Product Brochure

Anritsu

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Cell Master™ MT8212B

Cable, Antenna and Base Station Analyzer

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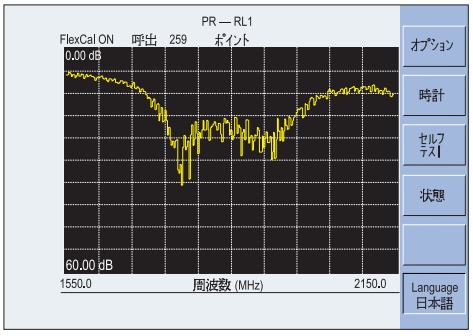
From the Industry Leader in Handheld Field Application Instrumentation – a Multi-Function Base Station Analyzer

The Cell Master from Anritsu is a single instrument that combines all of the tools required to simplify the job of maintaining and troubleshooting base stations.



Local languages included

Easy-to-Use

In a single, lightweight, handheld, battery-operated package, the Cell Master combines the functionality of a cable and antenna analyzer, spectrum analyzer, AM/FM demodulator, power meter, channel scanner, transmitter analyzer (GSM, CDMA and 1xEV-DO), transmission analyzer for 2-port devices (built-in RF source), interference analyzer, GPS receiver and T1/E1 analyzer.

This optimal combination of network test capabilities eases the job of a network technician by eliminating the need for several independent test instruments, reducing the number of tools the technician must carry and learn to operate. The Cell Master is a low-cost, easy-to-use, and rugged solution designed specifically for field based network technicians and engineers.

Rugged and Reliable

The Anritsu Handheld MT8212B is specifically designed for field environments and can easily withstand the day-to-day punishment of field use. The analyzer is almost impervious to the bumps and bangs typically encountered by portable field-based equipment. The battery can be changed in seconds when necessary to help extend measurement time in the field.

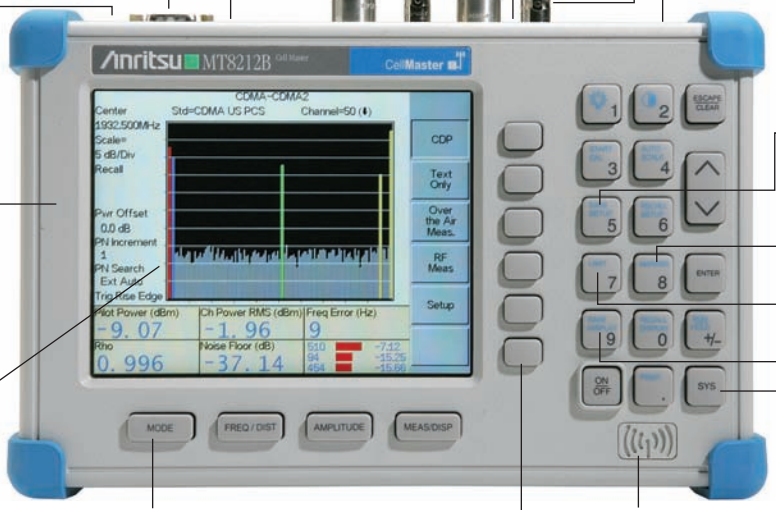
Transflective Color Display

The standard transflective color display is viewable in direct sunlight and at wide viewing angles.

Multilingual

The MT8212B multi-language user interface features on-screen menus and messages in six different languages: English, Chinese, Japanese, French, German, and Spanish.

The Cell Master is the only instrument you need for complete base station maintenance and trouble-shooting.



External DC Power Port

RS-232 Interface
Transfer stored data to and from a personal computer (PC) or download to a printer via a serial cable for further analysis. Use PC to automatically control and collect data in the field.

Snap-in field replaceable battery location

Spectrum Analyzer and Power Meter Port

GPS

Cable and Antenna Analyzer Port

External Trigger and External Frequency Reference In

CDMA Timing Input

T1/E1 Receive and Transmit Port or Option 5 RF Detector connector

Save and Recall Setup
Save 10 to 13 setups for fast repeatable testing (mode dependent).

Marker
Six markers for more comprehensive measurements.

Limit
Create simple pass/fail measurements with a single limit line, upper and/or lower mask limit lines.

Save and Recall Display
Up to 300 memory locations. Alphanumeric data labeling and automatic time/date stamp simplify data management.

Rugged and Reliable Chassis Design
Ruggedized, lightweight, compact, high-impact housing is designed to withstand repeated drops and rough handling. Weather resistant seals and rubber membrane keypad protect unit from dirt and moisture.

TFT Color Display
Standard TFT (640x480) color display featuring variable brightness control. Viewable in direct sunlight.

Function Keys
Four dedicated function keys simplify measurement tasks.

Soft Keys
Intuitive soft key menu and user interface.

AM/FM Receiver with Internal Speaker
Built-in AM/FM demodulator enables testing and trouble-shooting of wireless communications systems. An internal speaker and headphone jack are included.

Multilingual User Interface
Multi-language user interface features on-screen menus and messages in six different languages: Chinese, English, French, German, Japanese, and Spanish.

Function	Benefits
Cable and Antenna Analyzer	Quickly finds small, hard to identify faults before major failures occur.
Spectrum Analyzer	Easily locate, identify and record various signals with incredible accuracy.
Power Meter	Performs accurate power measurements, reducing holes and interference.
High Accuracy Power Meter	Perform accurate RMS power measurements for both CW and modulated signals.
Channel Scanner	Measures frequency, bandwidth and power of multiple transmitted signals.
Transmission Measurement	Built-in signal source to measure gain or loss of two port devices, as well as tower mounted amplifier antenna isolation measurements and repeater testing.
Interference Analyzer	Identify and locate interfering signals that cause dropped calls and coverage problems. Intermittent problems can be identified using spectrograms.
GPS Receiver	Built-in receiver for location information. In CDMA mode, the GPS clock can be used to make Over The Air measurements.
cdmaOne, CDMA2000 1xRTT, and CDMA2000 1xEV-DO measurements	RF measurements, demodulation and over the air measurements help the technician to quickly check base station performance.
GSM Measurements	RF measurements monitor transmitter performance.
iDEN Signal Analyzer	RF and demodulation measurements to monitor iDEN/WiDEN.
T1 and E1 Analyzer	Simplifies the task of determining if the source of problems is on the wireline or the wireless side.
Variable Bias Tee	Eliminates the need for an external power suppy when biasing tower mounted amplifier.
GPS Tester	Identify issues with GPS antennas.

Cable and Antenna Analysis – Increase System Uptime

The Cell Master cable and antenna analyzer uses Frequency Domain Reflectometry (FDR) to help technicians and wireless field engineers detect cable, feedline and antenna system problems before they become costly, time-consuming system failures. Superior immunity to ambient RF levels, and excellent directivity and source match ensure accurate and repeatable measurements.

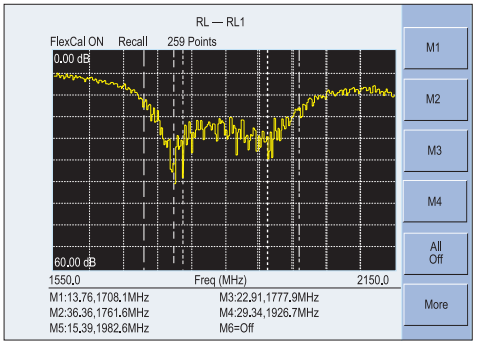
FDR Technique

Frequency Domain Reflectometry (FDR) and Time Domain Reflectometry (TDR) have similar acronyms, and both techniques are used to test transmission lines. But, that's where the similarities end. TDRs are not sensitive to RF problems: the TDR stimulus is a DC pulse, not RF. Thus, TDRs are unable to detect system faults that often lead to system failures. Additionally, FDR techniques save costly, time-consuming trouble shooting efforts by testing cable feedline and antenna systems at their proper operating frequency.

Deficient connectors, lightning arrestors, cables, jumpers or antennas are replaced before call quality is compromised.

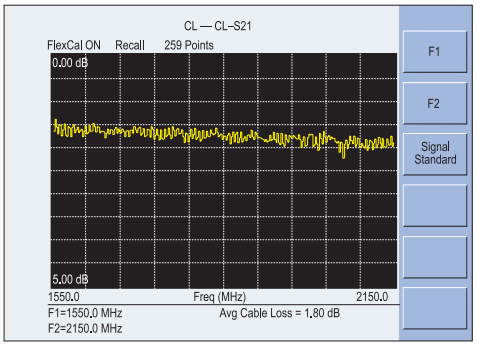
Quick, Simple Measurements

Cell Master performs various RF measurements aimed at simplifying cable feedline and antenna system analysis: Return Loss, SWR, Cable Loss and Distance-to-Fault (DTF). A single softkey selection on the main menu activates the desired measurement mode.



Return Loss, SWR

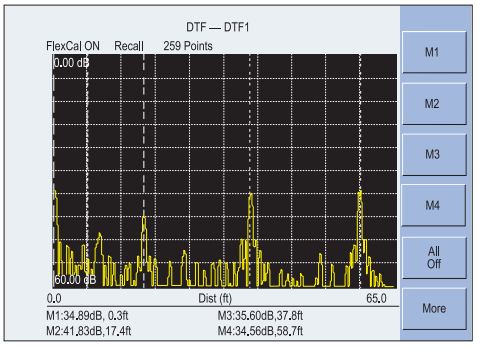
Return Loss measures the signal energy that is "reflected" or returned back to where it came from. VSWR (Voltage Standing Wave Ratio) is another method to measure the reflections. Return Loss and SWR "system" measurements ensure conformance to system performance engineering specifications. Measurements can easily be toggled between the two modes and can be performed without climbing the tower.



Cable Loss

Cable Loss measures the RF energy that is lost as heat and leakage as the signal travels down the cable. Insertion loss can be verified prior to deployment, when you have access to both ends of the cable, or on installed cables with access to the opposite end.

The MT8212B Cell Master automatically calculates and displays the average cable loss so there's no more guess work or need for complicated calculations in the field.



Distance-To-Fault pinpoints the location and reflection amplitude of transmission line components.

Distance-to-Fault

Although a Return Loss test can show users the magnitude of signal reflections, it can not show the precise location of a fault within the cable and antenna system. Distance-To-Fault measurements provide the clearest indication of trouble areas as it shows both the magnitude of the signal reflection and the location of the signal anomaly.

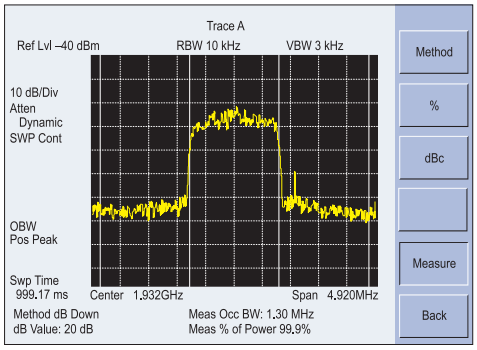
Distance-To-Fault can easily identify connector transitions, jumpers and kinks in the cable and antenna system. Return Loss/SWR measurement data is processed using Fast Fourier Transform and the resulting data indicates Return Loss/SWR versus distance.

Spectrum Analysis – Anywhere, Anytime

The Cell Master MT8212B integrated spectrum analysis capability provides the “ultimate” in measurement flexibility for field environments and applications requiring mobility. With the MT8212B you can locate, identify, record and solve communication systems problems quickly and easily, and with incredible accuracy – making it a perfect solution for conducting field measurements in the 100 kHz to 3 GHz frequency range.

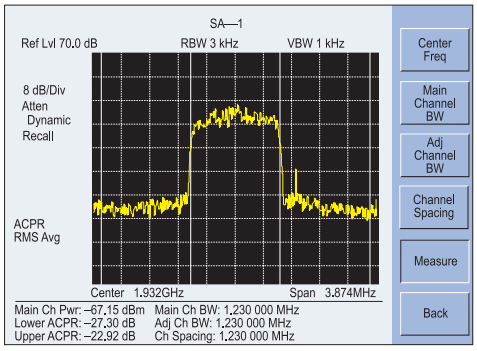
Smart Measurements

The Cell Master MT8212B has dedicated routines for smart measurements of field strength, channel power, occupied bandwidth, Adjacent Channel Power Ratio (ACPR), Carrier-to-Interference and interference analysis. These are increasingly critical measurements for today’s wireless communication systems. The simple interface for these complex measurements significantly reduces test time and increases analyzer usability.



Occupied Bandwidth

This measurement calculates the bandwidth containing the total integrated power occupied in a given signal bandwidth. There are two different methods of calculation depending on the technique used to modulate the carrier. The user can specify percent of power or the “x” dB down point, where “x” can be from 1 dB to 120 dB below the carrier.



Adjacent Channel Power Ratio

A common transmitter measurement is that of adjacent channel leakage power. This is the ratio of the amount of leakage power in an adjacent channel to the total transmitted power in the main channel. This measurement is used to replace the traditional two-tone intermodulation distortion (IMD) test for system non-linear behavior.

The result of an ACPR measurement can be expressed either as a power ratio or a power density. In order to calculate the upper and lower adjacent channel values, the Cell Master allows the adjustment of four parameters to meet specific measurement needs: main channel center frequency, measurement channel bandwidth, adjacent channel bandwidth and channel spacing. When an air interface standard and channel are specified in the MT8212B, all these values are automatically set to the normal values for that standard.

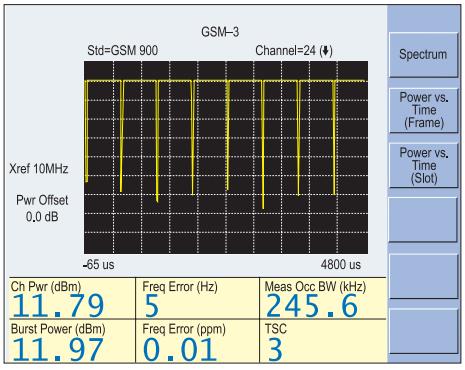
AM/FM Demodulator

A built-in demodulator for AM, narrowband FM, wideband FM and single sideband (selectable USB and LSB) allows easy identification of interfering signals.

Transmitter Performance Monitoring Made Simple

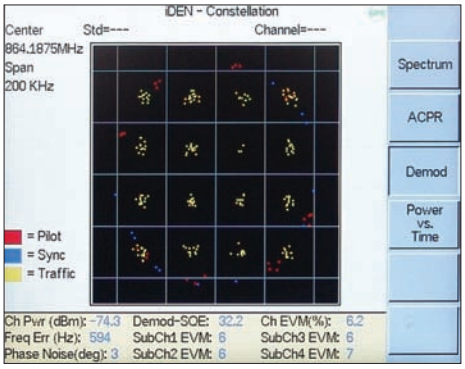
General purpose test equipment cannot measure all the important parameters of a wireless network. RF technicians and engineers need more sophisticated products to maintain and trouble shoot base stations. Bench top fully featured laboratory design, development and compliance instruments are expensive, big, bulky and very complicated to operate. RF technicians and engineers need an integrated, handheld, multi-function, battery operated and easy to use product to check base station performance.

RF measurements (CDMA, EVDO and GSM) give a general idea of how strong the transmitting signal is and whether the base station is transmitting at the designated frequency. The Cell Master demodulates the CDMA/1xEV-DO signal by connecting to the base station, or using an over the air antenna.



GSM RF Measurements (Option 40)

GSM RF measurements are channel power, burst power, occupied bandwidth, carrier frequency, frequency error and Training Sequence Code (TSC). The Cell Master displays time slot information.



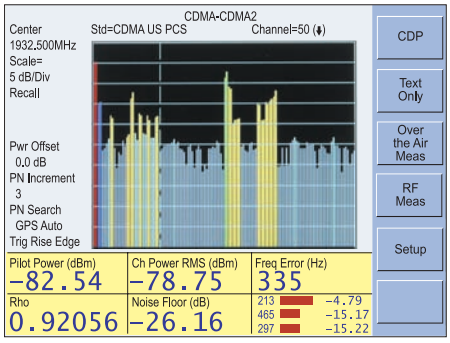
iDEN Signal Analyzer Measurements (Option 68)

The MT8212B CellMaster™ provides a dedicated measurement mode to test performance of iDEN Base Stations. This option includes RF and Demodulation measurements of iDEN and WiDEN signals.

CDMA RF Measurements (Option 42)

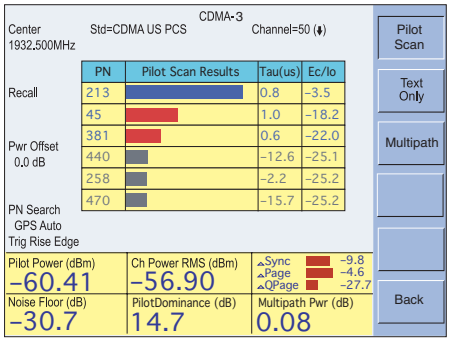
CDMA RF measurements are channel power, occupied bandwidth, carrier frequency, frequency error and noise floor.

– Direct Connect or Over The Air



cdmaOne and CDMA2000 1xRTT demodulator (Option 43)

Cell Master demodulates CDMA2000 1xRTT signals displaying code domain power, pilot power, channel power, frequency error, waveform quality (rho), pilot time tolerance (tau), Pilot Ec/Io and carrier feed through. The parameters can be displayed in graphical format or text only format. Code domain power can be displayed as 64 Walsh codes or 128 Walsh codes as bit reversed code.

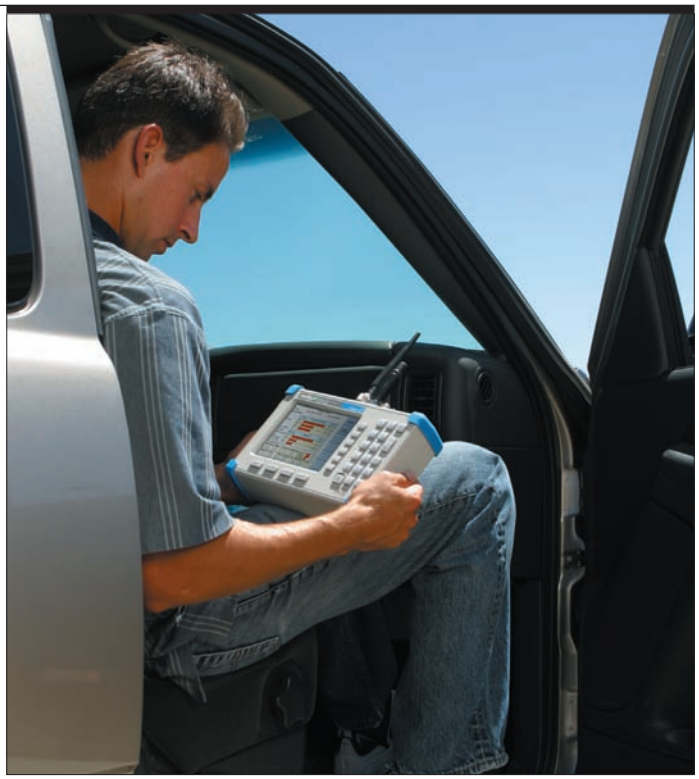


cdmaOne and CDMA2000 1xRTT Over The Air (Option 33)

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.

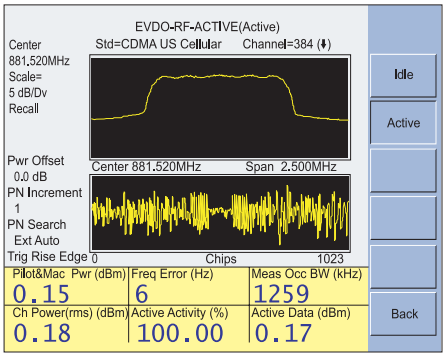
cdmaOne and CDMA2000 1xRTT Over The Air measurement displays pilot power, channel power, frequency error, noise floor, dominant pilot, multipath power, six strongest pilots with Ec/Io, and two strongest multipaths relative to the strongest pilot.

Make CDMA measurements right from your car or truck.



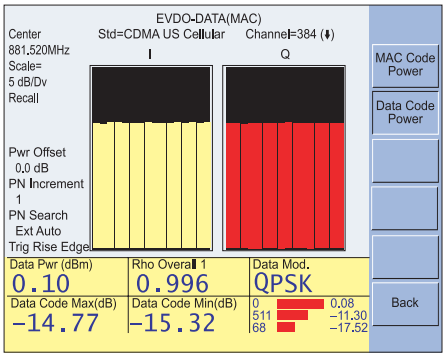
CDMA2000 1xEV-DO Transmitter Analysis

The data services such as internet browsing or streaming video for the mobile phones are becoming critical to the wireless service providers revenue. 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 (1xEV-DO) system is backward compatible and is spectrally identical to the cdmaOne and CDMA2000 systems. For 1xEV-DO technology, an operator should dedicate a single CDMA channel (1.25 MHz) to the packet-data system. This channel cannot carry any voice. In the 1xEV-DO technology, the mobile phone is always connected to the network, even if there is no data flow. The network assigns resources only when it is needed for the data transfer, and may be shared among many users with real time flow control. Cell Master supports 1xEV-DO Rev A.



1xEV-DO RF Measurements (Option 62)

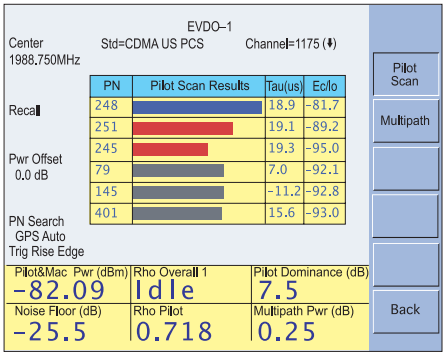
CDMA2000 1xEV-DO RF measurements are Pilot/Mac power, Pilot power, frequency error, measured bandwidth, idle/active activity and idle/active data. The RF measurements screen displays the received signal in frequency and time domain format for idle or active activity of the signal.



1xEV-DO Demodulator (Option 63)

Cell Master demodulates CDMA2000 1xEV-DO signals displaying code domain power as Mac code power or data code power screens. Mac code power measurement displays Pilot/Mac power, Noise Floor, Rho Overall 1, Rho Overall 2, Rho Pilot, data modulation type, channel power, frequency error, EVM, pilot time tolerance (tau) and carrier feed through.

Data code power measurement displays data power, data code max, data code min, Rho Overall 1, Rho Overall 2, Rho pilot, data modulation type, channel power, frequency error, EVM, pilot time tolerance (tau) and carrier feed through.



1xEV-DO Over The Air (Option 34)

CDMA2000 1xEV-DO Over The Air measurement displays Pilot/Mac power, Noise Floor, Rho Overall 1, Rho Pilot, Pilot dominance, multipath power, six strongest pilots with power, and two strongest multipaths relative to the strongest pilot.

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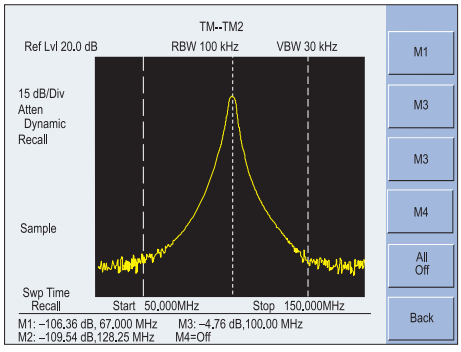
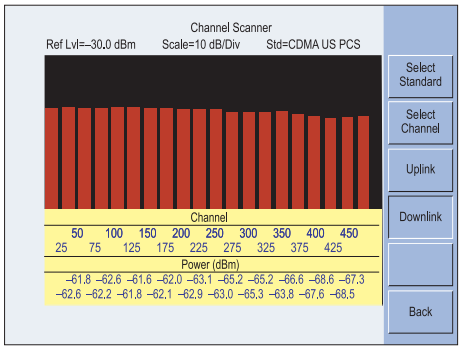
Built-in Multi-Functions to Increase Technician Productivity

GPS provides location and UTC time information.



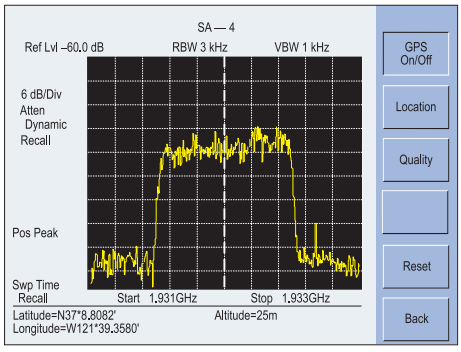
Transmission Measurement (Option 21)

Transmission Measurement is a two port measurement covering the 25 MHz to 3 GHz frequency range. It is a signal source providing the ability to measure loss or gain of two-port devices such as filters, cables, attenuators, duplexers and tower mounted amplifiers. Transmission measurement can also be used to make antenna-to-antenna isolation measurements and for repeater testing.



Channel Scanner (Option 27)

The Channel Scanner option measures the power of multiple transmitted signals, and is very useful for measuring channel power in AMPS, iDEN, GSM, and TDMA networks.

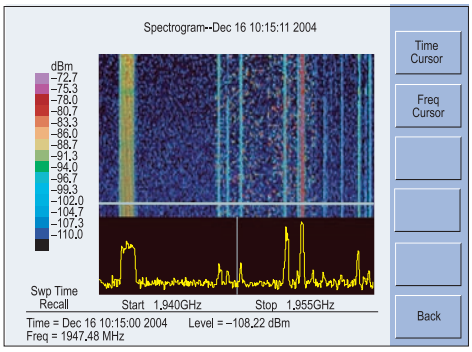


Built-in GPS Provides Location Information (Option 31)

GPS provides location (latitude, longitude, altitude) and UTC time information. The Cell Master can stamp each trace with location information to check if the measurements were taken at the right location. The Cell Master stores the GPS location information until the unit is turned off, so that the stored location information can be used to stamp traces taken indoors at the same cell site location. The GPS option is offered with a magnet mount antenna with a 15 foot (~ 5m) cable to mount on a car or other useful surface.

Interference Analysis – Critical to Wireless Networks

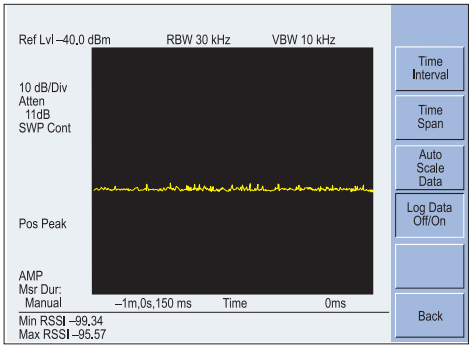
The Cell Master interference analyzer option provides technicians and field engineers the ability to identify and locate interfering signals that affect the quality of service. The Cell Master, with built-in preamplifier, can measure signals down to –135 dBm.



Interference Analyzer (Option 25)

Spectrogram

The Cell Master Spectrogram is a three dimensional display of frequency, power and time of the spectrum activity to identify intermittent interference and track signal levels over time. The Cell Master can save a history up to three days.

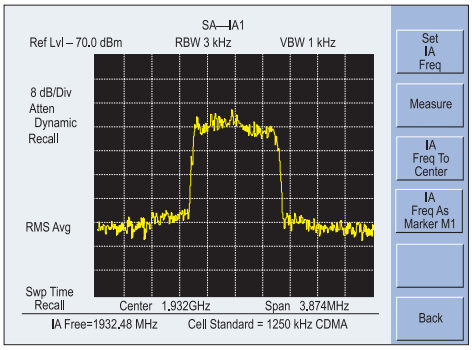


RSSI

RSSI measurement is useful to observe the signal strength of a single frequency over time. The data can be collected for up to seven days.

Locating an Interfering Signal

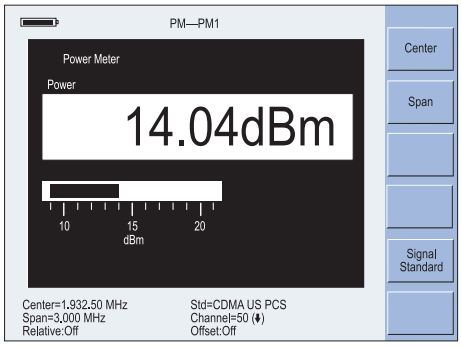
Connect a directional antenna to the Cell Master and locate the interfering source by measuring the strength of the interfering signal. Signal strength is indicated as an audible beep.



Identifying a Signal

The Cell Master MT8212B can provide assistance in identifying signal types from cellular/PCS sites. If you are plagued by an unknown signal, simply enter the frequency of the signal of interest as the “IA Frequency” and press “Measure.” The instrument looks at the bandwidth and shape of the measured signal, and if the signal is of a known type, it gives the name of the air interface standard (e.g., 1250 kHz CDMA) and the measured bandwidth of the signal. If the signal isn’t a cellular/PCS signal, it simply gives the bandwidth.

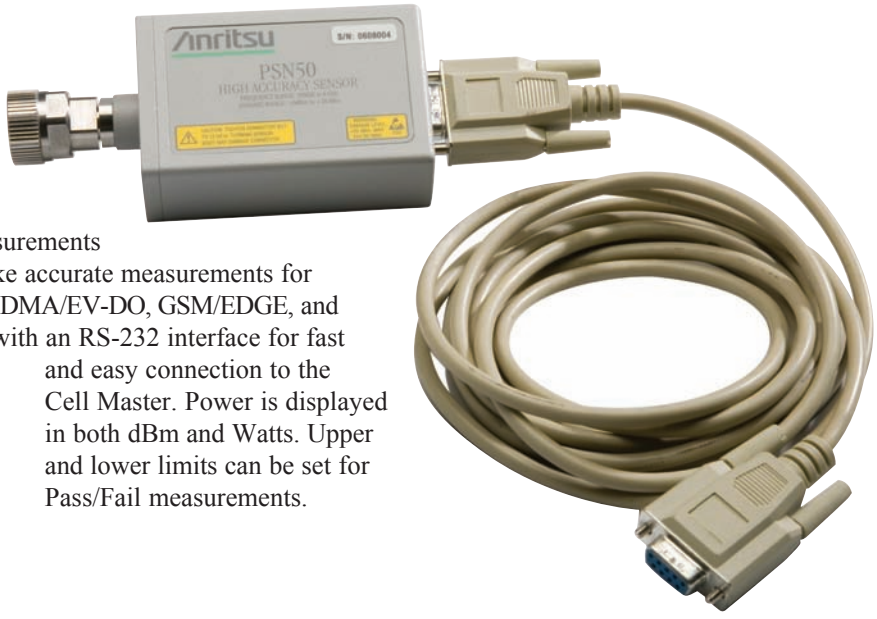
Cell Master Makes High Accurate Power Measurements



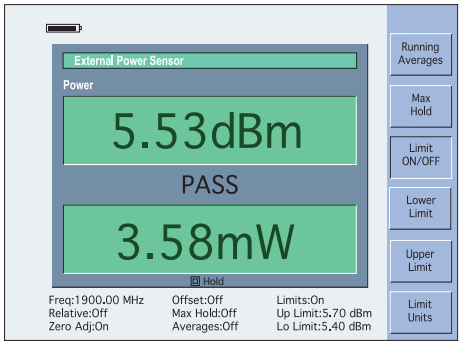
Power Meter (Standard)

The power meter frequency range of 4.5 MHz to 3 GHz performs accurate transmitter power measurements reducing coverage holes and interference. The measured power is the channel based power and the span can be set from 3MHz to 2.99 GHz. The power can be dispalyed in dBm or Watts. An external detector is not required for this measurement.

High Accuracy Power Meter (Option 19)



Anritsu's PSN50 sensor makes high accuracy power measurements from 50 MHz to 6 GHz. The sensor provides true RMS measurements from –30 to +20 dBm enabling users to make accurate measurements for CW and digitally modulated signals such as CDMA/EV-DO, GSM/EDGE, and WCDMA/HSDPA. The sensor is equipped with an RS-232 interface for fast and easy connection to the Cell Master. Power is displayed in both dBm and Watts. Upper and lower limits can be set for Pass/Fail measurements.



Power Monitor requires external detector (Option 5)

The optional Power Monitor features precision, high return loss (low SWR) detectors which can go up to 50 GHz. This excellent impedance match significantly reduces the largest component of power measurement error, mismatch uncertainty. Display formats include absolute power (dBm or Watts) and relative power (dBr or %). Built-in Auto-Averaging automatically reduces the effects of noise while zeroing control allows optimum measurement accuracy at low power levels.

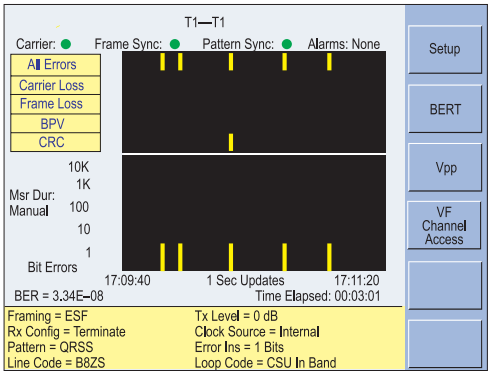
Cell Master is Reliable, Accurate and Field Proven

Bias Tee (Option 10)

The optional bias tee is integrated into the Cell Master and is designed for applications where both DC and RF signals must be applied to a device under test, such as a tower mounted amplifier (TMA).

CW Signal Generator (Option 28)

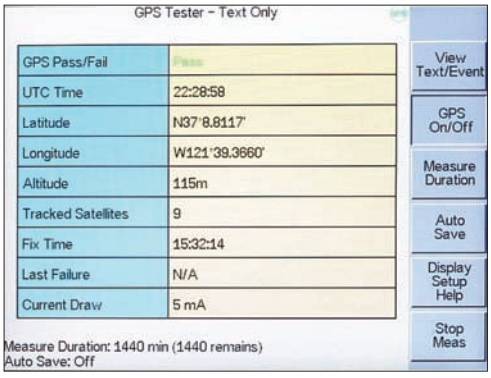
The CW signal generator provides a CW signal source to test low noise amplifiers, repeaters, and for base stations receiver sensitivity testing.



T1/E1 Analyzer (Option 50)

The Cell Master performs full T1/E1 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 Cell Master can collect the T1/E1 data for up to two days. The analyzer can also measure the carrier voltage which can be displayed in dBdsx or peak to peak voltage units. The T1/E1 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 Cell Master's integrated speaker. If there is a test tone on the channel, the Cell Master displays the signal level and frequency.



GPS Antenna Tester (Option 12A)

The MA82101A GPS Antenna Driver and the GPS Antenna Tester option in the MT8212B CellMaster™ can be used to test 3.3V/5V GPS Antennas. This option includes an easy to read Text only screen and an Event Viewer screen, where intermittent failures can be monitored over a period of time along with the current drawn by the GPS Antenna. The measurements displayed include GPS Pass/Fail, Current Draw, UTC Time, Latitude, Longitude, Altitude, Tracked Satellites, Fix Time and Last failure time.

The MA82101A GPS Antenna driver could also be used to adapt the MT8212B CellMaster™ 3.3 V GPS antenna input to 5 V antennas commonly used at cell site locations.

Master Software Tools™

Master Software Tools provides the user with comprehensive data management and post processing tools which augment the capabilities of the Cell Master. This software provides a simple and easy way to manage, archive, analyze, print measurement reports, customize your cable list, antenna list, signal standards list and keep your Cell Master up to date with the latest instrument firmware. Master Software Tools (MST) is a Windows program which is included with every Cell Master instrument. For the most current version of Master Software Tools, please visit www.us.anritsu.com.

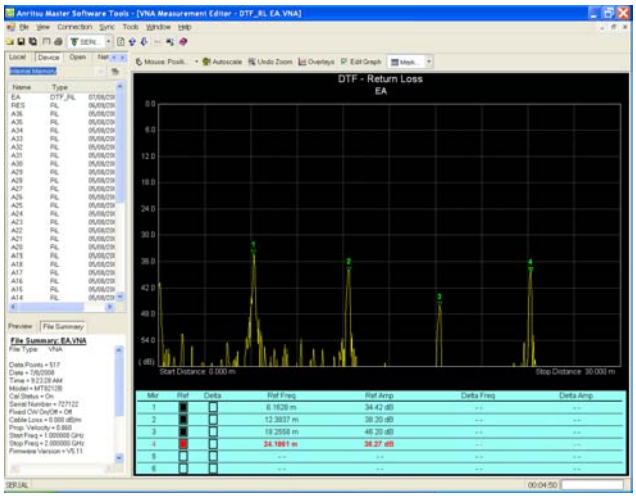


Figure 1, DTF trace transferred to MST

With Master Software Tools™ (Windows® 2000/XP/Vista compatible) you can:

- Download and archive all measurements stored in the Cell Master's internal memory with a single menu selection.
- Build historical records with an unlimited number of traces in one document
- Intelligent Trace Renaming features allow you to rename hundreds of traces in minutes instead of hours.
- Edit and create custom signal standards and cable lists
- Create custom reports
- View Spectrogram displays in 3D
- Copy markers and limit lines from one trace to all the traces in a specific folder with easy to use group edit functions.
- Use the Product Update feature to make sure you always use the latest instrument firmware.
- Coordinate cell site locations using Microsoft® MapPoint® and GPS location mapping.
- Export plot data as text files for use in spreadsheets or graphic files (JPG format).

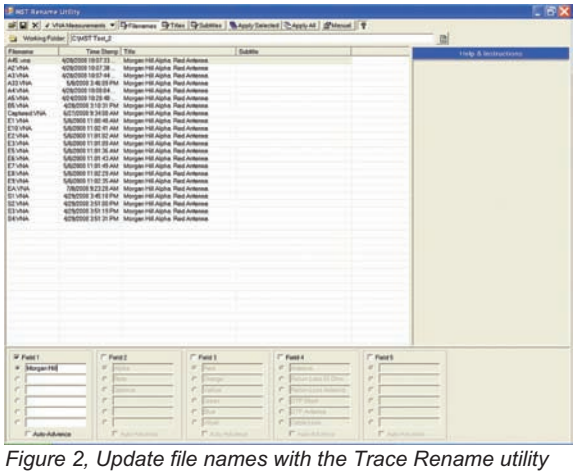


Figure 2, Update file names with the Trace Rename utility

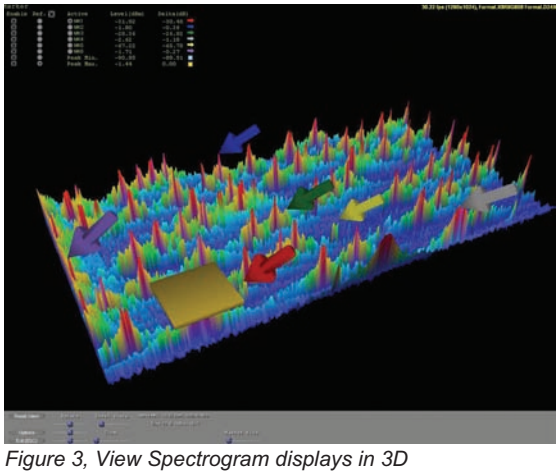


Figure 3, View Spectrogram displays in 3D

Specifications

Cable and Antenna Analyzer

Frequency Range: 25 MHz to 4.0 GHz
Frequency Accuracy: ±50 ppm @ +25° C
Frequency Resolution: 1 kHz (CW On)
100 kHz (CW Off)
Output Power: < 0 dBm (–10 dBm nominal)
Immunity to Interfering Signals: On-channel +17 dBm
On-frequency –5 dBm
Measurement Speed: ≤2.5 msec / data point (CW ON)
Number of Data Points: 130, 259, 517
Return Loss: Range: 0.00 to 60.00 dB
Resolution: 0.01 dB
VSWR: Range: 1.00 to 65.00
Resolution: 0.01
Cable Loss: Range: 0.00 to 30.00 dB
Resolution: 0.01 dB
Measurement Accuracy: >42 dB corrected directivity after calibration
Distance-To-Fault:
Vertical Range: Return Loss: 0.00 to 60.00 dB
VSWR: 1.00 to 65.00
Horizontal Range: 0 to (# of data pts –1) x
Resolution to a maximum of 1497 m (4912 ft), # of data pts = 130, 259 or 517
Horizontal Resolution
(Rectangular windowing): Resolution (meter) = (1.5 x 10^8) x (V_p)/DF
Where V_p is the cable's relative propagation velocity and where DF is the stop frequency minus the start frequency (in Hz)

Spectrum Analyzer

Frequency:
Frequency Range: 100 kHz to 3.0 GHz (tuneable to 9 kHz)
Frequency Reference (Internal Timebase):
Aging: ±1 ppm/yr
Accuracy: ±2 ppm
Frequency Span: 10 Hz to 2.99 GHz in 1, 2, 5 step selections in auto mode, plus zero span
Sweep Time: ≤1.3 sec full span; ≤50 µsec to 20 sec zero span
Resolution Bandwidth (–3 dB): 100 Hz to 1 MHz in 1-3 sequence ±5% Accuracy
Video Bandwidth (–3 dB): 3 Hz to 1 MHz in 1-3 sequence
SSB Phase Noise (1 GHz) @ 30 kHz Offset: ≤–75 dBc/Hz
Spurious Responses Input Related: ≤–45 dBc
Spurious Residual Responses: ≤–90 dBm, ≥10 MHz
≤–80 dBm, <10 MHz
(10 kHz RBW, pre-amp on)
Amplitude:
Total Level Accuracy: ±1 dB typical (±1.5 dB max), ≥10 MHz to 3 GHz
±2 dB typical <10 MHz for input signal levels –60 dBm, excluding input VSWR mismatch
Measurement Range: +20 dBm to –135 dBm
Input Attenuator Range: 0 to 51 dB, selected manually or automatically coupled to the reference level. Resolution in 1 dB steps.
Displayed Average Noise Level:
≤–135 dBm, ≥10 MHz (preamp on)
≤–115 dBm, <10 MHz (preamp on) for input terminated,
0 dB attenuation, RMS detection, 100 Hz RBW
Dynamic Range: >65 dB, typical
Display Range: 1 to 15 dB/division, in 1 dB steps, 10 divisions displayed
Scale Units: dBm, dBV, dBmV, dBµV, V, W
RF Input VSWR: (with ≥20 dB atten.) 1.5:1 typical, (10 MHz to 2.4 GHz)

AM/FM Demodulator

Standard Speaker and Headphone Jack

Power Meter

Frequency Range: 4.5 MHz to 3.0 GHz
Display Range: –80 dBm to +80 dBm
Measurement Range: –80 dBm to +20 dBm (+80 dBm with external attenuator)
Offset Range: 0 to +60 dB
Accuracy**: ±1 dB typical (±1.5 dB max), ≥10 MHz to 3 GHz
±2 dB typical <10 MHz
VSWR: 1.5:1 typical (P_{in} > –30 dBm, >10 MHz to 2.4 GHz)
Maximum Power: +20 dBm (0.1W) without external attenuator

**(Excludes Input VSWR)

Power Monitor (Option 5)

Detector Range: 1A peak 150 ms, 300 mA max steady state
Offset Range: –50 to +20 dBm, 10 nW to 100 nW
Display Range: –80 to 80 dBm
Resolution: 0.1 dB, 0.1 xW
Measurement Accuracy: ±1 dB maximum for >–40 dBm and <18 GHz

Bias Tee (Option 10A)

Voltage: +12 to +24V
Max Power: 6 W (steady state)
Max Current: 6/Voltage (steady state)

High Accuracy Power Meter 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 50° 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)
System:
Measurement Resolution: 0.01 dB
Offset Range: ±60 dB
Power Requirements:
Supply Voltage: 8 to 18 Vdc
Supply Current: <100 mA

* 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

Specifications (Continued)

Transmission Measurement (Option 21)

RF Source:
- Frequency Range: 25 MHz to 3 GHz
- Frequency Resolution: 10 Hz
- Output Power Level: –10 dBm typical
- Dynamic Range: 80 dB, 25 MHz to 2 GHz
  60 dB, >2 GHz to 3 GHz
- Output Impedance: 50 Ω

Interference Analyzer (Option 25)

Identify Interference type
Audible tone - Strength of the Interferer
RSSI
Spectrogram

Channel Scanner (Option 27)

Frequency Range: 100 kHz to 3.0 GHz
Frequency Accuracy: ±10 Hz + Time base error, 99% Confidence level
Measurement Range: +20 dBm to –110 dBm
Channel Power: ±1 dB typical (±1.5 dB max)
Adjacent Channel Power Accuracy: ±0.75 dBc

GPS (Option 31)

GPS Location Indicator
Latitude, Longitude and Altitude on Display
Latitude, Longitude and Altitude with trace storage

cdmaOne and CDMA2000 1xRTT Over The Air (Option 33)

Over The Air Measurement: Six strongest pilots with power
Two multipaths relative to strongest pilot
Tau: ±2 μs

GPS Tester (Option 12A)

GPS Pass/Fail indicator
Latitude, Longitude, Altitude, UTC
Time, Tracked Satellites information
GPS Antenna Current Draw (when MA82101A module powered by Cell Master)

CDMA RF Measurements (Option 42)

Occupied Bandwidth: Bandwidth within which 99% of the power transmitted
on a single channel lies
Channel Power: ±1 dB typical (±1.5 dB max)
Frequency Error: ±50 Hz + Time base error, 99% confidence level

cdmaOne and CDMA2000 1xRTT Demodulator (Option 43)

Residual Rho: ≥0.98 for RF input from +20 dBm to –48 dBm
Rho Accuracy: ±0.01 for ρ ≥0.9
Code Domain Power (CDP): Accurate to within ±1.5 dB above –20dB for RF input
from +20dBm to –48 dBm CDP
can be displayed for RF input from +20dBm to –90 dBm
Carrier Frequency Error: ±50 Hz 99% confidence level
Power Accuracy: ±1 dB typical (±1.5 dB absolute)
PN Offset: within 1 x 64 chi

GSM RF Measurements (Option 40)

Occupied Bandwidth: Bandwidth within which 99% of the power transmitted
on a single channel lies.
Channel Power: ±1 dB typical (±1.5 dB max)
Burst Power: ±1 dB typical for –20 dBm to +20 dBm (±1.5 dB max)
±1.75 dB typical for –80 dBm to –20 dBm (±2 dB max)
Frequency Error: ±10 Hz + Time base error, 99% confidence level

E1 Analyzer (Option 50)

Line Coding: AMI, HDB3
Framing Modes: PCM30, PCM30CRC, PCM31, PCM31CRC
Connection Configurations: Terminate (75 Ω, 120 Ω)
Bridge (≥1000 Ω)
Monitor (Connect via 20 dB pad in DSX)
Receiver Sensitivity: 0 to –43 dB
Clock Sources: External
Internal: 2.048 MHz ±30 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, T1-Daly, User defined (≤32 bits)
Circuit Status Reports: Carrier present, Frame ID and Sync., Pattern ID and Sync.
Alarm Detection: AIS, RAI, MMF
Error Detection: Frame Bits, Bit, BER, BPV, CRC, E-Bits, Error Sec
Error Insertion: Bit, BPV, Framing Bits, RAI, AIS
Loopback Modes: Self loopback
Level Measurements: Vp-p (±5%)
Data Log: Continuous, up to 48 hrs
E1 Frequency Measurement: ±10 ppm
VF Channel Access:
- Tone Generator: Frequency: 100 Hz to 3000 Hz
  Level: –30 to 0 dBm
- Audio Monitor: manually select channel 1-31
- VF Measurement: Frequency: 100 Hz to 3000 Hz ±2 Hz
  Level: –40.0 to +3.0 dBm ±0.2 dBm
- ITU G-821 Analysis: Errored seconds, error free seconds, severely errored seconds,
  unavailable seconds, available seconds, degraded minutes

T1 Analyzer (Option 50)

Line Coding: AMI, B8ZS
Framing Modes: D4 (Superframe)
ESF (Extended Superframe)
Connection Configurations: Terminate (100Ω)
Bridge (≥1000Ω)
Monitor (Connect via 20 dB pad in DSX)
Receiver Sensitivity: 0 to –36 dBdsx
Transmit Level: 0 dB, –7.5 dB, and –15 dB
Clock Sources: External
Internal: 1.544 MHz ±30 ppm
Pulse Shapes: Conform to ANSI T1.403
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 (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 48 hrs
T1 Frequency Measurement: ±10 ppm
DS0 Channel Access:
- Tone Generator: Frequency: 100 Hz to 3000 Hz
  Level: –30 to 0 dBm, 1 dB steps
- Audio Monitor: Manually select channel 1 to 24
- VF Measurement: Frequency: 100 Hz to 3000 Hz, ±2 Hz
  Level: –40.0 to +3.0 dBm, ±0.2 dBm
- ITU G-821 Analysis: Errored seconds, error free seconds, severely errored seconds,
  unavailable seconds, available seconds, degraded minutes

Specifications (Continued)

1xEV-DO Over The Air (Option 34)

Over The Air Measurement: Six strongest pilots with power
Two multipaths relative to strongest pilot
Tau: ±2 μs

1xEV-DO RF Measurements (Option 62)

Occupied Bandwidth: Bandwidth within which 99% of the power transmitted on a single channel lies
Channel Power: ±1 dB typical (±1.5 dB max)
Frequency Error: ±50 Hz + Time base error, 99% confidence level
Graphs: Idle and active power versus time graph

1xEV-DO Demodulator (Option 63)

Rho Accuracy: ±0.02 for $0.9<\rho<1$
Code Domain Power Display: Demodulation from –80 dBm to +15 dBm
Code Domain Power (CDP): ±1 dB when > –20 dB relative to Tx power
Mac Code Power: ±1 dB CDP level > –20 dB relative to total power in MAC interval
Data Code Power: ±1 dB for non-idle slot data
Frequency Accuracy: ±50 Hz + timebase error for 99% of measurements
Channel Power: ±1 dB typical (±1.5 dB absolute)
Pilot Power: ±1 dB typical (±1.5 dB absolute)

iDEN Signal Analyzer (Option 68)

Modulation Type: 16 QAM
Frequency Error: ±0.05 ppm+time
Base Error: 99% confidence level
Channel Power: ±1.5 dB

General

Language Support: English, Spanish, French, German, Chinese, Japanese
Internal Trace Memory: Up to 300 traces
Setup Configuration: 25
Display: TFT Color display, viewable in sunlight
Inputs and Outputs Ports:
- RF Out: Type N, female, 50 Ω
- Maximum Input without Damage: +20 dBm, ±50 VDC
- RF In: Type N, female, 50 Ω
- Maximum Input without Damage: +43 dBm (Peak), ±50 VDC
- CDMA Timing Input: BNC, female (5V TTL)
- Ext. Trig In: BNC, female (5V TTL)
- Ext. Freq Ref In (2 to 20 MHz): Shared BNC, female, 50 Ω, (–15 dBm to +10 dBm)
- GPS Antenna: reverse BNC
- T1/E1 (Receive & Transmit): Bantam Jack
- RF Detector: Type N(m), 50 Ω
- Serial Interface: RS-232 9 pin D-sub, three wire serial

Electromagnetic Compatibility: Meets European Community requirements for CE marking
Safety: Conforms to EN 61010-1 for Class 1 portable equipment
Temperature:
- Operating: –10° C to 55° C, humidity 85% or less
- Non-operating: –51° C to +71° C (Recommend the battery be stored separately between 0° C and +40° C for any prolonged non-operating storage period.)

Power Supply:
- External DC Input: +12.5 to +15 VDC, 1500mA
- Internal: NiMH battery: 10.8 volts, 1800 mA maximum

Dimensions:
- Size (w x h x d): 254 mm x 178 mm x 61 mm (10.0 in x 7.0 in x 2.4 in)
- Weight: <2.28 kg (<5 lbs) includes battery

Ordering Information

Base Model	Description
MT8212B	Cable and Antenna Analyzer (25 MHz to 4.0 GHz), Spectrum Analyzer (100 kHz to 3.0 GHz), and Power Meter (4.5 MHz to 3.0 GHz)

Options	Description
Option 5*	Power Monitor (requires external detector)
Option 10A	Bias Tee
Option 12A	GPSTester (MA82101A Module not included) (requires Option 31)
Option 19A	High Accuracy Power Meter (PSN50 sensor not included)
Option 21	Transmission Measurement
Option 25	Interference Analyzer (requires directional antenna)
Option 27	Channel Scanner
Option 28	CW Signal Generator (requires CW Signal Generator Kit)
Option 31	GPS (includes GPS antenna)
Option 33	cdmaOne and CDMA2000 1xRTT Over The Air (OTA) (requires Options 31 and 43)
Option 34	1xEV-DO Over The Air (OTA) (requires Options 31 and 63)
Option 40	GSM RF Measurements
Option 42	CDMA RF Measurements
Option 43	cdmaOne and CDMA2000 1xRTT Demodulator
Option 50*	T1/E1 Analyzer
Option 62	1xEV-DO RF Measurements
Option 63	1xEV-DO Demodulator
Option 68	iDEN Signal Analyzer

Standard Accessories Include:	
10580-00089	Cell Master User's Guide (for Model MT8212B)
2300-347	Anritsu Handheld Software Tools CDROM
65717	Soft Carrying Case
633-27	Rechargeable Battery, NiMH
40-168-R	AC-DC Adapter with Power Cord
806-141	Automotive Cigarette Lighter/12 Volt DC Adapter
800-441	Serial Interface Cable
	One Year Warranty

Optional Accessories	
1N50C	Limiter, N(m) to N(f), 50 Ω, 10 MHz to 18 GHz
42N50-20	Attenuator, 20 dB, 5 watt, DC to 18 GHz, N(m)-N(f)
42N50A-30	Attenuator, 30 dB, 50 watt, DC to 18 GHz, N(m)-N(f)
3-1010-127	Attenuator, 40 dB, 150 watt, DC to 3 GHz, N(m)-N(f)

Calibration Components	
ICN50	InstaCal™ Calibration Module, 2 MHz to 4.0 GHz, N(m), 50 Ω
22N50	Open/Short, DC to 18 GHz, N(m), 50 Ω
22NF50	Open/Short, DC to 18 GHz, N(f), 50 Ω
SM/PL-1	Precision Load, DC to 6 GHz, 42 dB, N(m), 50 Ω
SM/PLNF-1	Precision Load, DC to 6 GHz, 42 dB, N(f), 50 Ω
OSLN50-1	Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(m)
OSLNF50-1	Precision Open/Short/Load, DC to 6 GHz, 42 dB, 50 Ω, N(f)
2000-767	Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(m), 50 Ω
2000-768	Precision Open/Short/Load, DC to 4 GHz, 7/16 DIN(f), 50 Ω

* Option 5 and Option 50 are mutually exclusive.

Test Port Cables	
3-806-151	Cable, .86 meters, N(m)-N(m), 4 GHz, 50 Ω
3-806-186	Cable, .91 meters, N(m)-N(f), 4 GHz, 50 Ω
3-806-187	Cable, .91 meters, N(m)-N(m), 4 GHz, 50 Ω

Phase Stable Test Port Cables Armored	
15NN50-1.5C	Test Port Cable Armored, 1.5 meters, N(m)-N(m), 6 GHz, 50 Ω
15NN50-3.0C	Test Port Cable Armored, 3.0 meters, N(m)-N(m), 6 GHz, 50 Ω
15NN50-5.0C	Test Port Cable Armored, 5.0 meters, N(m)-N(m), 6 GHz, 50 Ω
15NNF50-1.5C	Test Port Cable Armored, 1.5 meters, N(m)-N(f), 6 GHz, 50 Ω
15NNF50-3.0C	Test Port Cable Armored, 3.0 meters, N(m)-N(f), 6 GHz, 50 Ω
15NNF50-5.0C	Test Port Cable Armored, 5.0 meters, N(m)-N(f), 6 GHz, 50 Ω
15ND50-1.5C	Test Port Cable Armored, 1.5 meters, N(m)-7/16 DIN(m), 6 GHz, 50 Ω
15NDF50-1.5C	Test Port Cable Armored, 1.5 meters, N(m)-7/16 DIN(f), 6 GHz, 50 Ω
15RNFN50-1.5-R	Test Port Cable Armored w/Reinforced Grip, 1.5 meters, N(m)-N(f), 6 GHz 50 Ω

Adapters	
34NN50A	Precision Adapter, N(m)-N(m), DC to 18 GHz, 50 Ω
34NFNF50	Precision Adapter, N(f)-N(f), DC to 18 GHz, 50 Ω
1091-26	Adapter, N(m)-SMA(m), DC to 18 GHz, 50 Ω
1091-27	Adapter, N(m)-SMA(f), DC to 18 GHz, 50 Ω
1091-80	Adapter, N(f)-SMA(m), DC to 18 GHz, 50 Ω
1091-81	Adapter, N(f)-SMA(f), DC to 18 GHz, 50 Ω
1091-172	Adapter, N(m)-BNC(f), DC to 1.3 GHz, 50 Ω
510-90	Adapter, 7/16 DIN(f)-N(m), DC to 7.5 GHz, 50 Ω
510-91	Adapter, 7/16 DIN(f)-N(f), DC to 7.5 GHz, 50 Ω
510-92	Adapter, 7/16 DIN(m)-N(m), DC to 7.5 GHz, 50 Ω
510-93	Adapter, 7/16 DIN(m)-N(f), DC to 7.5 GHz, 50 Ω
510-96	Adapter, 7/16 DIN(m)-7/16 DIN(m), DC to 7.5 GHz, 50 Ω
510-97	Adapter, 7/16 DIN(f)-7/16 DIN(f), DC to 7.5 GHz, 50 Ω
510-102	Adapter, N(m)-N(m) 90° right angle, DC to 11 GHz, 50 Ω

Portable Antennas	
2000-1030	Portable Antenna, SMA(m), 1.71 to 1.88 GHz, 50 Ω
2000-1031	Portable Antenna, SMA(m), 1.85 to 1.99 GHz, 50 Ω
2000-1032	Portable Antenna, SMA(m), 2.4 to 2.5 GHz, 50 Ω
2000-1200	Portable Antenna, SMA(m), 806-869 MHz, 50 Ω
2000-1035	Portable Antenna, SMA(m), 896-941 MHz, 50 Ω
2000-1361	Portable Antenna, SMA(m), 5.725-5.825 GHz, 50 Ω
61532	Antenna Kit: 2000-1030, 2000-1031, 2000-1032, 2000-1035, 2000-1200, and 2000-1361

Directional Antennas	
2000-1411	Portable YAGI Antenna, N(f), 822-900 MHz, 10 dBd
2000-1412	Portable YAGI Antenna, N(f), 885-975 MHz, 10 dBd
2000-1413	Portable YAGI Antenna, N(f), 1.71-1.88 GHz, 10 dBd
2000-1414	Portable YAGI Antenna, N(f), 1.85-1.99 GHz, 9.3 dBd
2000-1415	Portable YAGI Antenna, N(f), 2.4-2.5 GHz, 12 dBd
2000-1416	Portable YAGI Antenna, N(f), 1.92-2.17 GHz, 12 dBd

Ordering Information (Continued)

Bandpass Filters	
1030-109-R	Filter, Bandpass, 836.5 MHz Ctr Freq, 25.8 MHz BW, N(m) to SMA(f), 50 Ω
1030-110-R	Filter, Bandpass, 897.5 MHz Ctr Freq, 35 MHz BW, N(m) to SMA(f), 50 Ω
1030-111-R	Filter, Bandpass, 1.88 GHz Ctr Freq, 63.1 MHz BW, N(m) to SMA(f), 50 Ω
1030-112-R	Filter, Bandpass, 2.442 GHz Ctr Freq, 85.1 MHz BW N(m) to SMA(f), 50 Ω

Miscellaneous Accessories	
2000-1410	Magnet Mount GPS Antenna with 15 ft. cable
61534	CW Signal Generator Kit with variable step attenuator
806-16	Bantam Plug to Bantam Plug
806-116	Bantam Plug to BNC
806-117	Bantam “Y” Plug to RJ48
551-1691-R	USB to RS-232 adapter cable
67135	Backpack, 25 lb. max weight limit
65717	Soft Carrying Case
760-243-R	Transit Case
633-27	Rechargeable Battery, NiMH
2000-1029	Battery Charger, NiMH, w/ Universal Power Supply
40-168-R	AC/DC Adapter
806-141	Automotive Cigarette Lighter/12 Volt DC Adapter
800-441	Serial Interface Cable
2300-347	Handheld Software Tools CDROM

High Accuracy Power Meter Accessories	
PSN50	High Accuracy Power Sensor, 50 MHz to 6 GHz
40-168-R	AC-DC Adapter
800-441	Serial Interface Cable
3-1010-122	Attenuator, 20 dB, 5 Watt, DC to 12.4 GHz, N(m)-N(f)
3-1010-123	Attenuator (Bi-directional), 30 dB, 50 Watt, DC to 8.5 GHz, N(m)-N(f)
3-1010-124	Attenuator (Uni-directional), 40 dB, 100 Watt, DC to 8.5 GHz, N(m)-N(f)
1010-127-R	Attenuator, 30 dB, 150W, DC to 3 GHz, N(m)-N(f)
1010-128-R	Attenuator, 40 dB, 150W, DC to 3 GHz, N(m)-N(f)
65701	3 GHz Offset Cal Kit consisting of one each: 3-1010-119, 10 dB Attenuator, DC to 6 GHz, 2W 3-806-151, 4 GHz Cable, 18” (46 cm)
MA82101A	GPS Antenna Driver

Manuals	
10580-00089	Cell Master User’s Guide (for Model MT8212B)
10580-00106	Cell Master Programming Manual (for Model MT8212B)
10580-00107	Cell Master Maintenance Manual (for Model MT8212B)

Power Monitor - Detectors

The 5400 and 560 Series Detectors use zero-biased Schottky diodes. Measurement range is –55 dBm to +16 dBm using single cycle per sweep AC detection, auto-zeroing with DC detection during the frequency sweep. Extender cables of over 3000 feet can be used with the MT8212B Cell Master.

Model	Frequency Range	Impedance	Return Loss	Input Connector	Frequency Response
5400-71N50	0.001 to 3 GHz	50 Ω	26 dB	N(m)	±0.2 dB, <1 GHz ±0.3 dB, <3 GHz
5400-71N75	0.001 to 3 GHz	75 Ω	26 dB, <2 GHz 20 dB, <3 GHz	N(m)	±0.2 dB, <1 GHz ±0.5 dB, <3 GHz
560-7N50B	0.01 to 20 GHz	50 Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	N(m)	±0.5 dB, <18 GHz ±1.25 dB, <20 GHz
560-7S50B	0.01 to 20 GHz	50 Ω	15 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 14 dB, <20 GHz	WSMA(m)	±0.5 dB, <18 GHz ±1.25 dB, <20 GHz
560-7K50	0.01 to 40 GHz	50 Ω	12 dB, <0.04 GHz 22 dB, <8 GHz 17 dB, <18 GHz 15 dB, <26.5 GHz 14 dB, <32 GHz 13 dB, <40 GHz	K(m)	±0.5 dB, <18 GHz ±1.25 dB, <26.5 GHz ±2.2 dB, <32 GHz ±2.5 dB, <40 GHz
560-7VA50	0.01 to 50 GHz	50 Ω	12 dB, <0.04 GHz 19 dB, <20 GHz 15 dB, <40 GHz 10 dB, <50 GHz	V(m)	±0.8 dB, <20 GHz ±2.5 dB, <40 GHz ±3.0 dB, <50 GHz