MAKING 1XEVDO MEASUREMENTS WITH THE ANRITSU MT8212B CELL MASTER

Introduction

1xEV-DO is a 3G mobile standard that is the next evolution of cdma2000 intended to provide faster data transmission capabilities for mobile phones. EV-DO stands for “Evolution, Data-Only” and is based on the technology initially known as High Data Rate (HDR) or High Rate Packet Data (HRPD). EV-DO provides data rates that are10 faster than 1xRTT, which is the previous technology for CDMA. EV-DO only addresses data however most cdma2000 network operators are expected to combine 1xRTT (which addresses voice) and 1xEV-DO channels in their systems to provide varying voice and data capacities as required by customer demand.

There are currently two versions of 1xEV-DO, release 0 and revision A. Rev. 0 provides a peak data rate of 2.4 Mbps downstream and 153.6 kbps upstream, although actual downstream rates are often 300-600 kbps. It uses adaptive coding and modulation based on radio conditions: QPSK, 8-PSK, or 16QAM. Rev. A (or 1xEV-DOrA) increases peak data rates to 3.1 Mbps downstream and 1.8 Mbps upstream, enabling more applications and improving capabilities for services such as VoIP and video calling.

The Anritsu MT8212B Cell Master supports 1xEV-DO Rev A measurements. The Cell Master can measurements by directly connection to the Base Station or by over the air using an antenna. Specifically the MT8212B supports 1xEV-DO RF measurements (option 62), 1xEV-DO demodulation measurements (option 63) and 1xEV-DO Over the Air measurements (option 34). Additionally the Cell Master has a GPS option which is essential for making OTA measurements.

Making 1xEV-DO Measurements

Cell Master Setup

Use up/down arrow key to navigate the mode menu

To begin, the Cell Master must be in the 1xEV-DO measurement mode.

Step 1: Set Measurement Mode:
Using the hard keys along the bottom of the Cell Master, select Mode. This will bring up the all the measurements modes available in the unit. From the list select EVDO using the up/down arrow key and press enter.

Step 2: Select EVDO Measurement:
In the EVDO measurement mode there are three measurements to choose.
∑ EVDO RF Measurement for viewing the EVDO RF signal.
∑ EV-DO OTA (over the air) measurement for viewing up to 6 strongest PNs and Multi-path measurements.
∑ EV-DO Demodulator measurement (CDP Mode) for viewing the EVDO signal in the code domain.

Step 3: Select Signal Standard, Center Frequency or Channel Number

If the appropriate channel number is not chosen, the Cell Master can not lock in on the EVDO signal and will give an alarm of “level under”.

Step 4: Select “Meas/Disp” key to set Cell Master EVDO Settings:

- Set PN Search Criteria
- Set Mac Codes
- Set Data Modulation Type

Step 5: Connect Cell Master to Base Station using attenuator or connect an omni directional antenna for OTA measurements.

Note: When connecting to base station an attenuator is required. (Max. power input is 43 dB)

The Cell Master can measure EVDO performance over the air with an antenna, or by connecting the base station directly to the Cell Master.

To measure an EVDO signal over the air, connect the appropriate frequency band antenna to the Cell Master RF In connector, and an Anritsu GPS antenna to the Cell Master GPS connector. (Figure 1)

To connect the base station to the Cell Master, connect the power amplifier of the base station to the RF In connector of the Cell Master using a coupler or attenuator. (Figure 2)

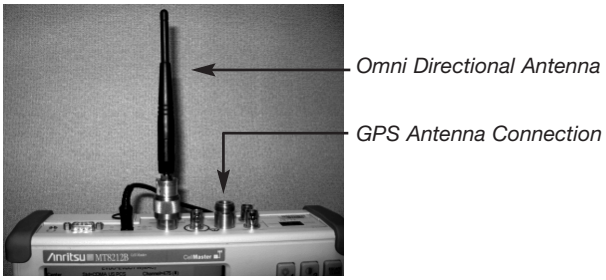


Figure 1

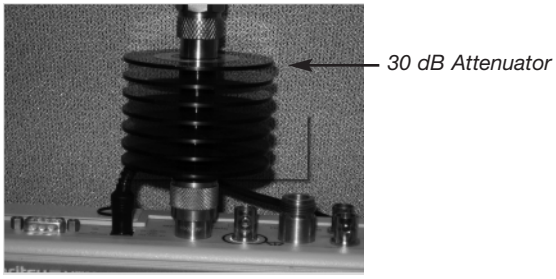
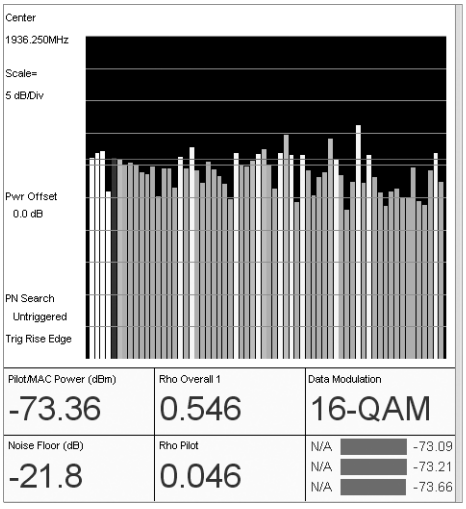


Figure 2

EVDO Measurement Results

CDP MAC Code Power

CDP MAC Code Power displays the EVDO signal in the code domain (Walsh Codes).



Key measurements

Pilot/MAC Power: Displays the Pilot and MAC channel power.

Rho Pilot: Measures the quality of the Pilot Channel. This value should be greater than 0.912.

Rho Overall 1: Measures the EVDO signal quality during and active slot.

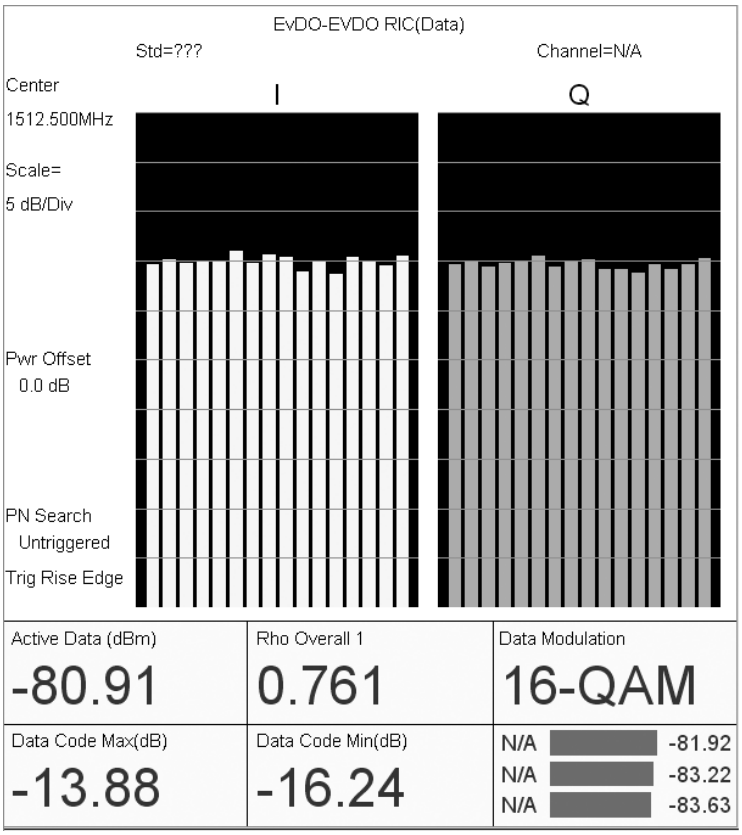
Noise Floor: Displays the average power of all inactive MAC channels relative to the total MAC power channel power.

EVDO Measurement Results

CDP Data Code Power

The CDP Data Code Power displays the EVDO active data channel power. Data Channels in EVDO consists of 16 “I” sub channel and 16 “Q” sub channels.

Each Channel should have an approximate power of -15.0 dB relative to the total Data Channel power.



Key Measurements

Data Modulation: Displays the type of modulation which will be determined automatically by the Cell Master. EVDO has 3 modulation types:

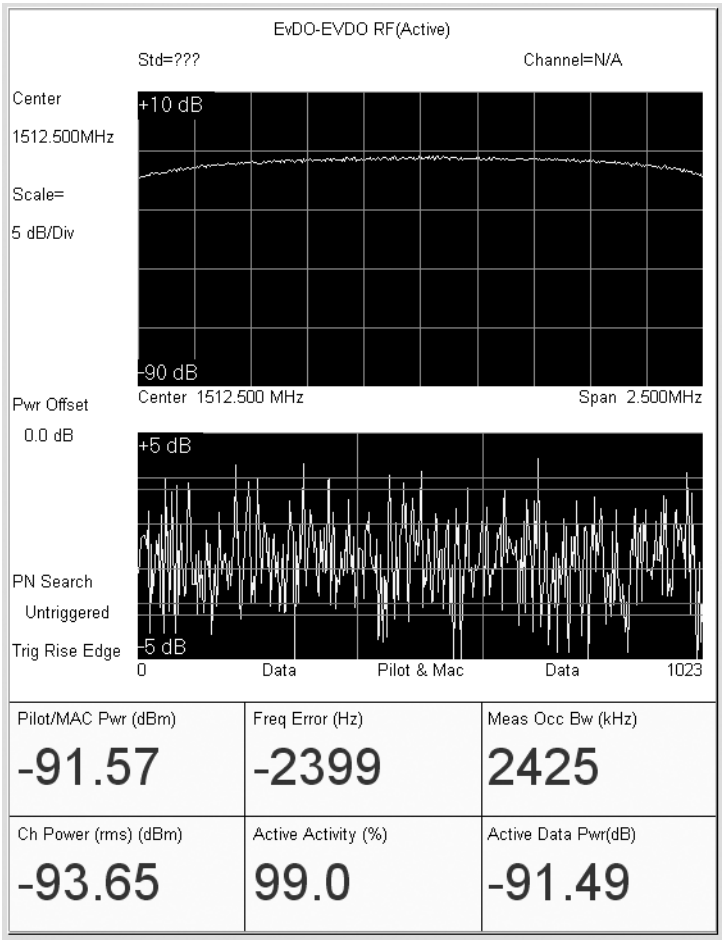
- QPSK, Low data rate, large distance from Base Station
- 8PSK, Medium data rate, most locations
- 16-QAM, High data rate, short distance to Base Station

PN Offset: Displays three PN Offsets or Short codes and the corresponding power of each. PN Offset provides a unique identifier for sector of a cell site. (GPS Required)

EVDO Measurement Results

EVDO RF Measurements

EVDO RF measurement displays the EVDO RF signal. The upper half of the display displays the power level and frequency of EVDO RF signal overall. The lower half of the display displays the power versus time of an EVDO an EVDO slot. The display can display Active or Idle slots.



Key Measurements:

Frequency Error (Hz): Frequency Error displays the delta of the designated and actual carrier frequency. (Sync source required)

Measured Occupied Bandwidth (kHz): Displays the occupied bandwidth over 99% of the transmitted power.

Channel Power (rms or dBm): Displays the average power of the channel.

Idle or Active Activity (%): Displays the estimated percentage of the idle or active slots in the total number of slots.

EVDO Measurement Results

EVDO Over the Air Measurements

EVDO Over the Air measurements displays the 6 strongest PN (Pilots) or shorts codes and the corresponding power of each. Additionally the Multipath measurement of the strongest PN is also displayed. GPS timing is required for this measurement.

PN	Pilot Scan Results	Tau (us)	Power
201		-3.46	-5.62
338		28.27	-23.17
101		-0.41	-23.32
51		13.22	-23.42
420		-4.48	-23.78
343		-4.28	-23.82

Tau (us)	Multipath	Power
-3.46		-5.62
-0.20		-24.22
-7.53		-27.24

Key Measurements:

Tau (uSec): Compares the PN Offset timing with the overall system time.

Pilot Dominance: Measures the delta in the amplitude of the strongest pilot channel and the other pilot channel displayed.

Multipath Power: Measures the amount of power of the dominate pilot that is dispersed outside the main correlated peak due to multi-path echoes.

Anritsu

Specifications are subject to change without notice.

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