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.

The cdma2000 / EV-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.
**SPECIFICATION**

**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.

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

**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 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
User defined (Hz)

Dynamic Range
-82 dBC (for RF input level >-10 dBm)

Indication
Ref Channel Power (dBm) (1.23 MHz channel bandwidth)
Offset power in (dBC) (30 kHz bandwidth)

Accuracy
<±0.05 dB error / 10 dBC

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
<±0.05 dB error / 10 dBC
TRANSMIT MODULATION

Modulation Accuracy
The modulation accuracy can be measured for composite RHO, EVM as per 3GPP2 C.50011_A or 3GPP2 C.50033-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 μs (cdma2000 RC1/2), 3.2 ms (cdma2000 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))

(1) Excluding the effects of noise
(2) cdma2000 only
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® 7

**Required Memory**
- 512 Mbytes minimum, 1024 Mbytes recommended

**Display Resolution**
- Minimum 1024 x 768

**Other**
- PXI 3000 Series modules require NI VISA version 4.6 or later
- PXI 3000 Series module drivers version 7.0.0 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