MXG X-Series Signal Generators
N5181B Analog & N5182B Vector

9 kHz to 3 or 6 GHz

Data Sheet

Anticipate __Accelerate __Achieve

Agilent Technologies

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Pure and precise

On the path to better performance, the new MXG X-Series signal generators are fine-tuned to be your "golden transmitter" in R&D. Whether you're pushing for a linear RF chain or an optimized link budget, the analog and vector MXG models deliver what you need: phase noise, ACPR, channel coding, and more. Take your devices and designs to the limit with the MXG.

Definitions and Conditions

Specifications describe the performance of parameters covered by the product warranty and apply to the full temperature range of 0 to 55 °C, unless otherwise noted.

Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 80 percent of the units exhibit with a 95 percent confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.

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.

Measured describes an attribute measured during the design phase for purposes of communicating expected performance, such as amplitude drift vs. time. This data is not warranted and is measured at room temperature (approximately 25 °C).

The generator will meet its specifications when it has been stored at an ambient temperature within the allowed operating range for at least two hours before being turned on or if it had previously been stored at a temperature range inside the allowed storage range, but outside the allowed operating range.

Frequency Specifications

Frequency range			
Frequency range	Option 503	9 kHz to 3 GHz	
	Option 506	9 kHz to 6 GHz	
Resolution	0.01 Hz		
Phase offset	Adjustable in nominal 0.1 ° increments		
Frequency bands [1]			
	Band	Frequency range	N
	1	9 kHz to < 5 MHz	1 (digital synthesis)
	1	5 to < 250 MHz	1
	2	250 to < 375 MHz	0.25
	3	375 to < 750 MHz	0.5
	4	750 to < 1500 MHz	1
	5	1500 to < 3000.001 MHz	2
	6	3000.001 to 6000 MHz	4

1. *N is a factor used to help define certain specifications within the document.*

Frequency switching speed [1, 2]			
	Standard	**Option UNZ [3]**	**Option UNZ, typical**
CW mode			
SCPI mode	≤ 5 ms, typical	≤ 1.15 ms	≤ 950 μs
List/step sweep mode	≤ 5 ms, typical	≤ 900 μs	≤ 800 μs
Digital modulation on (N5182B only)			
SCPI mode	≤ 5 ms, typical	≤ 1.15 ms	≤ 1.05 ms
List/step sweep mode	≤ 5 ms, typical	≤ 900 μs	≤ 800 μs

1. *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 from 20 to 30 °C. Implies simultaneous frequency and amplitude switching.*
2. *With internal channel corrections on, the frequency switching speed is < 1.3 ms, measured for list mode and SCPI mode cached frequency points. For the initial frequency point in SCPI mode the time is < 3.3 ms, measured. The instrument will automatically cache the most recently used 1024 frequencies. There is no speed degradation for amplitude-only changes.*
3. *Specifications apply when status register updates are off.*

Frequency reference	
Accuracy	± aging rate ± temperature effects ± line voltage effects
Internal time base reference oscillator aging rate [1]	< ± 1 x 10^-7/year, nominal < ± 5 x 10^-10/day after 30 days, nominal
Adjustment resolution	< 1 x1 0^-10, nominal
Temperature effects	< ± 2 x 10^-8 from 20 to 30 °C, nominal
Line voltage effects	< ± 1 x 10^-9 for ± 10% change
Reference output	
Frequency	10 MHz
Amplitude	≥ +4 dBm, nominal into 50 Ω load
External reference input	
Input frequency, standard	10 MHz
Input frequency, Option 1ER	1 to 50 MHz (in multiples of 0.1 Hz)
Lock range	± 1 ppm
Amplitude	5 dBm ± 2 dB, nominal
Impedance	50 Ω, nominal
Waveform	Sine or square

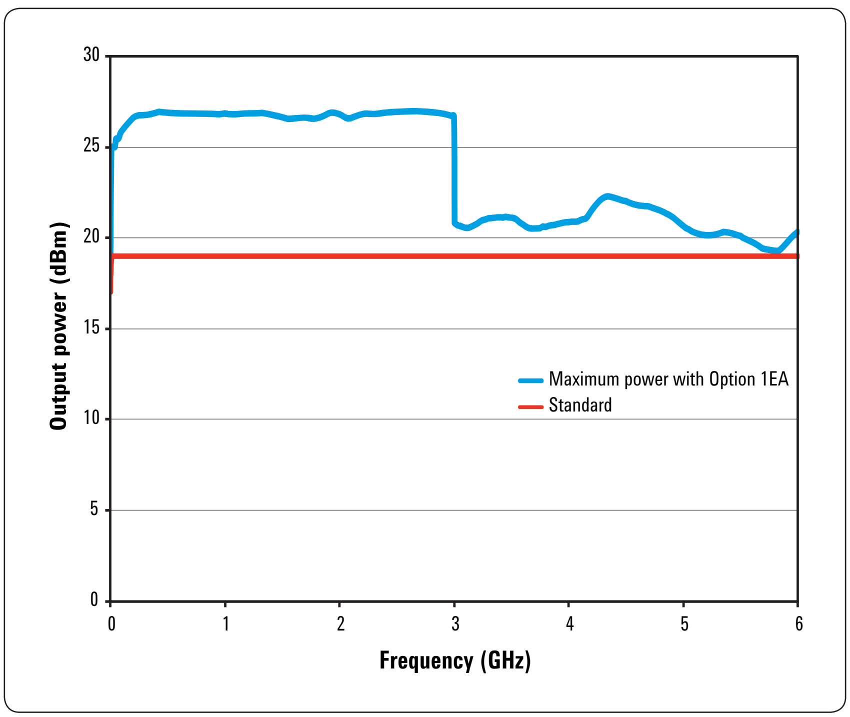
Sweep modes (frequency and amplitude)	
Operating modes	Step sweep (equally spaced frequency and amplitude or logarithmically spaced frequency steps) List sweep (arbitrary list of frequency and amplitude steps) Simultaneously sweep waveforms with N5182B; see Baseband Generator section for more detail
Sweep range	Within instrument frequency range
Dwell time	100 μs to 100 s
Number of points	2 to 65535 (step sweep) 1 to 3201 (list sweep)
Step change	Linear or logarithmic
Triggering	Free run, trigger key, external, timer, bus (GPIB, LAN, USB)

1. *Aging rate is determined by design as a function of the OCXO.*

Amplitude Specifications

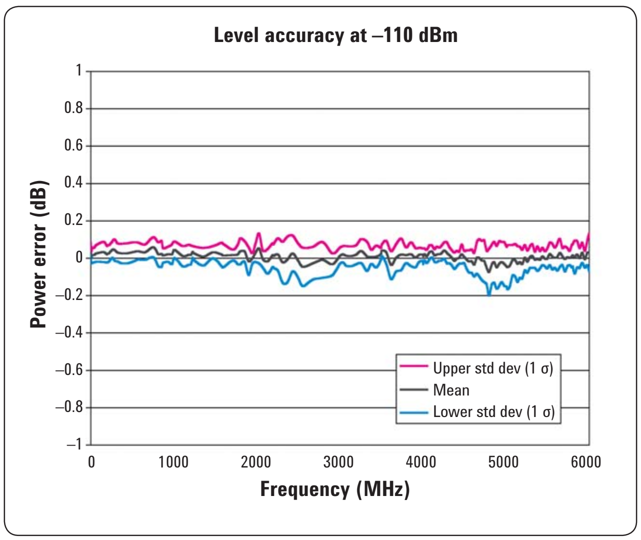
Output parameters		
Settable range	+30 to –144 dBm	
Resolution	0.01 dB, nominal	
Step attenuator	0 to 130 dB in 5 dB steps electronic type	
Connector	Type N 50 Ω, nominal	
Max output power [1]		
Frequency	**Standard**	**Option 1EA**
9 kHz to 10 MHz	+13 dBm	+17 dBm
> 10 MHz to 3 GHz	+18 dBm	+24 dBm
> 3 to 5 GHz	+16 dBm	+19 dBm
> 5 to 6.0 GHz	+16 dBm	+18 dBm

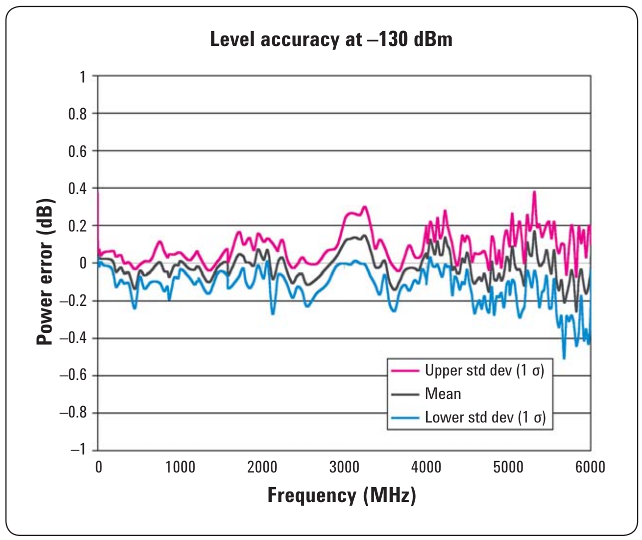
1. *Quoted specifications between 20 °C and 30 °C. Maximum output power typically decreases by 0.01 dB/°C for temperatures outside this range.*

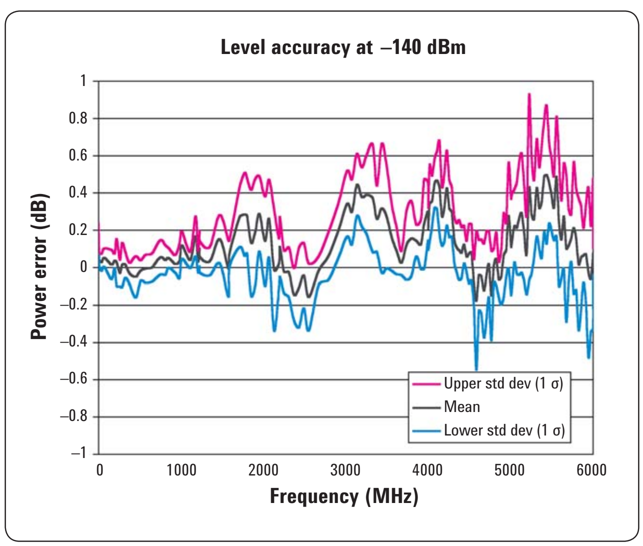


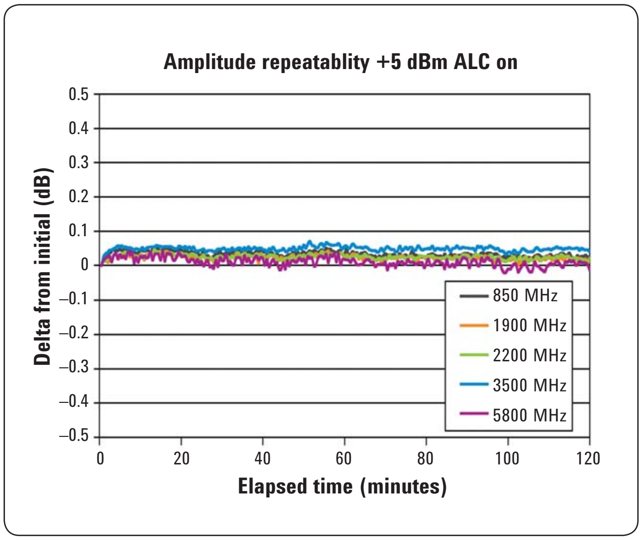
Absolute level accuracy in CW mode [1] (ALC on)			
		Standard	Option 1EQ
External reference input	**+24 to –60 dBm**	**< –60 to –110 dBm**	**< –110 to –127 dBm**
9 to 100 kHz	± 0.6 dB, typical	± 0.9 dB, typical	
100 kHz to 5 MHz	± 0.8 dB	± 0.9 dB	
> 5 MHz to 3 GHz	± 0.6 dB	± 0.8 dB	± 1.5 dB (± 0.5, typical)
> 3 to 6 GHz	± 0.6 dB	± 1.1 dB	± 1.6 dB (± 0.6, typical)
Absolute level accuracy in CW mode (ALC off, power search run, relative to ALC on)			
9 kHz to 6 GHz	± 0.15 dB, typical		
Absolute level accuracy in digital I/Q mode (N5182B only) (ALC on, relative to CW, W-CDMA 1 DPCH configuration < +10 dBm)			
9 kHz to 6 GHz	± 0.25 dB		

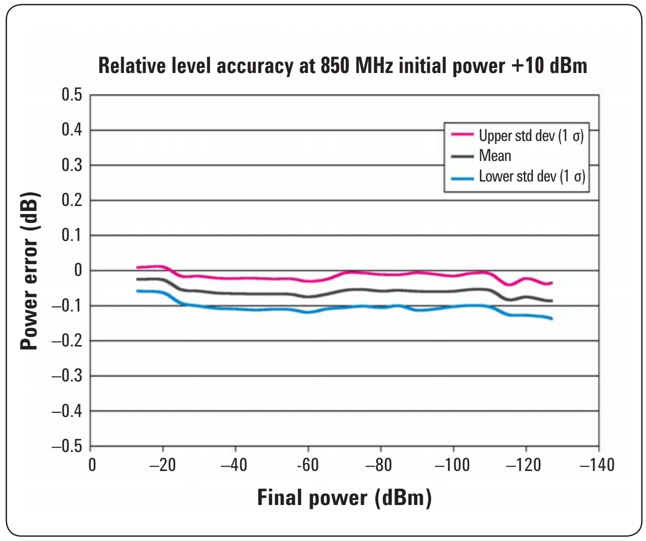
1. *Quoted specifications between 20 °C and 30 °C. For temperatures outside this range, absolute level accuracy degrades by 0.01 dB/°C. Output power may drift up to .003 dB per g/kg change in absolute humidity (nom).*





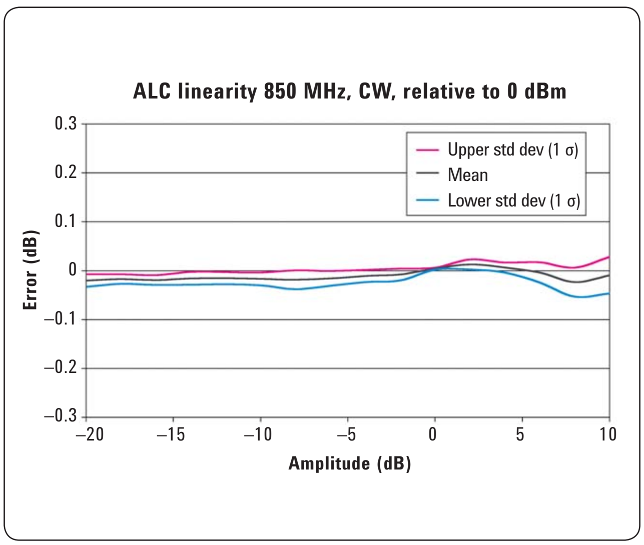


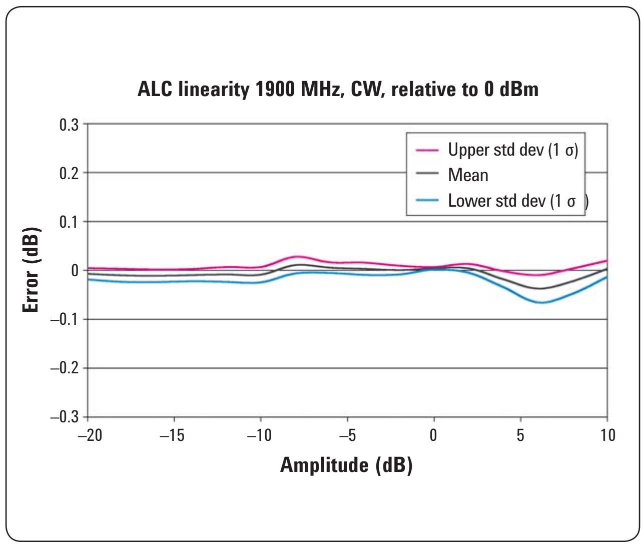




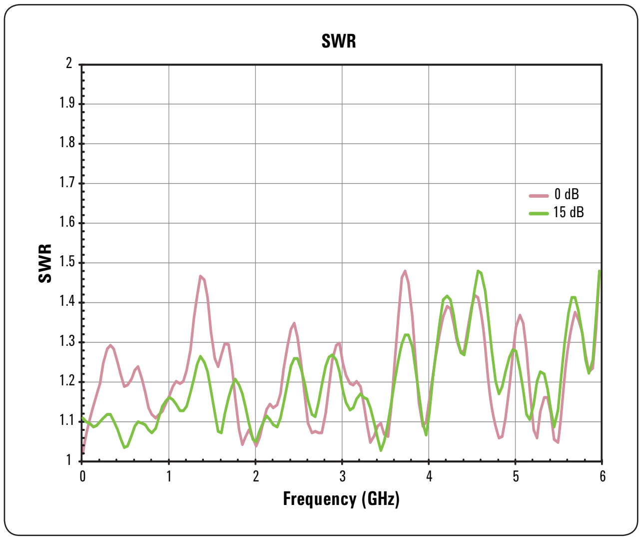
Repeatability measures the ability of the instrument to return to a given power setting after a random excursion to any other frequency and power setting. It should not be confused with absolute level accuracy.

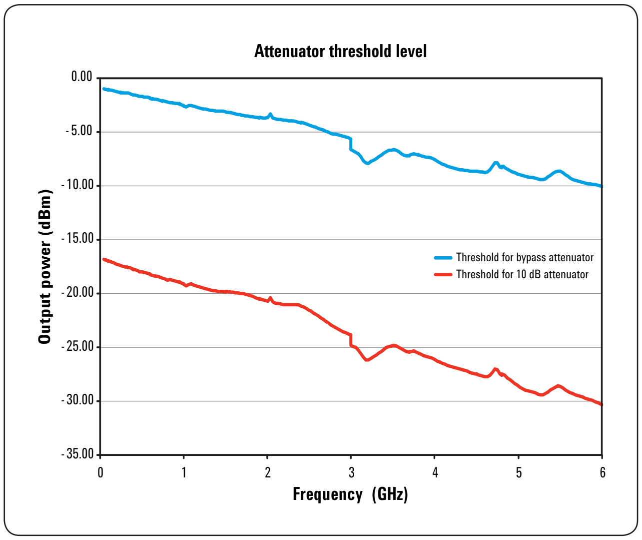
Relative level accuracy measures the accuracy of a step change from any power level to any other power level. This is useful for large changes (such as 5 dB steps).





SWR (measured CW mode)			
Frequency	**Attenuator state**		
	Bypass	**0 to 10 dB**	**15 dB or more**
≤ 1.0 GHz	< 1.3:1	< 1.35:1	< 1.2:1
> 1.0 to 2 GHz	< 1.55:1	< 1:5:1	< 1.3:1
> 2 to 3 GHz	< 1.9:1	< 1.4:1	< 1.3:1
> 3 to 4 GHz	< 1.5:1	< 1.6:1	< 1.45:1
> 4 to 6 GHz	< 1.8:1	< 1.6:1	< 1.6:1





Maximum reverse power, nominal			
< 1 GHz	50 W		
> 1 to < 2 GHz	25 W		
> 2 to < 6 GHz	20 W		
Max DC voltage	50 VDC		
Trip level	2 W		
Amplitude switching speed [1]	**Standard**	**Option UNZ**	**Option UNZ, typical**
CW mode			
SCPI mode	≤ 5 ms, typical	≤ 750 μs	≤ 650 μs
Power search SCPI mode	< 12 ms, measured		
List/step sweep mode	≤ 5 ms, typical	≤ 500 μs	≤ 300 μs
Digital modulation on (N5182B only)			
SCPI mode	≤ 5 ms, typical	≤ 1.15 ms	≤ 950 μs
Power search SCPI mode	< 12 ms, measured		
List/step sweep mode	≤ 5 ms, typical	≤ 900 μs	≤ 400 μs
Alternate power level control (N5182B only)			
Switching time (via waveform markers)	20 μs within ± 1 dB, measured		
Functional power range	–15 dBm to –144 dBm, measured		
User flatness correction			
Number of points	3201		
Number of tables	Dependent on available free memory in instrument; 10,000 maximum		
Entry modes	USB/LAN direct power meter control, LAN to GPIB and USB to GPIB, remote bus and manual USB/GPIB power meter control		
Sweep modes			
	See Frequency Specifications section for more detail		

1. *Time from receipt of SCPI command or trigger signal to amplitude settled within 0.2 dB. Switching speed specifications apply when status register updates are off.*

Spectral Purity Specifications

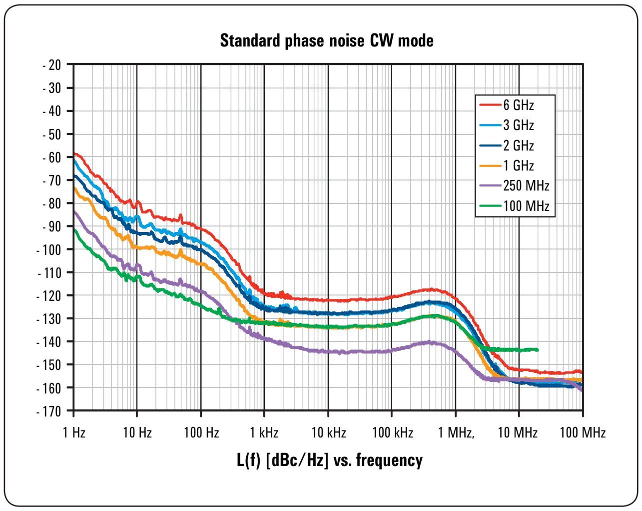
Standard absolute SSB phase noise (dBc/Hz, CW, at 20 kHz offset) () = typical [1]	
≤ 250 MHz	–129 (–133)
250.1 MHz	–140 (–143)
500 MHz	–135 (–139)
1 GHz	–131 (–134)
2 GHz	–124 (–127)
3 GHz	–123 (–127)
4 GHz	–118 (–122)
6 GHz	–116 (–121)

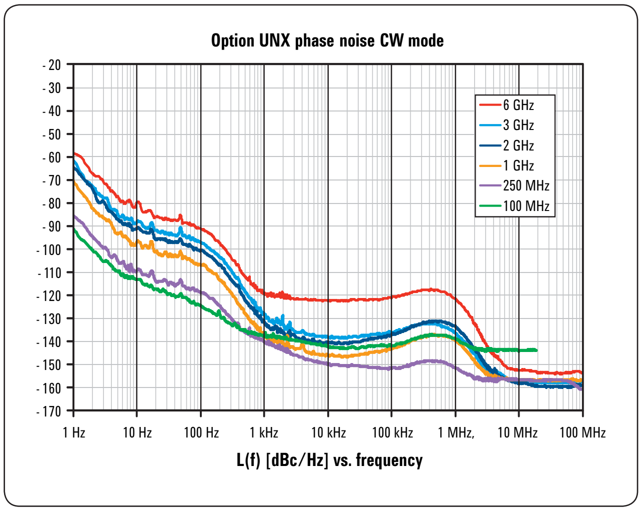
Option UNX absolute SSB phase noise (dBc/Hz, CW, at 20 kHz offset) () = typical [1]	
≤ 250 MHz	–140 (–143)
250.1 MHz	–144 (–150)
500 MHz	–143 (–150)
1 GHz	–141 (–146)
2 GHz	–135 (–141)
3 GHz	–131 (–137)
4 GHz	–118 (–122)
6 GHz	–117 (–121)

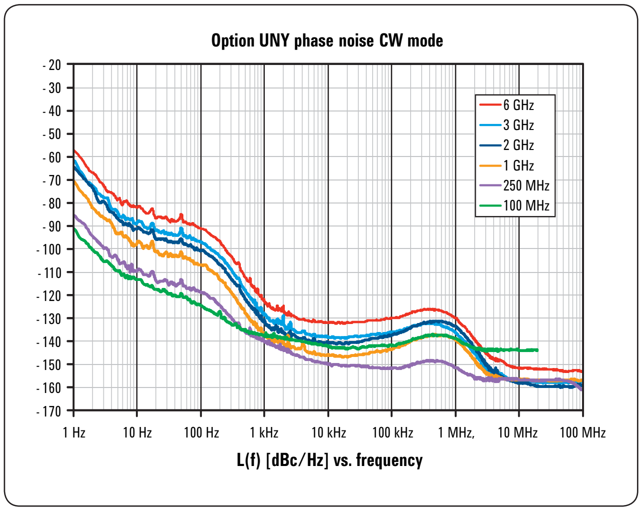
Option UNY absolute SSB phase noise (CW) () = measured [1] (Subject to export controls > 3.2 GHz)

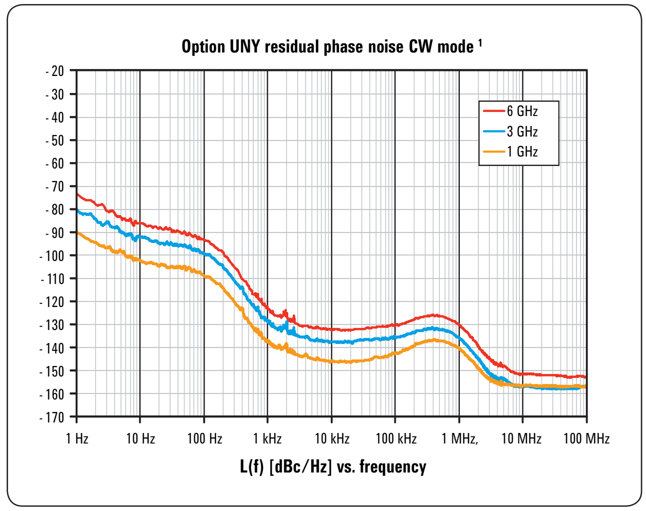
Frequency	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz
249 MHz	(–85)	–93 (–103)	–103 (–112)	–130 (–135)	–139 (–142)	–138 (–142)
250.1 MHz	(–85)	–96 (–110)	–104 (–118)	–127 (–139)	–144 (–148)	–147 (–152)
500 MHz	(–74)	–89 (–100)	–98 (–109)	–125 (–139)	–139 (–149)	–145 (–149)
1 GHz	(–70)	–87 (–97)	–93 (–106)	–123 (–136)	–141 (–146)	–140 (–143)
2 GHz	(–65)	–79 (–90)	–85 (–101)	–114 (–131)	–135 (–140)	–134 (–137)
3 GHz	(–61)	–74 (–88)	–81 (–98)	–112 (–126)	–132 (–136)	–131 (–135)
4 GHz	(–61)	–73 (–84)	–79 (–95)	–110 (–124)	–130 (–134)	–127 (–131)
6 GHz	(–57)	–69 (–81)	–76 (–91)	–107 (–121)	–126 (-130)	–125 (–129)

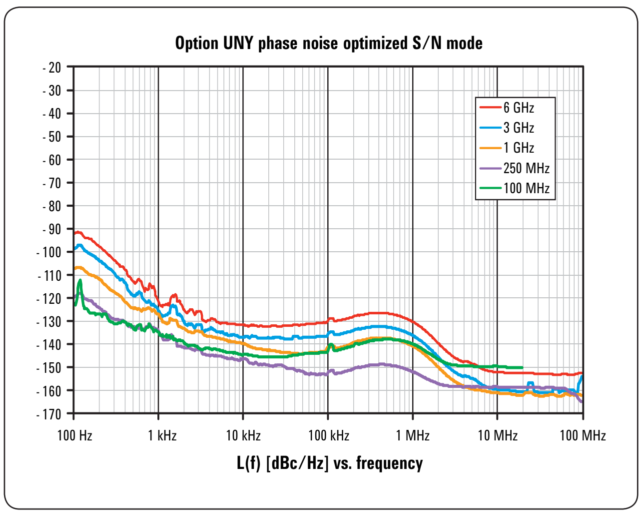
1. *From 20 to 30 °C, excludes mechanic vibration, measured @ +10 dBm or maximum specified power, whichever is less.*

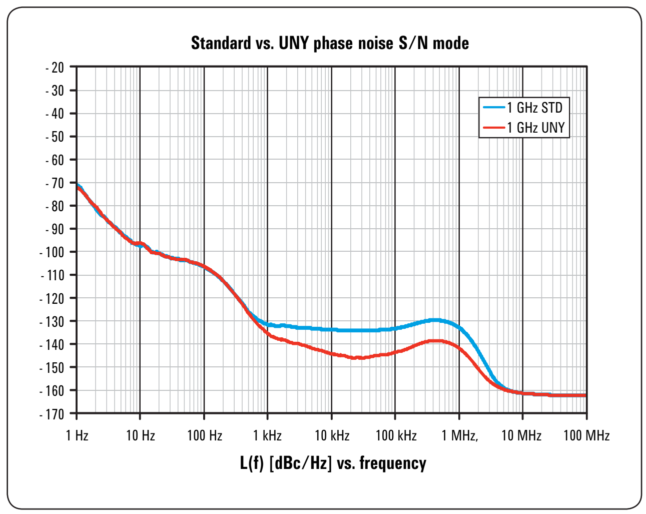


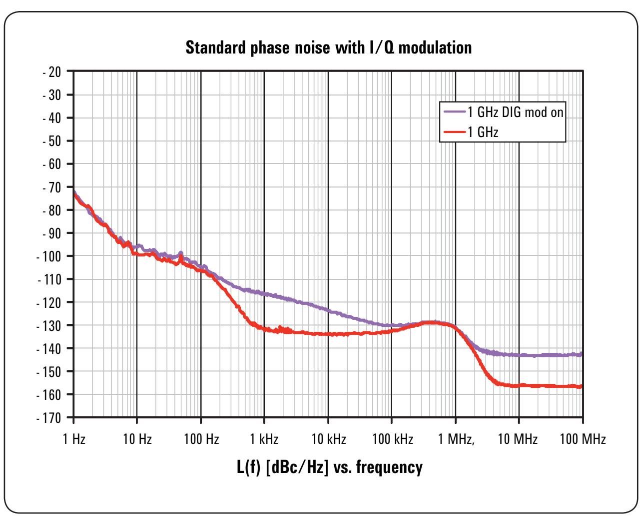


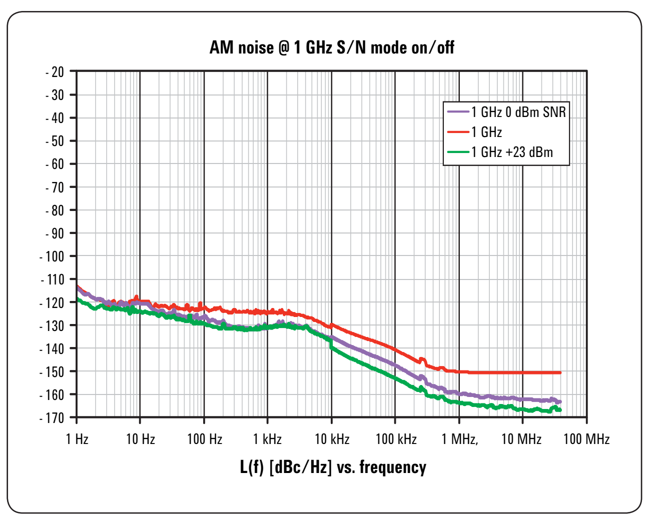












1. Use external 10 MHz input path for maximum performance

Harmonics (CW mode)		
Range	**Standard < +4 dBm**	**Option 1EA < +12 dBm**
9 kHz to 3 GHz	< –35 dBc	< –30 dBc
> 3 to 4 GHz	< –35 dBc, typical	< –35 dBc, typical
> 4 to 6 GHz	< –53 dBc, typical	< –40 dBc, typical

Nonharmonics (CW mode)[1] () = typical		
Range	**> 10 KHz offset**	
	Standard (dBc)	**UNX or UNY (dBc)**
9 kHz to < 5 MHz	–65, nominal	–65, nominal
5 to < 250MHz	–75	–75 (–80)
250 to < 750 MHz	–87	–96 (–100)
750 MHz to < 1.5 GHz	–87	–92 (–96)
1.5 to < 3.0 GHz	–81	–86 (–90)
3 to 6 GHz	–75	–80 (–84)

Subharmonics (CW mode) () = typical	
9 kHz to 1.5 GHz	None
> 1.5 to 3 GHz	–82 dBc (–91)
> 3 to 6 GHz	–74 dBc (–81)

Jitter (standard phase noise)[2]				
Carrier frequency	**SONET/SDH data rate**	**rms jitter BW**	**µUI rms, typical**	**Seconds, typical**
155 MHz	155 MB/s	100 Hz to 1.5 MHz	91.8	0.6 ps
622 MHz	622 MB/s	1 KHz to 5 MHz	50.5	81 fs
2.488 GHz	2488 MB/s	5 kHz to 20 MHz	198	80 fs

Jitter (UNX or UNY phase noise)[2]				
Carrier frequency	**SONET/SDH data rate**	**rms jitter BW**	**µUI rms, measured**	**Seconds, measured**
155 MHz	155 MB/s	100 Hz to 1.5 MHz	40	0.25 ps
622 MHz	622 MB/s	1 KHz to 5 MHz	21	33 fs
2.488 GHz	2488 MB/s	5 kHz to 20 MHz	72	29 fs

Phase coherence (Option 012)	
LO input frequency range	250 MHz to 6 GHz, nominal
LO input power range	0 to +7 dBm, nominal
LO output frequency range	250 MHz to 6 GHz, nominal
LO output power range	0 to +7 dBm, nominal

1. *< 3 GHz fixed 100 MHz spur is specified @ –78 dBc. In signal-to-noise optimization mode 100 MHz spur is < –100 dBc, measured.*
2. *Calculated from phase noise performance in CW mode at +10 dBm. For other frequencies, data rates, or bandwidths, please consult your sales representative.*

Analog Modulation Specifications

Frequency bands		
Band #	**Frequency range**	**N**
1	9 kHz to <5 MHz	1 (digital synthesis)
1	5 to < 250 MHz	1
2	250 to < 375 MHz	0.25
3	375 to < 750 MHz	0.5
4	750 to < 1500 MHz	1
5	1500 to < 3000.001 MHz	2
6	3000.001 to 6000 MHz	4

Frequency modulation (Option UNT) (See N value above)		
Max deviation	N × 4 MHz, nominal	
Resolution	0.1% of deviation or 1 Hz, whichever is greater, nominal	
Deviation accuracy	< ± 2% + 20 Hz (1 kHz rate, deviation is N x 50 kHz)	
Modulation frequency response @ 100 KHz rate	1 dB bandwidth 3 dB bandwidth	DC/5 Hz to 3 MHz, nominal DC/1 Hz to 7 MHz, nominal
Carrier frequency accuracy	< ± 0.2% of set deviation + (N × 1 Hz) [1]	
Relative to CW in DCFM	< ± 0.06% of set deviation + (N × 1 Hz), typical [2]	
Distortion	< 0.4% [1 kHz rate, deviation is N x 50 kHz]	
FM using external inputs 1 or 2	Sensitivity	+1 V peak for indicated deviation, nominal
	Input impedance	50 Ω/600 Ω/1 M Ω, nominal
	Paths	FM path 1 and FM path 2 are summed internally for composite modulation

Phase modulation (Option UNT) (See N value above)		
Maximum deviation	Normal bandwidth	N × 2 radians, nominal
	High-bandwidth mode	N × 0.2 radians, nominal
Frequency response	Normal bandwidth (3 dB)	DC to 1 MHz, nominal
	High-bandwidth mode (3 dB)	DC to 4 MHz, nominal
Resolution	0.1% of deviation	
Deviation accuracy	< + 0.5% + 0.01 rad, typical [1 kHz rate, normal bandwidth mode]	
Distortion	< 0.2%, typical [1 kHz rate, deviation normal bandwidth mode]	
ΦM using external inputs 1 or 2	Sensitivity	+1 V peak for indicated deviation, nominal
	Input impedance	50 Ω or 600 Ω or 1 M Ω, nominal
	Paths	ΦM path 1 and ΦM path 2 are summed internally for composite modulation

1. *Specification valid for temperature changes of less than ± 5 °C since last DCFM calibration.*
2. *Typical performance immediately after a DCFM calibration.*

Amplitude modulation (Option UNT) [1]		
AM depth type	Linear or exponential	
Maximum depth	100%	
Depth resolution	0.1% of depth (nom)	
AM depth error @1 KHz rate and < 80% depth	f < 5 MHz	< 1.5% of setting + 1% (typ 0.5% of setting + 1%)
	5 MHz < f < 2 GHz	< 3% of setting + 1 %
	2 < f < 3 GHz	< 5% of setting + 1% (typical 3% of setting + 1%)
Total harmonic distortion @ 1 KHz rate	F < 5 MHz	30% depth < 0.25%, typical
		80% depth < 0.5%, typical
	5 MHz < f < 2 GHz (2 to 3 GHz is typical)	30% depth < 2% 80% depth < 2%
Frequency response	30% depth, 3 dB BW	DC/10 Hz to 50 KHz
AM inputs using external inputs 1 or 2	Sensitivity	+1 V peak for indicated depth (Over-range can be 200% or 2.2 V peak)
	Input impedance	50 Ω or 600 Ω or 1M Ω, Damage level: ± 5 V max
	Paths	AM path 1 and AM path 2 are summed internally for composite modulation
Wideband AM (N5182B only)	Rates ALC off/on	DC/800 Hz to 80 MHz, nominal
	Sensitivity	0.5 V = 100% (0.5 V DC offset required)
	Input impedance	50 Ω, nominal (I input)

Simultaneous and composite modulation [2]						
Simultaneous modulation	All modulation types (IQ, FM, AM, ΦM, and pulse modulation) may be simultaneously enabled except: FM and phase modulation cannot be combined and two modulation types cannot be simultaneously generated using the same modulation source; for example, the baseband I/Q generator, AM, and FM can run concurrently and all will modulate the output RF (this is useful for simulating signal impairments)					
Composite modulation	AM, FM, and ΦM each consist of two modulation paths which are summed internally for composite modulation; modulation can be any combination of internal or external sources					
	AM	**FM**	**Phase**	**Pulse**	**Internal IQ** [1]	**External IQ** [1]
AM	+	+	+	+	+	+
FM	+	+	–	+	+	+
Phase	+	–	+	+	+	+
Pulse	+	+	+	–	+	+
Internal I/Q(1)	+	+	+	+	–	+
External IQ (1)	+	+	+	+	+	–
+ = compatible, - = incompatible, * = Internal + External						

1. *AM specifications apply 6 dB below maximum specified power from 20 to 30 °C.*
2. *IQ modulation available on N5182B.*

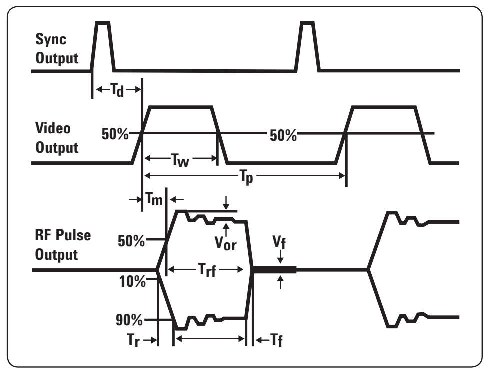
External modulation inputs	
(Option UNT required for FM, AM, and phase modulation inputs; Option UNW required for pulse modulation inputs)	
EXT1	AM, FM, PM
EXT2	AM, FM, PM
PULSE	Pulse (50 Ω only)
I	Wideband AM (50 Ω only, N5182B only)
Input impedance	50 Ω, 1 MΩ, 600 Ω, DC and AC coupled

Standard internal analog modulation source	
(Single sine wave generator for use with AM, FM, phase modulation requires Option UNT or 303)	
Waveform	Sine
Rate range	0.1 Hz to 2 MHz (tunable to 3 MHz)
Resolution	0.1 Hz
Frequency accuracy	Same as RF reference source, nominal
LF audio output	0 to 5 V peak into 50 Ω, –5V to 5 V offset, nominal

Multifunction generator (Option 303)	
The multifunction generator option (Option 303) consists of seven waveform generators that can be set independently with up to five simultaneously using the composite modulation features in AM, FM/PM, and LF out	
Waveform	
Function generator 1	Sine, triangle, square, positive ramp, negative ramp (pulse for LF out only)
Function generator 2	Sine, triangle, square, positive ramp, negative ramp (pulse for LF out only)
Dual function generator	Sine, triangle, square, positive ramp, negative ramp, phase offset, and amplitude ratio for Tone 2 relative to Tone 1
Swept function generator	Sine, triangle, square, positive ramp, negative ramp Trigger: free run, trigger key, bus, external, internal, timer trigger
Noise generator 1	Uniform, Gaussian
Noise generator 2	Uniform, Gaussian
DC	Only for LF output –5 V to +5 V, nominal
Frequency parameters	
Sine wave	0.1 Hz to 10 MHz
Triangle, square, ramp, pulse	0.1 Hz to 1 MHz, nominal
Noise bandwidth	10 MHz, nominal
Resolution	0.1 Hz
Frequency accuracy	Same as RF reference source, nominal

Narrow pulse modulation (Option UNW) [1]	
On/off ratio	> 80 dB, typical
Rise/fall times (Tr, Tf)	< 10 ns; 7 ns, typical
Minimum pulse width ALC on/off	> 2 us/> 20 ns
Repetition frequency ALC on/off	10 Hz to 500 kHz/DC to 10 MHz
Level accuracy (relative to CW) ALC on/off [2]	< ± 1.0 dB/< ± 1.0 dB, typical
Width compression (RF width relative to video out)	< 5 ns, typical

1. *Pulse specifications apply to frequencies > 500 MHz. Operable down to 10 MHz.*
2. *With power search on.*

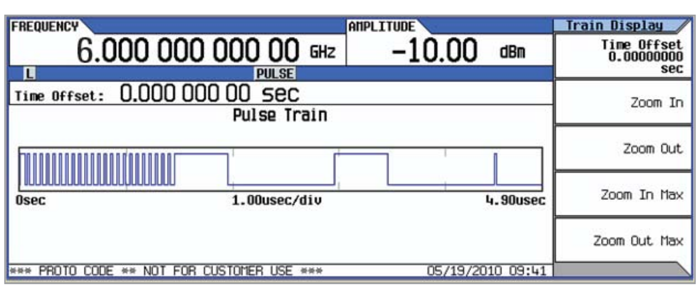
Video feed-through[1] ≤ 3GHz/> 3 GHz	< 50 mV, typical/< 5 mV, typical
Video delay (ext input to video)	30 ns, nominal
RF delay (video to RF output)	20 ns, nominal
Pulse overshoot	< 15%, typical
Input level	+1 Vpeak = RF on into 50 Ω, nominal
Td video delay (variable) Tw video pulse width (variable) Tp pulse period (variable) Tm RF delay Trf RF pulse width Tf RF pulse fall time Tr RF pulse rise time Vor pulse overshoot Vf Video feedthrough	

Internal pulse generator (included with Option UNW)

Modes	Free-run, square, triggered, adjustable doublet, trigger doublet, gated, and external pulse	
Square wave rate	0.1 Hz to 10 MHz, 0.1 Hz resolution, nominal	
Pulse period	30 ns to 42 seconds, nominal	
Pulse width	20 ns to pulse period –10 ns, nominal	
Resolution	10 ns	
Adjustable trigger delay	–pulse period + 10 ns to pulse period to pulse width –10 ns	
Settable delay	Free run	–3.99 to 3.97 µs
	Triggered	0 to 40 s
Resolution (delay, width, period)	10 ns, nominal	
Pulse doublets	1st pulse delay	(Relative to sync out) 0 to 42 s – pulse width – 10 ns
	1st pulse width	500 ns to 42 s – delay – 10 ns
	2nd pulse delay	0 to 42 s – (Delay 1 + Width 2) – 10 ns
	2nd pulse width	20 ns to 42 s – (Delay 1 + Delay 2) – 10 ns

Pulse train generator Option 320 (requires Option UNW)

Number of pulse patterns	2047
On/off time range	20 ns to 42 sec



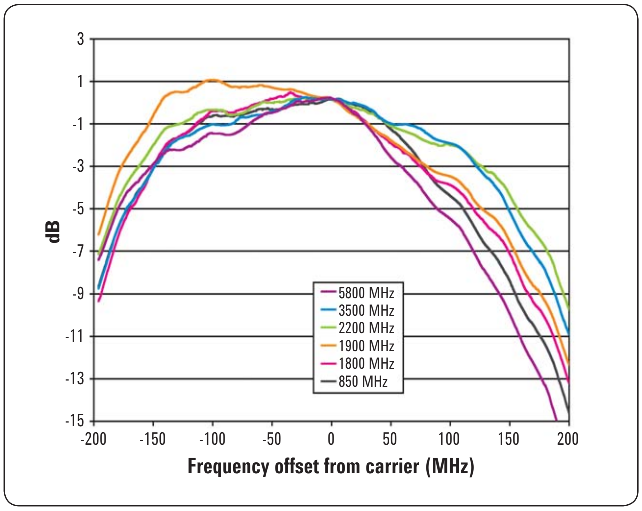
1. *Video feed through applies to power levels < +10 dBm.*

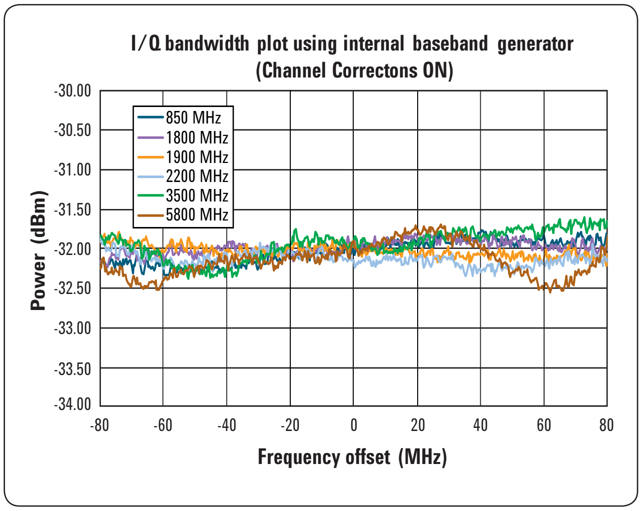
Vector Modulation Specifications

N5182B only

I/Q modulator external inputs [1]		
Bandwidth	Baseband (I or Q) RF (I+Q)	Up to 100 MHz baseband, nominal Up to 200 MHz RF, nominal
I or Q offset	± 100 mV (200 uV resolution)	
I/Q gain	± 1 dB (0.001 dB resolution)	
Quadrature angle adjustment	± 200 units	
Full scale input drive (I+Q)	0.5 V into 50 Ω, nominal	
Internal I/Q baseband generator adjustments [2] (Options 656 and 657)		
I/Q offset	± 20% (0.025% resolution)	
I/Q gain	± 1 dB (0.001 dB resolution)	
Quadrature angle adjustment	± 10 ° (0.01 degrees resolution)	
I/Q phase	± 360.00 ° (0.01 degrees resolution)	
I/Q skew	± 800.00 ns (1 picosecond resolution)	
I/Q delay	± 400.00 ns (1 picosecond resolution)	
External I/Q outputs		
Impedance	50 Ω, nominal per output	
	100 Ω, nominal differential output	
Type	Single-ended or differential (Option 1 EL)	
Maximum voltage per output	± 0.5 V peak-to-peak; into 50 Ω (200 uV resolution)	
Bandwidth	Baseband (I or Q)	80 MHz, nominal (Option 656 and 657)
Amplitude flatness	± 0.2 dB measured with channel corrections optimized for IQ output	
Phase flatness	± 2.5 degrees measured with channel corrections optimized for IQ output	
Common mode I/Q offset	± 1.5 V into 50 Ω (200 uV resolution)	
Differential mode I or Q offset	± 25 mV into 50 Ω (200 uV resolution)	

1. *I/Q adjustments represent user intverface parameter ranges and not specifications.*
2. *Internal IQ adjustments apply to RF out and IQ outputs simultaneously.*





Baseband generator (Options 656 and 657)		
Channels	2 [I and Q]	
Resolution	16 bits [1/65,536]	
Sample rate	Option 656 Option 656 and 657	100 Sa/s to 100 MSa/s 100 Sa/s to 200 MSa/s
RF bandwidth	Option 656 Option 656 and 657	80 MHz, nominal 160 MHz, nominal
Interpolated DAC rate	800 MHz (waveforms only need OSR = 1.25)	
Frequency offset range	± 80 MHz	
Digital sweep modes	In list sweep mode each point in the list can have independent waveforms (N5182B) along with user definable frequencies and amplitudes; see the Amplitude and Frequency Specifications sections for more detail.	
Waveform switching speed [1]	SCPI mode	≤ 5 ms, measured (standard)
		≤ 1.2 ms, measured (Option UNZ)
	List/step sweep mode	≤ 5 ms, measured (standard)
		≤ 900 us, measured (Option UNZ)
Waveform transfer rates (measured, no markers)	FTP LAN to internal SSD	10.7 MB/sec or 2.67 Msa/sec
	Internal SSD to FTP LAN	7.7 MB/sec 1.92 Msa/sec
	FTP LAN to BBG	8.2 MB/sec or 2.05 Msa/sec
	FTP LAN to BBG encrypted	4 MB/sec or 1 Msa/sec
	USB to BBG	19 MB/sec or 4.75 Msa/sec
	BBG to USB	1.2 MB/sec or 300 Ksa/sec
	Internal SSD to BBG	48 MB/sec or 12 Msa/sec
	BBG to internal SSD	1.2 MB/sec or 300 Ksa/sec
	Removable SD card to baseband generator (Option 006)	
Arbitrary waveform memory	Maximum playback capacity	32 Msa (standard)
		512 Msa (Option 022)
		1024 Msa (Option 023)
	Maximum storage capacity including markers	3 GBytes/800 Msa (standard)
		30 GBytes/7.5 Gsa (Option 009)
		8 GBytes / 2 Gsa (Option 006)
Waveform segments	Segment length	60 samples to 32 Msa (standard)
		60 samples to 512 Msa (Option 022)
		60 samples to 1024 Msa (Option 023)
	Minimum memory allocation per segment	256 samples
	Maximum number of segments	8192
Waveform sequences	Maximum number of sequences	> 2000 depending on non-volatile memory usage
	Maximum number of segments/sequence	32,000 (standard)
		4 million (Option 022 or 023)
	Maximum number of repetitions	65,535

1. *SCPI mode switching speed applies when waveforms are pre-loaded in list sweep and sample rate ≥ 10 MSa/s.*

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 coarse delay time		5 ns to 40 s
	External coarse delay resolution		5 ns
	Trigger latency (Single trigger only)		356 ns + 1 sample clock period, nominal
	Trigger accuracy (Single trigger only)		± 2.5 ns, nominal
Multi-baseband generator synchronization mode (multiple sources)	Fan out		1 master and up to 15 slaves
	Trigger repeatability		< 1 ns, nominal
	Trigger accuracy		Same as normal mode
	Trigger latency		Same as normal mode
	Fine trigger delay range		See Internal IQ Baseband section
	Fine trigger delay resolution		See Internal IQ Baseband section
	IQ phase adjustment range		See Internal IQ Baseband section
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, ALC hold functions, and alternate amplitude; see Users Guide for more information		
	Marker polarity		Negative, positive
	Number of markers		4
	RF blanking/burst on/off ratio		> 80 dB
	Alternate amplitude control switching speed		See amplitude section

Real-time baseband generator (Option 660)

Real-time baseband generator required for real-time Signal Studio applications [1]	Cellular real-time applications	LTE-FDD, LTE-TDD, HSPA+/W-CDMA, GSM/EDGE, cdma2000®
	Real-time navigation	GPS, GLONASS
	Real-time video applications	DVB-T/T2/H/S/S2/C/J.83 Annex A/C, ISDB-T/
	Note: Option 660 is not required for real-time custom modulation (Option 431)	
	Memory: Shares memory with Options 656 and 657	
	Triggering: Same as Options 656 and 657	
	Markers: 3 markers available, all other features are same as Options 656 and 657	

AWGN (Option 403)

Type	Real-time, continuously calculated, and played using DSP	
Modes of operation	Standalone or digitally added to signal played by arbitrary waveform or real-time baseband generator	
Bandwidth	With Option 656	1 Hz to 80 MHz
	With Option 656 and 657	1 Hz to 160 MHz
Crest factor	15 dB	
Randomness	90 bit pseudo-random generation, repetition period 313 x 10^9 years	
Carrier-to-noise ratio	± 100 dB when added to signal	
Carrier-to-noise ratio formats	C/N, Eb/No	
Carrier-to-noise ratio error	Magnitude error ≤ 0.2 dB at baseband I/Q outputs	

1. See Signal Studio configuration assistant for more information.

Custom modulation Arb Mode (Option 431)		
Modulation	PSK	BPSK, QPSK, OQPSK, π/4DQPSK, gray coded and unbalanced QPSK, 8PSK, 16PSK, D8PSK
	QAM	4, 16, 32, 64, 128, 256, 1024 (and 89600 VSA mappings)
	FSK	Selectable: 2,4,8, 16, C4FM
	MSK	0 to 100 °
	ASK	0 to 100%
Multicarrier	Number of carriers	Up to 100 (limited by a max bandwidth of 160 MHz depending on symbol rate and modulation type)
	Frequency offset (per carrier)	Up to –80 to +80 MHz
	Power offset (per carrier)	0 dB to –40 dB
Symbol rate	50 sps to 100 Msps	
Filter types	Nyquist, root-Nyquist, Gaussian, rectangular, APCO 25 C4EM, user	
Quick setup modes	APCO 25w/C4FM, APCO25 w/CQPSK, *Bluetooth*®, CDPD, DECT, EDGE, GSM, NADC, PDC, PHS, PWT, TETRA	
Data	Random only	

Custom modulation real-time mode (Option 431) (Does not require Option 660)			
Modulation	PSK		BPSK, QPSK, OQPSK, π/4DQPSK, gray coded and unbalanced QPSK, 8PSK, 16PSK, D8PSK
	QAM		4, 16, 32, 64, 128, 256, 1024 (and 89600 VSA mappings)
	FSK	Selectable	2,4,8, 16 level symmetric, C4FM
		User-defined	Custom map of up to 16 deviation levels
		Max deviation	40 MHz
	MSK	0 to 100 °	
	ASK	0 to 100%	
	Custom I/Q	Custom map of 1024 unique values	
Frequency offset	Up to –80 MHz to +80 MHz		
Symbol rate	Internal generated data		1000 sps up to 100 Msps and max of 10 bits per symbol
	External serial data		1000 sps to [(50 Mbits/sec)/(#bits/symbol)]
Filter types	Selectable		Nyquist, root-Nyquist, Gaussian, rectangular, APCO 25 C4FM, IS-95
	Custom FIR		16-bit resolution, up to 64 symbols long, automatically resampled to 1024 coefficients (max) > 32 to 64 symbol filter: symbol rate ≤ 12.5 MHz > 16 to 32 symbol filter: symbol rate ≤ 25 MHz Internal filters switch to 16 tap when symbol rate is between 25 and 100 MHz
Quick setup modes	APCO 25w/C4FM, APCO25 w/CQPSK, TETRA , Bluetooth, CDPD, DECT, EDGE, GSM, NADC, PDC, PHS, PWT, WorldSpace, Iridium, ICO, CT2, TFTS		
Trigger delay	Range		0 to 1,048,575 bits
	Resolution		1 bit

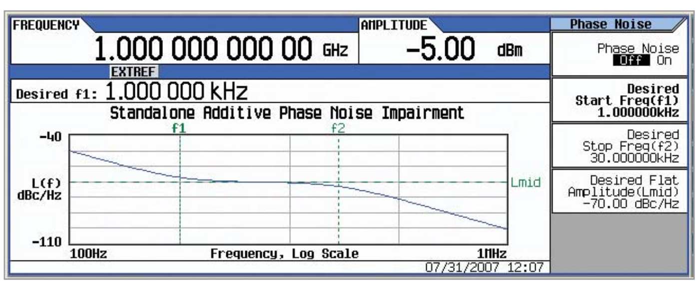
Data types	Internally generated	Pseudo-random patterns	PN9, PN11, PN15, PN20, PN23
		Repeating sequence	Any 4-bit sequence
	Direct-pattern RAM [PRAM] max size Note: Used for custom TDMA/non-standard framing		32 Mb (standard)
			512 Mb (Option 022)
			1024 Mb (Option 023)
	User file		32 MB (standard)
			512 MB (Option 022)
			1024 MB (Option 023)
	Externally streamed data	Type	Serial data
		Inputs/outputs	Data, symbol sync, bit clock (output only)
Internal burst shape (varies with bit rate)	Rise/fall time range		Up to 30 bits
	Rise/fall delay range		–15 to +15 bits

Multitone and two-tone (Option 430)

Number of tones	2 to 64, with selectable on/off state per tone
Frequency spacing	100 Hz to 160 MHz (Option 656 and 657)
Phase (per tone)	Fixed or random

Real-time phase noise impairments (Option 432)

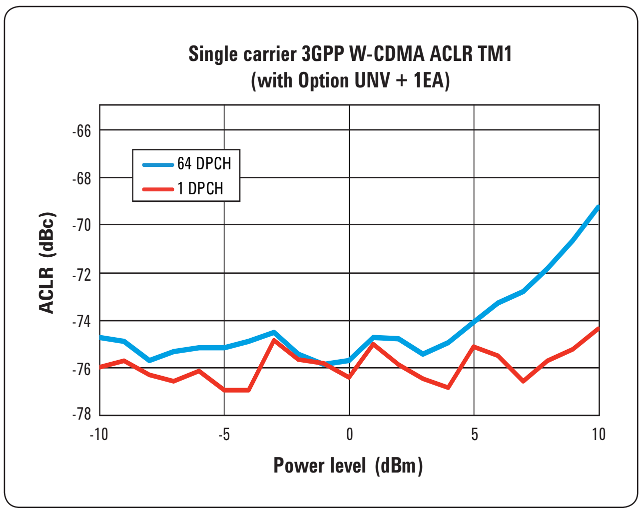
Close-in phase noise characteristics	–20 dB per decade	
Far-out phase noise characteristics	–20 dB per decade	
Mid-frequency characteristics	Start frequency (f1)	Offset settable from 0 to 77 MHz
	Stop frequency (f2)	Offset settable from 0 to 77 MHz
Phase noise amplitude level (L(f))	User selected; max degradation dependent on f2	

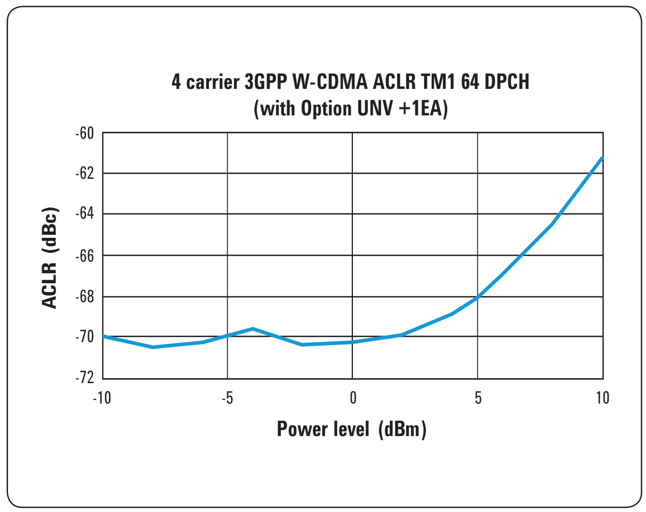


3GPP W-CDMA distortion performance [1,2]

			Standard		Option UNV		Option UNV with Option 1EA	
	Power level		≤ 2 dBm [2]		≤ 2 dBm [2]		≤ 5 dBm [2]	
Offset	**Configuration**	**Frequency**	**Spec**	**Typ**	**Spec**	**Typ**	**Spec**	**Typ**
Adjacent (5 MHz)	1 DPCH, 1 carrier	1800 to 2200 MHz	– 69 dBc	–73 dBc	–71 dBc	–75 dBc	–71 dBc	–75 dBc
Alternate (10 MHz)			–70 dBc	–75 dBc	–72 dBc	–77 dBc	–71 dBc	–77 dBc
Adjacent (5 MHz)	Test model 1 with 64 DPCH, 1 carrier	1800 to 2200 MHz	–68 dBc	–70 dBc	–71 dBc	–73 dBc	–71 dBc	–72 dBc
Alternate (10 MHz)				–73 dBc	–72 dBc	–76 dBc	–71 dBc	–76 dBc
Adjacent (5 MHz)	Test model 1 with 64 DPCH, 4 carrier	1800 to 2200 MHz	–63 dBc	–65 dBc	–65 dBc	–67 dBc	–64 dBc	–66 dBc
Alternate (10 MHz)			–64 dBc	–66 dBc	–66 dBc	–68 dBc	–66 dBc	–68 dBc

1. *ACPR specifications apply when the instrument is maintained within ± 20 to 30 °C.*
2. *This is rms power. Convert from rms to peak envelope power (PEP) with the following equation: PEP = rms power + crest factor (for example, 3GPP test model 1 with 64 DPCH has a crest factor 11.5 dB, therefore at +5 dBm rms, the PEP = 5 dBm + 11.5dB = +16.5 dBm PEP).*

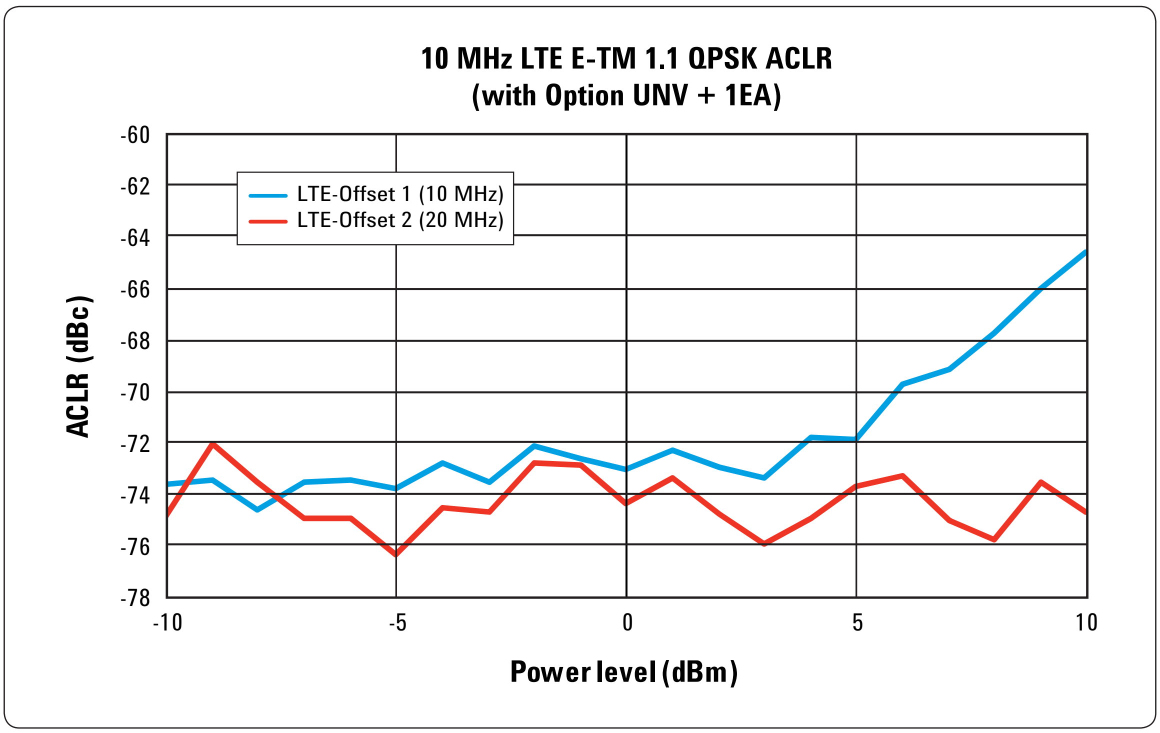




3GPP LTE-FDD distortion performance[1]

			Standard		Option UNV		Option UNV with Option 1EA	
	Power level		≤ 2 dBm[2]		≤ 2 dBm[2]		≤ 5 dBm[2]	
Offset	Configuration	Frequency	Spec	Typ	Spec	Typ	Spec	Typ
Adjacent (10 MHz)[3]	10 MHz E-TM 1.1 QPSK	1800 to 2200 MHz	–64 dBc	–66 dBc	–67 dBc	–69 dBc	–64 dBc	–67 dBc
Alternate (20 MHz)[3]			–66 dBc	–68 dBc	–69 dBc	–71 dBc	–69 dBc	–71 dBc

1. *ACPR specifications apply when the instrument is maintained within ± 20 to 30 °C.*
2. *This is rms power. Convert from rms to peak envelope power with the following equation: PEP = rms power + crest factor (for example, 3GPP test model 1 with 64 DPCH has a crest factor 11.5 dB, therefore at +5 dBm rms, the PEP = 5 dBm + 11.5 dB = +16.5 dBm PEP).*
3. *ACPR measurement configuration: reference channel integration BW: 9.015 MHz, offset channel integration bandwidth: 9.015 MHz.*



GSM/EDGE output RF spectrum (ORFS)

			GSM		EDGE	
	Power level		< +7 dBm		< +7 dBm	
Offset	Configuration	Frequency [1]	Standard, typical	Option UNV, typical	Standard, typical	Option UNV, typical
200 kHz	1 normal timeslot, bursted	800 to 900 MHz 1800 to 1900 MHz	–34 dBc	–36 dBc	–37 dBc	–38 dBc
400 kHz			–69 dBc	–70 dBc	–69 dBc	–70 dBc
600 kHz			–81 dBc	–82 dBc	–80 dBc	–81 dBc
800 kHz			–82 dBc	–83 dBc	–82 dBc	–83 dBc
1200 kHz			–84 dBc	–85 dBc	–83 dBc	–84 dBc

3GPP2 cdma2000 distortion performance, typical

			Standard	Option UNV	Option UNV + 1EA
	Power level [2]		≤ 2dBm	≤ 2 dBm	≤ 5 dBm
Offset	Configuration	Frequency (1)	Typical	Typical	Typical
885 kHz to 1.98 MHz	9 channel forward link	800 to 900 MHz	–78dBc	–79dBc	–77dBc
> 1.98 to 4.0 MHz			–86dBc	–87dBc	–87dBc
> 4.0 to 10 MHz			–91dBc	–93dBc	–93dBc

802.16e Mobile WiMAX™ distortion performance, measured

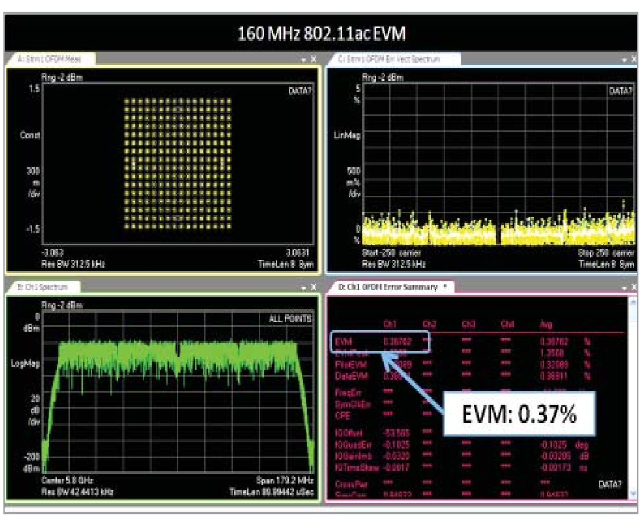
Power	Offset [3]	Configuration [4]	Frequency	Standard, measured	UNV, measured
<-7 dBm	10 MHz	QPSK	2.5 and 3.5 GHz	–65 dBc	–68 dBc
Up to +5 dBm	10 MHz	QPSK	3.5 GHz	–62 dBc	–65 dBc

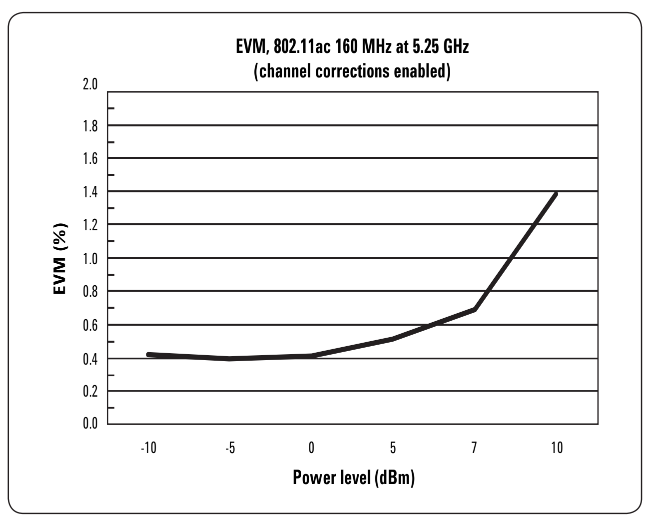
1. *Performance evaluated at bottom, middle, and top of bands shown.*
2. *This is rms power. Convert from rms to peak envelope power (PEP) with the following equation: PEP = rms power + crest factor (for example: 3GPP test model 1 with 64 DPCH has a crest factor > 11 dB, therefore at +5 dBm rms the PEP = 5 dBm + 11 dB = +16 dBm PEP).*
3. *Measurement configuration: reference channel integration BW: 9.5 MHz, offset channel integration BW: 9 MHz, channel offset: 10 MHz.*
4. *802.16e WiMAX signal configuration—bandwidth: 10 MHz, FFT: 1024, frame length: 5 ms, guard period: 1/8, symbol rolloff: 5%, content: 30 symbols of PN9 data.*

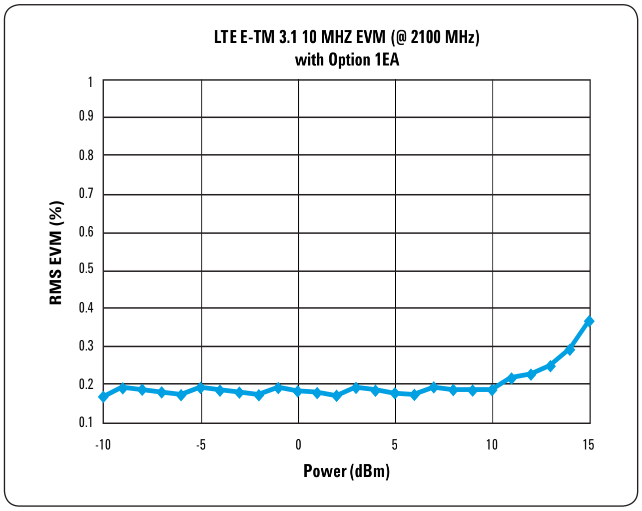
EVM performance data [1, 2]

Format	**GSM**		**EDGE**		**cdma2000/1xEV-DO**		**W-CDMA**		**LTE FDD** [3]	
Modulation type	GMSK (bursted)		3pi/8 8PSK (bursted)		QPSK		QPSK		64 QAM	
Modulation rate	270.833 ksps		70.833 ksps		1.2288 Mcps		3.84 Mcps		10 MHz BW	
Channel configuration	1 timeslot		1 timeslot		Pilot channel		1 DPCH		E-TM 3.1	
Frequency [4]	800 to 900 MHz 1800 to1900 MHz		800 to 900 MHz 1800 to 1900 MHz		800 to 900 MHz 1800 to 1900 MHz		1800 to 2200 MHz		1800 to 2200 MHz	
EVM power level	≤ 7 dBm		≤ 7 dBm		≤ 7 dBm		≤ 7 dBm		≤ 7 dBm	
EVM power level with Option 1EA	≤ 13 dBm		≤ 13 dBm		≤ 13 dBm		≤ 13 dBm		≤ 13 dBm	
EVM/global phase error	**Spec**	**Type**	**Spec**	**Type**	**Spec**	**Type**	**Spec**	**Type**	**Measured**	
	ms 0.8 ° peak 1.5 °	0.2 ° 0.6 °	1.2%	0.75%	1.3%	0.8%	1.2%	0.8%	0.2%	
Format	**802.11a/g**	**802.16e WiMAX** [5]	**QPSK**				**16 QAM**			
Modulation type	64 QAM	64 QAM	QPSK				16 QAM			
Modulation rate	54 Mbps	10 MHz BW	4 Msps (root-Nyquist filter α = 0.25)							
Frequency [4]	2400 to 2484 MHz 5150 to 5825 MHz	2300 to 2690 MHz 3300 to 3800 MHz	≤ 3 GHz		≤ 6 GHz		≤ 3 GHz		≤ 6 GHz	
EVM power level	≤ –5 dBm	≤ 2 dBm	≤ 4 dBm		≤ 4 dBm		≤ 4 dBm		≤ 4 dBm	
EVM power level with Option 1EA	≤ 2 dBm	≤ 8 dBm	≤ 10 dBm		≤ 10 dBm		≤ 10 dBm		≤ 10 dBm	
EVM	**Measured**	**Measured**	**Spec**	**Type**	**Spec**	**Type**	**Spec**	**Type**	**Spec**	**Type**
	0.3%	0.3%	1.2%	0.8%	1.9%	1.1%	1.1%	0.65%	1.5%	0.9%

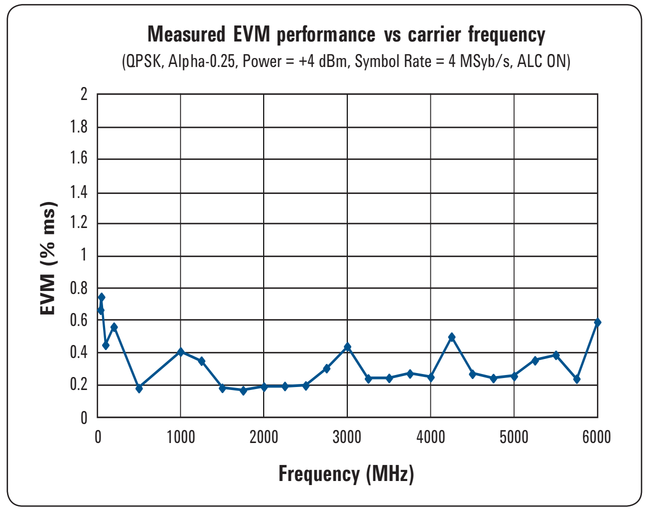
1. *EVM specifications apply for the default ARB file setup conditions with the default ARB files supplied with the instrument.*
2. *EVM specifications apply after execution of I/Q calibration when the instrument is maintained within ± 5 °C of the calibration temperature.*
3. *LTE FDD E-TM 3.1,10 MHz, 64 QAM PDSCH, full resource block. Measured EVM after DC calibration.*
4. *Performance evaluated at bottom, middle, and top of bands shown.*
5. *802.16e WiMAX signal configuration—bandwidth: 10 MHz, FFT: 1024, frame length: 5 ms, guard period: 1/8, symbol rolloff: 5%, content: 30 symbols of PN9 data.*



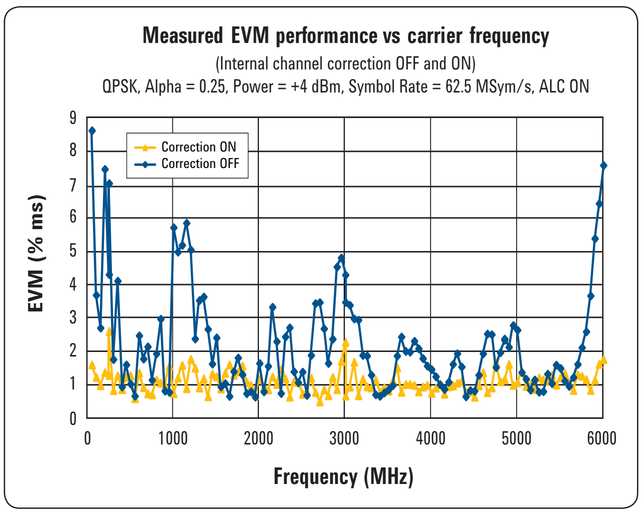




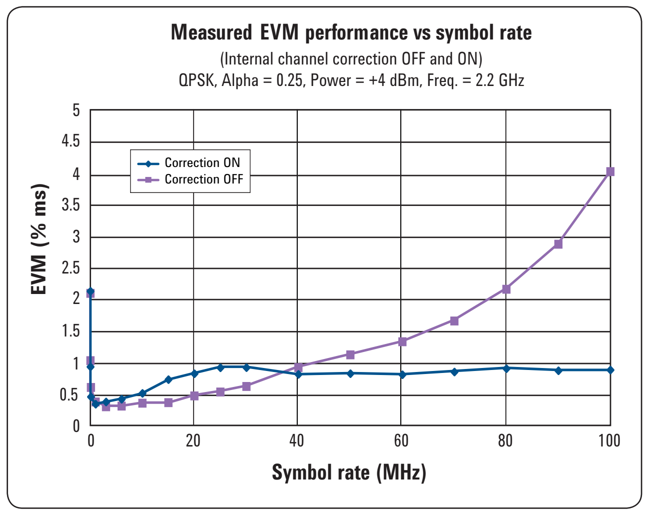
LTE E-TM 3.1 10 MHZ EVM (@ 2100 MHz)
with Option 1EA
RMS EVM (%)
Power (dBm)



Measured EVM performance vs carrier frequency
(QPSK, Alpha-0.25, Power = +4 dBm, Symbol Rate = 4 MSyb/s, ALC ON)
EVM (% ms)
Frequency (MHz)



Measured EVM performance vs carrier frequency
(Internal channel correction OFF and ON)
QPSK, Alpha = 0.25, Power = +4 dBm, Symbol Rate = 62.5 MSym/s, ALC ON
Correction ON
Correction OFF
EVM (% ms)
Frequency (MHz)



Measured EVM performance vs symbol rate
(Internal channel correction OFF and ON)
QPSK, Alpha = 0.25, Power = +4 dBm, Freq. = 2.2 GHz
Correction ON
Correction OFF
EVM (% ms)
Symbol rate (MHz)

General Specifications

Remote programming

Interfaces	GPIB IEEE-488.2, 1987 with listen and talk LAN 1000BaseT LAN interface, LXI class C compliant USB Version 2.0
Control languages	Control languages SCPI Version 1997.0
Compatibility languages	Agilent Technologies: N5181A\61A, N 5182A\62A, N5183A, E4438C, E4428C, E442xB, E443xB, E8241A, E8244A, E8251A, E8254A, E8247C, E8257C/D, E8267C/D, 8648 Series, 8656B, E8663B, 8657A/B Aeroflex Incorporated: 3410 Series Rohde & Schwarz: SMB100A, SMBV100A, SMA100A, SMU200A, SMJ100A, SMATE200A, SMIQ, SML, SMV

Power requirements

100-120 VAC, 50/60/400 Hz
220-240 VAC, 50/60 Hz
160 W maximum (N5181B)
300 W maximum (N5182B)

Operating temperature range

0 to 55 °C

Storage temperature range

–40 to 70 °C

Operating and storage altitude

Up to 15,000 feet

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 MIL-PRF-28800F Class 3

Safety

Complies with European Low Voltage Directive 2006/95/EC

• IEC/EN 61010-1, 2nd Edition • Canada: CSA C22.2 No. 61010-1 • USA: UL std no. 61010-1, 2nd Edition • German Acoustic statement	Acoustic noise emission LpA < 70 dB Operator position Normal position Per ISO 7779	Geraeuschemission LpA < 70 dB Am Arbeitsplatz Normaler Betrieb Nach DIN 45635 t.19

Complies with European EMC Directive 2004/108/EC

• IEC/EN 61326-1or IEC/EN 61326-2-1 • 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

Memory

- Memory is shared by instrument states, user data files, sweep list files, waveform sequences, and other files
- 2 GB (30 GB with Option 009) memory available in the N5182B
- Security Option 006 allows storage of up to 8 GB
- Depending on how the memory is utilized, a maximum of 1000 instrument states can be saved

Security (Option 006)

- Removable 8 GB solid state memory (SD card) from rear panel
- User can force all files to be stored only on external memory card including instrument states, user data files, sweep list files, waveforms, waveform sequences, and other files.
- Memory sanitizing, memory sanitizing on, power on, and display blanking

Note: Read/write speeds to external memory card will be slower compared to internal solid-state drive (Option 009)

Self-test

Internal diagnostic routines test most modules in a preset condition; for each module, if its node voltages are within acceptable limits, the module passes the test

Weight

N5181B: ≤ 13.6 kg (30 lb) net, ≤ 28.6 kg (63 lb.) shipping
N5182B: ≤ 15.9 kg (35 lb) net, ≤ 30.8 kg (68 lb.) shipping

Dimensions

88 mm H x 458 mm W x 508 mm L
(3.46 in H x 18 in W x 20 in L)

Recommended calibration cycle

36 months

ISO compliant

This instrument is manufactured in an ISO-9001 registered facility in concurrence with Agilent Technologies' commitment to quality.

Inputs and Outputs

Front panel connectors	
RF output	Outputs the RF signal via a precision N type female connector; see output section for reverse power protection information
I and Q inputs	BNC input accepts "in-phase" and "quadrature" input signals for I/Q modulation; nominal input impedance is 50 Ω, damage levels are 1 Vrms and 5 Vpeak
USB 2.0	Used with a memory stick for transferring instrument states, licenses and other files into or out of the instrument; also used with U2000 Series USB average power sensors For a current list of supported memory sticks, visit **www.agilent.com/find/X-series_SG,** click on Technical Support, and refer to FAQs: Waveform Downloads and Storage
Rear panel connectors	
Rear panel inputs and outputs are 3.3 V CMOS, unless indicated otherwise; CMOS inputs will accept 5 V CMOS, 3 V CMOS, or TTL voltage levels	
RF output (Option 1EM)	Outputs the RF signal via a precision N type female connector
I and Q inputs (Option 1EM)	Accepts "in-phase" and "quadrature" input signals for I/Q modulation SMB connector, nominal input impedance is 50 Ω; damage levels are 1 Vrms and 5 Vpeak; Option 1EM and N5162A units will come with 2 SMB to BNC adapters
I and Q outputs	BNC outputs the analog I/Q modulation signals from the internal baseband generator; nominal output impedance 50 Ω, DC coupled; damage levels ± 2 V
I bar and Q bar outputs (Option 1EL)	BNC outputs the complement of the I and Q signals for differential applications;
DAC Clk In (Option 012)	Reserved for future use.
Event 1	This connector outputs the programmable timing signal generated by marker 1 The marker signal can also be routed internally to control the RF blanking and ALC hold functions; this signal is also available on the AUX I/O connector This output is TTL and 3.3 V CMOS compatible Damage levels are > +8 V and < –4 V
Pattern trigger	Accepts signal to trigger internal pattern generator to start single pattern output, for use with the internal baseband generators Accepts CMOS signal with minimum pulse width of 10 ns Female BNC Damage levels are > +8 V and < –4 V
BBTRIG 1	Reserved for arbitrary and real-time baseband generators I/O such as Markers or trigger inputs
BBTRIG 2	Reserved for arbitrary and real-time baseband generators I/O such as Markers or trigger inputs
Sweep out	Generates output voltage, 0 to +10 V when the signal generator is sweeping; this output can also be programmed to indicate when the source is settled or output pulse video and is TTL and CMOS compatible in this mode; output impedance < 1 Ω, can drive 2 kΩ; damage levels are ± 15 V
Ext 1	External AM/FM/PM #1 input; nominal input impedance is 50 Ω/600 Ω/1M Ω, nominal; damage levels are ± 5 V
Ext 2	External AM/FM/PM #2 input; nominal input impedance is 50 Ω/600 Ω /1M Ω, nominal; damage levels are ± 5 V
LF OUT	0 to 5 V peak into 50 Ω, –5 V to 5 V offset, nominal
Pulse	External pulse modulation input; this input is TTL and CMOS compatible; low logic levels are 0 V and high logic levels are +1 V; nominal input impedance is 50 Ω; input damage levels are ≤ –0.3 V and ≥ +5.3 V

Trigger in	Accepts TTL and CMOS level signals for triggering point-to-point in sweep mode; damage levels are ≤ –0.3 V and ≥ +5.3 V
Trigger out	Outputs a TTL and CMOS compatible level signal for use with sweep mode The signal is high at start of dwell, or when waiting for point trigger in manual sweep mode, and low when dwell is over or point trigger is received This output can also be programmed to indicate when the source is settled, pulse synchronization, or pulse video Nominal output impedance 50 Ω Input damage levels are ≤ –0.3 V and ≥ +5.3 V
Reference input	Accepts a 10 MHz reference signal used to frequency lock the internal timebase; Option 1ER adds the capability to lock to a frequency from 1 MHz to 50 MHz; nominal input level –3.5 to +20 dBm, impedance 50 Ω, sine or square waveform
10 MHz out	Outputs the 10 MHz reference signal used by internal timebase; level nominally +3.9 dBm; nominal output impedance 50 Ω; input damage level is +16 dBm
LO in (Option 012)	Accepts a signal from a master signal generator that is used as the LO for MXG vector in order to configure a phase coherent system; nominal input levels between 0 to +7 dBm; nominal input impedance 50 Ω
LO out (Option 012)	Outputs a reference signal that can be used in a phase coherent system; nominal output levels between 0 to 7 dBm; nominal output impedance 50 Ω
Digital bus I/O	To be used with PXB or N5102A digital signal interface module
Aux IO	50 pin SCSI II connector; the AUX I/O connector provides additional digital signal inputs/outputs with Event 1 - 4 (Pin 1 - 4) This connector outputs programmable timing signals generated by Markers 1 – 4; the marker signals can also routed internally to control the RF blanking and ALC hold functions This output is TTL and 3.3 V CMOS compatible; damage levels are > +8 V and < –4 V
USB 2.0	The USB connector provides remote programming functions via SCPI
LAN (1000 BaseT)	The LAN connector provides the same SCPI remote programming functionality as the GPIB connector and is also used to access the internal Web server and FTP server Supports DHCP, sockets SCPI, VXI-11 SCPI, connection monitoring, dynamic hostname services, TCP keep alive LXI class C compliant Trigger response time for the immediate LAN trigger is 0.5 ms (minimum), 4 ms (maximum), 2 ms, typical; delayed/alarm triger is unknown Trigger output response time is 0.5 ms (minimum), 4 ms (maximum), 2 ms, typical
GPIB	The GPIB connector provides remote programming functionality via SCPI

www.agilent.com
www.agilent.com/find/MXG

Related Literature

Agilent X-Series Signal Generators

MXG Configuration Guide 5990-9959EN

EXG Data Sheet 5991-0039EN

EXG Configuration Guide 5990-9958EN

X-Series Signal Generator Brochure 5990-9957EN

Signal Studio Software Brochure 5989-6448EN

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