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Keysight E7515A
UXM Wireless Test Set



Data Sheet

KEYSIGHT TECHNOLOGIES

Make a Clear Call

The team looks to you: will a new chipset or UE pass the crucial tests? Clarity comes from accumulated insights – insights enabled by the Keysight Technologies's UXM wireless test set. The UXM is a highly integrated signaling test set created for functional and RF design validation in the 4G era and beyond. It provides the capabilities you need to test the newest designs, delivering LTE-Advanced data rates up to 1 Gbps now and handling more complex requirements later. When the team counts on you, count on the UXM to help you assess design readiness with greater confidence and make a clear call.

Definitions and Conditions

The specifications in this document apply to single TRX instruments with serial number MY5520xxxx/TH5520xxxx and dual TRX instruments with serial number MY5521xxxx/TH5521xxxx.

The test set will meet its specifications 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

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 (23°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.

Vector Signal Analyzer Performance

Frequency and time specification	
Operating frequency range	
E7515A-504	300 MHz to 3.8 GHz
E7515A-506	300 MHz to 6.0 GHz
Frequency setting resolution	100 kHz
Frequency accuracy	See Timebase specifications
VSWR all RF inputs	
300 MHz to 2.0 GHz	1.4 nominal
> 2.0 to 5.0 GHz	1.5 nominal
> 5.0 to 6.0 GHz	1.8 nominal
Amplitude and range specifications	
CW level accuracy	
–60 to +30 dBm for Rx1, Rx2;	
–53 to +30 dBm for TxRx1, TxRx2	
300 MHz to 3.5 GHz	*±0.45 dB typical*
> 3.5 to 6.0 GHz	*±0.45 dB typical*
–53 to +3.5 dBm	
300 MHz to 3.5 GHz	±1.0 dB
> 3.5 to 6 GHz	±1.1 dB
Level flatness	*±0.3 dB typical over 100 MHz bandwidth*
Noise floor	
For combined Tx and Rx	< 140 dBm/Hz nominal
For separate Tx and Rx	< 150 dBm/Hz nominal
Maximum CW input level at connectors	
TxRx1 and TxRx2	+33 dBm

Vector Signal Generator Performance

Frequency and time specification	
Operating frequency range	
E7515A-504	300 MHz to 3.8 GHz
E7515A-506	300 MHz to 6.0 GHz
Frequency setting resolution	100 kHz
Frequency accuracy	See Timebase specifications
VSWR all RF inputs	
300 MHz to 2.0 GHz	1.4 nominal
> 2.0 to 5.0 GHz	1.5 nominal
> 5.0 to 6.0 GHz	1.8 nominal
Amplitude and range specifications	
CW output power range	
TxRx1, TxRx2	–110 to –7 dBm nominal *(–110 to –10 dBm for typical and warranted)*
Tx1, Tx2	–110 to +5 dBm nominal *(–110 to 0 dBm for typical and warranted)*
CW output level accuracy	
TxRx1, TxRx2 and Tx1, Tx2	
300 MHz to 3.5 GHz	±1.0 dB, *±0.45 dB typical*
> 3.5 to 6.0 GHz	±1.0 dB, *±0.45 dB typical*
Output level setting resolution	0.1 dB
Output level settling time	±1.0 dB within 25 µs nominal
Output flatness	*±0.3 dB typical over 100 MHz bandwidth*
Harmonics	
Attenuation of 2nd harmonic TxRx1, TxRx2	
300 MHz to 4.0 GHz, power <–10 dBm	> 30 dB nominal
> 4.0 to 6.0 GHz, power <–10 dBm	> 45 dB nominal
Attenuation of 2nd harmonic Tx1, Tx2	
300 MHz to 4.0 GHz, power <0 dBm	> 30 dB nominal
> 4.0 to 6.0 GHz, power <0 dBm	> 45 dB nominal
Attenuation of 3rd harmonic TxRx1, TxRx2	
300 MHz to 3.0 GHz, power <–10 dBm	> 40 dB nominal
> 3.0 to 6.0 GHz, power <–10 dBm	> 55 dB nominal
Attenuation of 3rd harmonic Tx1, Tx2	
300 MHz to 3.0 GHz, power <0 dBm	> 40 dB nominal
> 3.0 to 6.0 GHz, power <0 dBm	> 55 dB nominal
Attenuation of non-harmonics TxRx1, TxRx2	
300 MHz to 6.0 GHz, –10 dBm, power > –40 dBm	> 40 dB nominal
Attenuation of non-harmonics Tx1, Tx2	
300 MHz to 6.0 GHz, –10 dBm, power > –40 dBm	> 40 dB nominal
Phase noise	–90 dB at 10 kHz offset nominal
Maximum reverse power	
TxRx1, TxRx2	< ±33 dBm
Tx1, Tx2	< ±30 dBm

Instrument Specifications

Input power requirements	
Voltage and frequency	100/120/220/240 VAC, 50/60 Hz, nominal
Power consumption (instrument with 2 TRXs)	1100 W max
Additional specifications	
Dimensions (H x W x L)	
Without feet and handles	305 mm x 435 mm x 445 mm
With feet and handles	321 mm x 435 mm x 504 mm
Weight	
One TRX	33 kg
Two TRXs	36 kg
Operating temperature	5 to 45 °C, 30 g/m³ absolute humidity, 5 to 85% non-condensing relative humidity
Storage temperature	–40 to +65 °C, 50 g/m³ absolute humidity, 5 to 85% non-condensing relative humidity
Altitude	Up to 2000 m
Radiated leakage due to RF generator	*< 2.5 µV induced in a resonant dipole antenna one inch from any surface except the underside and rear panel set at RF generator output frequency and output level of –40 dBm typical*
EMC	Complies with European EMC Directive 2004/108/EC – IEC/EN 61326-1 – CISPR Pub 11 Group 1, class A – AS/NZS CISPR 11 – ICES/NMB-001 – This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada. – South Korean Class A EMC declaration: This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home. A급 기기 (업무용 방송통신기 자재) 이기기는 업무용(A급) 전자파 적합기기로서 판매자 또 는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Mechanical resistance	EN60068-2-6, EN60068-2-27, EN60068-2-64
Safety	Complies with European Low Voltage Directive 2006/95/EC – IEC/EN 61010-1, 3rd edition – Canada: CAN/CSA C22.2 No. 61010-1012 – USA: UL std no. 61010-1, 3rd Edition – Acoustic statement (European Machinery Directive 2002/42/EC, 1.7.4.2u) Acoustic noise emission, LpA <70 dB, Operator position, Normal operation mode, Per ISO 7779
RF connections	
Tx1, Tx2	N-type female, 50 Ω nominal
TxRx1, TxRx2	N-type female, 50 Ω nominal
Other connectors and interfaces	
Display/Manual user interface	15.4 in (391 mm) active matrix, color, 1280 x 800 pixel resolution TFT-LCD flat panel display with touch panel controls; single-touch capacitive touch-screen; HDMI port
USB ports	
Front panel	2 USB 2.0 ports
Rear	2 USB 2.0 ports
LAN (local area network) ports	One external, 1 Gbps, LAN port rear panel One external, 1 Gbps, LAN port front panel

Instrument Specifications *(continued)*

Digital data acquisition	
General memory budgets and considerations	
RCB available memory	512 MB
Memory allocation for digital acquisition	256 MB
Basic acquisitions	
IQ data acquisition channels	2 (one per BS Rx antenna)
Sample rates	30.72 MSa/s, 122.88 MSa/s
Maximum sample storage	32 MSa per BS Rx antenna
Fixed size buffers per channel and allocation	
Single or dual channel (RF Carrier)	30.72 MHz: 1092 ms
Single or dual channel (RF Input)	122.88 MHz: 273 ms
Maximum digitalized data size	128 MB per channel
Trigger control	Immediate, event-based Ethernet
Source selection	
RF Input (1 & 2)	100 MHz bandwidth (122.88 MSa/s)
RF Carrier (1 & 2)	20 MHz bandwidth (30.72 MSa/s)
Channel emulation	
Antenna configuration	1x1, 1x2, 2x2, 4x2
3GPP LTE Rel 8 for RF fading profiles	Bypass EPA 5, custom Max Doppler frequency EVA 5, 70, 200, custom Max Doppler frequency ETU 70, 200, 300, custom Max Doppler frequency HST CQI
3GPP TD-SCDMA/HSPA RF fading profiles	Bypass Multi-path case 1 to 3 PA3 PB3 VA 30, 120 HST Moving Birth death
3GPP W-CDMA/HSPA+ RF fading profiles	Bypass Multi-path case 1 to 3 PA3 PB3 VA 30, 120 HST Moving Birth death

Instrument Specifications *(continued)*

PA3	
PB3	2
VA 30, 120	No channel Channel 1 Channel 2 Channel 1 and 2
HST	 –189 to –81 dBm/Hz –179 to –71 dBm/Hz
Moving	–49.6 to 49.6 MHz
Birth Death	 1.08, 2.7, 4.5, 9.0, 13.5, 18.0 MHz
Continuous wave generation	
Independent channels	2
Antenna output	No channel Channel 1 Channel 2 Channel 1 and 2
Digital frequency offset	–50 to 50 MHz
Time base	
Standard frequency reference	
Maximum frequency drift	±0.7 ppm/year
Short term stability	±0.005 ppm
Warm-up time	1 minute to be ±0.1 ppm at 25 °C
External clock time reference	
Connector type	SMA connector SYNC IN, rear panel
Frequency	
Sine wave	10 MHz
Square wave (greater than 40% ON duty cycle)	10 MHz
Input voltage range	0.4 to 2 Vpp
Impedance	50 Ω nominal
Format alignment trigger	
External connector	SMA Channel 0
Trigger duration configurable according format	Where sample resolution = (1/30.72) x 10^{-6}
LTE	0 to 30719 samples
Trigger offset delay	In terms of 1/6 of the period of the sample
Trigger period configurable according format	
LTE	1 to 10240 packets
Generic trigger	
External connector	SMA Channel 1, 2, 3 (Input, Output)
Arm channel for receiving trigger	Only input channels
External trigger generation	Only output channels
Calibration	
Recommended calibration cycle	One year

LTE Measurements

Modulation and channels	
Signal structure	FDD and TDD (with appropriate licenses)
Signal bandwidth	1.4, 3, 5, 10, 15, 20 MHz
LTE signal generation	
Error vector magnitude (EVM) 20 MHz LTE PDSCH signal with full allocation (100 RBs) modulation = 64QAM; power = –20 dBm	
300 MHz to 3.5 GHz	< 2% RMS nominal
>3.5 to 6 GHz	< 2.25% RMS nominal
LTE power measurements	
Level range (BW 20 MHz, OFDM, 64QAM)	–45 to +30 dBm, RMS
LTE channel power accuracy	±0.65 dB nominal
LTE adjacent channel power Dynamic range	
E-UTRA	> 45 dB nominal
UTRA	> 45 dB nominal
Residual EVM (5, 10, 15, 20 MHz bandwidths)	< 2% RMS typical at –20 dBm input power

GSM/GPRS/EGPRS Measurements

Modulation, bands, and frequency	
Modulation types	GMSK and 8PSK
Bands	GSM450, GSM480, GSM750, PGSM, EGSM, RGSM, TGSM810, GSM850, DCS, PCS
Frequency range	0.45 to 2 GHz (within bands)
GSM/GPRS/EGPRS signal generation	
Modulated output power range	
TxRx1, TxRx2	–110 to –10 dBm
Tx1, Tx2	–110 to 0 dBm
Output level accuracy with GMSK or 8PSK	*±0.55 dB, typical*
GSM/GPRS/EGPRS measurements	
Level range	–25 to +30 dBm
Transmit power accuracy	*±0.5 dB, typical*

TD-SCDMA/HSPA Measurements

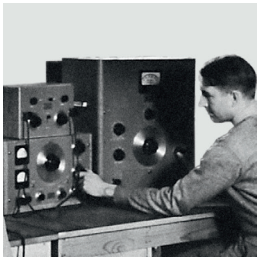
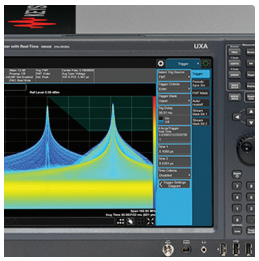
Modulation, bands, and frequency	
Modulation types	QPSK and 16QAM
Bands	a, b, c, d, e, f, 41
Frequency range	1.8 to 2.7 GHz (within bands)
TD-SCDMA/HSPA signal generation	
Modulated output power range	
TxRx1, TxRx2	–110 to –13 dBm/1.28 MHz
Tx1, Tx2	–110 to –5 dBm/1.28 MHz
Output level accuracy with QPSK or 16QAM	*±0.5 dB, typical*
TD-SCDMA/HSPA measurements	
Level range	–65 to +30 dBm/1.28 MHz
Channel power accuracy	*±0.5 dB, typical*

W-CDMA/HSPA+ Measurements

Modulation, bands, and frequency	
Modulation types	
Downlink	QPSK, 16QAM, 64QAM
Uplink	QPSK, 16QAM
Bands	1 to 14, 19 to 21, 25, 26
Frequency range	0.7 to 2.7 GHz (within bands)
W-CDMA/HSPA+ signal generation	
Modulated output power range	
TxRx1, TxRx2	–110 to –13 dBm/3.84 MHz
Tx1, Tx2	–110 to –5 dBm/3.84 MHz
Output level accuracy with QPSK or 16QAM	*±0.7 dB, typical*
W-CDMA/HSPA+ measurements	
Level ranges	
Channel power, frequency error	–61 to +28 dBm/3.84 MHz
ACLR, OBW, SEM	+5 to +28 dBm/3.84 MHz
EVM	–25 to +28 dBm/3.84 MHz
Channel power accuracy	*±0.7 dB, typical*
Adjacent channel leakage ratio (ACLR) accuracy	±0.7 dB, nominal
Spectrum emissions mask (SEM) accuracy	±1.5 dB, nominal
Occupied bandwidth (OBW) accuracy	< 100 kHz, nominal
Error vector magnitude (EVM) accuracy	< 2.5% RMS, nominal
Frequency error accuracy	< 10 Hz, nominal

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