), Ascend/Descend, Internal/USB, Copy, Format USB
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

Connectors

RF Out	Type N, female, 50 Ω
RF Out Damage Level	23 dBm, $\pm$ 50 VDC
RF In	Type N, female, 50 Ω
RF In Damage Level	+33 dBm peak, $\pm$ 50 VDC, Maximum Continuous Input ($\geq$ 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 (Available with option 0411 Ethernet)
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 $\pm$ 5 VDC

Display

Type	Resistive Touchscreen
Size	8.4 inch daylight viewable color LCD
Resolution	800 x 600
Pixel Defects	No more than one defective pixel (99.9997% good pixels)

Battery

Type	Li-Ion
Battery Operation	3.0 hours, typical
Battery Charging Limits	0 °C to +45 °C, Relative Humidity $\leq$ 80 %

Electromagnetic Compatibility

European Union	CE Mark, EMC Directive 2004/108/EC Low Voltage Directive 2006/95/EC
Australia and New Zealand	C-tick N274
Interference	EN 61326-1
Emissions	EN 55011
Immunity	EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-11

Safety

Safety Class	EN 61010-1 Class 1
Product Safety	IEC 60950-1 when used with Company supplied Power Supply

Warranty

Duration	Standard three-year warranty One-year warranty on battery
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General Specifications (Continued)

Environmental

Operating Temperature	−10 °C to +55 °C
Maximum Humidity	95 % RH (non-condensing) at 40 °C
Shock	MIL-PRF-28800F Class 2
Storage	−40 °C to +71 °C
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
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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)

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, Smith Chart, and PIM
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
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easyTest Tools (for your PC)**Instrument Mode**

Spectrum Analyzer

Commands

Display Image	Allows putting a custom image on the instrument screen
Recall Setup	Places the instrument into a known state
Prompt	Displays instructional messages on the instrument screen
Save	Allows automatic or manual saving of traces

Master Software Tools (for your PC)**Mapping** (GPS Required)

Spectrum Analyzer Mode	MapInfo, MapPoint
Mobile WiMAX OTA, LTE OTA Options	Google Earth, Google Maps, MapInfo

Folder Spectrogram (Spectrum Monitoring for Interference Analysis and Spectrum Clearing)

Folder Spectrogram – 2D View	Creates a composite file of multiple traces Peak Power, Total Power, Peak Frequency, Histogram, Average Power (Max/Min) File Filter (Violations over limit lines or deviations from averages) Playback
Video Folder Spectrogram – 2D View	Create AVI file to export for management review/reports
Folder Spectrogram – 3D View	Views (Set Threshold, Markers) - 3D (Rotate X, Y, Z Axis, Level Scale, Signal ID) - Playback (Frequency and/or Time Domain)

List/Parameter Editors

Traces	Add, delete, and modify limit lines and markers
Product Updates	Auto-checks Anritsu website for latest revision firmware
Pass/Fail	Create, download, or edit Signal Analysis Pass/Fail Limits
Languages	Add custom language or modify non-English language menus

Script Master™

Channel Scanner Mode	Automate scan up to 1200 channels, repeat for sets of 20 channels, repeat all channels
GSM/GPRS/EDGE or W-CDMA/HSPA+ Mode	Automate Signal Analysis testing requirements with annotated how-to pictures

Connectivity

Connections	Connect to PC using USB, Ethernet
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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 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 0031 recommended)
	MS2712E-0027	MS2713E-0027	Channel Scanner
	MS2712E-0431	MS2713E-0431	Coverage Mapping (requires Option 0031)
	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-0040	MS2713E-0040	GSM/EDGE RF Measurements*
	MS2712E-0041	MS2713E-0041	GSM/EDGE Demodulation*
	MS2712E-0044	MS2713E-0044	W-CDMA/HSPA+ RF Measurements*
	MS2712E-0065	MS2713E-0065	W-CDMA/HSPA+ Demodulation*
	MS2712E-0035	MS2713E-0035	W-CDMA/HSPA+ OTA Measurements* (Option 0031 recommended)
	MS2712E-0541	MS2713E-0541	LTE/LTE-A RF Measurements*
	MS2712E-0542	MS2713E-0542	LTE/LTE-A Modulation Quality*
	MS2712E-0546	MS2713E-0546	LTE/LTE-A OTA Measurements* (requires Options 0031 and 0542 for full functionality)
	MS2712E-0551	MS2713E-0551	TD-LTE/LTE-A RF Measurements*
	MS2712E-0552	MS2713E-0552	TD-LTE/LTE-A Modulation Quality*
	MS2712E-0556	MS2713E-0556	TD-LTE/LTE-A OTA Measurements* (requires Options 0031 and 0552 for full functionality)
	MS2712E-0060	MS2713E-0060	TD-SCDMA/HSPA+ Measurements*
	MS2712E-0061	MS2713E-0061	TD-SCDMA/HSPA+ Demodulation*
	MS2712E-0038	MS2713E-0038	TD-SCDMA/HSPA+ OTA Measurements* (requires Option 0031 for full functionality)
	MS2712E-0042	MS2713E-0042	CDMA RF Measurements*
	MS2712E-0043	MS2713E-0043	CDMA Demodulation*
	MS2712E-0033	MS2713E-0033	CDMA OTA Measurements* (requires Option 0031)
	MS2712E-0062	MS2713E-0062	EV-DO RF Measurements*
	MS2712E-0063	MS2713E-0063	EV-DO Demodulation*
	MS2712E-0034	MS2713E-0034	EV-DO OTA Measurements* (requires Option 0031)
	MS2712E-0046	MS2713E-0046	Fixed WiMAX RF Measurements*
	MS2712E-0047	MS2713E-0047	Fixed WiMAX Demodulation*
	MS2712E-0066	MS2713E-0066	Mobile WiMAX RF Measurements*
	MS2712E-0067	MS2713E-0067	Mobile WiMAX Demodulation*
	MS2712E-0037	MS2713E-0037	Mobile WiMAX OTA Measurements* (requires Option 0031 for full functionality)
	MS2712E-0030	MS2713E-0030	ISDB-T Digital Video Measurements
	MS2712E-0032	MS2713E-0032	ISDB-T SFN Measurements
	MS2712E-0079	MS2713E-0079	ISDB-T BER Measurements (requires Option 0030, cannot be ordered with Option 0411)
	MS2712E-0064	MS2713E-0064	DVB-T/H Digital Video Measurements*
	MS2712E-0078	MS2713E-0078	DVB-T/H SFN Measurements*
	MS2712E-0057	MS2713E-0057	DVB-T/H BER Measurements (requires Option 0064, cannot be ordered with Option 0411)
	MS2712E-0411	MS2713E-0411	Ethernet Connectivity
	MS2712E-0098	MS2713E-0098	Standard Calibration (ANSI Z540-1-1994)
	MS2712E-0099	MS2713E-0099	Premium Calibration (ANSI Z540-1-1994) plus printed test data

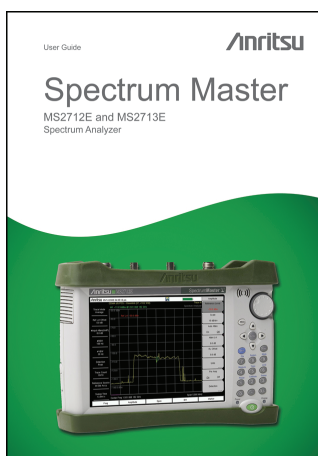
*Requires Option 0009

Standard Accessories (Included with instrument)

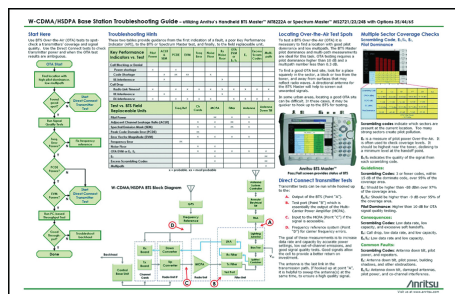
Part Number	Description
10920-00060	Handheld Instruments Documentation Disc
2300-577	Anritsu Software Tool Box for Handheld RF Instruments Disc
2000-1654-R	Soft Carrying Case
2000-1691-R	Stylus with Coiled Tether
2000-1797-R	Touchscreen Protective Film, 8.4 in
633-75	Rechargeable Li-Ion Battery, 7500 mAh
40-187-R	AC-DC Adapter
806-141-R	Automotive Power Adapter, 12 VDC, 60 W
3-2000-1498	USB A/5-pin mini-B Cable, 10 ft/305 cm

Power Sensors (For complete ordering information see the respective datasheets of each sensor)

Model Number	Description
PSN50	High Accuracy RF Power Sensor, 50 MHz to 6 GHz, +20 dBm
MA24105A	Inline High/Peak Power Sensor, 350 MHz to 4 GHz, +3 dBm to +51.76 dBm
MA24106A	High Accuracy RF 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
MA25100A	RF Power Indicator

Manuals (Soft copy included on Handheld Instruments Documentation Disc and at www.anritsu.com)

Part Number	Description
10920-00060	Handheld Instruments Documentation Disc
10580-00251	Spectrum Master User Guide
10580-00244	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
10580-00256	Programming Manual

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 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

Optional Accessories

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

Directional Antennas



Part Number	Description
2000-1411-R	822 MHz to 900 MHz, N(f), 10 dBd, Yagi
2000-1412-R	885 MHz to 975 MHz, N(f), 10 dBd, Yagi
2000-1413-R	1710 MHz to 1880 MHz, N(f), 10 dBd, Yagi
2000-1414-R	1850 MHz to 1990 MHz, N(f), 9.3 dBd, Yagi
2000-1415-R	2400 MHz to 2500 MHz, N(f), 10 dBd, Yagi
2000-1416-R	1920 MHz to 2170 MHz, N(f), 10 dBd, Yagi
2000-1659-R	698 MHz to 787 MHz, N(f), 8 dBd, Yagi
2000-1660-R	1425 MHz to 1535 MHz, N(f), 12.2 dBd, 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), 12 dBd, Yagi
2000-1747-R	Antenna, Log Periodic, 300 MHz to 5000 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)

Portable Antennas

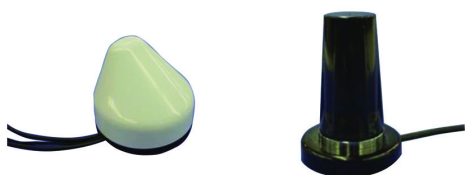


Part Number	Description
2000-1200-R	806 MHz to 866 MHz, SMA(m), 50 Ω
2000-1473-R	870 MHz to 960 MHz, SMA(m), 50 Ω
2000-1035-R	896 MHz to 941 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1030-R	1710 MHz to 1880 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1474-R	1710 MHz to 1880 MHz with knuckle elbow (1/2 wave)
2000-1031-R	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	TE Dipole, 698-960/1710-2170/2500-2700 MHz, SMA(m), 2 dBi, typical, 50 W

Isotropic Antenna



Part Number	Description
2000-1791-R	Isotropic Antenna, 700 MHz to 6000 MHz, N(m)

Optional Accessories (Continued)**Mag Mount Broadband Antennas**

Part Number	Description
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
2000-1645-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 2000 MHz 5 dBi peak gain, 2100 MHz to 2700 MHz 3 dBi peak gain, N(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



Optional Accessories (Continued)**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	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
15RNF50-1.5-R	1.5 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15RDF50-1.5-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
15RNF50-3.0-R	3.0 m, DC to 6 GHz, N(m) to N(f), 50 Ω
15RDF50-3.0-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	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
510-90-R	7/16 DIN(f) to N(m), DC to 7.5 GHz, 50 Ω
510-91-R	7/16 DIN(f) to N(f), DC to 7.5 GHz, 50 Ω
510-92-R	7/16 DIN(m) to N(m), DC to 7.5 GHz, 50 Ω
510-93-R	7/16 DIN(m) to N(f), DC to 7.5 GHz, 50 Ω
510-96-R	7/16 DIN(m) to 7/16 DIN (m), DC to 7.5 GHz, 50 Ω
510-97-R	7/16 DIN(f) to 7/16 DIN (f), DC to 7.5 GHz, 50 Ω
510-102-R	N(m) to N(m), DC to 11 GHz, 50 Ω, 90 degrees right angle

Optional Accessories (Continued)**Precision Adapters****Part Number Description**

- | | |
|---------|---|
| 34NN50A | Precision Adapter, N(m) to N(m), DC to 18 GHz, 50 Ω |
| 34NFN50 | Precision Adapter, N(f) to N(f), DC to 18 GHz, 50 Ω |

Miscellaneous Accessories**Part Number Description**

- | | |
|-------------|---|
| 2000-1374 | External Dual Charger for Li-Ion Batteries |
| 633-75 | Rechargeable Li-Ion Battery, 7500 mAh |
| 69793 | CW Signal Generator Kit |
| 2000-1689 | EMI Near Field Probe Kit |
| MA2700A | Handheld Interference Hunter (For full specifications, refer to the MA2700A Technical Data Sheet 11410-00692) |
| 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) |

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 |
| 760-271-R | Transit Case for Portable Directional Antennas and Port Extender (2000-1777-R, 2000-1778-R, 2000-1779-R, 2000-1798-R) |



The Master Users Group is an organization dedicated to providing training, technical support, networking opportunities and links to Master product development teams. As a member, you will receive the Insite Quarterly Newsletter with user stories, measurement tips, new product news and more. Visit us to register today: www.anritsu.com/mug



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