Anritsu envision : ensure

Product Brochure

Cell Master™

Compact Handheld Base Station Analyzer
Signal Analyzers for 2G, 3G, 4G, and Digital Broadcast

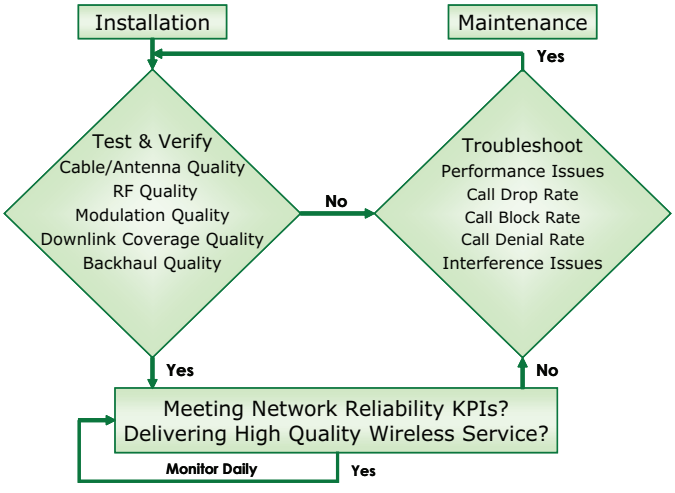
MT8213E

2 MHz to 6 GHz	Cable and Antenna Analyzer
9 kHz to 6 GHz	Spectrum Analyzer
10 MHz to 6 GHz	Power Meter

Cell Master™ Base Station Analyzer Features

Overview

Cell Master in Pass/Fail Mode



Installation and Maintenance Processes Supported by the Cell Master

Introduction

The Cell Master MT8213E is a compact handheld base station analyzer that has been specifically developed for cell site technicians to meet virtually all of the measurement needs in and around a cell site of 2G, 3G, and WiMAX networks.

The Cell Master features over 30 analyzers in one to meet virtually every measurement need. Standard features are:

- Cable and Antenna Analyzer: 2 MHz to 6 GHz
- Spectrum Analyzer: 9 kHz to 6 GHz
- Power Meter: 10 MHz to 6 GHz

A user can select from many options including:

- 2-Port Transmission Measurement
- High Accuracy Power Meter
- Interference Analyzer
- Channel Scanner
- CW Signal Generator
- 3GPP Signal Analyzers GSM/EDGE, W-CDMA/HSPA+, TD-SCDMA/HSPA+, LTE, TD-LTE, NB-IoT
- 3GPP2 Signal Analyzers cdmaONE/CDMA2000 1X, CDMA2000 1xEV-DO
- IEEE 802.16 Signal Analyzers Fixed WiMAX, Mobile WiMAX
- Digital Broadcast Signal Analyzers ISDB-T, ISDB-T SFN, DVB-T/H, DVB-T/H SFN
- PIM Hunting

Signal Analyzers have three methods for verifying the performance of a base station transmitter by measuring:

- RF Quality
- Modulation Quality
- Downlink Coverage Quality

Cell site technicians and RF engineers can use the Cell Master MT8213E to accurately and quickly test and verify the installation and commissioning of base stations and cell sites, for optimal wireless network performance. It is equally suited for on-going maintenance and troubleshooting to help ensure the operation of wireless network infrastructure.

Meeting Key Performance Indicators (KPIs)

Degradation in KPIs, such as dropped call and/or blocked call rates due to a malfunction at the cell site or due to interference, can be easily and accurately diagnosed down to the base station field replaceable unit (FRU) or the offending interfering signal with the Cell Master.

Line Sweep Tools™ (LST)

LST is a PC program that post processes Antenna, Cable, and PIM traces. It provides a powerful trace analysis and report generator for line sweepers.

Master Software Tools™ (MST)

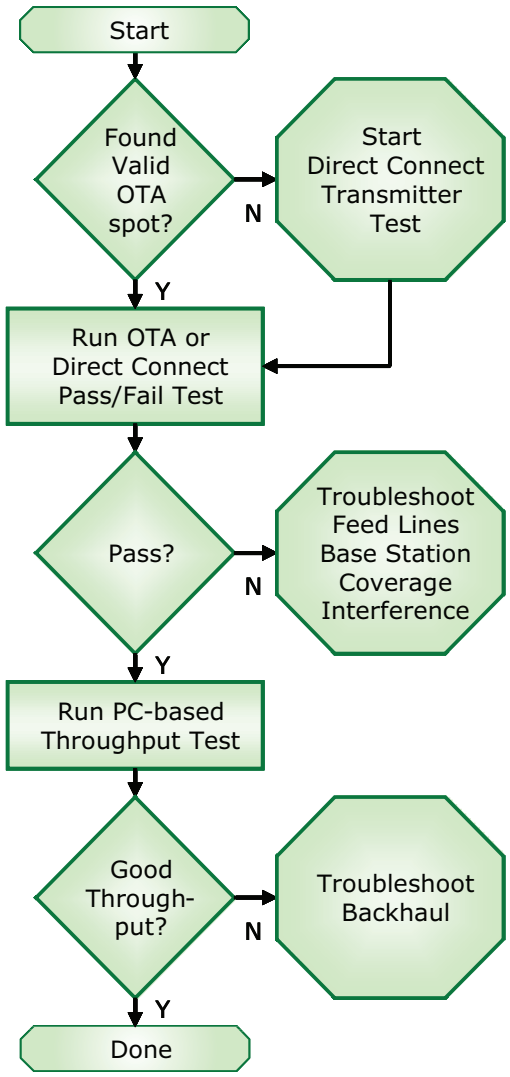
MST is a PC program that post processes spectrum analysis traces collected on your instrument. It provides a powerful data analysis tools for spectrum clearing and interference monitoring.

With Anritsu's design know-how and demanding production testing and performance verification you can count on the Cell Master to give you years of reliable dependable service.

easyTest Tools™

Anritsu's easyTest Tools is a PC based program that can help create, distribute, and display work instructions on Anritsu's Cable and Antenna Analyzers.

Overview (continued)



Fast Over-the-Air Pass/Fail Testing Process

Troubleshooting Fast

An Anritsu exclusive is its Signal Analysis Over-the-Air (OTA) Pass/Fail Tests. Technicians and RF engineers can quickly determine the health of a cell site with a one-step Pass/Fail test. A one-step OTA Pass/Fail test verifies:

- Antenna Feed Line Quality
- Base Station RF Quality
- Base Station Modulation Quality

If a cell site passes, the technician can move on to the next cell site. If the test fails, the Cell Master equips the technician to troubleshoot:

- Feed Lines and Antenna Systems
- Base Station Field Replaceable Units
- Downlink Coverage Issues
- Interference Problems
- Backhaul Bit-Error-Rates

By quickly determining the health of the cell site with Pass/Fail testing, the cell site technician becomes more productive and the Cell Master equips him with the tools to properly diagnose the root-cause of the problem minimizing costly service calls.

Network Reliability

Studies have shown that network reliability plays a significant part in subscriber churn. Leading reasons stated for churn are:

- Dropped Calls
- Poor Coverage
- Network Outages

As wireless users come to depend more and more on their wireless service they expect more and more in network performance. This makes it more critical than ever to meet your KPI optimization goals for network availability, network quality, and network coverage. Ultimately it is about eliminating reasons for demanding subscribers to churn.

Network Maintenance and Return on Investment

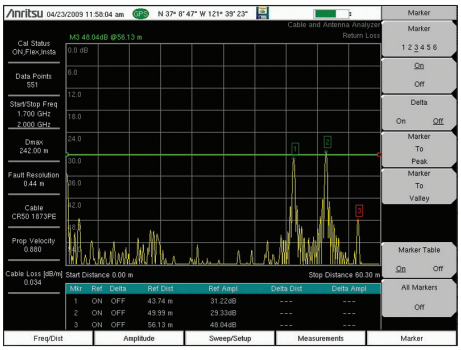
By outfitting cell site technicians with Cell Masters an operator can attack these reasons for churn. Benchmarking undertaken by Anritsu has shown that technicians equipped with base station analyzers provides them with the necessary tools to troubleshoot degrading KPIs which in-turn can reduce churn.

Learn what the return on investment is on equipping more technicians with the Cell Master MT8213E Base Station Analyzers from your local Anritsu sales professional. The Cell Master MT8213E Base Station Analyzer can become your vital tool to achieving optimal network performance.

Cell Master™ Base Station Analyzer Features

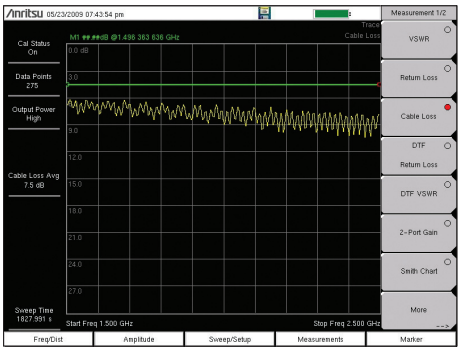
Cable and Antenna Analyzer

PIM Analyzer



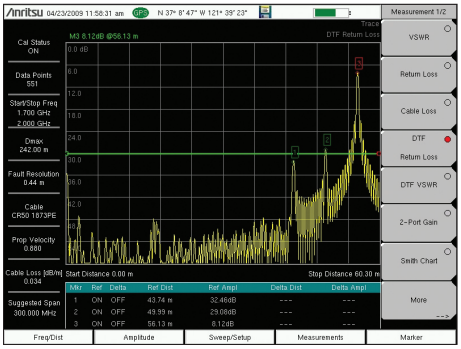
Return Loss/VSWR Measurement

Poor Return Loss/VSWR can damage transmitters, reduce the coverage area, increase dropped and blocked calls, and lower data rates.



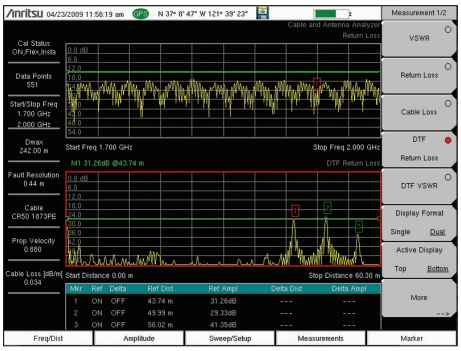
Cable Loss Measurement

This an important commissioning check. Excessive loss reduces the coverage area and can mask return loss issues, creating false good readings later.



Distance-to- Fault (DTF) Measurement

DTF can be used to identify and locate faulty cable components or connector pairs with poor Return Loss/VSWR in meters or feet.



Dual Trace Display with Independent Markers

Make two traces at once to increase productivity. Select which two traces to display from the Cable and Antenna Analyzer measurements.

Cable and Antenna Analyzer PIM Analyzer

The Cell Master features 1-port Cable and Antenna Analyzer and optional 2-port Transmission Measurement and PIM Analyzer to be able to test and verify the performance of nearly every feed-line and antenna component. This includes:

- Connectors
- Cables/Jumpers
- Antenna Isolation
- Diplexers/Duplexers
- Tower Mounted Amplifiers

The goal of these measurements is to maximize the coverage, data rate and capacity with problem-free antenna systems minimizing dropped calls and blocked calls for a good customer experience.

Antenna Systems Failure Mechanisms

Maintenance is an on-going requirement as antenna systems' performance can degrade at any point in time due to:

- Loose connectors
- Improperly weatherized connectors
- Pinched cables
- Poor grounding
- Corroded connectors
- Lightning strikes
- Strong winds misaligning antennas
- Rain getting into cables
- Bullet holes/nails in the cable
- Intermodulation of multiple signals

Making Measurements Easier

The Cell Master provides features for making measurements easier to perform and to analyze test results such as:

- InstaCal™ provides the most accurate one-step calibration process
- FlexCal™ eliminates the need to recalibrate when changing frequencies
- High RF Immunity for testing in harsh RF environments
- Trace Overlay compares reference traces to see changes over time
- Limit Lines and Alarming for providing reference standards
- High Power output to test tower-top components without climbing the tower
- GPS tagging of data to verify location of tests
- Line Sweep Tools for post-analysis and report generation

PIM Analyzer

The PIM Analyzer measures the 3rd, 5th, or 7th order intermodulation products in the receive band of two high power tones generated by the 40 Watt PIM Master. To learn more about PIM and finding the location of PIM with the Distance-to-PIM™ option see the PIM Master™ product brochure 11410-00824.

Cable and Antenna Analyzer Measurements

VSWR
Return Loss
Cable Loss
Distance-to-Fault (DTF) Return Loss
Distance-to-Fault (DTF) VSWR
1-port Phase
Smith Chart
2-port Transmission Measurement (Option 0021)

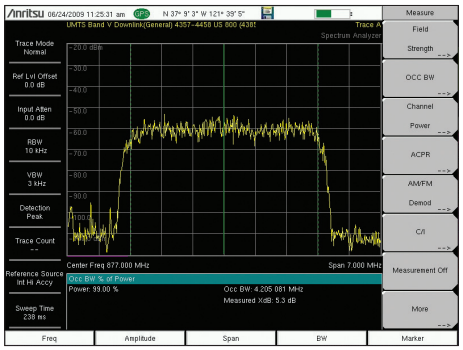
PIM Analyzer Measurements

(Requires PIM Master™ MW82119A only)

PIM
Noise Floor
Distance-to-PIM™ (DTP)
(see PIM Master Product Brochure 11410-00824)

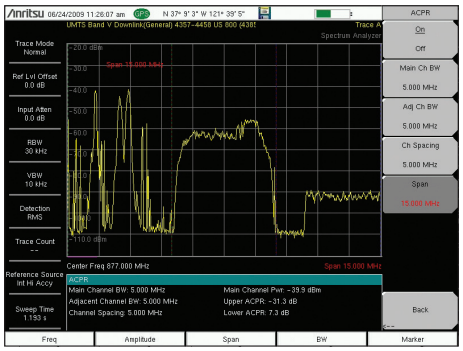
Cell Master™ Base Station Analyzer Features

Spectrum Analyzer



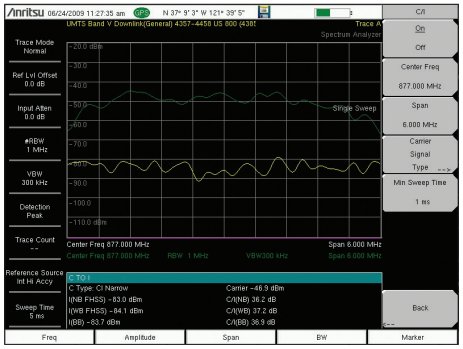
Occupied Bandwidth

Excessive occupied bandwidth can create interference with adjacent channels or be a sign of poor signal quality, leading to dropped calls.



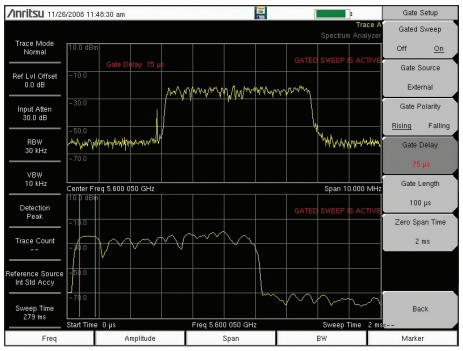
Adjacent Channel Power Ratio (ACPR)

High ACPR will create interference for neighboring carriers. This is also an indication of low signal quality and low capacity, which can lead to blocked calls.



Carrier-to-Interference (C/I)

Low C/I ratios will cause coverage issues including dropped calls, blocked calls, and other handset reception problems.



Gated Sweep – Option 0090

The gate is in the off-time of this WiMAX signal, which would let the user see interfering signals or user signals when the base station is not transmitting.

Spectrum Analyzer

The Cell Master features the most powerful handheld spectrum analyzer for field use with unmatched performance such as:

- Sensitivity
- Dynamic Range
- Phase Noise
- Frequency Accuracy
- Resolution Bandwidth (RBW)

The goal of the Spectrum Analyzer's measurements is to be able to monitor, measure, and analyze RF signals and their environments. It finds rogue signals, measures carriers and distortion, and verifies base stations' signal performance. It validates carrier frequency and identifies desired and undesired signals.

Simple But Powerful

The Cell Master features dedicated routines for one-button measurements and for more in-depth analysis the technician has control over the setting and features not even found on lab-grade benchtop spectrum analyzers, for instance:

- Multiple sweep detection methods – true RMS detector, quasi-peak, …
- Multiple traces and control – three traces, trace math, …
- Advanced marker functions – noise marker, frequency counter, …
- Advanced limit line functions – one-button envelope creation, relative, …
- Save-on-Event – automatically saves a sweep when crossing a limit line
- Gated sweep - view pulsed or burst signals only when they are on, or off

The Cell Master automatically sweeps as fast as possible for the selected settings consistent with accurate results.

GPS-Assisted Frequency Accuracy

With GPS Option 0031 the frequency accuracy is 50 ppb (parts per billion). Also all measurements can be GPS tagged for exporting to maps.

Rx Noise Floor Testing

The Cell Master can measure the Rx Noise Floor on the uplink of a base station using the channel power measurement. An elevated noise floor indicates interference and leads to call blocking, denial of services, call drops, low data rate, and low capacity.

Measurements

One Button Measurements
- Field Strength – in dBm/m² or dBmV/m
- Occupied Bandwidth - 1% to 99% of power
- Channel Power - in specified bandwidth
- ACPR - adjacent channel power ratio
- AM/FM/SSB Demodulation - audio out only
- C/I - carrier-to-interference ratio

Gated Sweep – Option 0090

Sweep Functions

Sweep
- Single/Continuous, Manual Trigger, Reset, Minimum Sweep Time

Detection
- Peak, RMS, Negative, Sample, Quasi-peak

Triggers
- Free Run, External, Video, Change Position, Manual

Trace Functions

Traces
- 1-3 Traces (A, B, C), View/Blank, Write/Hold

Trace A Operations
- Normal, Max Hold, Min Hold, Average, Number of Averages, (always the live trace)

Trace B Operations
- A → B, B ←→ C, Max Hold, Min Hold

Trace C Operations
- A → C, B ←→ C, Max Hold, Min Hold, A - B → C, B - A → C, Relative Reference (dB), Scale

Marker Functions

Markers
- 1-6 Markers each with a Delta Marker, or Marker 1 Reference with 6 Delta Markers

Marker Types
- Fixed, Tracking, Noise, Frequency Counter

Marker Auto-Position
- Peak Search, Next Peak (Right/Left), Peak Threshold %, To Channel, To Center, To Reference Level, Delta Marker to Span

Marker Table
- 1-6 markers' frequency & amplitude plus delta markers' frequency offset & amplitude

Limit Line Functions

Limit Lines
- Upper/Lower, Limit Alarm, Default Limit

Limit Line Edit
- Frequency, Amplitude, Add/Delete Point, Add Vertical, Next Point Left/Right

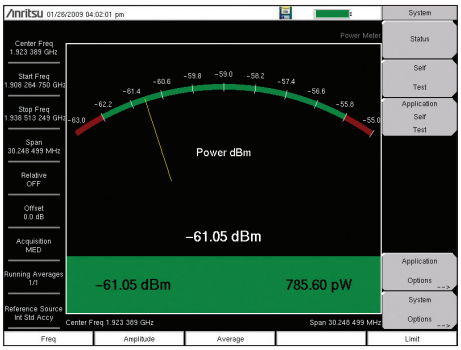
Limit Line Move
- To Current Center Frequency, By dB or Hz, To Marker 1, Offset from Marker 1

Limit Line Envelope
- Create, Update Amplitude, Number of Points (41), Offset, Shape Square/Slope

Limit Line Advanced
- Absolute/Relative, Mirror, Save/Recall

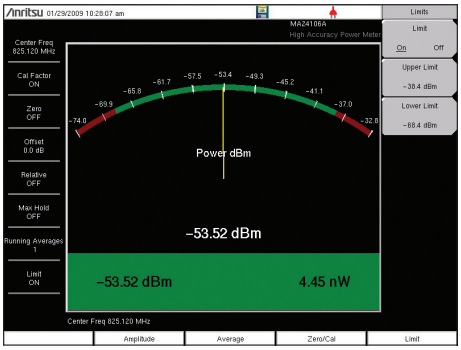
Cell Master™ Base Station Analyzer Features

Power Meter



Power Meter (built-in)

Power is displayed in an analog type display and, supports both Watts and dBm. RMS averaging can be set to low, medium, or high.

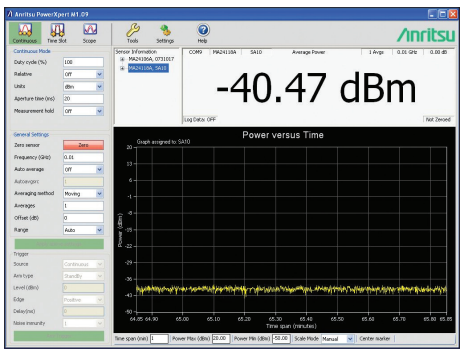


High Accuracy Power Meter (Option 0019)

Requires external power sensor with convenient connection via a USB A/mini-B cable. Use upper/lower limit activation during pass/fail measurements.

Power Sensors

Anritsu offers a family of Power Sensors for your power measurement requirements. They are compact enough to fit in your shirt pocket.



PC Power Meter

These power sensors can be used with a PC running Microsoft Windows® via USB. A front panel display makes the PC appear like a traditional power meter.

High Accuracy Power Meter (Option 0019)

Power Meters

The Cell Master offers as standard a built-in Power Meter utilizing the Spectrum Analyzer and an optional High Accuracy Power Meter requiring external power sensors.

Setting the transmitter output power of a base station properly is critical to the overall operation of a wireless network. A 1.5 dB change in power levels means a 15% change in coverage area.

Too much power means overlapping coverage which translates into cell-to-cell self interference. Too little power, too little coverage, creates island cells with non-overlapping cell sites and reduced in-building coverage. High or low values will cause dead zones/dropped calls, lower data rates/reduced capacity near cell edges, and cell loading imbalances/blocked calls.

High Accuracy Power Meter (Option 0019)

For the most accurate power measurement requirements select the high accuracy measurement option with a choice of sensors with:

- Frequency ranges: 10 MHz to 50 GHz
- Power ranges: -40 dBm to +51.76 dBm
- Measurement uncertainties: ≤ ± 0.18 dB

These sensors enable users to make accurate measurements for CW and digitally modulated signals for 2G/3G and upcoming 4G wireless networks.

The power sensor easily connects to the Cell Master via a USB A/mini-B cable. An additional benefit of using the USB connection is that a separate DC supply (or battery) is not needed since the necessary power is supplied by the USB port.

PC Power Meter

These power sensors can be used with a PC running Microsoft Windows® via USB. They come with PowerXpert™ application, a data analysis and control software. The application has abundant features, such as data logging, power versus time graph, big numerical display, and many more, that enable quick and accurate measurements.

Remote Power Monitoring via LAN

A USB-to-LAN hub converter enables power monitoring via the Internet across continents, if desired.

Power Sensors
PSN50

High Accuracy RF Power Sensor
- 50 MHz to 6 GHz
- Type N(m), 50 Ω
- -30 dBm to + 20 dBm
- (.001 to 100 mW)
- True-RMS

MA24104A

Inline High Power Sensor
- 600 MHz to 4 GHz
- +3 dBm to +51.76 dBm
- (2 mW to 150 W)
- True-RMS

MA24105A

Inline Peak Power Sensor
- 350 MHz to 4 GHz
- +3 dBm to +51.76 dBm
- (2 mW to 150 W)
- True-RMS

MA24106A

High Accuracy RF Power Sensor
- 50 MHz to 6 GHz
- -40 dBm to +23 dBm
- (0.1 µW to 200 mW)
- True-RMS

MA24108A

Microwave USB Power Sensor
- 10 MHz to 8 GHz
- -40 dBm to +20 dBm
- (0.1 µW to 100 mW)
- True-RMS
- Slot Power
- Burst Average Power

MA24118A

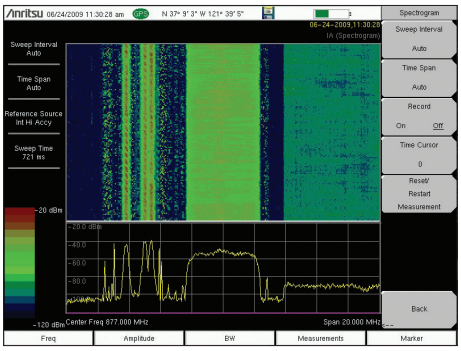
Microwave USB Power Sensor
- 10 MHz to 18 GHz,
- -40 dBm to +20 dBm
- (0.1 µW to 100 mW)
- True-RMS
- Slot Power
- Burst Average Power

MA24126A

Microwave USB Power Sensor
- 10 MHz to 26 GHz,
- -40 dBm to +20 dBm
- (0.1 µW to 100 mW)
- True-RMS
- Slot Power
- Burst Average Power

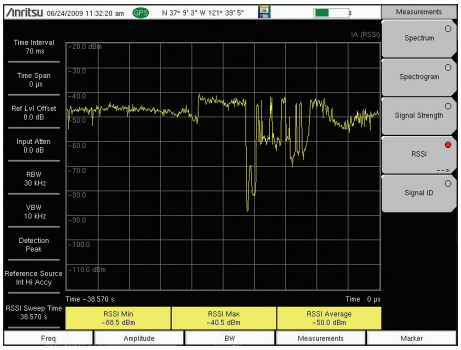
Cell Master™ Base Station Analyzer Features

Interference Analyzer (Opton 0025) Channel Scanner (Option 0027)



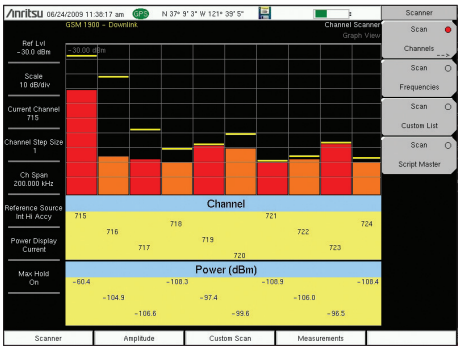
Spectrogram

For identifying intermittent interference and tracking signal levels over time for up to 72 hours with an external USB flash drive.



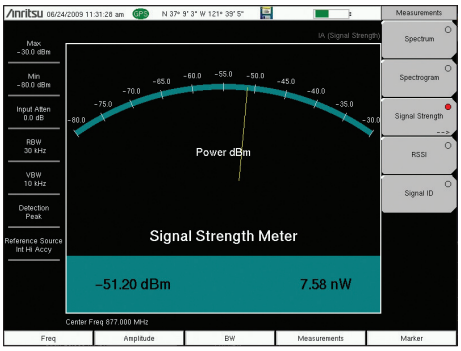
Received Signal Strength Indicator (RSSI)

Used to observe the signal strength of a single frequency over time. Data can be collected for up to one week with an external USB flash drive.



Channel Scanner

Works on any signal and is useful when looking for IM or harmonics. Can help spot signals widely separated in frequency that turn on and off together.



Signal Strength Meter

Can locate an interfering signal, by using a directional antenna and measuring the signal strength and by an audible beep proportional to its strength.

Interference Analyzer (Option 0025) Channel Scanner (Option 0027)

Interference is a continuously growing problem for wireless network operators. Compounding the problem are the many sources that can generate interference such as:

- Intentional Radiators
- Unintentional Radiators
- Self Interference

Interference causes Carrier-to-Interference degradation robbing the network of capacity. In many instances interference can cause an outage to a sector, a cell, and/or neighboring cells. The goal of these measurements is to resolve interference issues as quickly as possible.

Monitoring Interference

The Cell Master offers many tools for monitoring intermittent interferers over time to determine patterns:

- Spectrogram
- Received Signal Strength Indicator
- Remote Monitoring over the Internet
- Save-on-Event – crossing a limit line

Master Software Tools for your PC features diagnostic tools for efficient analysis of the data collected during interference monitoring. These features include:

- Folder Spectrogram – creates a composite file of multiple traces for quick review
- Movie playback – playback data in the familiar frequency domain view
- Histogram – filter data and search for number of occurrences and time of day
- 3D Spectrogram – for in-depth analysis with 3-axis rotation viewing control

Identifying Interference

The Cell Master provides several tools to identify the interference – either from a neighboring wireless operator, illegal repeater or jammer, or self-interference:

- Signal ID (up to 12 signals at once)
- Signal Analyzer Over-the-Air Scanners
- Channel Scanner (up to 1200 channels, 20 at a time)
- Interference Mapping

Locating Interference

Once interference has been identified the Signal Strength Meter with its audible output beep coupled with a directional antenna makes finding the interference easier. Use Interference Mapping to triangulate the interference signal on an on-screen map.

Interference Analyzer Measurements

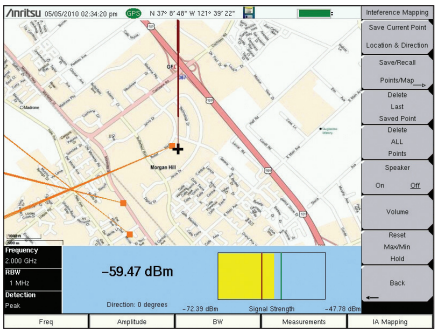
Spectrogram
Signal Strength Meter
Received Signal Strength Indicator (RSSI)
Signal ID (up to 12 signals)
Interference Mapping
Spectrum
- Field Strength – in dBm/m^2 or dBmV/m
- Occupied Bandwidth - 1% to 99% of power
- Channel Power - in specified bandwidth
- ACPR - adjacent channel power ratio
- AM/FM/SSB Demodulation - audio out only
- C/I - carrier-to-interference ratio
- SEM - spectral emission mask

Channel Scanner

Scan
- 20 channels at once, by frequency or channel
- Noncontiguous channels
- Different channel bandwidths in one scan

Display
- Current plus Max hold display
- Graph View
- Table View

Script Master™
- Up to 1200 Channels
- Auto-repeat sets of 20 channels and total
- Auto-Save with GPS tagging

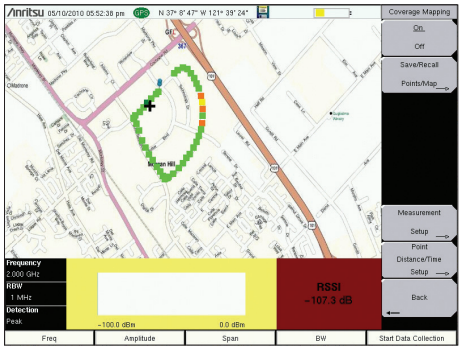


Interference Mapping

Eliminates the need to use printed maps and draw lines to triangulate location. Use on-screen maps generated with GPS coordinates with Map Master™.

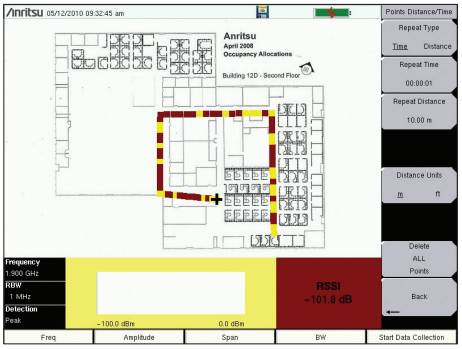
Cell Master™ Base Station Analyzer Features

Coverage Mapping (Option 0431)



On-screen Outdoor Coverage Mapping

Enables a maintenance technician to make low cost coverage measurements to quickly verify coverage around a base station site.

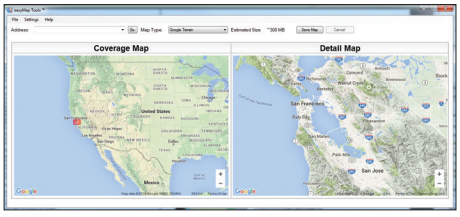


On-screen Indoor Coverage Mapping

Import an image of an office floor plan and use the start-walk-stop method to record coverage strength. Validates coverage for enterprise accounts.

Plot Coverage on PC-based Map

Once coverage data has been collected on the instrument, the data can be imported into a mapping program for further review and reporting.



easyMap Tools™

These capabilities make it possible to find and prepare maps and floor plans for use on Anritsu handheld spectrum analyzers.

Coverage Mapping

There is a growing demand for low cost coverage mapping solutions. Anritsu's Coverage Mapping measurements option provides wireless service providers, public safety users, land mobile ratio operators, and government officials with indoor and outdoor mapping capabilities

Outdoor Mapping

With a connected to the instrument and a valid GPS signal, the instrument monitors RSSI and ACPR levels automatically.
Using a map created with Map Master, the instrument displays maps, the location of the measurement, and a special color code for the power level.
The refresh rate can be set up in time (1 sec, minimum) or distance.

The overall amplitude accuracy coupled with the GPS update rate ensures accurate and reliable mapping results.

Indoor Mapping

When there is no GPS signal valid, the Cell Master uses a start-walk-stop approach to record RSSI and ACPR levels. You can set the update rate, start location, and end location and the interpolated points will be displayed on the map.

Export KML Files

Save files as KML or JPEG. Open KML files with Google Earth™. When opening up a pin in Google Earth, center frequency, detection method, measurement type, and RBW are shown on screen.

easyMap Tools™

easyMap Tools provides maps in formats that Antritsu's handheld spectrum analyzers can use for either coverage mapping or interference hunting. It helps users find and prepare geo-referenced maps and building floor plans for use by Anritsu handheld spectrum analyzers.

easyMap allows users to quickly:

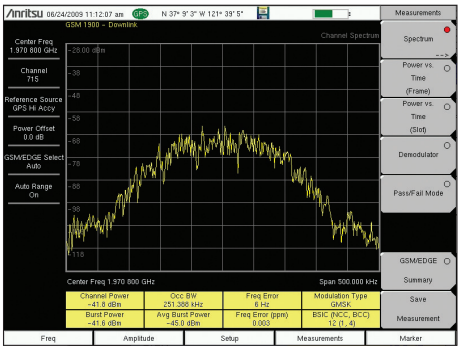
- Create geo-referenced maps with pan and zoom capability
- Use either Google Maps or MapQuest (an Open Source map provider) to source maps
- Create legacy mode geo-referenced maps
- Convert maps and floor plans to a form suitable for use on Anritsu handheld spectrum analyzers
- Insert GPS information into previously non-geo-referenced maps

Coverage Mapping Measurements

Spectrum Analyzer Mode
- ACPR
- RSSI

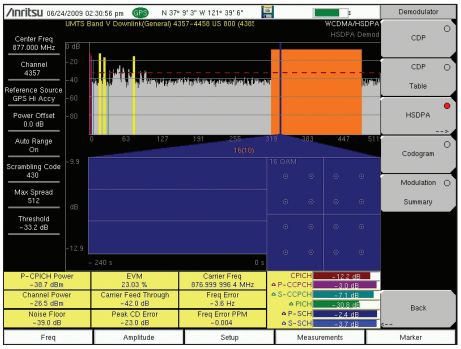
Cell Master™ Base Station Analyzer Features

Introduction to Signal Analyzers



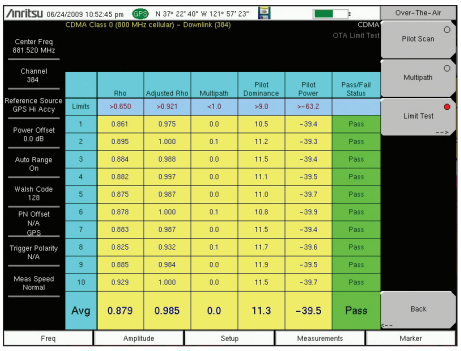
RF Measurement – GSM

High Frequency Error will cause calls to drop when mobiles travel at higher speed. In some cases, cell phones cannot hand off into, or out of the cell.



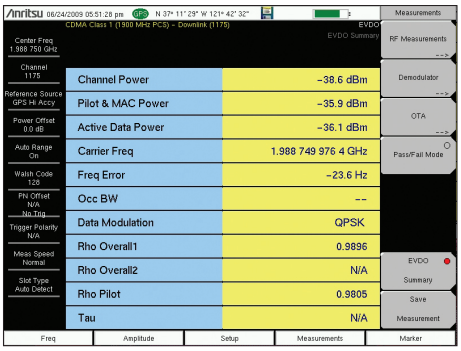
Demodulation – HSPA+

This is the single most important signal quality measurement. Poor EVM leads to dropped calls, low data rate, low sector capacity, and blocked calls.



Over-the- Air Measurement - CDMA

Having low multi-path and high pilot dominance is required for quality Rho measurements OTA. Poor Rho leads to dropped and blocked calls, and low data rate.



Measurement Summary – EV-DO

Having a summary of all key measurements is a quick way for a technician to see the health of the base station and record the measurements for reference.

Signal Analyzers

The Cell Master features Signal Analyzers for the major wireless standards around the world. The Signal Analyzers are designed to test and verify the:

- RF Quality
- Modulation Quality
- Downlink Coverage Quality

of the base stations' transmitters. The goal of these tests are to improve the Key Performance Indicators (KPIs) associated with:

- Call Drop Rate
- Call Block Rate
- Call Denial Rate

By understanding which test to perform on the Cell Master when the KPIs degrade to an unacceptable level, a technician can troubleshoot down to the Field Replacement Unit (FRU) in the base station's transmitter chain. This will minimize the problem of costly no trouble founds (NTF) associated with card swapping. This will allow you to have a lower inventory of spare parts as they are used more efficiently.

Troubleshooting Guides

The screen shots on this page are all measurements made over-the-air with the MT8213E on commercial base stations carrying live traffic. To understand when, where, how, and why you make these measurements Anritsu publishes Troubleshooting Guides which explain for each measurement the:

- Guidelines for a good measurement
- Consequences of a poor measurement
- Common faults in a base station

These *Troubleshooting Guides for Base Stations* are one-page each per Signal Analyzer. They are printed on tear-resistant and smudge-resistant paper and are designed to fit in the soft case of the instrument for easy reference in the field. They are complimentary and their part numbers can be found in the ordering information.

- LTE, TD-LTE Base Stations
- GSM/GPRS/EDGE Base Stations
- W-CDMA/HSPA+ Base Stations
- CDMA2000 1X Base Stations
- CDMA2000 1xEV-DO Base Stations
- Fixed WiMAX Base Stations
- Mobile WiMAX Base Stations
- TD-SCDMA/HSPA+ Base Station

Signal Analyzers

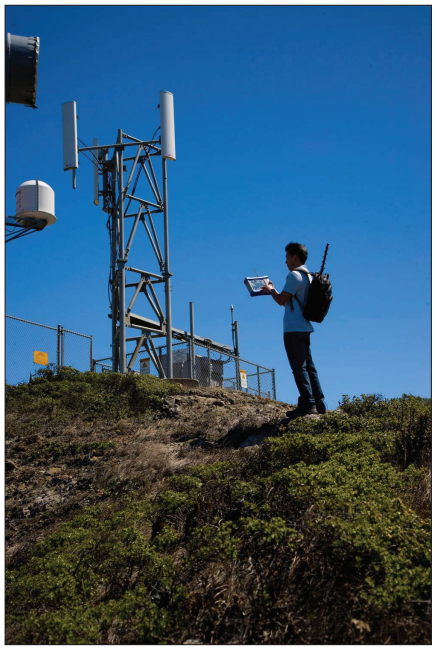
LTE, TD-LTE
GSM/EDGE
W-CDMA/HSPA+
cdmaOne/CDMA2000 1X
CDMA2000 1xEV-DO
Fixed WiMAX
Mobile WiMAX
TD-SCDMA/HSPA+

Typical Signal Analyzer Options

RF Measurements
Demodulation
Over-the-Air Measurements

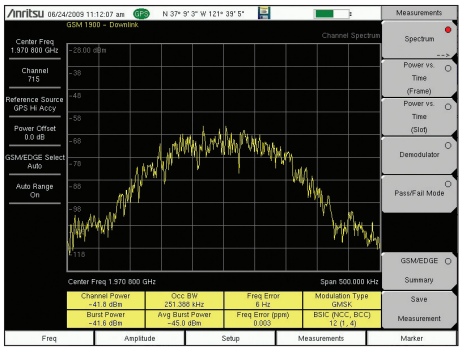
Signal Analyzer Features

Measurement Summary Display
Pass/Fail Limit Testing



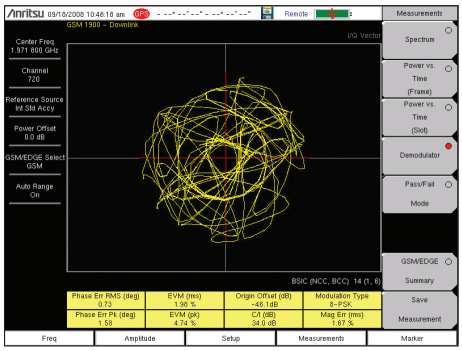
Cell Master™ Base Station Analyzer Features

GSM/EDGE Signal Analyzers (Option 0880)



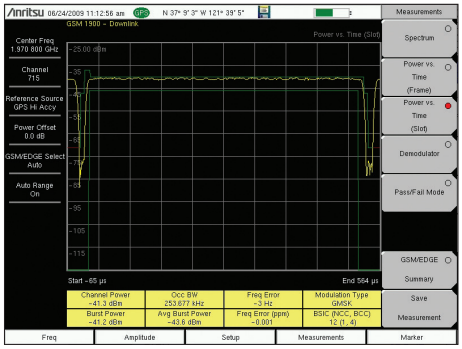
RF Measurement – Occupied Bandwidth

Excessive occupied bandwidth can create interference with adjacent channels or be a sign of poor signal quality, leading to dropped calls.



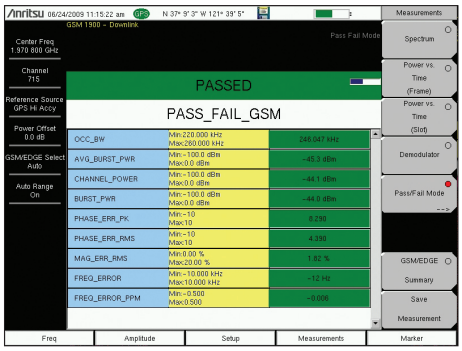
Demodulation – Error Vector Magnitude (EVM)

This is the single most important signal quality measurement. Poor EVM leads to dropped calls, low data rate, low sector capacity, and blocked calls.



RF Measurement – Average Burst Power

High or low values will create larger areas of cell-to-cell interference and create lower data rates near cell edges. Low values create dropouts and dead zones.



Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations, leads to inconsistent network behavior.

GSM/EDGE Analyzers

The Cell Master features two GSM/EDGE measurement modes.

- RF Measurements
- Demodulation

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the cell site off-line. When the OTA test results are ambiguous one can directly connect to the base station to check the signal quality and transmitter power.

For easy identification of which cell you are measuring the Base Station Identity Code (BSIC) gives the base station id, the Network Color Code (NCC) identifies the owner of the network, and the Base Station Color Code (BCC) provides the sector information.

Carrier-to-Interference (C/I)

C/I indicates the quality of the received signal. It also can be used to identify areas of poor signal quality. Low C/I ratios will cause coverage issues including dropped calls, blocked calls, and other handset reception problems.

Phase Error

Phase Error is a measure of the phase difference between an ideal and actual GMSK modulated voice signal. High phase error leads to dropped calls, blocked calls, and missed handoffs.

Origin Offset

Origin Offset is a measure of the DC power leaking through local oscillators and mixers. A high Origin Offset will lower EVM and Phase Error measurements and create higher dropped call rates.

Power versus Time (Slot and Frame)

Power versus Time (Slot and Frame) should be used if the GSM base station is setup to turn RF power off between timeslots. When used OTA, this measurement can also spot GSM signals from other cells. Violations of the mask create dropped calls, low capacity, and small service area issues.

RF Measurements

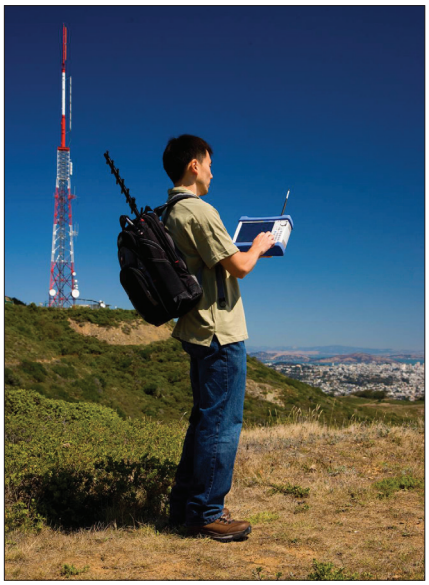
Channel Spectrum
- Channel Power
- Occupied Bandwidth
- Burst Power
- Average Burst Power
- Frequency Error
- Modulation Type
- BSIC (NCC, BCC)

Multi-channel Spectrum

Power vs. Time (Frame/Slot)
- Channel Power
- Occupied Bandwidth
- Burst Power
- Average Burst Power
- Frequency Error
- Modulation Type
- BSIC (NCC, BCC)

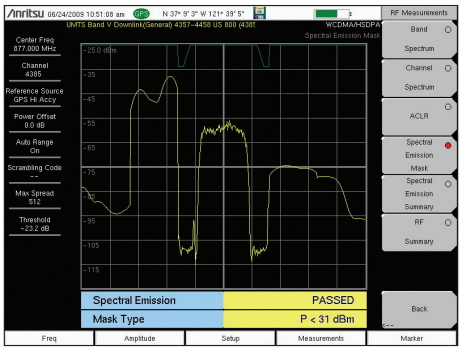
Demodulation

Phase Error
EVM
Origin Offset
C/I
Modulation Type
Magnitude Error
BSIC (NCC, BCC)



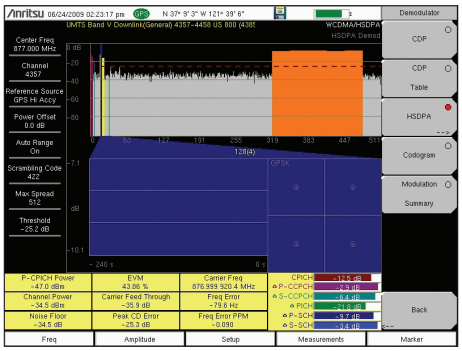
Cell Master™ Base Station Analyzer Features

W-CDMA/HSPA+ Signal Analyzers (Option 0881)



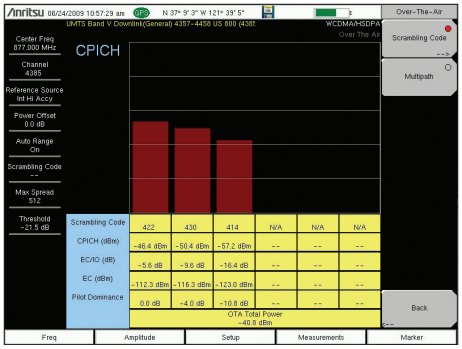
RF Measurements – Spectral Emissions Mask

The 3GPP spectral emission mask is displayed. Failing this test leads to interference with neighboring carriers, legal liability, and low signal quality.



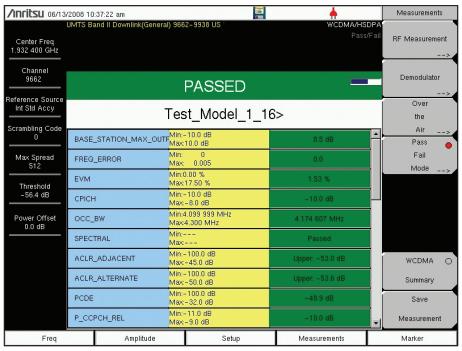
Demodulation – Error Vector Magnitude (EVM)

This is the single most important signal quality measurement. Poor EVM leads to dropped calls, low data rate, low sector capacity, and blocked calls.



Over-the-Air Measurements – Scrambling Codes

Too many strong sectors at the same location creates pilot pollution. This leads to low data rate, low capacity, and excessive soft handoffs.



Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations, leads to inconsistent network behavior

W-CDMA/HSPA+ Signal Analyzers

The Cell Master features four W-CDMA/HSPA+ measurement modes:

- RF Measurements
- Demodulation
- Over-the Air Measurements (OTA)

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the Node B off-line. When the OTA test results are ambiguous one can directly connect to the base station to check the signal quality and transmitter power.

Frequency Error

Frequency Error is a check to see that the carrier frequency is precisely set. The Cell Master can accurately measure Carrier Frequency Error OTA if the instrument is GPS enabled or in GPS holdover. Calls will drop when mobiles travel at higher speed. In some cases, cell phones cannot hand off into, or out of the cell.

Peak Code Domain Error (PCDE)

Peak Code Domain Error is a measure of the errors between one code channel and another. High PCDE causes dropped calls, low signal quality, low data rate, low sector capacity, and blocked calls.

Multipath

Multipath measurements show how many, how long, and how strong the various radio signal paths are. Multipath signals outside tolerances set by the cell phone or other UE devices become interference. The primary issue is co-channel interference leading to dropped calls and low data rates.

Pass/Fail Mode

The Cell Master 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.

RF Measurements

- Band Spectrum
- Channel Spectrum
  - Channel Power
  - Occupied Bandwidth
  - Peak-to-Average Power
- Spectral Emission Mask
- Single carrier ACLR
- Multi-carrier ACLR

Demodulation

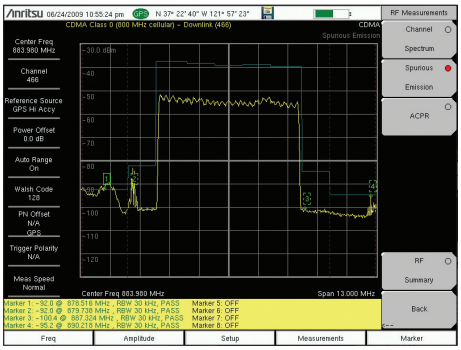
- Code Domain Power Graph
  - P-CPICH Power
  - Channel Power
  - Noise Floor
  - EVM
  - Carrier Feed Through
  - Peak Code Domain Error
  - Carrier Frequency
  - Frequency Error
  - Control Channel Power
  - Abs/Rel/Delta Power
    - CPICH, P-CCPCH
    - S-CCPCH, PICH
    - P-SCH, S-SCH
  - HSPA+
    - Power vs. Time
    - Constellation
- Code Domain Power Table
  - Code, Status
  - EVM, Modulation Type
  - Power, Code Utilization
  - Power Amplifier Capacity
- Codogram

Over-the-Air (OTA) Measurements

- Scrambling Code Scanner (Six)
  - Scrambling Codes
  - CPICH
  - E_c/I_o
  - E_c
  - Pilot Dominance
  - OTA Total Power
- Multipath Scanner (Six)
  - Six Multipaths
  - Tau
  - Distance
  - RSCP
  - Relative Power
  - Multipath Power

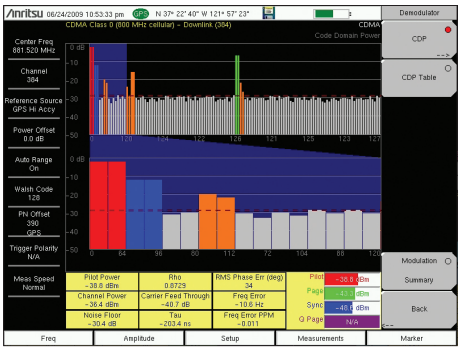
Cell Master™ Base Station Analyzer Features

CDMA Signal Analyzers (Option 0884)



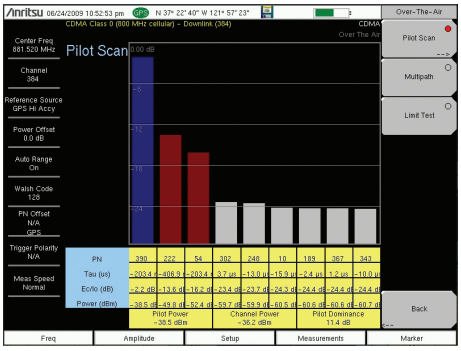
RF Measurements – Spectral Emissions Mask

The 3GPP spectral emission mask is displayed. Failing this test leads to interference with neighboring carriers, legal liability, and low signal quality.



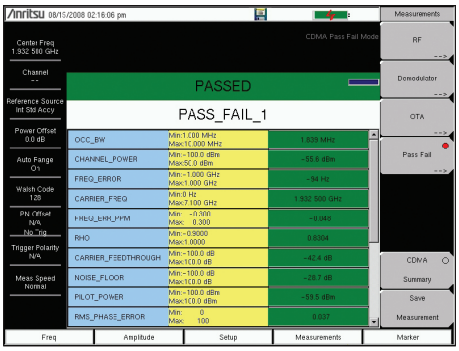
Modulation Quality – EVM

High or low values will create larger areas of cell-to-cell interference and create lower data rates near cell edges. Low values affect in-building coverage.



Over-the-Air Measurements – Sync Signal Power

Check for un-even amplitude of sub-carriers. Data will be less reliable on weak sub-carriers, creating a lower over-all data rate.



Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations, leads to inconsistent network behavior.

CDMA Signal Analyzers

The Cell Master features three CDMA measurement modes:

- RF Measurements
- Demodulation
- Over-the Air Measurements (OTA)

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the cell site off-line. When the OTA test results are ambiguous one can directly connect to the base station to check the signal quality and transmitter power.

Adjacent Channel Power Ratio (ACPR)

ACPR measures how much of the carrier gets into neighboring RF channels. ACPR, and multi-channel ACPR, check the closest (adjacent) and second closest (alternate) RF channels for single and multicarrier signals. High ACPR will create interference for neighboring carriers. This is also an indication of low signal quality and low capacity, which can lead to blocked calls.

RMS Phase Error

RMS Phase Error is a measure of signal distortion caused by frequency instability. Any changes in the reference frequency or the radio's internal local oscillators will cause problems with phase error. A high reading will cause dropped calls, low signal quality, low data rate, low sector capacity, and blocked calls.

Noise Floor

Noise Floor is the average level of the visible code domain noise floor. This will affect Rho. A high noise floor will result in dropped calls, low signal quality, low data rate, low sector capacity, and blocked calls.

E_c/I_o

E_c/I_o indicates the quality of the signal from each PN. Low E_c/I_o leads to low data rate and low capacity.

RF Measurements

Channel Spectrum
- Channel Power
- Occupied Bandwidth
- Peak-to-Average Power

Spectral Emission Mask

Multi-carrier ACPR

Demodulation

Code Domain Power Graph
- Pilot Power
- Channel Power
- Noise Floor
- Rho
- Carrier Feed Through
- Tau
- RMS Phase Error
- Frequency Error
- Abs/Rel/ Power
  - Pilot
  - Page
  - Sync
  - Q Page

Code Domain Power Table
- Code
- Status
- Power
- Multiple Codes
- Code Utilization

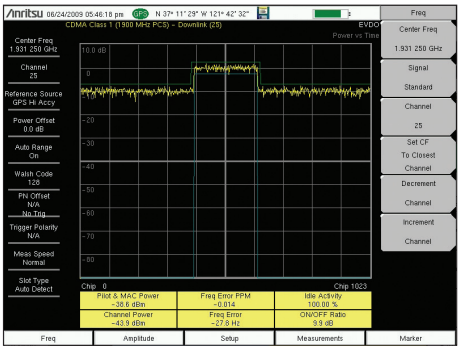
Over-the-Air (OTA) Measurements

Pilot Scanner (Nine)
- PN
- E_c/I_o
- Tau
- Pilot Power
- Channel Power
- Pilot Dominance

Multipath Scanner (Six)
- E_c/I_o
- Tau
- Channel Power
- Multipath Power

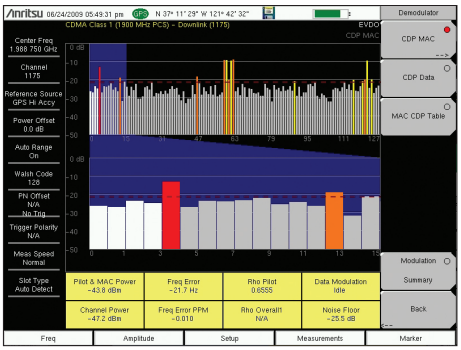
Limit Test – 10 Tests Averaged
- Rho
- Adjusted Rho
- Multipath
- Pilot Dominance
- Pilot Power
- Pass/Fail Status

EV-DO Signal Analyzers (Option 0884)



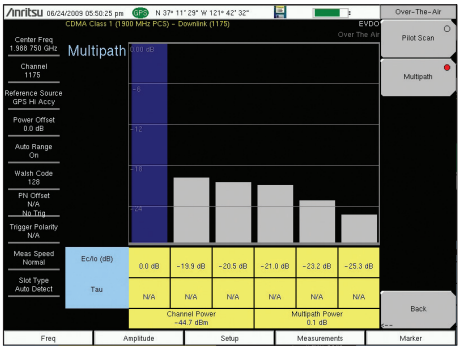
RF Measurements – Pilot and MAC Power

High values will create pilot pollution. High or low values will cause dead spots/dropped calls and cell loading imbalances/blocked calls.



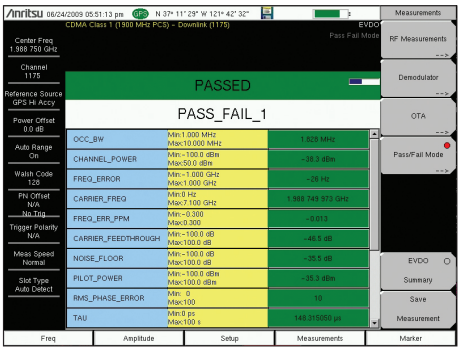
Demodulation – Frequency Error

Calls will drop when mobiles travel at higher speed. In some cases, cell phones cannot hand off into, or out of the cell, creating island cells.



Over-the-Air Measurements – Multipath

Too much Multipath from the selected PN Code is the primary issue of co-channel interference leading to dropped calls and low data rates.



Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations, leads to inconsistent network behavior.

EV-DO Signal Analyzers

The Cell Master features three EV-DO measurement modes.

- RF Measurements
- Demodulation
- Over-the Air Measurements (OTA)

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the cell site off-line. When the OTA test results are ambiguous one can directly connect to the base station to check the signal quality and transmitter power.

Spectral Emission Mask (SEM)

SEM is a way to check out-of-channel spurious emissions near the carrier. These spurious emissions both indicate distortion in the signal and can create interference with carriers in the adjacent channels. Faults leads to interference and thus, lower data rates for adjacent carriers. Faults also may lead to legal liability and low in-channel signal quality.

Rho

Rho is a measure of modulation quality. Rho Pilot, Rho Mac, and Rho Data are the primary signal quality tests for EV-DO base stations. Low Rho results in dropped calls, low signal quality, low data rate, low sector capacity, and blocked calls. This is the single most important signal quality measurement.

PN Codes

PN Code overlap is checked by the pilot scanner. Too many strong pilots create pilot pollution which results in low data rate, low capacity, and excessive soft handoffs.

Over-the-Air (OTA) Pilot Power

OTA Pilot Power indicates signal strength. Low OTA Pilot Power causes dropped calls, low data rate, and low capacity.

RF Measurements

Channel Spectrum
- Channel Power
- Occupied Bandwidth
- Peak-to-Average Power

Power vs. Time
- Pilot & MAC Power
- Channel Power
- Frequency Error
- Idle Activity
- On/Off Ratio

Spectral Emission Mask

Multi-carrier ACPR

Demodulation

MAC Code Domain Power Graph
- Pilot & MAC Power
- Channel Power
- Frequency Error
- Rho Pilot
- Rho Overall
- Data Modulation
- Noise Floor

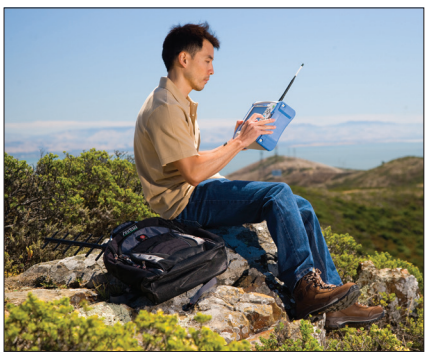
MAC Code Domain Power Table
- Code
- Status
- Power
- Code Utilization

Data Code Domain Power
- Active Data Power
- Data Modulation
- Rho Pilot
- Rho Overall
- Maximum Data CDP
- Minimum Data CDP

Over-the-Air (OTA) Measurements

Pilot Scanner (Nine)
- PN
- E_c/I_o
- Tau
- Pilot Power
- Channel Power
- Pilot Dominance

Mulitpath Scanner (Six)
- E_c/I_o
- Tau
- Channel Power
- Multipath Power

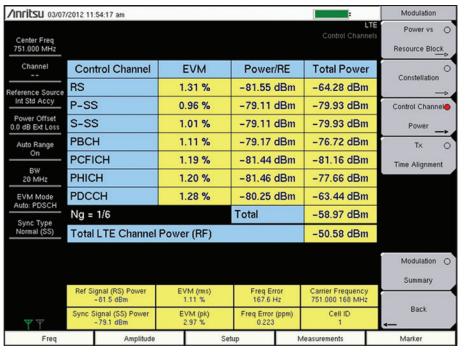


Cell Master™ Base Station Analyzer Features

LTE and TD-LTE Signal Analyzers (Option 0883 and 0886)

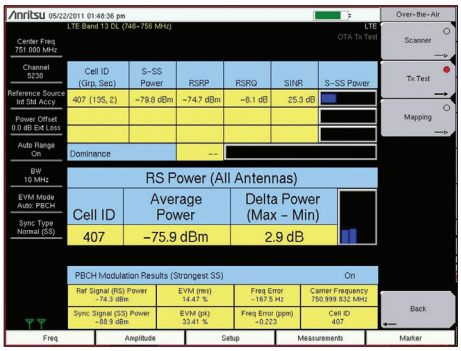
Modulation Quality – Power vs. Resource Block

A high utilization of the Resource Blocks would indicate a cell site is nearing overload and it may be appropriate to start planning for additional capacity.



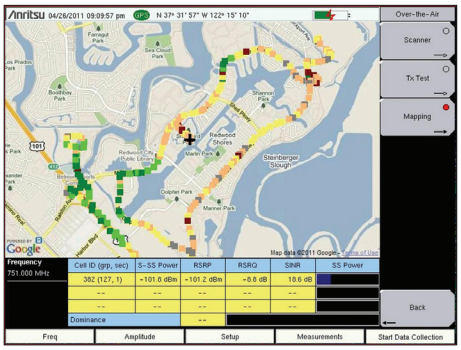
Modulation Quality – Control Channels

High values will create larger areas of cell-to-cell interference and create lower data rates near cell edges. Low values affect in-building coverage.



Over-the-Air Measurements – Tx Test

By looking at the reference signals of MIMO antennas one can determine if MIMO is working properly. If the delta power is too large, there is an issue.



Over-the-Air On-screen Mapping

With Map Master™ import map area on instrument screen to drive test downlink coverage of S-SS Power, RSRP, RSRQ, or SINR.

LTE and TD-LTE Signal Analyzers

The Cell Master features three LTE and TD-LTE measurement modes:

- RF Measurements
- Modulation Measurements
- Over-the Air Measurements (OTA)

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the cell site off-line. When the OTA test results are ambiguous one can directly connect to the base station to check the signal quality and transmitter power.

Adjacent Channel Leakage Ratio (ACLR)

Adjacent Channel Leakage Ratio (ACLR) measures how much BTS signal gets into neighboring RF channels. ACLR checks the closest (adjacent) and the second closest (alternate) channels. Poor ACLR can lead to interference with adjacent carriers and legal liability. It also can indicate poor signal quality which leads to low throughput.

Cell ID (Sector ID, Group ID)

Cell ID indicates which base station is being measured OTA. The strongest base station at your current location is selected for measurement. Wrong values for Cell ID lead to inability to register. If the cause is excessive overlapping coverage, it also will lead to poor EVM and low data rates.

Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations, leads to inconsistent network behavior.

EVM

High values will create larger areas of cell-to-cell interference and create lower data rates near cell edges.

Mapping

On-screen mapping allows field technicians to quickly determine the downlink coverage quality in a given geographic location. Plot S-SS Power, RSRP, RSRQ or SINR with five user definable thresholds. All parameters are collected for the three strongest signals and can be saved as *.kml and *.mtd (tab delimited) for importing to third party mapping programs for further analysis.

RF Measurements

Channel Spectrum
- Channel Power, Occupied Bandwidth

Power vs. Time (TDD only)
- Total Frame Power, DwPTS Power
- Transmit Off Power, Cell ID
- Timing Error, Frame/Sub-Frame View

ACLR

Spectral Emission Mask

RF Summary

Modulation Measurements

Power vs. Resource Block
- Active RBs, Utilization %, Channel Power, Cell ID
- OSTP, Frame EVM (FDD only)

Constellation
- QPSK, 16 QAM, 64 QAM, 256 QAM (Opt 886)
- Modulation Results
  - RS Power, SS Power, EVM, Freq Error, Carrier Frequency, Cell ID

Control Channel Power
- Bar Graph or Table View
- RS, P-SS, S-SS, PBCH, PCFICH
- PHICH, PDCCH (FDD only)
- Total Power (Table View)
- Modulation Results

Tx Time Alignment (FDD only)

Modulation Summary

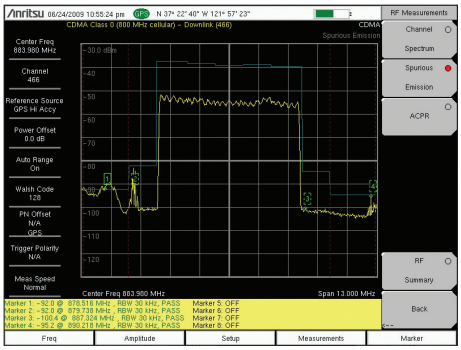
Over-the-Air Measurements (OTA)

Scanner – six strongest signals
- Cell ID (Group, Sector)
- S-SS, RSRP, RSRQ, SINR, Dominance

Tx Test
- Scanner – three strongest signals
- RS Power of MIMO antennas
  - Cell ID, Average Power, Delta Power (Max-Min)
  - Graph Antenna Power
- Modulation Results – On/Off

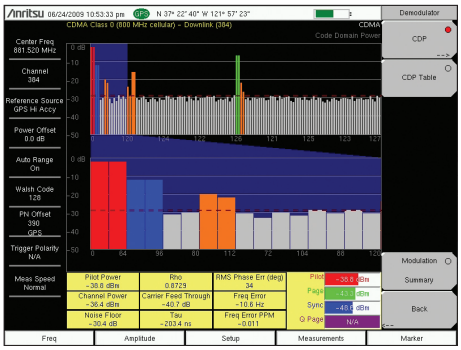
Mapping
- On-screen S-SS, RSRP, RSRQ, or SINR
- Scanner – three strongest signals

CDMA/EV-DO Measurements (Option 0884)



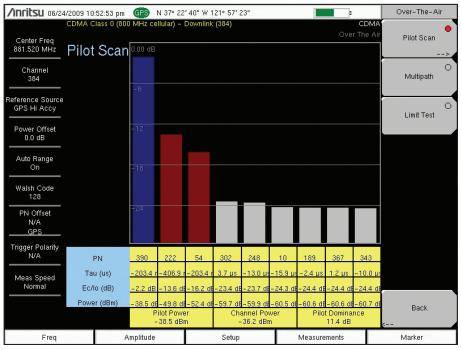
RF Measurements – Spectral Emissions Mask

The 3GPP2 spectral emission mask is displayed. Failing this test leads to interference with neighboring carriers, legal liability, and low signal quality.



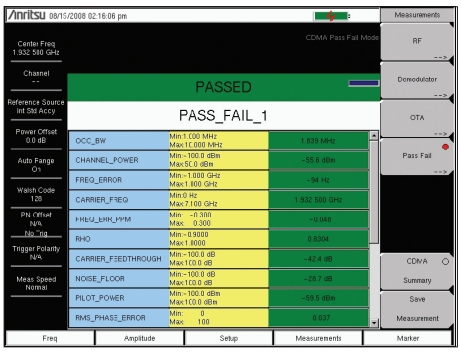
Modulation Quality – EVM

High or low values will create larger areas of cell-to-cell interference and create lower data rates near cell edges. Low values affect in-building coverage.



Over-the-Air Measurements – Sync Signal Power

Check for uneven amplitude of sub-carriers. Data will be less reliable on weak sub-carriers, creating a lower overall data rate.



Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations lead to inconsistent network behavior.

CDMA Measurements

The BTS Master features three CDMA measurement modes:

- RF Measurements
- Demodulation
- Over-the Air Measurements (OTA)

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the cell site off-line. When the OTA test results are ambiguous, one can directly connect to the base station to check the signal quality and transmitter power.

Adjacent Channel Power Ratio (ACPR)

ACPR measures how much of the carrier gets into neighboring RF channels. ACPR, and multi-channel ACPR, check the closest (adjacent) and second closest (alternate) RF channels for single and multicarrier signals. High ACPR will create interference for neighboring carriers. This is also an indication of low signal quality and low capacity, which can lead to blocked calls.

RMS Phase Error

RMS Phase Error is a measure of signal distortion caused by frequency instability. Any changes in the reference frequency or the radio's internal local oscillators will cause problems with phase error. A high reading will cause dropped calls, low signal quality, low data rate, low sector capacity, and blocked calls.

Noise Floor

Noise Floor is the average level of the visible code domain noise floor. This will affect Rho. A high noise floor will result in dropped calls, low signal quality, low data rate, low sector capacity, and blocked calls.

E_c/I_o

E_c/I_o indicates the quality of the signal from each PN. Low E_c/I_o leads to low data rate and low capacity.

RF Measurements

Channel Spectrum
- Channel Power
- Occupied Bandwidth
- Peak-to-Average Power

Spectral Emission Mask
Multi-carrier ACPR
Rf Summary

Demodulation

Code Domain Power Graph
- Pilot Power
- Channel Power
- Noise Floor
- Rho
- Carrier Feed Through
- Tau
- RMS Phase Error
- Frequency Error
- Abs/Rel/ Power
  - Pilot
  - Page
  - Sync
  - Q Page

Code Domain Power Table
- Code
- Status
- Power
- Multiple Codes
- Code Utilization

Modulation Summary

Over-the-Air (OTA) Measurements

Pilot Scanner (Nine)
- PN
- E_c/I_o
- Tau
- Pilot Power
- Channel Power
- Pilot Dominance

Multipath Scanner (Six)
- E_c/I_o
- Tau
- Channel Power
- Multipath Power

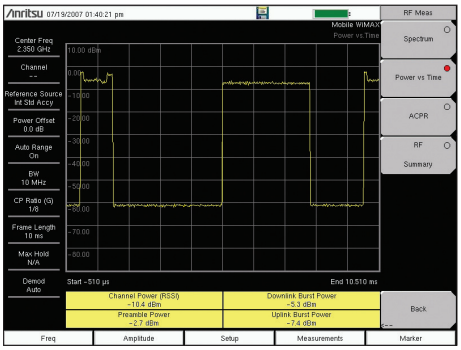
Limit Test – 10 Tests Averaged
- Rho
- Adjusted Rho
- Multipath
- Pilot Dominance
- Pilot Power
- Pass/Fail Status

Pass/Fail (User Editable)

Measurements
- Channel Power
- Occupied Bandwidth
- Peak-to-Average Power
- Spectral Mask Test
- Frequency Error
- Channel Frequency
- Pilot Power
- Noise Floor
- Rho
- Carrier Feed Through
- Tau
- RMS Phase Error
- Code Utilization
- Measured PN
- Pilot Dominance
- Multipath Power

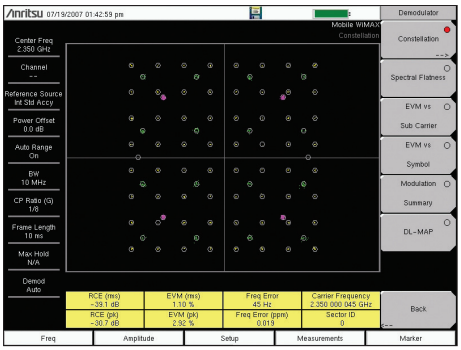
Cell Master™ Base Station Analyzer Features

Fixed and Mobile WiMAX Signal Analyzers (Option 0885)



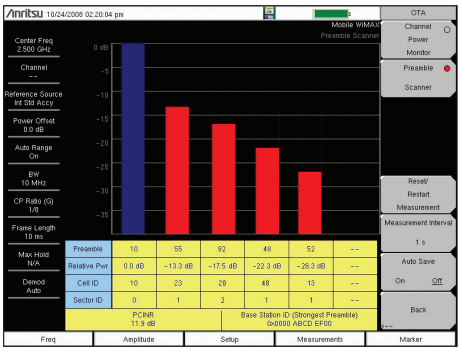
RF Measurement – Preamble Power

High or low values will create larger areas of cell-to-cell interference and create lower data rates near cell edges. Low values affect in-building coverage.



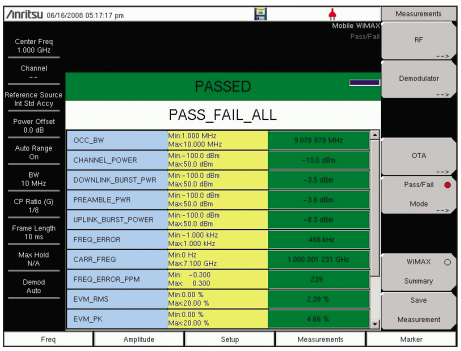
Demodulation – Frequency Error

Calls will drop when user's equipment travels at high speed. In severe cases, handoffs will not be possible at any speed, creating island cells.



Over-the-Air Measurements – PCINR

A low Physical Carrier to Interference plus Noise Ratio (PCINR) indicates poor signal quality, low data rate and reduced sector capacity.



Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations, leads to inconsistent network behavior.

Fixed and Mobile WiMAX Signal Analyzers

The Cell Master features two Fixed WiMAX and three Mobile WiMAX measurement modes:

- RF Measurements
- Demodulation (up to 10 MHz)
- Over-the Air Measurements (OTA) (Mobile only)

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the cell site off-line. When the OTA test results are ambiguous one can directly connect to the base station to check the signal quality and transmitter power.

Cell ID, Sector ID, and Preamble

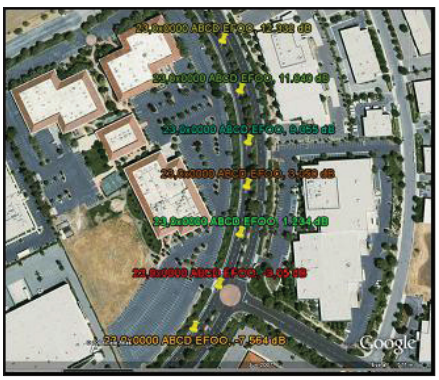
Cell ID, Sector ID, and Preamble show which cell, sector, and segment are being measured OTA. The strongest signal is selected automatically for the additional PCINR and Base Station ID measurement. Wrong values for cell, sector and segment ID lead to dropped handoffs and island cells. If the cause is excessive coverage, it also will lead to large areas of low data rates.

Error Vector Magnitude (EVM) Reletive Constellation Error (RCE)

RCE and EVM measure the difference between the actual and ideal signal. RCE is measured in dB and EVM in percent. A known modulation is required to make these measurements. High RCE and EVM causes low signal quality, low data rate, and low sector capacity. This is the single most important signal quality measurement.

Preamble Mapping (Mobile WiMAX)

Preamble Scanner can be used with the GPS to save scan results for later display on a map. PCINR ratio for the strongest WiMAX preamble available at that spot. The Base Station ID and Sector ID information are also included so that it's easier to interpret the results. Once PCINR data is mapped, it becomes much easier to understand and troubleshoot any interference or coverage issues.



RF Measurements

Channel Spectrum
- Channel Power
- Occupied Bandwidth

Power vs. Time
- Channel Power
- Preamble Power
- Downlink Burst Power (Mobile only)
- Uplink Burst Power (Mobile only)
- Data Burst Power (Fixed only)
- Crest Factor (Fixed only)

ACPR

Demodulation (10 MHz maximum)

Constellation
- RCE (RMS/Peak)
- EVM (RMS/Peak)
- Frequency Error
- CINR (Mobile only)
- Base Station ID
- Carrier Frequency
- Sector ID

Spectral Flatness
- Adjacent Subcarrier Flatness

EVM vs. Subcarrier/Symbol
- RCE (RMS/Peak)
- EVM (RMS/Peak)
- Frequency Error
- CINR (Mobile only)
- Base Station ID
- Sector ID (Mobile only)

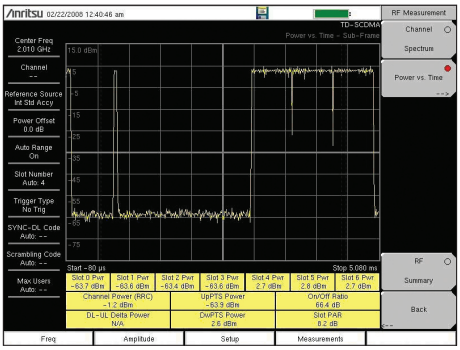
DL-MAP (Tree View) (Mobile only)

Over-the-Air (OTA)

Channel Power Monitor
- Preamble Scanner (Six)
- Preamble
- Relative Power
- Cell ID
- Sector ID
- PCINR
- Dominant Preamble
  - Base Station ID

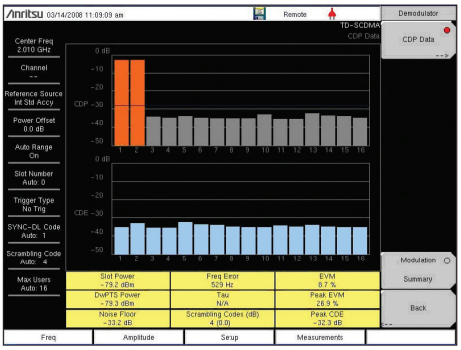
Auto-Save with GPS Tagging and Logging

TD-SCDMA/HSPA+ Signal Analyzers (Option 0882)



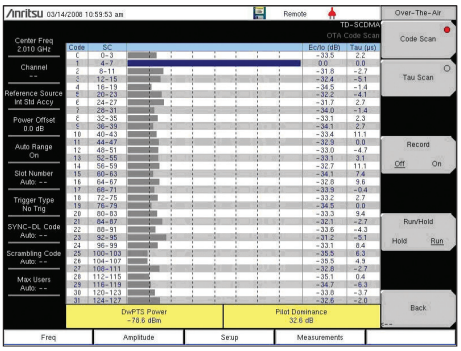
RF Measurement – Time Slot Power

Empty downlink slots with access power will reduce the sensibility of the receiver and the size of the sector. This will cause dropped and blocked calls.



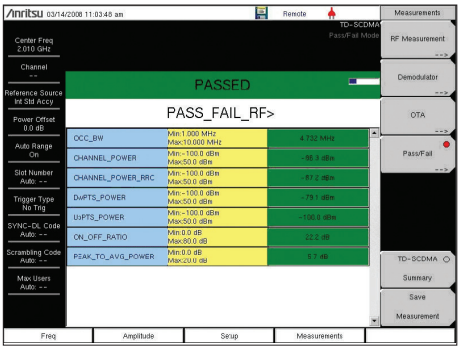
Demodulation – Scrambling Code

Scrambling Code measurements provide a check for the BTS settings. Scrambling Code errors can cause a very high dropped call rate on hand off.



Over-the-Air Measurements – Code Scanner

Excessive sync codes produce too much co-channel interference, which leads to lower capacity, low data rate and excessive handoffs.



Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations, leads to inconsistent network behavior.

TD-SCDMA/HSPA+ Signal Analyzers

The Cell Master features three TD-SCDMA/ HSPA+ measurement modes:

- RF Measurements
- Demodulation
- Over-the Air Measurements (OTA)

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the cell site off-line. When the OTA test results are ambiguous one can directly connect to the base station to check the signal quality and transmitter power.

Error Vector Magnitude (EVM) EVM is the ratio of errors, or distortions, in the actual signal, compared to a perfect signal. EVM faults will result in poor signal quality to all user equipment. In turn, this will result in extended hand off time, lower sector capacity, and lower data rates, increasing dropped and blocked calls.

Peak Code Domain Error (Peak CDE)

Peak CDE is the EVM of the worst code. Code Domain displays show the traffic in a specific time slot. Peak CDE faults will result in poor signal quality to all user equipment. In turn, this will result in extended hand off time, lower sector capacity, and lower data rates.

OTA Tau Scanner E_c/I_o

E_c/I_o faults indicate excessive or inadequate coverage and lead to low capacity, low data rates, extended handoffs, and excessive call drops.

DwPTS OTA Power Mapping

DwPTS OTA Power when added to E_c/I_o gives the absolute sync code power which is often proportional to PCCPCH (pilot) power. Use this to check and plot coverage with GPS. Coverage plots can be downloaded to PC based mapping programs for later analysis. Poor readings will lead to low capacity, low data rates, excessive call drops and call blocking.

RF Measurements

Channel Spectrum
- Channel Power
- Occupied Bandwidth
- Left Channel Power
- Left Channel Occ B/W
- Right Channel Power
- Right Channel Occ B/W

Power vs. Time
- Six Slot Powers
- Channel Power (RRC)
- DL-UL Delta Power
- UpPTS Power
- DwPTS Power
- On/Off Ratio
- Slot Peak-to-Average Power

Spectral Emission

Demodulation

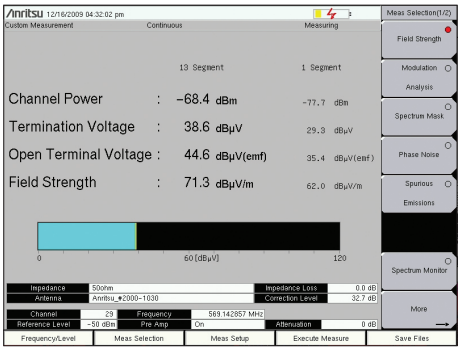
Code Domain Power/Error
- (QPSK/8 PSK/16 QAM)
- Slot Power
- DwPTS Power
- Noise Floor
- Frequency Error
- Tau
- Scrambling Code
- EVM
- Peak EVM
- Peak Code Domain Error

Over-the-Air (OTA) Measurements

Code Scan (32)
- Scrambling Code Group
- Tau
- E_c/I_o
- DwPTS Power
- Pilot Dominance

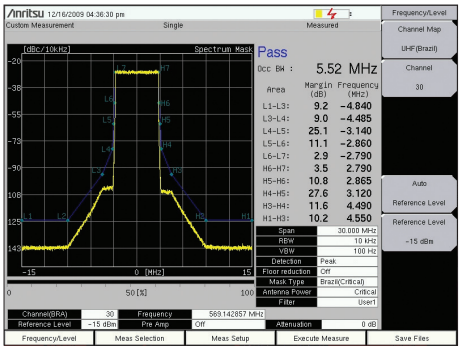
Tau Scan (Six)
- Sync-DL#
- Tau
- E_c/I_o
- DwPTS Power
- Pilot Dominance

ISDB-T Signal Analyzers (Option 0030, 0079, 0032)



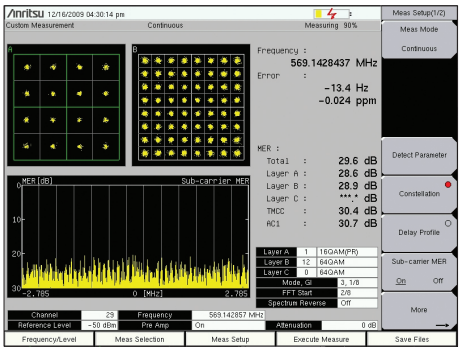
RF Measurements – Signal Power

The Signal Power screen showing the transmission channel power and signal field strength used to assess suitable reception coverage area.



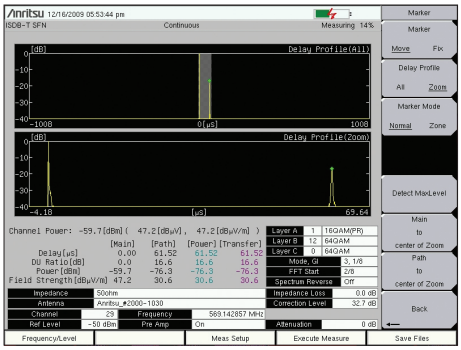
RF Measurements – Spectrum Mask

The Spectrum Mask measurement is shown. ISDB-T systems in Japan and South America call for different spectrum mask specifications. Both are catered for.



Signal Analysis – Constellation and MER

This is the single most important signal quality measurement. Poor MER leads to higher received errors which can cause serious picture degradation.



SFN Analysis – Delay Profile

This measurement indicates whether signals from different transmitters in an SFN are received correctly to prevent interference and high received errors.

ISDB-T Signal Analyzer

The Cell Master features options that enable area survey measurements and the installation and field maintenance of ISDB-T digital broadcasting equipment in accordance with ARIB (Japan) and ABNT (Brazil) standards.

The user has three measurement modes to choose from depending on the his skill level and test environment: Custom, where specific measurements and setups are chosen; Easy, where some setup parameters are automatically set or detected; Batch, where the user can specify all relevant measurements, setups and channels for automatic measurement and results' display for fast and efficient field testing.

The goal of all measurements is to ensure digital TV transmitters are configured according to license agreements and optimized for error-free reception over the entire coverage area helping to create an excellent televisual experience.

Field Strength

Field Strength (dBµV/m) measurement enables a technician to assess whether signals will be detected at a location with sufficient power for good TV reception. The antenna factors of the antenna used for measurement can be compensated for to facilitate easy measurement comparison.

Modulation Error Ratio (MER)

MER is the fundamental measurement in digital TV broadcast systems. It quantifies the modulation signal quality directly. It is essential for managing signal margin and the deterioration of equipment with time, as well as for maintaining stable broadcast services. MER is independent of modulation type so MER measurements can be easily compared.

Delay Profile

This function measures the difference in time and frequency of multi-path signals caused by reflections from obstacles or from other transmitters. By measuring the channel frequency response, the multi-path effect or frequency selective fading can be observed. It is important that all signals from reflections or other transmitters are received within the guard interval to prevent inter-symbol interference which will cause reception degradation. Delay Profile measurement is useful for adjusting the timing of SFN repeaters to achieve this.

RF Measurements (Option 0030)

- Signal Power
  - Channel Power
  - Termination Voltage
  - Open Terminal Voltage
  - Field Strength
- Spectrum Monitor
  - Channel Power
  - Zone Center Channel
  - Zone Center Frequency
- Spectrum Mask
  - Mask (Standard A and B) Japan
  - Mask (Critical, Sub-critical, Non-critical) Brazil
- Phase Noise
- Spurious Emissions

Signal Analysis (Option 0030)

- Constellation (w/zoom)
  - Layer A, B, C, TMCC
- Sub-carrier MER
- Delay Profile (w/zoom)
- Frequency Response
- Measured Data
  - Frequency
  - Frequency Offset
  - MER (Total, Layer A/B/C, TMCC, AC1)
  - Modulation (Layer A/B/C)
  - Mode, GI
  - Sub-carrier MER w/marker
  - Delay w/marker
  - Frequency Response w/marker

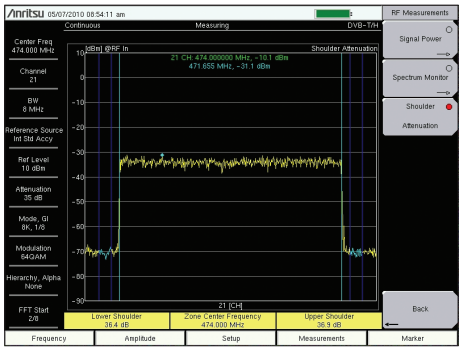
BER Analysis (Option 0079)

- Layer A, Layer B, Layer C
- BER and Error Count per Layer
  - Before RS
  - Before Viterbi
- PER and Error Count per Layer
- MPEG Bit Rate per Layer
- TMCC Information per Layer
  - Modulation
  - Code Rate
  - Interleave
  - Segments
- Channel Power
- Mode, GI
- Signal Sync Status
- ASI Out

SFN Analysis (Option 0032)

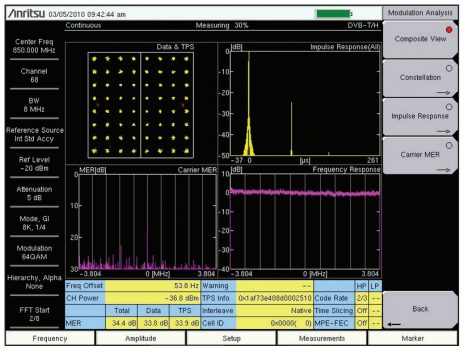
- Delay Profile (w/zoom)
- Inband Spectrum
- Measured Data
  - Channel Power
  - Delay
  - DU Ratio
  - Power
  - Field Strength

DVB-T/H Signal Analyzers (Option 0064, 0057, 0078)



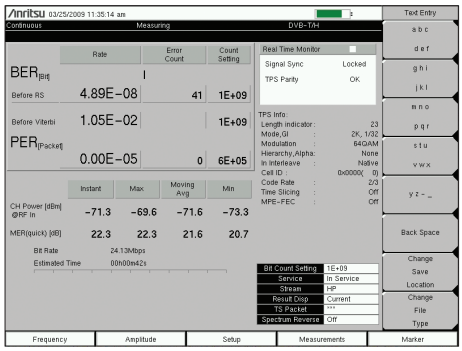
RF Measurements – Shoulder Attenuation

The Shoulder Attenuation measurement is shown. It assesses power amplifier linearity by measuring the relative level of adjacent spurious components.



Signal Analysis – Composite Measurement View

Constellation, MER, impulse response, frequency response are displayed on a single screen for fast and convenient system assessment.



BER Analysis

Pre-Viterbi and pre-RS bit error rates are recorded along with PER to assess transmitter integrity and reception conditions in the coverage area.

SFN Analysis – Impulse Response

This measurement indicates whether signals from different transmitters in an SFN are received correctly to prevent interference and high received errors.

DVB-T/H Signal Analyzer

The Cell Master features options that perform installation, commissioning, field maintenance and area survey measurements of DVB-T/H digital broadcasting equipment in accordance with DVB standards.

The measurements are conveniently organized into RF tests, signal analysis and BER tests. The simplified user interface permits users to quickly set up measurements enabling the efficient characterization and configuration of broadcasting transmitters. The same measurements can be performed remotely from the transmitter using an antenna to assess the coverage and reception quality.

The goal of all measurements is to ensure digital TV transmitters are configured according to license agreements and optimized for error-free reception over the intended coverage area.

Shoulder Attenuation

Within the RF measurement suite, shoulder attenuation determines the linearity of a transmitter according to ETSI TR 101 290.

Composite Measurement View

Although individual signal analysis measurement screens are available, the Composite Measurement View combines all onto one display. Other key measurement and set up information is also shown allowing a complete analysis on a single, convenient screenshot.

BER Analysis

In DTV systems the transmitted data are protected by forward error correction (FEC). The BER analysis option allows the measurement of errors at both levels of correction to assess transmitter performance and reception conditions.

Impulse Response

This function measures the time difference of multi-path signals caused by reflections from obstacles or other transmitters. By measuring the channel frequency response, the multi-path effect or frequency selective fading can be observed. It is important that all signals from reflections or other transmitters are received within the guard interval to prevent inter-symbol interference which will cause reception degradation. The extended, alias-free delay range measurement in the SFN Analysis option is useful for adjusting the timing of SFN transmitters and repeaters to achieve this.

RF Measurements (Option 0064)

- Signal Power
  - Channel Power
  - Termination Voltage
  - Open Terminal Voltage
  - Field Strength
- Spectrum Monitor
  - Channel Power
  - Zone Center Channel
  - Zone Center Frequency
- Shoulder Attenuation
  - Upper Shoulder
  - Lower Shoulder
  - Channel Power
  - Peak Power

Signal Analysis (Option 0064)

- Composite or Individual Views
  - Constellation
  - Impulse Response (w/zoom)
  - Carrier MER (w/zoom)
  - Freq Response (composite view only)
- Measured Data
  - Mode, GI
  - Modulation
  - Hierarchy
  - Freq Offset
  - Channel Power
  - MER (Total/Data/TPS)
  - TPS Warning Message
  - TPS Info
  - Interleave Type
  - Cell ID
  - Code Rate (HP/LP)
  - Time Slicing (HP/LP)
  - MPE-FEC (HP/LP)

BER Analysis (Option 0057)

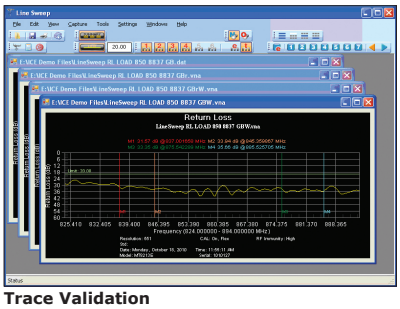
- BER
  - Before RS, Before Viterbi
- PER (Packet)
- Channel Power
- MER (Quick)
- Bit Rate
- TPS Info
  - Length Indicator
  - Mode, GI
  - Modulation
  - Hierarchy
  - Interleave Type
  - Cell ID
  - Code Rate
  - Time Slicing
  - MPE-FEC
- TPS Warning Message
- ASI Out

SFN Analysis (Option 0078)

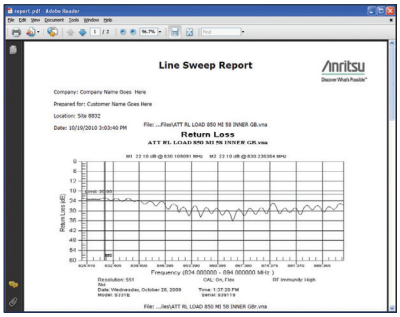
- Impulse Response (w/zoom)
- Inband Spectrum
- Measured Data
  - Channel Power
  - Delay
  - DU Ratio
  - Power
  - Field Strength

Cell Master™ Base Station Analyzer Features

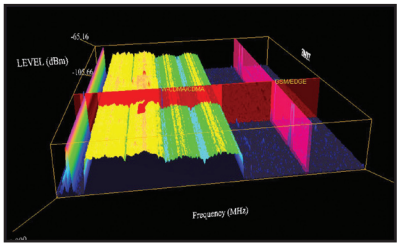
Line Sweep Tools™, Master Software Tools™ and easyTest Tools™ (for your PC)



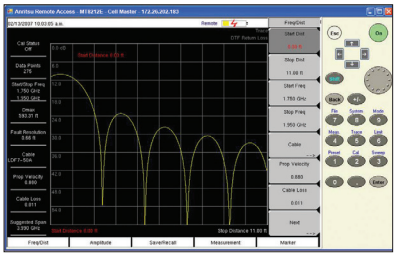
Trace Validation
Marker and Limit Line presets allow quick checks of traces for limit violations.



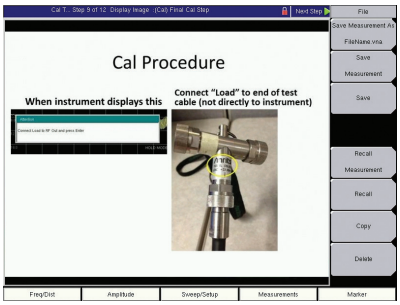
Report Generation
Create reports with company logo, GPS tagging information, calibration status, and serial number of the instrument for complete reporting.



3D Spectrogram
For in-depth analysis with 3-axis rotation viewing, threshold, reference level, and marker control. Turn on Signal ID to see the types of signals.



Remote Access Tool
The Remote Access Tool allows user's to remotely view and control the instrument over the Internet.



easyTest Tools
easyTest Tools is a PC based program that helps create, distribute and display work instructions on Anritsu's Cable and Antenna Analyzers.

Line Sweep Tools

Line Sweep Tools increases productivity for people who deal with dozens of Cable and Antenna traces, or Passive Inter-Modulation (PIM) traces, every day.

- User Interface will be familiar to users of Anritsu's Hand Held Software Tools. This will lead to a short learning curve.
- Marker and Limit Line Presets make applying markers and a limit line to similar traces, as well as validating traces, a quick task.
- Renaming Grid makes changing file names, trace titles, and trace subtitles from field values to those required for a report much quicker than manual typing and is less prone to error.
- Report Generatorwill generate a professional looking PDF of all open traces with additional information such as contractor logos and contact information.

Master Software Tools

Master Software Tools (MST) is a powerful PC software post-processing tool designed to enhance the productivity of technicians in data analysis and testing automation.

Folder Spectrogram – creates a composite file of up to 15,000 multiple traces for quick review, also create:

- Peak Power, Total Power, and Peak Frequency plotted over time
- Histogram – filter data and plot number of occurrences over time
- Minimum, Maximum, and Average Power plotted over frequency
- Movie playback – playback data in the familiar frequency domain view
- 3D Spectrogram – for in-depth analysis with 3-axis rotation viewing control

easyTest Tools

Anritsu's easyTest Tools is a PC based program that can help create, distribute, and display work instructions on Anritsu's Cable and Antenna Analyzers. easyTest can:

- **Create** – easyTest Tools has a simple-to-use tool set to help create an on-instrument procedure, with setups, pictures, prompts, and easy methods to save results.
- **Distribute** – An easyTest procedure is completely contained in a single compressed file, making electronic distribution simple.
- **Display** – work instructions on the instrument. Prompts, photos, and even Power Point slides can be displayed on your Anritsu handheld cable and antenna analyzers. The ability to recall setups and automatically save results make using easyTest even easier.

Line Sweep Features

Presets

7 sets of 6 markers and 1 limit line
Next trace capability

File Types

Input: HHST DAT, VNA Measurements: Return Loss (VSWR), Cable Loss, DTF-RL, DTF-VSWR, PIM
Output: LS DAT, VNA, CSV, PNG, BMP, JPG, PDF

Report Generator

Logo, title, company name, customer name, location, date and time, filename, PDF, HTML, all open traces

Tools

Cable Editor
Distance to Fault
Measurement calculator
Signal Standard Editor
Renaming Grid

Interfaces
Serial, Ethernet, USB

Capture Plots to
Screen, Database, DAT files, JPEG, Instrument

Master Software Tools Features

Database Management

Full Trace Retrieval
Trace Catalog
Group Edit
Trace Editor

Data Analysis
Trace Math and Smoothing
Data Converter
Measurement Calculator

Mapping (GPS Required)
Spectrum Analyzer Mode
Mobile WiMAX OTA Option
TS-SCDMA OTA Option
LTE, both FDD and TDD Options

Folder Spectrogram
Folder Spectrogram – 2D View
Video Folder Spectrogram – 2D View
Folder Spectrogram – 3D View

List/Parameter Editors

Traces
Antennas, Cables, Signal Standards
Product Updates
Firmware Upload
Pass/Fail
VSG Pattern Converter
Languages
Mobile WiMAX
Display

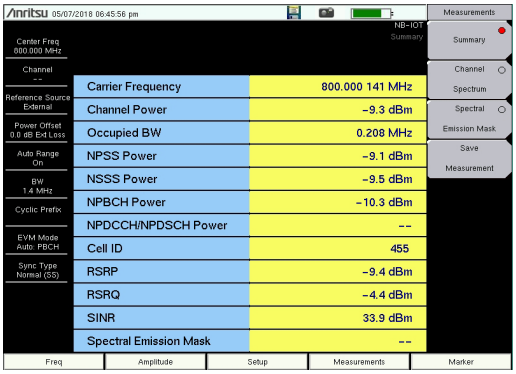
Connectivity

USB
Download measurements and live traces
Upload Lists/Parameters
Firmware Updates
Remote Access Tool over the Internet

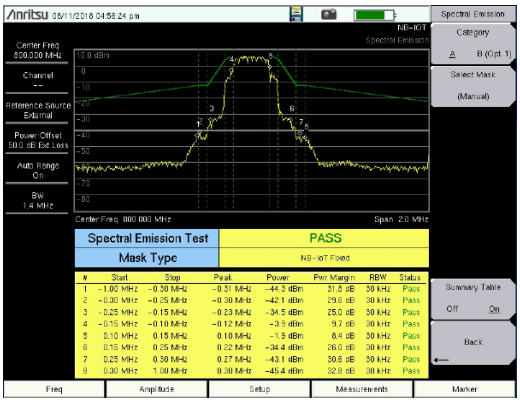
easyTest Tools

Create tests
Distribute procedures
Display instructions

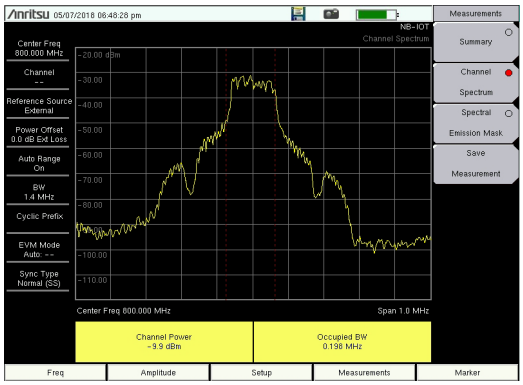
NB-IoT Analyzer (Otion 887)



NB-IoT Analyzer Summary Screen



NB-IoT Analyzer Spectral Emission Mask



NB-IoT Analyzer Channel Spectrum

NB-IoT Analyzer (Option 887)

Narrowband Internet of Things (NB-IoT), also known as LTE Cat-NB1, is a cellular technology introduced in 3GPP Release 13 for providing wide-area coverage for the Internet of Things (IoT).

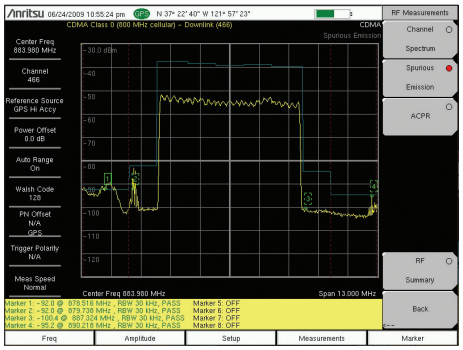
The NB-IoT Analyzer is ideal for network operator installation and maintenance teams, along with their contractors that are deploying or have already deployed NB-IoT services. This feature allows field installation and maintenance teams to verify that NB-IoT services are deployed and are working as intended.

Key Features and Benefits

The NB-IoT analyzer, Option 887 has the following features:

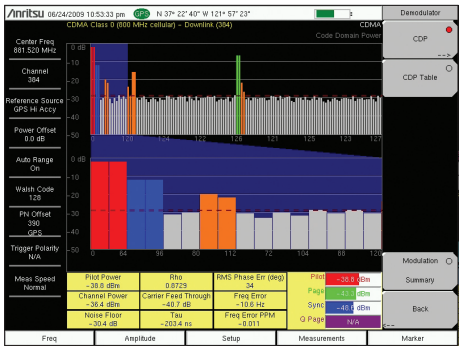
- Summary screen showing the following RF measurements:
  - Carrier Frequency
  - Channel Power
  - Occupied BW
  - NPSS Power
  - NSSS Power
  - NPBCH Power
  - NPDCH/NPDSCH Power
  - Cell ID
  - RSRP
  - RSRQ
  - SINR
  - Spectral Emission Mask (Pass/Fail)
- Channel Spectrum
- Spectral Emission Mask

CDMA/EV-DO Measurements (Option 0884)



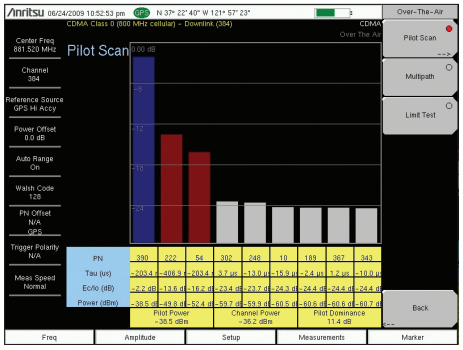
RF Measurements – Spectral Emissions Mask

The 3GPP2 spectral emission mask is displayed. Failing this test leads to interference with neighboring carriers, legal liability, and low signal quality.



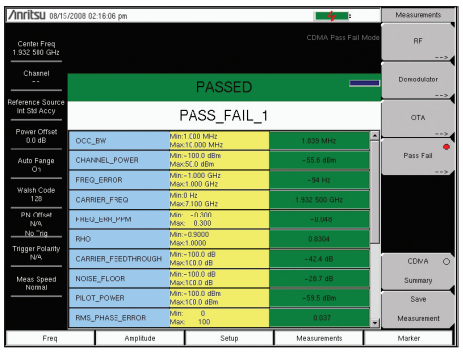
Modulation Quality – EVM

High or low values will create larger areas of cell-to-cell interference and create lower data rates near cell edges. Low values affect in-building coverage.



Over-the-Air Measurements – Sync Signal Power

Check for uneven amplitude of sub-carriers. Data will be less reliable on weak sub-carriers, creating a lower overall data rate.



Pass/Fail Test

Set up common test limits, or sets of limits, for each instrument. Inconsistent settings between base stations lead to inconsistent network behavior.

CDMA Measurements

The BTS Master features three CDMA measurement modes:

- RF Measurements
- Demodulation
- Over-the Air Measurements (OTA)

The goal of these measurements is to increase data rate and capacity by accurate power settings, ensuring low out-of-channel emissions, and good signal quality. These attributes help to create a low dropped call rate, a low blocked call rate, and a good customer experience.

Cell site technicians or RF engineers can make measurements Over-the-Air (OTA) to spot-check a transmitter's coverage and signal quality without taking the cell site off-line. When the OTA test results are ambiguous, one can directly connect to the base station to check the signal quality and transmitter power.

Adjacent Channel Power Ratio (ACPR)

ACPR measures how much of the carrier gets into neighboring RF channels. ACPR, and multi-channel ACPR, check the closest (adjacent) and second closest (alternate) RF channels for single and multicarrier signals. High ACPR will create interference for neighboring carriers. This is also an indication of low signal quality and low capacity, which can lead to blocked calls.

RMS Phase Error

RMS Phase Error is a measure of signal distortion caused by frequency instability. Any changes in the reference frequency or the radio's internal local oscillators will cause problems with phase error. A high reading will cause dropped calls, low signal quality, low data rate, low sector capacity, and blocked calls.

Noise Floor

Noise Floor is the average level of the visible code domain noise floor. This will affect Rho. A high noise floor will result in dropped calls, low signal quality, low data rate, low sector capacity, and blocked calls.

E_c/I_o

E_c/I_o indicates the quality of the signal from each PN. Low E_c/I_o leads to low data rate and low capacity.

RF Measurements

Channel Spectrum
- Channel Power
- Occupied Bandwidth
- Peak-to-Average Power

Spectral Emission Mask
Multi-carrier ACPR
Rf Summary

Demodulation

Code Domain Power Graph
- Pilot Power
- Channel Power
- Noise Floor
- Rho
- Carrier Feed Through
- Tau
- RMS Phase Error
- Frequency Error
- Abs/Rel/ Power
  - Pilot
  - Page
  - Sync
  - Q Page

Code Domain Power Table
- Code
- Status
- Power
- Multiple Codes
- Code Utilization

Modulation Summary

Over-the-Air (OTA) Measurements

Pilot Scanner (Nine)
- PN
- E_c/I_o
- Tau
- Pilot Power
- Channel Power
- Pilot Dominance

Multipath Scanner (Six)
- E_c/I_o
- Tau
- Channel Power
- Multipath Power

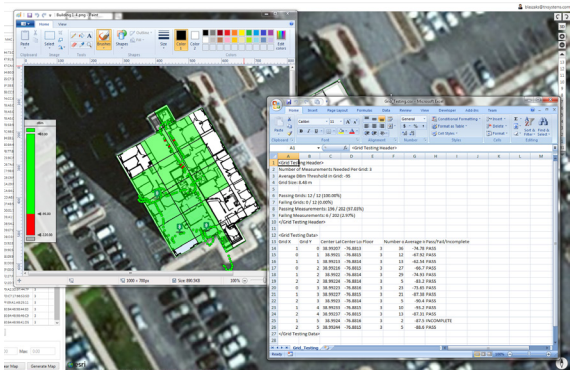
Limit Test – 10 Tests Averaged
- Rho
- Adjusted Rho
- Multipath
- Pilot Dominance
- Pilot Power
- Pass/Fail Status

Pass/Fail (User Editable)

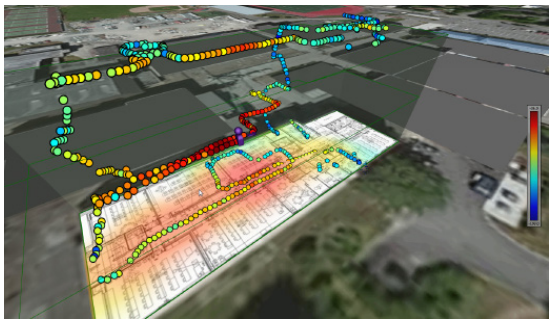
Measurements
- Channel Power
- Occupied Bandwidth
- Peak-to-Average Power
- Spectral Mask Test
- Frequency Error
- Channel Frequency
- Pilot Power
- Noise Floor
- Rho
- Carrier Feed Through
- Tau
- RMS Phase Error
- Code Utilization
- Measured PN
- Pilot Dominance
- Multipath Power

MA8100A Series NEON Signal Mapper

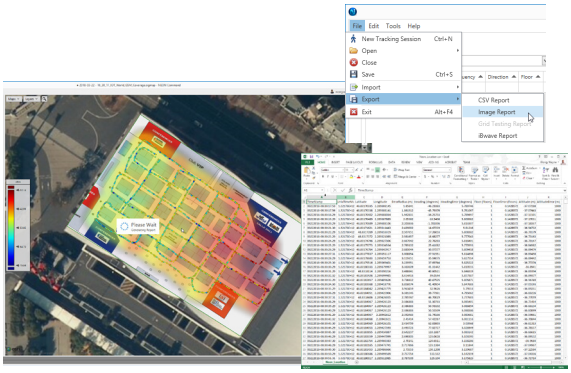
NEON Signal Mapper with Anritsu Handhelds



Support for NFPA Gridding Requirements



Automatically generate 3-D Heatmaps



Automatic Report Generation

MA8100A Series NEON® Signal Mapper*

The most powerful 3D in-building coverage mapping tool specially for Anritsu Handheld Spectrum Analyzers

Anritsu's NEON Signal Mapper, a 3D in-building coverage mapping solution, is compatible with all Anritsu handheld instruments with spectrum analyzer mode. Instruments supported include Spectrum Master, LMR Master, Site Master, BTS Master, Cell Master, and VNA Master.

The MA8100A-xxx consists of both hardware and software from TRX Systems, a 3rd party partner. The MA8100A-xxx consists of a TRX Systems NEON Tracking Unit, NEON Signal Mapper Software for Android devices, and NEON Command Software for a PC.

The NEON Tracking Unit supports collection and processing of sensor data that delivers 3D location information. The Tracking Unit connects to the NEON Signal Mapper application which is run on an Android device via a Bluetooth connection.

The NEON Signal Mapper application provides an intuitive Android user interface enabling lightly trained users to map RF signals within buildings. Users can initialize their location, start/stop mapping and save mapping data to the cloud. RF data is captured by an Anritsu Handheld spectrum analyzer product and the data is sent to the Android device via a USB connection.

The NEON Command Software, run on a PC, enables creation and visualization of 3D building maps and provides centralized access to the NEON Cloud Service to access stored maps and measurement data.

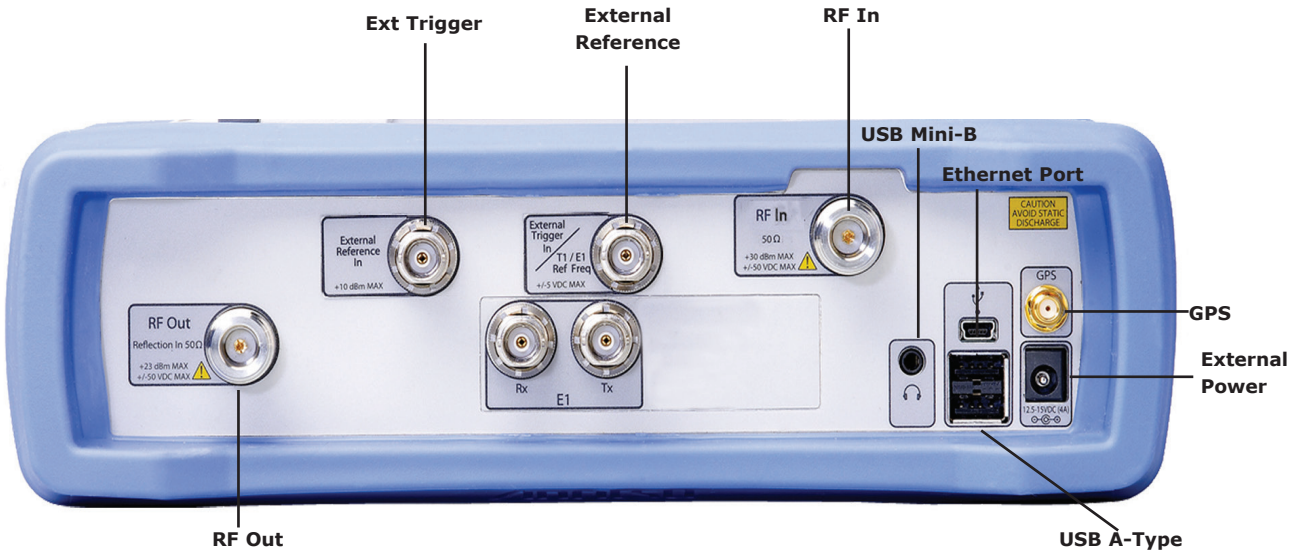
Key Features and Benefits

Integrating NEON's capability to automatically collect geo-referenced test data with Anritsu handheld spectrum analyzer products saves valuable time and money by:

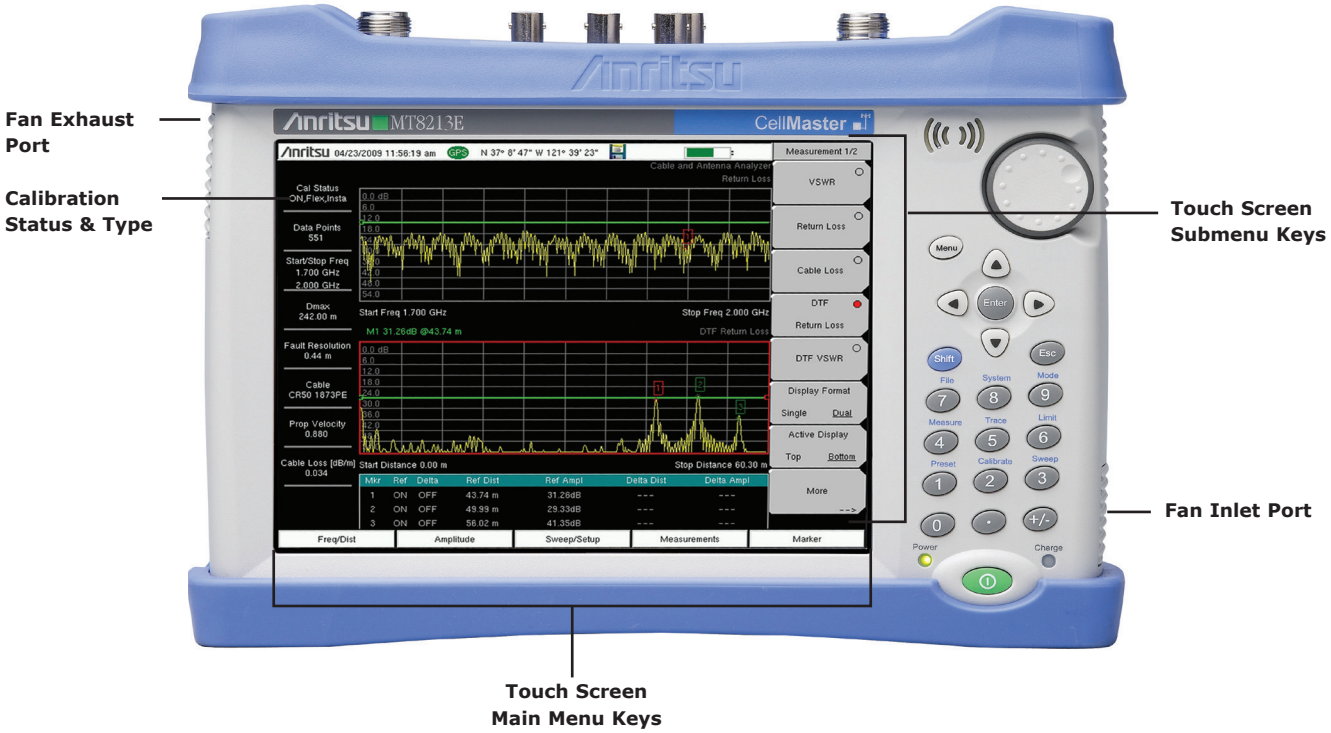
- Eliminating the need to manually perform "check-ins" at each test point by automatically calculating indoor location
- Providing vastly more data than is possible with manual processes by recording data with every step
- Removing typical data recording errors caused by "guesstimating" locations in large buildings through automatic indoor location and path estimation
- Delivering actionable data in areas not easily analyzed such as stairways and elevators by recording and referencing measurements in 3D
- Enabling quick analysis of signal coverage and faster problem resolution by delivering the industry's only geo-referenced 3D visualization
- Provides color-graded measurement results in 2D and 3D views. Measurement values can be seen by clicking on each point. A .csv file of all measurements is also provided.

*Android device and PC are NOT included in the MA8100A-xxx. Customers must purchase their own Android device and PC.

Cell Master™ Base Station Analyzer Features



All connectors are conveniently located on the top panel, leaving the sides clear for handheld use



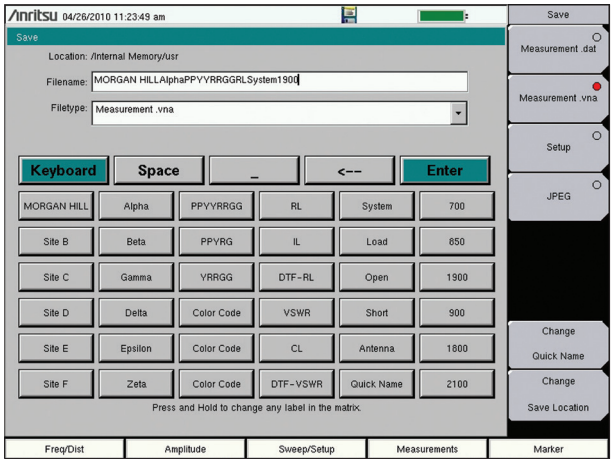
Handheld Size: 273 x 199 x 91 mm (10.7 x 7.8 x 3.6 in), Lightweight: 3.71 kg (8.2 lbs)

Cell Master™ Base Station Analyzer Features

Touch screen menu

The Menu Key activates the touch screen menu for one button access to all of the Analyzers.

User defined shortcuts can be created for one-button access to commonly used functions.



Touch screen keyboard

A built-in touch screen keyboard saves valuable time in the field when entering trace names.

For Cable and Antenna Analysis, a Quick Name Matrix can be customized for quickly naming naming your line sweeps.

Tilt bails are integrated into the case and soft case for better screen viewing.

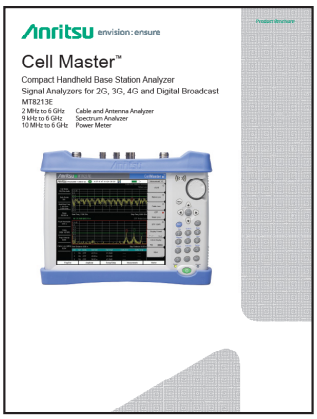
Cell Master™ Base Station Analyzer Ordering Information

Ordering Information

	MT8213E	Description
	2 MHz to 6 GHz	Cable and Antenna Analyzer
	9 kHz to 6 GHz	Spectrum Analyzer
	10 MHz to 6 GHz	Power Meter
	Options	
	MT8213E-0021	2-Port Transmission Measurement
	MT8213E-0010	Bias-Tee
	MT8213E-0031	GPS Receiver (requires Antenna)
	MT8213E-0019	High-Accuracy Power Meter (requires External Power Sensor)
	MT8213E-0025	Interference Analyzer (Option 31 recommended)
	MT8213E-0027	Channel Scanner
	MT8213E-0431	Coverage Mapping (requires Option 31)
	MT8213E-0444	EMF Measurements (requires Anritsu Isotropic Antenna)
	MT8213E-0090	Gated Sweep
	MT8213E-0028	C/W Signal Generator (requires CW Signal Generator Kit, P/N 69793)
	MT8213E-0880	GSM/GPRS/EDGE Measurements
	MT8213E-0881	W-CDMA/HSPA+ Measurements (Option 31 recommended)
	MT8213E-0882	TD-SCDMA/HSPA+ Measurements (requires Option 31 for full functionality)
	MT8213E-0883	LTE/LTE-A FDD/TDD Measurements (requires Option 31 for full functionality)
	MT8213E-0884	CDMA/EV-DO Measurements (requires Option 31 for full functionality)
	MT8213E-0885	WiMAX Fixed/Mobile Measurements (requires Option 31 for full functionality)
	MT8213E-0886	LTE 256 QAM Demodulation (requires Option 883)
	MT8213E-0887	NB-IoT Analyzer
	MT8213E-0030	ISDB-T Digital Video Measurements
	MT8213E-0032	ISDB-T SFN Measurements
	MT8213E-0079	ISDB-T BER Measurements (requires Option 30; cannot be ordered with Options 759)
	MT8213E-0064	DVB-T/H Digital Video Measurements
	MT8213E-0078	DVB-T/H SFN Measurements
	MT8213E-0057	DVB-T/H BER Measurements (requires Option 64; cannot be ordered with Option 759)
	MT8213E-0098	Standard Calibration (ANSI 2540-1-1994)
	MT8213E-0099	Premium Calibration to (ANSI 2540-1-1994 plus test data)

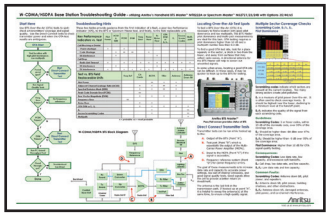
Cell Master™ Base Station Analyzer Ordering Information

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



Part Number	Description
10920-00065	Product Information, Compliance, and Safety
10580-00250	Cell Master Instrument User Guide (Hard copy included) - Bias-Tee, GPS Receiver
10580-00241	Cable and Antenna Analyzer Measurement Guide
10580-00242	2-Port Transmission Measurement - Bias-Tee
10580-00349	Spectrum Analyzer Measurement Guide
10580-00240	Power Meter Measurement Guide
10580-00234	3GPP Signal Analyzer Measurement Guide
10580-00235	3GPP2 Signal Analyzer Measurement Guide
10580-00236	WiMAX Signal Analyzer Measurement Guide
10580-00237	Digital TV Measurement Guide
10580-00256	Programming Manual
10580-00237	Backhaul Analyzer Measurement Guide
10580-00415	CPRI LTE RF Analyser Measurement Guide
10580-00434	OBSAI LTE RF Analyzer Measurement Guide
10580-00280	PIM Master User Guide

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



11410-00473	Cable, Antenna and Components
11410-00551	Spectrum Analyzers
11410-00472	Interference
11410-00566	LTE eNodeB Testing
11410-00615	TD-LTE eNodeB Testing
11410-00466	GSM/GPRS/EDGE Base Stations
11410-00463	W-CDMA/HSDPA Base Stations
11410-00465	TD-SCDMA/HSDPA Base Stations
11410-00467	cdmaOne/CDMA2000 1X Base Stations
11410-00468	CDMA2000 1xEV-DO Base Stations
11410-00470	Fixed WiMAX Base Stations
11410-00469	Mobile WiMAX Base Stations
11410-00552	T1/DS1 Backhaul Testing
11410-00553	Ei Backhaul Testing

Standard Accessories (included with instrument)

Part Number	Description
2000-1691-R	Stylus with Coiled Tether
2000-1654-R	Soft Carrying Case
2000-1797-R	Touchscreen Protective Film, 8.4 in
633-75	Rechargeable Li-Ion Battery, 7500mAh
40-187-R	AC-DC Adapter
806-141-R	Automotive Cigarette Lighter 12 VDC Adapter
3-2000-1498	USB A/5-pin mini-B Cable, 10 feet/305 cm
11410-00485	Cell Master MT8212E/MT8213E Technical Data Sheet
	One Year Warranty (Including battery, firmware, and software) Certificate of Calibration and Conformance