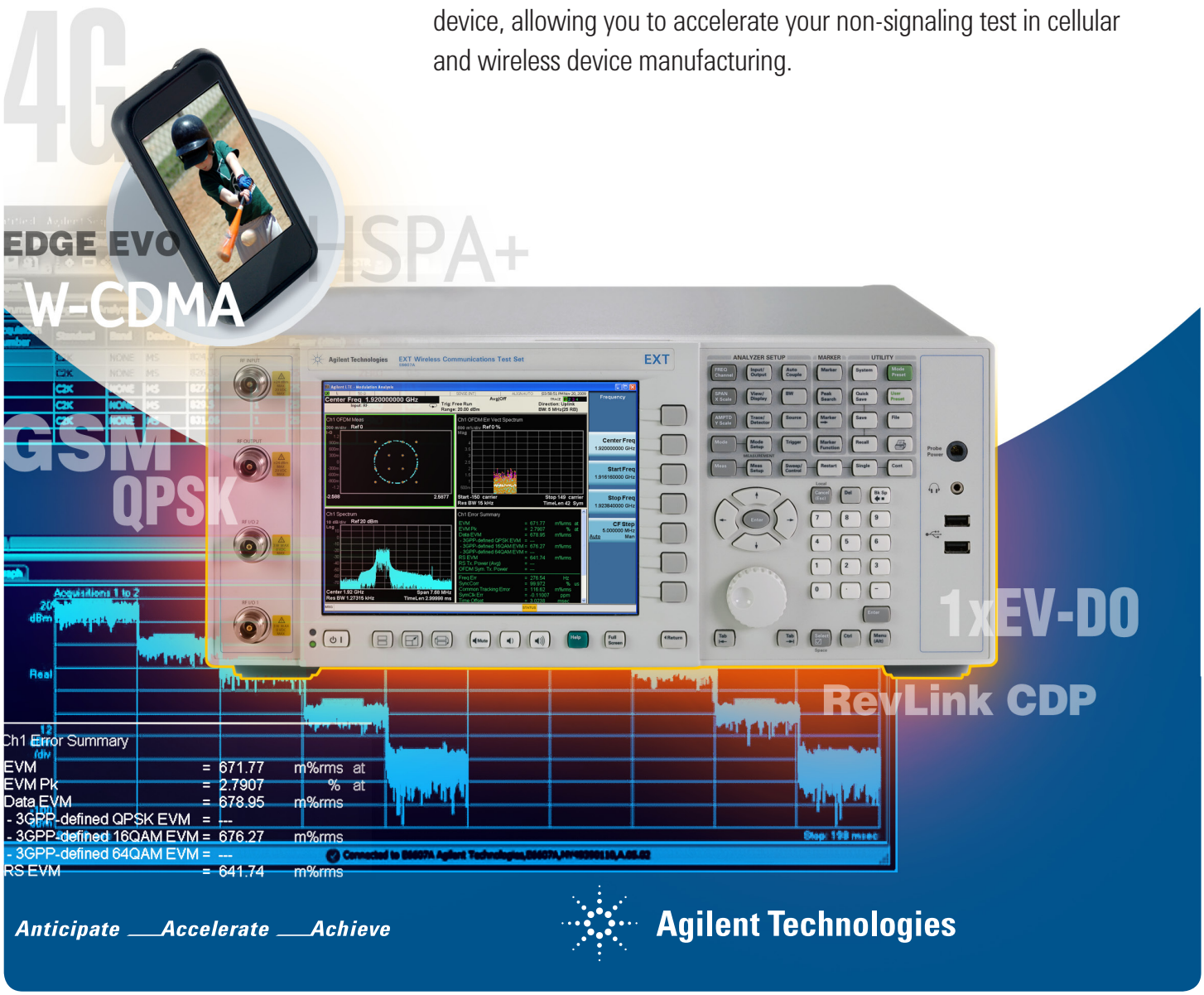
Agilent E6607A EXT Wireless Communications Test Set

Data Sheet

The Agilent E6607A EXT wireless communications test set integrates an innovative test sequencer, vector signal analyzer, vector signal generator, and multi-port RF input/output hardware into a single device, allowing you to accelerate your non-signaling test in cellular and wireless device manufacturing.



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Definitions and Conditions

Specification

Specifications describe the performance parameters covered by the product warranty and are valid from 20 to 35 °C unless otherwise noted.

Typical

Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 95 percent of the units exhibit with a 95 percent confidence level. This data, shown in italics, does not include measurement uncertainty, and is valid only at room temperature (approximately 25 °C).

Nominal

Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but are not covered by the product warranty.

The test set will meet its specification when:

- The test set is within its calibration cycle
- The test set has been stored at an ambient temperature within the allowed operating range for at least two hours before being turned on; if it had previously been stored at a temperature range inside the allowed storage range, but outside the allowed operating range
- The test set has been turned on for at least 30 minutes with Auto Align[1] set to normal.

[1] For more information on using Alignments in a manufacturing environment, please see the EXT user documentation.

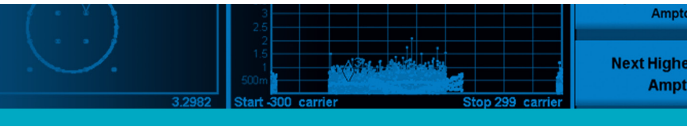
Vector Signal Analyzer Performance

Performance	
Capture depth	256 MSa of IQ data

Frequency and time specifications	
Frequency range	10 MHz to 3.6 GHz (Option 503)
Frequency reference	
Accuracy	± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]
Aging rate	
Standard	$\pm 1 \times 10^{-6}$ / year
Option PFR	$\pm 1 \times 10^{-7}$ / year, $\pm 1.5 \times 10^{-7}$ / 2 years
Temperature stability	
Standard	$\pm 2 \times 10^{-6}$ / year
Option PFR	$\pm 1.5 \times 10^{-8}$
Achievable initial calibration accuracy	
Standard	$\pm 1.4 \times 10^{-6}$ / year
Option PFR	$\pm 4 \times 10^{-8}$ / year
Residual FM	
Option PFR	≤ 0.25 Hz p-p in 20 ms nominal
Standard	≤ 10 Hz p-p in 20 ms nominal
CW measurement frequency accuracy	
Accuracy	(Transmitter frequency x frequency reference accuracy) ±50 Hz
Resolution	1 Hz
Analysis bandwidth	
Maximum bandwidth	40 MHz
Triggering	
Trigger	
Sequence analyzer	Free run, external 1, external 2, RF burst, video, internal
IQ analyzer	Free run, external 1, external 2, RF burst, video, line, periodic
Trigger delay range	–150 to 500 ms
Resolution	0.1 µs

Vector Signal Analyzer Performance

Amplitude accuracy and range specifications	
Electromechanical attenuator	
Input range	0 to 50 dB, 2 dB steps
Electronic attenuator	
Frequency range	10 MHz to 3.6 GHz
Electronic attenuator range	0 to 24 dB, 1 dB steps
Total absolute amplitude accuracy	
RF I/O 1 and 2, input signal –65 dBm to +33 dBm	*< ±0.6 dB typical*
RF INPUT, input signal –70 dBm to +24 dBm	*< ±0.6 dB typical*
Input voltage standing wave ratio (VSWR)	
RF I/O 1 and 2, RF INPUT	*< 1.42:1 typical*
Spurious responses	
Residual responses (Input 10 MHz to 3.6 GHz)	*< –60 dBm typical*
Other spurious, f ≥ 10 MHz from carrier	*< –60 dBc typical*
Phase noise	
1 GHz, 10 kHz offset	*< –100 dBc/Hz typical*



Vector Signal Generator Performance

Performance	
Arb sample rate range and bandwidth	
Clock rate	100 Sa/s to 60 MSa/s
Bandwidth 48 MHz	48 MHz

Frequency specifications	
Frequency range	10 MHz to 3.6 GHz (Option 503)
Frequency accuracy	Refer to vector signal analyzer frequency reference accuracy
Frequency resolution	0.01 Hz

Amplitude specifications	
Output level ranges[1]	
RF I/O 1 and 2	
10 to 375 MHz	*–90 to –15 dBm, typical*
375 MHz to 3.6 GHz	*–90 to –5 dBm, **typical***
	[1] Power level is user-settable from –130 to 0 dBm
RF OUTPUT	
10 to 375 MHz	*–80 to +5 dBm, typical*
375 MHz to 3.6 GHz	*–80 to +10 dBm, typical*
	[1] Power level is user-settable from –130 to +20 dBm
Absolute level accuracy	
RF I/O 1 and 2	
10 to 375 MHz	–90 to –15 dBm, < *±0.6 dB typical*
375 MHz to 3.6 GHz	–90 to –5 dBm, < *±0.6 dB typical*
RF OUTPUT	
10 to 375 MHz	–80 to +5 dBm, < *±0.6 dB typical*
375 MHz to 3.6 GHz	–80 to +10 dBm, < *±0.6 dB typical*
Setting resolution	0.01 dB
VSWR RF OUTPUT	
10 MHz to 3.6 GHz	*< 1.42:1 typical*
VSWR RF I/O 1 and 2	
10 MHz to 3.6 GHz	*< 1.4:1 typical*
Harmonics and spurious	
RF OUTPUT; harmonics	
At 0 dBm output power	*< –30 dBc typical*
RF I/O 1 and 2; harmonics	
10 to 375 MHz at –15 dBm output power	*< –30 dBc, typical*
375 MHz to 3.6 GHz at –10 dBm output power	*< –30 dBc, typical*
RF I/O 1 and 2; non-harmonic spurious	
10 to 375 MHz	*< –54 dBc typical*
375 MHz to 3.6 GHz	*< –51 dBc typical*
RF OUTPUT; non-harmonic spurious	
10 to 375 MHz	*< –54 dBc typical*
375 MHz to 3.6 GHz	*< –51dBc typical*

General Specifications

Power requirements

Voltage and frequency (nominal)	100/120 V, 50/60 Hz and 220/240 V, 50/60 Hz
Power consumption	350 W maximum

Data storage

Internal	80 GB (SSD)
External	Supports USB 2.0-compatible memory devices

Size and weight

Dimensions (H x W x L)	177 mm x 426 mm x 368 mm 7.0 in x 16.8 in x 14.5 in
Weight	18.6 kg (41 lbs) nominal (net) 32.4 kg (71.4 lbs) nominal (shipping: carton only, no accessories included)

Environmental characteristics

Operating temperature	+5 to +50 °C
Storage temperature	–40 to +65 °C

Safety

Complies with European Low Voltage Directive 2006/95/EC

- IEC/EN 61010-1
- Canada: CSA C22.2 No. 61010-1-04
- USA: UL Std. 61010-1

Remote programming

GPIB IEEE standard 488.2
LAN 1 RJ45 rear-panel connector
USB-B 1 rear-panel connector

Warranty

This test set is supplied with a standard one-year warranty

Calibration cycle

The recommended calibration cycle is two years

General Specifications

Maximum applied reverse power	
RF IN/OUT 1 and 2	3 W CW
RF IN	< +24 dBm CW
RF OUT	< +24 dBm CW
RF port isolation	> 45 dB nominal

Front Panel

RF IN/OUT 1 and 2	
Connector	Type-N female, 50 Ω nominal
RF IN	
Connector	Type-N female, 50 Ω nominal
RF OUT	
Connector	Type-N female, 50 Ω nominal
USB ports	
Master (2 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	0.5 A nominal

Rear Panel

Ext Ref In	
Accepts a 1 to 50 MHz (nominal), selectable in 1 Hz resolution, reference signal used to frequency lock the internal timebase. Note: Noise sidebands and spurious response performance may be affected by the quality of the external reference used	
Connector	BNC female, 50 Ω nominal
Input amplitude range	–5 to +10 dBm nominal
Frequency lock range	$\pm 5 \times 10^{-6}$ of specified external reference input frequency
10 MHz Out	
Outputs the 10 MHz reference signal used by the internal timebase	
Connector	BNC female, 50 Ω nominal
Output amplitude	≥ 0 dBm nominal
Frequency	10 MHz ± frequency reference accuracy
Trigger 1 and Trigger 2 inputs	
Connector	BNC female
Impedance	> 10 kΩ nominal
Trigger level range	–5 to +5 V
Trigger 1 and Trigger 2 outputs	
Connector	BNC female
Impedance	50 Ω nominal
Trigger level range	5 V TTL nominal
Sync (reserved for future use)	
Connector	BNC female
Monitor output	
Connector	VGA compatible, 15-pin mini D-SUB
Format	XGA (60 Hz vertical sync rates, non-interlaced) analog RGB
Resolution	1024 x 768

Rear Panel

Digital bus (reserved for future use)	
Connector	MDR-80
Analog out (reserved for future use)	
Connector	BNC female
USB 2.0 ports	
Master (4 ports)	
Standard	Compatible with USB 2.0
Connector	USB Type-A female
Output current	0.5 A nominal
Slave (1 port)	
Standard	Compatible with USB 2.0
Connector	USB Type-B female
Output current	0.5 A nominal
GPIB interface	
Connector	IEEE-488 bus connector
GPIB codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3, C28, DT1, L4, C0
LAN TCP/IP interface	
Standard	1000 Base-T
Connector	RJ45 Ethertwist

U9071A GSM/EDGE/Evo Measurement Application

Key Specifications[1]

Power versus time (PvT)	
Minimum carrier power at RF input	> –28 dBm (RF Input port), > –14 dBm (RFIO ports)
Absolute power accuracy	–0.11 ±0.3 dB nominal[2]
Power ramp relative accuracy	±0.11 dB nominal
EDGE error vector magnitude (EVM)	
Carrier power range at RF Input	+24 to –24 dBm (RF Input port), +33 to –24 dBm (RFIO ports)
EVM rms	
Operating range	0 to 20% nominal
Accuracy	±0.5% nominal
Floor	0.5% nominal
Frequency error	
Range	±80 kHz nominal
Accuracy	±5 Hz + tfa[3]
Trigger to TO time offset	±5.0 ns nominal
ORFS and EDGE ORFS	
ORFS absolute RF power accuracy: ±0.3 dB nominal	+24 to –14 dBm RF Input port
ORFS relative RF power accuracy: ±0.3 dB nominal	+33 to +1 dBm RFIO ports
ORFS dynamic range, spectrum due to modulation	
600 kHz offset, GSM	77.1 dB nominal
1.2 MHz offset, GSM	81.3 dB nominal
600 kHz offset, EDGE	76.6 dB nominal
1.2 MHz offset, EDGE	80.0 dB nominal
ORFS dynamic range, spectrum due to switching	
1.2 MHz offset	78.2 dB nominal
1.8 MHz offset	87.2 dB nominal
Phase and frequency error (GMSK)	
Carrier power range at RF input	+24 to –38 dBm RF Input port; +33 to –24 dBm RFIO ports
Phase error, rms	
Floor	±0.3° nominal
Accuracy, error range 1 to 6°	0.3° nominal
Frequency error	
Range	±80 kHz nominal
Accuracy	±5 Hz + tfa[3]
IQ origin offset floor	–50 dBc nominal
Trigger to TO time offset	±5.0 ns nominal

[1] Specifications apply for frequencies between 380 to 960 MHz and 1710 to 1990 MHz.

[2] The power versus time measurement uses a RBW of about 510 kHz. This is not wide enough to pass all the transmitter power unattenuated, leading to the consistent error shown (–0.11 dB) in addition to the uncertainty. A wider RBW would allow smaller errors in the carrier measurement, but would allow more noise to reduce the dynamic range of the low-level measurements. The measurement floor will change by 10 x log(RBW/510 kHz). The average amplitude error will be about –0.11 dB x (510 kHz/RBW)^2. The consistent part of the amplitude error can be eliminated by using a wider RBW.

[3] tfa = transmitter frequency x frequency reference accuracy.

U9073A W-CDMA/HSPA+ Measurement Application

Key Specifications[1]

Channel power	
Absolute power accuracy	±0.35 dB nominal
Adjacent channel leakage ratio (ACLR) and adjacent channel power ratio(ACPR)	
Dynamic range	> 65 dB nominal
Spectrum emission mask (2.515, 2.715, 3.515, 4.000, 8.000, and 12.00 MHz offset)	
Absolute accuracy	See absolute power accuracy
Relative accuracy	±0.35 dB nominal
Dynamic range, relative	> 79 dB nominal
Code domain power (–25 dBm < mixer level < –15 dBm, 20 to 30°C)	
Code domain power	+33 to –5 dBm (RFIO ports), +24 to –19 dBm (RF Input port)
Relative accuracy	±0.2 dB nominal (0 to –40 dBc)
Symbol EVM accuracy	1% nominal (0 to –25 dBc)
QPSK EVM	
Carrier power range at RF Input	+33 to –5 dBm (RFIO ports), ±24 to –10 dBm (RF Input port)
EVM accuracy	1% nominal (0 to 25%)[2]
EVM floor	1.5% nominal
Initial frequency error range	±30 kHz
Frequency error accuracy	±5 Hz + tfa[3]
I/Q origin offset floor	–50 dBc nominal

[1] Specifications apply for frequencies between 698 to 960 MHz and 1427 to 2570 MHz.

[2] The QPSK EVM accuracy specification applies when the EVM to be measured is well above the measurement floor. When the EVM does not greatly exceed the floor, the errors due to the floor add to the accuracy errors. The errors due to the floor are noise-like and add incoherently with the UUT EVM. The errors depend on the EVM of the UUT and the floor as follows: error = sqrt(EVM_{UUT}^2 + EVM_{sa}^2) – EVM_{UUT}. For example, if the EVM is 7% and the floor is 2.5% the error due to the floor is 0.43%.

[3] tfa = transmitter frequency x frequency reference accuracy.

[4] QPSK EVM measurement frequency error range (30 kHz) specifies a synchronization range with CPICH for CPICH only signal.

U9072A cdma2000® Measurement Application and U9076A 1xEV-DO Measurement Application

Key Specifications[1]

Channel power	
Absolute power accuracy	±0.35 dB nominal
Adjacent channel power (ACP) and spectrum emission mask (SEM)	
ACP	
Relative accuracy	±0.35 dB nominal (≤ ±4 MHz offsets)
Dynamic range	> 80 dB nominal (30 kHz integrating bandwidth)
SEM	
Relative accuracy +24 to –29 dBm (RF Input port, cdma2000)	±0.35 dB nominal
Absolute accuracy +33 to –15 dBm (RFIO ports, cdma2000)	See absolute power accuracy
Dynamic range (885 kHz offset) +24 to –14 dBm (RF Input port, 1xEV-DO)	> 80 dB nominal
Dynamic range (1980 kHz offset) +33 to +1 dBm (RFIO ports, 1xEV-DO)	> 80 dB nominal
Code domain (–25 dBm ≤ mixer level ≤ –15 dBm, 20 to 30 °C)	
Relative accuracy Code domain power range	±0.2 dB nominal (0 to –40 dBc)
Symbol power vs. time Symbol EVM accuracy	1% nominal (0 to –25 dBc)
Modulation accuracy (composite rho)	
Carrier power range at RF Input	+33 to –5 dBm (RFIO ports), +24 to –19 dBm (RF Input port)
EVM	
Accuracy	1% nominal (0 to 25%)[2]
Floor	1.5% nominal
Rho accuracy	
At rho = 0.99751 (EVM 5%)	±0.0010 nominal
At rho = 0.94118 (EVM 25%)	±0.0045 nominal
Frequency error accuracy	±5 Hz + tfa[3]
IQ origin offset floor	–50 dBc nominal

U9075A Mobile WiMAX Measurement Application

Key Specifications[4]

Modulation analysis	
RCE (EVM) floor CF ≤ 3 GHz	–45 dB nominal
Channel power	
Absolute accuracy	See VSA performance, nominal
Minimum power at RF input	–35 dBm nominal
Measurement floor	–79.7 dBm nominal
Spectrum emission mask	
Dynamic range, relative	77.4

[1] Specifications apply for frequencies between 421 to 935 MHz and 1750 to 1980 MHz.

[2] The composite EVM accuracy specification applies when the EVM to be measured is well above the measurement floor. When the EVM does not greatly exceed the floor, the errors due to the floor add to the accuracy errors. The errors due to the floor are noise-like and add incoherently with the UUT EVM. The errors depend on the EVM of the UUT and the floor as follows: error = sqrt(EVMUUT^2 + EVMsa^2) – EVMUUT. For example, if the EVM is 7% and the floor is 2.5% the error due to the floor is 0.43%.

[3] tfa = transmitter frequency x frequency reference accuracy.

[4] Specifications apply for frequencies between 2300 to 2800 MHz, and 3300 to 3600 MHz.

U9080A LTE FDD Measurement Application

Key Specifications[1]

3GPP standards supported	36.211 V8.6.0 (2009-03), 36.212 V8.6.0 (2009-03), 36.213 V8.6.0 (2009-03) 36.101 V8.5.0 (2009-03), 36.104 V8.5.0 (2009-03), 36.141 V8.2.0 (2009-03) 36.521-1 V8.1.0 (2009-03)
Signal structure	FDD frame structure Type 1
Signal bandwidth	1.4 MHz (6 RB), 3 MHz (15 RB), 5 MHz (25 RB), 10 MHz (50 RB), 15 MHz (75 RB), 20 MHz (100 RB)
Modulation formats and sequences	BPSK, BPSK with I & Q CDM, QPSK, 16QAM, 64QAM, PRS, CAZAC (Zadoff-Chu)
Physical channels	
Downlink	P-SS, S-SS, RS
Uplink	S-RS, PUCCH-DMRS, PUSCH-DMRS
Channel power	
Absolute power accuracy	±0.4 dB nominal
Error vector magnitude (EVM)	
Minimum power at RFIO Input	–5 dBm nominal
Residual EVM	
5 MHz channel BW	–45 dB (0.45%) nominal
Frequency error	
Lock range	±2.5 subcarrier spacing (nominal), default is 15 kHz (spacing)
Error accuracy	±1 Hz + tfa[4]

U9081A *Bluetooth*® Measurement Application

Key Specifications[5]

Modulation characteristics	
Deviation range	±250 kHz nominal
Deviation resolution	100 Hz nominal
Measurement accuracy	±100 Hz + tfa[6] nominal
Initial carrier frequency tolerance	
Measurement range	Nominal channel freq ±100 kHz nominal
Measurement accuracy	±100 Hz + tfa[6] nominal
Carrier frequency drift	
Measurement range	±100 kHz nominal
Measurement accuracy	±100 Hz + tfa[6] nominal
EDR modulation accuracy	
Range (rms DEVM)	0 to 12% nominal
Floor	1.5% nominal
Accuracy	±1.2%[7] nominal

[1] Specifications apply for frequencies between 824 to 960 MHz and 1710 to 2690 MHz.

[2] Measured with mechanical attenuation set to 0 dB.

[3] Minimum power for the channel power measurement is calculated to be 16 dB above the noise floor. At this power level, the additional error contribution in the channel power measurement due to the noise floor will be nominally ≤ 0.11 dB.

[4] tfa = transmitter frequency x frequency reference accuracy.

[5] Specifications apply for frequencies between 2400 to 2486 MHz.

[6] tfa = transmitter frequency x frequency reference accuracy.

[7] The accuracy specification applies when the EVM to be measured is well above the measurement floor.

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Product specifications and descriptions in this document subject to change without notice.

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E6607A

10 MHz to 3.6 GHz

X-Series measurement applications
Sequence Studio software
Signal Studio software
Chipset software

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