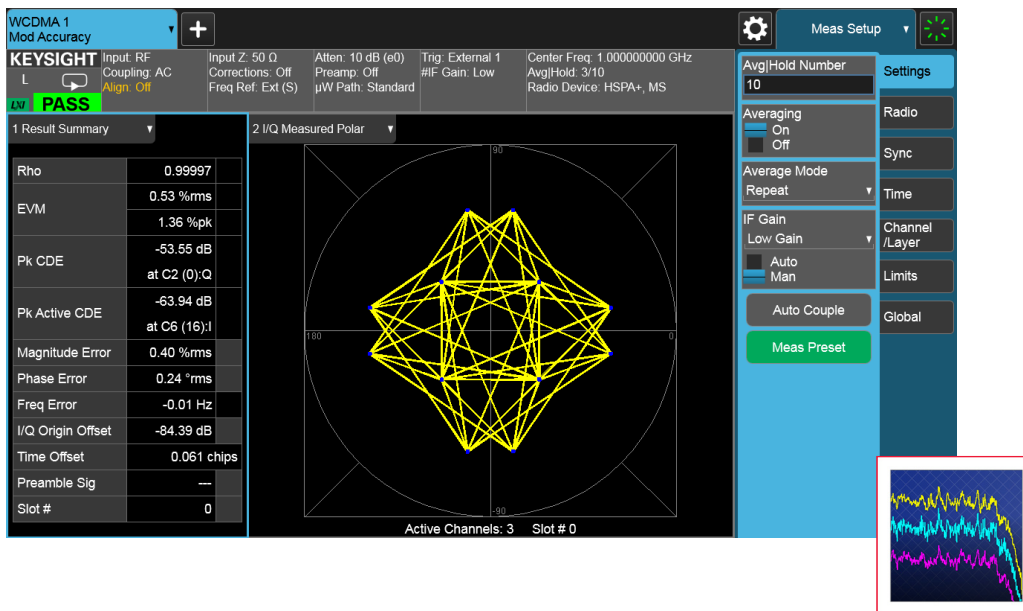# Keysight Technologies

W-CDMA/HSPA+
X-Series Measurement App, Multi-Touch UI
N9073EM0E

Technical Overview

- Perform W-CDMA, HSPA, and HSPA+ downlink and uplink transmitter test per 3GPP standard
- Perform one-touch tests with pass/fail limit per 3GPP standard
- Use multi-touch user interface or SCPI remote interface
- Leverage built-in, context-sensitive help
- Flexible licensing provides the option of using perpetual or time based licenses with one or multiple signal analyzers

KEYSIGHT
TECHNOLOGIES

W-CDMA/HSPA+ Measurement Application

The W-CDMA/HSPA+ measurement application transforms the X-Series signal analyzers into 3GPP standard-based transmitter testers. The application provides fast, one-touch 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.

X-Series measurement applications

X-Series measurement applications increase the capability and functionality of Keysight Technologies, Inc. signal analyzers to speed time to insight. They provide essential measurements for specific tasks in general-purpose, cellular communications, wire-less connectivity and digital video applications, covering established standards and modulation types. Applications are supported across X-Series analyzers, with the only difference being the level of performance achieved by the hardware you select.

X-Series measurement applications can help you:
– Gain more insight into device performance with intuitive display and graphs for your application. Select from our library of over 25 different measurement applications.
– Ensure that your design meets the latest standard. Updates are made to the X-Series measurement applications as standards evolve.
– Apply the same measurement science across multiple hardware platforms for consistent measurement results over your design cycle from R&D to production.
– Choose the license structure that meets your business needs. We provide a range of license types (node-locked, transportable, floating or USB portable) and license terms (perpetual or time-based).

Download your next insight

Keysight software is downloadable expertise. From first simulation through first customer shipment, we deliver the tools your team needs to accelerate from data to information to actionable insight.

– Electronic design automation (EDA) software
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– Programming environments
– Productivity software

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Top Features

With the W-CDMA measurement application, you can perform RF transmitter measurements on eNB and UE devices in time, frequency, and modulation domains. Measurement setups are simplified with automatic detection of downlink channels and signals. For eNB conformance testing, measurement is simplified by recalling E-TM presets according to 3GPP TS 25 standard.

- Expedite troubleshooting and design verification using a rich selection of traces: I/Q measured polar graph; code domain power; peak/avg metrics showing numeric result table with average and peak hold statistic results; capture time summary showing a summary table with measurement results of multiple slots; slot CDE/EVM showing EVM, peak CDE, and frequency error in three windows
- Add real-time spectrum analyzer (RTSA) capability to the UXA, PXA or MXA signal analyzers to pinpoint interference caused by multi-carrier W-CDMA signals or other events in the transmitter

Downlink eNB measurements

- EVM, frequency error, CPICH power accuracy, 64QAM RCDE, SEM, ACLR and more
- Perform adjacent channel power measurement over wide dynamic range (up to –88 dBc) on single-carrier and multi-carrier ACLR measurements on base station systems, as well as components such as amplifiers that have to meet more stringent requirements
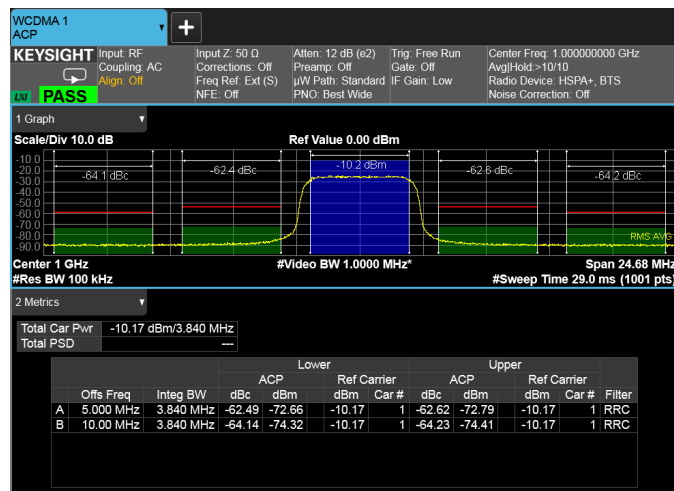

Figure 1. W-CDMA ACLR measurement

Figure 2. HSPA+ modulation analysis with 64QAM RCDE metrics

Uplink UE measurements

– EVM, frequency error, PkCDE, RCDE, PRACH power, slot power, SEM, ACLR and more
– Characterize your UE device using the uplink power control measurement. The power control measurement includes: slot power, PRACH power and slot phase
– Evaluate 3GPP UE phase discontinuity EVM of uplink slots with slot power and phase measurements
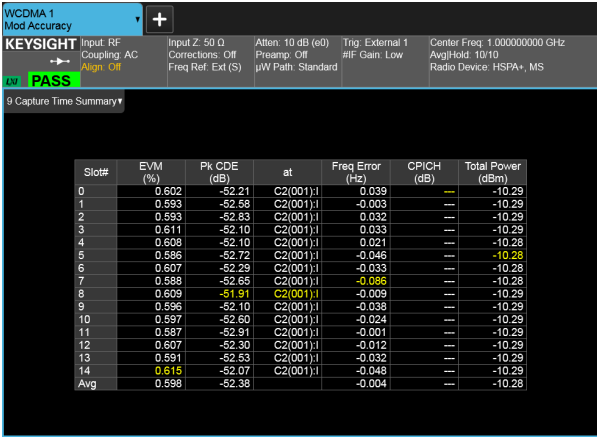

Figure 3. HSUPA capture time summary trace showing error metrics for 15 consecutive slots
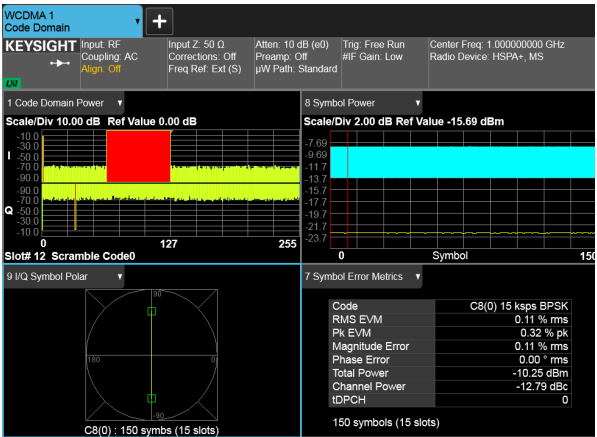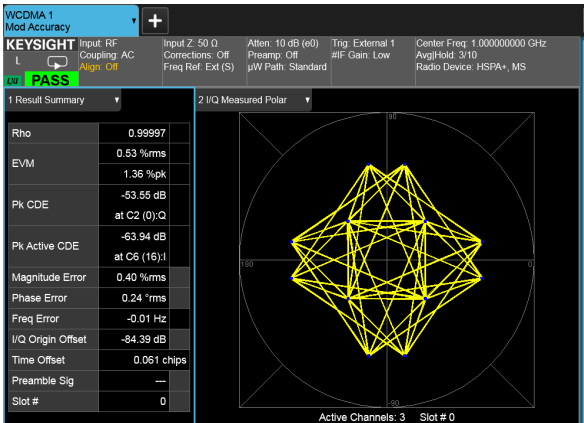

Figure 4. HSPA+ 64QAM code domain power quad view

Figure 5. W-CDMA uplink EVM measurement

Measurement Summary

One-touch standards-based measurements

Required base station (eNB) RF transmitter measurements

Table 1. Required base station (eNB) RF transmitter measurements and the corresponding measurements in the N9073EM0E measurement application and 89600 VSA software

3GPP TS25.141 subclause	Transmitter test	N9073EM0E W-CDMA/HSPA+ 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 N9073EM0E 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. Measurement parameters must be set up manually. For N9073EM0E 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).
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 power suite 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.
6. Both the N9073EM0E 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, or Keysight oscilloscopes.

Measurement Summary

One-touch standards-based measurements

Required user equipment (UE) RF transmitter measurements

Table 2. Required user equipment (UE) RF transmitter measurements and the corresponding measurements in the N9073EM0E measurement application and 89600 VSA software.

3GPP TS34.121 subclause	Transmitter test	N9073EM0E W-CDMA/HSPA+ 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 the N9073EM0E 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 2 cont'd. Required user equipment (UE) RF transmitter measurements and the corresponding measurements in the N9073EM0E measurement application and 89600 VSA software.

3GPP TS34.121 Paragraph #	Transmitter test	N9073EM0E W-CDMA/HSPA+ 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 N9073EM0E 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.

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 accessible directly on the instrument's touch screen (Tables 3 and 5). These measurements are fully remote control-lable 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 (eNB) transmitter test

Table 3. One-touch measurements for base station (eNB) test provided by the N9073EM0E measurement application

Technology	W-CDMA	HSDPA/HSUPA	HSPA+
Model-option	N9073EM0E	N9073EM0E	N9073EM0E
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	●	●	●

Measurement details for user equipment (UE) transmitter test

Table 4. One-touch measurements for user equipment provided by the N9073EM0E measurement application

Technology	W-CDMA	HSUPA	HSPA+
Model-option	**N9073EM0E**	**N9073EM0E**	**N9073EM0E**
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	●	●	●

Key Specifications

Definitions

- Specifications describe the performance of parameters covered by the product warranty.
- 95th percentile values indicate the breadth of the population (≈2□) 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

Supported standards

Table 5. Supported standards

3GPP standards sections		3GPP required test instrument tolerance (as of 2009-12)	Instrument tolerance interval[1,2,3]	Supplemental information
Sub-clause	Measurement name			
6.2.1	Maximum output power (channel power)	±0.7 dB (95%)	±0.19 dB (95%)	
6.2.2	CPICH power accuracy (code domain)	±0.8 dB (95%)	±0.2 dB (95%)	
6.3	Frequency error (modulation accuracy)	±12 Hz (95%)	±5 Hz (100%)	Excluding timebase error
6.4.2	Power control steps[4] (code domain)			
	1 dB step	±0.1 dB (95%)	±0.03 dB (100%)	
	Ten 1 dB steps	±0.1 dB (95%)	±0.03 dB (100%)	
6.4.3	Power dynamic range	±1.1 dB (95%)	±0.14 dB (100%)	
6.4.4	Total power dynamic range[4] (code domain)	±0.3 dB (95%)	±0.06 dB (100%)	
6.5.1	Occupied bandwidth	±100 kHz (95%)	±10 kHz (100%)	
6.5.2.1	Spectrum emission mask	±1.5 dB (95%)	±0.20 dB (95%)	Absolute peak[5]
6.5.2.2	ACLR			
	5 MHz offset	±0.8 dB (95%)	±0.22 dB (100%)	
	10 MHz offset	±0.8 dB (95%)	±0.18 dB (100%)	
6.5.3	Spurious emissions			Excluding timebase error
	f ≤ 2.2 GHz	±1.58 dB (95%)	±0.19 Hz (95%)	
	2.2 GHz < f ≤ 4 GHz	±2.0 dB (95%)	±1.13 Hz (95%)	
	4 GHz < f	±4.0 dB (95%)	±1.50 Hz (95%)	
6.7.1	EVM (Modulation accuracy)	±2.5% (95%)	±0.5% (100%)	EVM in the range of 12.5% to 22.5%
6.7.2	Peak Code Domain Error (Modulation accuracy)	±1.0 dB (95%)	±1.0 dB (100%)	
6.7.3	Time alignment error in Tx Diversity (Modulation accuracy)	±26 ns (95%)[= 0.1 Tc]	±1.25 ns (100%)	

Key Specifications (continued)

Table 6. Key specifications

Description		UXA	PXA	MXA	EXA	CXA
Channel power						
Minimum power at RF input		–50 dBm (nom)	–50 dBm (nom)	–50 dBm (nom)	–50 dBm (nom)	–50 dBm (nom)
Absolute power accuracy (Atten = 10 dB)		±0.61 dB	±0.61 dB	±0.82 dB	±0.94 dB	±1.33 dB
Power accuracy (95% confidence)		±0.19 dB	±0.19 dB	±0.23 dB	±0.27 dB	±0.61 dB
Measurement floor		–84.8 dBm (nom)	–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)		
ACPR accuracy (RRC weighted, 3.84 MHz noise BW)						
Radio	Offset frequency					
UE	5 MHz (ACPR –30 to –36 dBc)	±0.08 dB	±0.08 dB	±0.14 dB	±0.22 dB	±0.76 dB
UE	10 MHz (ACPR –40 to –46 dBc)	±0.09 dB	±0.12 dB	±0.21 dB	±0.34 dB	±0.73 dB
BTS	5 MHz (ACPR –42 to –48 dBc)	±0.22 dB	±0.20 dB	±0.49 dB	±1.07 dB	±1.72 dB
BTS	10 MHz (ACPR –48 to –53 dBc)	±0.18 dB	±0.21 dB	±0.44 dB	±1.00 dB	±1.96 dB
BTS	5 MHz (–48 dBc with non-coherent ACPR)	±0.10 dB	±0.10 dB	±0.21 dB	±0.44 dB	±0.87 dB
Dynamic range (RRC weighted, 3.84 MHz noise BW)						
Noise correction	Offset	Method frequency				
Off	5 MHz	Filtered IBW	–81.5 dB (typ) Opt ML -8 dBm (nom)	–80 dB (typ)	–73 dB (typ)	–68 dB (typ)	–63 dB (typ)
Off	5 MHz	Fast	–81 dB (typ) Opt ML -8 dBm (nom)	–80 dB (typ)	–72 dB (typ)	–67 dB (typ)	n/a
Off	10 MHz	Filtered IBW	–87 dB (typ) Opt ML -8 dBm (nom)	–87 dB (typ)	–79 dB (typ)	–74 dB (typ)	–67 dB (typ)
On	5 MHz	Filtered IBW	–82.5 dB (typ) Opt ML -8 dBm (nom)	–83.5 dB (typ); –88 dB (nom)	–78 dB (typ)	–73 dB (typ)	–73 dB (typ)
On	10 MHz	Filtered IBW	–88 dB (typ) Opt ML -4 dBm (nom)	–89.5 dB (typ)	–82 dB (typ)	–76 dB (typ)	–78 dB (typ)

Table 6, continued. Key specifications

Description	UXA	PXA	MXA	EXA	CXA
RRC weighting accuracy, nominal					
White noise in adjacent channel	0.00 dB	0.00 dB	0.00 dB	0.00 dB	0.00 dB
TOI-induced spectrum	0.001 dB	0.001 dB	0.001 dB	0.001 dB	0.001 dB
rms CW error	0.012 dB	0.012 dB	0.012 dB	0.012 dB	0.012 dB
Multiple carriers (RRC weighted, 3.84 MHz noise BW)					
ACPR dynamic range (two carriers), nominal					
5 MHz offset, noise correction (NC)	–83 dB, NC on	–83 dB, NC on	–70 dB, NC off	n/a	n/a
ACPR accuracy (two carriers), nominal					
5 MHz offset, noise correction on	±0.20 dB	±0.20 dB	±0.42 dB	n/a	n/a
ACPR dynamic range (four carriers), nominal					
5 MHz offset, noise correction off (NFE off on PXA)	-69 dB	–69 dB	–64 dB	n/a	n/a
5 MHz offset, noise correction on	-79 dB	–79 dB	–72 dB	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	±0.18 dB	±0.42 dB	n/a	n/a
5 MHz offset, noise correction on	±0.09 dB	±0.09 dB	±0.17 dB	n/a	n/a
Spectrum emission mask					
Dynamic range, relative 2.515 MHz offset	86.8 (91.3 dB typ)	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 (-105.7 dBm typ)	–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	±0.08 dB	±0.06 dB	±0.12 dB	±0.11 dB	±0.11 dB
Absolute (20 to 30 °C)	±0.62 dB (±0.20 dB 95%)	±0.62 dB (±0.20 dB 95%)	±0.88 dB (±0.27 dB 95%)	±1.15 dB (±0.31 dB 95%)	±1.53 dB (±0.65 dB 95%)
Spurious emissions					
Dynamic range, relative	88.8 (91.1 dB typ)	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	–88.5 (–90.5 dBm typ)	–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	±0.19 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	±1.13 dB	±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	±1.5 dB	±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)				
Frequency accuracy	±10 kHz (RBW = 30 kHz; number of points = 1001 span = 10 MHz)				
Power statistics CCDF					
Histogram resolution	0.01 dB				

Table 6, continued. Key specifications

Code domain	UXA	PXA	MXA	EXA	CXA
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)	±0.20 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		
CDP range between –10 and –30 dBc			±0.06 dB		
CDP range between –30 and –40 dBc			±0.07 dB		
Power control steps accuracy					
CDP range between 0 and –10 dBc			±0.03 dB		
CDP range between –10 and –30 dBc			±0.12 dB		
Power dynamic range accuracy					
CDP range 0 to –40 dBc			±0.14 dB		
Symbol power vs. time					
Relative accuracy					
CDP range between 0 and –10 dBc			±0.015 dB		
CDP range between –10 and –30 dBc			±0.06 dB		
CDP range between –30 and –40 dBc			±0.07 dB		
Symbol error vector magnitude					
Accuracy for range between 0 and –25 dBc			±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%		
Composite EVM floor	1.50%	1.50%	1.50%	1.60%	1.60%
Composite EVM floor (with Option BBA)	±1.5% (nom)	±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 codes)
Peak code domain error accuracy			±1.0 dB		
I/Q origin offset, DUT maximum offset			–10 dBc (nom)		
I/Q origin offset, analyzer noise floor			–50 dBc (nom)		
Frequency error range			±3 kHz (nom)		
Frequency error accuracy			±5 Hz + (transmitter frequency x frequency reference accuracy)		
Time offset					
Absolute frame offset accuracy			±20 nsec		
Relative frame offset accuracy			±5.0 nsec (nom)		
Relative offset accuracy (for STTD diff mode)			±1.25 nsec		

Table 6, continued. Key specifications

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

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

Benchtop:
UXA: www.keysight.com/find/uxa_specifications
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

PXIe:
VSA up to 6 GHz: www.keysight.com/find/m9391a
VSA up to 50 GHz: www.keysight.com/find/m9393a

Ordering Information

Flexible licensing and configuration

- **Perpetual:** License can be used in perpetuity.
- **Time-based:** License is time limited to a defined period, such as 12-months.
- **Node-locked:** Allows you to use the license on one specified instrument/computer.
- **Transportable:** Allows you to use the license on one instrument/computer at a time. This license may be transferred to another instrument/computer using Keysight's online tool.
- **Floating:** Allows you to access the license on networked instruments/computers from a server, one at a time. For concurrent access, multiple licenses may be purchased.
- **USB portable:** Allows you to move the license from one instrument/computer to another by end-user only with certified USB dongle, purchased separately.
- **Software support subscription:** Allows the license holder access to Keysight technical support and all software upgrades

You Can Upgrade!

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

UP GRADE

W-CDMA/HSPA+ measurement app (N9073EM0E)

Model	Software License Type	Support Contract	Support Subscription (12-month) [2]
N9073EM0E-1FP	Node-locked perpetual	R-Y5C-001-A[2]	R-Y6C-001-L[2]
N9073EM0E-1FL	Node-locked 12-month	R-Y4C-001-L[1]	Included
N9073EM0E-1TP	Transportable perpetual	R-Y5C-004-D[2]	R-Y6C-004-L[2]
N9073EM0E-1TL	Transportable 12-month	R-Y4C-004-L[1]	Included
N9073EM0E-1NP	Floating perpetual	R-Y5C-002-B[2]	R-Y6C-002-L[2]
N9073EM0E-1NL	Floating 12-month	R-Y4C-002-L[1]	Included
N9073EM0E-1UP	USB portable perpetual	R-Y5C-005-E[2]	R-Y6C-005-L[2]
N9073EM0E-1UL	USB portable 12-month	R-Y4C-005-L[1]	Included

One month software support subscription extensions [3]

Model	Description
R-Y6C-501[3]	1-month of software support subscription for node-locked license
R-Y6C-502[3]	1-month of software support subscription for floating license
R-Y6C-504[3]	1-month of software support subscription for transportable license
R-Y6C-505[3]	1-month of software support subscription for USB portable license

Try Before You Buy!

Evaluate a full-featured version of our X-Series measurement application with our *FREE* trial. Redeem one 30-day trial license of each measurement application online at: www.keysight.com/find/X-Series_apps_trial

Hardware Configurations

To learn more about compatible platforms and required configurations, please visit: www.keysight.com/find/X-Series_apps_platform

Software Models & Options

To learn more about X-Series measurement application licensing, model numbers and options, please visit: www.keysight.com/find/X-Series_apps_model

1. All time-based X-Series measurement application licenses includes a 12-month support contract which also includes the 12-month software support subscription as same duration.
2. Support contract must bundle software support subscription for all perpetual licenses in the first year. All software upgrades and Keysight support are provided for software licenses with valid support subscription.
3. After the first year, software support subscription may be extended with annual or monthly software support subscription extension.

Hardware Configuration

For optimizing the W-CDMA/HSPA+ measurement application, Keysight recommends a minimum level of instrument hardware functionality at each instrument performance point. Supported instruments include:

Benchtop:
 – PXA   N9030B
 – MXA N9020B
 – EXA N9010B
 – CXA N9000B

PXIe:
 – VSA (6 GHz)   M9391A
 – VSA (50 GHz) M9393A

N90x0B X-Series signal analyzer

Capability	Instrument Option	Benefit
Analysis bandwidth	10 or 25 MHz as default or higher	**Required:** Wider analysis bandwidth options such as 25/40/85/160/510 MHz or 1 GHz can be selected depending on the specified signal analyzer model
Precision frequency reference	-PFR	**Recommended**: For enhanced frequency accuracy and repeatability for lower measurement uncertainty
Electronic attenuator	-EA3	**Recommended**: Fast and reliable attenuation changes ideal for manufacturing without the wear associated with mechanical attenuators up to 3.6 GHz in 1 dB steps
Pre-amplifier	3.6 GHz (-P03) or higher	**Recommended**: For maximizing the measurement sensitivity
Fine resolution step attenuator	-FSA	**Recommended**: Useful for maximizing useable dynamic range to see signals
Analog baseband I/Q inputs	-BBA on PXA and MXA only	**Optional**: To extend measurements at baseband if required by device under test

M9391/93A PXIe VSA vector signal analyzer

Description	Model-Option	Additional information
Frequency range 3 or 6 GHz	M9391A-F03, or F06	One required for M9391A
Frequency range 8.4, 14, 18, or 27 GHz Frequency extension to 43.5 or 50 GHz	M9393A-F08, F14, F18, or F27 M9393A-FRZ or FRX	One required for M9393A Optional (requires M9393A-F27)
Analysis bandwidth 40, 100 or 160 MHz	M9391A/M9393A-B04, B10 or B16	One required
Memory 128, 512 or 1024 MSa	M9391A/M9393A-M01, M05 or M10	One required
Frequency reference 10 MHz and 100 MHz	M9391A/M9393A-300	One required

Related Literature

W-CDMA/HSPA/HSPA+ Self-Guided Demonstration,
literature number 5990-5926EN

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 Through-
put 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 N9073EM0E product page.*

Web

W-CDMA/HSPA+ X-Series measurement app, multi-touch UI product webpage
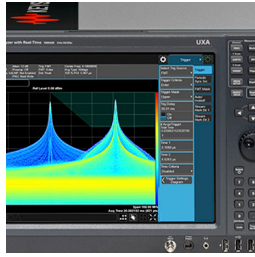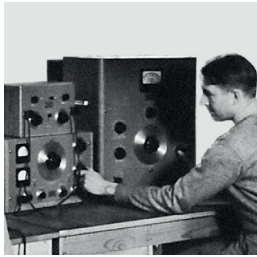**www.keysight.com/find/N9073E**

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

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