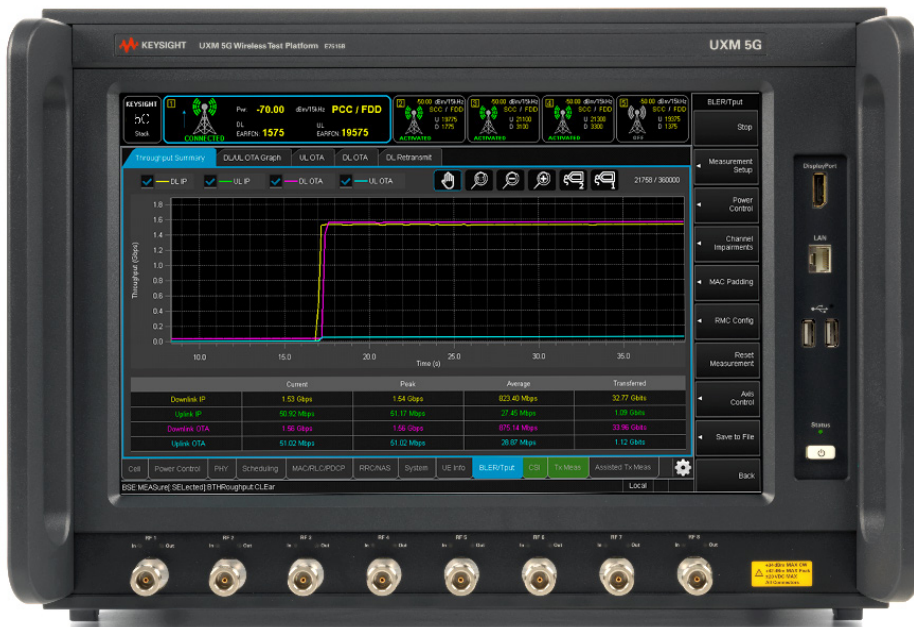




E7515B

UXM 5G Wireless Test Platform



Definitions and Conditions

Unless otherwise noted, this data sheet applies to eight transmitters and four receiver port E7515B units with serial numbers ending with 5951xxxx or greater.

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.

Specifications

Specifications describe the performance parameters covered by the product warranty and are valid from 20 to 30 °C unless otherwise noted.

Typical

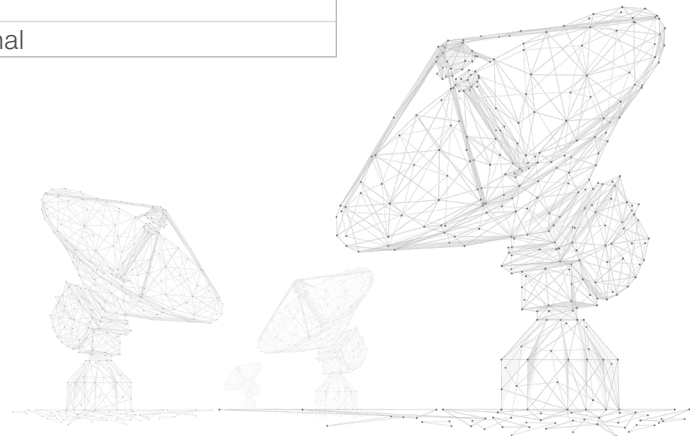
Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 95 percent of the units exhibit with a 95 percent confidence level. This data, shown in italics, does not include measurement uncertainty, and is valid 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	
<ul style="list-style-type: none"> E7515B-506 	380 MHz to 6 GHz
<ul style="list-style-type: none"> Frequency setting resolution 	100 kHz
<ul style="list-style-type: none"> Frequency accuracy 	See Timebase specifications
VSWR all RF_in/ RF_out ports	
380 MHz to 600 MHz	< 1.5 nominal
> 600 MHz to 2 GHz	< 1.3 nominal
> 2 GHz to 4 GHz	< 1.5 nominal
> 4 GHz to 6 GHz	< 1.8 nominal
Amplitude and range specifications	
CW level accuracy	
+5 to +30 dBm for all receiver ports	
<ul style="list-style-type: none"> 380 MHz to 3 GHz 	± 0.43 dB <i>typical</i>
<ul style="list-style-type: none"> > 3 GHz to 4.2 GHz 	± 0.71 dB <i>typical</i>
<ul style="list-style-type: none"> > 4.2 GHz to 6 GHz 	± 0.79 dB <i>typical</i>
-60 to +5 dBm for all receiver ports	
<ul style="list-style-type: none"> 380 MHz to 4.2 GHz 	± 0.3 dB <i>typical</i>
<ul style="list-style-type: none"> > 3 GHz to 4.2 GHz 	± 0.33 dB <i>typical</i>
<ul style="list-style-type: none"> > 4.2 GHz to 6 GHz 	± 0.4 dB <i>typical</i>
-40 to +5 dBm for all receiver ports	
<ul style="list-style-type: none"> 380 MHz to 4.2 GHz 	± 0.9 dB warranted
Level flatness	
<ul style="list-style-type: none"> Over 100 MHz bandwidth relative to central frequency 	
<ul style="list-style-type: none"> 380 MHz to 3 GHz 	± 0.30 dB <i>typical</i>
<ul style="list-style-type: none"> > 3 GHz to 4.2 GHz 	± 0.32 dB <i>typical</i>
<ul style="list-style-type: none"> > 4.2 GHz to 6 GHz 	± 0.36 dB <i>typical</i>
<ul style="list-style-type: none"> Over 800 MHz bandwidth relative to central frequency 	
<ul style="list-style-type: none"> 380 MHz to 3 GHz 	± 0.39 dB <i>typical</i>
<ul style="list-style-type: none"> > 3 GHz to 4.2 GHz 	± 0.42 dB <i>typical</i>
<ul style="list-style-type: none"> > 4.2 GHz to 6 GHz 	± 0.58 dB <i>typical</i>
Noise spectral density all RF_in/RF_out ports	
<ul style="list-style-type: none"> RF_out set to max DL power 	< -130 dBm/Hz nominal
<ul style="list-style-type: none"> RF_out set to OFF 	< -150 dBm/Hz nominal
<ul style="list-style-type: none"> Maximum CW input level 	
<ul style="list-style-type: none"> RF_in/ RF_out ports 	+34 dBm nominal



Vector Signal Generator Performance

Frequency and time specification	
Operating frequency range	
<ul style="list-style-type: none"> E7515B-506 	380 MHz to 6 GHz
Frequency setting resolution	100 kHz
Frequency accuracy	See Time base specifications
VSWR all RF_in/ RF_out ports	
380 MHz to 600 MHz	< 1.5 nominal
> 600 MHz to 2 GHz	< 1.3 nominal
> 2 GHz to 4 GHz	< 1.5 nominal
> 4 GHz to 6 GHz	< 1.8 nominal
Amplitude and range specifications	
CW output level accuracy	
-110 dBm to +7 dBm for all transmitter ports	
<ul style="list-style-type: none"> 380 MHz to 3 GHz 	± 0.68 dB <i>typical</i>
<ul style="list-style-type: none"> > 3 GHz to 4.2 GHz 	± 0.62 dB <i>typical</i>
-100 dBm to +3 dBm for all transmitter ports	
<ul style="list-style-type: none"> 380 MHz to 4.2 GHz 	± 0.4 dB <i>typical</i>
<ul style="list-style-type: none"> > 4.2 GHz to 6 GHz 	± 0.6 dB <i>typical</i>
-50 dBm to -3 dBm for all transmitter ports	
<ul style="list-style-type: none"> 380 MHz to 4 GHz 	± 1.2 dB warranted and ± 0.48 dB <i>typical</i>
Output level setting resolution	0.1 dB
Output level settling time	
<ul style="list-style-type: none"> No amplitude change, frequency change within band 	± 1.0 dB within 100 μ s nominal
<ul style="list-style-type: none"> Amplitude change, no frequency change 	± 0.1 dB within 25 μ s nominal
<ul style="list-style-type: none"> Frequency change 	± 0.1 dB within 100 ms nominal
Output flatness	
Over 100 MHz bandwidth relative to central frequency	
<ul style="list-style-type: none"> 380 MHz to 3 GHz 	± 0.21 dB <i>typical</i>
<ul style="list-style-type: none"> > 3 GHz to 4.2 GHz 	± 0.23 dB <i>typical</i>
<ul style="list-style-type: none"> > 4.2 GHz to 6 GHz 	± 0.45 dB <i>typical</i>
Over 800 MHz bandwidth relative to central frequency	
<ul style="list-style-type: none"> 380 MHz to 3 GHz 	± 0.25 dB <i>typical</i>
<ul style="list-style-type: none"> > 3 GHz to 4.2 GHz 	± 0.36 dB <i>typical</i>
<ul style="list-style-type: none"> > 4.2 GHz to 6 GHz 	± 0.52 dB <i>typical</i>
Wideband noise floor (for DL at max CW power)	-130 dBm/Hz <i>typical</i>
Maximum reverse power (Operating)	
<ul style="list-style-type: none"> All RF_in/ RF_out ports 	34 dBm average power, nominal 42 dBm peak power, nominal
Maximum reverse power (Damage)	
<ul style="list-style-type: none"> All RF_in/ RF_out ports 	34 dBm average power, nominal 42 dBm peak power, nominal
Phase noise	
<ul style="list-style-type: none"> 380 MHz to 6 GHz 	-100 dBc at 100 kHz, nominal -110 dBc at 300 kHz, nominal

Harmonics	
Attenuation of 2 nd harmonic all RF_in/ RF_out ports	
• 380 MHz to 4 GHz, power < -10 dBm	> 30 dBc nominal
• > 4 GHz to 6 GHz, power < -10 dBm	> 45 dBc nominal
Attenuation of 3 rd harmonic all RF_in/ RF_out ports	
• 380 MHz to 4 GHz, power < -10 dBm	> 40 dBc nominal
• > 4 GHz to 6 GHz, power < -10 dBm	> 55 dBc nominal

Instrument Specifications

Input power requirements	
Voltage and frequency	100/120/220/240 VAC, 50/60 Hz, nominal
Power consumption (Fully loaded configuration)	1400W max
Additional specifications	
Dimensions (H x W x L)	
• Without feet and handles	309 mm x 436 mm x 554 mm
• With feet and handles	323 mm x 453 mm x 554 mm
Weight	
• Fully loaded configuration	42.4 kg
Operating temperature	+10 to +40 °C, 30 g/m ³ absolute humidity, 5 to 85% non-condensing relative humidity
Storage temperature	-40 to +70 °C, 50 g/m ³ absolute humidity, 5 to 85% non-condensing relative humidity
Altitude	Up to 2000 m
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) 이 기기는 업무용 (A급) 전자파 적합기기로서 판매자 또는 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	

Instrument Specifications (Continued)

RF connections	
RF_in/ RF_out ports	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
USB ports	
• Front panel	2x USB 2.0
• Rear panel	2x USB 3.0
LAN (local area network) ports	One external, 1 Gbps, LAN port rear panel One external, 1 Gbps, LAN port front panel
Digital data acquisition	
General memory budgets and considerations	
• Available memory (capture and/or playback)	16 GB total
Signal acquisition	
• IQ data acquisition channels	4 (one per UL RF_in port)
• Samples rates	122.88 and 1228.8 MSa/s
• Maximum sample storage	1 GSa per UL RF_in port
Maximum capture size	4 GB per channel
Trigger control	Immediate and external
Analyzer bandwidth	100 MHz bandwidth (122.88 MSa/s) 800 MHz bandwidth (1228.8 MSa/s)
Channel emulation	
Antenna configuration	1x1, 1x2, 1x4, 1x8, 2x1, 2x2, 2x4, 2x8, 4x1, 4x2, 4x4, 4x8, 8x1, 8x2, 8x4, 8x8
Gaussian noise generator	
Independent channels	8
RF_IN/ RF_OUT port	Configured via RFIO
Digital frequency offset	$-400 \text{ MHz} + \text{BW}_{\text{Noise}}/2$ to $400 \text{ MHz} - \text{BW}_{\text{Noise}}/2$
Continuous wave generation	
Independent channels	8
RF_IN/ RF_OUT port	Configured via RFIO
Digital frequency offset	-400 to 400 MHz
Arbitrary wave generation	
Independent channels	8
Antenna output	Configured via RFIO
Digital frequency offset	
• Bandwidth 100 MHz	-350 MHz to 350 MHz
Memory allocation for arbitrary wave generation	16 GB (shared with digital data acquisition)
Waveform sampling rate	
• Bandwidth 100 MHz	122.88 MSa/s
Maximum waveform file size	4 GB
Waveform play modes	Single, continuous

Instrument Specifications (Continued)

Time base	
Standard frequency reference	
<ul style="list-style-type: none"> Maximum frequency drift 	± 50 ppb/2 years <i>typical</i>
<ul style="list-style-type: none"> Warm-up time 	30 min
External clock time reference	
Connector type	SMA connector 10 MHz IN, rear panel
Frequency	
<ul style="list-style-type: none"> Sine wave 	10 MHz
<ul style="list-style-type: none"> Square wave (greater than 40% ON duty cycle) 	10 MHz
<ul style="list-style-type: none"> Input voltage range 	0.4 to 2 Vpp
<ul style="list-style-type: none"> Impedance 	50 Ω nominal
Format alignment trigger	
External connector	SMA Channel 0
Trigger duration configurable according to format	Samples resolution = $(1 / 30.72) \times 10^{-6}$
<ul style="list-style-type: none"> VZW 5GTF 	1 to $2^{31} - 1$ samples
Trigger offset delay	In terms of 1/6 of the period of the sample
Trigger period configurable according format	
<ul style="list-style-type: none"> VZW 5GTF 	1 to $2^{31} - 1$ samples
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
Warranty and calibration	
Standard warranty	One year
Recommended calibration cycle	One year

Verizon 5GTF Measurements

Modulation and channels	
Signal structure	TDD (with appropriate license)
Signal bandwidth	100 MHz
VZW 5GTF signal generation	
Error vector magnitude (EVM)	
100 MHz 5GTF PDSCH signal with full allocation modulation = 64 QAM; power = -20 dBm	
<ul style="list-style-type: none"> 300 MHz to 3.5 GHz 	< 1 % RMS nominal
<ul style="list-style-type: none"> > 3.5 GHz to 6 GHz 	< 1 % RMS nominal
VZW 5GTF power measurements	
Level range (BW 100 MHz, OFDM, 64 QAM)	-45 to +30 dBm, RMS (only if PAPR < 12 dB)
Residual EVM (100 MHz bandwidth)	< 1.5% RMS nominal at -20 dBm input power

5G NR Measurements

Modulation and channels	
Signal structure	TDD (with appropriate license)
Signal bandwidth	100 MHz
5G NR signal generation	
Error vector magnitude (EVM)	
100 MHz 5G NR PDSCH, signal modulation = QPSK; power = -10 dBm	
• 300 MHz to 6 GHz	< 1 % RMS nominal

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