EXT Wireless Communications Test Set E6607B

Data Sheet

The Agilent Technologies E6607B EXT wireless communications test set integrates an innovative test sequencer, vector signal analyzer, vector signal generator, and multi-port RF input/output hardware all in a single box, allowing you to accelerate non-signaling test in cellular and wireless device manufacturing.

Anticipate ___Accelerate ___Achieve

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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.
- Error vector magnitude (EVM) specifications apply after execution of a source alignment when the instrument is maintained within ±5 ºC of the alignment temperature.

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 3.8 GHz (Option 504)
Frequency reference	
Accuracy	± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]
Aging rate[1]	
Standard	±1.0 ppm/year
Option PRF	±0.1 ppm/year, ±0.15 ppm/2 years
Temperature stability[1]	
Standard	±2.0 ppm
Option PRF	±0.015 ppm
Achievable initial calibration accuracy[1]	
Standard	±1.4 ppm
Option PRF	±0.04 ppm
Residual FM[1]	
Standard	≤ 10 Hz p-p in 20 ms nominal
Option PRF	≤ 0.25 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

1. *Standard and Option PFR values apply to units purchased prior to October 1, 2012; for units purchased after October 1, 2012 Option PFR is included in the standard configuration and these (PFR) values apply to all units.*

Vector Signal Analyzer Performance *(con't)*

Amplitude accuracy and range specifications	
Electromechanical attenuator	
Input electromechanical attenuator range	0 to 50 dB, 2 dB steps
Electronic attenuator	
Frequency range	10 MHz to 3.8 GHz
Electronic attenuator range	0 to 24 dB, 1 dB steps
Input level ranges (average power)	
RF I/O 1 and 2	–65 to +33 dBm
RF INPUT	–70 to +24 dBm
Total absolute amplitude accuracy	
RF I/O 1 and 2, input signal –35 to + 33 dBm	
10 MHz to 3.6 GHz	< ±0.65 dB, < *±0.35 dB typical*
3.6 GHz to 3.8 GHz	< ±0.80 dB, < *±0.40 dB typical*
RF INPUT, input signal –70 to + 24 dBm	
10 MHz to 3.6 GHz	< ±0.70 dB, < *±0.40 dB typical*
3.6 GHz to 3.8 GHz	< ±0.90 dB, < *±0.45 dB typical*
IF flatness	
RF I/O 1 and 2, RF INPUT	
10 MHz BW	< *±0.12 dB typical*
25 MHz BW	< *±0.40 dB typical*
40 MHz BW	< *±0.34 dB typical*
Input voltage standing wave ratio (VSWR)	
RF I/O 1 & 2, 10 MHz to 2.4 GHz	< *1.2:1 typical*
RF I/O 1 & 2, 2.4 to 2.7 GHz	< *1.34:1 typical*
RF I/O 1 & 2, 2.7 to 3.8 GHz	< *1.42:1 typical*
RF INPUT	< *1.3:1 typical*
Spurious responses	
Residual responses, 10 MHz to 3.8 GHz (1.5 kHz res BW)	
10 MHz BW	< *–78 dBm typical*
25 MHz BW	< *–77 dBm typical*
40 MHz BW	< *–81 dBm typical*
Other spurious, f ≥ 10 MHz from carrier	< *–67 dBc typical*
Phase noise (noise sidebands (CF = 1 GHz))	
10 kHz offset	< *–104 dBc/Hz typical*
1 MHz offset	< *–130 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
Arb sample memory (storage capacity)	2 GB memory, 256 MSa of IQ data

Frequency specifications	
Frequency range	10 MHz to 3.8 GHz (Option 504)
Frequency accuracy	Refer to vector signal analyzer frequency reference accuracy
Frequency resolution	0.01 Hz

Amplitude specifications	
Output level ranges	
RF I/O 1 and 2[1]	
10 MHz to 3.8 GHz	*–120 to –5 dBm typical*
RF OUTPUT[2]	
10 MHz to 3.8 GHz	*–100 to +10 dBm typical*
Absolute level accuracy	
RF I/O 1 and 2; 10 MHz to 3.8 GHz	
–120 to –110 dBm	*< ±0.8 dB typical*
–110 to –90 dBm	*< ±0.3 dB typical*
–90 to –5 dBm	*< ±0.6 dB, < ±0.3 dB typical*
RF OUTPUT; 10 MHz to 3.8 GHz	
–100 to –80 dBm	*< ±0.4 dB typical*
–80 to –10 dBm	*< ±0.6 dB, < ±0.3 dB typical*
Setting resolution	0.01 dB
VSWR RF I/O 1 and 2	
10 MHz to 2.7 GHz	*< 1.32:1 typical*
2.7 to 3.8 GHz	*< 1.42:1 typical*
VSWR RF OUTPUT	
10 MHz to 2.7 GHz	*< 1.2:1 typical*
2.7 to 3.8 GHz	*< 1.4:1 typical*
Harmonics and spurious	
RF OUTPUT; harmonics	
+5 dBm output power	*< –30 dBc typical*
RF I/O 1 and 2; harmonics	
–10 dBm output power	*< –30 dBc typical*
RF I/O 1 and 2; RF OUTPUT; non-harmonic spurious (CW mode)	
10 to 375 MHz	*< –54 dBc typical*
375 MHz to 3.8 GHz	*< –51 dBc typical*
Phase noise	
RF I/O 1 & 2, –15 dBm; RF OUT, +5 dBm, 1 MHz offset	
10 MHz to 3 GHz	*≤ –123 dBc typical*
3 to 3.8 GHz	*≤ –118 dBc typical*

1. Power level is user-settable from –130 to 0 dBm.

2. Power level is user-settable from –130 to +20 dBm.

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 x 426 x 368 mm (7.0 x 16.8 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
EMC	Complies with European EMC Directive 2004/108/EC • IEC/EN 61326-1 or IEC/EN 61326-2-1 • CISPR Pub 11 Group 1, class A • AS/NZS CISPR 11:2002 • ICES/NMB-001 This ISM device complies with Canadian ICES-001 Cet appareil ISM est conforme a la norme NMB-001 du Canada
Environmental stress	Samples of this product have been type tested in accordance with the Agilent Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation, and end-use; those stresses include, but are not limited to, temperature, humidity, shock, vibration, altitude, and power line conditions; test methods are aligned with IEC 60068-2 and levels are similar to MILPRF-28800F Class 3

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

Audio noise	
Acoustic noise emission	Geraeuschemission
LpA < 70 dB	LpA < 70 dB
Operator position	Am Arbeitsplatz
Normal position	Normaler Betrieb
Per ISO 7779	Nach DIN 45635 t.19

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

General Specifications *(con't)*

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

Calibration cycle
The recommended calibration cycle is two years; calibration services are available through Agilent service centers

Maximum applied reverse power	
RF IN/OUT 1 and 2	3 W CW
RF OUT	< +24 dBm CW
RF IN	< +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	
Connector	BNC female, 50 Ω nominal
Input amplitude range	–5 to 10 dBm nominal
Input frequency	1 to 50 MHz nominal
Frequency lock range	$\pm 5 \times 10^{-6}$ of specified external reference input frequency

10 MHz Out	
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

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
GPIB mode	Controller or device

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	±0.4 dB nominal
Power ramp relative accuracy (referenced to mean transmitted power)	
Accuracy	±0.11 dB nominal
Measurement floor	–92 dBm 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	
Initial frequency error range	±80 kHz nominal
Accuracy	±5 Hz + tfa[2]
Trigger to T0 time offset	
Relative accuracy	±5.0 ns nominal

Output RF spectrum (ORFS) and EDGE ORFS	
Carrier power range at RF input	+24 to –14 dBm (RF INPUT port), +33 to +1 dBm (RFIO ports)
ORFS absolute RF power accuracy	±0.3 dB nominal
ORFS relative RF power accuracy	±0.3 dB nominal
GSM (GMSK)	
Dynamic range, spectrum due to modulation	
Offset frequency	
600 kHz	77.1 dB nominal
1.2 MHz	81.3 dB nominal
Dynamic range, spectrum due to switching	
Offset frequency	
1.2 MHz	–74.6 dB nominal
1.8 MHz	–76.0 dB nominal
EDGE (NSR 8PSK & narrow QPSK)	
Dynamic range, spectrum due to modulation	
Offset frequency	
600 kHz	76.6 dB nominal
1.2 MHz	80.0 dB nominal
Dynamic range, spectrum due to switching	
Offset frequency	
1.2 MHz	78.2 dB nominal
1.8 MHz	87.2 dB nominal

1. *Specifications apply for frequencies between 380 to 960 MHz and 1710 to 1990 MHz.*
2. *tfa = transmitter frequency x frequency reference accuracy.*

U9071A GSM/EDGE/Evo Measurement Application Key Specifications[1] *(con't)*

Phase and frequency error (GMSK modulation)	
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, rms	
Phase error range 1 to 6°	±0.3° nominal
Frequency error	
Initial frequency error range	±80 kHz nominal
Accuracy	±5 Hz + tfa[2]
IQ origin offset	
Analyzer noise floor	–50 dBc nominal
Trigger to T0 time offset	
Relative accuracy	±5.0 ns nominal

GSM/EDGE/Evo Source Key Specifications[3]

Signal quality (RF OUTPUT: 0 dBm, RF I/O 1 and 2: –10 dBm)	
Phase error (GMSK)	
RMS	< 0.3° nominal
Peak	< 2.0° nominal
EVM (EDGE)	
RMS	< 3% nominal

1. *Specifications apply for frequencies between 380 to 960 MHz, and 1710 to 1990 MHz.*
2. *tfa = transmitter frequency x frequency reference accuracy.*
3. *Specifications apply for frequencies between 390 to 1990 MHz.*

U9073A W-CDMA/HSPA+ Measurement Application Key Specifications[1]

Channel power	
Absolute power accuracy	*±0.36 dB typical*

Adjacent channel leakage ratio (ACLR) and adjacent channel power ratio (ACPR)	
Dynamic range	*71 dB typical*

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 typical*

Code domain (–25 dBm ≤ mixer level ≤ –15 dBm, 20 to 30 °C)	
Code domain power	
Relative accuracy Code domain power range: 0 to –40 dBc	±0.2 dB nominal
Symbol power vs. time	
Symbol EVM accuracy: 0 to –25 dBc	±1% nominal

QPSK EVM	
Carrier power range at RF input	+24 to –34 dBm (RF INPUT port), +33 to –20 dBm (RFIO ports)
EVM accuracy	1% nominal (0 to 25%)
Residual EVM	*< 1.5% typical*
Frequency error Initial frequency error range Accuracy	 ±30 kHz ±5 Hz + tfa[2]
IQ origin offset	
Analyzer noise floor	–50 dBc nominal

W-CDMA/HSPA+ Source Key Specifications[3]

Signal quality (RF OUTPUT: 0 dBm, RF I/O 1 and 2: –10 dBm)	
Composite EVM	
RMS	< 1.1% nominal

1. *Specifications apply for frequencies between 698 to 960 MHz, and 1427 to 2570 MHz.*
2. *tfa = transmitter frequency x frequency reference accuracy.*
3. *Specifications apply for frequencies between 390 to 2715 MHz.*

U9072A cdma2000® Measurement Application and U9076A 1xEV-DO Measurement Application Key Specifications[1]

Channel power	
Absolute power accuracy	*±0.35 dB typical*

Adjacent channel power (ACP)	
ACP relative accuracy Offset ≤ ±4 MHz	±0.35 dB nominal
ACP dynamic range 30 kHz integrating bandwidth	> 70 dB nominal

Spectrum emission mask (SEM)	
Relative accuracy	±0.35 dB nominal
Absolute accuracy	See absolute power accuracy
SEM dynamic range 750 kHz offset	> 70 dB nominal

Code domain (–25 dBm ≤ mixer level ≤ –15 dBm, 20 to 30 °C)	
Code domain power	
Relative accuracy	
Code domain power range: 0 to –40 dBc	±0.2 dB nominal
Symbol power vs. time	
Symbol EVM accuracy: 0 to –25 dBc	1% nominal

Modulation accuracy (composite rho)	
Carrier power range at RF input	+24 to –34 dBm (RF INPUT port); +33 to –20 dBm (RF I/O)
EVM accuracy	1% nominal (0 to 25%)[2]
Residual EVM	*1.5% typical*
Rho accuracy	
At rho = 0.99751 (EVM 5%)	±0.0010 nominal
Frequency error	
Initial frequency error range	±400 Hz
Accuracy	±10 Hz + tfa[3]
IQ origin offset	
Analyzer noise floor	–50 dBc nominal
DUT maximum offset	–10 dBc nominal

1. *Specifications apply for frequencies between 410 to 935 MHz, and 1710 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.*

cdma2000 and 1xEV-DO Source Key Specifications[1]

Signal quality (RF OUTPUT: 0 dBm, RF I/O 1 and 2: –20 dBm)	
Composite EVM	
RMS	< 1.1% nominal

U9075A Mobile WiMAX™ Measurement Application Key Specifications[2]

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 390 to 2170 MHz.*
2. *Specifications apply for frequencies between 2300 to 2800 MHz, and 3300 to 3600 MHz.*

U9080A LTE FDD Measurement Application
Key Specifications[1]

Modulation accuracy (composite rho)	
3GPP standards supported	3GPP TS 36.201 V9.1.0 (2010-03), 3GPP TS 36.211 V9.1.0 (2010-03), 3GPP TS 36.212 V9.3.0 (2010-03), 3GPP TS 36.213 V9.2.0 (2010-06), 3GPP TS 36.214 V9.2.0 (2010-06), 3GPP TS 36.101 V9.4.0 (2010-06)
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	PBCH, PCFICH, PHICH, PDCCH, PDSCH
Uplink	PUCCH, PUSCH, PRACH
Physical signals	
Downlink	P-SS, S-SS, RS
Uplink	S-RS, PUCCH-DMRS, PUSCH-DMRS

Channel power	
Absolute power accuracy	±0.4 dB nominal

Adjacent channel power	
Minimum power at RFIO input	–5 dBm nominal
Dynamic range	
E-UTRA	70 dB nominal
UTRA	74 dB nominal

Error vector magnitude (EVM)	
Residual EVM	
Signal bandwidth	
5 MHz	–45 dB (0.45%) nominal
10 MHz	–45 dB (0.45%) nominal

Frequency error	
Frequency error, lock range	±2.5 x subcarrier spacing (nominal), default is 15 kHz
Frequency error accuracy	±1 Hz + tfa[2]

1. *Specifications apply for frequencies between 824 to 960 MHz, and 1710 to 2690 MHz.*
2. *tfa = transmitter frequency x frequency reference accuracy.*

U9081A *Bluetooth*® Measurement Application Key Specifications[1]

Modulation characteristics	
Deviation range	±250 kHz nominal
Deviation resolution	100 Hz nominal
Measurement accuracy	±100 Hz + tfa[2] nominal

Initial carrier frequency tolerance	
Measurement range	Nominal channel freq ±100 kHz nominal
Measurement accuracy	±100 Hz + tfa[2] nominal

Carrier frequency drift	
Measurement range	±100 kHz nominal
Measurement accuracy	±100 Hz + tfa[2] nominal

EDR modulation accuracy	
Range (rms DEVM)	0 to 12% nominal
Floor	1.5% nominal
Accuracy	±1.2%[3] nominal

1. *Specifications apply for frequencies between 2400 to 2486 MHz.*
2. *tfa = transmitter frequency x frequency reference accuracy.*
3. *The accuracy specification applies when the EVM to be measured is well above the measurement floor.*

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