

# BTS Master<sup>TM</sup>

## High Performance Handheld Base Station Analyzer

MT8221B

MT8222B

400 MHz to 4.0 GHz

400 MHz to 6.0 GHz

Cable and Antenna Analyzer

150 kHz to 7.1 GHz

150 kHz to 7.1 GHz

Spectrum Analyzer

10 MHz to 7.1 GHz

10 MHz to 7.1 GHz

Power Meter

### Introduction

Anritsu introduces its next generation high performance handheld Base Station Analyzer for installation and maintenance of wireless networks. The BTS Master features the latest support for HSPA+ and LTE and is a future-proof platform with 20 MHz demodulation bandwidth and a Vector Signal Generator for receiver testing.

#### Cable and Antenna Analyzer Highlights

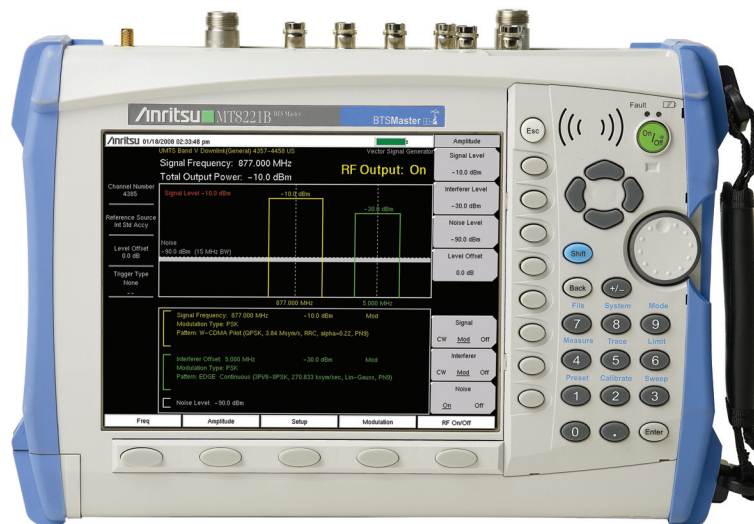
- Measurements: RL, VSWR, Cable Loss, DTF, Phase, Gain
- 2-port Gain Measurement Uncertainty: < 0.45 dB
- 2-port Dynamic Range: > 80 dB
- RF Immunity: +17 dBm on-channel, +10 dBm on-frequency
- Calibration: OSL and FlexCal<sup>TM</sup>
- Bias Tee: 32 V internal

#### Spectrum and Interference Analyzer Highlights

- Measurements: Occupied Bandwidth, Channel Power, ACPR, C/I
- Interference Analyzer: Spectrogram, Signal Strength, RSSI, Signal ID
- Dynamic Range: > 95 dB in 1 Hz RBW
- DANL: -163 dBm in 1 Hz RBW
- Phase Noise: -100 dBc/Hz @ 10 kHz offset
- Frequency Accuracy: ± 25 ppb with GPS On

#### Capabilities and Functional Highlights

- |                       |                                    |                                   |                                   |
|-----------------------|------------------------------------|-----------------------------------|-----------------------------------|
| • LTE, TD-LTE         | • PIM Analyzer                     | • Internal Power Meter            | • Backhaul Analyzers E1, T1, T3   |
| • GSM/GPRS/EDGE       | • Vector Signal Generator          | • High Accuracy Power Meter       | • 2.5 hour battery operation time |
| • W-CDMA/HSPA+        | • Zero-span IF Output              | • USB Power Sensors, up to 26 GHz | • Ethernet/USB Data Transfer      |
| • TD-SCDMA/HSPA+      | • Gated Sweep                      | • Channel Scanner                 | • MST Remote Access Tool          |
| • CDMA, EV-DO         | • GPS information on stored traces | • < 5 minute warm-up time         | • Line Sweep Tools                |
| • Fixed, Mobile WiMAX | • Standard Internal Preamp         |                                   |                                   |



BTS Master<sup>TM</sup> MT822xB Base Station Analyzer featuring Vector Signal Generator  
 Handheld Size: 315 mm x 211 mm x 94 mm (12.4 in x 8.3 in x 3.7 in), Lightweight: 4.9 kg (10.8 lb)



## Cable and Antenna Analyzer

### Measurements

Measurements	VSWR, Return Loss, Cable Loss, Distance-to-Fault (DTF) VSWR, Distance-to-Fault (DTF) Return Loss, 1-port Phase, 2-port Phase, 2-port Gain, Smith Chart
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### Setup Parameters

Frequency	Start/Stop, Signal Standard, Start Cal
DTF	Start/Stop, DTF Aid, Units (m/ft), Cable Loss, Propagation Velocity, Cable, Windowing
Windowing	Rectangular, Normal Side Lobe, Low Side Lobe, Minimum Side Lobe
Amplitude	Top, Bottom Auto Scale, Full Scale
Sweep	Run/Hold, Single/Continuous, RF Immunity (High/Low), Data Points, Averaging/Smoothing, Output Power (High/Low)
Data Points	137, 275, 551
Markers	Markers 1 to 6 each with a Delta Marker, Marker to Peak/Valley, Marker Table (On/Off), All Markers Off
Traces	Recall, Copy to Display Memory, No Trace Math, Trace + Memory, Trace - Memory, Trace Overlay (On/Off)
Limit Line	On/Off, Single Limit, Multi-segment (41), Limit Alarm, Clear
Limit Line Edit	Frequency, Amplitude, Add Point, Delete Point, Next Point Left, Next Point Right, Move Limit
Calibration	Start Cal, 1/2-port, Low/High Power, Standard/FlexCal™, DUT Connector, Configure DUT
Save/Recall	Setups, Measurements, Screen Shots (JPEG - save only)
Application Options	Bias-Tee (On/Off)

### Frequency

Frequency Range	400 MHz to 4 GHz (MT8221B), 400 MHz to 6 GHz (MT8222B)
Frequency Accuracy	± 3.0 ppm
Frequency Resolution	1 kHz (RF immunity low) 100 kHz (RF immunity high)

### Output Power

High	-7 dBm, typical, 1 or 2-port
Low	-40 dBm, typical, 2-port

### Dynamic Range

400 MHz to 3.0 GHz	80 dB
> 3.0 GHz to 4.0 GHz	70 dB

### Interference Immunity

On-Channel	+17 dBm @ >1.0 MHz from carrier frequency
On-Frequency	+10 dBm within ±10 kHz from the carrier frequency

### Measurement Speed

Return Loss	≤ 4.5 ms/data point, RF immunity low, typical
Distance-to-Fault	≤ 4.5 ms/data point, RF immunity low, typical

### Return Loss

Measurement Range	0 to 60 dB
Resolution	0.01 dB

### VSWR

Measurement Range	1:1 to 65:1
Resolution	0.01

### Cable Loss

Measurement Range	0 to 30 dB
Resolution	0.01 dB

### 2-Port Gain

Measurement Range	-120 to +100 dB
Resolution	0.01 dB



**Cable and Antenna Analyzer** (continued)

**Distance-to-Fault**

Vertical Range Return Loss	0 dB to 60 dB
Vertical Range VSWR	1 to 65
Fault Resolution (m)	$(1.5 \times 10^8 \times vp) / \Delta F$ (vp = velocity propagation constant, $\Delta F$ is F2-F1 in Hz)
Horizontal Range (m)	0 to (Data Points-1) x Fault Resolution, to a maximum of 1500 m (4921 ft)

**Phase (1- and 2-Port)**

Measurement Range	-180° to +180°
Resolution	0.01°

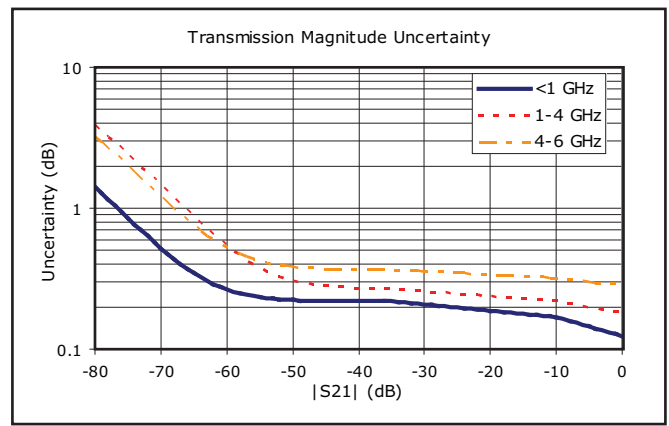
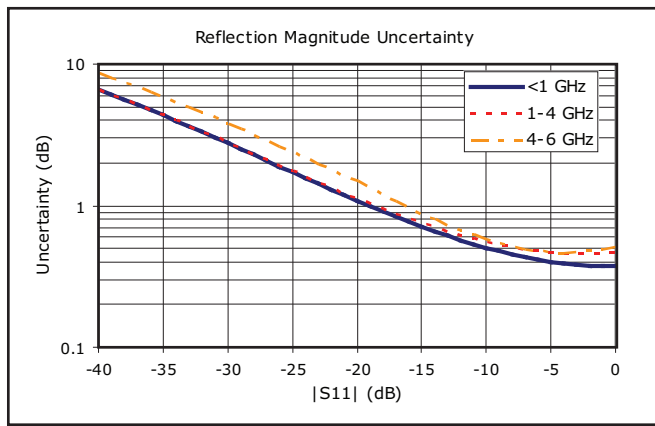
**Smith Chart**

Resolution	0.01
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**Measurement Accuracy**

Corrected Directivity	> 42 dB
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**Measurement Uncertainty**



**Bias-Tee (Option 0010)**

**General**

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



**PIM Analyzer**

(Requires PIM Master™) See Product Brochure 11410-00546



## Spectrum Analyzer

### Measurements

Smart Measurements	Field Strength (dBm/m <sup>2</sup> , dBW/m <sup>2</sup> , V/m, A/m, Watt/m <sup>2</sup> , Watt/cm <sup>2</sup> , or dBmV/m) 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, upper/lower SSB), (audio out only) C/I (carrier-to-interference ratio) Emission Mask (recall limit lines as emission mask) Coverage Mapping (requires Option 0431) IQ Waveform Capture (requires Option 0024)
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### Setup Parameters

Frequency	Center/Start/Stop, Span, Frequency Step, Frequency Offset, Signal Standard, Channel #
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/WBW, Span/RBW
Application Options	Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)

### Sweep Functions

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

### Limit Line Functions

Limit Lines	Upper/Lower, On/Off, Edit, Move, Envelope, Advanced, Limit Alarm, Default Limit
Limit Line Edit	Frequency, Amplitude, Add Point, Add Vertical, Delete Point, Next Point Left/Right
Limit Line Move	To Current Center Frequency, By dB or Hz, To Marker 1, Offset from Marker 1
Limit Line Envelope	Create Envelope, Update Amplitude, Number of Points (41), Offset, Shape Square/Slope
Limit Line Advanced	Type (Absolute/Relative), Mirror, Save/Recall

### Frequency

Frequency Range	150 kHz to 7.1 GHz (usable to 0 Hz)
Maximum Continuous Input	+30 dBm
Tuning Resolution	1 Hz
Frequency Reference	Aging: ± 1.0 ppm/10 years
Frequency Span	Accuracy: ± 0.3 ppm (25 °C ± 25 °C) + aging 10 Hz to 7.1 GHz including zero span
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)
RBW with Quasi-Peak Detection	200 Hz, 9 kHz, 120 kHz (-6 dB bandwidth)
VBW with Quasi-Peak Detection	Auto VBW is On, RBW/VBW = 1
VBW/Average Type	Linear/Log

### Spectral Purity

SSB Phase Noise	-100 dBc/Hz @ 10 kHz, 20 kHz and 30 kHz offset from carrier -102 dBc/Hz @ 100 kHz offset from carrier
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**Spectrum Analyzer** (continued)

**Amplitude Ranges**

Dynamic Range	> 95 dB (600 MHz, 3.5 GHz), 2/3 (TOI-DANL) in 1 Hz RBW
Measurement Range	DANL to +30 dBm
Display Range	1 dB to 15 dB/div in 1 dB steps, ten divisions displayed
Reference Level Range	-120 dBm to +30 dBm
Attenuator Resolution	0 dB to 65 dB, 5.0 dB steps
Amplitude Units	Log Scale Modes: dBm, dBV, dBmv, dBμV, dBW, dBA Linear Scale Modes: nV, μV, mV, V, kV, nW, μW, mW, W, kW, fA, pA, nA, μA, mA, A

**Amplitude Accuracy (Power level > -50 dBm)**

Input attenuation	Preamp Off (≤ 35 dB)	Preamp Off (40 to 55 dB)	Preamp Off (60 to 65 dB)	Preamp On (0 or 10 dB)
150 kHz to ≤10 MHz	± 1.50 dB	± 1.50 dB	± 1.50 dB	-
150 kHz to 4.0 GHz	-	-	-	± 1.50 dB
>10 MHz to 4.0 GHz	± 1.25 dB	± 1.75 dB	± 1.75 dB	-
>4.0 GHz to 6.5 GHz	-	± 1.75 dB	± 1.75 dB	-
>4.0 GHz to 7.1 GHz	± 1.75 dB	-	-	± 1.75 dB
>6.5 GHz to 7.1 GHz	-	± 2.00 dB	± 3.00 dB	-

**Displayed Average Noise Level (DANL)**

DANL in 1 Hz RBW, 0 dB attenuation	Preamp Off (Reference level -20 dBm)		Preamp On (Reference level -50 dBm)	
	Maximum	Typical	Maximum	Typical
3 MHz to 1.0 GHz	-137 dBm	-150 dBm	-161 dBm	-163 dBm
> 1.0 GHz to 2.2 GHz	-133 dBm	-147 dBm	-159 dBm	-160 dBm
> 2.2 GHz to 4.0 GHz	-133 dBm	-143 dBm	-156 dBm	-159 dBm
> 4.0 GHz to 7.1 GHz	-130 dBm	-138 dBm	-154 dBm	-156 dBm

**Spurs**

Residual Spurs	Preamp Off (RF input terminated, 0 dB input attenuation) -90 dBm, 150 kHz to 3.2 GHz -84 dBm, > 3.2 GHz to 7.1 GHz
Exceptions	-70 dBm @ 3200 MHz
Input-Related Spurious	Preamp On (RF input terminated, 0 dB input attenuation) -100 dBm, 10 MHz to 7.1 GHz
Exceptions	-95 dBm @ 50, 100, 150 MHz
Input-Related Spurious	(0 dB attenuation, -30 dBm input, span <1.7 GHz, carrier offset > 4.5 MHz) -60 dBc, -70 dBc typical
Exceptions	-40 dBc, -60 dBc typical @ 1672 MHz

**Third-Order Intercept (TOI)**

Preamp Off	
600 MHz	+8 dBm typical
3.5 GHz	+9 dBm typical

**Second Harmonic Distortion**

Preamp Off	-50 dBc maximum -70 dBc typical
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**VSWR**

<4.0 GHz	1:5:1 typical
4.0 GHz to 7.1 GHz	1.8:1 typical



**Power Meter**

**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 7.1 GHz
Span	1 kHz to 100 MHz
Display Range	-140 dBm to +30 dBm, ≤ 40 dB span
Measurement Range	-120 dBm to +30 dBm
Offset Range	0 to +100 dB
VSWR	1.5:1 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	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 μW to 200 mW)	-40 dBm to +20 dBm (0.1 μW 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 <sup>1</sup>	± 0.17 dB <sup>2</sup>	± 0.16 dB <sup>1</sup>	± 0.18 dB <sup>3</sup>
Data Sheet (for complete specifications)	11410-00414	11410-00621	11410-00424	11410-00504

- Notes:
1. Total RSS measurement uncertainty (0 °C to 50 °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.



**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, Signal Analyzers  
 GPS Lock Accuracy when GPS Antenna is connected:  
 ± 25 ppb with GPS On, 3 minutes after satellite lock in selected mode  
 after antenna is disconnected:  
 ± 50 ppb for 3 days, 0 °C to 50 °C ambient temperature  
 Connector SMA, female



**Coverage Mapping (Option 0431)**

**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  
 Bandwidth 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  
 Recall Points Map Recall Map, Recall KML Points only, Recall KML Points with Map, Recall Default Grid

**Interference Analyzer (Option 0025)****Measurements**

Spectrum	Field Strength Occupied Bandwidth Channel Power Adjacent Channel Power (ACPR) AM/FM/SSB Demodulation (Wide/Narrow FM, Upper/Lower SSB), (audio out only) Carrier-to-Interference ratio (C/I)
Spectrogram	Collect data up to one week
Signal Strength	Visual and audible indication of signal strength
Received Signal Strength Indicator (RSSI)	Collect data up to one week Gives visual and aural indication of signal strength
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)

**Channel Scanner (Option 0027)****General**

Number of Channels	1 to 20 Channels (Power Levels)
Measurements	Graph/Table, Max Hold (On/5 s/Off), Frequency/Channel, Current/Maximum, Dual Color
Scanner	Scan Channels, Scan Frequencies, Scan Customer List, Scan Script Master™
Amplitude	Reference Level, Scale
Custom Scan	Signal Standard, Channel, # of Channels, Channel Step Size, Custom Scan
Frequency Range	150 kHz to 7.1 GHz
Frequency Accuracy	± 10 Hz + Time base error
Measurement Range	-110 dBm to +30 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 μs to 65 ms typical) Zero Span Time

**Zero Span IF Output (Option 0089)****General**

Mode	Spectrum Analyzer/Span/Zero Span
Center Frequency	140 MHz ± 130 kHz
Output Level	-25 dBm typical
Reference Level	-57 dBm to +30 dBm (Preamp Off) -87 dBm to -40 dBm (Preamp On)
IF Bandwidths	Up to 30 MHz (3 dB bandwidth)
Connector	BNC female

**I/Q Waveform Capture (Option 0024)****General**

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







**TD-SCDMA/HSPA+ Signal Analyzers (Options 0060, 0061, 0038)**

**Measurements**

RF (Option 0060)	Demodulation (Option 0060)	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 $E_c/I_o$ 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 Carrier Feedthrough 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 (save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Signal Quality Measurements

**RF Measurements (Option 0060)**

RF Channel Power Accuracy (RRC)	$\pm 1.5$ dB, $\pm 1.0$ dB typical, (slot power -40 dBm to +10 dBm)
Frequency Error	$\pm 20$ Hz + time base error, in the presence of a downlink slot

**Demodulation Measurements (Option 0061)**

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	$\pm 1.0$ dB typical
Timing Error (Tau)	
for Dominant SYNC-DL	$\pm 0.2$ $\mu$ s (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 Tagging and Logging	Yes



**LTE Signal Analyzers (Options 0541, 0542, 0543, 0546)**

**Measurements**

<b>RF (Option 0541)</b>	<b>Modulation (Option 0542)</b>	<b>Over-the-Air (OTA) (Option 0546)</b>	<b>Pass/Fail (User Editable)</b>
Channel Spectrum Channel Power Occupied Bandwidth ACPR 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 or 2)	Scanner Cell ID (Group, Sector) S-SS, RSRP, RSRQ, SINR Dominance Modulation Results - On/Off Auto Save - On/Off Tx Test Scanner RS Power of MIMO antennas Cell ID, Average Power Delta Power (Max-Min) Graph of Antenna Power Modulation Results - On/Off Mapping On-screen S-SS, RSRP, RSRQ, or SINR Scanner Modulation Results - Off	View Pass/Fail Limits All, RF, Modulation Available Measurements Channel Power Occupied Bandwidth ACLR Frequency Error Carrier Frequency Dominance EVM peak, rms RS Power SS, P-SS, S-SS Power PBCH Power PCFICH Power Cell, Group, Sector ID OSTP Tx Time Alignment

**Setup Parameters**

Frequency	E-UTRA bands 1 - 14, 17 - 21, 23 - 28 (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 (15 and 20 requires Option 0543)
Span (MHz)	Auto, 1.4, 3, 5, 10, 15, 20, 30
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous
EVM Mode	Auto, PBCH only, Max Hold
Save/Recall	Setup, Measurement, JPEG (save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

**RF Measurements (Option 0541)**

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

**Modulation Measurements (Option 0542)**

RS Power Accuracy	± 1.0 dB typical, (RF input -50 dBm to +10 dBm)
Frequency Error	± 10 Hz + time base error, 99 % confidence level
Residual EVM (rms)	2.0 % typical (E-UTRA Test Model 3.1, RF Input -50 dBm to +10 dBm)

**BW = 15 MHz, 20 MHz (Option 0543)**

Bandwidths 15 MHz, 20 MHz

**Over-the-Air (OTA, Option 0546) Measurements**

Scanner	Six strongest signals if present Auto Save - Sync Signal Power and Modulation Results with GPS tagging
Tx Test	Scanner - three strongest signals if present RS Power - strongest signal
Mapping	Map On-screen S-SS, RSRP, RSRQ, or SINR of Cell ID with strongest signal Scanner - three strongest signals if present Save and Export Mapping data: *.kml, *.mtd (tab delimited)



**TD-LTE Signal Analyzers (Options 0551, 0552, 0543, 0556)**

**Measurements**

<b>RF (Option 0551)</b>	<b>Modulation (Option 0552)</b>	<b>Over-the-Air (OTA) (Option 0556)</b>	<b>Pass/Fail (User Editable)</b>
Channel Spectrum Channel Power Occupied Bandwidth Power vs. Time Frame View Sub-Frame View Total Frame Power DwPTS Power Transmit Off Power Cell ID Timing Error ACLR Spectral Emission Mask Category A or B (Opt 1) RF Summary	Power vs. Resource Block (RB) RB Power (PDSCH) Active RBs, Utilization % Channel Power, Cell ID 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 Total Power (Table View) Modulation Results Antenna Icons Detects active antennas (1 or 2) Modulation Summary	Scanner Cell ID (Group, Sector) S-SS, RSRP, RSRQ, SINR Dominance Modulation Results – On/Off Auto Save – On/Off Tx Test Scanner RS Power of MIMO antennas Cell ID, Average Power Delta Power (Max-Min) Graph of Antenna Power Modulation Results – On/Off Mapping On-screen S-SS, RSRP, RSRQ, or SINR Scanner Modulation Results – Off	View Pass/Fail Limits All, RF, Modulation Available Measurements Channel Power Occupied Bandwidth ACLR Frequency Error Carrier Frequency Dominance EVM peak, rms RS Power SS, P-SS, S-SS Power PBCH Power PCFICH Power Cell, Group, Sector ID Frame Power DwPTS Power Transmit Off Power Timing Error

**Setup Parameters**

Frequency	E-UTRA bands 33 - 44 (tunable 10 MHz to 4.0 GHz) Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel
Bandwidth (MHz)	1.4, 3, 5, 10, 15, 20 (15 and 20 requires Option 0543)
Span (MHz)	Auto, 1.4, 3, 5, 10, 15, 20, 30
Amplitude	Scale/Division, Power Offset, Auto Range, Adjust Range
Sweep	Single/Continuous, Trigger Sweep
EVM Mode	Auto, PBCH only, Max Hold
Trigger	No Trigger/Ext Trigger, Rising/Falling
Save/Recall	Setup, Measurement, JPEG (save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Modulation Measurements

**RF Measurements (Option 0551)**

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

**Modulation Measurements (Option 0552)**

RS Power Accuracy ± 1.0 dB typical, (RF input -30 dBm to +10 dBm)  
 Frequency Error ± 10 Hz + time base error, 99 % confidence level  
 Residual EVM (rms) 2.0 % typical (E-UTRA Test Model 3.1, RF Input -30 dBm to +10 dBm)

**BW = 15, 20 MHz (Option 0543)**

Bandwidths 15 MHz, 20 MHz

**Over-the-Air (OTA) Measurements (Option 0556)**

Scanner Six strongest signals if present  
 Auto Save – Sync Signal Power and Modulation Results with GPS tagging  
 Tx Test Scanner – three strongest signals if present  
 RS Power – strongest signal  
 Mapping Map On-screen S-SS, RSRP, RSRQ, or SINR of Cell ID with strongest signal  
 Scanner – three strongest signals if present  
 Save and Export Mapping data: \*.kml, \*.mtd (tab delimited)



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

**Measurements**

<b>RF (Option 0040)</b>	<b>Demodulation (Option 0041)</b>	<b>Over-the-Air (OTA)</b>	<b>Pass/Fail</b>
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	Available Measurements Channel Power Occupied Bandwidth Burst Power Average Burst power Frequency Error Phase Error EVM Origin Offset C/I Magnitude Error

**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 (save only), to Internal/External Memory
Measurement Summary Screen	Overall Measurements

**RF Measurements (Option 0040)**

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

**Demodulation Measurements (Option 0041)**

GSMK Modulation Quality (RMS Phase)	
Measurement Accuracy	± 1 deg
Residual Error (GSMK)	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 $E_c/I_o$ $E_c$ Pilot Dominance OTA Total Power Multipath Scanner (Six) Six Multipaths Tau Distance RSCP Relative Power Multipath Power	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 (save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Signal Quality Measurements

**RF Measurements (Option 0044)**

RF Channel Power Accuracy	$\pm 1.25$ dB, $\pm 0.7$ dB typical, (temperature range 15 °C to 35 °C)
Occupied Bandwidth Accuracy	$\pm 100$ kHz
Adjacent Channel Leakage Ratio (ACLR)	-54 dB/-59 dB $\pm 0.8$ dB @ 5 MHz/10 MHz offset, typical, Bands I - VI, VIII - XIV, XVII -54 dB/-57 dB $\pm 1.0$ dB @ 5 MHz/10 MHz offset, typical, Band VII

**Demodulation Measurements (Option 0065)**

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	$\pm 10$ Hz + time base error, 99 % confidence level
EVM Accuracy	$\pm 2.5$ %, $6\% \leq \text{EVM} \leq 25\%$
Residual EVM	2.5 %
Code Domain Power	$\pm 0.5$ dB for code channel power $> -25$ dB, 16, 32, 64 DCPH (test model 1), 16, 32 DCPH (test model 2, 3)
CPICH (dBm) Accuracy	$\pm 0.8$ 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**

<b>RF (Option 0042)</b>	<b>Demodulation (Option 0043)</b>	<b>Over-the-Air (OTA) (Option 0033)</b>	<b>Pass/Fail (User Editable)</b>
Channel Spectrum Channel Power Occupied Bandwidth Peak-to-Average Power Spectral Emission Mask 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 $E_c/I_0$ Tau Pilot Power Channel Power Pilot Dominance Multipath Scanner (Six) $E_c/I_0$ Tau Channel Power Multipath Power Limit Test – 10 Tests Averaged Rho Adjusted Rho Multipath Pilot Dominance Pilot Power Pass/Fail Status	Available Measurements Channel Power Occupied Bandwidth Peak-to-Average Power Spectral Mask Test Frequency Error Channel Frequency Frequency error 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 (save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Signal Quality Measurements

**RF Measurements (Option 0042)**

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

**Demodulation Measurements (Option 0043)**

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 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**

<b>RF (Option 0062)</b>	<b>Demodulation (Option 0063)</b>	<b>Over-the-Air (OTA) (Option 0034)</b>	<b>Pass/Fail (User Editable)</b>
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 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	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 (save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Signal Quality Measurements

**RF Measurements (Option 0062)**

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

**Demodulation Measurements (Option 0063)**

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**

<b>RF (Option 0046)</b>	<b>Demodulation (Option 0047)</b>	<b>Over-the-Air (OTA)</b>	<b>Pass/Fail (User Editable)</b>
Channel Spectrum Channel Power Occupied Bandwidth	Constellation RCE (RMS/Peak) EVM (RMS/Peak)	There are no additional OTA Measurements RF and Demodulation Measurements can be made OTA	Available Measurements Channel Power Occupied Bandwidth Burst Power Preamble Power Crest Factor Frequency Error Carrier Frequency
Power vs. Time Channel Power Preamble Power Data Burst Power Crest Factor	Frequency Error Carrier Frequency Base Station ID Spectral Flatness Adjacent Subcarrier Flatness		
ACPR RF Summary	EVM vs. Subcarrier/Symbol RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error Carrier Frequency Base Station ID Sector ID (Mobile) Modulation Summary		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 (save only), to Internal/External Memory
Measurement Summary Screens	Overall Measurements, RF Measurements, Signal Quality 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)

**Demodulation Measurements (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<sup>1</sup> Signal Analyzers (Options 0066, 0067, 0037)**
**Measurements**

<b>RF (Option 0066)</b>	<b>Demodulation (Option 0067)</b>	<b>Over-the-Air (OTA) (Option 0037)</b>	<b>Pass/Fail (User Editable)</b>
Channel Spectrum Channel Power Occupied Bandwidth	Constellation RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error CINR	Channel Power Monitor Preamble Scanner (Six) Preamble Relative Power Cell ID Sector ID PCINR	View Pass/Fail Limits All, RF, Modulation Available Measurements
Power vs. Time Channel Power Preamble Power Downlink Burst Power Uplink Burst Power	Base Station ID Sector ID Spectral Flatness Adjacent Subcarrier Flatness	Dominant Preamble Base Station ID Auto Save - On/Off	Channel Power Occupied Bandwidth Downlink Burst Power Uplink Burst Power Preamble Power Crest Factor
Spectral Emission Mask ACPR RF Summary	EVM vs. Subcarrier/Symbol RCE (RMS/Peak) EVM (RMS/Peak) Frequency Error CINR Base Station ID Sector ID DL-MAP (Tree View) Modulation Summary		Frequency Error Carrier Frequency EVM RCE Sector ID

**Setup Parameters**

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

**Demodulation Measurements (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

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.

**Backhaul Analyzers T1 Bit-Error-Rate Tester (BERT) (Option 0051)****Measurements**

Error Detection	Frame Bits, Bit Errors, BER, BPV, CRC, PATLS
Error Analysis (ITU G-821)	Errored Seconds (ES), Error Free Seconds (EFS), Severely Errored Seconds (SES), Unavailable Seconds (UAS), Available Seconds (AS), Degraded Minutes (DGRM)
Rx Signal	Frequency ( $\pm 5$ ppm, Max/Min), Vpp ( $\pm 5$ %) (Max/Min), dBdsx, Clock Slips, Frame Slips
VF	Frequency (100 Hz to 3000 Hz, $\pm 3$ Hz), Power (-40.0 dBm to +3.0 dBm, $\pm 0.2$ dBm)
Status (Historical and Current)	Rx (Signal, Frame Sync, Pattern Sync), DS1 (Alarms, Errors, B8ZS)
Status (Current)	Tx (Alarm On, Error On, Loop On)

**Setup Parameters**

BERT Display	Table, Histogram, Event List, Clear History
VF	Tx (Off/On), Channel (1-24), Tx Freq, Tx Level (-30 dBm to 0 dBm), Volume, Audio, Clear
Line Code	AMI, B8ZS
Tx Clock	Internal (1.544 MHz $\pm 5$ ppm), Recovered, External
Tx LBO	0.0 dB, -7.5 dB, -15.0 dB
Rx Configuration	Terminate (100 $\Omega$ balanced), Monitor (Connect via 20 dB pad in DSX, 20 dB flat gain) Bridge ( $\geq 1000 \Omega$ , -36 dB to +6 dB)
I/O Connector	Bantam
Framing	ESF, SF-D4
Payload	T1 (1.544 Mbps), Fractional T1 (Nx64, 64, 56, 16, 8 kbps)
Pulse Shapes	Conform to ANSI T1.403 and ITU G.703
Patterns	QRSS, PRBS (2-9, 2-11, 2-15, 2-20, 2-23), All Ones, All Zeros, 1-in-8 (1-in-7), 2-in-8, 3-in-24 T1 Daly, Six User defined ( $\leq 32$ bits), Inverse Patterns (On/Off), Remote Loop Up/Down
Loopback Modes	CSU, NIU, Link Type (In-Band, Data-Link), Self Loop Up/Down, Loop Code User Defined
Error Insertion	Bit Error, Bit Error Rate (BER), BPV, Frame Bit Error, Error (On/Off)
Alarm Insertion	AIS On/Off (Blue Alarm), RAI On/Off (Yellow Alarm)
Data Log	1 minute to 3 days

**Backhaul Analyzers E1 Bit-Error-Rate Tester (BERT) (Option 0052)****Measurements**

Error Detection	Frame Bits, Bit Errors, BER, BPV, CRC, E Bits
Error Analysis (ITU G-821)	Errored Seconds (ES), Error Free Seconds (EFS), Severely Errored Seconds (SES), Unavailable Seconds (UAS), Available Seconds (AS), Degraded Minutes (DGRM)
Rx Signal	Frequency ( $\pm 5$ ppm, Max/Min), Vpp ( $\pm 5$ %) (Max/Min), dBdsx, Clock Slips, Frame Slips
VF	Frequency (100 Hz to 3000 Hz), Power (-40.0 dBm to +3.0 dBm, $\pm 0.2$ dBm)
Status (Historical and Current)	Rx (Signal, FAS, Pattern Sync), E1 (Alarms, Errors)
Status (Current)	Tx (Alarm On, Error On)

**Setup Parameters**

BERT Display	Table, Histogram, Event List, Clear History
VF	Tx (Off/On), Channel (1-31), Tx Freq, Tx Level (-30 dBm to 0 dBm), Volume, Audio, Clear
Line Code	AMI, HDB3
Tx Clock	Internal (2.048 MHz $\pm 5$ ppm), Recovered, External
Rx Input	Terminate (RJ48 120/75 $\Omega$ balanced, BNC 75 $\Omega$ unbalanced, -43 dB to +6 dB) Bridge ( $\geq 1000 \Omega$ , -43 dB to +6 dB) Monitor (Connect via 20 dB pad in DSX, 20 dB flat gain)
Framing	PCM30, PCM30 CRC-4, PCM31, PCM31 CRC-4
Pulse Shapes	Conform to ITU G.703
Payload	E1 (2.048 Mbps), Fractional E1 (N x 64, 64, 16, 8 kbps)
Patterns	QRSS, PRBS (2-9, 2-11, 2-15, 2-20, 2-23), All Ones, All Zeros, 1010, 1-in-8 (1-in-7), 2-in-8, 3-in-24, Six User defined ( $\leq 32$ bits), Inverse Patterns (On/Off)
Loopback Mode	Self loop
Error Insertion	Bit Error, Bit Error Rate (BER), Frame Bit Error, Error (On/Off)
Alarm Insertion	AIS (On/Off) (Blue Alarm), RAI (On/Off) (Yellow Alarm)
Data Log	1 minute to 3 days



## Backhaul Analyzers T3 Bit-Error-Rate Tester (BERT) (Option 0053)

### Measurements

Error Detection	Frame Bits, Bit Errors, BER, BPV, Lof Count, P-bit Errors, C-bit Errors, FEBE Errors
Error Analysis (ITU G-821)	Excess Zeros, Errored Seconds (ES), Error Free Seconds (EFS), Severely Errored Seconds (SES), Unavailable Seconds (UAS), Available Seconds (AS), Degraded Minutes (DGRM), Pattern Loss Seconds (PATLS)
Rx Signal	Frequency ( $\pm 5$ ppm, Max/Min), Vpp ( $\pm 5\%$ ) (Max/Min), dBdsx
VF	Frequency (100 Hz to 3000 Hz, $\pm 3$ Hz), Power ( $-30.0$ dBm to $+0.0$ dBm, $\pm 0.2$ dBm)
Status (Historical and Current)	Rx (Signal, Frame Sync, Pattern Sync), DS3 (Alarms, Errors, DS3ZS)
Status (Current)	Insert (Alarm On, Error On, Loop On)

### Setup Parameters

BERT Display	Table, Histogram, Event List, Clear History
VF	Tx (Off/On), Channel #, Tx Freq, Tx, Level, Volume, Audio (On/Off)
Line Code	AMI, B3ZS
Tx Clock	Internal (44.736 MHz $\pm 5$ ppm), Recovered
Tx LBO	Low, DSX
Rx Input	DS1 (Bantam connector 100 $\Omega$ balanced) DS3 (BNC 75 $\Omega$ unbalanced) Monitor (Connect via 20 dB pad in DSX)
Framing	M13, C-Bit, Unframed
Test Mode	Auto, DS3, DS1
Pulse Shapes	Carrier present, Frame ID and Sync, Pattern ID and Sync
Patterns	QRSS, PRBS (2-9, 2-11, 2-15, 2-20, 2-23), All Ones, All Zeros, 1010, 1-in-8 (1-in-7), 2-in-8, 3-in-24 T1 Daly, Six User defined ( $\leq 32$ bits), Inverse Patterns (On/Off), Loop Up/Down
Loopback Modes	Stuff Bit, DS3 C-Bit FEAC, DS3 Self Loop
Error Insertion	Bit Error, BPV, DS3 Frame Bit Error, C-bit, P-bit, FEBE, Error Insert (On/Off)
Alarm Insertion	AIS (Blue Alarm), RAI (Yellow Alarm), Idle Alarm, Alarm (On/Off)
Data Log	1 minute to 3 days

## DS1 Test Mode

### Measurements

Error Detection	Frame Bits, Bit Errors, BER, BPV, CRC, PATLS
Error Analysis (ITU G-821)	Errored Seconds (ES), Error Free Seconds (EFS), Severely Errored Minutes (DGRM), Unavailable Seconds (UAS), Available Seconds (AS), Degraded Minutes (DGRM)
Rx Signal	Frequency ( $\pm 5$ ppm, Max/Min), Vpp ( $\pm 5\%$ ) (Max/Min), dBdsx, Clock Slips, Frame Slips
VF	Frequency (100 Hz to 3000 Hz, $\pm 3$ Hz), Power ( $-40.0$ dBm to $+3.0$ dBm, $\pm 0.2$ dBm)
Status (Historical and Current)	Rx (Signal, Frame Sync, Pattern Sync), DS1 (Alarms, Errors, B8ZS)
Status (Current)	Tx (Alarm On, Error On, Loop On)

### Setup Parameters

BERT Display	Table, Histogram, Event List, Clear History
VF	Tx (Off/On), Channel (1-24), Tx Freq, Tx Level ( $-30$ to $0$ dBm), Volume, Audio, Clear
Line Code	AMI, B8ZS
Tx Clock	Internal (1.544 MHz $\pm 5$ ppm), Recovered, External
Tx LBO	$0.0$ dB, $-7.5$ dB, $-15.0$ dB
Rx Input	Terminate (Bantam connector 100 $\Omega$ balanced) Monitor (Connect via 20 dB pad in DSX, 20 dB flat gain) Bridge ( $\geq 1000$ $\Omega$ , $-36$ dB to $+6$ dB)
Framing	ESF, SF-D4
Payload	T1 (1.544 Mbps), Fractional T1 (Nx64, 64, 56, 16, 8 kbps)
Pulse Shapes	Conform to ANSI T1.403 and ITU G.703
Patterns	QRSS, PRBS (2-9, 2-11, 2-15, 2-20, 2-23), All Ones, All Zeros, 1-in-8 (1-in-7), 2-in-8, 3-in-24 T1 Daly, Six User defined ( $\leq 32$ bits), Inverse Patterns (On/Off), Remote Loop Up/Down
Loopback Mode	CSU, NIU, Link Type (In-Band, Data-Link), Self Loop Up/Down, Loop Code User Defined
Error Insertion	Bit Error, Bit Error Rate (BER), BPV, Frame Bit Error, Error (On/Off)
Alarm Insertion	AIS On/Off (Blue Alarm), RAI On/Off (Yellow Alarm)
Data Log	1 minute to 3 days



## General Specifications

All specifications and characteristics apply under the following conditions, unless otherwise stated: 1) After 5 minutes of warm-up time, where the instrument is left in the ON state; 2) Apply when using internal reference and performance sweep mode; 3) Subject to change without notice; 4) Typical performance is the measured performance of an average unit; 5) Recommended calibration cycle is 12 months.

### 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, Ethernet Configuration, Volume Display (Brightness, Blank, Default, Black & White, Night Vision, High Contrast, Invert Black & White) Language (English, French, German, Spanish, Chinese, Japanese, Korean, Italian, Russian, User Defined) Reset (Factory Defaults, Master Reset, Update Firmware)
File	Save As, Save Meas, Save, Save On Event, Recall Meas, Recall, Copy, Delete
Save/Recall	Setups, Measurements, Screen Shots (JPEG - save only)
Delete	By File Type, All, Selected
Internal Trace/Setup Memory	> 30,000 traces
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, Maximum Input +23 dBm, ± 50 VDC, (Reflection In)
RF In	Type N, female, 50 Ω, Maximum Input +30 dBm, ± 50 VDC
GPS	SMA, female
T1	Bantam Jacks (Option 0051)
T3	BNC (Option 0053)
E1	RJ48C and BNC (Option 0052)
External Power	5.5 mm barrel connector, 12 VDC to 14.5 VDC, < 5.0 A
LAN Connection	RJ48C, 10/100 Mbps, Connect to PC or LAN for Remote Access
USB Interface	Two Type A, Connect Flash Drive and Power Sensor 5-pin mini-B, Connect to PC for data transfer
Headset Jack	2.5 mm barrel connector
External Reference In	BNC, female, 50 Ω, Maximum Input +10 dB
Reference Out	BNC, female, 50 Ω, 10 MHz
External Trigger In/Clock Recovery	BNC, female, 50 Ω, Maximum Input ± 5 VDC
IF Out	BNC, female, 50 Ω, 140 MHz

### Display

Size	8.4 in
Resolution	800 x 600

### Battery

Type	Li-Ion
Battery Operation	2.5 hours, typical

### Electromagnetic Compatibility

European Union	CE Mark, EMC Directive 89/336/EEC, 92/31/EEC, 93/68/EEC and Low Voltage Directive 73/23/EEC, 93/68/EEC
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

### Environmental

Operating Temperature	-10 °C to 55 °C
Maximum Humidity	85 %
Shock	MIL-PRF-28800F Class 2
Storage	-51 °C to 71 °C
Altitude	4600 m, operating and non-operating

### Size and Weight

Size	315 mm x 211 mm x 94 mm, (12.4 in x 8.3 in x 3.7 in)
Weight	4.9 kg, (10.8 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
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**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
Firmware Upload	Upload new firmware into the instrument
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 or Ethernet
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Ordering Information – Instrument Options

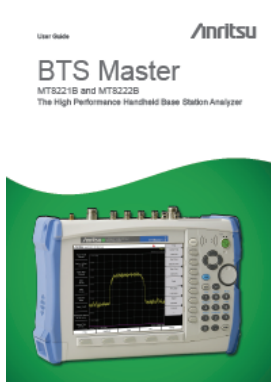
	MT8221B	MT8222B	Description
	400 MHz to 4 GHz	400 MHz to 6 GHz	Cable and Antenna Analyzer
	150 kHz to 7.1 GHz	150 kHz to 7.1 GHz	Spectrum Analyzer
	10 MHz to 7.1 GHz	10 MHz to 7.1 GHz	Power Meter
	<b>Options</b>		
	MT8221B-0010	MT8222B-0010	Bias-Tee
	MT8221B-0031	MT8222B-0031	GPS Receiver (requires antenna)
	MT8221B-0019	MT8222B-0019	High-Accuracy Power Meter (requires external power sensor)
	MT8221B-0025	MT8222B-0025	Interference Analyzer (recommend Option 0031)
	MT8221B-0027	MT8222B-0027	Channel Scanner
	MT8221B-0089	MT8222B-0089	Zero-Span IF Output
	MT8221B-0431	MT8222B-0431	Coverage Mapping (requires Option 0031)
	MT8221B-0090	MT8222B-0090	Gated Sweep
	MT8221B-0024	MT8222B-0024	I/Q Waveform Capture
	MT8221B-0023	MT8222B-0023	Vector Signal Generator
	MT8221B-0040	MT8222B-0040	GSM/EDGE RF Measurements
	MT8221B-0041	MT8222B-0041	GSM/EDGE Demodulation
	MT8221B-0044	MT8222B-0044	W-CDMA/HSPA+ RF Measurements
	MT8221B-0065	MT8222B-0065	W-CDMA/HSPA+ Demodulation
	MT8221B-0035	MT8222B-0035	W-CDMA/HSPA+ Over-the-Air Measurements
	MT8221B-0060	MT8222B-0060	TD-SCDMA/HSPA+ RF Measurements
	MT8221B-0061	MT8222B-0061	TD-SCDMA/HSPA+ Demodulation
	MT8221B-0038	MT8222B-0038	TD-SCDMA/HSPA+ Over-the-Air Measurements (recommend Option 0031)
	MT8221B-0541	MT8222B-0541	LTE RF Measurements (BW = ≤ 10 MHz)
	MT8221B-0542	MT8222B-0542	LTE Modulation Measurements (BW = ≤ 10 MHz)
	MT8221B-0546	MT8222B-0546	LTE Over-the-Air Measurements (recommend Option 0031)
	MT8221B-0543	MT8222B-0543	15 MHz and 20 MHz, LTE Modulation Measurements (requires Option 0541, 0542, 0551 or 0552)
	MT8221B-0551	MT8222B-0551	TD-LTE RF Measurements (BW = ≤ 10 MHz)
	MT8221B-0552	MT8222B-0552	TD-LTE Modulation Measurements (BW = ≤ 10 MHz)
	MT8221B-0556	MT8222B-0556	TD-LTE Over-the-Air Measurements (recommend Option 0031)
	MT8221B-0042	MT8222B-0042	CDMA RF Measurements
	MT8221B-0043	MT8222B-0043	CDMA Demodulation
	MT8221B-0033	MT8222B-0033	CDMA OTA Measurements (requires Option 0031)
	MT8221B-0062	MT8222B-0062	EV-DO RF Measurements
	MT8221B-0063	MT8222B-0063	EV-DO Demodulation
	MT8221B-0034	MT8222B-0034	EV-DO OTA Measurements (requires Option 0031)
	MT8221B-0046	MT8222B-0046	Fixed WiMAX RF Measurements
	MT8221B-0047	MT8222B-0047	Fixed WiMAX Demodulation
	MT8221B-0066	MT8222B-0066	Mobile WiMAX RF Measurements
	MT8221B-0067	MT8222B-0067	Mobile WiMAX Demodulation
	MT8221B-0037	MT8222B-0037	Mobile WiMAX OTA Measurements (recommend Option 0031)
	MT8221B-0051	MT8222B-0051	T1 Analyzer (mutually exclusive with Options 0052, 0053)
	MT8221B-0052	MT8222B-0052	E1 Analyzer (mutually exclusive with Options 0051, 0053)
	MT8221B-0053	MT8222B-0053	T3/T1 Analyzer (mutually exclusive with Options 0051, 0052)
	MT8221B-0098	MT8222B-0098	Standard Calibration to ISO/IEC 17025:2005
	MT8221B-0099	MT8222B-0099	Premium Calibration to ISO/IEC 17025:2005 plus test data

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



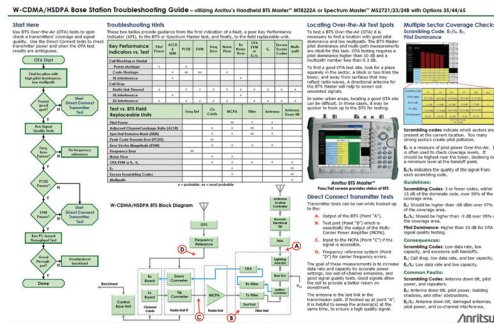
Part Number	Description
PSN50	High Accuracy RF Power Sensor, 50 MHz to 6 GHz, +20 dBm
MA24105A	Inline Peak Power Sensor, 350 MHz to 4 GHz, +51.76 dBm
MA24106A	High Accuracy RF Power Sensor, 50 MHz to 6 GHz, +23 dBm
MA24108A	Microwave USB Power Sensor, 10 MHz to 8 GHz, +20 dBm
MA24118A	Microwave USB Power Sensor, 10 MHz to 18 GHz, +20 dBm
MA24126A	Microwave USB Power Sensor, 10 MHz to 26 GHz, +20 dBm

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



Part Number	Description
10920-00060	Handheld Instruments Documentation Disc
10580-00207	BTS Master User Guide
10580-00230	Cable and Antenna Analyzer Measurement Guide
10580-00244	Spectrum Analyzer Measurement Guide
10580-00240	Power Meter Measurement Guide
10580-00232	Vector Signal Generator Measurement Guide
10580-00234	3GPP Signal Analyzer Measurement Guide
10580-00235	3GPP2 Signal Analyzer Measurement Guide
10580-00236	WiMAX Signal Analyzer Measurement Guide
10580-00238	Backhaul Analyzer Measurement Guide
10580-00208	Programming Manual
10580-00209	Maintenance Manual

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



Part Number	Description
11410-00473	Cable, Antenna and Components
11410-00551	Spectrum Analyzers
11410-00472	Interference
11410-00566	LTE eNodeB Base Stations
11410-00466	GSM/GPRS/EDGE Base Stations
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
11410-00552	T1/DS1 Backhaul Testing
11410-00553	E1 Backhaul Testing



**Standard Accessories** (included with instrument)



Part Number	Description
10920-00060	Handheld Instruments Documentation Disc
2000-1686-R	Soft Carrying Case
2300-577	Anritsu Software Tool Box for Handheld RF Instruments Disc
633-75	Rechargeable Li-Ion Battery
40-187-R	AC/DC Power Supply
806-141-R	Automotive Power Adapter, 12 VDC, 60 Watts
3-806-152	Cat 5e Crossover Patch Cable, 213 cm (7 ft)
2000-1371-R	Ethernet Cable, 213 cm (7 ft)
3-2000-1498	USB A-mini B Cable, 305 cm (10 ft)
1091-27-R	Type-N male to SMA female adapter
1091-172-R	Type-N male to BNC female adapter

One Year Warranty (Including battery, firmware, and software)  
Certificate of Calibration and Conformance

**Optional Accessories**

**Calibration Components, 50 Ω**



Part Number	Description
OSLN50-1	Precision Open/Short/Load, N(m), 42 dB, 6.0 GHz, 50 Ω
OSLNF50-1	Precision Open/Short/Load, N(f), 42 dB, 6.0 GHz, 50 Ω
2000-1618-R	Precision Open/Short/Load, 7/16 DIN(m), DC to 6.0 GHz 50 Ω
2000-1619-R	Precision Open/Short/Load, 7/16 DIN(f), DC to 6.0 GHz 50 Ω
22N50	Open/Short, N(m), DC to 18 GHz, 50 Ω
22NF50	Open/Short, N(f), DC to 18 GHz, 50 Ω
SM/PL-1	Precision Load, N(m), 42 dB, 6.0 GHz
SM/PLNF-1	Precision Load, N(f), 42 dB, 6.0 GHz

**Calibration Components, 75 Ω**



Part Number	Description
22N75	Open/Short, N(m), DC to 3 GHz, 75 Ω
22NF75	Open/Short, N(f), DC to 3 GHz, 75 Ω
26N75A	Precision Termination, N(m), DC to 3 GHz, 75 Ω
26NF75A	Precision Termination, N(f), DC to 3 GHz, 75 Ω
12N50-75B	Matching Pad, DC to 3 GHz, 50 Ω to 75 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
1091-379-R	7/16 DIN(f) to 7/16 DIN(f), DC to 6 GHz, 50 Ω with Reinforced Grip
510-102-R	N(m) to N(m), DC to 11 GHz, 50 Ω, 90 degrees right angle



**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

**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

**InterChangeable Adaptor Phase Stable Test Port Cables, Armored w/Reinforced Grip** (recommended for cable and antenna line sweep applications. It uses the same ruggedized grip as the Reinforced grip series cables. Now you can also change the adaptor interface on the grip to four different connector types)



Part Number	Description
15RCN50-1.5-R	1.5 m, DC to 6 GHz, N(m), N(f), 7/16 DIN(m), 7/16 DIN(f), 50 Ω
15RCN50-3.0-R	3.0 m, DC to 6 GHz, N(m), N(f), 7/16 DIN(m), 7/16 DIN(f), 50 Ω

**Phase-Stable Test Port Cables, Armored** (ideal for use with tightly spaced connectors and other general use 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

**Miscellaneous Accessories**



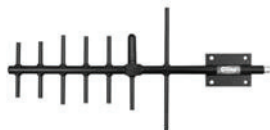
Part Number	Description
2000-1528-R	GPS Antenna, SMA(m) with 15 ft cable
2000-1652-R	GPS Antenna, SMA(m) with 1 ft cable
2000-1733-R	Passive GPS Antenna
2000-1374	External Charger for Li-Ion Batteries
2000-1689	EMI Near Field Probe Kit
MA2700A	Handheld Interference Hunter (For full specifications, refer to the MA2700A Technical Data Sheet 11410-00692)

**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

**Directional Antennas**



Part Number	Description
2000-1411-R	824 MHz to 896 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
2000-1617	600 MHz to 21 GHz, N(f), 5-8 dBi to 12 GHz, 0-6 dBi to 21 GHz, log periodic
2000-1677-R	300 MHz to 3000 MHz, SMA(m), 50 Ω, 3 m cable (9.8 ft) 0 to 6 dBi gain @ 950 MHz, log periodic

**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 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, 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)

**Mag Mount Broadband Antenna**



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, 3 m (9.8 ft) Cable 2: 3000 MHz to 6000 MHz 5 dBi peak gain, N(m), 50 Ω, 3 m (9.8 ft) Cable 3: GPS 26 dB gain, SMA(m), 50 Ω, 3 m (9.8 ft)
2000-1645-R	694 MHz to 894 MHz 3 dBi peak gain, 1700 MHz to 2700 MHz 3dBi peak gain, N(m), 50 Ω, 3 m (9.8 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, 3 m (9.8 ft)
2000-1648-R	1700 MHz to 6000 MHz 3 dBi peak gain, N(m), 50 Ω, 3 m (9.8 ft)

**Bandpass 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 797 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

**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)

**T1/E1 Extender Cables**

Part Number	Description
806-16-R	Bantam Plug to Bantam Plug
3-806-116	Bantam Plug to BNC
3-806-117	Bantam Y Plug to RJ48
3-806-169	1.8 m (72 in) BNC to BNC, 75 1/2 RG59 Type Coax Cable
806-176-R	Bantam Plug to Alligator Clips



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](http://www.anritsu.com/mug)



To receive a quote to purchase a product or order accessories visit our online ordering site: [www.ShopAnritsu.com](http://www.ShopAnritsu.com)

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