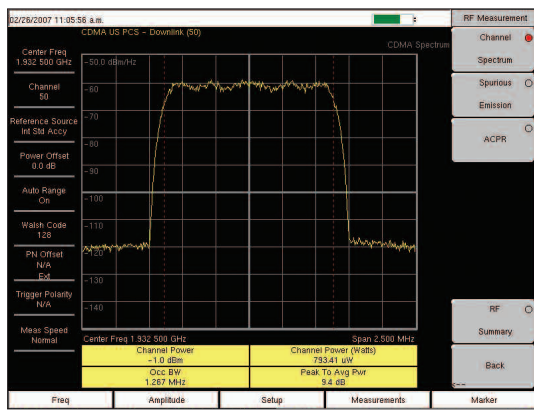


# Connect Directly or Over the Air to Make CDMA/EVDO Measurements

The Spectrum Master/BTS Master can measure CDMA signals by connecting directly to the base station or over the air by connecting an antenna to the unit.

## CDMA RF Measurements (Option 42)

RF Measurements are used to measure the transmitted signal power, shape, power in adjacent channels and spurious emissions. The following sets of measurements help the technician evaluate the RF characteristics of a CDMA base station.

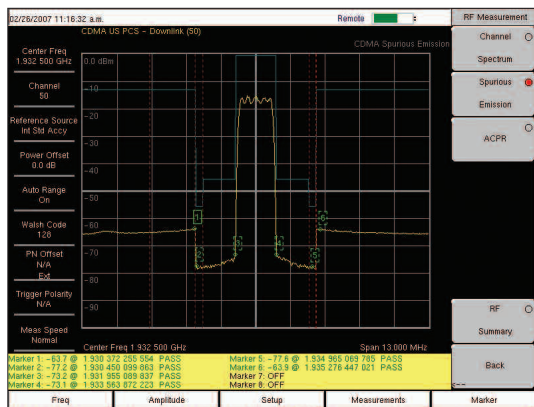


CDMA Channel Spectrum measurement display

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

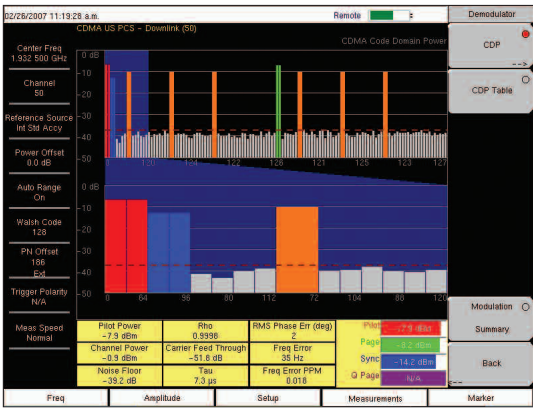
**ACPR:** The ACPR measurement displays the main channel and the power of two adjacent channels on each side of a bar graph. The user can configure up to five main channels.

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



CDMA Spurious Emissions measurement display

# Evaluate the Quality of the Modulation from the CDMA Base Station



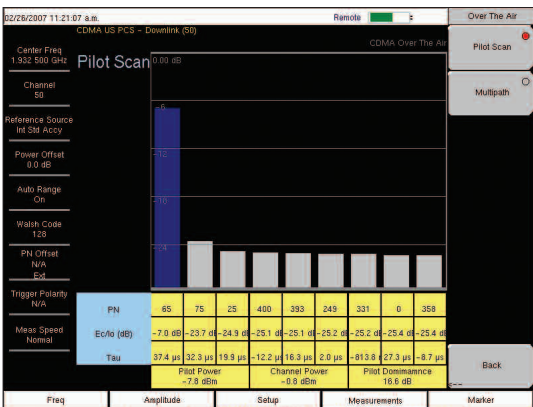
CDMA Code Domain Power measurement display

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

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

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

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



CDMA Over the Air measurement display

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

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

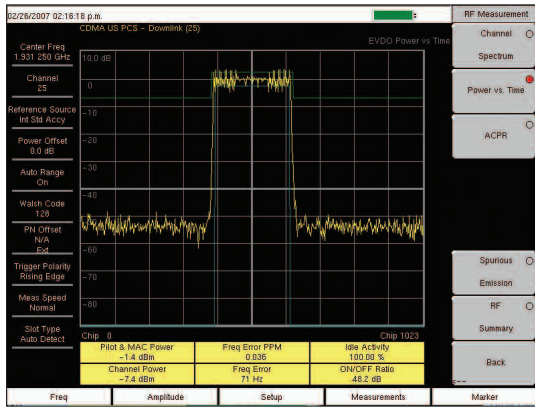
**Pilot Scan:** The strongest nine received PNs are displayed as bar graphs, and the PN numbers are displayed at the bottom of the bar graphs. For each PN, a table displays PN number, Ec/Io, and Tau. Also shown are Pilot Power, Channel Power, and Pilot Dominance.

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

# Optimize EVDO Network Performance

## EVDO

With the 3G evolution of CDMA technology, 1xEV-DO provides data rates up to 2.4 Mbps, providing greater system capacity and lower costs, making wireless broadband possible. The CDMA2000 1xEV-DO (EVDO) system is backward compatible and is spectrally identical to the cdmaOne and CDMA2000 systems.



EVDO Power vs. Time measurement display

## EVDO RF Measurements (Option 62)

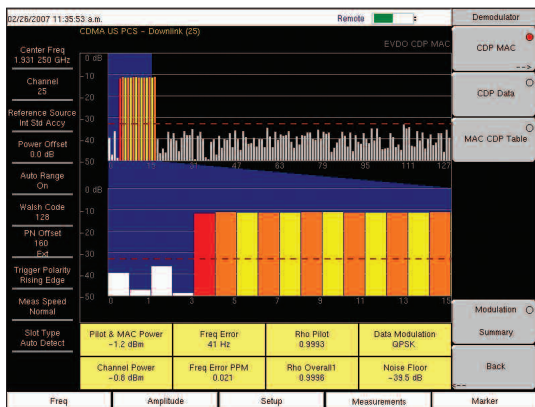
RF Measurements are used to measure the transmitted signal power, shape, power in adjacent channels and spurious emissions. The following sets of measurements help the technician evaluate the RF characteristics of an EVDO base station.

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

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

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

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



EVDO CDP MAC measurement display

## EVDO Demodulator (Option 63)

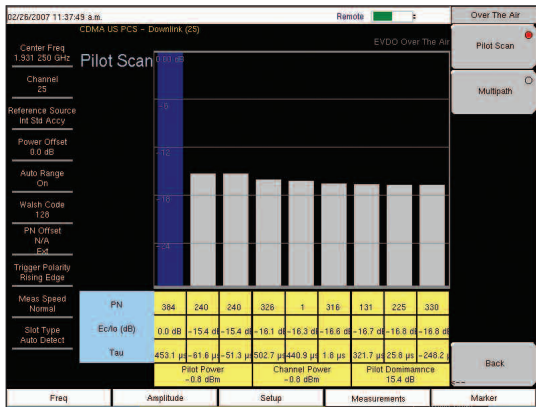
Demodulator measurements are used to measure the code domain power in both graphical and tabular forms. The following sets of measurements help the technician evaluate the quality of the modulation from the EVDO base station.

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

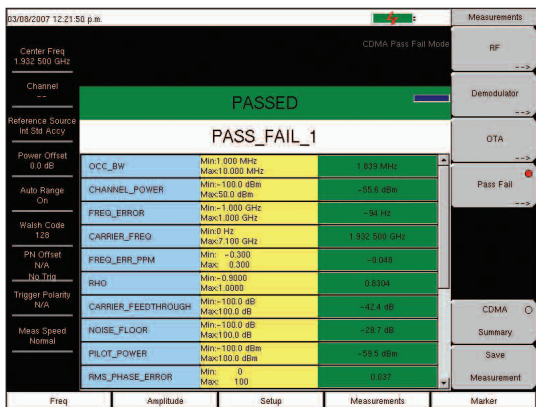
**CDP Data:** This measurement displays the power of the 16 I and 16 Q sub-channels of the Data channel separately.

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

# Cost Effective Way to Identify Base Station Performance Problems



EVDO Over the Air measurement display



EVDO Pass Fail Mode measurement display

## EVDO Over The Air (Option 34)

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

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

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

## Pass/Fail Mode

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

## Specifications

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

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

cdmaOne and CDMA2000 1xRTT Demodulator (Option 43)

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

**Rho Accuracy:** ±0.01 for Rho >0.9

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

**PN Offset:** with 1 x 64 chips

**Pilot Power Accuracy:** ±1 dB typical, relative to Channel Power

**Tau:** ±0.5 μs typical (±1 μs maximum)

EVDO Demodulator (Option 63)

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

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

**Rho Accuracy:** ±0.01 for Rho >0.9

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

**PN Offset:** within 1 x 64 chips

**Pilot Power Accuracy:** ±1 dB typical relative to Channel Power

**Tau:** ±0.5 μs typical (±1 μs maximum)

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

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

## Ordering Information

The following options are available for the Spectrum Master MS272xB and BTS Master MT8222A.

- Option 33** cdmaOne and CDMA2000 1xRTT Over The Air Measurements
- Option 42** CDMA RF Measurements
- Option 43** cdmaOne and CDMA2000 1xRTT Demodulator
- Option 34** EVDO Over The Air Measurements
- Option 62** EVDO RF Measurements
- Option 63** EVDO Demodulator

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