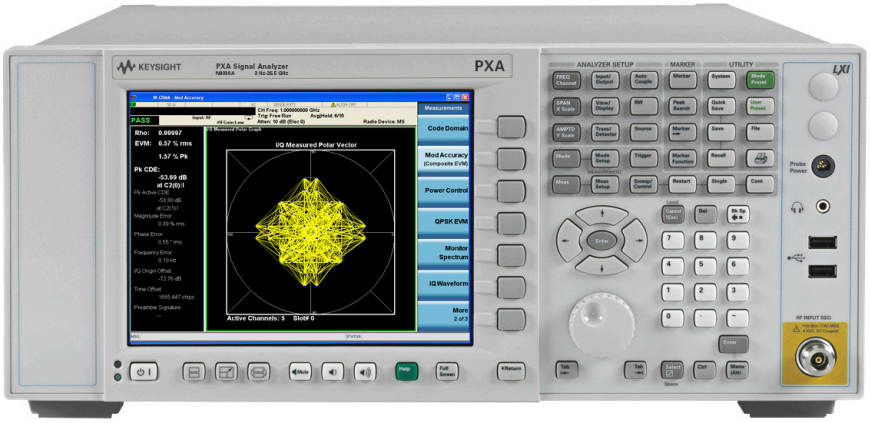
# Keysight Technologies
# W-CDMA/HSPA+
# X-Series Measurement Application
# N9073A & W9073A

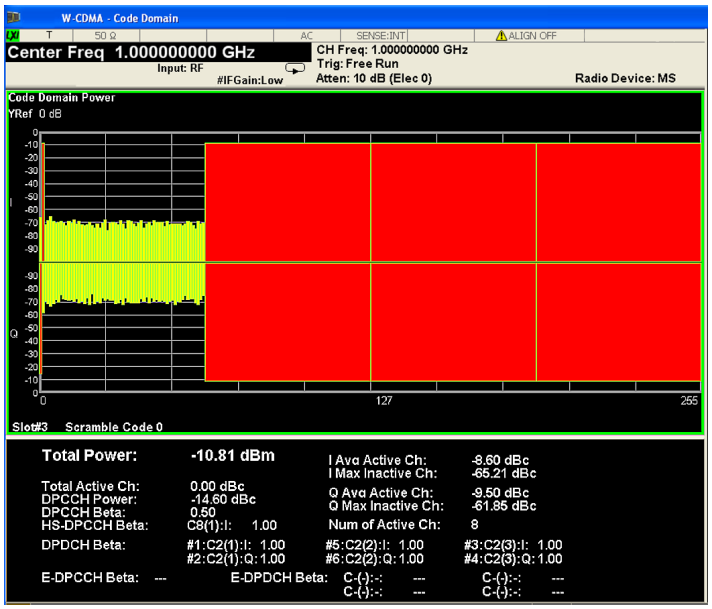



## Technical Overview

- Perform W-CDMA, HSPA, and HSPA+ downlink and uplink transmitter test per 3GPP standard
- Perform one-button tests with pass/fail limit per 3GPP standard
- Use hardkey/softkey manual user interface or SCPI remote user interface
- Leverage built-in, context-sensitive help
- Move application between Keysight Technologies, Inc. X-Series signal analyzers with transportable licensing

KEYSIGHT TECHNOLOGIES

# W-CDMA/HSPA+ Measurement Application




## Choosing Between X-Series Applications and 89600 VSA Software

X-Series measurement applications provide embedded format-specific, one-button measurements for X-Series analyzers. With fast measurement speed, SCPI programmability, pass/fail testing and simplicity of operation, these applications are ideally suited for design verification and manufacturing. 89600 VSA software is a comprehensive set of tools for demodulation and vector signal analysis. These tools enable you to explore virtually every facet of a signal and optimize your most advanced designs. Use the 89600 VSA software with a variety of Keysight hardware platforms to pinpoint the answers to signal problems in R&D.

www.keysight.com/find/89600vsa

The W-CDMA/HSPA+ measurement application transforms the X-Series signal analyzers into 3GPP standard-based transmitter testers. The application provides fast, one-button RF conformance measurements to help you design, evaluate, and manufacture your W-CDMA/HSPA/HSPA+ base station and user equipment devices. The measurement application closely follows the 3GPP standard, allowing you to stay on the leading edge of your design and manufacturing challenges.

The W-CDMA/HSPA+ measurement application is one in a common library of more than 25 measurement applications in the Keysight X-Series, an evolutionary approach to signal analysis that spans instrumentation, measurements, and software. The X-Series analyzers, with upgradeable CPU, memory, disk drives, and I/O ports, enable you to keep your test assets current and extend instrument longevity. Proven algorithms, 100% code-compatibility, and a common UI across the X-Series create a consistent measurement framework for signal analysis that ensures repeatable results and measurement integrity so you can leverage your test system software through all phases of product development. In addition to fixed, perpetual licenses for our X-Series measurement applications, we also offer transportable licenses which can increase the value of your investment by allowing you to transport the application to multiple X-Series analyzers.

# Technology Overview

Wideband code-division multiple-access (W-CDMA) is one of the main technologies for the implementation of third-generation (3G) cellular systems. Release 99 of the 3GPP specifications provided the evolutionary path for GSM, GPRS, and EDGE technologies, enabling more spectrally efficient and better performing voice and data services through the introduction of a 5 MHz W-CDMA carrier.

High speed downlink packet access (HSDPA), the first step in the evolution of WCDMA was introduced in Release 5 of the 3GPP standard. HSDPA enhances the WCDMA downlink packet-data performance and capabilities in terms of higher peak data rate, reduced latency, and increased capacity.

High-speed uplink packet access (HSUPA) also known as "enhanced uplink" was introduced in W-CDMA Release 6. It provides improvements in W-CDMA uplink capabilities and performance in terms of much higher data rates in the uplink, reduced latency, and improved system capacity and is therefore a companion technology to HSDPA. Together, HSDPA and HSUPA are commonly referred to as high-speed packet access (HSPA). HSPA+, also known as "HSPA evolution," was introduced to W-CDMA in Release 7 with significant enhancements in Releases 8, 9 and 10 of the 3GPP standard. 3GPP Release 7 of the standard introduced new major HSPA+ features such as multiple input multiple output (MIMO) for downlink as well as higher order modulation; 64QAM in the downlink and 4PAM (16QAM) in the uplink. However, for downlink, it only allowed operation for either MIMO or the 64QAM. Release 8 of the standard allowed simultaneous operation of 64QAM and MIMO as well as defined dual carrier operation in the downlink (dual cell HSDPA). Release 9 of the standard defined dual carrier operation in the uplink (dual cell HSUPA), dual band HSDPA as well as combination of dual cell HSDPA and MIMO. Release 10 of the standard introduced four carrier HSDPA (quad-cell HSDPA).

Table 1. Key differences in W-CDMA, HSPA and HSPA+ standards.

| | W-CDMA | | HSPA | | HSPA+ | |
|---|---|---|---|---|---|---|
| | **Downlink** | **Uplink** | **HSDPA** | **HSUPA** | **HSPA+ downlink** | **HSPA+ uplink** |
| 3GPP standard | Release 99 | Release 99 | Release-5 | Release-6 | Release 7 and beyond | Release 7 and beyond |
| Modulation | QPSK | BPSK | QPSK, 16QAM | BPSK | QPSK, 16QAM, 64QAM | BPSK, 4PAM (16QAM) |
| Carrier bandwidth | 5 MHz | 5 MHz | 5 MHz | 5 MHz | 5 MHz, 10 MHz with dual-cell (Release 8), 20 MHz with four carrier HSDPA (Release 10) | 5 MHz, 10 MHz with dual-cell (Release 9) |
| Data channel | Dedicated (voice/ packet) | Dedicated (voice/ packet) | Shared (packet) | Dedicated (packet) | Shared (packet) | Dedicated (packet) |
| Peak data rate | 384 kbps | 384 kbps | 14.4 Mbps (16QAM) | 5.7 Mbps | · 21.1 Mbps (64QAM)<br>· 42.2 Mbps (64QAM and MIMO)<br>· 84.4 Mbps (64QAM DC-HSDPA and MIMO)<br>· 168.8 Mbps (64QAM QC-HSDPA and MIMO) | · 11.5 Mbps (16QAM)<br>· 23 Mbps (DC-HSUPA) |

# RF Transmitter Tests

With the X-Series signal analyzers and the W-CDMA/HSPA+ measurement application you can perform RF transmitter measurements on base station and user equipment devices in time, frequency, and modulation domains. Measure basic W-CDMA signals as well as HSPA (HSDPA/HSUPA) and HSPA+ signals with all channel configurations.
For high-speed manufacturing, a single acquisition combined W-CDMA measurement is available where the speed is up to 20 times faster than traditional one-button measurements (for details refer to Ordering Information).

## Standard-based RF transmitter tests

The RF transmitter test requirements for W-CDMA/HSPA/HSPA+ are defined in 3GPP TS 25.141 (BTS) and 3GPP TS34.121 (UE) of the 3GPP standard. Table 2 shows the 3GPP required BTS RF transmitter tests along with the corresponding measurements available in the X-Series and 89600 VSA W-CDMA applications. Table 4 shows similar information for UE transmitter tests.

Table 2. Required base station (BTS) RF transmitter measurements and the corresponding measurements in the N/W9073A measurement application and 89600 VSA software

| 3GPP TS25.141 subclause | Transmitter test | N/W9073A X-Series measurement application | 89601B Option B7U |
|---|---|---|---|
| 6.2.1 | Base station maximum output power | Total power[1] | Total power[1] |
| 6.2.2 | CPICH power accuracy | CPICH power[1] | CPICH power[1] |
| 6.3 | Frequency error | Freq error[1] | Freq error[1] |
| 6.4.1 | Inner loop power control | Channel power[2] | IQ meas time[3] |
| 6.4.2 | Power control steps | Channel power[2] | IQ meas time[3] |
| 6.4.3 | Power control dynamic range | Channel power[2] | IQ meas time[3] |
| 6.4.4 | Total power dynamic range | Total power[1] | Total power[1] |
| 6.4.5 | IPDL time mask | Chip power vs. time[4] | Composite meas time[4] |
| 6.5.1 | Occupied bandwidth | Occupied BW | OBW[5] |
| 6.5.2.1 | Spectrum emission mask | Spectrum emission mask | Not available[6] |
| 6.5.2.2 | Adjacent channel leakage power ratio | ACP | ACP[5] |
| 6.5.3 | Spurious emissions | Spurious emissions | Not available[6] |
| 6.6 | Transmit intermodulation | ACP, SEM, spur emissions or spectrum analyzer mode | Not available[6] |
| 6.7.1 | Error vector magnitude | EVM[1] | EVM[1] |
| 6.7.2 | Peak code domain error | PkCDE[1] | PkCDE[1] |
| 6.7.3 | Time alignment error in Tx diversity and MMO transmission | Time offset[7] (under mod accuracy) | Time offset (under error summary or MIMO info trace). Note: 89601B-B7U supports 2x2 MIMO.[7] |
| 6.7.4 | Relative code domain error | 64QAM RCDE (under mod accuracy) | RCDE for 64QAM (under composite error summary) |

1. For N/W9073A application, these values are found in “Capture Time Summary” view under Mod Accuracy measurement. For 89601B-B7U, these values are found under “Composite Slot Summary” trace.
2. This “channel power” metric is reported under Symbol EVM error summary result under code domain power measurement quad view. “Symbol power” trace under code domain power quad view can also be used for this measurement however RMS slot power is not provided.
3. Measurement parameters must be set up manually. IQ Meas Time with LogMag (dB) format with band marker over each slot length can be used.
4. Measurement parameters must be set up manually. For N/W9073A application, “chip power vs. time” is one of the traces displayed in the “symbol power” display under code domain quad view. For 89601B-B7U, “composite Meas Time” trace with LogMag (dB) format provides chip power in dB (dBm value not available).
5. Measurement parameters must be set up manually. If 89601B Option B7U is used with a Keysight spectrum or signal analyzer, these measurements are available as part of the spectrum analyzer mode under power suite measurements.
6. If 89601B Option B7U is used with a Keysight spectrum or signal analyzer, these measurements are available as part of the spectrum analyzer mode under power suite measurements.
7. Both the N/W9073A and 89601B Option B7U can perform the time offset measurement for Tx diversity. In addition, the 89601B Option B7U supports 2x2 MIMO analysis using dual channel hardware such as dual-MXA, dual-EXA, N7109A multi-channel signal analyzer, or Keysight Oscilloscopes.

## Measurement details

All of the RF transmitter measurements as defined by the 3GPP standard, as well as a wide range of additional measurements and analysis tools, are available with a press of a button (Table 3 and 5). These measurements are fully remote controllable via the IEC/IEEE bus or LAN, using SCPI commands.

Analog baseband measurements are available on the PXA or MXA signal analyzer equipped with BBIQ hardware. Supported baseband measurements include all of the modulation quality plus I/Q waveform measurements.

## Measurement details for base station transmitter test

Table 3. One-button measurements for base station provided by the N/W9073A measurement application

| Technology | W-CDMA | HSDPA | HSPA+ |
|---|---|---|---|
| Modulation Accuracy | | | |
| Rho | ● | ● | ● |
| RMS EVM | ● | ● | ● |
| Peak EVM | ● | ● | ● |
| Pk CDE | ● | ● | ● |
| Pk active CDE | ● | ● | ● |
| RMS mag error | ● | ● | ● |
| RMS phase error | ● | ● | ● |
| Freq error | ● | ● | ● |
| I/Q origin offset | ● | ● | ● |
| Time offset | ● | ● | ● |
| CPICH power | ● | ● | ● |
| Total power | ● | ● | ● |
| 64QAM RCDE | | | ● |
| QPSK EVM | ● | ● | ● |
| Code domain power | ● | ● | ● |
| Time alignment error for Tx diversity, and MIMO | ● | ● | ● |
| Channel power | ● | ● | ● |
| ACP | ● | ● | ● |
| Spectrum emission mask (SEM) | ● | ● | ● |
| Spurious emissions | ● | ● | ● |
| Occupied bandwidth | ● | ● | ● |
| CCDF | ● | ● | ● |
| Monitor spectrum | ● | ● | ● |
| I/Q waveform | ● | ● | ● |

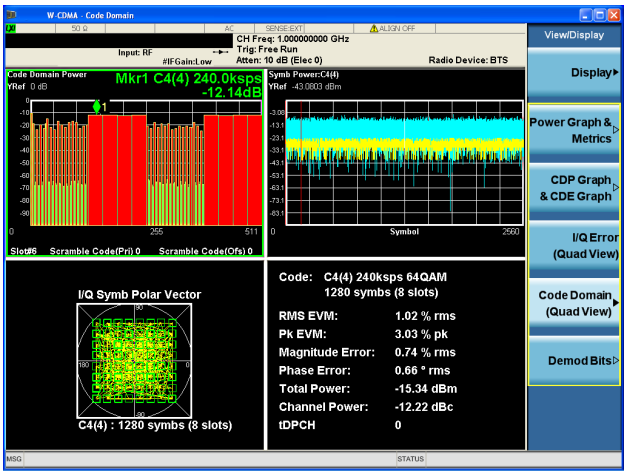



Figure 1. HSPA+ 64QAM code domain power quad view

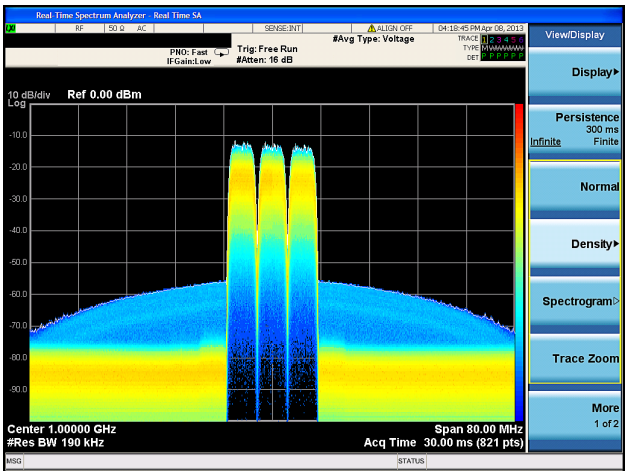



Figure 2. Real-time view of multi-carrier W-CDMA signal using RTSA option on the PXA or MXA signal analyzers

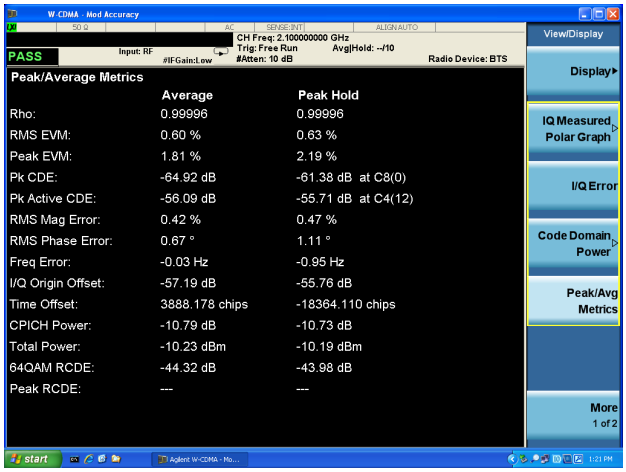



Figure 3. HSPA+ modulation analysis with 64QAM RCDE metrics

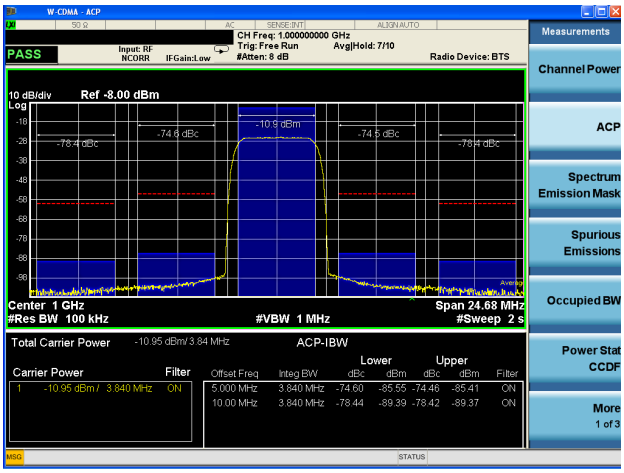



Figure 4. W-CDMA ACLR measurement

Table 4. Required user equipment (UE) RF transmitter measurements and the corresponding measurements in the N/W9073A measurement application and 89600 VSA software.

| 3GPP TS34.121 subclause | Transmitter test | N/W9073A X-Series measurement application | 89601B Option B7U |
|---|---|---|---|
| 5.2 | Maximum output power | Total power[1] | Total power[1] |
| 5.2A, 5.2AA | Maximum output power with HS-DPCCH | Total power[1] | Total power[1] |
| 5.2B | Maximum output power with HS-DPCCH and E-DCH | Total power[1] | Total power[1] |
| 5.2C | UE Relative code domain power accuracy | Not available[2] | Not available[2] |
| 5.2D | UE Relative code domain power accuracy for HS-DPCCH and E-DCH | Not available[2] | Not available[2] |
| 5.2E | UE Relative code domain power accuracy for HS-DPCCH and E-DCH with 16QAM | Not available[2] | Not available[2] |
| 5.3 | Frequency error | Freq error[1] | Freq error[1] |
| 5.4.1 | Open loop power control in the uplink | Power control (Meas type = PRACH power) | Not available |
| 5.4.2 | Inner loop power control in the uplink | Power control (Meas type = slot power) | IQ Meas time[3] |
| 5.4.3 | Minimum output power | Channel power | Channel power using band power marker |
| 5.4.4 | Out-of-synchronization handling of output power | Manual configuration using symbol power vs. time or I/Q waveform (time domain) trace | Not available |
| 5.5.1 | Transmit off power | Power control (Meas type = slot power and I/Q waveform with RRC filtered) | Not available |
| 5.5.2 | Transmit on/off time mask | Power control (Meas type = PRACH power) | Manual configuration using “Time” trace with trigger and band power marker |
| 5.6 | Change of TFC | Power control (Meas type = slot power) | IQ meas time[3] |
| 5.7 | Power setting in uplink compressed mode | Power control (Meas type = slot power) | IQ meas time[3] |
| 5.7A | HS-DPCCH power control | Power control (Meas type = slot phase) with meas interval = 0.5 slot | IQ meas time with “LogMag (dB)” with band marker over each half-slot length. |
| 5.8 | Occupied bandwidth | Occupied bandwidth | OBW[4] |
| 5.9 | Spectrum emission mask | Spectrum emission mask | Not available[5] |
| 5.9A | Spectrum emission mask with HS-DPCCH | Spectrum emission mask | Not available[5] |
| 5.9B | Spectrum emission mask with E-DCH | Spectrum emission mask | Not available[5] |
| 5.10 | Adjacent channel leakage power ratio | ACP | ACP[4] |
| 5.10A | Adjacent channel leakage power ration with HS-DPCCH | ACP | ACP[4] |
| 5.10B | Adjacent channel leakage power ratio with E-DCH | ACP | ACP[4] |
| 5.11 | Spurious emissions | Spurious emissions | Not available[5] |

1. For N/W9073A application, these values are found in “Capture Time Summary” table under Mod Accuracy measurement. For 89601B-B7U, these values are found under “Composite Slot Summary” trace.
2. This measurement is not supported. One possible way is to make code domain power measurement and subtract the result from the expected code domain power value.
3. Measurement parameters must be set up manually. IQ Meas Time trace with LogMag(dB) format and band power marker over each slot length.
4. Measurement parameters must be set up manually. If 89601B Option B7U is used with a Keysight spectrum or signal analyzer, these measurements are available as part of the spectrum analyzer mode under PowerSuite measurements.
5. If 89601B Option B7U is used with a Keysight spectrum or signal analyzer, these measurements are available as part of the spectrum analyzer mode under power suite measurements.

Table 4. (continued)

| 3GPP TS34.121 Paragraph # | Transmitter test | N/W9073A X-Series measurement application | 89601B Option B7U |
|---|---|---|---|
| 5.12 | Transmit intermodulation | ACP | ACP[4] |
| 5.13.1 | Error vector magnitude | EVM[1] | EVM[1] |
| 5.13.1A | Error vector magnitude with HS-DPCCH | Power control (meas type = slot phase) with meas interval = 0.5 slot | EVM (over half-slot length) |
| 5.13.1AA | Error vector magnitude and phase discontinuity with HS-DPCCH | Power control (meas type = slot phase) with meas interval = 0.5 slot | Not available |
| 5.13.1AAA | EVM and IQ origin offset for HS-DPCCH and E-DCH with 16QAM | Mod accuracy | Error summary trace |
| 5.13.2 | Peak code domain error | PkCDE [1] | PkCDE [1] |
| 5.13.2A | Relative code domain error with HS-DPCCH | RCDE in mod accuracy | RCDE in code domain offsets |
| 5.13.2B | Relative code domain error with HS-DPCCH and E-DCH | RCDE in mod accuracy | RCDE in code domain offsets |
| 5.13.2C | Relative code domain error with HS-DPCCH and E-DCH with 16QAM | RCDE in mod accuracy | RCDE in code domain offsets |
| 5.13.3 | UE phase discontinuity | Power control (meas type = slot phase) | Not available |
| 5.13.4 | PRACH preamble quality | QPSK EVM | QPSK EVM (using Option AYA) |

1. For N/W9073A application, these values are found in “Capture Time Summary” table under Mod Accuracy measurement. For 89601B-B7U, these values are found under “Composite Slot Summary” trace.

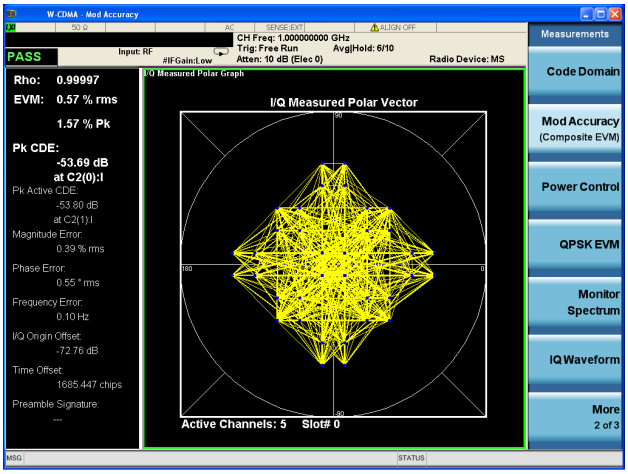



Figure 5. W-CDMA uplink EVM measurement

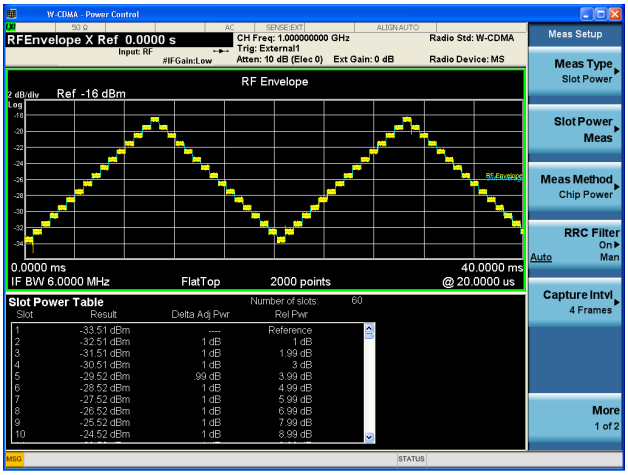



Figure 6. W-CDMA UL power control measurement

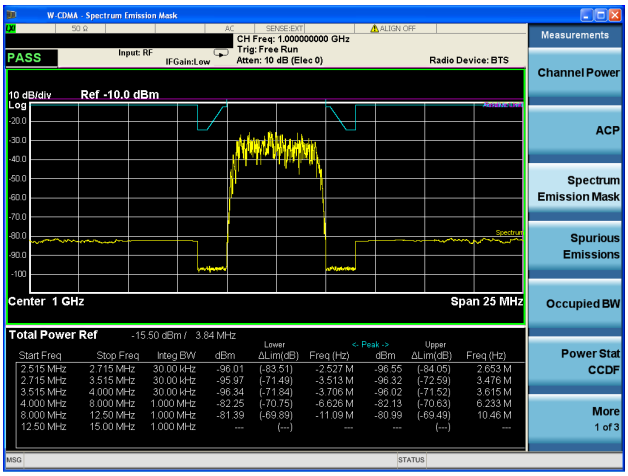



Figure 7. W-CDMA spectrum emissions mask measurement


Figure 8. HSUPA capture time summary trace showing error metrics for 15 consecutive slots

## Measurement details for user equipment transmitter test

*Table 5. One-button measurements for user equipment provided by the N/W9073A measurement application*

| Technology | W-CDMA | HSUPA | HSPA+ |
|---|---|---|---|
| Modulation accuracy | | | |
| Rho | ● | ● | ● |
| RMS EVM | ● | ● | ● |
| Peak EVM | ● | ● | ● |
| Pk CDE | ● | ● | ● |
| Pk active CDE | ● | ● | ● |
| RMS mag error | ● | ● | ● |
| RMS phase error | ● | ● | ● |
| Freq error | ● | ● | ● |
| I/Q origin offset | ● | ● | ● |
| Time offset | ● | ● | ● |
| Total power | ● | ● | ● |
| Peak RCDE | ● | ● | ● |
| QPSK EVM | ● | ● | ● |
| Code domain power | ● | ● | ● |
| Power control | ● | ● | ● |
| PRACH power | ● | ● | ● |
| Slot power | ● | ● | ● |
| Slot phase | ● | ● | ● |
| Channel power | ● | ● | ● |
| ACP | ● | ● | ● |
| Spectrum emission mask (SEM) | ● | ● | ● |
| Spurious emissions | ● | ● | ● |
| Occupied bandwidth | ● | ● | ● |
| CCDF | ● | ● | ● |
| Monitor spectrum | ● | ● | ● |
| I/Q waveform | ● | ● | ● |

## Single acquisition combined measurements

The N9073A-XFP single acquisition combined W-CDMA measurement application is for high-speed manufacturing of W-CDMA mobile phone transmitters, wireless components, such as power amplifiers, and low-cost pico/femtocell base stations. Used with the MXA and EXA signal analyzers, it provides up to 20 times speed improvement compared to traditional one-button measurements for a combined W-CDMA ACP, modulation quality (Rho) and QPSK EVM.

## Single Acquisition

Contains one continuous block of captured data collected using predefined capture settings.

## Combined Measurements

Implies that the measurement sequence performed by the analyzer can accommodate any mix of transmitter power measurements and modulation quality measurements performed on the data collected within the capture period.

# Key Specifications

## Definitions

- Specifications describe the performance of parameters.
- 95th percentile values indicate the breadth of the population (≈2σ) of performance tolerances expected to be met in 95% of cases with a 95% confidence.
- Typical values are designated with the abbreviation "typ." These are performance beyond specification that 80% of the units exhibit with a 95% confidence.
- Nominal values are designated with the abbreviation "nom." These values indicate expected performance, or describe product performance that is useful in the application of the product.

Note: Data subject to change

## You Can Upgrade!

Options can be added after your initial purchase.

All of our X-Series application options are license-key upgradeable.

UPGRADE

| Description | | | PXA | MXA | EXA | CXA |
|---|---|---|---|---|---|---|
| **Channel power** | | | | | | |
| Minimum power at RF input | | | –50 dBm (nom) | –50 dBm (nom) | –50 dBm (nom) | –50 dBm (nom) |
| Absolute power accuracy (Atten = 10 dB) | | | ±0.61 dB (±0.19 dB 95th percentile) | ±0.82 dB (±0.23 dB 95th percentile) | ±0.94 dB (±0.27 dB 95th percentile) | ±1.33 dB (±0.61 dB 95th percentile) |
| Measurement floor | | | –85.8 dBm (nom) | –83.8 dBm (nom) | –79.8 dBm (nom) | –76.8 dBm (nom) |
| **Adjacent channel power (ACPR, ACLR)** | | | | | | |
| **Single carrier** | | | | | | |
| Minimum power at RF input | | | –36 dBm (nom) | –36 dBm (nom) | –36 dBm (nom) | –36 dBm (nom) |
| ACPR accuracy (RRC weighted, 3.84 MHz noise BW) | | | | | | |
| | Radio | Offset frequency | | | | |
| | UE | 5 MHz (ACPR –30 to –36 dBc) | ±0.08 dB | ±0.14 dB | ±0.22 dB | ±0.76 dB |
| | UE | 10 MHz (ACPR –40 to –46 dBc) | ±0.12 dB | ±0.21 dB | ±0.34 dB | ±0.73 dB |
| | BTS | 5 MHz (ACPR –42 to –48 dBc) | ±0.20 dB | ±0.49 dB | ±1.07 dB | ±1.72 dB |
| | BTS | 10 MHz (ACPR –48 to –53 dBc) | ±0.21 dB | ±0.44 dB | ±1.00 dB | ±1.96 dB |
| | BTS | 5 MHz (–48 dBc with non-coherent ACPR) | ±0.10 dB | ±0.21 dB | ±0.44 dB | ±0.87 dB |
| Dynamic range (RRC weighted, 3.84 MHz noise BW) | | | | | | |
| | Noise correction | Offset frequency | Method | | | |
| | Off | 5 MHz | Filtered IBW | –80 dB (typ) | –73 dB (typ) | –68 dB (typ) | –63 dB (typ) |
| | Off | 5 MHz | Fast | –80 dB (typ) | –72 dB (typ) | –67 dB (typ) | n/a |
| | Off | 10 MHz | Filtered IBW | –87 dB (typ) | –79 dB (typ) | –74 dB (typ) | –67 dB (typ) |
| | On | 5 MHz | Filtered IBW | –83.5 dB (typ); –88 dB (nom) | –78 dB (typ) | –73 dB (typ) | –73 dB (typ) |
| | On | 10 MHz | Filtered IBW | –89.5 dB (typ) | –82 dB (typ) | –76 dB (typ) | –78 dB (typ) |

| Description | PXA | MXA | EXA | CXA |
|---|---|---|---|---|
| **RRC weighting accuracy** | | | | |
| White noise in adjacent channel | 0.00 dB (nom) | 0.00 dB (nom) | 0.00 dB (nom) | 0.00 dB (nom) |
| TOI-induced spectrum | 0.001 dB (nom) | 0.001 dB (nom) | 0.001 dB (nom) | 0.001 dB (nom) |
| rms CW error | 0.012 dB (nom) | 0.012 dB (nom) | 0.012 dB (nom) | 0.012 dB (nom) |
| **Multiple carriers (RRC weighted, 3.84 MHz noise BW)** | | | | |
| ACPR dynamic range (two carriers) | | | | |
| 5 MHz offset, noise correction (NC) | –83 dB (nom), NC on | –70 dB (nom), NC off | n/a | n/a |
| ACPR accuracy (two carriers) | | | | |
| 5 MHz offset, noise correction on | ±0.20 dB (nom) | ±0.42 dB (nom) | n/a | n/a |
| ACPR dynamic range (four carriers) | | | | |
| 5 MHz offset, noise correction off (NFE off on PXA) | –69 dB (nom) | –64 dB (nom) | n/a | n/a |
| 5 MHz offset, noise correction on | –79 dB (nom) | –72 dB (nom) | n/a | n/a |
| ACPR accuracy (four carriers, 5 MHz offset) | | | | |
| BTS, incoherent TOI, ACPR range –42 to –48 dB | | | | |
| 5 MHz offset, noise correction off | ±0.18 dB | ±0.42 dB | n/a | n/a |
| 5 MHz offset, noise correction on | ±0.09 dB | ±0.17 dB | n/a | n/a |
| **Spectrum emission mask** | | | | |
| Dynamic range, relative 2.515 MHz offset | 87.9 (92.6 dB typ) | 81.9 (88.2 dB typ) | 76.6 (83.8 dB typ) | 73.4 (80.2 dB typ) |
| Sensitivity, absolute 2.515 MHz offset | –103.7 (–106.7 dBm typ) | –99.7 (–104.7 dBm typ) | –94.7 (–100.7 dBm typ) | –91.7 (–97.7 dBm typ) |
| Accuracy, 2.515 MHz offset | | | | |
| Relative | ±0.06 dB | ±0.12 dB | ±0.11 dB | ±0.11 dB |
| Absolute (20 to 30 °C) | ±0.62 dB (±0.20 dB 95% confidence) | ±0.88 dB (±0.27 dB 95% confidence) | ±1.15 dB (±0.31 dB 95% confidence) | ±1.53 dB (±0.65 dB 95% confidence) |
| **Spurious emissions** | | | | |
| Dynamic range, relative | 88.8 (92.1 dB typ) | 81.3 (82.2 dB typ) | 76.9 (77.4 dB typ) | 70.7 (75.9 dB typ) |
| Sensitivity, absolute | –88.4 (–91.4 dBm typ) | –84.4 (–89.4 dBm typ) | –79.4 (–85.4 dBm typ) | –76.5 (–82.5 dBm typ) |
| Accuracy (95% confidence; attenuation = 10 dB) | | | | |
| Frequency range | | | | |
| 20 Hz to 3.6 GHz | ±0.19 dB | ±0.29 dB | ±0.38 dB (9 kHz to 3.6 GHz) | ±0.81 dB (100 kHz to 3.0 GHz) |
| 3.5 GHz to 8.4 GHz | ±1.08 dB | ±1.17 dB | ±1.22 dB (3.5 GHz to 7.0 GHz) | ±1.80 dB (3.0 GHz to 7.5 GHz) |
| 8.3 GHz to 13.6 GHz | ±1.48 dB | ±1.54 dB | ±1.59 dB (6.9 GHz to 13.6 GHz) | n/a |
| **Occupied bandwidth** | | | | |
| Minimum power at RF input | –30 dBm (nom) | –30 dBm (nom) | –30 dBm (nom) | –30 dBm (nom) |
| Frequency accuracy | ±10 kHz (RBW = 30 kHz; number of points = 1001 span = 10 MHz | ±10 kHz (RBW = 30 kHz; number of points = 1001 span = 10 MHz | ±10 kHz (RBW = 30 kHz; number of points = 1001 span = 10 MHz | ±10 kHz (RBW = 30 kHz; number of points = 1001 span = 10 MHz |
| **Power statistics CCDF** | | | | |
| Histogram resolution | 0.01 dB | 0.01 dB | 0.01 dB | 0.01 dB |

| | | | | |
|---|---|---|---|---|
| **Code domain** | | | | |
| BTS measurements,<br>–25 dBm ≤ mixer level ≤ –15 dBm, 20 to 30 °C | | | | |
| Code domain power | | | | |
| Absolute accuracy (95% confidence)<br>(–10 dBc CPICH, Atten = 10 dB) | ±0.25 dB | ±0.25 dB | ±0.32 dB | ±0.61 dB |
| Relative accuracy | | | | |
| CDP range between 0 and –10 dBc | ±0.015 dB | ±0.015 dB | ±0.015 dB | ±0.015 dB |
| CDP range between –10 and –30 dBc | ±0.06 dB | ±0.06 dB | ±0.06 dB | ±0.06 dB |
| CDP range between –30 and –40 dBc | ±0.07 dB | ±0.07 dB | ±0.07 dB | ±0.07 dB |
| Power control steps accuracy | | | | |
| CDP range between 0 and –10 dBc | ±0.03 dB | ±0.03 dB | ±0.03 dB | ±0.03 dB |
| CDP range between –10 and –30 dBc | ±0.12 dB | ±0.12 dB | ±0.12 dB | ±0.12 dB |
| Power dynamic range accuracy | | | | |
| CDP range 0 to –40 dBc | ±0.14 dB | ±0.14 dB | ±0.14 dB | ±0.14 dB |
| Symbol power vs. time | | | | |
| Relative accuracy | | | | |
| CDP range between 0 and –10 dBc | ±0.015 dB | ±0.015 dB | ±0.015 dB | ±0.015 dB |
| CDP range between –10 and –30 dBc | ±0.06 dB | ±0.06 dB | ±0.06 dB | ±0.06 dB |
| vCDP range between –30 and –40 dBc | ±0.07 dB | ±0.07 dB | ±0.07 dB | ±0.07 dB |
| Symbol error vector magnitude | | | | |
| Accuracy for range between 0 and –25 dBc | ±1.0% (nom) | ±1.0% (nom) | ±1.0% (nom) | ±1.0% (nom) |
| **Modulation accuracy (composite EVM)** | | | | |
| BTS measurements,<br>–25 dBm ≤ mixer level ≤ –15 dBm, 20 to 30 °C | | | | |
| Composite EVM range | 0 to 25% | 0 to 25% | 0 to 25% | 0 to 25% |
| Composite EVM floor | 1.50% | 1.50% | 1.60% | 1.6% |
| Composite EVM floor (with Option BBA) | ±1.5% (nom) | ±1.5% (nom) | n/a | n/a |
| Composite EVM accuracy | ±1.0%, (±0.5% in the EVM range of 12.5% to 22.5%, no 16QAM nor 64QAM codes) | ±1.0%, (±0.5% in the EVM range of 12.5% to 22.5%, no 16QAM nor 64QAM codes) | ±1.0%, (±0.5% in the EVM range of 12.5% to 22.5%, no 16QAM nor 64QAM codes) | ±1.0%, (±0.5% in the EVM range of 12.5% to 22.5%, no 16QAM codes) |
| Peak code domain error accuracy | ±1.0 dB | ±1.0 dB | ±1.0 dB | ±1.0 dB |
| I/Q origin offset, DUT maximum offset | –10 dBc (nom) | –10 dBc (nom) | –10 dBc (nom) | –10 dBc (nom) |
| I/Q origin offset, analyzer noise floor | –50 dBc (nom) | –50 dBc (nom) | –50 dBc (nom) | –50 dBc (nom) |
| Frequency error range | ±3 kHz (nom) | ±3 kHz (nom) | ±3 kHz (nom) | ±3 kHz (nom) |
| Frequency error accuracy | ±5 Hz + (transmitter frequency x frequency reference accuracy) | ±5 Hz + (transmitter frequency x frequency reference accuracy) | ±5 Hz + (transmitter frequency x frequency reference accuracy) | ±5 Hz + (transmitter frequency x frequency reference accuracy) |
| Time offset | | | | |
| Absolute frame offset accuracy | ±20 nsec | ±20 nsec | ±20 nsec | ±20 nsec |
| Relative frame offset accuracy | ±5.0 nsec (nom) | ±5.0 nsec (nom) | ±5.0 nsec (nom) | ±5.0 nsec (nom) |
| Relative offset accuracy (for STTD diff mode) | ±1.25 nsec | ±1.25 nsec | ±1.25 nsec | ±1.25 nsec |

| | | | | |
|---|---|---|---|---|
| **Power control** | | | | |
| Using 5 MHz resolution BW | | | | |
| Absolute power measurement | | | | |
| Accuracy 0 to –20 dBm | ±0.7 dB (nom) | ±0.7 dB (nom) | ±0.7 dB (nom) | ±0.7 dB (nom) |
| Accuracy –20 to –60 dBm | ±1.0 dB (nom) | ±1.0 dB (nom) | ±1.0 dB (nom) | ±1.0 dB (nom) |
| Relative power measurement accuracy | | | | |
| Step range ±1.5 dB | ±0.1 dB (nom) | ±0.1 dB (nom) | ±0.1 dB (nom) | ±0.1 dB (nom) |
| Step range ±3.0 dB | ±0.15 dB (nom) | ±0.15 dB (nom) | ±0.15 dB (nom) | ±0.15 dB (nom) |
| Step range ±4.5 dB | ±0.2 dB (nom) | ±0.2 dB (nom) | ±0.2 dB (nom) | ±0.2 dB (nom) |
| Step range ±26.0 dB | ±0.3 dB (nom) | ±0.3 dB (nom) | ±0.3 dB (nom) | ±0.3 dB (nom) |
| **QPSK EVM** | | | | |
| –25 dBm ≤ mixer level ≤ –15 dBm, 20 to 30 °C | | | | |
| EVM | | | | |
| Range | 0 to 25% (nom) | 0 to 25% (nom) | 0 to 25% (nom) | 0 to 25% (nom) |
| Floor | 1.50% | 1.50% | 1.60% | 1.6% |
| Accuracy | ±1.0% | ±1.0% | ±1.0% | ±1.0% |
| I/Q origin offset | | | | |
| DUT maximum offset | –10 dBc (nom) | –10 dBc (nom) | –10 dBc (nom) | –10 dBc (nom) |
| Analyzer noise floor | –50 dBc (nom) | –50 dBc (nom) | –50 dBc (nom) | –50 dBc (nom) |
| Frequency error | | | | |
| Range | ±30 kHz (nom) | ±30 kHz (nom) | ±30 kHz (nom) | ±30 kHz (nom) |
| Accuracy | ±5 Hz + (transmitter frequency x frequency reference accuracy) | ±5 Hz + (transmitter frequency x frequency reference accuracy) | ±5 Hz + (transmitter frequency x frequency reference accuracy) | ±5 Hz + (transmitter frequency x frequency reference accuracy) |

For a complete list of specifications refer to the appropriate specifications guide.

PXA: www.keysight.com/find/pxa_specifications
MXA: www.keysight.com/find/mxa_specifications
EXA: www.keysight.com/find/exa_specifications
CXA: www.keysight.com/find/cxa_specifications

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N9073A & W9073A W-CDMA/HSPA+ X-Series measurement application

| Description | Model-Option | | Additional information |
|---|---|---|---|
| | PXA, MXA, EXA | CXA/CXA-m[1] | |
| W-CDMA | N9073A-1FP | W9073A-1FP | |
| HSPA | N9073A-2FP | W9073A-2FP | Requires 1FP |
| HSPA+ | N9073A-3FP | W9073A-3FP | Requires 1FP and 2FP |
| W-CDMA feature enhancements | N9073A-CFP | W9073A-BFP | Requires 1FP |
| Single acquisition combined W-CDMA | N9073A-XFP | | MXA and EXA only; requires 1FP |

1. The CXA-m only supports transportable license. Visit the product web page for further information.

# Hardware configuration

## N9030A PXA signal analyzer

| Description | Model-Option | Additional information |
|---|---|---|
| 3.6, 8.4, 13.6, 26.5, 43, 44, or 50 GHz frequency range | N9030A-503, 508, 513, 526, 543, 544, or 550 | One required |
| Analog baseband IQ (BBIQ) inputs | N9030A-BBA | Required for analog baseband measurement |
| 25 MHz, 40 MHz, 85 MHz, 160 MHz analysis bandwidth | N9030A-B25, -B40, -B85, -B1X | One required for analysis over 10 MHz such as 4 carrier CCDF |
| Precision frequency reference | N9030A-PFR | Recommended |
| Electronic attenuator, 3.6 GHz | N9030A-EA3 | Recommended |
| Preamplifier, 3.6, 8.4, 13.6, 26.5, 43, 44, or 50 GHz | N9030A-P03, P08, P13, P26, P43, P44, or P50 | One recommended |

## N9020A MXA signal analyzer

| Description | Model-Option | Additional information |
|---|---|---|
| 3.6, 8.4, 13.6, or 26.5 GHz frequency range | N9020A-503, 508, 513 or 526 | One required |
| Analog baseband IQ (BBIQ) inputs | N9020A-BBA | Required for analog baseband measurement |
| 25, 40, 85, 125, or 160 MHz analysis bandwidth | N9020A-B25, -B40, -B85, -B1A, -B1X | One required for analysis over 10 MHz such as 4 carrier CCDF |
| Precision frequency reference | N9020A-PFR | Recommended |
| Electronic attenuator, 3.6 GHz | N9020A-EA3 | Recommended |
| Preamplifier, 3.6, 8.4, 13.6 or 26.5 GHz | N9020A-P03, P08, P13 or P26 | One recommended |

## N9010A EXA signal analyzer

| Description | Model-Option | Additional information |
|---|---|---|
| 3.6, 7.0, 13.6, 26.5, 32, or 44 GHz frequency range | N9010A-503, 507, 513, 526, 532, or 544 | One required |
| 25 MHz, 40 MHz analysis bandwidth | N9010A-B25, B40 | One required for analysis over 10 MHz such as 4 carrier CCDF |
| Precision frequency reference | N9010A-PFR | Recommended |
| Fine step attenuator | N9010A-FSA | Recommended |
| Electronic attenuator, 3.6 GHz | N9010A-EA3 | Recommended |
| Preamplifier, 3.6, 7.0, 13.6, 26.5, 32, or 44 GHz | N9010A-P03, P07, P13, P26, P32, or P44 | One recommended |

## N9000A CXA signal analyzer

| Description | Model-Option | Additional information |
|---|---|---|
| 3.0, 7.5, 13.6, or 26.5 GHz frequency range | N9000A-503 or 507 | One required |
| 25 MHz analysis bandwidth | N9000A-B25 | Required for analysis over 10 MHz such as 4 carrier CCDF |
| Precision frequency reference | N9000A-PFR | Recommended |
| Fine step attenuator | N9000A-FSA | Recommended |
| Preamplifier, 3.0 or 7.5 GHz | N9000A-P03 or P07 | One recommended |

# Related Literature

*N9073A & W9073A W-CDMA/HSPA/HSPA+ Self-Guided Demonstration,* literature number 5990-5926EN

*N9073A & W9073A W-CDMA/HSPA/HSPA+ Measurement Application Measurement Guide,* part number N9073-90017

*Designing and Testing 3GPP W-CDMA Base Transceiver Stations (Including Femtocells), Application Note 1355,* literature number 5980-1239E

*Designing and Testing 3GPP W-CDMA User Equipment, Application Note 1356,* literature number 5980-1238E

*Concepts of High Speed Downlink Packet Access: Bringing Increased Throughput and Efficiency to W-CDMA, Application Note,* literature number 5989-2365EN

*User's and Programmer's Reference Guide is available in the library section of the N9073A and W9073A product pages.*

# Web

Product pages:
**www.keysight.com/find/n9073a**
**www.keysight.com/find/w9073a**

X-Series measurement applications:
**www.keysight.com/find/X-Series_Apps**

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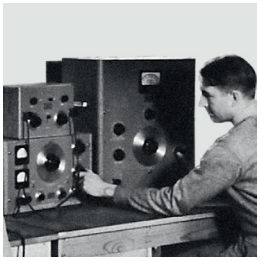
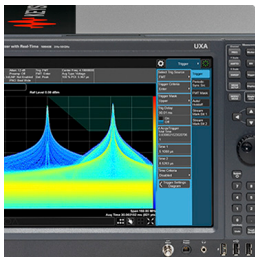


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