Green is life tmg

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Test & Measurement

- sales
- rentals
- calibration
- repair
- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

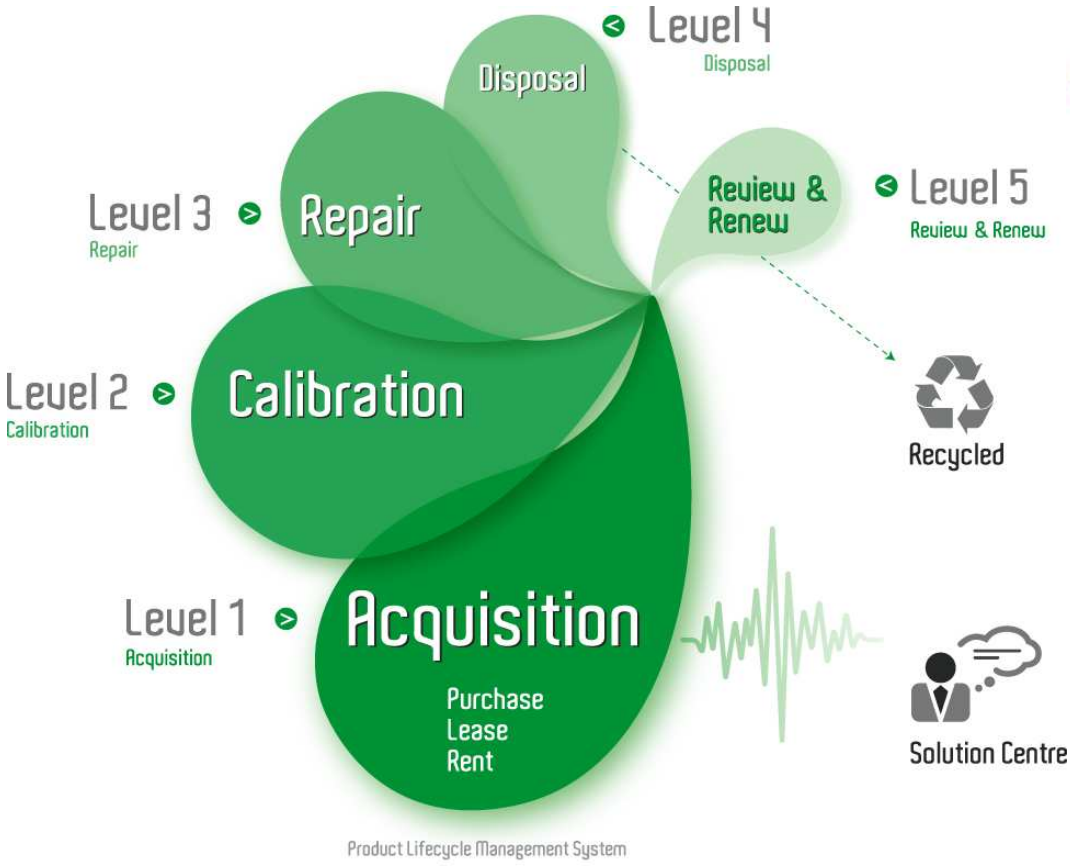
TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

If you click on the "Click-to-Call" logo below, you can all us for FREE!

TMG Corporate Website **TMG Products Website**

Click-to-Call
TMG Now



Product Brochure

Anritsu

BTS Master™ MT8222A

A High Performance – Handheld Base Station Analyzer

Introducing the incredibly accurate, rugged, handheld BTS Master MT8222A

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 and Fixed WiMAX, RF and Demod measurements and W-CDMA/HSPDA Over the Air (OTA), interference analysis, channel scanner, 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.

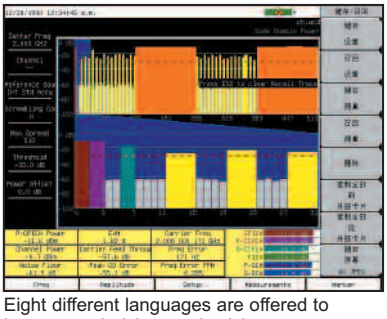
Keep on going – wherever you like

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

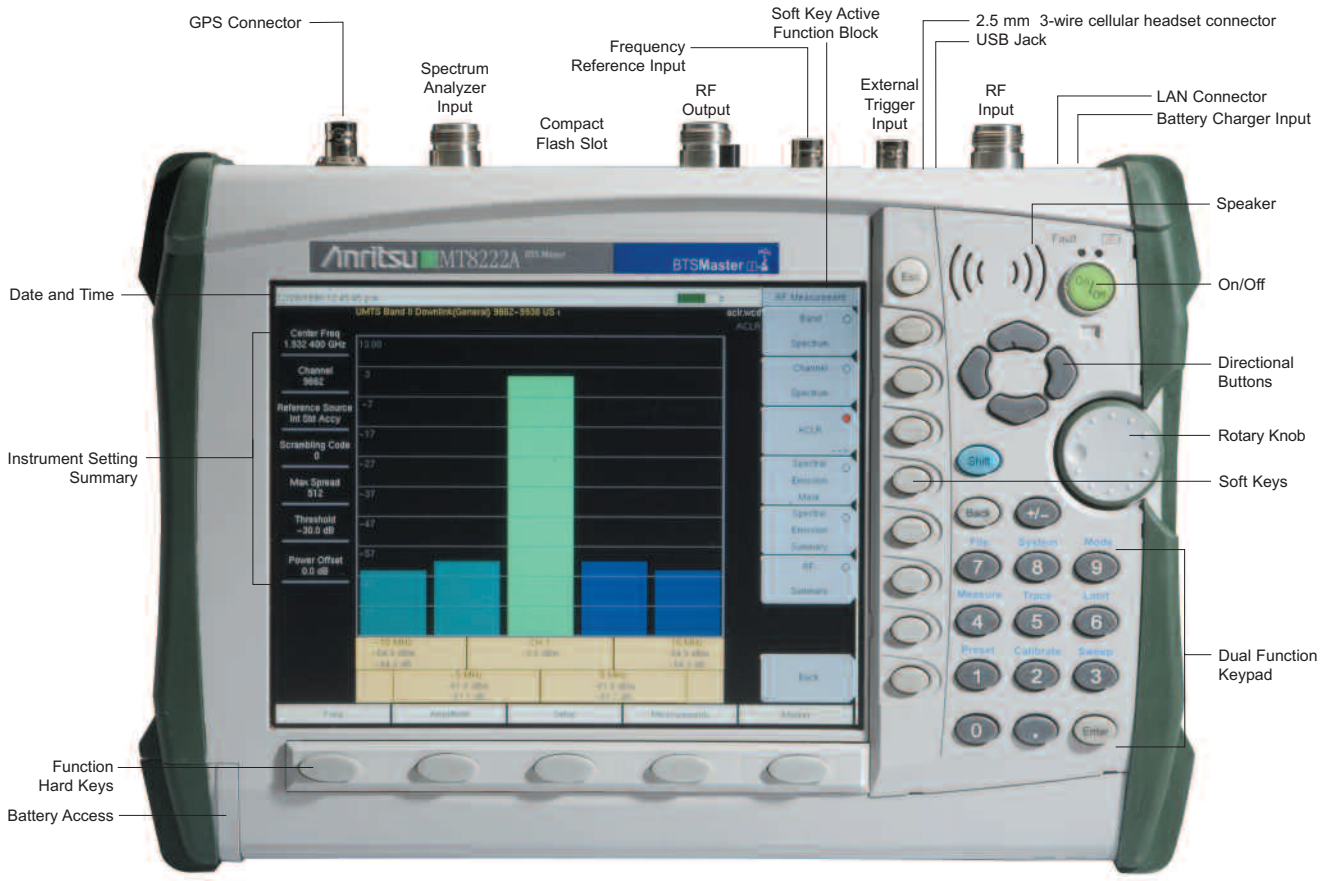
While fluent in English, Spanish, German, French, Japanese, Chinese, Italian and Korean, the MT8222A user can also customize two additional languages using Master Software Tools.

Choose from eight different languages or upload two custom languages.



Eight different languages are offered to improve technician productivity.

From the ground up to the tower, accurate and powerful cable and antenna analysis in one handheld instrument



Function	Benefits
W-CDMA/HSDPA	Quickly check base station performance using RF, Demodulation, and Over The Air measurements. Easily identify HSDPA and W-CDMA OVSF codes by color
GSM/GPRS/EDGE	Rapidly review base station performance via RF and Demodulation measurements
Fixed WiMAX	Check the base station performance with ease using RF and Demodulation measurements
Spectrum Analyzer	Outstanding performance from 100 KHz to 7.1 GHz
Cable and Antenna Analysis	10 MHz to 4 GHz, 10 MHz to 6 GHz (Option 26): Return Loss, Cable Loss, VSWR, Distance-To-Fault, 2-port Gain, 1-port Phase, 2-port phase, and Smith Chart for detailed analysis
Power Meter	Channelized or Broadband power measurements (no detector needed) from 100 KHz to 7.1 GHz
High Accuracy Power Meter	Performs accurate RMS power measurements for CW and modulated signals
Interference Analyzer	Identify interfering signals using Spectrogram display, RSSI, and Signal Strength displays.
Channel Scanner	Measure frequency, bandwidth and power of multiple transmitted signals. Create 20 custom channels to scan by frequencies or channels.
Bit Error Rate Tester (BERT)	T1, FT1, T3, 2 Mb/s-E1 Capability to analyze if the problem is on the wireline or the wireless side.
GPS Receiver	Provides location Information and enhance reference frequency oscillator accuracy.

Increase system uptime with 1-port cable and antenna analysis

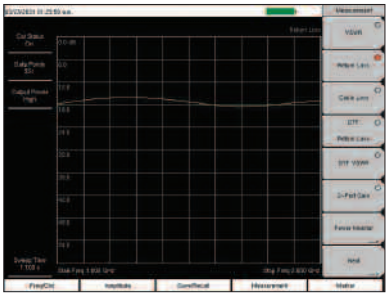
The BTS Master MT8222A performs a variety of cable and antenna measurements aimed at simplifying the task for the technician and engineer. A single key selection on the bottom hard keys brings up all the measurements you need.

Frequency Domain Reflectometry (FDR)

Cable and antenna measurements are based on a swept RF signal and are ideal for detecting faults and degradations in the RF bands. 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)

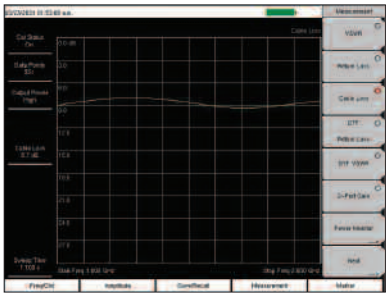
The 6 GHz Cable and Antenna Analyzer option supports all Cable and Antenna Analyzer functionality and extends the measurement range from 4 GHz to 6 GHz.



Return Loss measures reflected power

Return Loss/VSWR

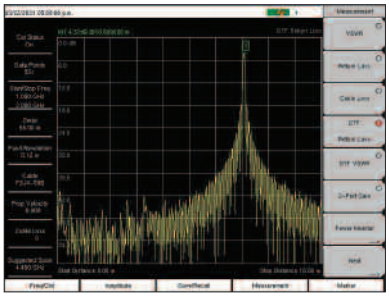
Return Loss and VSWR measurements can be used to characterize cable and antenna systems to ensure conformance to system specific requirements. Return Loss measures the signal energy that is “reflected” or returned back to where it came from. Measurements can be easily toggled between Return Loss and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



Cable Loss measures energy lost in the cable

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.



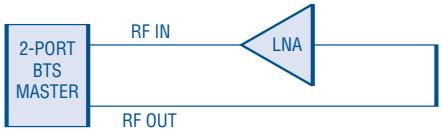
Distance-To-Fault finds faults within cable and feedline system

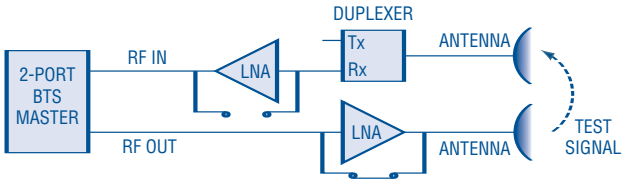
Distance-To-Fault (DTF)

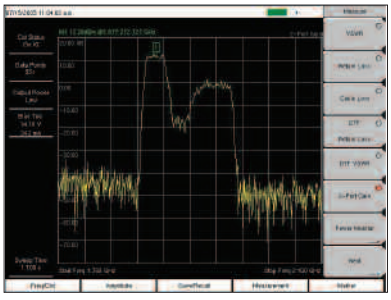
Precisely locate faults within cable and feedline systems using the MT8222A’s Distance-To-Fault (DTF) measurement. Users will see magnitude discontinuities displayed in dB or VSWR over distance in meters or feet. The Distance-To-Fault (DTF) display is obtained by performing a sweep in the frequency domain 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 application performance with 2-port cable and antenna analysis

Many cellular/PCS and 3G base stations today use diplexers, duplexers, 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.





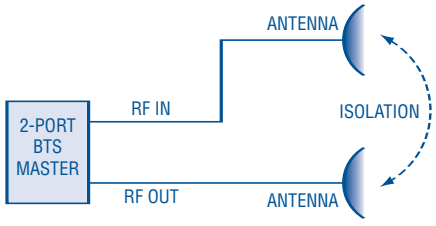


2-Port Gain

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.

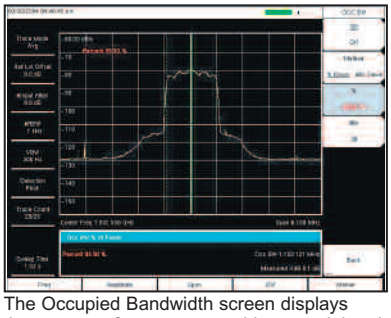
Phase Measurements and Smith Chart

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.

Lab-grade spectrum analysis in a handheld package



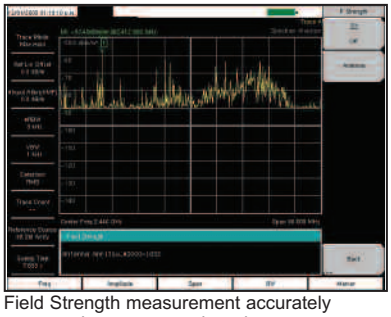
The Occupied Bandwidth screen displays the amount of spectrum used by a modulated signal.

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.



Field Strength measurement accurately corrects the antenna gain or loss.

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

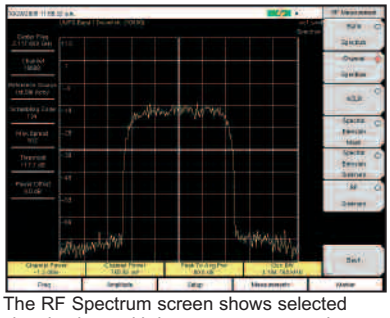
To correct the loss or gain of an antenna field strength measurement, the MT8222A applies an "antenna factor." The MT8222A will then automatically adjust the results of the selected antenna frequency band based on the antenna factor. Plus, you'll find antenna factors of all the antennas offered by Anritsu 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)

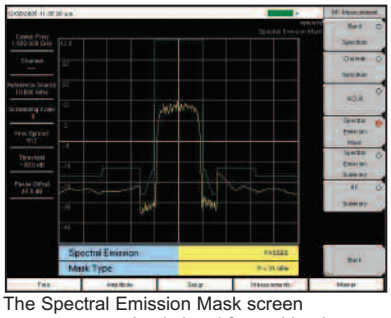
RF measurements are used to measure the transmitted signal strength and signal shape of the selected Node B transmitter. For convenience, the RF measurement option includes Channel Spectrum, Spectral Emission Mask, ACLR and RF Summary screens.



The RF Spectrum screen shows selected signals along with key parameters, such as channel power and occupied bandwidth.

Channel Spectrum

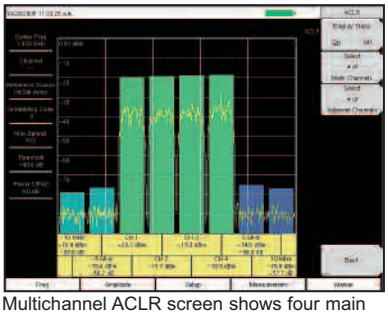
The Channel Spectrum screen displays the signals of a selected channel as well as channel power (in dBm and watts), occupied bandwidth and peak to average power. Operators can select a channel by using the band channel or by choosing a signal standard and channel.



The Spectral Emission Mask screen presents a received signal framed by the 3GPP spectral mask.

Spectral Emission Mask

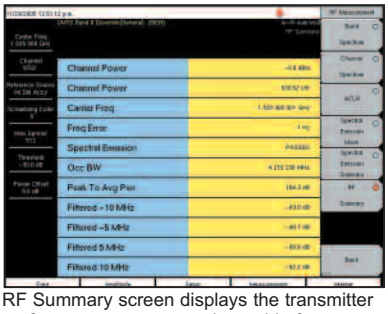
The Spectral Emission Mask measurement applies the mask depending upon the transmitter output as defined in the 3GPP specification (TS 25.141). The mask varies depending upon the input signal. The MT8222A indicates if the signal “PASSED” or “FAILED” according to the specified limits. For ease of analysis,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



Multichannel ACLR screen shows four main channels as well as two adjacent channels power levels.

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.

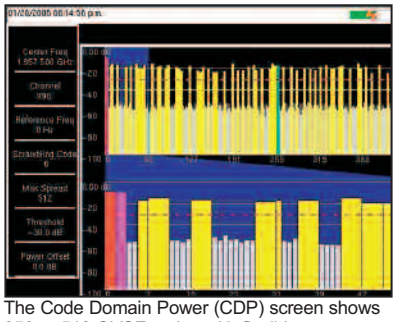


RF Summary screen displays the transmitter performance parameters in a table format.

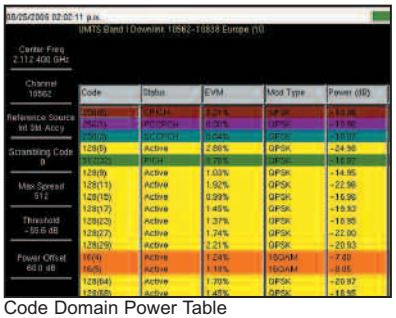
RF Summary

Technicians can quickly check transmitter performance parameters and details at a glance in RF Summary screen.

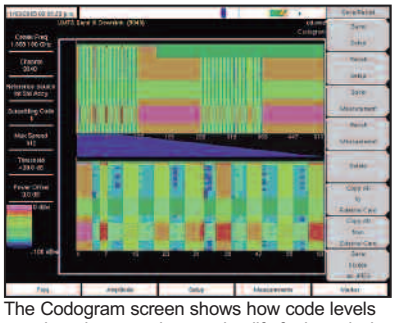
Node B transmitter performance testing made simple



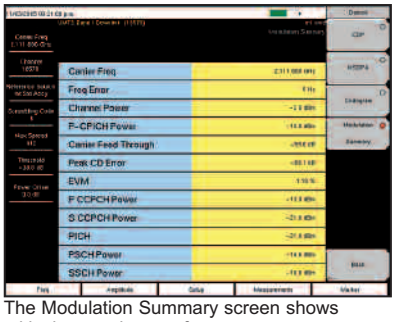
The Code Domain Power (CDP) screen shows 256 or 512 OVSF codes with flexible zoom capabilities.



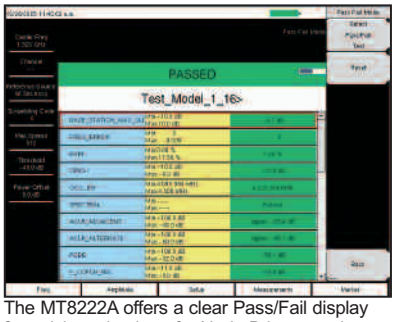
Code Domain Power Table



The Codogram screen shows how code levels are changing over time to simplify fault analysis.



The Modulation Summary screen shows critical transmitter performance parameters in table format.



The MT8222A offers a clear Pass/Fail display for quick evaluation of a Node B base station.

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

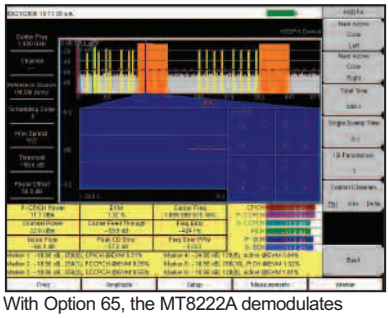
The Modulation Summary screen displays critical transmitter performance measurements in table format for easy viewing, showing carrier frequency, frequency error, channel power, primary common pilot channel (P-CPICH) absolute power, secondary common pilot channel (S-CCPCH) power and paging indicator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

Pass/Fail Mode

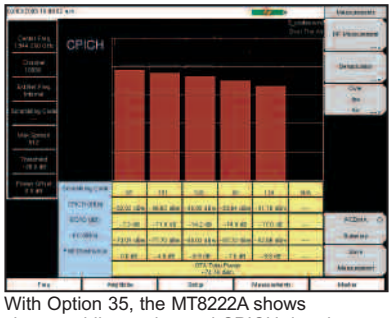
The MT8222A stores the five test models covering all eleven test scenarios specified in the 3GPP specification (TS 25.141) for testing base station performance and recalls these models for quick easy measurements. After an operator selects a test model, the MT8222A displays test results in table format 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 downloaded 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.

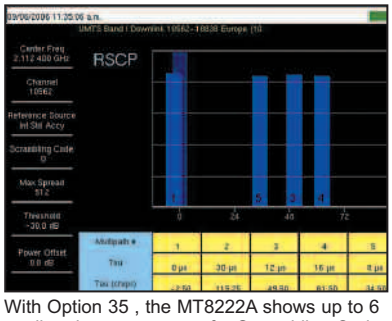
Demodulate and display HSDPA signals with ease



With Option 65, the MT8222A demodulates HSDPA and W-CDMA signals and displays the selected code constellation. The selected code Power vs. Time is also displayed.



With Option 35, the MT8222A shows six scrambling codes and CPICH data in a combination bar graph/table view.



With Option 35 , the MT8222A shows up to 6 mutli-path components of a Scrambling Code, including total multi-path power in a comibination bar graph/table view.

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)

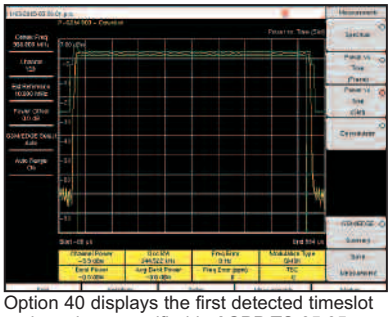
OTA has two measurement screens: Scrambling Code and Multi-path. The Scrambling Code measurement displays six scrambling codes in a bar graph format. For each scrambling code, CPICH in dBm, Ec/Io in dB, Ec in dBm, and pilot dominance in dB are displayed in table format. The user will also see OTA total 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.

Demodulate GSM, GPRS and EDGE signals with ease

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.

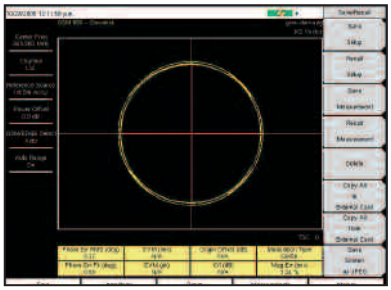


Option 40 displays the first detected timeslot and mask as specified in 3GPP TS 05.05.

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.

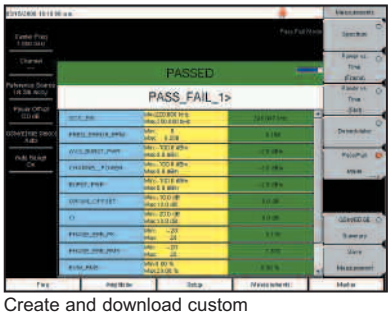
The user can view Channel Spectrum or Multi Channel Spectrums.
The Channel Spectrum screen includes channel power, burst power, average burst power, frequency error, modulation type and Training Sequence Code.



Option 41 demodulates and displays GSM/GPRS/EDGE signals, including vector diagrams.

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.



Create and download custom GSM/GPRS/EDGE Pass/Fail test sets.

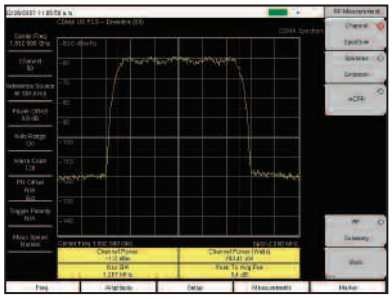
Pass/Fail Mode

Using Master Software Tools, custom GSM/GPRS/EDGE Pass/Fail test sets can be easily created and downloaded 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.

Connect Directly or Over the Air to Make CDMA/EVDO Measurements

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.



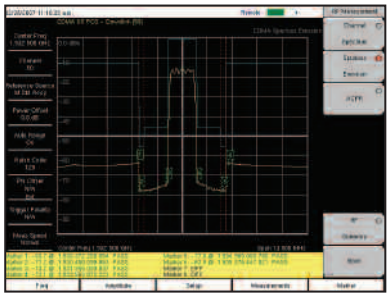
CDMA Channel Spectrum measurement display

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.



CDMA Spurious Emissions measurement display

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.

CDMA Code Domain Power measurement display

CDP

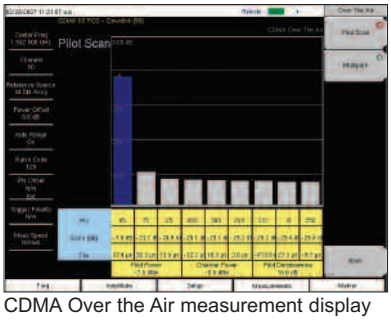
The Code Domain Power measurement displays the power of the various demodulated codes (display is automatically bit reversed if Walsh Codes are set to 128). Rho, Frequency Error, Average Noise Floor and Tau are numerical values that are calculated and displayed. A zoom view of 16, 32 or 64 codes is also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



CDMA Over the Air measurement display

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.

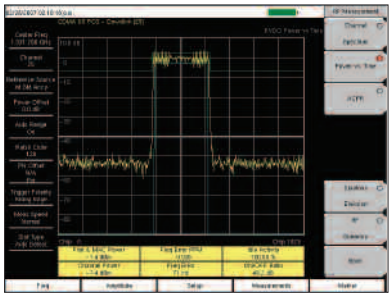
Optimize EVDO Network Performance

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.



EVDO Power vs. Time measurement display

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

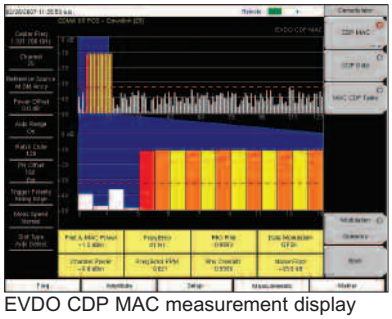
The ACPR measurement displays the main channel and the power of two adjacent channels on each side of a bar graph. The user can configure up to five main channels.

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.



EVDO CDP MAC measurement display

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.

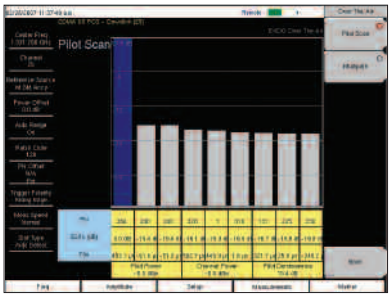
MAC CDP Table

This measurement displays all the active codes in the MAC channel in a color coded tabular format.

Cost Effective Way to Identify Base Station Performance Problems

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.



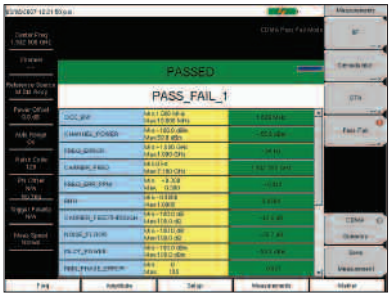
EVDO Over the Air measurement display

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 Pass Fail Mode measurement display

Pass/Fail Mode

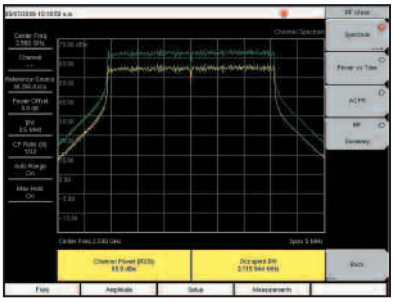
The Spectrum Master and BTS Master can perform automated Pass/Fail testing for both CDMA and EVDO. The test results are displayed in table format with clear PASS or FAIL indications that include min/max thresholds and actual measured results. Using Master Software Tools, custom tests can be easily created and downloaded into the BTS Master. All critical parameters can be selected for Pass/Fail testing.

WiMAX Measurements made simple

Fixed WiMAX Measurements

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.



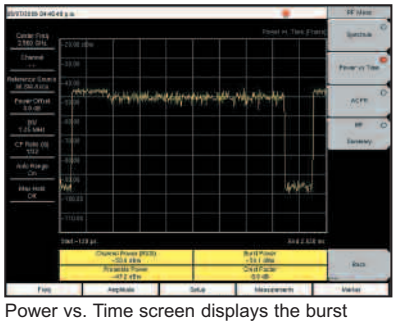
The RF Spectrum screen shows the signal spectrum along with key parameters, such as channel power and occupied bandwidth.

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

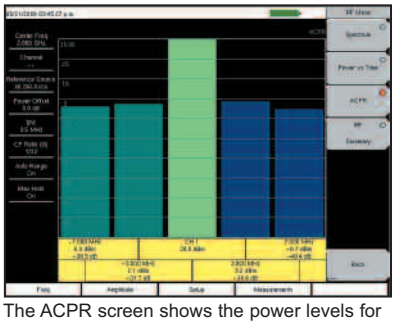
In the Spectrum screen, technicians can view and examine the selected signal's channel power (in dBm) and occupied bandwidth.



Power vs. Time screen displays the burst power and preamble power of the signal.

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.

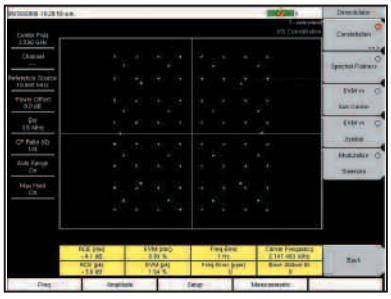


The ACPR screen shows the power levels for the main channel and two adjacent channels.

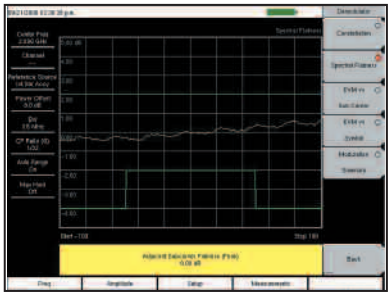
ACPR

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.

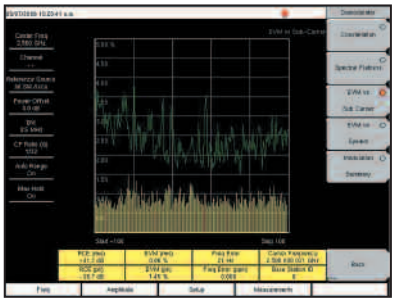
Demodulate Fixed WiMAX signals with ease



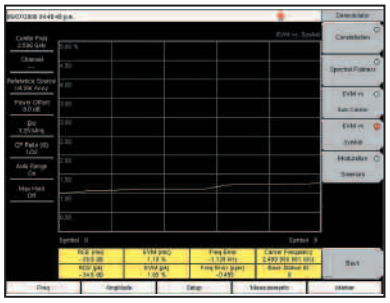
Option 47 displays the constellation of the demodulator signal.



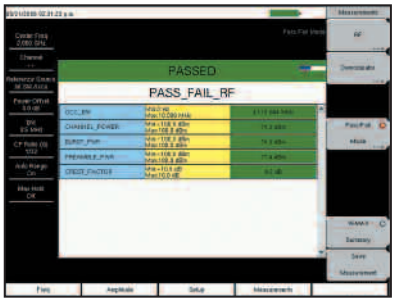
Spectral Flatness is displayed with the mask as specified in 802.16-2004.



EVM vs. Sub Carrier displays pilot and data subcarrier.



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



Using Master Software Tools create and download custom Fixed WiMAX Pass/Fail test sets.

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 which is, a channel estimation step. 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

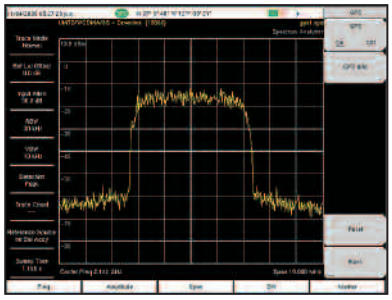
The MT8222A has the capability of creating test procedures with minimum and maximum limits for testing base station performance and recalls these tests for quick and easy measurements. After a test procedure, the MT8222A can display test results in table format with clear PASS or FAIL indications that include min/max thresholds and actual measured results. Plus using Master Software Tools, additional custom tests can be easily created and downloaded into the MT8222A.

Enhance frequency accuracy with built-in GPS

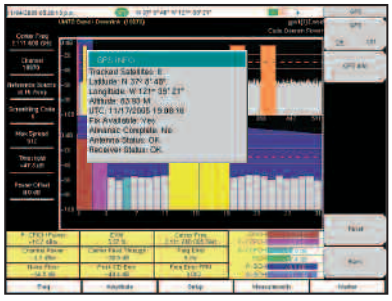
GPS (Option 31)

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.

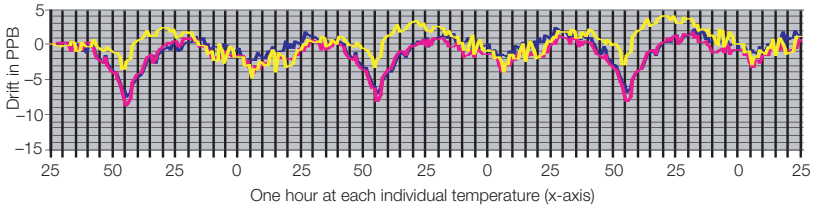


GPS location information (longitude, latitude) is shown at the top of the screen.

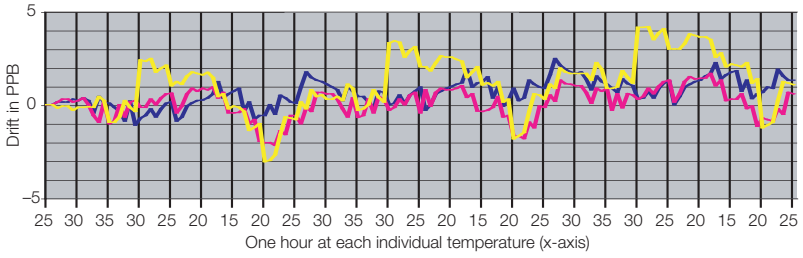


The MT8222A can easily enhance the frequency reference oscillator accuracy to make precise frequency error measurements.

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



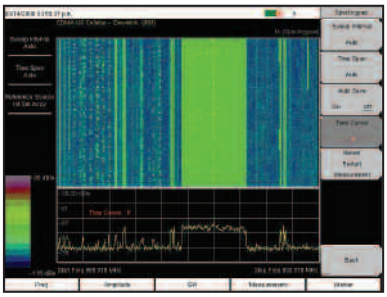
Typical frequency accuracy of the MT8222A for 24 hours following the GPS antenna disconnect over temperature range 15°C to 35°C.



Track down unwanted interference with the MT8222A

Interference Analyzer (Option 25)

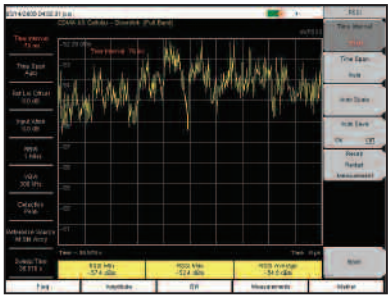
With its built-in low-noise preamplifier, the MT8222A with the interference analyzer option provides the ability to identify and locate interfering signals down to –154 dBm, allowing technicians to better address the quality issues that affect user service.



Spectrogram measurements identifies intermittent interference.

Spectrogram

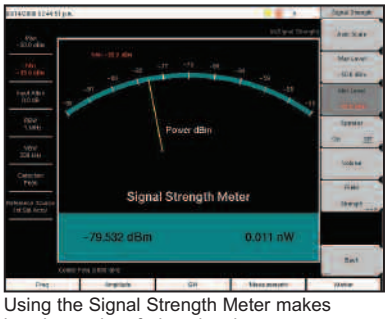
For identifying intermittent interference and tracking signal levels over time, the Spectrogram display provides a three dimensional display of frequency, power, and time of the spectrum. And the MT8222A can collect this data for up to 72 hours.



RSSI measurement analyzes signal strength of a signal over time.

RSSI

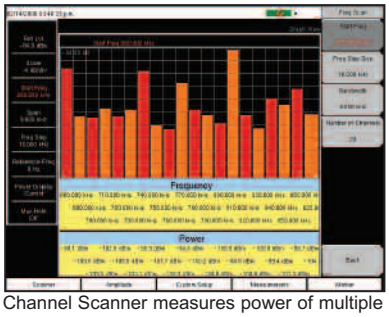
RSSI indicator can be used to observe the signal strength of a single frequency over time. Data can be collected for up to 72 hours.



Using the Signal Strength Meter makes locating an interfering signal easy.

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.

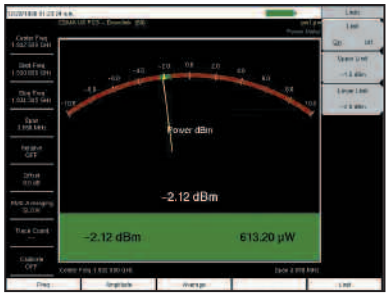


Channel Scanner measures power of multiple transmitters.

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.

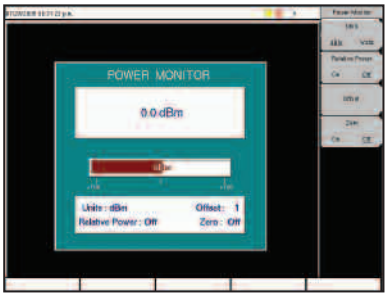
Extend the functionality with valuable options



Power Meter measures total input power in a selected frequency span.

Power Meter (Standard)

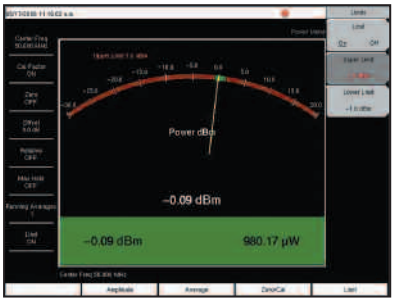
The internal Power Meter uses the spectrum analyzer circuitry to measure the power (no external sensor is required). Select frequency to make channelized power measurement over specific channels, or broadband measurements over the entire frequency range. Power is displayed in an analog type display and, 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.



Measure broadband power up to 50 GHz. with the Power Monitor.

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.



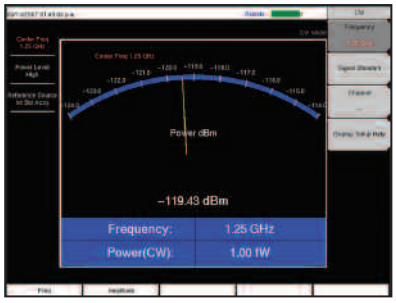
High Accuracy Power Meter provides true RMS measurements from –30 dBm to +20 dBm.

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.

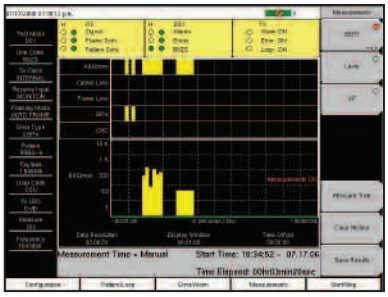


CW Signal Generator has a high and low power setting.

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.

Extend the functionality with valuable options

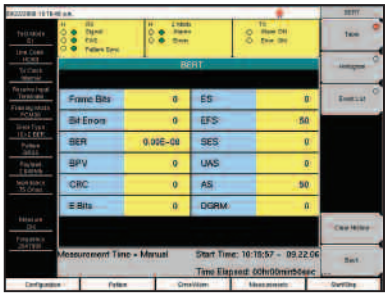


With Option 50, let T1 tester find out if the problem is on the wireline or the wireless side.

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.

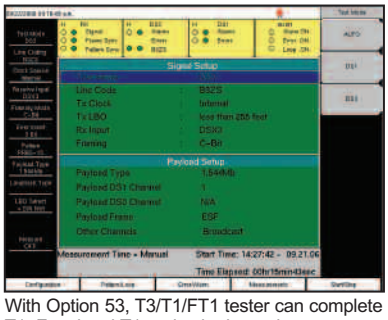
The user can manually select a DS0/VF channel and listen to the channel using the BTS Master's integrated speaker. If there is a test tone on the channel, the BTS Master displays the signal level and frequency.



With Option 52, 2 Mb/s - E1 tester can perform a full complement of 2 Mb/s - E1 and Trau-channels tests.

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- 2Mb/s BERT analyzer includes both a RJ48 or BNC connector. The ability to have E1- 2Mb/s testing in one test tool simplifies troubleshooting problems and determining if it's on the wireline or the wireless side. The E1- 2Mb/s data can be displayed in multiple formats including a histogram, and the BTS Master can collect the E1- 2Mb/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- 2Mb/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.



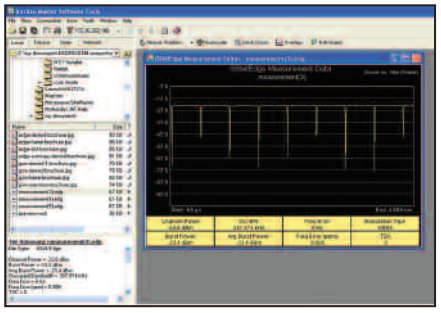
With Option 53, T3/T1/FT1 tester can complete T1, Fractional T1 and sub-channel tests.

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

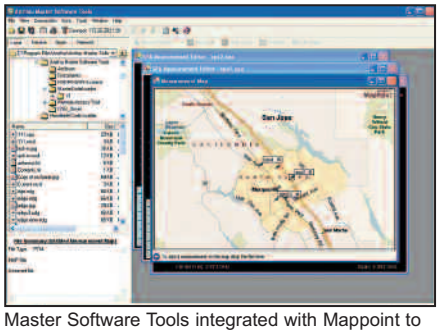
The BTS Master's optional T3 BERT analyzer has not only a full range of T3 functional tests but also complete T1, Fractional T1 (FT1) and sub-channel (8 kb, 16 kb) tests. This enhanced capability is key for high traffic sites using a T3 backhaul. The BTS Master can measure the DS3 carrier exclusively 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.

Master Software Tools augments the power of the MT8222A

To further increase the power of the MT8222A, each BTS Master instrument comes with Master Software Tools – comprehensive data management and analysis software that provides simple and easy methods to manage, archive, analyze, print and report system performance. For the most current version of Anritsu Master Software Tools, please visit www.us.anritsu.com.



Master Software Tools simplifies the process of formatting data and generating reports.



Master Software Tools integrated with Mappoint to quickly display the geographic location of measurements with GPS data.

With Master Software Tools™ (Windows® 2000/XP 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.

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 + $\left|20 \log (1 \pm 10^{-E\Delta/20})\right|$ dB, typical EΔ = Directivity – Measured Return Loss

System Dynamic Range:
80 dB, 2 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 x 10^8 x vp)/ΔF vp is the propagation constant and ΔF 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: ±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 in zero span

Sweep Trigger: Free run, Single, Video, External

Resolution Bandwidth:
(–3 dB width) ±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 ≥–50 dBm, ≤35 dB input attenuation,

Preamplifier 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

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

Amplitude Units Log Scale Modes:
dBm, dBV, dBmv, dBµV

Attenuator Range: 0 to 65 dB

Attenuator Resolution: 5 dB steps

Power Meters:

Frequency Range: 100 KHz 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 ≤+15 dBm:
10 MHz –4 GHz: ±1.25 dB
4 GHz –7.1 GHz: ±1.75 dB
Max> +15 dBm:
10 MHz –6.5 GHz: ±1.75 dB
6.5 GHz –7 GHz: ±2 dB
Max ≤–40 dBm:
10 MHz –4 GHz: ±1.5 dB
4 GHz –7.1 GHz: ±1.75 dB

VSWR: 1.5:1 typical

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

W-CDMA/HSDPA RF Measurements (Option 44)

Frequency Ranges:
824–894 MHz, 1710–2170 MHz, 2300–2700 MHz

RF Channel Power (Temperature range 15ºC to 35ºC):
±0.7 dB typical
(±1.25 dB max)

Occupied Bandwidth Accuracy: ±100 kHz

Residual Adjacent Channel Leakage Ratio (ACLR)[1] (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[1] (824 to 894 MHz, 1710 to 2170 MHz):
(3GPP Test Model 4) ±2.5%; ≤EVM ≤25%
(3GPP Test Model 5) ±2.5%; ≤EVM ≤20%
(2300 MHz to 2700 MHz)

EVM Accuracy[2]: ±2.5% for 6 ≤EVM ≤20%

Residual EVM: 2.5% typical

Code Domain Power:
±0.5 dB for code channel power >–25 dB
16, 32, 64 DCPH (test model 1)
16, 32 DCPH (test model 2, 3)

CPICH (dBm) Accuracy: ±0.8 dB typical

Scrambling Code: 3 seconds

W-CDMA/HSDPA OTA (Option 35)

Resolution: 0.1 dB 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 nW to 40 mW)

Offset Range: 0 to +60 dB

Resolution: 0.1 dB or 0.1W

Accuracy:
±1 dB maximum 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

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

Channel Scanner (Option 27)

Frequency Range: 100 KHz to 7.1 GHz

Frequency Accuracy:
±10 Hz + Time base error, 99% Confidence level

Measurement Range: +20 dBm to –110 dBm

Channel Power:
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

Adjacent Channel Power Accuracy: ±0.75 dB

[1] Depends on reference level, input signal level and single channel conditions
[2] Will vary with amount of data burst traffic

Options Specifications

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:
±25 ppb with GPS ON, 3 minutes after satellite lock

Internal High Accuracy, when GPS antenna is not connected:
Better than ±50 ppb for 3 days from a High Accuracy GPS Lock and within 0º C to 50º 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:
±1 dB typical for –50 dBm to +20 dBm (±1.5 dB max)

Frequency Error:
±10 Hz + 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 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: ±0.01 for Rho >0.9

Frequency Error: ±20 Hz + Time base error, 99% confidence level

PN Offset: with 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 EVDO Rev A compatible.

Residual Rho: >0.995 typical for RF Input from +20 dBm to –50 dBm (>0.99 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)

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[2]:
±1 dB Typical for +20 dBm to –50 dBm (±1.5 dB max)

Fixed WiMAX Demodulator (Option 47)

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

Frequency Error:
±10 Hz + time base error, 99% confidence level

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

T1 Analyzer, Fractional T1 and sub-channels

BER testing at 64, 16 and 8 kB 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 +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 T1.403 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 (≤32 bits)

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

Alarm Detection: AIS, RAI

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 Bit-Error-Rate-Tester (BERT), (Option 52)

E1 - 2 MB/s Analyzer, sub-channnels

BER testing at 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, 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 (± 5%)

Data Log: Continuous, up to 72 hrs

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

VF Measurement:
Frequency: 100 Hz to 3000 Hz ±3 Hz
Level: –40.0 to +3.0 dBm ±0.2 dBm

[1] Depends on reference level, input signal level and single channel conditions
[2] Will vary with amount of data burst traffic

Options Specifications

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

T3 Analyzer

Line Coding: B3ZS, AMI

Framing Modes: Unframed, M13, C-bit

Connection Configurations:
Terminate (75 Ω) 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 ±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, RAI

Error Detection:
Frame Bits, Bit, BER, BPV, FEBE,
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 (±5%), can also display in dBdsx

Data Log: Continuous, up to 72 hrs

T3 Frequency Measurement: ±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 at 64, 16 and 8 kB rates

Line Coding: AMI, B8ZS

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

Connection Configurations:
Terminate (100 Ω) balanced, Bantam
Bridge (≤1000 Ω)
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 ±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 (≤32 bits)

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

Alarm Detection: AIS, RAI

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, 50Ω

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 50ºC):
±0.16 dB*

Noise: 20 nW max

Zero Set: 20 nW

Zero Drift: 10nW 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)

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 (50Ω)
BNC female connectors for external reference and external trigger
Reverse BNC connector for GPS antenna
E1-2Mb/s (Receive and Transmit):
RJ48 (75 Ω) connector and BNC(f) (120 Ω)
T1 (Receive and Transmit): Bantam Jack
T1, T3 (Receive and Transmit):
Bantam Jack and BNC (75 Ω)
RF Detector: Type N(m) 50Ω
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 AnalyzerTest Port, Type N: +23 dBm, ±50 VDC

Environmental:
MIL-PRF-28800F Class 2
Operating: –10ºC to 55ºC, humidity 85%
Storage: –51ºC to 71ºC
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.)

PSN50 High Accuracy Power Sensor

* 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

MT8222A - BTS Master

Standard

Cable and Antenna Analyzer
Frequency Range: 10 MHz to 4 GHz

Spectrum Analyzer Analyzer
Frequency Range: 9 kHz to 7.1 GHz

Power Meter
Frequency Range: 9 kHz to 7.1 GHz

Optional

Interference Analyzer
Frequency Range: 9 kHz to 7.1 GHz

Channel Scanner
Frequency Range: 9 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, 806-866 MHz, 824 to 894 MHz, 890-960 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

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-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-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-062	EVDO RF Measurements
MT8222A-063	EVDO Demodulator
MT8222A-065	W-CDMA/HSDPA Demodulation***

*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

High Accuracy Power Meter Accessories

PSN50	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

10580-00156	BTS Master User's Guide
65681	Soft Carrying Case
40-168	AC/DC Adapter
806-141	Automotive Cigarette Lighter/12 Volt DC Adapter
3-2000-1500	256 MB Compact Flash 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

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
760-243-R	Transit Case for Anritsu MT8222A BTS Master
1N50C	Limiter, N(m) to N(f), 50Ω, 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, 50Ω, N(m)
OSLNF50-1	Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50Ω, N(f)
2000-767	Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50Ω
2000-768	Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(f), 50Ω
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

Ordering Information

Adapters

510–90	7/16 DIN(f) to N(m), DC to 7.5 GHz, 50 Ω
510–91	7/16 DIN(f) to N(f), 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, 50Ω, N(m) to N(m)
34NFNF50	Precision Adapter, DC to 18 GHz, 50Ω, 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 2.23 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), 870 to 960 MHz, 50 Ω
2000-1474	SMA(m), 2.41 to 2.5 GHz, 50 Ω
2000-1475	SMA(m), 1920 to 1980, 2.11 to 2.17 GHz, 50 Ω
61532	Antenna Kit: 2000–1030, 2000–1031, 2000–1032, 2000-1035, 2000–1200, and 2000–1361

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
807-117	Bantam “Y” Plug to RJ48
3-806-169	72-inch (1.8 m), BNC to BNC, 75 Ω RG59 type coax cable

Band Pass Filters

1030-105	890 to 915 MHz Band, N(m) to N(f), 50 Ω
1030-106	1710 to 1790 MHz Band, N(m) to N(f), 50 Ω
1030-107	1910 to 1990 MHz Band, N(m) to N(f), 50 Ω
1030-109	824 to 849 MHz Band, N(m) to SMA(f), 50 Ω
1030-110	880 to 915 MHz Band, N(m) to SMA(f), 50 Ω
1030-111	1850 to 1910 MHz Band, N(m) to SMA(f), 50 Ω
1030-112	2400 to 2484 MHz Band, N(m) to SMA(f), 50 Ω
1030-114	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	Adaptor, 90º, N(m), N(m)
SC7651	Power Splitter, 50 Ω, N(f), N(m), N(f)
67263	Cable, N(m), N(m)

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Catalog No. 11410-00386, Rev. E Printed in United States 2007-06