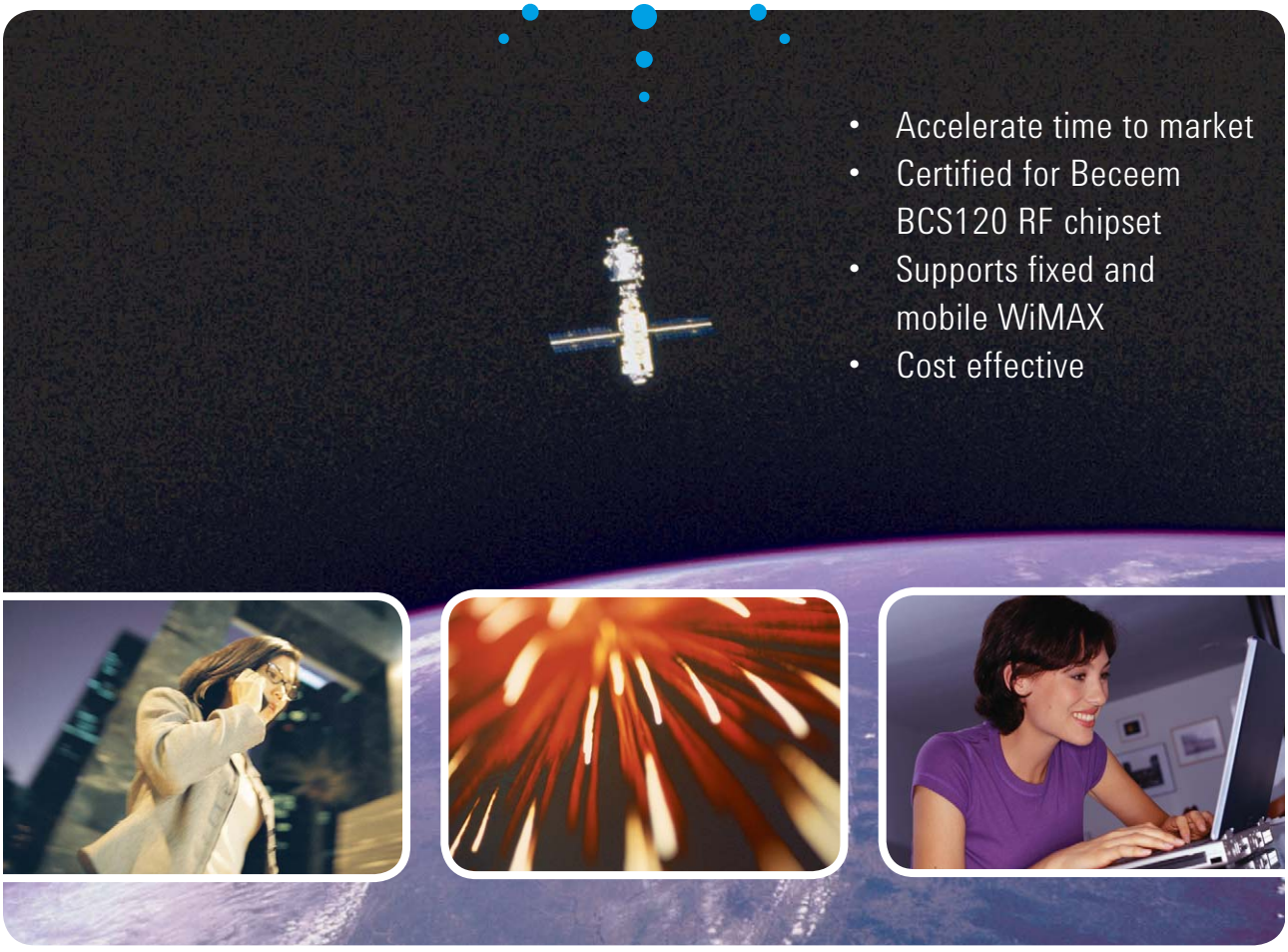
Agilent MXZ-1000 WiMAX Manufacturing Test System

Data Sheet



BECEEM COMMUNICATIONS

Collabaration with Beceem WiMAX RF chipset

Agilent Technologies

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Agilent MXZ-1000 WiMAX Manufacturing Test System

The Agilent MXZ-1000 is a fully integrated WiMAX calibration and tuning test solution offering exceptional test speed, superior measurement performance and capability, a user-friendly GUI environment, and world-wide global delivery and support.

Agilent MXZ-1000 is the industry-leading WiMAX manufacturing test system offering a library of proprietary chipset communication and calibration profiles for WiMAX manufacturers seeking a WiMAX calibration solution optimized for high-volume environments. The MXZ-1000 is ideal for:

- Reference designers and contract manufacturers for modules
- Original Equipment Manufacturer (OEM) for consumer products like PC/PDA/ handset
- Access Point (AP) manufacturers and Reference Design Houses (RDH) using OEM reference chipsets

Key Features

Accelerate time to market
Offering the industry's fastest signal analysis and switching speeds, MXZ-1000 helps accelerate your success.

Certified for Beceem BCS120 RF chipset
The MXZ-1000 has been certified for communication between the Beceem BCS120 RF chipset and the WiMAX test software, enabling the highest measurement throughput. Other chipsets will be offered in the future.

Supports fixed and mobile WiMAX
Compatible with both fixed (802.16-2004) and mobile (802.16e-2005 OFDMA) "last mile" broadband wireless access (BWA) systems using point-to-point or point-to-multipoint architecture.

Compact, cost effective
Combining superior performance and small size, MZX1000 saves floor space with its bench-top design. Compared with custom solutions it also reduces overall test cost.

Hardware

MXZ-1000 WiMAX Manufacturing Test System consists of hardware components as below:

- N9020A MXA Signal Analyzer
- N5182A MXG Vector Signal Generator
- N8990A-P43 Interface Unit
- 66319D Power Supply (optional)
- PC controller application (optional)

Hardware Features

- Exceptional test speed with 30 to 300% faster in spectrum and signal analysis
- Fastest switching speeds in class of - < 1.2 ms in SCPI mode; simultaneous frequency, amplitude and waveform switching at < 900 µs in list mode
- Maximize uptime – simplified self-maintenance enables calibration in less than 1 hour and repairs in 30 minutes using field-replaceable assemblies

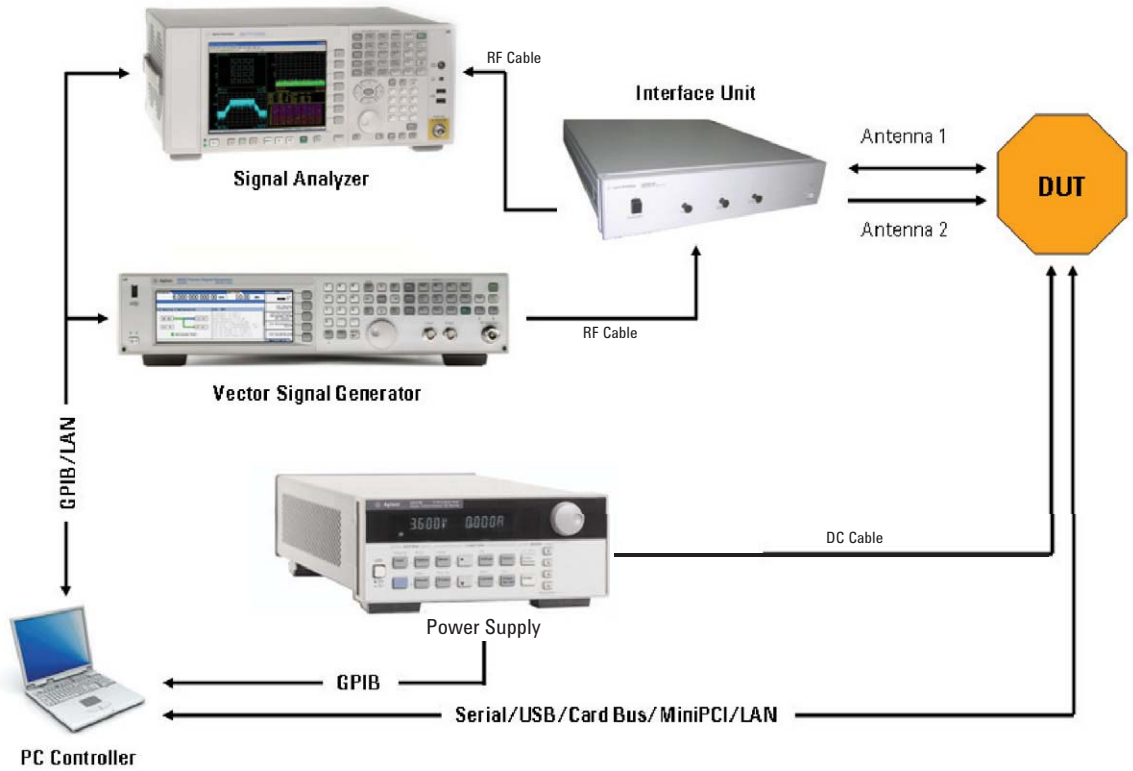


Figure 1: Hardware Architecture

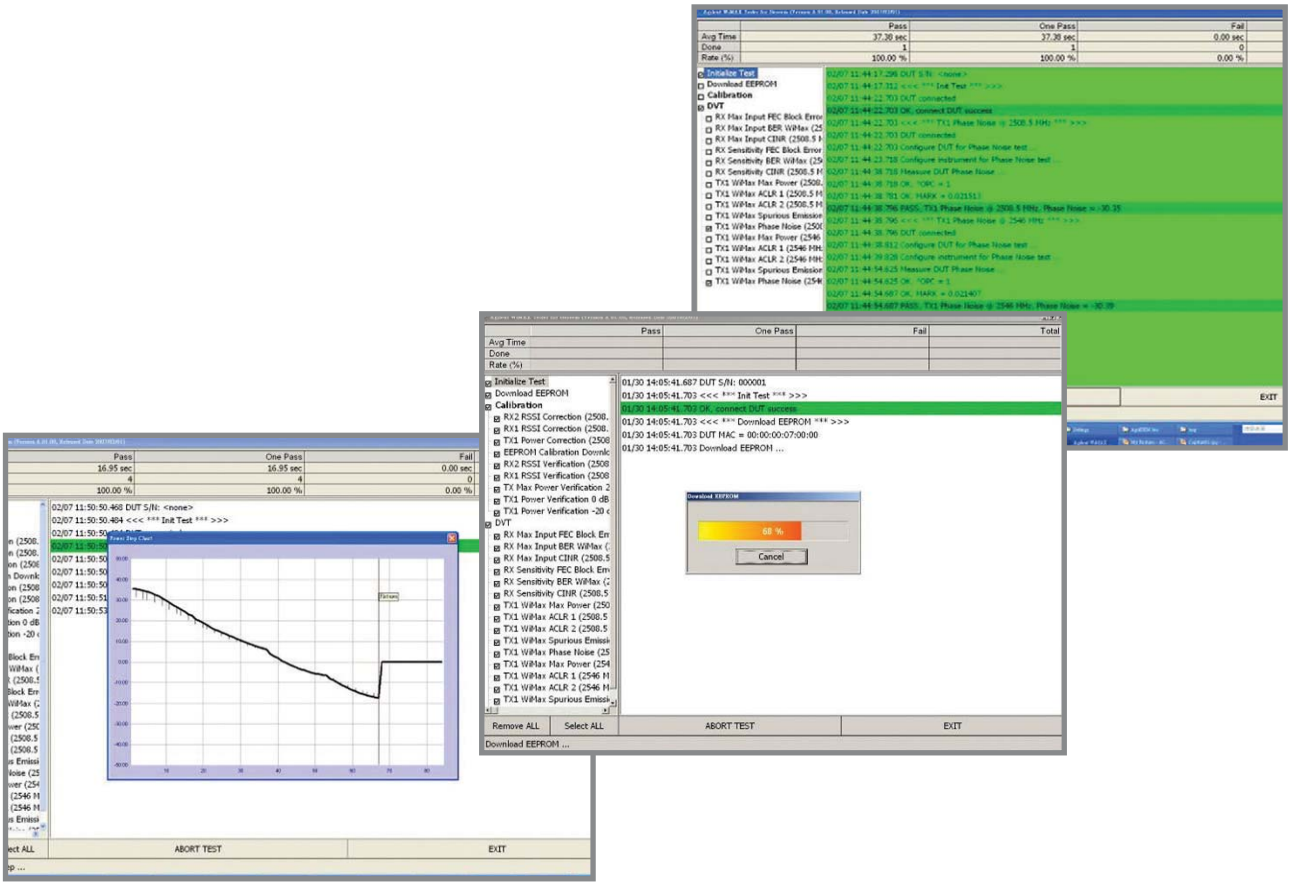
Software

MXZ-1000 WiMAX Manufacturing Test System consists of software applications as below:

- N9075A 802.16-OFDMA measurement application
- N7615B 8002.16 WiMAX Signal Studio (optional)
- 89601A Vector Signal Analysis Software (optional)

Software Features

- User friendly GUI
- Auto-generated reports
- Support multiple instrument selections
- Support Beceem reference design test items required for calibration and functional test



Signal Analyzer

Frequency and Time Specifications

Frequency Range	
DC Coupled	*AC Coupled*
20 Hz to 8.4 GHz	10 MHz to 8.4 GHz

Band		
	LO Multiple (N)	
0	1	20 Hz to 3.6 GHz
1	1	3.5 to 8.4 GHz

Frequency Span (FFT and swept mode)	
Range	0 Hz (zero span), 10 Hz to maximum frequency of instrument
Resolution	2 Hz
Accuracy	
Swept	±(0.25% x span + horizontal resolution)
FFT	±(0.10% x span + horizontal resolution)

Sweep Time and Triggering		
Range	Span = 0 Hz	1 µs to 6000 s
	Span ≥ 10 Hz	1 ms to 4000 s
Accuracy	Span ≥ 10 Hz, swept	±0.01% nominal
	Span ≥ 10 Hz, FFT	±40% nominal
	Span = 0 Hz	±0.01% nominal
Trigger	Free run, line, video, external 1, external 2, RF burst, periodic timer	
Trigger delay	Span = 0 Hz or FFT	–150 to +500 ms
	Span ≥ 10 Hz, swept	1 µs to 500 ms
	Resolution	0.1 µs

Sweep (trace) Point Range	
All spans	1 to 20001

Resolution Bandwidth (RBW)		
Range (–3.01 dB bandwidth)	1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz	
Bandwidth accuracy (power) RBW range	1 Hz to 750 kHz	±1.0% (±0.044 dB)
	820 kHz to 1.2 MHz (< 3.6 GHz CF)	±2.0% (±0.088 dB)
	1.3 to 2.0 MHz (<3.6 GHz CF)	±0.07 dB nominal
	2.2 to 3 MHz (<3.6 GHz CF)	±0.15 dB nominal
	4 to 8 MHz (3.6 GHz CF)	±0.25 dB nominal
Bandwidth accuracy (–3.01 dB) RBW range	1 Hz to 1.3 MHz	±2% nominal
Selectivity (–60 dB/–3 dB)	4.1:1 nominal	

Analysis Bandwidth[1]	
Maximum bandwidth	
Option	25 MHz
Standard	10 MHz

(1) Analysis bandwidth is the instantaneous bandwidth available around a center frequency over which the input signal can be digitized for further analysis or processing in the time, frequency, or modulation domain.

Video Bandwidth (VBW)	
Range	1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz and wide open (labeled 50 MHz)
Accuracy	±6% nominal

Measurement Speed		
Local measurement and display update rate	Sweep points = 1001	11 ms (90/s) nominal
Remote measurement and LAN transfer rate	Sweep points = 1001	4 ms (250/s) nominal
Marker peak search	5 ms nominal	
Center frequency tune and transfer (RF)	51 ms nominal	
Center frequency tune and transfer (µW)	86 ms nominal	
Measurement/mode switching	75 ms nominal	

Amplitude Accuracy and Range Specifications

Amplitude Range	
Measurement range	Displayed average noise level (DANL) to maximum safe input level
Input attenuator range (20 Hz to 26.5 GHz)	0 to 70 dB in 2 dB steps

Electronic Attenuator	
Frequency range	20 Hz to 3.6 GHz
Attenuation range	
Electronic attenuator range	0 to 24 dB, 1 dB steps
Full attenuation range (mechanical + electronic)	0 to 94 dB, 1 dB steps

Maximum Safe Input Level		
Average total power	+30 dBm (1 W)	
Preamp	+25 dBm	
Peak pulse power	<10 µs pulse width, <1% duty cycle and input attenuation ≥30 dB	+50 dBm (100 W)

DC volts	
DC coupled	±0.2 Vdc
AC coupled	±70 Vdc

Display Range	
Log scale	0.1 to 1 dB/division in 0.1 dB steps 1 to 20 dB/division in 1 dB steps (10 display divisions)
Linear scale	10 divisions
Scale units	dBm, dBmV, dBµV, dBmA, dBµA, V, W, A

Frequency Response (10 dB input attenuation, 20 to 30 °C, preselector centering applied, = nominal standard deviation)

		Specification	*95th Percentile (≈ 2σ)*
	20 Hz to 10 MHz	±0.6 dB	±0.28 dB
	10 MHz to 3.6 GHz	±0.45 dB	±0.17 dB
	3.5 to 8.4 GHz	±1.5 dB	±0.48 dB
Preamp on attenuation 0 dB	100 kHz to 3.6 GHz	±0.75 dB	±0.28 dB
	3.5 to 8.4 GHz	±2.0 dB	±0.53 dB

Input Attenuation Switching Uncertainty

	50 MHz (reference frequency) attenuation > 2 dB	±0.20 dB	±0.08 dB typical
	20 Hz to 3.6 GHz		±0.3 dB nominal
	3.5 to 8.4 GHz		±0.5 dB nominal

Total Absolute Amplitude Accuracy (10 dB attenuation, 20 to 30 °C, 1 Hz ≤ RBW ≤ 1 MHz, input signal –10 to –50 dBm, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale, = nominal standard deviation)

	At 50 MHz	±0.33 dB
	At all frequencies	±(0.33 dB + frequency response)
	20 Hz to 3.6 GHz	±0.30 dB (95th Percentile ≈ 2σ)
Preamp	At all frequencies	± (0.39 dB + frequency response)

Input Voltage Standing Wave Ratio (VSWR) (≥10 dB input attenuation)

	10 MHz to 3.6 GHz	< 1.7:1 nominal
	3.6 to 8.4 GHz	< 1.8:1 nominal
Preamp on (0 dB attenuation)	10 MHz to 3.6 GHz	< 1.7:1 nominal
	3.6 to 8.4 GHz	< 1.8:1 nominal

Resolution Bandwidth Switching Uncertainty (referenced to 30 kHz RBW)

1 Hz to 1.5 MHz RBW	±0.05 dB
1.6 MHz to 3 MHz RBW	±0.10 dB
4, 5, 6, 8 MHz RBW	±1.0 dB

Preamplifier

Frequency range	100 kHz to 8.4 GHz	
Gain	100 kHz to 3.6 GHz	+20 dB nominal
	3.6 to 8.4 GHz	+35 dB nominal
Noise figure	100 kHz to 3.6 GHz	11 dB nominal
	3.6 to 8.4 GHz	9 dB nominal

Dynamic Range Specifications

1 dB gain compression (two-tone)

		Total power at input mixer	
	20 to 500 MHz	0 dBm	+3 dBm typical
	500 MHz to 3.6 GHz	+3 dBm	+7 dBm typical
	3.6 to 8.4 GHz	0 dBm	+4 dBm typical
Preamp on	10 MHz to 3.6 GHz		–10 dBm nominal
	3.6 to 8.4 GHz		
	Tone spacing 100 kHz to 20 MHz		–26 dBm nominal
	Tone spacing >70 MHz		–16 dBm nominal

Displayed Average Noise Level (DANL) (Input terminated, sample or average detector, averaging type = Log, 0 dB input attenuation, IF Gain = High, 20 to 30°C)

		Specification	*Typical*
Preamp off	9 kHz to 1 MHz		–125 dBm
	1 to 10 MHz	–150 dBm	–153 dBm
	10 MHz to 2.1 GHz	–151 dBm	–154 dBm
	2.1 to 3.6 GHz	–149 dBm	–152 dBm
	3.6 to 8.4 GHz	–149 dBm	–153 dBm
Preamp on	100 kHz to 1 MHz		–149 dBm
	1 to 10 MHz	–161 dBm	–163 dBm
	10 MHz to 2.1 GHz	–163 dBm	–166 dBm
	2.1 to 3.6 GHz	–162 dBm	–164 dBm
	3.6 to 8.4 GHz	–162 dBm	–166 dBm

Spurious Responses

Residual responses (Input terminated and 0 dB attenuation)	200 kHz to 8.4 GHz (swept)	–100 dBm
	Zero span or FFT or other frequencies	–100 dBm nominal
Image responses	10 MHz to 3.6 GHz	–80 dBc (–107 dBc typical)
	3.6 to 8.4 GHz	–78 dBc (–88 dBc typical)
LO related spurious (f > 600 MHz from carrier)	10 MHz to 3.6 GHz	–90 dBc typical
Other spurious		
f ≥ 10 MHz from carrier	–80 dBc	

Second Harmonic Distortion (SHI)

	Mixer level	*Distortion*	*SHI*
10 MHz to 1.8 GHz	–15 dBm	–60 dBc	+45 dBm
1.8 to 7.0 GHz	–15 dBm	–80 dBc	+65 dBm
7.0 to 8.4 GHz	–15 dBm	–70 dBc	+55 dBm

		Preamp level	*Distortion*	*SHI*
Preamp on	10 MHz to 1.8 GHz	–45 dBm	–78 dBc nominal	+33 dBm nominal
	1.8 to 8.4 GHz	–50 dBm	–60 dBc nominal	+10 dBm nominal

Third-order Intermodulation Distortion (TOI) (two -30 dBm tones at input mixer with tone separation > 5 times IF prefilter bandwidth, 20 to 30 degC, see Specifications Guide for IF prefilter bandwidths)

		Distortion	*TOI*	*Typical*
	10 to 100 MHz	–84 dBc	+12 dBm	+17 dBm
	100 to 400 MHz	–88 dBc	+14 dBm	+18 dBm
	400 MHz to 1.7 GHz	–90 dBc	+15 dBm	+19 dBm
	1.7 to 3.6 GHz	–92 dBc	+16 dBm	+19 dBm
	3.6 to 8.4 GHz	–90 dBc	+15 dBm	+18 dBm
Preamp on	10 to 500 MHz	+4 dBm nominal		
	500 MHz to 3.6 GHz	+5 dBm nominal		
	3.6 to 8.4 GHz	–15 dBm nominal		

Phase Noise

	Offset	*Specification*	*Typical*
Noise sidebands (20 to 30 °C, CF = 1 GHz)	100 Hz	–84 dBc/Hz	–88 dBc/Hz
	1 kHz		–100 dBc/Hz nominal
	10 kHz	–103 dBc/Hz	–106 dBc/Hz
	100 kHz	–115 dBc/Hz	–117 dBc/Hz
	1 MHz	–133 dBc/Hz	–137 dBc/Hz
	10 MHz		–148 dBc/Hz nominal

Signal Generator

Frequency

Range	250 kHz to 6 GHz	
Minimum frequency	100 kHz [1]	
Resolution	0.01 Hz	
Phase offset	Adjustable in nominal 0.01° **increments**	
Frequency bands [2]	**Frequency range**	**N**
1	100 kHz to < 250 MHz	0.5
2	250 to < 375 MHz	0.125
3	375 to < 750 MHz	0.25
4	750 to < 1500 MHz	0.5
5	1500 to < 3000.001 MHz	1
6	3000.001 to 6000 MHz	2
Switching speed [3, 4]		
Type	*Standard*	*Option*
Digital modulation off		
SCPI mode	≤ 5 ms (typ)	≤ 1.15 ms
List/Step sweep mode	≤ 5 ms (typ)	≤ 900 µs
Digital modulation on		
SCPI mode	≤ 5 ms (typ)	≤ 1.15 ms
List/Step sweep mode	≤ 5 ms (typ)	≤ 900 µs
Accuracy	± aging rate ± temperature effects ± line voltage effects	

Internal time base reference oscillator aging rate	≤ ± 5 ppm/10 yrs, < ± 1 ppm/yr
Temperature effects	± 1 ppm (0 to 55 °C)
Line voltage effects	± 0.1 ppm (nom)
Line voltage range	5% to –10% (nom)
Reference output	
Frequency	10 MHz
Amplitude	≥ +4 dBm (nom) into 50 Ω load
External reference input	
Input frequency	10 MHz
Lock range	± 1 ppm
Amplitude	> –3.5 to 20 dbm (nom)
Impedance	50 Ω (nom)
Digital sweep modes	
Operating modes	Step sweep (equally or logarithmically spaced frequency steps) List sweep (arbitrary list of frequency steps) Can also simultaneously sweep amplitude and waveforms. See amplitude and baseband generator sections for more detail.
Sweep range	Within instrument frequency range
Dwell time	100 µs to 100 s
Number of points	2 to 65535 (step sweep) 1 to 1601 (list sweep)
Step change	Linear or logarithmic
Triggering	Free run, trigger key, external, timer, bus (GPIB, LAN, USB)

(1) Performance below 250 kHz is unspecified.
(2) 2 N is a factor used to help define certain specifications within the document.
(3) 3 Time from receipt of SCPI command or trigger signal to within 0.1 ppm of final frequency or within 100 Hz, whichever is greater, and amplitude settled to within 0.2 dB.
(4) 4 Additional time may be required for the amplitude to settle within 0.2 dB when switching to or from frequencies < 500 kHz or amplitudes > +5 dBm.

Amplitude

Output power		
Range [1]	*Standard*	*Option*
250 GHz to 2.5 GHz	–110 to +13 dBm	–127 to +13 dBm
> 2.5 to 3.0 GHz	–110 to +10 dBm	–127 to +10 dBm
> 3.0 to 4.5 GHz	–110 to +13 dBm	–127 to +13 dBm
> 4.5 to 5.8 GHz	–110 to +10 dBm	–127 to +10 dBm
> 5.8 to 6 GHz	–110 to +7 dBm	–127 to +7 dBm
Resolution	0.02 dB (nom)	
Step attenuator	0 to 130 dB in 5 dB steps, electronic type	
Connector	50 Ω (nom)	
Maximum reverse power		
Max DC voltage	50 VDC (nom)	
250 kHz to 6 GHz	2 W (nom)	

Switching speed [2]			
Type		*Standard*	*Option*
Digital modulation off		≤ 5 ms (typ)	≤ 750 µs
SCPI mode		≤ 5 ms (typ)	≤ 500 µs
List/Step sweep mode			
Digital modulation on		≤ 5 ms (typ)	≤ 1.15 ms
SCPI mode		≤ 5 ms (typ)	≤ 900 µs
List/Step sweep mode			
Absolute level accuracy in CW mode [3] [ALC on]			
		Standard	*Option*
	+7 to –60 dBm	< –60 to –110 dBm	< –110 to –127 dBm
250 kHz to 1 MHz	±0.6 dB	±0.7 dB	±1.7 dB
> 1 MHz to 1 GHz	±0.6 dB	±0.7 dB	±1.0 dB
> 1 to 3 GHz	±0.7 dB	±0.9 dB	±1.4 dB
> 3 to 4 GHz	±0.8 dB	±0.9 dB	±1.0 dB
> 4 to 6 GHz	±0.8 dB	±1.1 dB	±1.3 dB
Absolute level accuracy in CW mode [ALC off, relative to ALC on]		±0.35 dB (typ)	
Absolute level accuracy in digital I/Q mode [ALC on, relative to CW]			
300 MHz to 2.5 GHz		±0.25 dB	
3.3 to 3.8 GHz		±0.45 dB	
5.0 to 6.0 GHz		±0.25 dB	
User flatness correction			
Number of points		1601	
Number of tables		Dependent on available free memory in instrument	
Digital Sweep modes			
Operating modes		Step sweep (evenly spaced amplitude steps) List sweep (arbitrary list of amplitude steps) Can also simultaneously sweep frequency and waveforms. See frequency and baseband generator sections for more detail.	
Sweep range		Within instrument amplitude range	
Dwell time		100 µs to 100 s	
Number of points		2 to 65535 (step sweep) 1 to 1601 (list sweep)	
Step change		Linear	
Triggering		Free run, trigger key, external, timer, bus (GPIB, LAN, USB)	

(1) Quoted specifications between 20 and 30 °C. Maximum output power typically decreases by 0.2 dB/ °C for temperatures outside this range.

(2) 1 Time from receipt of SCPI command or trigger signal to amplitude settled within 0.2 dB when switching to or from amplitudes < +5 dBm.

(3) 2 Quoted specifications between 20 °C and 30 °C. For temperatures outside this range, absolute level accuracy degrades by 0.01 dB/degree C for frequencies ≤ 4.5 GHz and 0.02 dB/degree C for frequencies > 4.5 GHz.

Spectral Purity

Single sideband phase noise [at 20 kHz offset]

500 MHz	≤ –126 dBc/Hz (typ)	3 GHz	≤ –110 dBc/Hz (typ)
1 GHz	≤ –121 dBc/Hz (typ)	4 GHz	≤ –109 dBc/Hz (typ)
2 GHz	≤ –115 dBc/Hz (typ)	5 GHz	≤ –104 dBc/Hz (typ)

Residual FM [CW mode, 300 Hz to 3 kHz BW, CCITT, rμs] < N x 2 Hz (typ)

Harmonics [CW mode, output level < 4 dBm]

≤ 3 GHz	< –30 dBc
> 3 to 6 GHz	< –44 dBc (typ)

Nonharmonics [CW mode]

	> 10 kHz offset
250 kHz to 250 MHz	< –54 dBc, < –70 dBc (typ)
> 250 to 375 MHz	< –61 dBc, < –81 dBc (typ)
> 375 to 750 MHz	< –55 dBc, < –73 dBc (typ)
> 750 MHz to 1.5 GHz	< –48 dBc, < –62 dBc (typ)
> 1.5 to 3 GHz	< –48 dBc, < –62 dBc (typ)
> 3 to 6 GHz	< –42 dBc, < –56 dBc (typ)

Subharmonics [CW mode]

≤ 4 GHz	< –76 dBc
> 4 to 5 GHz	< –64 dBc
> 5 to 5.5 GHz	< –50 dBc
> 5.5 to 6 GHz	< –46 dBc

Jitter

Carrier	SONET/SDH			
Frequency	*Data rate*	*rms jitter BW*	*μUI rms*	*Femtoseconds*
155 MHz	155 MB/s	100 Hz to 1.5 MHz	84	537
622 MHz	155 MB/s	1 KHz to 5 MHz	47	75
2.488 GHz	2488 MB/s	5 KHz to 20 MHz	178	72

Vector Modulation

I/Q input and output data [1]

External I/Q inputs

Impedance	50 Ω (nom)
Full scale input	1.0 Vp (sqrt(I^2 + Q^2) = 0.15 Vrms) (nom)
Bandwidth	100 MHz baseband (nom) 200 MHz RF (nom)
I offset	±100 mV
Q offset	±100 mV
Quadrature angle adjustment	±200 units

Internal I/Q from baseband generator

I offset	±20%
Q offset	±20%
I/Q gain	±1 dB
Quadrature angle adjustment I/Q	±10 °
skew	±800 ns
I/Q delay	±400 ns

External I/Q outputs		
Impedance	50 Ω (nom)	
Type	Single ended or differential (Option)	
Full scale output voltage	±1.5 Vpeak (nom), high impedance	
Bandwidth	50 MHz baseband (nom)	
Common mode I/Q offset	100 MHz RF (nom)	
Differential mode I offset	±2.5 V	
Differential mode Q offset	±25 mV	
	±25 mV	

(1) I/Q adjustments represent user interface parameter ranges and not "specifications".

Baseband Generator

Channels	2 [I and Q]	
Sample rate and bandwidth	*Clock rate*	*Bandwidth*
Option 651	1 kSa/s to 30 MSa/s	24 MHz
Effective DAC resolution	11 bits 16 bits (Option UNV)	
Reconstruction filter	50 MHz	
Baseband frequency offset range	±50 MHz	
Waveform switching speed	*Standard*	*Option*
SCPI mode	≤ 5 ms (typ)	≤ 1.2 ms (typ)
List/Step sweep mode	≤ 5 ms (typ)	≤ 900 µs (typ)
Digital sweep modes	In list sweep mode each point in the list can have independent waveforms along with user definable frequencies and amplitudes. See the amplitude and frequency sections for more detail.	
Data transfer rates		
LAN to non-volatile storage		161 kSa/s (meas)
LAN to baseband generator		265 kSa/s (meas)
Non-volatile storage to baseband generator		262 kSa/s (meas)
Arbitrary waveform memory		
Maximum playback capacity		8 Msa
Maximum storage capacity including markers		100 Msa
Waveform segments		
Segment length		60 samples to 8 MSa
Maximum number of segments in playback memory		1024
Maximum number of segments in non-volatile memory		1024
Minimum memory allocation per segment		256 samples
Waveform sequences		
Maximum number of sequences	Up to 2000 depending on memory usage	
Maximum number of segments/ sequence	1024	
Maximum number of repetitions	65535	

Triggers	
Types	Continuous, single, gated, segment advance
Source	Trigger key, external, bus (GPIB, LAN, USB)
Modes	
Continuous	Free run, trigger and run, reset and run
Single	No retrigger, buffered trigger, immediate retrigger
Gated	Negative polarity or positive polarity
Segment advance	Single or continuous
External delay time	8 ns to 30 s
External delay resolution	8 ns
Trigger latency	490 ns + 1 sample clock period (nom)
Trigger accuracy	±4 ns (nom)
Markers [Markers are defined in a segment during the waveform generation process, or from the front panel. A marker can also be routed to the RF blanking and ALC Hold functions]	
Marker polarity	Negative, positive
Number of markers	4
Burst on / off ratio	> 80 dB (typ)
AWGN	
Type	Real-time, continuously calculated and played using DSP
Modes of operation	Standalone or digitally added to arbitrary waveform
Bandwidth	1 Hz to 100 MHz
Crest factor	15 dB
Randomness	90 bit pseudo-random generation, repetition period 313 x 10 years
Carrier to noise ratio	± 100 dB when added to arbitrary waveforms
Carrier to noise ratio error	Magnitude error ≤ 0.2 dB at baseband I/Q outputs

EVM Performance Data

Format	802.16-2005 WiMAX[1]
Modulation type	64QAM
Frequency	2300 to 2690 MHz 2300 to 3800 MHz
EVM power level	≤ 7 dBm
EVM	0.4% (typ)

(1) 802.16-2005 WiMAX signal configuration: bandwidth: 10 MHz, FFT: 1024, frame length: 5ms, guard period: 1/8, symbol rolloff: 5%, content: 30 symbols of PN9 data.

Note: *For 802.16-2004 WiMAX, additional Vector Signal Analysis Software 89601A is needed.*

802.16-2005 Mobile WiMax Distortion Performance

Offet	*Configuration* [1]	*Frequency*	*Standard*	*Option*
10 MHz	QPSK modulation	2.5 and 3.5 GHz	–63 dBc (typ)	–68 dBc (typ)

(1) 802.16-2005 WiMAX signal configuration: bandwidth: 10 MHz, FFT: 1024, frame length: 5ms, guard period: 1/8, symbol rolloff: 5%, content: 30 symbols of PN9 data.

Software

N9075A 802.16-OFDMA Measurement Application

Available measurements

- Channel power [1]
- ACP (adjacent channel power)[1]
- Spectrum emission mask [1]
- Spurious emissions
- Occupied bandwidth [1]
- Power versus time
- Modulation analysis (including spectral flatness)
- Power statistics CCDF
- Monitor spectrum
- IQ waveform

Key Parameter Setups	
Radio device	BS (downlink) and MS (uplink)
Radio standard	IEEE 802.16-2005
Bandwidth	1.25 to 28 MHz [2] (present)
FFT size	128, 512, 1024, 2048
Zone types	PUSC, OPUSC, FUSC, OFUSC

(1) These measurement require a timing trigger to capture the burst power on period. To measure time-gated spectrum analysis for burst signals, gated LO function is required. These measurments will become available with the time-gated LO firmware upgrade in the next firmware release. "Gate required for valid results" would be seen in the status message at the bottom of display when these measurement are running.

(2) When 28 MHz is selected, IQ acquisition measurements such as modulation analysis, CCDF, power versus time be grayed out. 25 MHz is the maximum bandwidth for modulation analysis with N9020A-B25 on MXA.

Key Specifications	
Spurious emissions	
Accuracy	Attenuation = 10 dB
Frequency range	
20 HZ to 3.6 GHz	±0.36 dB (nominal)
3.5 GHz to 8.4 GHz	±1.17 dB (nominal)
Channel power	
Minimum power at RF input	–30 dB (nominal)
Absolute power accuracy	±0.30 dB (nominal)
20 to 30 °C, Attenuation = 10 dB	
Power statistic CCDF	
Histogram resolution	0.01 dB
Modulation analysis	
–25 dBM ≤ Mixer level ≤ –15 dBm , 20 to 30 °C	
EVM floor	–44 dB (nominal)

N7615B Signal Studio for 802.16 WiMAX

Key specifications

- Single- and multi-carrier 802.16-2005 WiMAX
- Flexible downlink and uplink (or both) frame configuration: zones , burst, and MAC PDUs
- Basic options: create partially coded signals for components test
- Advanced options: create fully coded signals for receiver test
- Control frequency, amplitude and ALC, waveform scaling, triggers, makers and more
- I/Q impairments and real time AWGN

Power Supply

Mobile communications dc sources (40 W to 100 W)

- Ideal for wireless/portable product test
- Programmable output resistance (66319B/D and 66321B/D only)
- Dynamic pulse measurement
- High-speed programming
- SCPI (Standard Commands for Programmable Instruments)
- GPIB Interface, VXI*plug&play* drivers

Specifications (at 0 to 55°C unless otherwise specified)			**66319B/D**	**66321B/D**
Number of outputs			2	1
Output ratings	Voltage		0 to 15 V	
	Current		0 to 3 A	
	Peak current for up to 7 ms		5 A	
Programming accuracy at 25°C ±5°C (% of setting plus fixed)	Voltage	0.05%+	10 mV	
	+Current	0.05%+	1.33 mA	
Ripple and Noise (20 Hz to 20 MHz)	Voltage (rms/p-p)		1 mV/6 mV	
	Current (rms)		2 mA	
dc measurement accuracy	Voltage	0.03%+	5 mV	
	-3 A to +5 A	0.2%	0.5 mA [1]	
	-1 A to +1 A	0.1%	0.2 mA	
	-20 mA to +20 mA	0.1%+	2.5 µA	
Dynamic measurment system	Buffer size		4096 points	
	Sampling interval		15 µs - 31,200 s	
Transient response time			< 20 µs [2]	< 20 µs
Transient voltage dip (typical with up to 15 feet 22 AWG wiring)			40 mV	
Programmable output resistance	Range		-40 mΩ to +1 Ω	
	Programming accuracy		0.5% + 2 mΩ	
	Resolution		1 mΩ	
Voltmeter input	Input range		-25 to +25 Vdc	
	dc readback accuracy (at 25°C ±5°C)		0.04% +5 mV	
	ac + dc readback accuracy (at 25°C ±5°C) with dc plus a sinewave input > 25 mV rms		1% +5 mV (60 kHZ to 10 kHZ)	
Auxiliary output				
Output ratings	Voltage Current		0 to 12 V 0 to 1.5 A	N/A
Programming accuracy	Voltage +Current		0.2% +40 mV 0.2% +4.5 mV	N/A
dc measurement accuracy	Voltage +Current		0.2% +15 mV 0.2% +3 mV	N/A
Ripple and Noise (20 Hz to 20 MHz)	Voltage (rms/p-p) Current (rms)		1mV/6 mV 2 mA	N/A

(1) Applies with current detector set to dc.
(2) Time for the output voltage to recover to within 20 mV of final value after 0.1 to 1.5 A load change in high capacitance compensation range.

Interface Unit

- Two RF ports interface with DUT (antenna-1 and antenna-2)
- 19-inches Mountable rack design
- Minimum isolation of 17dB between SA and SG path by implementing 3 ports circulator
- Operating frequency range of up to 4GHz, (6GHz optional)
- Max input power of 30dBm

Test Coverage

Transmitter calibration and check:

- TX Power Correction
- TX Max Power Verification

Receiver calibration and check:

- RX RSSI Correction and Verification
- RX RSSI Verification

Transmitter test:

- Tx Maximum Output Power
- Tx Spurious Emissions (Out of Band)
- Tx Phase Noise
- Tx Adjacent Ch. Leakage Ratio 1/2

Receiver (Rx) test:

- Rx Maximum Input FEC BLER
- Rx Maximum Input BER
- Rx Sensitivity FEC BLER
- Rx Sensitivity CINR
- Rx Sensitivity BER

Others:

- EEPROM Download

PC Controller

PC requirements:

- Operating system:Microsoft® Windows® XP Professional Service Pack 1 or later
- 600 MHz Pentium® III or higher
- 256 MB RAM minimum (512 MB is recommended for normal development)
- 200 MB free hard drive space
- CD-ROM
- GPIB card or converter with VISA drivers (one per test system)

MXZ Dimensions and Weight

Item	Height	Width	Length	Weight (without option)
N9020A MXA Signal Analyzer	177mm (7.0″)	426mm (16.8″)	368mm (14.5″)	16kg (15 lbs)
N5182A MXG Vector Signal Generator	103mm (4.07″)	426mm (16.8″)	432mm (17″)	12.5kg (27.5
Interface Unit	88.1mm (3.5″)	212.8mm (8.4″)	269.2mm (10.60″)	5kg (10lbs)
66319D Power Supply (Optional)	88.1 (3.5″)	212.8mm (8.4″)	435mm (17.125″)	9.07kg (20 lbs)
Rack (Optional)	1620mm (63.8″)	600mm (23.6″)	905mm (35.6″)	100kg (112lbs)

Warranty

The MXZ-1000 WiMAX Manufacturing Test System is supplied with a one-year warranty.

Ordering Information

U1031A MXZ-1000 WiMAX Manufacturing Test System

Related Agilent Literature

Publication Title	Publication Number
WiMAX Concepts and RF Measurements Application Note	**5989-2027EN**
N9075A 802.16 OFDMA Measurement Application Techinal Overview	**5989-5353EN**
Agilent MXA Signal Analyzer N9020A Datasheet	**5989-4942EN**
Agilent MXG Vector Signal Generator Datasheet	**5989-5261EN**

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