BTS Master™
MT8222A
A High Performance – Handheld Base Station Analyzer
Handheld integrated multi-function test tool
RF engineers and technicians in the field need a lightweight, practical, and rugged test solution that can perform all the measurements needed for installation and maintenance of modern cell sites. That solution is the BTS Master MT8222A. It combines the functionality of Anritsu’s high performance-handheld products, including the MS2721B Spectrum Master and the MS2024A and MS2026A Cable and Antenna Analyzer. This combined product weighs less than 4 kg. (9lbs.). The MT8222A provides users with cable and antenna analysis, spectrum analysis, power meter, W-CDMA/HSDPA, GSM/GPRS/EDGE, CDMA/EVDO, Fixed WiMAX, Mobile WiMAX and TD-SCDMA, RF and Demod measurements and W-CDMA/HSDPA CDMA/EVDO, Mobile WiMAX and TD-SCDMA Over the Air (OTA), channel scanner, Interference Analyzer, variable Bias Tee, Bit Error Rate Tester (BERT) and Power Monitor. So technicians can eliminate the need to carry several independent instruments and instead get the job done with the MT8222A – an optimal combination of Anritsu’s high performing handheld instruments.

Easy to use
Coming from the leader in cable and antenna analysis, it’s no surprise that the BTS Master MT8222A is very easy to operate and requires little or no training. Users will enjoy the bright 8.5 in. (215 mm.) color TFT display – easy to read even in broad daylight. Up to six markers can be displayed on the screen including noise markers and frequency counter markers in the Spectrum Analyzer mode.

Keep on going – wherever you like
The BTS Master runs for more than 2.5 hours on a single, rechargeable Li-ion battery. So users have the time and freedom to move from ground installations to the highest towers, or anywhere where critical measurements are needed. Plus, when it’s time to replace the battery, it takes no time at all, and requires no tools.

Eight Built-in Languages
While fluent in English, Spanish, German, French, Japanese, Chinese, Italian and Korean, the MT8222A user can also customize two additional languages using Master Software Tools.
From the Ground Up to the Tower, Accurate and Powerful Cable and Antenna Analysis in One Handheld Instrument

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Increase System Uptime with 1-Port Cable and Antenna Analysis

The BTS Master MT8222A performs a variety of cable and antenna measurements aimed at simplifying the task for the technician and engineer. A single key selection on the bottom hard keys brings up all the measurements you need.

**Frequency Domain Reflectometry (FDR)**
Frequency Domain Reflectometry (FDR) can be used to characterize systems using frequency selective devices (filters, duplexers, lightning arrestors, antennas, combiners), thus providing an early alert to devastating system failures. Plus, FDR can track down costly, time consuming problems due to corrosion, slight pin gaps and damaged RF components. By breaking away from the traditional fix-after-failure maintenance process, FDR techniques find small, hard-to-identify problems before they become big problems by testing the system at the operating frequency.

**6 GHz Cable and Antenna Analyzer (Option 26)**
The 6 GHz Cable and Antenna Analyzer option supports all Cable and Antenna Analyzer functionality and extends the measurement range from 4 GHz to 6 GHz.

**Return Loss/VSWR**
Return Loss and VSWR measurements can be used to characterize cable and antenna systems to ensure conformance to system specific requirements. Return Loss measures the signal energy that is “reflected” or returned back to where it came from. Measurements can be easily toggled between Return Loss and VSWR modes and can be performed without climbing the tower.

**Cable Loss**
Usually performed with a short or open at the end of the cable, Cable Loss measures the energy lost in the cable or transmission line. Since the MT8222A automatically calculates and displays the average cable loss over the set frequency range, there's no more need for guesswork or complicated calculations in the field.

**Distance-To-Fault (DTF)**
Precisely locate faults within cable and feedline systems using the MT8222A’s Distance-To-Fault (DTF) measurement. Users will see magnitude discontinuities displayed in dB or VSWR over distance in meters or feet. The Distance-To-Fault (DTF) display is obtained by performing a sweep in the frequency domain and then by using the inverse Fast Fourier Transform, the data is converted to the time domain. Distance-To-Fault (DTF) can easily identify connector transitions, jumpers and kinks in the cable and antenna system. Different windowing (frequency filters) types give the user the flexibility to trade off sidelobes for pulse width.
See Overall Tower Top Performance with 2-Port Cable and Antenna Analysis

Many cellular/PCS and 3G base stations today use diplexers, duplexer, and Tower Mounted Amplifiers (TMAs) to extend the coverage of the uplink signal – adding a host of complexities for technicians working on these systems. To help simplify performance verification, the MT8222A allows users to take advantage of 2-port measurements to make gain, isolation, and insertion loss measurements, as well as to verify the sector-to-sector isolation, TMA and duplexed antennas.

2-Port Gain
The MT8222A simplifies the task of verifying amplifier and system performance during installation or periodic maintenance and troubleshooting intervals. Its 2-port Gain measurement features two different output power levels: High (0 dBm) and Low (–30 dBm). Low power levels are used to measure the gain of the TMA directly to ensure that the amplifier does not saturate and that the receiver port remains unexposed to excess power.

If the TMA has already been installed on the tower, the MT8222A can measure the relative gain by sending out an RF signal to the transmit antenna and then measure the received uplink signal with the bias turned on and off.

Antenna-to-Antenna Isolation
Improving isolation between antenna sectors can reduce cell-to-cell RF interference and improve system coverage and capacity. An advantage of the MT8222A is its high power level selection and excellent dynamic range, ensuring accurate measurements during deployment and during periodic maintenance intervals. Furthermore, if the antenna has moved from the installed mounting angle, such as after harsh weather, this change would be detected in side lobe and back lobe coupling magnitudes. Additionally, Tx-Rx isolation of duplexers and filters can be easily tested with the MT8222A’s Dynamic Range performance.

Phase Measurements and Smith Chart
The MT8222A provides 1-port and 2-port phase measurements for phase matching cables. Using the trace math menu, relative phase measurements can be made. Technicians can also view impedance matching results in the Smith Chart display. Markers show real and imaginary components of the load impedance.

Bias Tee (Option 10)
The optional built-in Bias Tee places adjustable +12V to +24V of the RF In port and eliminates the need for an external power supply when biasing an amplifier.
Smart Measurements
Dedicated routines for one-button measurements of field strength, channel power, occupied bandwidth, Adjacent Channel Power Ratio (ACPR) and Carrier to Interference Ratio (C/I) make the MT8222A the ideal choice for the field. Its simple interface significantly reduces test time and increases analyzer usability, putting more power where it belongs – in the hands of the technician.

Fast Sweep Speed
The MT8222A automatically sweeps as fast as possible for the selected settings consistent with accurate results. This allows users to select their settings and then sweep faster than any portable spectrum analyzer on the market today, simplifying the capture of intermittent interference signals. Plus, it’s all done automatically, accurately and consistently.

Occupied Bandwidth
This measurement determines the amount of spectrum used by a modulated signal. You can choose between two different methods of determining bandwidth: the percent of power method or the “x” dB down method, where “x” can be from 1 dB to 100 dB down the skirts of the signal.

Field Strength
To correct the loss or gain of an antenna field strength measurement, the MT8222A applies an “antenna factor.” The MT8222A will then automatically adjust the results of the selected antenna frequency band based on the antenna factor. Plus, you’ll find antenna factors of all the antennas offered by Anritsu stored in the unit. Antenna factors for all other antennas can easily be created and saved using Master Software Tools.
Connect Directly or Over the Air to Make W-CDMA/HSDPA Measurements

With four measurement options; W-CDMA/HSDPA RF Meas, W-CDMA Demod, W-CDMA/HSDPA Demod (covering all W-CDMA Demod measurements) and W-CDMA/HSDPA Over The Air (OTA) measurements, technicians and RF engineers can connect the MT8222A to any Node B for accurate RF and Demodulator measurements. A physical connection is not required for the MT8222A to receive and demodulate W-CDMA and HSDPA OTA signals. With the MT8222A, a technician no longer needs to take a Node B site off-line.

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

RF measurements are used to measure the transmitted signal strength and signal shape of the selected Node B transmitter. For convenience, the RF measurement option includes Channel Spectrum, Spectral Emission Mask, ACLR and RF Summary screens.

**Channel Spectrum**

The Channel Spectrum screen displays the signals of a selected channel as well as channel power (in dBm and watts), occupied bandwidth and peak to average power. Operators can select a channel by using the band channel or by choosing a signal standard and channel.

**Spectral Emission Mask**

The Spectral Emission Mask measurement applies the mask depending upon the transmitter output as defined in the 3GPP specification (TS 25.141). The mask varies depending upon the input signal. The MT8222A indicates if the signal “PASSED” or “FAILED” according to the specified limits. For ease of analysis, the spectral emission mask is also displayed in a tabular format with different frequency ranges and a PASS or FAIL indication for each range.

**ACLR**

The ACLR screen shows measurements of main channel power as well as the power levels of the adjacent channels set at –10 MHz, –5 MHz, +5 MHz and +10 MHz according to the 3GPP standard (TS 25.141). The MT8222A can also make multichannel ACLR measurements with as many as four main channels and four adjacent channels. See the example with four main channels and two adjacent channels on both sides.

**RF Summary**

Technicians can quickly check transmitter performance parameters and details at a glance in RF Summary screen.
W-CDMA Demodulator (Option 45)
Demodulates W-CDMA signals and views detailed measurements for evaluating transmitter modulation performance using Code Domain Power (CDP), Codogram, Modulation Summary and Pass/Fail screens using MT8222A with Option 45.

Code Domain Power
The Code Domain Power (CDP) screen displays 256 or 512 OVSF codes with zoom capability, common pilot power (P-CPICH), channel power, error vector magnitude (EVM), carrier frequency, carrier feed through, frequency error (in Hz and ppm), Peak CD error, and noise floor. This view can zoom to 32, 64, or 128 codes and the user can input the zoom start code to zoom in on the OVSF codes. The demodulator also displays CPICH, P-CCPCH, S-CCPCH, PICH, P-SCH and S-SCH power in a dedicated control channel view.

Code Domain Power Table
The Code Domain Power (CDP) Table screen views all active OVSF codes, the Spreading Factor, Code, Status, Symbol EVM, modulation type, Relative Power and Absolute Power – all within the CDP Table screen.

Codogram
Users can take advantage of the Codogram screen display and see how code levels are changing over time – making it easier to monitor traffic, faults and hand-off activity. Showing 256 or 512 OVSF codes with zoom codes, the MT8222A can zoom to 32, 64 or 128 codes, or the user can directly zoom to particular OVSF codes of interest.
Modulation Summary

The Modulation Summary screen displays critical transmitter performance measurements in table format for easy viewing, showing carrier frequency, frequency error, channel power, primary common pilot channel (P-CPICH) absolute power, secondary common pilot channel (S-CCPCH) power and paging indicator channel (PICH) as well as physical shared channel (PSCH) absolute power.

Pass/Fail Mode

The MT8222A stores the five test models covering all eleven test scenarios specified in the 3GPP specification (TS 25.141) for testing base station performance and recalls these models for quick easy measurements. After an operator selects a test model, the MT8222A displays test results in table format with clear PASS or FAIL indications that include min/max thresholds and actual measured results.

Using Master Software Tools, additional custom tests can be easily created and uploaded into the MT8222A. All critical parameters can be selected for Pass/Fail testing including each individual code’s power level, the spreading factor and symbol EVM.
W-CDMA/HSDPA Demodulator (Option 65)
HSDPA, or High Speed Downlink Packet Access uses up to fifteen dedicated physical channels to provide high downlink data rates. The BTS Master with Option 65 allows demodulating HSDPA signals and displaying CDP, selected code power variation over time, and the constellation for the selected code, in addition to all the standard W-CDMA demodulator measurements.

W-CDMA/HSDPA Over The Air (Option 35)
OTA has two measurement screens: Scrambling Code and Multi-path. The Scrambling Code measurement displays six scrambling codes in a bar graph/table view. For each scrambling code, CPICH in dBm, Ec/Io in dB, Ec in dBm, and pilot dominance in dB are displayed in table format. The user will also see OTA total power in dBm.

The Multi-path measurement displays up to six multi-path components of the strongest or selected Scrambling Code, measuring Tau in μSec, Tau in Chips, Distance in feet or meters, Received Signal Code Power, Relative Power and total Multi-path Power.
GSM/GPRS/EDGE Measurements
For flexibility, the MT8222A features two GSM/GPRS/EDGE measurement modes: RF Meas and Demod. Technicians and RF Engineers can connect the MT8222A to any GSM/GPRS/EDGE base station for accurate RF and demodulator measurements. When a physical connection is not required, the MT8222A can receive and demodulate GSM/GPRS/EDGE signals over the air.

GSM/GPRS/EDGE RF Measurements (Option 40)
Examine views of single-channel spectrum, Power vs. Time (frame), Power vs. Time (slot) with mask per 3GPP TS 05.05 specification and summary screens.

The user can view Channel Spectrum or Multi Channel Spectrums. The Channel Spectrum screen includes channel power, burst power, average burst power, frequency error, modulation type and Training Sequence Code.

GSM/GPRS/EDGE Demodulator (Option 41)
Option 41 demodulates GSM/GPRS/EDGE signals and displays the results of detailed measurements to analyze transmitter modulation performance. Results are shown for phase error (rms), phase error peak, EVM (rms), EVM (peak), origin offset, C/I, modulation type and magnitude error (rms) with an I/Q vector diagram of the signal.

Pass/Fail Mode
Using Master Software Tools, custom GSM/GPRS/EDGE Pass/Fail test sets can be easily created and uploaded into the MT8222A. The test results are displayed in table format with clear Pass or Fail indicators that include min/max thresholds and actual measured results.
CDMA RF Measurements (Option 42)
RF Measurements are used to measure the transmitted signal power, shape, power in adjacent channels and spurious emissions. The following sets of measurements help the technician evaluate the RF characteristics of a CDMA base station.

Channel Spectrum
The Channel Spectrum measurement displays the spectrum of the specified channel in addition to numerical values for Channel Power, Occupied BW and Peak to Average Ratio.

ACPR
The ACPR measurement displays the main channel and the power of two adjacent channels on each side of a bar graph. The user can configure up to five main channels.

Spurious Emission
This measurement displays the spectrum of the input signal at specific offsets (based upon the Signal Standard). Markers are automatically tuned to measure the input power at these offsets and to determine a PASS or FAIL according to limits that are set by the signal standard. A blue mask is also calculated and shown on the spectrum to visually check for pass fail conditions.
Evaluate the Quality of the Modulation from the CDMA Base Station

cdmaOne and CDMA2000 1xRTT Demodulator (Option 43)
Demodulator measurements are used to measure the code domain power in both graphical and tabular forms. The following sets of measurements help the technician evaluate the quality of the modulation from the CDMA base station.

CDP
The Code Domain Power measurement displays the power of the various demodulated codes (display is automatically bit reversed if Walsh Codes are set to 128). Rho, Frequency Error, Average Noise Floor and Tau are numerical values that are calculated and displayed. A zoom view of 16, 32 or 64 codes is also seen. Markers can be turned on to display the code power and code type.

CDP Table
This measurement displays all the active codes in a color coded tabular format.

cdmaOne and CDMA2000 1xRTT Over The Air (Option 33)
Over The Air Measurement provides a cost effective way to identify base station performance problems before they become catastrophic without taking the base station off the air. Traditionally, technicians had to bring down the sector or site to test the base station performance. Now technicians can sit in a vehicle and make these measurements. For accurate measurements over the air, a GPS antenna should be used to provide a timing reference.

Pilot Scan
The strongest nine received PNs are displayed as bar graphs, and the PN numbers are displayed at the bottom of the bar graphs. For each PN, a table displays PN number, Ec/Io, and Tau. Also shown are Pilot Power, Channel Power, and Pilot Dominance.

MultiPath
The strongest six paths are displayed. For each path, a table below the bar graph displays Ec/Io and Tau. Also shown are Channel Power and Multipath Power.
EVDO
With the 3G evolution of CDMA technology, 1xEV-DO provides data rates up to 2.4 Mbps, providing greater system capacity and lower costs, making wireless broadband possible. The CDMA2000 1xEV-DO (EVDO) system is backward compatible and is spectrally identical to the cdmaOne and CDMA2000 systems.

EVDO RF Measurements (Option 62)
RF Measurements are used to measure the transmitted signal power, shape, power in adjacent channels and spurious emissions. The following sets of measurements help the technician evaluate the RF characteristics of an EVDO base station.

Channel Spectrum
The Channel Spectrum measurement displays the spectrum of the specified channel in addition to numerical values for Channel Power, Occupied BW and Peak to Average Ratio.

Power vs Time
This measurement displays the time domain view of an EVDO half-slot and helps determine the % of idle activity which gives a measure of how many users are connected to the base station.

ACPR
The ACPR measurement displays the main channel and the power of two adjacent channels on each side of a bar graph. The user can configure up to five main channels.

Spurious Emission
This measurement displays the spectrum of the input signal at specific offsets (based upon the Signal Standard). Markers are automatically tuned to measure the input power at these offsets and to determine a PASS or FAIL according to limits that are set by the signal standard. A blue mask is also calculated and shown on the spectrum to visually check for pass fail conditions.

EVDO Demodulator (Option 63)
Demodulator measurements are used to measure the code domain power in both graphical and tabular forms. The following sets of measurements help the technician evaluate the quality of the modulation from the EVDO base station.

CDP MAC
This measurement displays the power of the various demodulated codes in the MAC Channel. Pilot and MAC Power, Rho, Frequency Error, and Average Noise Floor are numerical values that are calculated and displayed. A zoom view of 16, 32 or 64 codes is also seen. Markers can be turned on to display the code power and code type.

CDP Data
This measurement displays the power of the 16 I and 16 Q sub-channels of the Data channel separately.

MAC CDP Table
This measurement displays all the active codes in the MAC channel in a color coded tabular format.
EVDO Over The Air (Option 34)
Over The Air Measurement provides a cost effective way to identify base station performance problems before they become catastrophic without taking the base station off the air. Traditionally, technicians had to bring down the sector or site to test the base station performance. Now technicians can sit in a vehicle and make these measurements. For accurate measurements over the air, a GPS antenna should be used to provide a timing reference.

Pilot Scan
The strongest nine received PNPs are displayed as bar graphs, and the PN numbers are displayed at the bottom of the bar graphs. For each PN, a table displays PN number, Ec/Io, and Tau. Also shown are Pilot Power, Channel Power, and Pilot Dominance.

MultiPath
The strongest six paths are displayed. For each path, a table below the bar graph displays Ec/Io and Tau. Also shown are Channel Power and Multipath Power.

Pass/Fail Mode
The Spectrum Master and BTS Master can perform automated Pass/Fail testing for both CDMA and EVDO. The test results are displayed in table format with clear PASS or FAIL indications that include min/max thresholds and actual measured results. Using Master Software Tools, custom tests can be easily created and uploaded into the BTS Master. All critical parameters can be selected for Pass/Fail testing.
The Fixed WiMAX 802.16-2004 specification refers to an air interface standard for Broadband Wireless Access systems. It enables multiple services in a wireless metropolitan area network, such as wireless backhaul for telecommunications, E1/T1 replacement for small and medium businesses and residential wireless cable/DSL for broadband internet at home. Also, WiMAX provides fixed, nomadic, portable and mobile wireless broadband connectivity without the need for a direct line-of-sight connectivity between a base station and a subscriber.

MT8222A provides two WiMAX measurement options: Fixed WiMAX RF Meas and Fixed WiMAX Demod. So for accurate RF and demodulator measurements, technicians and RF engineers can connect the Base Station Analyzer, MT8222A to any Fixed WiMAX Base Station.

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

RF measurements are used to measure the transmitted signal strength and signal shape of the selected BTS transmitter. For the technician’s convenience, the RF measurement option can display Channel Spectrum, Power vs. Time, ACPR and RF Summary screens.

**Spectrum**

In the Spectrum screen, technicians can view and examine the selected signal’s channel power (in dBm) and occupied bandwidth.

**Power vs. Time**

The Power vs. Time screen shows the time domain view of a Fixed WiMAX OFDM signal. The Preamble power is always 3 dB higher than the data power. The channel power, preamble power, burst power of data bursts in dBm and the Crest Factor are displayed as numerical values.

**ACPR**

ACPR is the ratio of the amount of leakage power in an adjacent channel to the total transmitted power in the main channel. With the MT8222A, technicians can easily inspect measurements of main channel power as well as the power levels of the two adjacent channels on each side.
Demodulate Fixed WiMAX Signals with Ease

Fixed WiMAX Demodulator (Option 47)
With Option 47, the MT8222A can demodulate Fixed WiMAX OFDM signals and displays detailed measurements for evaluating transmitter modulation performance using Constellation, Spectral Flatness, EVM vs. Sub carrier, and EVM vs. Symbol.

Constellation
The Constellation view shows the constellation of the demodulated data symbols over 1 frame. The data bursts can have BPSK, QPSK, 16 QAM or 64 QAM modulations. All the modulations are color coded. The screen also displays RCE (rms) in dB, RCE (pk) in dB, EVM (rms) in %, EVM (pk) in %, Freq Error in Hz, Freq Error in ppm, Carrier Frequency in Hz and Base Station ID.

Spectral Flatness
The Spectral Flatness view displays the data collected from the preamble before channel estimation is performed. The deviation of the spectral flatness from the average over all the carriers is shown in dB. A mask that conforms to the 802.16-2004 specification is displayed as green/red lines depending on the measurement value. The absolute delta of the power between adjacent sub carriers in dB is also displayed.

EVM vs. Sub Carrier
The EVM vs. Sub Carrier screen displays the EVM (rms) values vs. OFDM sub carriers. The pilot and data sub carriers are displayed and color-coded.

EVM vs. Symbol
The EVM vs. Symbol screen displays the EVM (rms) values vs. OFDM Symbols.

Pass/Fail Mode
The MT8222A has the capability of creating test procedures with minimum and maximum limits for testing base station performance and recalls these tests for quick and easy measurements. After a test procedure, the MT8222A can display test results in table format with clear PASS or FAIL indications that include min/max thresholds and actual measured results. Plus using Master Software Tools, additional custom tests can be easily created and uploaded into the MT8222A.
The Mobile WiMAX 802.16-2005 specification refers to an air interface standard for Broadband Wireless Access systems. It enables multiple services in a high speed wireless network, such as wireless backhaul for telecommunications, E1/T1 replacement for small and medium businesses, wireless cable/DSL for broadband internet at home or on the move, video on demand and voice over IP services. Also, WiMAX provides, nomadic, portable and mobile wireless broadband connectivity without the need for a direct line-of-sight connectivity between a base station and a subscriber.

The MT8222A provides three Mobile WiMAX measurement options: Mobile WiMAX RF Measurements, Mobile WiMAX Demodulator and Mobile WiMAX Over The Air (OTA) measurements. So for accurate RF and demodulator measurements, technicians and RF engineers can connect the Base Station Analyzer, MT8222A to any Mobile WiMAX Base Station.

Mobile WiMAX RF Measurements (Option 66)
RF measurements are used to measure the transmitted signal strength and signal shape of the selected BTS transmitter. For the technician’s convenience, the RF measurement option can display Channel Spectrum, Power vs. Time, ACPR and RF Summary screens.

Spectrum
In the Spectrum screen, technicians can view and examine the selected signal’s channel power (in dBm) and occupied bandwidth.

Power vs. Time
The Power vs. Time screen shows the time domain view of a Mobile WiMAX OFDMA signal in either 5 ms or 10 ms frames. The different power vs. time components of a Mobile WiMAX signal are measured and displayed as channel power, preamble power, downlink burst power and uplink burst power in dBm.

ACPR
ACPR is the ratio of the amount of leakage power in an adjacent channel to the total transmitted power in the main channel. With the MT8222A, technicians can easily inspect measurements of main channel power as well as the power levels of the two adjacent channels on each side.

WiMAX Summary
Technicians can quickly view key measurement parameters in the various Summary screens. The WiMAX RF summary screen displays channel power, preamble power, DL burst power and UL burst power and occupied bandwidth. The WiMAX demod summary screen displays RCE (Relative Constellation Error) rms and peak, EVM (Error Vector Magnitude) rms and peak, carrier frequency, frequency error Hz and ppm, Base Station ID and sector ID. The WiMAX Summary is a compilation of both RF and demod measurements together.
Demodulate Mobile WiMAX

Mobile WiMAX Demodulator (Option 67)
With Option 67, the MT8222A can demodulate Mobile WiMAX OFDMA signals and displays detailed measurements for evaluating transmitter modulation performance using Constellation, Spectral Flatness, EVM vs. Sub carrier, and EVM vs. Symbol and it can automatically decode the DL MAP. For faster go no-go testing, a technician can specify to only demodulate the FCH (Frame Control Header).

Constellation
The Constellation view shows the constellation of the demodulated data symbols over one frame. The data bursts can have QPSK, 16 QAM or 64 QAM modulations. Each modulation format is color coded for easy identification. The screen also displays RCE (rms) in dB, RCE (pk) in dB, EVM (rms) in %, EVM (pk) in %, Freq Error in Hz, Freq Error in ppm, Base Station ID and Sector ID.

Spectral Flatness
The Spectral Flatness view displays the data measured from the preamble before channel estimation is performed. The deviation of the spectral flatness from the average over all the carriers is shown in dB. A mask that conforms to the 802.16-2005 specification is displayed as green lines, the mask turns red when the measured value crosses the mask. The absolute delta of the power between adjacent sub carriers in dB is also displayed.

EVM vs. Sub Carrier
The EVM vs. Sub Carrier screen displays the EVM (rms) values vs. OFDMA sub carriers. The number of sub carriers will vary depending on the bandwidth of the signal.

EVM vs. Symbol
The EVM vs. Symbol screen displays the EVM (rms) values vs. OFDMA Symbols. The values displayed are a composite of all sub carriers.

DL MAP
The MT8222A can automatically decode the DL MAP information from the Mobile WiMAX carrier, thereby simplifying the testing of the demodulated Mobile WiMAX signals. The DL MAP screen displays the decoded DL MAP zone information and all relevant data associated with each individual burst in a zone. If the instrument is set to manual demodulation the DL MAP parameters from the XML file specified is shown.
Mobile WiMAX OTA (Over The Air) (Option 37)
With Option 37, the MT8222A has basic drive test capability with it’s channel monitor measurement that combines the
channel power measurement made over time with the GPS location information (requires Option 31) of the instrument, this
information can be saved to either internal or external memory for export to post processing software such as Mapinfo or
MapPoint, which can display Mobile WiMAX power levels over a geographic area.

Channel Power Monitor
The channel power monitor view captures Mobile WiMAX channel power continuously or for a specified time, the user can also select the
time interval to capture measurements and can set the instrument to automatically save the data, if the optional GPS receiver is turned on
the captured data will also have the longitude/latitude and time
information tagged to each measurement.

The Channel Power Monitor data can be plotted on a map.
TD-SCDMA Analyzer offers three different measurement modes – RF Measurements, Demodulator and Over the Air Measurements. These options help RF engineers and technicians to make accurate RF and Demodulation measurements by connecting the MT8222A to any Node B. A physical connection is not required for the MT8222A to receive and demodulate TD-SCDMA OTA signals. With the MT8222A, a technician no longer needs to take a Node B site off-line.

TD-SCDMA RF Measurements (Option 60)
RF measurements are used to measure the transmitted signal strength and signal shape of the selected Node B transmitter. The RF measurement option includes Channel Spectrum, Power vs. Time and RF Summary screens.

Channel Spectrum
The Channel Spectrum screen displays the signals of a selected channel as well as channel power (in dBm or watts), occupied bandwidth. In addition, the left and right channel powers and occupied bandwidths are also displayed.

Power vs. Time
The Power vs. Time screen displays the power over the frame of the signal. The display can also be configured to zoom in on a selected slot. In the frame view, individual slot powers are displayed along with Channel Power RRC, UpPTS Power, DwPTS Power, ON/OFF Ratio, Slot Peak to Average Ratio and Downlink – Uplink Delta Power.
TD-SCDMA Demodulator (Option 61)
Demodulation measurements are used to measure the modulation performance of the transmitted signal of the selected Node B transmitter. The Demodulator measurement option includes Code Domain Power Data screen and Demod Summary screens.

Code Domain Power (CDP) Data
The CDP Data screen displays the power of the 16 codes of a demodulated TD-SCDMA Signal. The Code Domain Power and Code Domain Error of the codes are displayed as a bar graph. Other measurement results include Slot Power, Frequency Error in Hz, EVM and Peak EVM, DwPTS Power, Tau, Noise Floor, and Peak Code Domain Error.

TD-SCDMA Over the Air (OTA) Measurements (Option 38)
Over the Air Measurements provide the user with an easy way to monitor all 32 SYNC-DL codes outside a base station. The MT8222A displays the codes in two convenient formats sorted by codes or by Tau, indicating distance from a base station. The Code scan view displays all 32 codes in a bar graph with their individual Ec/Io and Tau. The Code scan view also displays the DwPTS Power and the Pilot Dominance. The Tau scan displays the code power in the Y axis and the Tau in the X axis. In addition, a table below the graph displays six of the strongest codes sorted by power.

Pass/Fail Mode
The BTS Master can perform automated Pass/Fail testing for TD-SCDMA signals. The test results are displayed in table format with clear PASS or FAIL indications that include min/max thresholds and actual measured results. Using Master Software Tools, custom tests can be easily created and uploaded into the BTS Master. All critical parameters can be selected for Pass/Fail testing.
GPS (Option 31)
The GPS option is used to confirm and save the exact measurement, location (longitude, latitude), date and time for each measurement. This option also comes with a magnet mount antenna with a 5m (15 foot) cable, for convenient use on a car roof or other surfaces.

The GPS Option 31 also enhances the frequency accuracy of the MT8222A’s internal OCXO oscillator. Within three minutes of GPS satellite acquisition, the built-in GPS receiver provides a frequency accuracy to better than 25 ppb (parts per billion). After disconnection of the GPS antenna, the instrument will remain in High-Accuracy mode for three days, preserving frequency accuracy to better than 50 ppb.

The MT8222A can easily enhance the frequency reference oscillator accuracy to make precise frequency error measurements.

GPS location information (longitude, latitude) is shown at the top of the screen.

Typical frequency accuracy of the MT8222A for 72 hours following the GPS antenna disconnect over full specified temperature range.

Typical frequency accuracy of the MT8222A for 24 hours following the GPS antenna disconnect over temperature range 15° C to 35° C.
Track Down Unwanted Interference with the MT8222A

Interference Analyzer (Option 25)
With its built-in low-noise preamplifier, the MT8222A with the interference analyzer option provides the ability to identify and locate interfering signals down to –154 dBm, allowing technicians to better address the quality issues that affect user service.

Spectrogram
For identifying intermittent interference and tracking signal levels over time, the Spectrogram display provides a three dimensional display of frequency, power, and time of the spectrum. And the MT8222A can collect this data for up to 72 hours.

RSSI
RSSI indicator can be used to observe the signal strength of a single frequency over time. Data can be collected for up to 72 hours.

Signal Strength Meter
The Signal Strength Meter can locate an interfering signal, by using a directional antenna and measuring the signal strength. Power is displayed in watts, dBm, in the graphical analog meter display and also by an audible beep proportional to its strength. For accurate field strength measurements by using an appropriate calibrated antenna, the MT8222A can automatically convert power to field strength.
Track Down Unwanted Interference with the MT8222A

**Signal ID**
The Signal ID feature in the interference Analyzer can help to quickly identify the type of the interfering signal. This measurement can be configured to identify all signals in the selected band or just monitor one single interfering frequency. The results displayed include the Center Frequency, Bandwidth of the signal, the type of the signal (CDMA, GSM and WCDMA), its closest channel number, the number of carriers, its Signal to Noise ratio and the Channel Power of the signal. The spectrum of the signal is colored to ease review of the scanned signals.

**Channel Scanner (Option 27)**
The Channel Scanner option measures the power of multiple transmitted signals, making it very useful for measuring channel power of up to 20 channels in AMPS, iDEN, GSM, TDMA, CDMA, W-CDMA, and HSDPA networks – all at the same time. Users can select the frequencies or the scanned data – to be displayed by frequencies or the channel number. View display data in easy to read graph or table format. And in the custom setup menu each channel can be custom built with different frequency bandwidth, or channels from different signal standards.
Extend Functionality with Valuable Options

Power Meter (Standard)
The internal Power Meter uses the spectrum analyzer circuitry to measure the power (no external sensor is required). Select frequency to make channelized power measurement over specific channels, or broadband measurements over the entire frequency range. Power is displayed in an analog type display and, supports both watts and dBm. RMS averaging can be set to low, medium, or high. Upper and lower limit lines can be turned on as needed.

Power Monitor (Option 5)
With the Anritsu 560 series detectors, technicians can accurately measure broadband power up to 50 GHz using precision detectors designed to minimize mismatch uncertainty. Then, users can view and analyze results in absolute power (dBm or watts) or relative power (dBr or %). Users will also find built-in auto averaging automatically reduces the effects of noise while zeroing control allows optimum measurement accuracy at low power levels. This detector has a measurement range from –40 dBm to +16 dBm.

High Accuracy Power Meter (Option 19)
Anritsu’s PSN50 sensor makes high accuracy power measurements from 50 MHz to 6 GHz and provides true RMS measurements from –30 dBm to +20 dBm. This enables users to make accurate measurements for CW and digitally modulated signals such as CDMA/EV-DO, GSM/EDGE, and W-CDMA/HSDPA. Users will also find:
- Convenient connection via a USB A/mini-B cable
- Power displayed in both dBm and watts
- Optional upper/lower limit activation during Pass/Fail measurements

Option 19 adds support for the PSN50 Sensor, which is purchased separately.

CW Signal Generator (Option 28)
The CW signal generator provides a CW signal source to test low noise amplifiers, repeaters, and for base stations receiver sensitivity testing.
More Valuable Options

T1/FT1 Bit Error Rate Tester (Option 51)
The BTS Master performs full T1, Fractional T1 (FT1) and sub-channel (8 kb, 16 kb) functional tests, simplifying the task of determining if the source of the problem is on the wireline or the wireless side. The data can be displayed in a histogram, and the BTS Master can collect the T1 data for up to three days. The analyzer can also measure the carrier voltage which can be displayed in dBdsx or peak to peak voltage units. The T1 carrier frequency is also measured and displayed in Hz.

The user can manually select a DS0/VF channel and listen to the channel using the BTS Master’s integrated speaker. If there is a test tone on the channel, the BTS Master displays the signal level and frequency.

E1- 2Mb/s Bit Error Rate Tester (Option 52)
The BTS Master has an optional E1- 2Mb/s functionality that can perform a full complement of E1- 2Mb/s and sub-channels tests. The E1- 2 Mb/s BERT analyzer includes both a RJ48 or BNC connector. The ability to have E1- 2 Mb/s testing in one test tool simplifies troubleshooting problems and determining if it’s on the wireline or the wireless side. The E1- 2 Mb/s data can be displayed in multiple formats including a histogram, and the BTS Master can collect the E1- 2 Mb/s Histogram data for up to three days. The analyzer can also measure the carrier voltage which can be displayed in dBdsx or peak to peak voltage units. The E1- 2 Mb/s carrier frequency is also measured and displayed in Hz. The user can manually select a VF channel and listen to the channel using the BTS Master’s integrated speaker. If there is a test tone on the channel, the BTS Master displays the signal level and frequency.

T3/T1/FT1 Bit Error Rate Tester (Option 53)
The BTS Master’s optional T3 BERT analyzer has not only a full range of T3 functional tests but also complete T1, Fractional T1 (FT1) and sub-channel (8 kb, 16 kb) tests. This enhanced capability is key for high traffic sites using a T3 backhaul. The BTS Master can measure the DS3 carrier exclusively or it can also choose to measure a DS1 and DS0 payload. The collected data can be displayed in a histogram, the BTS Master can also collect the T3, T1, FT1 data for up to three days. The analyzer can measure the carrier voltage which can be displayed in dBdsx or peak to peak voltage units. The T3, T1, FT1 carrier frequency is also measured and displayed in Hz. The user can manually select a DS0/VF channel and listen to the channel using the BTS Master’s integrated speaker. If there is a test tone on the channel, the BTS Master displays the signal level and frequency.
With Master Software Tools™ (Windows® 2000/XP/Vista compatible) the MS8222A can:

- Automatically update the MT8222A with the latest firmware available from the Anritsu web site
- Create and download new Cable Loss signal standards, Pass/Fail Mode custom lists and antenna factors to existing lists into the unit
- Store an unlimited number of data traces to a PC – easing the task of analyzing and monitoring historical performance
- Coordinate cell site locations using Microsoft® MapPoint® and GPS location mapping
- Modify existing languages or add two custom languages to the MT8222A
- Establish a connection to a PC using USB, Ethernet LAN, or Direct Ethernet
- Export plot data as text files for use in spreadsheets or graphic files (JPG format)
- View multiple Spectrum Analyzer measurements on the same screen using Trace Overlay
- Capture live traces from the instrument and view them on the PC
- Add or modify Limit Lines and Markers
- Handle long file names for easy, descriptive data labeling
- Obtain VSWR, Cable Loss, Phase or Smith Chart plots from Return Loss measurement
MT8222A - BTS Master

**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

Interference Analyzer
Frequency Range: 100 kHz to 7.1 GHz

Optional

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-019 High Accuracy Power Meter (PSN50 sensor not included)
MT8222A-025 Interference Analysis
MT8222A-027 Channel Scanner
MT8222A-028 CW Signal Generator (requires CW Signal Generator kit)
MT8222A-031 GPS Receiver (including 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 Over The Air (OTA) Measurements
MT8222A-041 GSM/GPRS/EDGE RF Measurements
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 T3/1/FT1 BERT (Bit-Error-Rate-Tester)**
MT8222A-060 TD-SCDMA RF Measurements

MT8222A-061 TD-SCDMA Demodulator
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 Mobile WiMAX Demodulator

**High Accuracy Power Meter Accessories**

PSN50 High Accuracy Power Sensor, 50 MHz to 6 GHz
3-2000-1498 USB A/mi-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 6.5 GHz, N(m) to N(f)
3-1010-124 Attenuator (Uni-directional), 40 dB, 100 watt, DC to 6.5 GHz, N(m) to N(f)

**Standard Accessories**

10580-00156 BTS Master User’s Guide
65681 Soft Carrying Case
40-168-R AC/DC Adapter
806-141 Automotive Cigarette Lighter/12 Volt DC Adapter
3-2000-1450 256 MB Compact Flash Memory Module
2000-1520-R 2 GB USB Memory Module
1091-27 Adapter, DC to 18 GHz, N(m)-SMA(f), 50 39
1091-172 Adapter, DC to 1.3 GHz, N(m) - BNC(f), 50 39

One Year Warranty
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
2000-1501-R 256 MB USB Memory Module
2000-1520-R 2 GB USB Memory Module
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
22N50F Open/Short, DC to 18 GHz, N(f), 50 Ω
SMPL-1 Precision Load, DC to 6 GHz, 42 dB, N(m), 50 Ω
SMPLNF-1 Precision Load, DC to 6 GHz, 42 dB, N(f), 50 Ω
OSLN50-1 Precision Op/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(m)
OSLN50F-1 Precision Op/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(f)
2000-767 Precision Op/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50 Ω
2000-768 Precision Op/Short/Load, DC to 4 GHz, 7/16 DIN(f), 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.
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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 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 ±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
• 3G Modulation options W-CDMA/HSDPA, 1xrtt/EVDO and TD-SCDMA
• 3.5G modulation options 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 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**:
- \( \Delta = 0.08 \times \log(1 + 10^{-\text{Offset}}) \) dB, typical

**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 dB

**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 dB

**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: 0.01 dB
- Horizontal Range (meters): 0 to (data points-1) x propagation constant
- Fault Resolution (meters): \( 1.5 \times 10^4 \times (FVP / 2) \) meters

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

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

**Spectrum Analyzer**

- **Frequency**:
  - 100 kHz to 7.1 GHz
  - Maximum Continuous Input: +30 dBm
- **Tuning Resolution**: 1 Hz
- **Frequency Reference**:
  - Aging: ±1 ppm/10 years
  - Accuracy: ±0.3 ppm (25 °C ±25 °C) + aging
- **Frequency Span**:
  - 10 Hz to 7.1 GHz plus 0 Hz (zero span)
- **Sweep Time**:
  - Minimum 100 ms, 10 μs to 600 seconds (zero span)
- **Sweep Trigger**:
  - Free run, Single, Video, External
- **Resolution Bandwidth**:
  - (-3 dB width) ±10%, 1 Hz to 3 MHz in
- **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 +30 dBm

**Absolute amplitude accuracy Power Levels**
- \( \geq -50 \text{ dBm}, \leq -35 \text{ dBm} \) input attenuation, Preamp Off:
  - 100 kHz to ±10 MHz ±1.5 dB
  - >10 MHz to 4 GHz ±1.25 dB
  - >4 GHz to 7.1 GHz ±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**:
- (Preamp on, RF input terminated, 0 dB input attenuation)
  - –100 dBm max
  - (Preamp off, RF input terminated, 0 dB input attenuation)
  - –90 dBm max*, 100 kHz to <3200 MHz
  - –84 dBm max*, 3200 to 7100 MHz

**Distance-to-Fault**:
- Fault Resolution: 0.01 dB
- Horizontal Range (meters): 0 to (data points-1) x propagation constant
- Fault Resolution (meters): \( 1.5 \times 10^4 \times (FVP / 2) \) meters

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

**Spectrum Analyzer**

- **Frequency**:
  - 100 kHz to 7.1 GHz
- **Maximum Continuous Input**: +30 dBm
- **Tuning Resolution**: 1 Hz
- **Frequency Reference**:
  - Aging: ±1 ppm/10 years
  - Accuracy: ±0.3 ppm (25 °C ±25 °C) + aging
- **Frequency Span**:
  - 10 Hz to 7.1 GHz plus 0 Hz (zero span)
- **Sweep Time**:
  - Minimum 100 ms, 10 μs to 600 seconds (zero span)
- **Sweep Trigger**:
  - Free run, Single, Video, External
- **Resolution Bandwidth**:
  - (-3 dB width) ±10%, 1 Hz to 3 MHz in
- **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

**W-CDMA/HSDPA**

**RF Measurements (Option 44)**

- **Frequency Ranges**: Bands I - IX
- **RF Channel Power** (Temperature range 15° C to 35° C):
  - ±0.7 dB typical
  - ±1.25 dB max
- **Occupied Bandwidth Accuracy**: ±100 kHz
- **Residual Adjacent Channel Leakage Ratio (ACLR)**:
  - (824 to 894 MHz, 1710 to 2170): –54 dB typical at 5 MHz offset
  - –59 dB typical at 10 MHz offset
- **Leakage Ratio (ACLR)1 (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):
    - ±0.8 dB for ACLR ≥–45 dB at 5 MHz offset
    - ±0.8 dB for ACLR ≥–50 dB at 10 MHz offset
- **ACLR Accuracy (Single Channel Active)**:
  - (2300-2700 MHz):
    - ±1.0 dB for ACLR ≥–45 dB at 5 MHz offset
    - ±1.0 dB for ACLR ≥–50 dB at 10 MHz offset
- **Frequency Error**: ±10 Hz + Time Base Error, 99% confidence level
- **+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): ±2.5%, 6% ≤EVM ≤25%
- (3GPP Test Model 5): ±2.5%, 6% ≤EVM ≤20%
- (2300 MHz to 2700 MHz):
  - ±2.5% for 6% ≤EVM ≤20%
  - Residual EVM: 2.5% typical

**Code Domain Power**:
- ±5.0 dB for code channel power >–25 dB
- 16, 32, 64 DCPH (test model 1)
- 16, 32 DCPH (test model 2, 3)

**CPICH (dBm) Accuracy**:
- ±0.8 dB typical

**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 to +20 dBm (10 mW to 40 mW)
- **Offset Range**: 0 to +60 dB
- **Resolution**: 0.1 dB or 0.1W

**Accuracy**:
- ±1 dB for >–40 dBm using 560-7N50 detector

**Bias Tee (Option 10)**

**Voltage/Current**:

- +12 V, 250, or 500 mA steady state
- +15 V, 250, or 500 mA steady state
- +18 V, 350 mA steady state
- +21 V, 250 mA steady state
- +24 V, 250 mA steady state

1. Depends on reference level, input signal level and single channel conditions
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:
\[ \pm 10 \text{ Hz} + \text{Time base error, 99\% confidence level} \]

Measurements Range: +20 dBm to –110 dBm
Channel Power:
- 100 KHz to ±10 MHz ±1.5 dB
- >10 MHz to 4 GHz ±2.25 dB
- >4 GHz to 7.1 GHz ±1.75 dB
Adjacent Channel Power Accuracy: ±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:
\[ \pm 25 \text{ ppb with GPS ON, 3 minutes after satellite lock} \]
when GPS antenna is not connected:
- Better than ±50 ppb for 3 days from a High Accuracy GPS Lock and within 0° C to 50° 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:
\[ \pm 1 \text{ dB typical for –50 dBm to +20 dBm (±1.5 dB max)} \]
- Frequency Error:
\[ \pm 10 \text{ Hz} + \text{Time base error, 99\% confidence level} \]

GSM/GPRS/EDGE Demodulator (Option 41)
GSMK Modulation Quality
(RMS Phase) Measurement Accuracy: ±1 deg
Residual Error (GSMK): 1 deg

8PSK Modulation Quality
(EVM) Measurement Accuracy: ±1.5%
Residual Error (8PSK): 2.5%

CDMA – RF Measurements (Option 42) and EVDO RF Measurements (Option 62)
Channel Power Accuracy:
- ±1 dB typical for RF Input from +20 dBm to –50 dBm (±1.5 dB max)

cdmaOne and CDMA2000 1xRTT Demodulator (Option 43)
Residual Rho:
\[ >0.995 \text{ typical for RF Input from +20 dBm to –50 dBm} \]
\[ (>0.99 \text{ dB maximum}) \]
Rho Accuracy: ±0.005 for Rho >0.9
Frequency Error:
\[ \pm 10 \text{ Hz} + \text{Time base error, 99\% confidence level (in slow mode)} \]

PN Offset: within 1 x 64 chips
Pilot Power Accuracy:
- ±1 dB typical, relative to Channel Power
- TAU: ±0.5 µs typical (±1 µs maximum)

EVDO Demodulator (Option 63)
Demodulator Measurements are:
EVDOR Rev A compatible.
Residual Rho:
\[ >0.995 \text{ typical for RF Input from +20 dBm to –50 dBm} \]
\[ (>0.99 \text{ dB maximum}) \]
Rho Accuracy: ±0.01 for Rho >0.9
Frequency Error:
- ±20 Hz + Time base error, 99% confidence level
PN Offset: within 1 x 64 chips
Pilot Power Accuracy:
- ±1 dB typical, relative to Channel Power
- TAU: ±0.5 µs typical (±1 µs maximum)

TD-SCDMA Demodulator (Option 61)
Residual EVM (rms):
- 3% typical (for P-CCPCH slot, slot power >-50 dBm)
Freq Error Accuracy:
- ±10 Hz typical + time base error (in the presence of a downlink slot)
Timing Error (Td) for dominant SYNC-DL code:
- ±0.2 us (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:
- ±0.02 ppm + time base error, 99% confidence level
T1 Bit-Error-Rate-Tester (BERT), (Option 31)
T1 Analyzer, Fractional T1 and sub-channels
BER testing at 1.544 MB, 64, 16 and 8 kbit rates
Line Coding: AMI, B8ZS

Framing Modes:
- D4 (Superframe), ESF (Extended Superframe)
Connection Configurations:
- Terminate: 100 Ω
- Bridge: ≥1000 Ω
- Monitor: Connect via 20 dB pad in DSX
Receiver Sensitivity:
- Terminate: +6 dB to –36 dB
- Bridge: +5 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 ±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), 3-in-24,
- All ones, All zeros, T1-Daly, User defined (±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
Loopback Modes:
- Self loop, CSU, NIU, User defined, In-band or Data Link
Level Measurements:
- Vp-p (±5%), can also display in dBdsx
Data Log:
Continuous, up to 72 hrs
T1 Frequency Measurement: ±5 ppm
DSO 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, ±3 Hz
- Level: –40.0 to +3.0 dBm, ±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)

\[ ^{\text{Channel power accuracy will vary with amount of data burst traffic}} \]
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 Ω BNC unbalanced, 120 Ω RJ48C balanced
- Bridge: >1000 Ω
- 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 ± 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 (≤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, FEBE,
- Frame Bits, 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 (±5%), can also display in dBdsx
**Data Log:**
- Continuous, up to 72 hrs

T3/T1/FT1 Bit-Error-Rate-Tester (BERT), (Option 53)

**T3 Analyzer**

**Line Coding:**
- B3ZS, AMI
**Framing Modes:**
- Unframed, C-bit
**Connection Configurations:**
- Terminate (75 Ω) BNC unbalanced
- External Internal: 44.736 MHz ±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 (≤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 (±5%), can also display in dBdsx
**Data Log:**
- Continuous, up to 72 hrs
**T1 Frequency Measurement:**
- ±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, ±3 Hz
  Level: –40.0 to +3.0 dBm ±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

**E1 - 2 MB/s Frequency Measurement:**
- ±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

**T3/T1/FT1 Frequency Measurement:**
- ±5 ppm

**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 ±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, QRSS, 1-in-8 (1-in-7), 2-in-8, 3-in-24,
- All ones, All zeros, 1-Daly, User defined (≤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 (±5%), can also display in dBdsx
**Data Log:**
- Continuous, up to 72 hrs
**T1 Frequency Measurement:**
- ±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, ±3 Hz
  Level: –40.0 to +3.0 dBm ±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
High Accuracy Power Meter Specifications using PSN50 (Option 19)

Sensor
- Measurement Range: –30 to +20 dBm
- Frequency Range: 50 MHz to 6 GHz
- Input Connector: Type N, male, 50 Ω
- Max Input Without Damage: +33 dBm, ±25 VDC
- Input Return Loss:
  - 50 MHz to 2 GHz: >26 dB
  - 2 GHz to 6 GHz: ≥20 dB

Accuracy
- Total RSS Measurement Uncertainty (0 to 50º C):
  - ±0.16 dB*
- Noise: 20 nW max
- Zero Set: 20 nW
- Zero Drift: 10 nW max**
- Sensor Linearity: ±0.13 dB max
- Instrumentation Accuracy: 0.00 dB
- Sensor Cal Factor Uncertainty: ±0.06 dB
- Temperature Compensation: ±0.06 dB max
- Continuous Digital Modulation Uncertainty:
  - +0.06 dB (+17 to +20 dBm)

High Accuracy Power Meter Specifications using MA24106A (Option 19)

Sensor
- Measurement Range: –40 to +23 dBm
- Frequency Range: 50 MHz to 6 GHz
- Input Connector: Type N, male, 50 Ω
- Max Input Without Damage: +33 dBm, ±25 VDC
- Input Return Loss:
  - 50 MHz to 2 GHz: >26 dB
  - 2 GHz to 6 GHz: >20 dB

Accuracy
- Total RSS Measurement Uncertainty (0 to 50º C):
  - ±0.16 dB*
- Noise: 2.5 nW max
- Zero Set: 10 nW
- Zero Drift: 3 nW max**
- Sensor Linearity: ±0.18 dB max
- Instrumentation Accuracy: 0.00 dB
- Sensor Cal Factor Uncertainty: ±0.06 dB
- Temperature Compensation: ±0.06 dB max
- Continuous Digital Modulation Uncertainty:
  - ±0.02 dB (< +18 dBm)
  - ±0.10 dB (≥ +18 dB)

System
- Measurement Resolution: 0.01 dB
- Offset Range: ±60 dB
- Interfaces: USB A/mini-B 2.0

General Specifications
- Maximum Continuous Input into Spectrum Analyzer:
  - 10 dB attenuation, +30 dBm, ±50 VDC
- RF Input VSWR:
  - 2.0:1 maximum, 1.5:1 typical (≥10 dB attenuation)
- Internal Time Base Accuracy: ±0.3 ppm
- Interfaces:
  - Type N female RF Connector
  - Type N female RF Out Port and RF In Port (50 Ω)
  - BNC female connectors for external reference and external trigger
  - T1 (Receive and Transmit): Bantam Jack (100 Ω)
  - T1, T3 (Receive and Transmit): Bantam Jack (100 Ω) and BNC (75 Ω)
  - E1-2Mb/s (Receive and Transmit): RJ48 (75 Ω) connector and BNC(f) (120 Ω)
  - 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, ±50 VDC

Environmental:
- MIL-PRF-28800F Class 2
- Operating: –10º C to 55º C, humidity 85%
- Storage: –51º C to 71º 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-018 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-032 cdmaOne and CDMA2000 1xRTT Over The Air (OTA)****
MT8222A-033 EVDO Over the Air (OTA)****
MT8222A-034 Fixed WiMAX Over The Air (OTA) Measurements
MT8222A-035 W-CDMA/HSDPA Over The Air (OTA) Measurements
MT8222A-038 TD-SCDMA Over The Air (OTA) Measurements
MT8222A-039 Mobile WiMAX 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/F1 BERT (Bit-Error-Rate-Tester)**
MT8222A-052 E1-2 Mb/s Bit-Error-Rate-Tester (BERT)**
MT8222A-053 T3/T1/F1 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 Mobile WiMAX Demodulator

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 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

10580-00156 BTS Master User’s Guide
65681 Soft Carrying Case
40-168-R AC/DC Adapter
806-141 Automotive Cigarette Lighter/12 Volt DC Adapter
3-2000-1567 512 MB Compact Flash Memory Module
2000-1520-R 2 GB USB Memory Module
2300-498 Anritsu Master Software Tools
633-44 Rechargeable Battery, Li-Ion
3-2000-1360 USB A-mini-B cable 6 ft.
3-806-152 Cross-over Ethernet cable
1091-27 Adapter, DC to 18 GHz, N(m)-SM(f), 50 Ω
1091-172 Adapter, DC to 1.3 GHz, N(m) - BNC(f), 50 Ω

One Year Warranty
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 (10 ft) Cable
2000-1501-R 256 MB USB Memory Module
2000-1520-R 2 GB USB Memory Module
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)
42N50-30 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/PLN-1 Precision Load, DC to 6 GHz, 42 dB, N(f), 50 Ω
1OSL50-1 Precision Open/Short/Load, DC to 4 GHz, 42 dB, 50 Ω, N(m)
1OSLNF50-1 Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(f)
2000-767 Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(f), 50 Ω
2000-768 Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50 Ω
1091-26 N(m) to SMA(m) DC to 18 GHz, 50 Ω
1091-27 N(m) to SMA(f) DC to 18 GHz, 50 Ω
1091-80 N(f) to SMA(m) DC to 18 GHz, 50 Ω
1091-81 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  7/16 DIN(f) to N(m), DC to 7.5 GHz, 50 Ω
510–91  7/16 DIN(f) to DC to 7.5 GHz, 50 Ω
510–92  7/16 DIN(m) to N(m), DC to 7.5 GHz, 50 Ω
510–93  7/16 DIN(m) to N(f), DC to 7.5 GHz, 50 Ω
510–96  7/16 DIN(m) to 7/16 DIN(m), DC to 7.5 GHz, 50 Ω
510–97  7/16 DIN(f) to 7/16 DIN(f), DC to 7.5 GHz, 50 Ω
510–102 N(m) to N(m) 90° right angle, DC to 11 GHz, 50 Ω

Precision Adapters
34NN50A  Precision Adapter, DC to 18 GHz, 50 Ω, N(m) to N(m)
34NFNF50  Precision Adapter, DC to 18 GHz, 50 Ω, N(f) to N(f)

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

Portable Antennas
2000-1030 SMA(m), 1.71 to 1.88 GHz, 50 Ω
2000-1031 SMA(m), 1.85 to 1.99 MHz, 50 Ω
2000-1032 SMA(m), 2.4 to 2.5 GHz, 50 Ω
2000-1035 SMA(m), 896 to 941 MHz, 50 Ω
2000-1200 SMA(m), 806 to 869 MHz, 50 Ω
2000-1361 SMA(m), 5725 to 5825 MHz, 50 Ω
2000-1473 SMA(m), 2.41 to 2.5 GHz, 50 Ω
2000-1474 SMA(m), 1920 to 1980, 2.11 to 2.17 GHz, 50 Ω

Attenuator
42N50A-30  30 dB, 50 watt, Bi-directional, DC to 18 GHz, N(m) to N(f)

Cables
806-16 Bantam Plug to Bantam Plug
806-116 Bantam Plug to BNC
806-117 Bantam “Y” Plug to RJ48
3-806-169 72-inch (1.8 m), BNC to BNC, 75 Ω 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 2464 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 Armed
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
15NNF50-5.0C  5.0 meters, N(m) to N(f), 6 GHz, 50 Ω
15ND50-1.5C  1.5 meters, N(m) to 7/16 DIN(m), 6 GHz, 50 Ω
15ND50-1.5C  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  Adaptor, 90°, N(m), N(m)
SC7651  Power Splitter, 50 Ω, N(f), N(m), N(f)
67263  Cable, N(m), N(m)