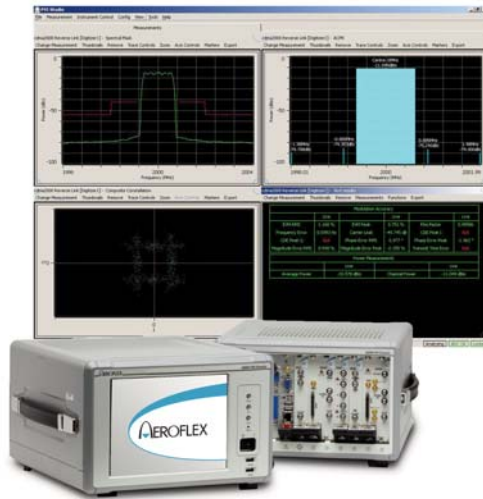


PXI

CDMA2000/EV-DO Measurement Suite



AEROFLEX
A passion for performance.

Measurement functions to analyze cdma2000, 1xRTT, EV-DO Rev 0, A and B signal characteristics in accordance with the requirements of 3GPP2 C.S0033-B version 1 and C.S0024-B version 2.0 for reverse link transmissions.

- cdma2000 RC1 to RC4 reverse link analysis
- 1xEV-DO rev 0, rev A and rev B (No Feedback Multiplexing mode) reverse link analysis
- Channel power
- Total power
- ACPR
- Phase Error and Magnitude Error
- Spurious emissions (spectral emission mask)
- Composite modulation accuracy (RHO and EVM)
- Carrier Leak (Carrier Feed through)
- QPSK origin offset⁽¹⁾
- Code domain powers and PCDE
- Frequency error
- CCDF
- Fast Sequence Tuning (FST)⁽¹⁾

(1) Not exposed in PXI Studio

The cdma2000 / 1xEV-DO reverse link measurement suite enables precision characterization of power, modulation and spectral parameters for both cdma2000 rev C, 1xEV-DO rev 0, A and B reverse link transmissions.

Trace displays are provided for de-scrambled code domain powers for both cdma2000 RC3/4 and 1xEV-DO channels and constellation diagrams.

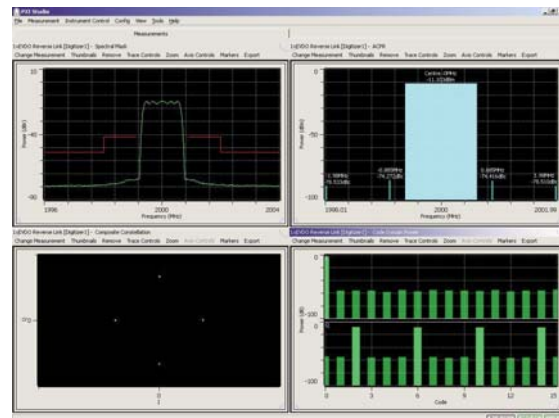


Figure 1. CDMA 2000 plug-in typical screenshot

CDMA2000R 1XRTT AND 1xEV-DO REV 0, A AND B

All specifications are defined when used in conjunction with the 3030 Series PXI RF digitizer with option 102 operating in cdmaOne, cdma2000 and 1xEVDO band classes BC0 to BC15.

Measurements performed are in accordance with 3GPP2 C.S0033-B version and C.S0024-B version 2.0 for High Rate Packet Data Access reverse link transmissions.

Specifications are defined with the input signal at the RF digitizer tuned frequency and at the reference level unless otherwise stated.

CONTROL PARAMETERS

Frequency

Uplink (Hz)

User defined frequency or preset bands, as shown in the table below.

Band Class	Channel	MHz
15	0-899	1710-1754.95
14	0-1299	1850-1914.95
13	0-1399	2500-2569.95
12	0-239	870.0125-875.9875
11	1-871, 1536-1715	410-483.475
10	0-919	806-900.975
9	0-699	880-914.95
8	0-1499	1710-1784.95
7	0-240	776-788
6	0-1199	1920-1979.95
5	1-871, 1039-2016	410-484.6
4	0-599	1750-1779.95
3	2-1600	887.025 - 924.975
2	1329-2047, 0-1000	872.0125-889.9625 889.9875-914.9875
1	0-1199	1850-1909.95
0		815.025-848.985

Long Code Mask

Long code mask range: 0 to 4,398,046,511,103

Radio Configuration Mode (cdma2000 only)

RC1 / RC2 or RC3 / RC4

Slot Number (1xEVDO only)

0 to 15

Subtype Configuration (1xEV-DO only)

Subtype 0, 1, 2 and 3

MEASUREMENTS

POWER

Channel Power

The channel power is the power measured in the 1.23 MHz bandwidth.

Average Power

The broadband average power is measured for a user defined segment.

Indication

Channel power, average power (dBm)

Accuracy

See 3030 Series module level accuracy spec

ADJACENT CHANNEL POWER RATIO (ACPR)

The power to the power measured at frequency offsets relative to the reference channel power.

(Not supported for 1xEV-DO Subtype 3).

Offsets

4 fixed or 4 user defined

Fixed offsets

± 885 kHz, ± 1980 kHz

User offsets

Determined by digitizer model

Dynamic Range

-82 dBc (for 303x input levels > -10 dBm)

Indication

Ref Channel Power (dBm) (1.23 MHz channel bandwidth)

Offset power in (dBc) (30 kHz bandwidth)

Accuracy

$< \pm 0.05$ dB error / 10 dBc⁽¹⁾

SPECTRAL EMISSION MASK

The power spectrum of the transmitted signal is compared to a mask.

Mask Type

Pre-defined, User defined.

Adjacent Carriers (1xEV-DO Subtype 3 only), Two carriers maximum frequency separation (1xEV-DO Subtype 3 only)

Indication

Pass/fail

Frequency + dBr mask value with closest proximity to mask

Spectral trace + mask trace

Number of failed points

Accuracy

$< \pm 0.05$ dB error / 10 dBc⁽¹⁾

TRANSMIT MODULATION

Modulation Accuracy

The modulation accuracy can be measured for composite RHO, EVM as per 3GPP2 C.50011_A or 3GPP2 C.S0033-A.

1xEV-DO composite RHO is computed for default or user channel settings. When set to user channel settings, RHO is measured only on the selected channel subset.

The modulation accuracy is a measure of the difference between the measured waveform and the theoretical modulated waveform (the error vector).

The minimum measurement interval for composite rho / EVM is 500 μ s (cdma200 RC1/2), 3.2 ms (cdma200 RC3/4), 1xEV-DO or user defined).

COMPOSITE RHO

Mode (1xEVDO only)

Random / Specific slot 0 to 15

rho range: 0.9 to 1.00000

Accuracy

Better than ± 0.003 for rho values between 0.9 and 1.0

EVM rms/peak

Range

0 to 20% RMS

0 to 40% Peak

Residual Error

Typically 1%

Magnitude Error Peak/rms⁽²⁾

%

Phase Error Peak/rms⁽²⁾

degrees

Carrier Leak (Carrier Feed Through)

Range

0 to 20%

Residual Error

Typically 1%

Indication

dB

Time Error (requires ext trigger)

μs

1xEVDO Additional Indications

Payload Index, Sub packet Index, Analysed slot number

FREQUENCY ERROR

The frequency error is derived from modulation quality measurement and is the frequency relative to the 3030 tuned frequency.

Range

RC1-2: ±5 kHz

RC3-4: ±2 kHz

1xEV-DO: ±2 kHz

QPSK: ±10 kHz

Accuracy

< ±(10 Hz + (Freq standard error x transmitter freq))

CODE DOMAIN POWER (RC3/RC4, 1xEVDO)

Code domain power is a measure of the power in each code channel of a CDMA channel. Code domain power gives the distribution of signal energy among the code channels, normalized by the total signal energy.

Indication

Pilot channel power (dBc)

Data channel power (dBc)

Ack channel power (dBc), (1xEVDO only)

DRC channel power (dBc), (1xEVDO only)

RRI power (dBc)

Aux channel power (dBc) (1xEVDO only)

DSC channel power (dBc) (1xEVDO only)

RRI pilot ratio

ACK pilot ratio

AUX pilot ratio

Data pilot ratio

DRC pilot ratio

DSC pilot ratio

Trace

Power dBm vs. code channel (dB)

PEAK CODE DOMAIN ERROR

Code domain error is a measure of the code domain distribution of error power, provided by a code domain power measurement of the error signal. Peak code domain error is the largest power in the error.

Indication

Peak Code Domain Error I (dB)

Peak Code Domain Error Q (dB)

CCDF (COMPLIMENTARY CUMULATIVE DISTRIBUTION FUNCTION)

Trace: Peak to average power (dB) vs. probability (%)

GENERAL

Operating System

Windows® XP (service pack 2) and 32-bit Vista.

Required Memory

512 Mbytes minimum, 1024 Mbytes recommended

Display Resolution

Minimum 1024 x 768

Other

Aeroflex 3000 Series modules require NI VISA version 3.1 or later (NI Visa 4.2 or later under Windows® Vista).

Aeroflex 3000 Series module drivers version 5.4.0 or later

ORDERING

PXI Studio is supplied as standard with plug-ins for RF Digitizer, Signal Generator, RF Combiner and Spectrum Analyzer.

Optional measurement plug-ins may be purchased with the 303x at time of order or purchased as an upgrade to the 303x.

Note: To be able to use measurement plug-ins within PXI Studio, associated options must be enabled in the 303x digitizer.

CDMA2000 / 1xEVDO Rev A/B

When purchased with a 303x, order as: 3030 option 102

When purchased as an upgrade, then order as: RTROPT102/3030

(1) Excluding the effects of noise

(2) CDMA2000 only

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.