

# A High Performance – Handheld Base Station Analyzer

MT8222A

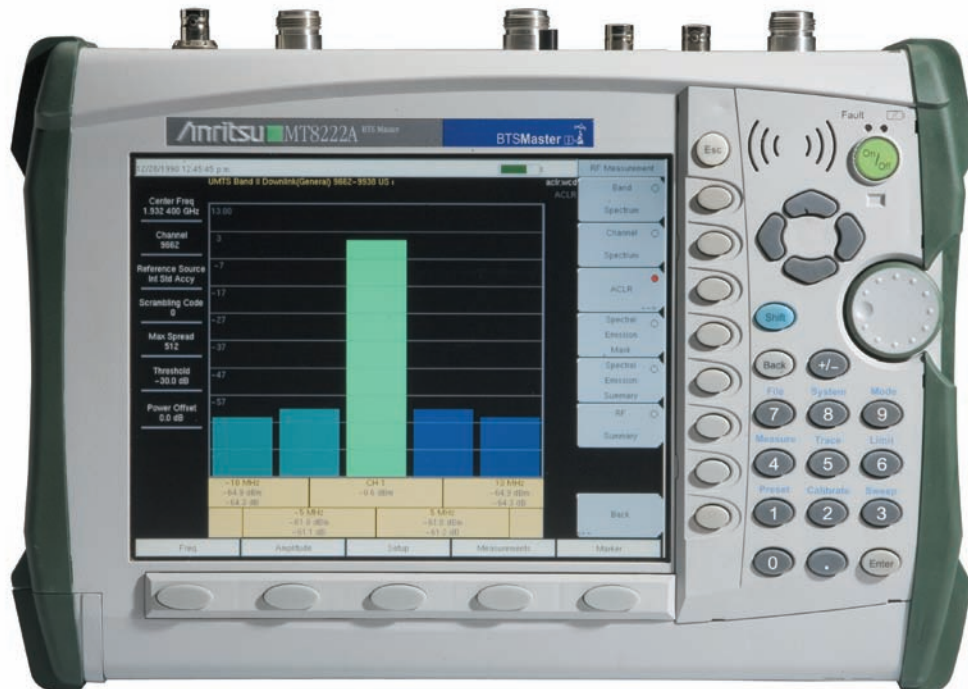
BTS Master™

## Introduction

High performance handheld base station analyzer with a complete set of measurement tools, spectrum analyzer, cable and antenna analysis, power meter, Bit Error Rate Tester for communication backhaul, supports multiple modulation formats GSM/GPRS/EDGE, W-CDMA/HSDPA, CDMA/EVDO, WiMAX 802.16d/802.16e, TD-SCDMA, LTE and GPS.

### High Performance Highlights

- Spectrum Analyzer 100 kHz to 7.1 GHz
- 2 port Cable & Antenna Analyzer 10 MHz to 4 or 6 GHz
- High Accuracy Power Meter  $\pm 0.16$  dB
- 4 kg (9.0 lbs)
- Bit Error Rate Tester E1, T1 & T3
- Interference Analyzer
- Channel scanner
- GPS receiver option
- 2 and 2.5G modulation options GSM/GPRS/EDGE, IS-95
- PIM Analyzer
- 3G Modulation options W-CDMA/HSDPA, 1xrtt/EVDO and TD-SCDMA
- 3.5G modulation options LTE, 802.16d and 802.16e
- 2.5 – 3 hour battery life



The Anritsu MT8222A is the most advanced ultra-portable base station analyzer on the market, featuring unparalleled performance at a modest price.

## Specifications

### Cable and Antenna Analyzer

**Frequency Range:** 10 MHz to 4 GHz

**Frequency Range (Option 26):** 10 MHz to 6 GHz  
(All other specs remain the same)

**Frequency Accuracy:** 25 ppm

**Frequency Resolution:** 10 kHz

**Data Points:** Low, Medium, High (137/275/551)

**Interference Immunity:** On-Channel: +17 dBm  
On-Frequency: 0 dBm (RF Out) +30 dBc RF In

**1-Port Power:** High: 0 dBm (typical)

**2-Port Power:** High: 0 dBm (typical)  
Low: -35 dBm (typical)

**Corrected Directivity:** 42 dB (10 MHz to 6 GHz)

**1-Port Accuracy:**

$= < 0.8 + |20 \log(1 \pm 10^{-E\Delta})|$  dB, typical  $E\Delta = \text{Directivity} - \text{Measured Return Loss}$

**System Dynamic Range:** 80 dB, 10 MHz to 3 GHz

70 dB, > 3 GHz to 5.5 GHz

65 dB, > 5.5 GHz to 6 GHz

**Return Loss:** Range: 0 to 60 dB

Resolution: 0.01 dB

**VSWR:** Range: 1 to 65

Resolution: 0.01

**Cable Loss:** Range: 0 to 30 dB

Resolution: 0.01 dB

**1-Port Phase:** Range: -180° to +180°

Resolution: 0.01°

**Smith Chart:** Resolution: 0.01

**2-Port Gain:** Range: -120 to 100 dB

Resolution: 0.01 dB

**2-Port Phase:** Range: -180° to +180°

Resolution: 0.01°

**Distance-to-Fault:** Fault Resolution (meters):  $(1.5 \times 10^9 \times vp) / \Delta F$  vp is the propagation constant and  $\Delta F$  is F2-F1 in Hz  
Horizontal Range (meters): 0 to (data points-1) x Fault Resolution to a maximum of 1500m (4921 ft.)  
where datapoints = 137/275/551

**Vertical Range (Return Loss):** 0 to 60 dB

**Vertical Range (VSWR):** 1 to 65

### Spectrum Analyzer

#### Frequency:

**Frequency:** 100 kHz to 7.1 GHz

**Maximum Continuous Input:** +30 dBm

**Tuning Resolution:** 1 Hz

**Frequency Reference:** Aging:  $\pm 1$  ppm/10 years

Accuracy:  $\pm 0.3$  ppm (25 °C  $\pm 25$  °C) + aging

**Frequency Span:** 10 Hz to 7.1 GHz plus 0 Hz (zero span)

**Sweep Time:** Minimum 100 ms, 10  $\mu$ s to 600 seconds (zero span)

**Sweep Trigger:** Free run, Single, Video, External

**Resolution Bandwidth:** (-3 dB width)  $\pm 10\%$ , 1 Hz to 3 MHz in

1-3 sequence 8 MHz demodulation bandwidth

**Video Bandwidth:** (-3 dB) 1 Hz to 3 MHz in 1-3 sequence

**SSB Phase Noise:** -100 dBc/Hz max at 10, 20 and 30 kHz offset from carrier  
-102 dBc/Hz max at 100 kHz offset from carrier

#### Amplitude:

**Measurement Range:** DANL to +30 dBm

**Absolute amplitude accuracy Power Levels**

$\geq -50$  dBm,  $\leq 35$  dB input attenuation,

**Preamplifier Off:** 100 kHz to  $\leq 10$  MHz  $\pm 1.5$  dB

> 10 MHz to 4 GHz  $\pm 1.25$  dB

> 4 GHz to 7.1 GHz  $\pm 1.75$  dB

**Displayed Average Noise Level (DANL in 1 Hz RBW, 0 dB attenuation,**

**Reference level -50 dBm, preamp on):**

Frequency	Typical	Max
10 MHz to 1 GHz	-163 dBm	-161 dBm
> 1 GHz to 2.2 GHz	-160 dBm	-159 dBm
> 2.2 GHz to 2.8 GHz	-156 dBm	-153 dBm
> 2.8 GHz to 4.0 GHz	-160 dBm	-159 dBm
> 4.0 GHz to 7.1 GHz	-158 dBm	-154 dBm

#### Input-Related Spurious:

(-30 dBm input, 0 dB input attenuation, Span < 1.7 GHz)

-70 dBc typical -60 dBc max\*

#### \*Exceptions:

Input Frequency	Spur Level
1674 MHz	-38 dBc (-48 typical)

#### Residual Spurious:

(Preamplifier on, RF input terminated, 0 dB input attenuation)

-100 dBm max

(Preamplifier off, RF input terminated, 0 dB input attenuation)

-90 dBm max\*\*, 100 kHz to <3200 MHz

-84 dBm max\*\*, 3200 to 7100 MHz

#### \*\*Exceptions:

**Frequency Max Spur Level (Typical)**

250, 300, and 350 MHz -85 dBm

-4010 MHz -80 dBm (-90 dBm)

-5084 MHz -70 dBm (-83 dBm)

-5894 MHz -75 dBm (-87 dBm)

-7028 MHz -80 dBm (-92 dBm)

**Display Range:** 1 to 15 dB/div in 1 dB steps. Ten divisions displayed

**Amplitude Units Log Scale Modes:** dBm, dBV, dBmV, dB $\mu$ V

**Attenuator Range:** 0 to 65 dB

**Attenuator Resolution:** 5 dB steps

#### Power Meters:

**Frequency Range:** 10 MHz to 7.1 GHz

**Display Range:** -80 dBm to +80 dBm

**Measurement Range:** -60 dBm to +30 dBm

Offset Range: 0 to +60 dB

#### Accuracy:

-40 dBm < Max  $\leq$  +15 dBm:

10 MHz -4 GHz:  $\pm 1.25$  dB

4 GHz -7.1 GHz:  $\pm 1.75$  dB

Max > +15 dBm:

10 MHz -6.5 GHz:  $\pm 1.75$  dB

6.5 GHz -7 GHz:  $\pm 2$  dB

Max  $\leq$  -40 dBm:

10 MHz -4 GHz:  $\pm 1.5$  dB

4 GHz -7.1 GHz:  $\pm 1.75$  dB

**VSWR:** 1.5:1 typical

**Maximum Power:** +30 dBm (1 W) without external attenuator

#### W-CDMA/HSDPA RF Measurements (Option 44)

#### Frequency Ranges:

Bands I - IX

#### RF Channel Power

(Temperature range 15 °C to 35 °C):

$\pm 0.7$  dB typical

( $\pm 1.25$  dB max)

**Occupied Bandwidth Accuracy:**  $\pm 100$  kHz

#### Residual Adjacent Channel

##### Leakage Ratio (ACLR)<sup>1</sup>

(824 to 894 MHz, 1710 to 2170):

-54 dB typical at 5 MHz offset

-59 dB typical at 10 MHz offset

**Leakage Ratio (ACLR)<sup>1</sup> (2300-2700 MHz):**

-54 dB typical at 5 MHz offset

-57 dB typical at 10 MHz offset

##### ACLR Accuracy (Single Channel Active)

(824 to 894 MHz, 1710 to 2170):

$\pm 0.8$  dB for ACLR  $\geq$  -45 dB at 5 MHz offset

$\pm 0.8$  dB for ACLR  $\geq$  -50 dB at 10 MHz offset

##### ACLR Accuracy (Single Channel Active)

(2300-2700 MHz):

$\pm 1.0$  dB for ACLR  $\geq$  -45 dB at 5 MHz offset

$\pm 1.0$  dB for ACLR  $\geq$  -50 dB at 10 MHz offset

**Frequency Error:  $\pm 10$  Hz + Time Base Error,**

**99% confidence level:**

$\pm 10$  Hz + Time Base Error, 99% confidence level

## *W-CDMA Demodulation and W-CDMA/HSDPA Demodulator (Options 45 and 65)*

### **EVM Accuracy (824 to 894 MHz, 1710 to 2170 MHz):**

(3GPP Test Model 4)  $\pm 2.5\%$ ;  $6\% \leq \text{EVM} \leq 25\%$   
(3GPP Test Model 5)  $\pm 2.5\%$ ;  $6\% \leq \text{EVM} \leq 20\%$   
(2300 MHz to 2700 MHz)

**EVM Accuracy:**  $\pm 2.5\%$  for  $6\% \leq \text{EVM} \leq 20\%$

**Residual EVM:** 2.5% typical

**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

**Scrambling Code:** 3 seconds

## *W-CDMA/HSDPA OTA (Option 35)*

**Resolution:** 0.1 dB

## *Power Monitor (Option 5) (requires external sensor)*

**Display Range:**  $-80$  to  $+80$  dBm (10 pW to 100 kW)

**Measurement Range:**  $-40$  dBm to  $+20$  dBm (10 nW to 40 mW)

**Offset Range:** 0 to  $+60$  dB

**Resolution:** 0.1 dB or 0.1W

**Accuracy:**  $\pm 1$  dB for  $>-40$  dBm using 560-7N50 detector

## *Bias Tee (Option 10A)*

**Voltage Range:**  $+12\text{V}$  to  $+32\text{V}$

**Current (Low/High):** 250 mA/450 mA, 1 A surge for 100 ms

**Resolution:** 0.1 V

## *Interference Analyzer (Option 25)*

**Strength of the Interferer:** Locate the Interferer

**RSSI:** Collect data up to 72 hours

**Spectrogram:** Collect data up to 72 hours

### **Signal ID:**

Monitors one particular frequency or scan the span and identify up to 12 signals. Identifies CDMA, GSM and WCDMA signals with Signal-to-noise ratio greater than 10 dB.

## *Channel Scanner (Option 27)*

**Frequency Range:** 100 kHz to 7.1 GHz

**Frequency Accuracy:**

$\pm 10$  Hz + Time base error, 99% Confidence level

**Measurement Range:**  $+20$  dBm to  $-110$  dBm

**Channel Power:**

100 kHz to  $\leq 10$  MHz  $\pm 1.5$  dB

$> 10$  MHz to 4 GHz  $\pm 1.25$  dB

$> 4$  GHz to 7.1 GHz  $\pm 1.75$  dB

**Adjacent Channel Power Accuracy:**  $\pm 0.75$  dB

## *GPS (Option 31)*

**GPS Location Indicator:**

Latitude, Longitude and Altitude on display

Latitude, Longitude and Altitude with trace storage

**GPS High Frequency Accuracy**

**when GPS antenna is connected:**

$\pm 25$  ppb with GPS ON, 3 minutes after satellite lock

**Internal High Accuracy, when**

**GPS antenna is not connected:**

Better than  $\pm 50$  ppb for 3 days from a High Accuracy GPS Lock and within  $0^\circ\text{C}$  to  $50^\circ\text{C}$  ambient temperature

## *GSM/GPRS/EDGE RF Measurements (Option 40)*

**Occupied Bandwidth:** Bandwidth within which 99% of the power transmitted on a single channel lies

**Burst Power:**  $\pm 1$  dB typical for  $-50$  dBm to  $+20$  dBm ( $\pm 1.5$  dB max)

**Frequency Error:**  $\pm 10$  Hz + time base error, 99% confidence level

## *GSM/GPRS/EDGE Demodulator (Option 41)*

**GSMK Modulation Quality (RMS Phase) Measurement Accuracy:**  $\pm 1$  deg

**Residual Error (GSMK):** 1 deg

**8PSK Modulation Quality (EVM) Measurement Accuracy:**  $\pm 1.5\%$

**Residual Error (8PSK):** 2.5%

## *CDMA – RF Measurements (Option 42) and EVDO RF Measurements (Option 62)*

**Channel Power Accuracy:**  $\pm 1$  dB typical for RF Input from  $+20$  dBm to  $-50$  dBm ( $\pm 1.5$  dB maximum)

## *cdmaOne and CDMA2000 1xRTT Demodulator (Option 43)*

**Residual Rho:**  $> 0.995$  typical for RF Input from  $+20$  dBm to  $-50$  dBm ( $> 0.99$  dB maximum)

**Rho Accuracy:**  $\pm 0.005$  for  $\text{Rho} > 0.9$

**Frequency Error:**  $\pm 10$  Hz + Time base error, 99% confidence level (in slow mode)

**PN Offset:** with  $1 \times 64$  chips

**Pilot Power Accuracy:**  $\pm 1$  dB typical, relative to Channel Power

**Tau:**  $\pm 0.5$   $\mu\text{s}$  typical ( $\pm 1$   $\mu\text{s}$  maximum)

## *EVDO Demodulator (Option 63)*

**Demodulator Measurements are EVDO Rev A compatible.**

**Residual Rho:**  $> 0.995$  typical for RF Input from  $+20$  dBm to  $-50$  dBm ( $> 0.99$  dB maximum)

**Rho Accuracy:**  $\pm 0.01$  for  $\text{Rho} > 0.9$

**Frequency Error:**  $\pm 20$  Hz + Time base error, 99% confidence level

**PN Offset:** within  $1 \times 64$  chips

**Pilot Power Accuracy:**  $\pm 1$  dB typical relative to Channel Power

**Tau:**  $\pm 0.5$   $\mu\text{s}$  typical ( $\pm 1$   $\mu\text{s}$  maximum)

## *cdmaOne and CDMA2000 1xRTT Over The Air (Option 33) and EVDO Over The Air (Option 34)*

**Over The Air Measurement:** Nine strongest pilots with Tau and Ec/Io. Six multipaths relative to strongest pilot.

## *Fixed WiMAX RF Measurements (Option 46)*

**Channel Power Accuracy<sup>1</sup>:**  $\pm 1$  dB Typical for  $+20$  dBm to  $-50$  dBm ( $\pm 1.5$  dB max)

## *Fixed WiMAX Demodulator (Option 47)*

**Residual EVM (rms):** 3% for  $+20$  dBm to  $-50$  dBm (3.5% max.)

**Frequency Error:**  $\pm 0.1$  ppm + time base error, 99% confidence level

## *Mobile WiMAX Specifications*

**Bandwidths:** 3.5 MHz, 5 MHz, 7 MHz 8.75 MHz, 10 MHz

**Frame Length:** 5 ms, 10 ms

**Zone Types:** PUSC

**DL-MAP Support:**

Regular and Compressed Map, DIUC support

**DL-MAP Auto Decoding:** Convolutional Coding (CC), Convolution Turbo Coding (CTC)

## *Mobile WiMAX Over the Air (OTA) Measurements (Option 37)*

**Time Interval:** 1 sec – 60 sec

**Measurement Duration:** 72 hours max

**Auto Save:** Yes

**GPS Logging:** Yes

## *Mobile WiMAX RF Measurements (Option 66)*

**Channel Power Accuracy:**  $\pm 1$  dB Typical ( $\pm 1.5$  dB max) for  $+20$  dBm to  $-50$  dBm

## *Mobile WiMAX Demodulator (Option 67)*

**For  $+20$  dBm to  $-50$  dBm, Residual EVM (rms):** 2.5% typical (3% max), at  $-50$  dBm on FCH

**Frequency Error:**  $\pm 0.02$  ppm + time base error, 99% confidence level

<sup>1</sup>Channel power accuracy will vary with amount of data burst traffic

## *TD-SCDMA RF Measurements (Option 60)*

**Channel Power (RRC):**  $\pm 1$  dB typical, 1.5 dB max  
(slot power from +10 dBm to -40 dBm)

## *TD-SCDMA Demodulator (Option 61)*

**Residual EVM (rms):** 3% typical (for P-CCPCH slot, slot power  $> -50$  dBm)

**Freq Error Accuracy:**  $\pm 10$  Hz typical + time base error (in the presence of a downlink slot)

**Timing Error (Tau) for dominant SYNC-DL code:**  $\pm 0.2$   $\mu$ s (external trigger)

**Supported Modulation:** QPSK

**Spreading Factor:** 1, 16

## *TD-SCDMA Over the Air (OTA) Measurements (Option 38)*

32 codes displaying Ec/Io, Tau

**Frequency Error:**

$\pm 0.02$  ppm + time base error, 99% confidence level

## *T1 Bit-Error-Rate-Tester (BERT), (Option 51)*

**T1 Analyzer, Fractional T1 and sub-channels BER testing at 1.544 MB, 64, 16 and 8 kB rates**

**Line Coding:** AMI, B8ZS

**Framing Modes:** D4 (Superframe), ESF (Extended Superframe)

**Connection Configurations:** Terminate: 100  $\Omega$

Bridge:  $\geq 1000$   $\Omega$

Monitor: Connect via 20 dB pad in DSX

**Receiver Sensitivity:** Terminate: +6 dB to -36 dB

Bridge: +6 dB to -36 dB

Monitor: 20 dB flat gain

**Transmit Level:** 0 dB, -7.5 dB, and -15 dB Clock

**Sources:** External Bits Clock

**Internal:** 1.544 MHz  $\pm 5$  ppm

**Pulse Shapes:** Conform to ANSI T1.403 and ITU G.703

**Pattern Generation and Detection:** PRBS: 2-9, 2-11, 2-15, 2-20, 2-23

Inverted and non-inverted

QRSS, 1-in-8 (1-in-7), 2-in-8, 3-in-24,

All ones, All zeros, T1-Daly,

User defined ( $\leq 32$  bits)

**Circuit Status Reports:** Carrier present, Frame ID and Sync.,  
Pattern ID and Sync.

**Alarm Detection:** AIS (Blue Alarm), RAI (Yellow Alarm)

**Error Detection:** Frame Bits, Bit, BER, BPV, CRC

**Error Sec Error Insertion:** Bit, BPV, Framing Bits, RAI, AIS

**Loopback Modes:** Self loop, CSU, NIU, User defined,  
In-band or Data Link

**Level Measurements:** Vp-p ( $\pm 5\%$ ), can also display in dBdsx

**Data Log:** Continuous, up to 72 hrs

**T1 Frequency Measurement:**  $\pm 5$  ppm

**DS0 Channel Access:** Tone Generator

**Frequency:** 100 Hz to 3000 Hz

**Level:** -30 to 0 dBm, with 1 dB steps

**VF Measurement:** Frequency: 100 Hz to 3000 Hz,  $\pm 3$  Hz

Level: -40.0 to +3.0 dBm,  $\pm 0.2$  dBm

Audio Monitor: Manually select channel 1 to 24

**ITU G-821 Analysis:** Error seconds (ES), error free seconds (EFS),  
severely errored seconds (SES), unavailable seconds (UAS),  
available seconds (AS), degrade minutes (DGRM)

## *E1 - 2 MB/s Bit-Error-Rate-Tester (BERT), (Option 52)*

### **E1 - 2 MB/s Analyzer, sub-channels**

**BER testing:** BER testing at 2.048 MB, 64, 16 and 8 kB rates

**Line Coding:** AMI, HDB3

**Framing Modes:** PCM30, PCM30CRC-4, PCM31, PCM31CRC-4

**Connection Configurations:** Terminate: 75  $\Omega$  BNC unbalanced, 120  $\Omega$

RJ48C balanced

Bridge:  $> 1000$   $\Omega$

Monitor: Connect via 20 dB pad in DSX

**Receiver Sensitivity:** Terminate: +6 dB to -43 dB

Bridge: +6 dB to -43 dB

Monitor: 20 dB flat gain

**Clock Sources:** External: Sets clock,

Internal: 2.048 MHz  $\pm 5$  ppm

**Pulse Shapes:** Conform to ITU G.703

**Pattern Generation and Detection:** PRBS: 2-9, 2-11, 2-15, 2-20, 2-23

Inverted and non-inverted

QRSS, 1-in-8 (1-in-7), 2-in-8, 3-in-24,

All ones, All zeros, User defined  $\leq 32$  bits)

**Circuit Status Reports:** Carrier present, Frame ID and Sync.,  
Pattern ID and Sync.

**Alarm Detection:** AIS, RAI, MFAS RAI (PCM-30)

**Error Detection:** Frame Bits, BER (FAS), Bit, CRC-4, E-Bits, BPV

**Error Analysis:** Error rates, Error Counts

**ITU G-821 Analysis:** Errored seconds, error free seconds,  
severely errored seconds, unavailable seconds,  
available seconds, degraded minutes

**Error Insertion:** E-bit, Framing Bits (FAS), RAI, AIS

**Loopback Modes:** Self loopback

**Level Measurements:** Vp-p ( $\pm 5\%$ )

**Data Log:** Continuous, up to 72 hrs

**E1 - 2 MB/s Frequency Measurement:**  $\pm 5$  ppm

**VF Tone Generator:**

Frequency: 100 Hz to 3000 Hz

Level: -30 to 0 dBm with 1 dB steps

**Audio Monitor:** manually select channel 1-31

**VF Measurement:**

Frequency: 100 Hz to 3000 Hz  $\pm 3$  Hz

Level: -40.0 to +3.0 dBm  $\pm 0.2$  dBm

## *T3/T1/FT1 Bit-Error-Rate-Tester (BERT), (Option 053)*

### **T3 Analyzer**

**Line Coding:** B3ZS, AMI

**Framing Modes:** Unframed, M13, C-bit

**Connection Configurations:** Terminate (75  $\Omega$ ) BNC unbalanced  
Monitor (Connect via 20 dB pad in DSX)

**Receiver Sensitivity:** +6 dB to -24 dB

**Transmit Level:** DSX, Low, Pulse shape: conforms to ITU G.703

**Clock Sources:** External, Internal: 44.736 MHz  $\pm 5$  ppm

**Pulse Shapes:** Conform to ANSI T1.102 & ITU G.703

**Pattern Generation and Detection:** PRBS: 2-9, 2-11, 2-15, 2-20, 2-23  
Inverted and non-inverted,  
User defined ( $\leq 32$  bits)

**Circuit Status Reports:** Carrier present, Frame ID and Sync.,  
Pattern ID and Sync.

**Alarm Detection:** AIS (Blue Alarm), RAI (Yellow Alarm)

**Error Detection:** Frame Bits, Bit, BER, BPV, FEBC,  
C-bit, P-bit, Error Sec

**Error Insertion:** Bit, Framing Bits

**Loopback Modes:** Stuff Bit (M13 & C-bit): 1 of DS1  
FEAC (C-bit): DS3, 1 of DS1 all DS1

**Level Measurements:** Vp-p ( $\pm 5\%$ ), can also display in dBdsx

**Data Log:** Continuous, up to 72 hrs

**T3 Frequency Measurement:**  $\pm 5$  ppm

**ITU G-821 Analysis:** Errored seconds, error free seconds,  
severely errored seconds, unavailable seconds,  
available seconds, degraded minutes (32 bits)

## T1 Analyzer, Fractional T1 and sub-channels

**BER Testing:** BER testing at 1.544 MB, 64, 16 and 8 kB rates

**Line Coding:** AMI, B8ZS

**Framing Modes:** D4 (Superframe), ESF (Extended Superframe)

**Connection Configurations:** Terminate: 100  $\Omega$  balanced, Bantam  
Bridge:  $\leq$  1000  $\Omega$

Monitor: Connect via 20 dB pad in DSX

**Receiver Sensitivity:** Terminate: +6 dB to -36 dB

Bridge: +6 dB to -36 dB

Monitor: 20 dB flat gain

**Transmit Level:** 0 dB, -7.5 dB, and -15 dB

**Clock Sources:** External Bits clock,

Internal: 1.544 MHz  $\pm$  5 ppm

**Pulse Shapes:** Conform to ANSI T1.403 & ITU G.703

**Pattern Generation and Detection:**

PRBS: 2-9, 2-11, 2-15, 2-20, 2-23 Inverted and non-inverted, QRSS, 1-in-8 (1-in-7), 2-in-8, 3-in-24, All ones, All zeros, T1-Daly, User defined ( $\leq$  32 bits)

**Circuit Status Reports:**

Carrier present, Frame ID and Sync.,

Pattern ID and Sync.

**Alarm Detection:** AIS (Blue Alarm), RAI (Yellow Alarm)

**Error Detection:** Frame Bits, Bit, BER, BPV, CRC, Error Sec

**Error Insertion:** Bit, BPV, Framing Bits, RAI, AIS

**Loopback Modes:** Self loop, CSU, NIU, User defined, In-band or Data Link

**Level Measurements:** Vp-p ( $\pm$  5%), can also display in dBdsx

**Data Log:** Continuous, up to 72 hrs

**T1 Frequency Measurement:**  $\pm$  5 ppm

**DS0 Channel Access:** Tone Generator Frequency: 100 Hz to 3000 Hz

Level: -30 to 0 dBm, with 1 dB steps

**VF Measurement:** Frequency: 100 Hz to 3000 Hz,  $\pm$  3 Hz

Level: -40.0 to +3.0 dBm,  $\pm$  0.2 dBm

**Audio Monitor:** Manually select channel 1 to 24

**ITU G-821 Analysis:** Errored seconds, error free seconds, severely errored seconds, unavailable seconds, available seconds, degraded minutes

## Gated Sweep (Option 090)

The option adds gated sweep to the spectrum analyzer mode, giving the user the capability to view pulsed or burst signals only when they are on, or conversely look at the spectrum only when a signal is off.

**Trigger Signal:** External TTL input, user selectable high or low level.

**Gate Delay:** 0 to 65 ms typical

**Gate Length:** 1  $\mu$ s to 65 ms typical

## PIM Analyzer Specifications (Option 0419)

(requires PIM Master™)

See Product Brochure 11410-00546

## LTE Specifications

**Bandwidth:** 10 MHz

**Span:** 1.4, 3, 5, 10, 15, 20 MHz

**Frame Length:** 2.5, 5.0, 10.0 msec

## LTE RF Measurements (Option 0541)

**RF Channel Power Accuracy:**  $\pm$  1.0 dB typical, (RF input -50 to +10 dBm)

## LTE Modulation Measurements (Option 0542)

**Frequency Error:**  $\pm$  10 Hz + time base error, 99% confidence level

**Residual EVM (rms):** 2.5 % typical (E-UTRA Test Model 3.1)  
(RF Input -50 dBm to +10 dBm)

## LTE Over-the-Air (OTA) Measurements

(Option 0546)

**Scanner:** Six strongest Sync Signals

**Auto Save:** Yes

**GPS Tagging and Logging:** Yes

## System

**Measurement Resolution:** 0.01 dB

**Offset Range:**  $\pm$  60 dB

**Interfaces:** USB A/mini-B 2.0

## General Specifications

**Maximum Continuous Input into Spectrum Analyzer:**

10 dB attenuation, +30 dBm,  $\pm$  50 VDC

**RF Input VSWR:** 2.0:1 maximum, 1.5:1 typical ( $\geq$  10 dB attenuation)

**Internal Time Base Accuracy:**  $\pm$  0.3 ppm

**Interfaces:**

Type N female RF Connector

Type N female RF Out Port and RF In Port (50  $\Omega$ )

BNC female connectors for external reference

and external trigger

Reverse BNC connector for GPS antenna

E1-2Mb/s (Receive and Transmit): RJ48 (75  $\Omega$ ) connector and BNC(f) (120  $\Omega$ )

T1 (Receive and Transmit): Bantam Jack (100  $\Omega$ )

T1, T3 (Receive and Transmit): Bantam Jack (100  $\Omega$ ) and BNC (75  $\Omega$ )

RF Detector: Type N(m) 50  $\Omega$

RJ45 connector for Ethernet 10/100-Base T

2.5 mm 3-wire cellular headset connector

5-pin Mini-B USB 2.0 device connector

USB 2.0 Host connector used with PSN50

and USB Flash Drives

**Maximum Input (Damage Level) into Cable and Antenna Analyzer Test Port:**

Type N: +23 dBm,  $\pm$  50 VDC

**Environmental:** MIL-PRF-28800F Class 2

Operating: -10  $^{\circ}$ C to 55  $^{\circ}$ C, humidity 85%

Storage: -51  $^{\circ}$ C to 71  $^{\circ}$ C

Altitude: 4600 meters, operating and non-operating

**Safety:** Conforms to EN 61010-1 for Class 1 portable equipment

**Electromagnetic Compatibility:** Meets European Community requirements for CE marking

**Size:** 315 x 211 x 94 mm (12.4 x 8.3 x 3.7 in.)

**Weight:** 4 kg (9 lbs.)

\* Excludes mismatch errors.

Excludes noise, zero set, zero drift for levels  $<$ -20 dBm.

Excludes digital modulation uncertainty between +17 and +20 dBm.

\*\*After 30 min warm-up

## Ordering Information

### Model

#### MT8222A - BTS Master

100 kHz to 7.1 GHz

### Standard

#### Cable and Antenna Analyzer

Frequency Range: 10 MHz to 4 GHz

#### Spectrum Analyzer

Frequency Range: 100 kHz to 7.1 GHz

#### Power Meter

Frequency Range: 100 kHz to 7.1 GHz

### Optional

#### Interference Analyzer

Frequency Range: 100 kHz to 7.1 GHz

#### Channel Scanner

Frequency Range: 100 kHz to 7.1 GHz

#### W-CDMA/HSDPA Analyzer

Frequency Range: 824 to 894 MHz, 1710 to 2170 MHz, and 2300 to 2700 MHz

#### GSM/GPRS/EDGE Analyzer

Frequency Range: 380 to 400 MHz, 410 to 430 MHz, 450 to 468 MHz, 478 to 496 MHz, 698 to 746 MHz, 747 to 792 MHz, 806 to 866 MHz, 824 to 894 MHz, 890 to 960 MHz, 880 to 960 MHz, 876 to 960 MHz, 870 to 921 MHz, 1710 to 1990 MHz

#### Fixed WiMAX Analyzer

Frequency Range: 2.3 to 2.7 GHz, 3.3 to 3.8 GHz, 5.25 to 5.875 GHz

#### Mobile WiMAX Analyzer

Frequency Range: 2.3 to 2.7 GHz, 3.3 to 3.8 GHz

#### CDMA Analyzer

Frequency Range: 1 MHz to 2.7 GHz

#### EVDO Analyzer

Frequency Range: 1 MHz to 2.7 GHz

#### TD-SCDMA Analyzer

Frequency Range: 400 MHz to 2.7 GHz

### Options

MT8222A-005	Power Monitor (requires external detector)**
MT8222A-010	Bias Tee variable voltage
MT8222A-10A	High Voltage Bias Tee
MT8222A-019	High Accuracy Power Meter (PSN50 sensor not included)
MT8222A-025	Interference Analysis
MT8222A-026	6 GHz Cable and Antenna Analyzer (10 MHz to 6 GHz)
MT8222A-027	Channel Scanner
MT8222A-028	CW Signal Generator (requires CW Signal Generator kit)
MT8222A-031	GPS Receiver (includes GPS antenna, Anritsu part number: 2000-1410)
MT8222A-033	cdmaOne and CDMA2000 1xRTT Over The Air (OTA)****
MT8222A-034	EVDO Over the Air (OTA)****
MT8222A-035	W-CDMA/HSDPA (OTA)****
MT8222A-037	Mobile WiMAX Over The Air (OTA) Measurements
MT8222A-038	TD-SCDMA Over The Air (OTA) Measurements
MT8222A-040	GSM/GPRS/EDGE RF Measurement
MT8222A-041	GSM/GPRS/EDGE Demodulation
MT8222A-042	CDMA RF Measurements
MT8222A-043	cdmaOne and CDMA2000 1xRTT Demodulator
MT8222A-044	W-CDMA/HSDPA RF Measurement
MT8222A-045	W-CDMA Demodulation
MT8222A-046	Fixed WiMAX RF Measurement
MT8222A-047	Fixed WiMAX Demodulation
MT8222A-051	T1/FT1 BERT (Bit-Error-Rate-Tester)**
MT8222A-052	E1-2 Mb/s Bit-Error-Rate-Tester (BERT)**
MT8222A-053	T3/T1/FT1 BERT (Bit-Error-Rate-Tester)**
MT8222A-060	TD-SCDMA RF Measurement
MT8222A-061	TD-SCDMA Demodulation
MT8222A-062	EVDO RF Measurements
MT8222A-063	EVDO Demodulator
MT8222A-064	DVB-T/H Digital Video Measurement
MT8222A-065	W-CDMA/HSDPA Demodulation***
MT8222A-066	Mobile WiMAX RF Measurements

MT8222A-067  
MT8222A-090  
MT8222A-0419  
MT8222A-0541  
MT8222A-0542  
MT8222A-0546

Mobile WiMAX Demodulator  
Gated Sweep  
PIM Analyzer (requires PIM Master™)  
LTE RF Measurements  
LTE Modulation Measurements  
LTE Over-the-Air Measurements\*\*\*\*

### High Accuracy Power Meter Accessories

PSN50	High Accuracy Power Sensor, 50 MHz to 6 GHz
MA24106A	High Accuracy Power Sensor, 50 MHz to 6 GHz
3-2000-1498	USB A/mini-B cable 10 ft
3-1010-122	Attenuator (Bi-directional), 20 dB, 5 watt, DC to 12.4 GHz, N(m) to N(f)
3-1010-123	Attenuator (Bi-directional), 30 dB, 50 watt, DC to 8.5 GHz, N(m) to N(f)
3-1010-124	Attenuator (Uni-directional), 40 dB, 100 watt, DC to 8.5 GHz, N(m) to N(f)

### Standard Accessories

10920-00060	Handheld Instruments Documentation Disc
10580-00156	BTS Master™ User's Guide
11410-00433	BTS Master MT8222A Technical Data Sheet
65681	Soft Carrying Case
2300-498	Master Software Tools
2300-530	Anritsu Tool Box with Line Sweep Tools
633-44	Rechargeable Li-Ion Battery
40-168-R	AC/DC Adapter
806-141-R	Automotive Cigarette Lighter/12 Volt DC Adapter
3-2000-1567	512 MB Compact Flash Memory Module
2000-1520-R	USB Flash Drive
3-2000-1360	USB A/mini-B cable 6 ft.
3-806-152	Cross-over Ethernet cable
1091-27-R	Adapter, DC to 18 GHz, N(m) to SMA(f), 50 Ω
1091-172-R	Adapter, DC to 1.3 GHz, N(m) to BNC(f), 50 Ω

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

### Optional Accessories

800-109	Detector Extender Cable, 7.6 m (25 ft.)
800-111	Detector Extender Cable, 30.5 m (100 ft.)
2000-1374	Dual External, Li-Ion Charger with Universal Power Supply
2000-1410	Magnet Mount GPS Antenna with 3 m (15 ft) Cable
3-2000-1567	512 MB Compact Flash Memory Module
2000-1520-R	USB Flash Drive
760-243-R	Transit Case for Anritsu MT8222A BTS Master
1N50C	Limiter, N(m) to N(f), 50 Ω, 10 MHz to 18 GHz
790-641	Cable Lock
42N50-20	Attenuator, 20 dB, 5 watt, DC to 18 GHz, N(m) to N(f)
42N50A-30	Attenuator, 30 dB, 50 watt, DC to 18 GHz, N(m) to N(f)
22N50	Open/Short, DC to 18 GHz, N(m), 50 Ω
22NF50	Open/Short, DC to 18 GHz, N(f), 50 Ω
SM/PL-1	Precision Load, DC to 6 GHz, 42 dB, N(m), 50 Ω
SM/PLNF-1	Precision Load, DC to 6 GHz, 42 dB, N(f), 50 Ω
OSLN50-1	Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(m)
OSLNF50-1	Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(f)
2000-767-R	Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50 Ω
2000-768-R	Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(f), 50 Ω
1091-26-R	N(m) to SMA(m) DC to 18 GHz, 50 Ω
1091-27-R	N(m) to SMA(f) DC to 18 GHz, 50 Ω
1091-80-R	N(f) to SMA(m) DC to 18 GHz, 50 Ω
1091-81-R	N(f) to SMA(f) DC to 18 GHz, 50 Ω

\*All the options are upgradeable at Service Centers except T1 option.

\*\*Option 5 and Options 51, 52 and 53 are mutually exclusive.

\*\*\*Option 65 includes Option 45.

\*\*\*\*Requires Option 31 GPS

## Adapters

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° right angle

## Precision Adapters

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

## Directional Antennas

2000-1411-R	Portable Yagi Antenna, 10 dBd, N(f), 822 to 900 MHz
2000-1412-R	Portable Yagi Antenna, 10 dBd, N(f), 885 to 975 MHz
2000-1413-R	Portable Yagi Antenna, 10 dBd, N(f), 1.71 to 1.88 GHz
2000-1414-R	Portable Yagi Antenna, 9.3 dBd, N(f), 1.85 to 1.99 GHz
2000-1415-R	Portable Yagi Antenna, 10 dBd, N(f), 2.4 to 2.5 GHz
2000-1416-R	Portable Yagi Antenna, 10 dBd, N(f), 1.92 to 2.17 GHz

## GPS Antenna

2000-1410	Magnet Mount GPS Antenna with 15 ft. cable
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## Portable Antennas

2000-1200-R	806 MHz to 866 MHz, SMA(m), 50 Ω
2000-1030-R	1.71 GHz to 1.88 GHz, SMA(m), 50 Ω (1/2 wave)
2000-1031-R	1.85 GHz to 1.99 GHz, SMA(m), 50 Ω (1/2 wave)
2000-1032-R	2.4 GHz to 2.5 GHz, SMA(m), 50 Ω (1/2 wave)
2000-1035-R	896 MHz to 941 MHz, SMA(m), 50 Ω (1/2 wave)
2000-1361-R	2.4 GHz to 2.5 GHz, 5 GHz to 6 GHz, SMA(m), 50 Ω
2000-1473-R	870 MHz to 960 MHz, SMA(m), 50 Ω
2000-1474-R	1.71 GHz to 1.88 GHz with knuckle elbow (1/2 wave)
2000-1475-R	1.92 GHz to 1.98 GHz and 2.11 GHz to 2.17 GHz, 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)

## Attenuator

42N50A-30	30 dB, 50 W, Bi-directional, DC to 18 GHz, N(m) to N(f)
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## Cables

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	72-inch (1.8 m), BNC to BNC, 75.5 RG59 Type Coax Cable
806-176-R	Bantam Plug to Alligator Clips
806-177-R	RJ48 to RJ48

## Band Pass Filters

1030-105-R	890 to 915 MHz Band, N(m) to N(f), 50 Ω
1030-106-R	1710 to 1790 MHz Band, N(m) to N(f), 50 Ω
1030-107-R	1910 to 1990 MHz Band, N(m) to N(f), 50 Ω
1030-109-R	824 to 849 MHz Band, N(m) to SMA(f), 50 Ω
1030-110-R	880 to 915 MHz Band, N(m) to SMA(f), 50 Ω
1030-111-R	1850 to 1910 MHz Band, N(m) to SMA(f), 50 Ω
1030-112-R	2400 to 2484 MHz Band, N(m) to SMA(f), 50 Ω
1030-114-R	806 to 869 MHz Band, N(m) to SMA(f), 50 Ω

## Test Port Cable Armored

15NN50-1.5C	1.5 meters, N(m) to N(m), 6 GHz, 50 Ω
15NNF50-1.5B	1.5 meters N(m) to N(f), 18 GHz, 50 Ω
15NN50-3.0C	3.0 meters, N(m) to N(m), 6 GHz, 50 Ω
15NN50-5.0C	5.0 meters, N(m) to N(m), 6 GHz, 50 Ω
15NNF50-1.5C	1.5 meters, N(m) to N(f), 6 GHz, 50 Ω
15NNF50-3.0C	3.0 meters, N(m) to N(f), 6 GHz, 50 Ω
15NN50-5.0C	5.0 meters, N(m) to N(m), 6 GHz, 50 Ω
15ND50-1.5C	1.5 meters, N(m) to 7/16 DIN(m), 6 GHz, 50 Ω
15NDF50-1.5C	1.5 meters, N(m) to 7/16 DIN(f), 6 GHz, 50 Ω

## Power Monitor Detectors

560-7N50B	0.01 to 20 GHz
560-7S50B	0.01 to 20 GHz
560-7K50	0.01 to 40 GHz
560-7VA50	0.01 to 50 GHz

## CW Signal Generator Kit

67276	CW Signal Generator Kit (includes the 4 parts listed below)
65-54	Attenuator, 0-90 dB (1 dB and 10 dB steps), 2.5 GHz, N(f), N(f)
510-102-R	Adaptor, N(m) to N(m), DC to 11 GHz, 50 Ω, 90° right angle
SC7651	Power Splitter, 50 Ω, N(f), N(m), N(f)
67263	Cable, N(m), N(m)



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