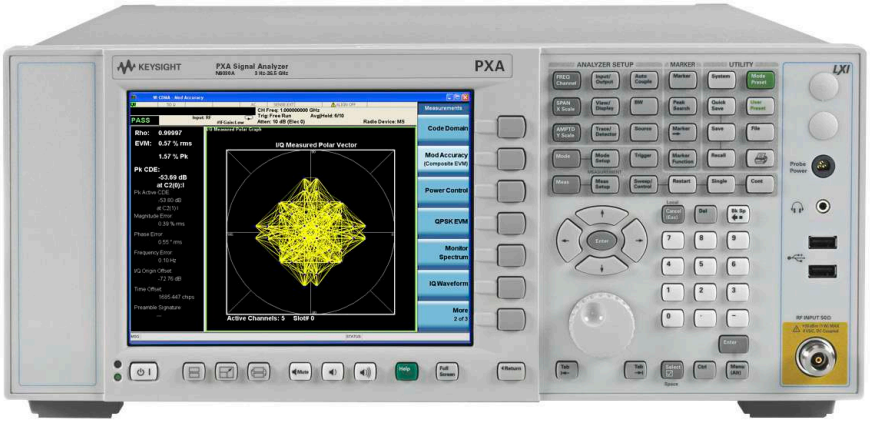
Keysight Technologies
W-CDMA/HSPA+
X-Series Measurement Application
N9073A & W9073A

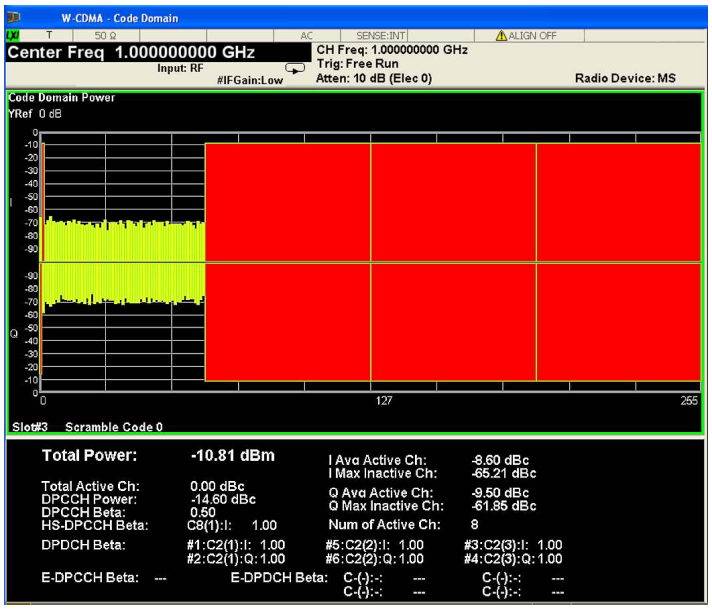


Technical Overview

- 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) • 42.2 Mbps (64QAM and MIMO) • 84.4 Mbps (64QAM DC-HSDPA and MIMO) • 168.8 Mbps (64QAM QC-HSDPA and MIMO)	• 11.5 Mbps (16QAM) • 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	●	●	●

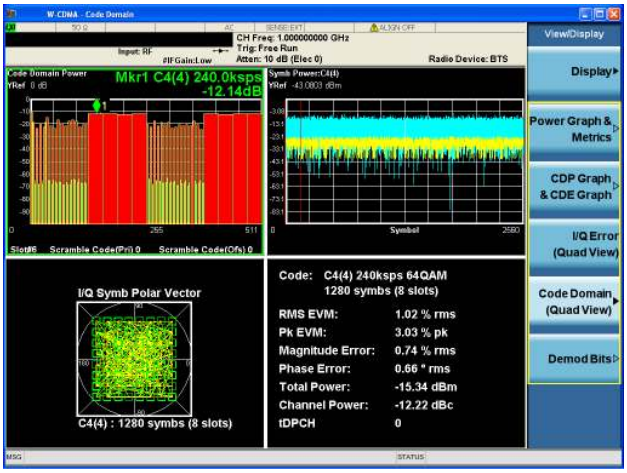


Figure 1. HSPA+ 64QAM code domain power quad view

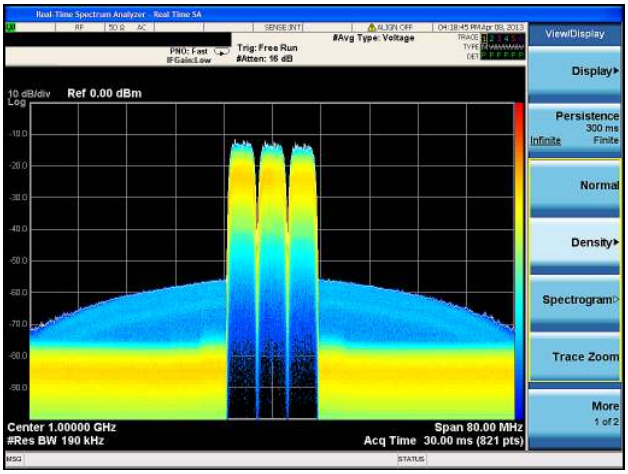


Figure 2. Real-time view of multi-carrier W-CDMA signal using RTSA option on the PXA or MXA signal analyzers

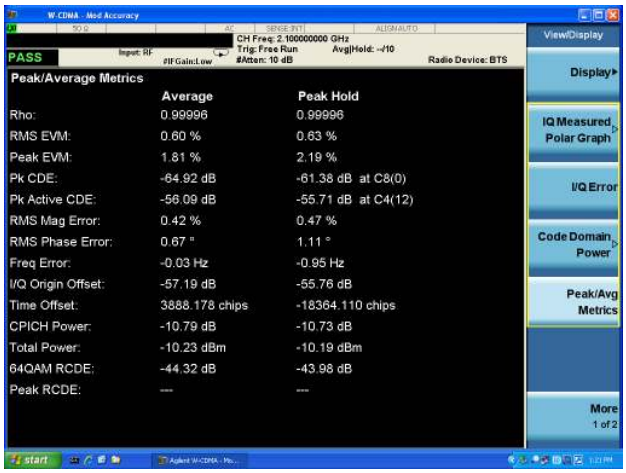


Figure 3. HSPA+ modulation analysis with 64QAM RCDE metrics

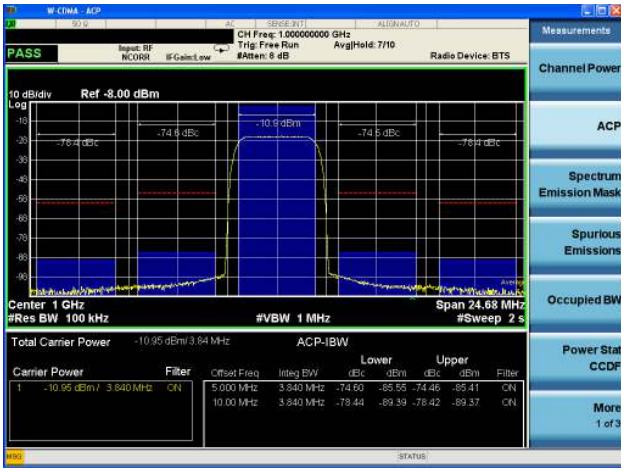


Figure 4. W-CDMA ACLR measurement

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.*

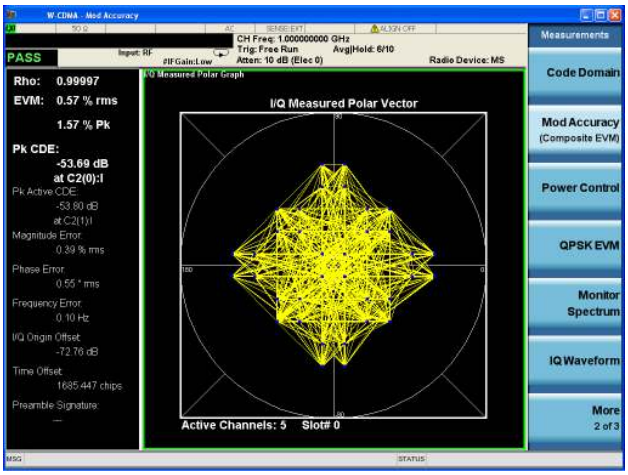


Figure 5. W-CDMA uplink EVM measurement

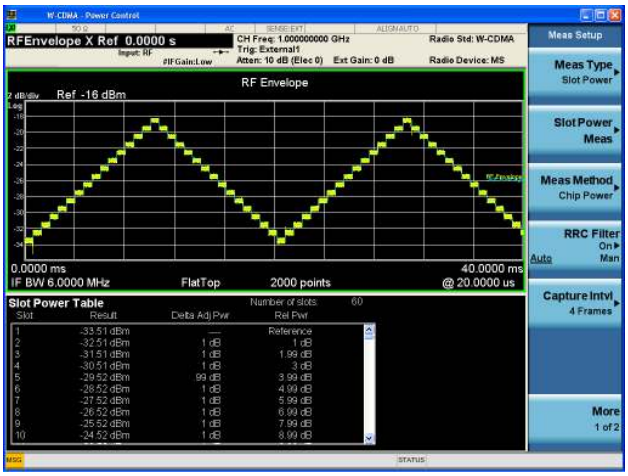


Figure 6. W-CDMA UL power control measurement

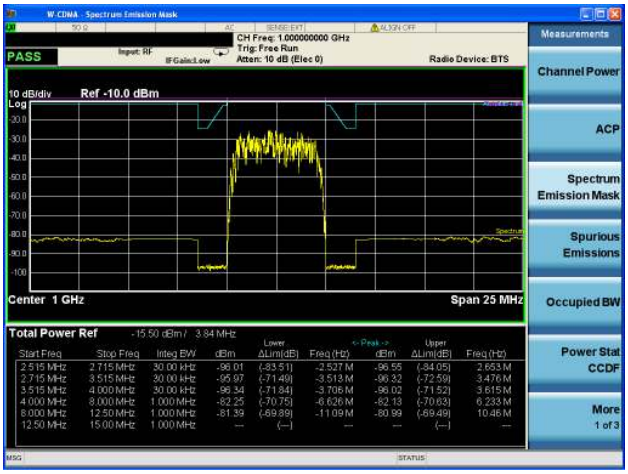


Figure 7. W-CDMA spectrum emissions mask measurement

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 covered by the product warranty.
- 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. These values are not covered by the product warranty.
- Typical values are designated with the abbreviation "typ." These are performance beyond specification that 80% of the units exhibit with a 95% confidence. These values are not covered by the product warranty.
- 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, but is not covered by the product warranty.

Note: Data subject to change

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)	–78.8 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	±0.65 dB
BTS 5 MHz (ACPR –42 to –48 dBc)	±0.20 dB	±0.49 dB	±1.07 dB	±1.41 dB
BTS 10 MHz (ACPR –48 to –53 dBc)	±0.21 dB	±0.44 dB	±1.00 dB	±1.62 dB
BTS 5 MHz (–48 dBc with non-coherent ACPR)	±0.10 dB	±0.21 dB	±0.44 dB	±0.72 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)	–66 dB (typ)
On 10 MHz Filtered IBW	–89.5 dB (typ)	–82 dB (typ)	–76 dB (typ)	–72 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)	74.3 (80.3 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)	–93.7 (–99.7 dBm typ)
Accuracy, 2.515 MHz offset				
Relative	±0.06 dB	±0.12 dB	±0.12 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	±1.05 dB ±0.31 dB 95% confidence	±1.53 dB ±0.65 dB 95% confidence
Spurious emissions				
Dynamic range, relative	104.1 (107.4 dB typ)	96.7 (101.7 dB typ)	93.1 (98.4 dB typ)	83.9 (86.7 dB typ)
Sensitivity, absolute	–88.4 (–91.4 dBm typ)	–84.4 (–89.4 dBm typ)	–79.4 (–85.4 dBm typ)	–78.4 (–84.4 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, –25 dBm ≤ mixer level ≤ –15 dBm, 20 to 30 °C				
Code domain power				
Absolute accuracy (95% confidence) (–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
CDP 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, –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% (nom)
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% (nom)
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

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

Description	Model-Option		Additional information
	PXA, MXA, EXA	**CXA**	
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

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 or 7.5 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:
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