DATA SHEET

VXG M9384B and VXG-m M9383B

Microwave Signal Generators, 1 MHz to 44 GHz

This data sheet provides key features and specifications for the M9384B VXG and M9383B VXG-m microwave signal generators. The information presented in this document is preliminary and subject to change.

KEYSIGHT TECHNOLOGIES

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Definitions and Conditions

Specification (spec)
Specifications represent warranted performance of a calibrated instrument that has been stored for a minimum of 2 hours within the operating temperature range of 0 to 40 °C, unless otherwise stated, and after a 45-minute warm-up period. All Specifications apply over a 20 °C to 30 °C temperature range (unless otherwise stated). Specifications include guard bands to account for the expected statistical performance distribution, measurement uncertainties, and changes in performance due to environmental conditions. Data represented in this document are Specifications unless otherwise noted."

Typical (typ)
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 90 percent confidence level at room temperature (approximately 23 °C). Typical performance does not include measurement uncertainty.

Nominal (nom)
Nominal values indicate the expected mean or average performance, or an attribute whose performance is by design, such as the 50-ohm connector. This data is not warranted and is measured at room temperature (approximately 23 °C).

Measured (meas)
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 23 °C).

Block diagram

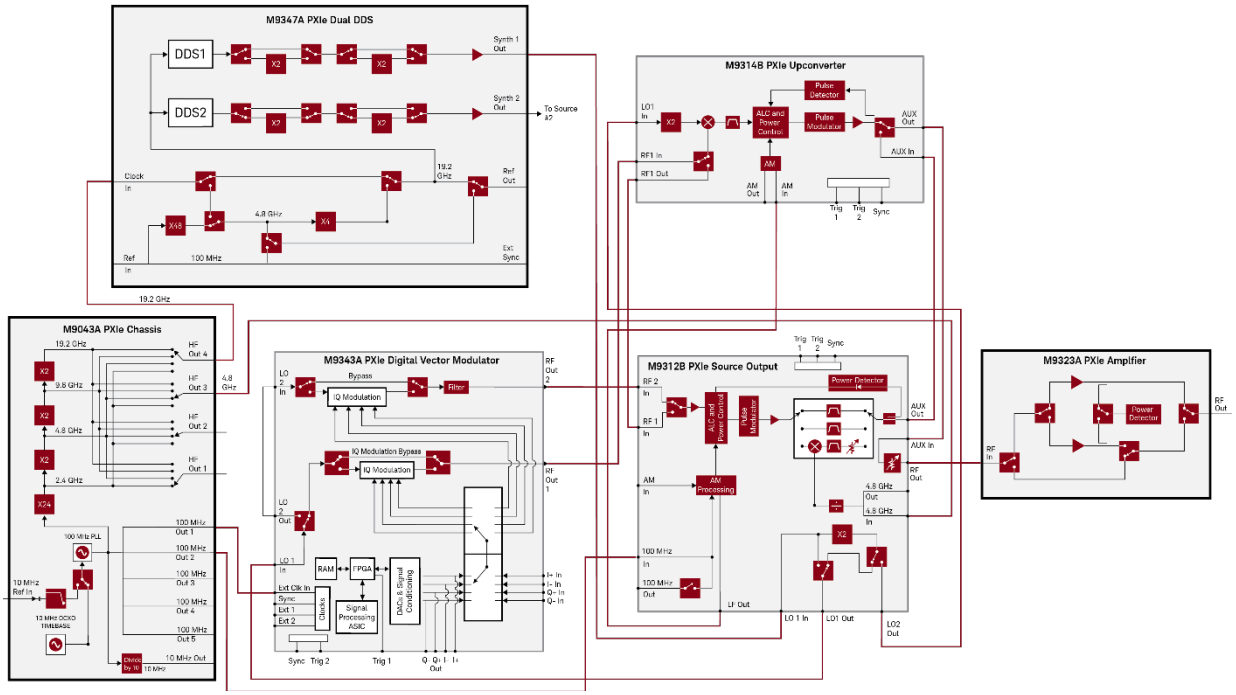


Figure 1: Block diagram for the VXG, a 44 GHz signal generator with 2 GHz RF bandwidth.

Frequency

Range	
Option F32	1 MHz to 31.8 GHz
Option F44	1 MHz to 44 GHz
Resolution	0.01 Hz
Phase adjustments	
Phase offset range	± 180 degrees
Phase offset resolution	0.001 degrees
Relative phase adjustments: channel 1 versus channel 2 (option PCH)	
Relative phase offset range	± 180 degrees
Relative phase offset resolution	0.001 degree
Relative phase repeatability[1]	0.0001 degree

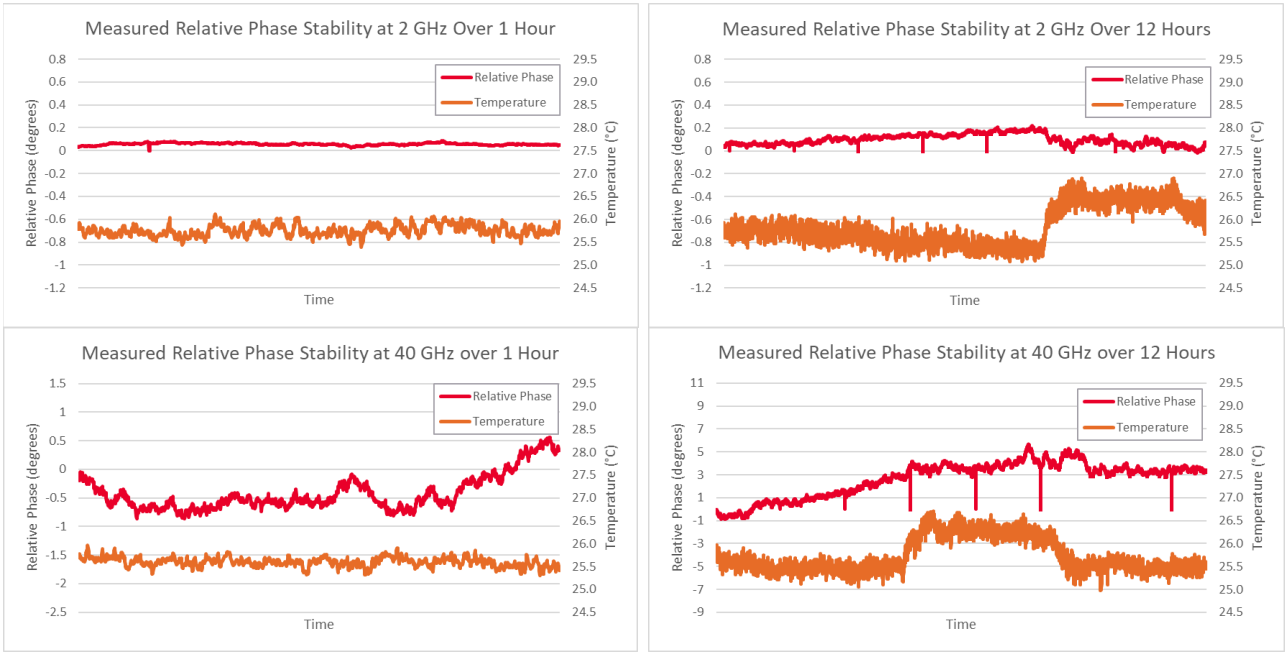


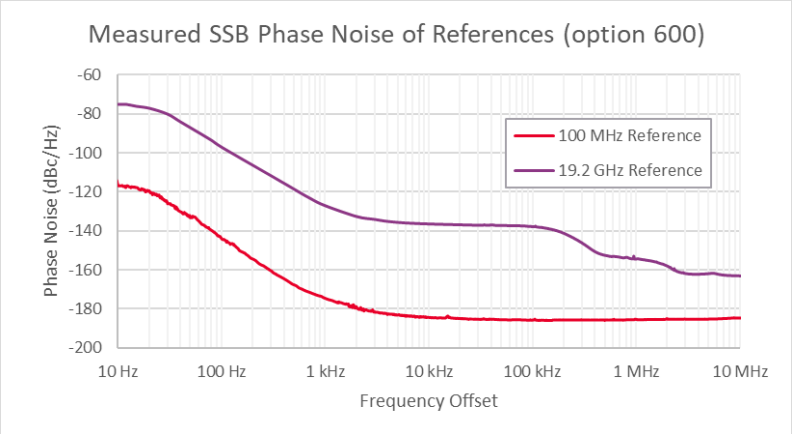
Figure 2: Relative phase stability between VXG channel 1 and channel 2 measured in an office environment.

[1] When tuning frequency from f_1 to f_2 and back to f_1.

Frequency Reference

Reference Outputs	
100 MHz out	
Amplitude	≥ 10 dBm, 15 dBm (typ.)
Connector	SMB male (M9383B), SMA female (M9384B)
Impedance	50 Ω (nom.)
10 MHz out	
Amplitude	≥ 10 dBm, 13 dBm (typ.)
Connector	SMB male (M9383B), BNC female (M9384B)
Impedance	50 Ω (nom.)
19.2 GHz out	
Amplitude	> 0 dBm, 1 dBm (typ.)
Connector	SMA female
Impedance	50 Ω (nom.)
External reference input	
Frequency	1 to 100 MHz
Lock range	± 0.6 ppm (nom.)
Amplitude	-3 dBm to 20 dBm
Connector	SMB male (M9383B), BNC female (M9384B)
Impedance	50 Ω (nom.)
EFC	
Voltage	± 2.25 Volts
Tune range	6 Hz/ V at 10 MHz, 0.6 ppm
Damage level	± 20 Volts or 30 Volts ESD
Impedance	100 kΩ (nom.)

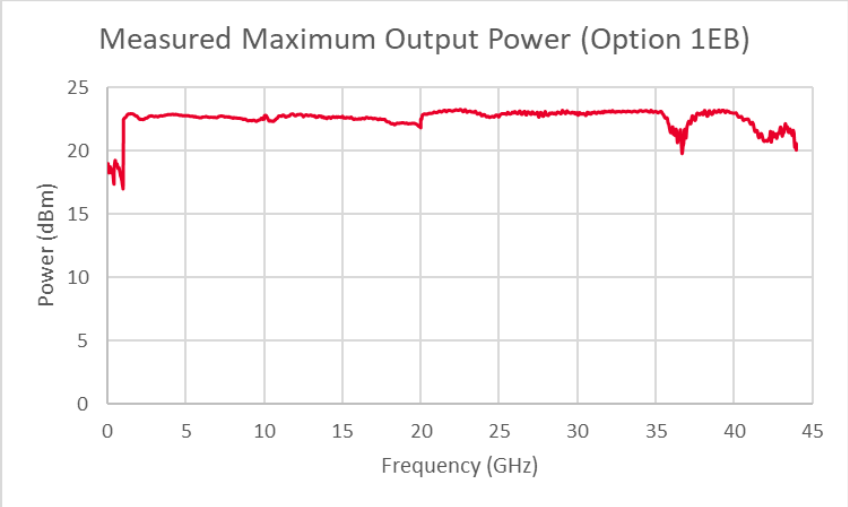
Frequency accuracy		
Calculation		± (time since last adjustment x aging rate) ± temperature effects ± calibration accuracy
Aging rate	Daily	< ± 0.5 ppb/day, after 72-hour warm-up
	Hourly	< ± 0.1 ppm/year, after 72-hour warm-up
	Total 10 years	< ± 0.6 ppm/10yrs, after 72-hour warm-up
Temperature effects	20 to 30 °C	< ± 10 ppb
	Full temperature range	< ± 50 ppb
Initial achievable calibration accuracy[2]		± 5 x 10^{-8}
Warm up		
5 minutes over +20 to +30 °C, with respect to 1 hour		< ± 0.1 ppm
15 minutes over +20 to +30 °C, with respect to 1 hour		< ± 0.01 ppm



[2] At time of shipment.

Power

Output parameters		
Settable range	-120 dBm to +23 dBm	
Resolution	0.01 dB	
Output impedance	50 Ω (nom.)	
Maximum reverse power	½ Watt, 0 VDC, nominal	
Units	dBm	
Maximum output power		
Frequency	**Option 1EB[3]**	**Option 1EE**
10 MHz to < 1.5 GHz	+16 dBm (nom.)	+16 dBm (nom.)
1.5 GHz to < 34 GHz	+21 dBm (nom.)	+21 dBm (nom.)
34 GHz to 43.5 GHz	+19 dBm (nom.)	+19 dBm (nom.)
> 43.5 GHz to 44 GHz	+19 dBm (nom.)	+18 dBm (nom.)



[3] Expect a 1-2 dBm maximum output power improvement for M9383B.

Absolute level accuracy (CW)[4]				
Frequency	> +5 dBm	+5 dBm to -40 dBm	-40 dBm to -80 dBm	-80 dBm to -90 dBm
10 MHz to < 200 MHz	0.5 dB (nom.)	0.5 dB (nom.)	0.5 dB (nom.)	0.5 dB (nom.)
200 MHz to < 400 MHz	0.5 dB (nom.)	0.5 dB (nom.)	0.5 dB (nom.)	0.5 dB (nom.)
400 MHz to < 3.6 GHz	0.5 dB (nom.)	0.5 dB (nom.)	0.5 dB (nom.)	1.3 dB (nom.)
3.6 GHz to < 16 GHz	0.7 dB (nom.)	0.7 dB (nom.)	0.7 dB (nom.)	1.0 dB (nom.)
16 GHz to < 20 GHz	0.7 dB (nom.)	0.7 dB (nom.)	0.7 dB (nom.)	1.0 dB (nom.)
20 GHz to < 34 GHz	0.9 dB (nom.)	0.9 dB (nom.)	0.9 dB (nom.)	1.0 dB (nom.)
34 GHz to 44 GHz	0.9 dB (nom.)	0.9 dB (nom.)	0.9 dB (nom.)	1.0 dB (nom.)

Absolute level accuracy in IQ mode relative to CW (-14 dBm to +4 dBm)	
Frequency	Waveform type: 5G NR, SCS 120 kHz, 100 MHz BW, 256 QAM, 1CC
1 GHz to 44 GHz	0.5 dB (nom.)

Switching Speed

Frequency switching speed using SCPI	
Mode	Switching speed
CW mode	< 28 ms (nom.)
Digital modulation	< 85 ms (nom.)

Amplitude switching speed using SCPI	
Mode	Switching speed
CW mode	< 90 ms (nom.)
Digital modulation	< 140 ms (nom.)

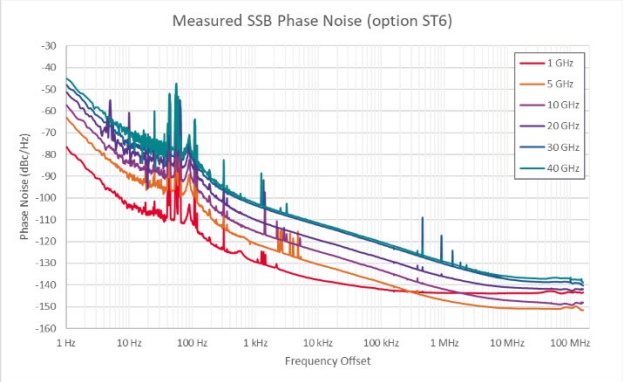
[4] ALC on over a power search.

Spectral Purity

Harmonics	
Frequency	**Harmonics measured at +5 dBm**
10 MHz to < 2 GHz	-33 dBc (nom.)
2 GHz to < 3.4 GHz	-41 dBc (nom.)
3.4 GHz to < 4.9 GHz	-30 dBc (nom.)
4.9 GHz to < 6.5 GHz	-37 dBc (nom.)
6.5 GHz to < 7 GHz	-28 dBc (nom.)
7 GHz to < 12 GHz	-32 dBc (nom.)
12 GHz to < 16 GHz	-60 dBc (nom.)
16 GHz to < 20 GHz	-50 dBc (nom.)
20 GHz to 22 GHz	-37 dBc (nom.)
Subharmonics	
Frequency	**Subharmonics measured at +9 dBm**
10 MHz to < 10 GHz	-72 dBc (nom.)
10 GHz to < 20 GHz	-53 dBc (nom.)
20 GHz to 44 GHz	-74 dBc (nom.)

Absolute SSB phase noise (CW) (dBc/Hz) (option ST6) (nom.)									
Frequency	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz	100 MHz
≤ 100 MHz	-96	-110	-120	-132	-138	-139	-140	-140	N/A
≤ 250 MHz	-86	-105	-114	-128	-136	-139	-140	-141	-140
≤ 500 MHz	-80	-100	-111	-137	-141	-141	-141	-141	-141
≤ 1 GHz	-73	-98	-107	-136	-141	-142	-143	-143	-143
≤ 2 GHz	-66	-89	-99	-132	-138	-142	-144	-145	-145
≤ 3.2 GHz	-62	-85	-95	-127	-135	-140	-145	-146	-147
≤ 10 GHz	-57	-76	-86	-120	-127	-133	-142	-147	-148
≤ 20 GHz	-48	-71	-79	-118	-122	-128	-137	-141	-142
≤ 30 GHz	-47	-68	-77	-105	-115	-123	-131	-136	-137
≤ 40 GHz	-44	-65	-74	-104	-114	-121	-129	-135	-135

Absolute SSB phase noise (CW) (dBc/Hz) (option ST5) (nom.)									
Frequency	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz	100 MHz
3.2 GHz	-50	-68	-89	-110	-124	-132	-141	-146	-146
≤ 10 GHz	-40	-59	-78	-100	-114	-123	-133	-141	-143
≤ 20 GHz	-33	-52	-73	-95	-108	-117	-126	-135	-136



Pulse Modulation (Option PMR or PME)

Pulse paths	
Internal pulse generator, external input	
Minimum pulse width (T_w) with duty cycle ≤ 50%	
ALC on	1 µs (nom.)
ALC off, 10 MHz to 20 GHz	100 µs (nom.)
ALC off, > 20 GHz	30 ns (nom.)
On/off ratio without I/Q modulation	
10 MHz to 11 GHz	60 dB (nom.)
>11 GHz to 13 GHz	50 dB (nom.)
>13 GHz to 20 GHz	60 dB (nom.)
> 20 GHz to 44 GHz	80 dB (nom.)
Rise/fall times (T_r and T_f)	
ALC off	7 ns (nom.)
Level accuracy relative to CW	
10 MHz to 44 GHz	± 0.75 dB (nom.)
Width compression ($T_{rf} – T_w$)	
< 20 GHz	10 ns (nom.)
> 20 GHz	-10 ns (nom.)
Video feed-through (V_f)	
400 MHz to 3.2 GHz	150 mV pk-pk (nom.)
> 3.2 GHz to 5.2 GHz	20 mV pk-pk (nom.)
> 5.2 GHz to 44 GHz	10 mV pk-pk (nom.)

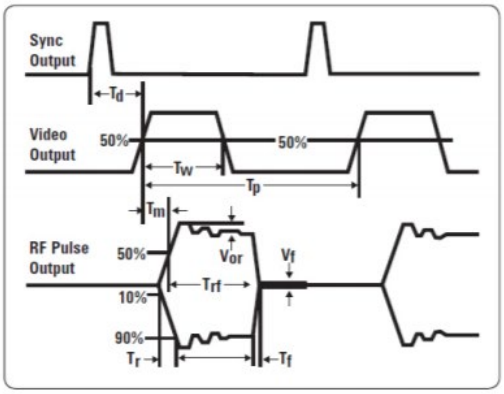
RF delay (external input to RF output)	
< 20 GHz	< 250 ns (nom)
>20 GHz	< 120 ns (nom)
Pulse overshoot	
≤ 3.2 GHz	10% (nom.)
> 3.2 GHz	6% (nom.)
External input level	
RF on	+1 V (nom.)
RF off	0 V (nom.)
External input impedance	
50 Ω (nom.)	

Internal Pulse Generator (Option PMR or PME)

Internal pulse generator		
Modes	Square, adjustable, doublet, pulse train	
Triggering	Free run, triggered, triggered doublet, gated, external pulse	
Square wave rate	(50 MHz)/k from 0.1 Hz to 16.66 MHz where k is an integer (nom)	
Signal routing		
Signal	**M9383B**	**M9384B**
Trigger in	M9314B Trig 1	Pulse In
Trigger out	M9323A Trig 1	Pulse Video Out
Sync	M9323A Trig 2	Pulse Sync Out

Timing		
Pulse period (PRI) (T_p)		40 ns to 41.99s
Pulse width (T_w)		30 ns to 41.99 s
Video delay (T_d)	Free run	0 to 42s
	Triggered modes	0 to 42s
Sync trigger		30 ns to 41.99 s
Pulse doublets	Delay 1	0 to 42s
	Pulse width 1	30 ns to 41.99 s
	Delay 2	60 ns to 42s
	Pulse width 2	30 ns to 41.99s

- 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



Vector Modulation (Option Dxx)

External I/Q input (option EXT)		
Type		Differential: $I, \overline{I}, Q, \overline{Q}$
Input impedance		50 Ω (nom.)
External recommended input level		-1 dBm or 0.2 V_{rms} (nom.)
External input level range		0.1 V_{rms} minimum 1 V_{peak} maximum
External I/Q offset		± 50%
External I/Q quadrature skew	< 3.2 GHz	None
	≥ 3.2 GHz	± 20°
External I/Q gain balance		± 10 dB (nom.)

External I/Q input bandwidth (option EXT)	
Frequency	**I/Q Bandwidth**
1 MHz to < 375 MHz	20% of carrier
375 MHz to < 550 MHz	200 MHz
550 MHz to < 750 MHz	300 MHz
750 MHz to < 1 GHz	400 MHz
1 GHz to < 1.5 GHz	750 MHz
1.5 GHz to < 3.2 GHz	1 GHz
3.2 GHz to 44 GHz	2 GHz

RF path filters[5] (nom.)	
Carrier frequency	**Filter cut-off frequency**
>3.2 to 4.3 GHz	5.3 GHz low pass filter
4.3 to 6.5 GHz	2.5 to 8 GHz high + low pass filter
6.5 to 11 GHz	5 GHz to 12.5 GHz high + low pass filter
11 to 19.5 GHz	8 GHz to 21 GHz high + low pass filter
19.5 to 22.3 GHz	18.5 to 23.3 GHz bandpass + low pass filter
22.3 to 25.1 GHz	21.3 to 26.1 GHz bandpass + low pass filter
25.1 to 28.5 GHz	24.1 to 29.5 GHz bandpass filter
28.5 to 30 .5 GHz	27.5 to 31.5 GHz bandpass filter
30.5 to 32.9 GHz	29.5 to 33.9 GHz bandpass filter
32.9 to 35.3 GHz	31.9 to 36.3 GHz bandpass filter
35.3 to 38 GHz	34.3 to 39 GHz bandpass filter
38 to 40.4 GHz	37 to 41.4 GHz bandpass filter
40.4 to 44 GHz	39.4 to 45 GHz bandpass filter

[5] The IF filter cut off is 10.5 GHz when upconverting above 19.5 GHz. When above 19.5 GHz and center frequency f < 28.5 GHz, the IF is $\frac{f}{3}$. For f ≥ 28.5 GHz, the IF is $\frac{f}{5}$. Therefore, modulation bandwidth is limited by how close $\frac{f}{3}$ or $\frac{f}{5}$ is to the cutoff of 10.5 GHz IF filter. For example, at 21 GHz, the IF is centered at $\frac{21}{3} = 7$ GHz, which provides 3.5 GHz overhead since $10.5 - 7 = 3.5$.

Internal I/Q baseband generator adjustments		
Internal I and Q offset		± 50 mV (nom.)
Internal I/Q quadrature skew		± 20° (0.001° resolution)
Internal I/Q gain balance		± 10 dB (nom.) (0.001 dB resolution)
Internal I/Q time skew		± 19.5 ns (1 ps resolution)
Fine I/Q delay range		0 to 1.589609 µs
Fine I/Q delay resolution		1 ps
I/Q baseband output (option DIQ)		
Type		Single-ended, differential: $I, \overline{I}, Q, \overline{Q}$
Output impedance	Single ended	50 Ω (nom.)
	Differential	100 Ω (nom.)
Frequency range		DC to 1 GHz (nom.) for < 1 dB bandwidth
DC offset adjustments		± 3 V
DC offset resolution		1 mV
Common-mode I/Q offset		± 200 mV (0.001 mV resolution)
Differential mode I or Q offset		± 50 mV (0.001 mV resolution)
I/Q baseband output amplitude[6]		
Internal I/Q modulation	Single ended	0 V_{pp} to 0.8 V_{pp}
	Differential	0 V_{pp} to 1.6 V_{pp}

[6] At maximum sample rate. Reducing sample rate will allow for higher amplitude settings.

Internal real-time complex digital I/Q filters		
Factory channel corrections – corrects the linear phase and amplitude response of the baseband I/Q and RF outputs of the signal generator using factory calibration arrays.		
RF amplitude flatness	1 GHz bandwidth	< ± 0.7 dB (nom.)
	1.6 GHz bandwidth	< ± 0.7 dB (nom.)
	2 GHz bandwidth	< ± 0.9 dB (nom.)
User defined automatic channel response correction and S-parameter de-embedding (N7653APPC)		
Methods for fixture error removal		
Scatter parameters de-embedding/embedding files generated by a network analyzer or simulation		
Automatic channel response correction using a power sensor or spectrum analyzer (amplitude and phase correction)		
Scaler user flatness (absolute power correction)		
Scatter parameters		
File format	.s2p, .csv	
Number of cascadeable calibration sets	4	
Automated channel response correction (256 taps)[7]		
Recommended maximum amplitude for error correction	± 15 dB	
Recommended maximum phase error for correction	± 25°	
User flatness		
File format	.uflat, .csv	
Entry modes	USB or LAN direct power meter control	

[7] Automated routine uses power sensor to correct for linear phase and amplitude response of DUT (equalizer). See User Documentation for more details.

Internal Baseband Generator (Option Dxx)

Internal baseband generator (option Dxx)			
Channels	In phase (I), quadrature (Q)		
DAC resolution	16 bits [1/65536]		
Waveform granularity	8 samples		
Sample rate	1 Hz to 2.56 GHz		
Same rate resolution	1 Hz		
Interpolated DAC rate	Fixed 2.56 GHz		
RF (I + Q) bandwidth			
Frequency	**Option D06**	**Option D11**	**Option D21**
1 MHz to < 375 MHz	20% of carrier	20% of carrier	20% of carrier
375 MHz to < 550 MHz	200 MHz	200 MHz	200 MHz
550 MHz to < 750 MHz	300 MHz	300 MHz	300 MHz
750 MHz to < 1 GHz	400 MHz	400 MHz	400 MHz
1 GHz to < 1.5 GHz	500 MHz	750 MHz	750 MHz
1.5 GHz to < 3.2 GHz	500 MHz	1 GHz	1 GHz
3.2 GHz to 44 GHz	500 MHz	1 GHz	2 GHz
Arbitrary waveform memory			
Maximum arbitrary waveform playback memory	256 MSa (standard) 512 MSa (option M05) 1024 MSa (option M10)		
Maximum storage capacity	16 GB shared with operating systems		

Triggers		
Trigger types		Continuous, single
Trigger sources		Trigger key, external, bus (LAN, GPIB)
Trigger modes	Continuous	Immediate, trigger and run
	Single	No retrigger
Course trigger delay range		0 to 12 s
Course trigger delay resolution		3.125 ns
Fine I/Q delay range		See Internal I/Q baseband adjustment generator section
Fine I/Q delay resolution		See Internal I/Q baseband adjustment generator section
Trigger jitter		± 3.125 ns (320 MHz trigger sample rate)
Trigger latency with correction filter on		1614 ns + (21 × sample clock in ns) + RF path latency
Trigger RF electrical latency		Variable depending on attenuator path and cabling

Multi-channel baseband synchronization master/subordinate (option PCH)		
Trigger types		Continuous, single
Trigger sources		Trigger key, external, bus (LAN, GPIB)
Trigger modes	Continuous	Immediate, trigger and run
	Single	No retrigger
Global course trigger delay range[8]		0 ns to 12 s
Global course trigger delay resolution[8]		3.125 ns
Global trigger jitter		± 50 ns relative to asynchronous external system trigger event
Relative trigger repeatability		± 5 ps
Relative trigger repeatability after power cycle		± 25 ps
Relative fine I/Q delay range		Delay of channel 1 relative to channel 2. See Internal I/Q baseband adjustment generator section.
Relative fine I/Q delay resolution		Delay of channel 1 relative to channel 2. See Internal I/Q baseband adjustment generator section.
Relative phase adjust range		See Frequency section
Relative phase adjust resolution		See Frequency section
Relative phase repeatability		See Frequency section
Trigger latency with correction filter on		2064 ns + (21 × sample clock in ns) ± 50 ns + RF path latency
Trigger RF electrical latency		Variable depending on attenuator path and cabling

[8] For channel 1 and channel 2 together.

Markers	
Markers are defined in a segment during the waveform generation process. A marker can also be routed to the RF blanking and/or external output. See User's Documentation for more information.	
Marker polarity	Positive
Number of markers	4
RF blanking/burst or on/off ratio	> 80 dB
Marker to waveform jitter	< 250 ps (sample rate is a submultiple of 2.56 GHz) < 3.125 ns (sample rate is not a submultiple of 2.56 GHz)

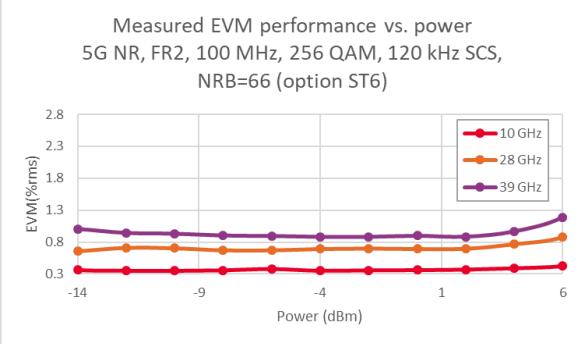
Error Vector Magnitude (EVM)

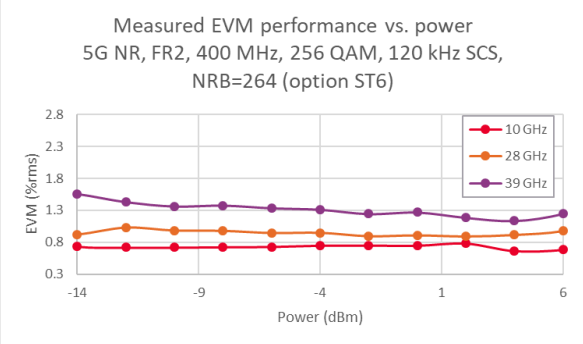
EVM for 5G NR FR2 bands and IFs, -14 dBm to +6 dBm (nom.)[9], option ST6		
Frequency	100 MHz, 256QAM, 120 kHz SCS, NRB = 66 or 5GTF	400 MHz, 256QAM, 120 kHz SCS, NRB = 264
3.4 GHz	0.35%	0.65%
10 GHz	0.42%	0.73%
12 GHz	0.43%	0.71%
24.5 GHz	0.85%	1.50%
28 GHz	0.96%	1.60%
39 GHz	1.42%	1.86%
42.5 GHz	1.97%	2.10%

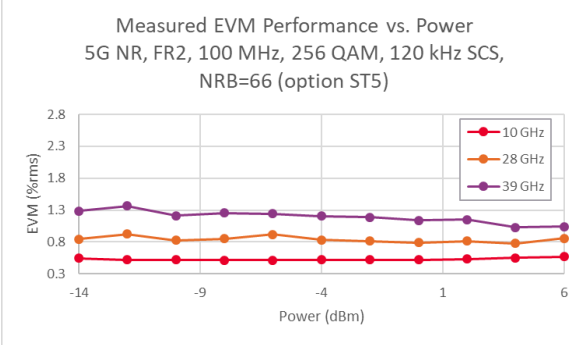
EVM for 5G NR FR1 bands, -14 dBm to +6 dBm (nom.)[9], option ST6	
Frequency	100 MHz, 256QAM, 60 kHz SCS, NRB = 135
2.3 GHz	0.49%
3.55 GHz	0.47%
4.9 GHz	0.37%

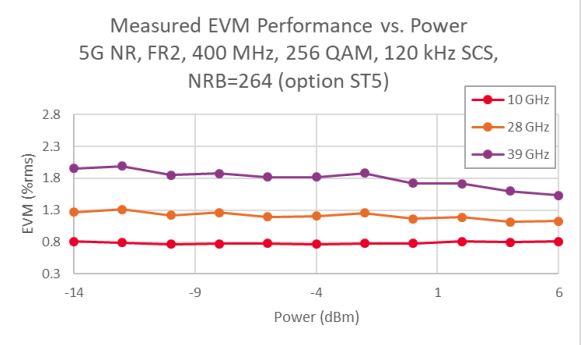
[9] Measured EVM after DC calibration.

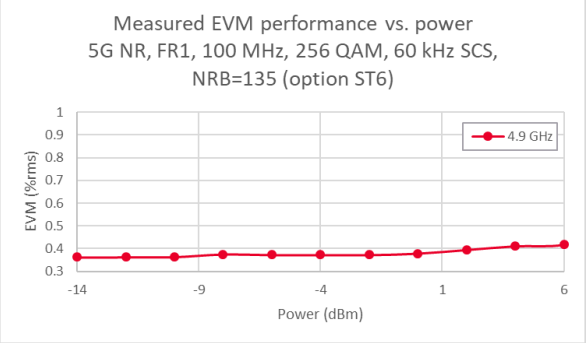
EVM for LTE, -15 dBm to +5 dBm (nom.) [10], option ST6	
Frequency	**LTE FDD E-TM 3.1,10 MHz, 64 QAM PDSCH, full resource block**
2 GHz	0.28%

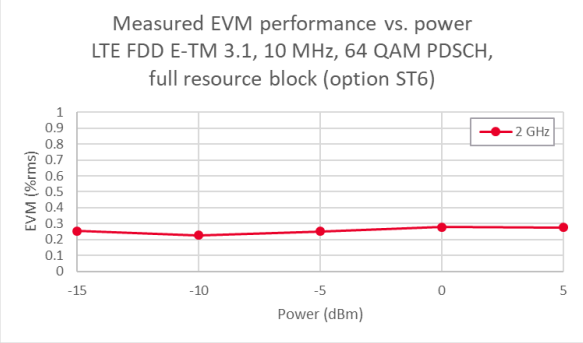










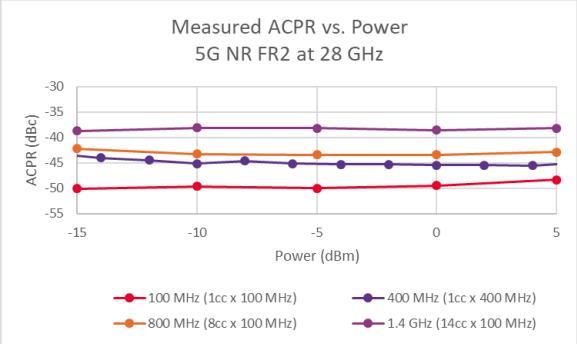


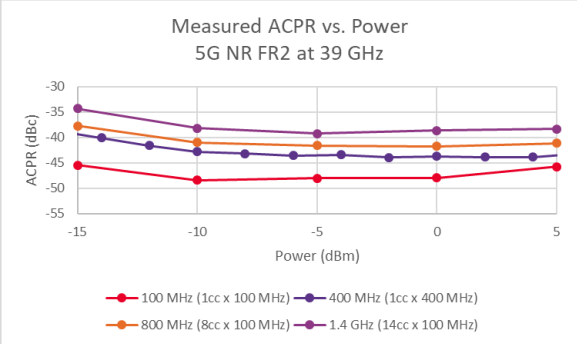
[10] Measured EVM after DC calibration.

Adjacent Channel Power Ratio (ACPR)

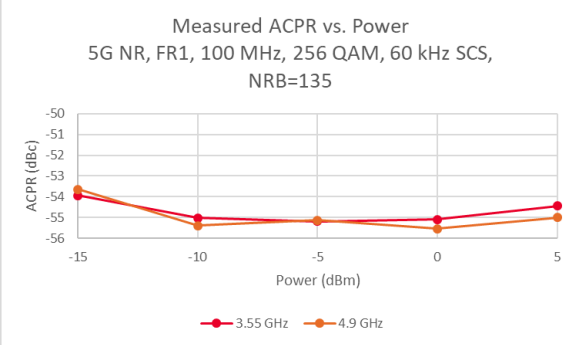
ACPR for 5G NR FR2 bands and IFs, -15 dBm to +5 dBm (nom.)				
Frequency	**100 MHz, 256QAM, 120 kHz SCS, NRB = 66**	**400 MHz, 256QAM, 120 kHz SCS, NRB = 264[11]**	**8cc x 100 MHz (800 MHz), 256QAM, 120 kHz SCS, NRB = 66 or 5GTF**	**14cc x 100 MHz (1.4 GHz), 256QAM, 120 kHz SCS, NRB = 66**
10 GHz	-53 dBc	-48 dBc	-45 dBc	-41 dBc
24.5 GHz	-49 dBc	-45 dBc	-42 dBc	-38 dBc
28 GHz	-48 dBc	-44 dBc	-42 dBc	-38 dBc
39 GHz	-45 dBc	-40 dBc	-37 dBc	-34 dBc
42.5 GHz	-42 dBc	-37 dBc	-35 dBc	-32 dBc

ACPR for 5G NR FR1 bands, -15 dBm to +5 dBm (nom.)	
Frequency	**100 MHz, 256QAM, 60 kHz SCS, NRB = 135**
2.3 GHz	-51 dBc
3.55 GHz	-53 dBc
4.9 GHz	-53 dBc





[11] Over power range -14 dBm to +6 dBm.



Remote Programming

Remote programming	
Software drivers	IVI.NET
Interfaces	GPIB (IEEE-488.2,1987) with listen and talk, and 1000BaseT LAN interface
Control languages	SCPI version 1999.0
IEEE-488 functions	SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT0, C0, E2
Keysight IO libraries	Keysight's IO Library Suite helps you quickly establish an error-free connection between your PC and instruments – regardless of the vendor. It provides robust instrument control and works with the software development environment you choose.

Environmental Specifications

Environmental specifications and regulatory compliance		
Temperature	Operating	0 to 45 °C (single channel), 0 to 40 °C (dual channel)
	Storage	-40 to +70 °C
Humidity		Type tested at 95%, +40 °C (non-condensing) (From 40°C to 45°C, the maximum % relative humidity follows the line of constant dew point.)
Shock/Vibration	Operating random vibration	Type tested at 5 to 500 Hz, 0.21 g rms
	Survival random vibration	Type tested at 5 to 500 Hz, 2.09 g rms
	Functional shock	Type tested at half-sine, 30 g, 11 ms
	Bench handling	Type tested per MIL-PRF-28800F
Altitude	Operating	Up to 10,000 feet (3,048 meters)
	Storage	Up to 15,000 feet (4,572 meters)
EMC		Complies with European EMC Directive – 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.
Environmental testing		Samples of this product have been type tested in accordance with the Keysight 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.

M9384B VXG Physical Specifications

Physical specifications		
Weight	Single channel	30 kg (66 lbs.)
	Dual channel	35 Kg (77.2 lbs.)
Dimensions (L x W x H)		583 mm x 445 mm x 194 mm
Power requirements		
Single channel		640 W
Dual channel		1000 W

M9384B VXG Input and Output Connectors

Front panel connectors		
Connectors	**Type**	**Description**
19.2 GHz Out 1	SMA female	Outputs a selectable CW 19.2 GHz frequency reference.
19.2 GHz Out 2	SMA female	Outputs a selectable CW 19.2 GHz frequency reference.
100 MHz Out	SMB male	Outputs a CW 100 MHz frequency reference.
Trig 1	SMB male	Provides an input or output signal for trigger and events.
Trig 2	SMB male	Provides an input or output signal for trigger and events.
Settled	SMB male	Outputs DDS 1/2 Mark signal
EFC In	SMB male	Accepts a signal for Electronic Frequency Control of the reference frequency or accepts a calibration signal.
LF1 Out	SMB male	Outputs a external amplitude modulated signal with 50%/volt or 20 dB/volt.
AM In	BNC female	Accepts an external amplitude modulated signal.
Pulse In	BNC female	Provides an input or output signal for trigger and events.
Pulse Video Out	SMB male	Provides an input or output signal for trigger and events.
Pulse Sync Out	SMB male	Provides an input or output signal for trigger and events.
RF Out 1/2	Male (2.4 mm)	Outputs the desired signal.

I+, I- (In)	SMA female	Deal with the in-phase component of I/Q modulation required for external differential I/Q.
Q+, Q- (In)	SMA female	Deal with the quadrature-phase component of I/Q modulation required for external differential I/Q.
I+, I- (Out)	SMA female	Deal with the in-phase component of I/Q modulation provided by the internal baseband generator.
Q+, Q- (Out)	SMA female	Deal with the quadrature-phase component of I/Q modulation provided by the internal baseband generator.
19.2 GHz In	SMA female	Accepts a 19.2 GHz signal.
BBG Sync	SMA female	Intended for future use.
Ctrl M	uHDMI female	This port is the master used for synchronization.
Ctrl S	uHDMI female	This port is the slave used for synchronization.
USB Ports	USB Type-A female	Allows control of USB devices.
Display Port	Dual Mode DisplayPort++ (DVI-D, VGA, HDMI with an adapter	Used to connect display devices.

Rear panel connectors

Connectors	Type	Description
10 MHz In	BNC female	Accepts an external clock to be used as the system reference frequency.
10 MHz Out	BNC female	Outputs a 10 MHz reference frequency or a calibration signal.
100 MHz Out	SMA female	Outputs CW 100 MHz frequency reference.
EXT 1	BNC female	Provides an input or output signal used for trigger and events.
SYNC OUT	BNC female	Provides an input or output signal used for trigger and events.
EXT CLK IN	SMA female	Inputs a 100 MHz signal.
GPIB	Micro-D 25-pin	Allows GPIB communication.
LAN	RJ -45	Allows LAN TCP/IP communication. The connector provides SCPI remote programming functionality. The LAN supports DHCP, HiSLIP,sockets SCIP, VXI-11 SCPI, connection monitoring, dynamic hostname services, and TCP keep alive.

M9383B VXG-m Physical Specifications

Physical Specifications			
Module	**Size**	**Dimensions (L x W x H)**	**Weight**
M9312B	3 PXIe slots	205 mm x 61.8 mm x 130 mm	1.9 kg (4.2 lbs.)
M9314B	1 PXIe slot	205 mm x 21.2 mm x 130 mm	0.6 kg (1.4 lbs.)
M9323A	1 PXIe slot	205 mm x 21.2 mm x 130 mm	0.6 kg (1.4 lbs.)
M9343A	3 PXIe slots	205 mm x 61.8 mm x 130 mm	1.6 kg (3.6 lbs.)
M9347A	1 PXIe slot	205 mm x 20.2 mm x 130 mm	0.7 kg (1.6 lbs.)
Power requirements			
Single channel	630 W		
Dual channel	990 W		

M9383B VXG-m Input and Output Connectors

M9312B		
Connectors	**Type**	**Description**
4.8 GHz In	APC female (3.5 mm)	Inputs a 4.8 GHz reference clock from the M9043A Chassis 4.8 GHz Out 1 connector.
4.8 GHz Out	APC female (3.5 mm)	Outputs a copy of 4.8 GHz signal accepted by the 4.8 GHz In connector.
LO 2 Out	APC female (3.5 mm)	Outputs either a copy of LO 1 In signal or a doubled copy of LO 1 In signal (selectable) to the M9314B LO 1 In connector.
100 MHz In	SMP male	Inputs a 100 MHz reference signal from the M9043A Chassis 100 MHz Out 3 connector.
100 MHz Out	SMP male	Outputs a copy of the 100 MHz reference signal (received by 100 MHz In connector) to the M9347A Ref In connector.
LF Out	SMP male	Outputs a waveform from the internal function generator or a copy of the AM modulated signal.
AM In	SMP male	Accepts an external amplitude modulated signal.
Trig 1	SMP male	Accepts a bi-directional trigger signal from the M9343A Ext 2 connector.
Trig 2	SMP male	Accepts a bi-directional trigger signal from the M9314B Trig 2 connector.
Sync Out	SMP male	Accepts a bidirectional signal used for synchronization with other modules.

LO 1 In	SMA female	Accepts an LO signal between 400 MHz and 10 GHz from the M9347A Synth 1 Out connector.
LO 1 Out	SMA female	Outputs either a copy of LO 1 In signal or a doubled copy of LO 1 In signal (selectable) to the M9343A LO 1 In connector.
RF Out	Female (2.4 mm)	Outputs an RF signal between 1 MHz and 20 GHz to the M9323A RF In connector when Aux Out is connected to Aux In. Otherwise, outputs the signal to the Aux Out connector attenuated by the selected attenuation value.
Aux In	SMA female	Accepts an input signal between 1 MHz to 44 GHz from the M9314B Aux Out connector.
Aux Out	SMA female	Provides an output signal to the M9314B Aux In connector.
RF 2 In	SMA female	Inputs an IF signal between 400 MHz and 3.2 GHz from the M9343A RF 2 Out connector.
RF 1 In	SMA female	Inputs an IF signal between 3.2 GHz and 20 GHz from the M9314B RF 1 Out connector.

M9314B

Connectors	Type	Description
Trig 1	SMP male	Provides an input or output signal for trigger and events.
Trig 2	SMP male	Outputs the trigger signal to the M9312B Trig 2 connector.
Sync	SMP male	Accepts a bidirectional signal used for synchronization with other modules.
AM In	SMP male	Accepts an external amplitude modulated signal with 50%/volt or 20 dB/volt (selectable).
AM Out	SMP male	Provides a copy of the AM In signal.
LO 1 In	Female (2.4 mm)	Inputs an LO signal between 22 GHz and 38 GHz from the M9312B LO 2 Out connector.
RF 1 Out	SMA female	Outputs a copy of the RF 1 In signal to the M9312B RF 1 In connector.
RF 1 In	SMA female	Inputs the IF signal between 400 MHz and 20 GHz from the M9343A RF 1 Out connector.
Aux In	SMA female	Accepts an input signal between 1 MHz and 20 GHz from the M9312B Aux Out connector.
Aux Out	Female (2.4 mm)	Provides a RF output as either the upconverted signal from RF 1 In connector or the Aux In signal to the M9312B Aux In connector.

M9323A		
Connectors	**Type**	**Description**
Trig 1	SMP male	Provides an input or output signal for trigger and events.
Trig 2	SMP male	Provides an input or output signal for trigger and events.
Sync	SMP male	Accepts a bidirectional signal used for synchronization with other modules.
RF 1 Out	Female (2.4 mm)	Outputs the desired signal.
RF 1 In	Female (2.4 mm)	Accepts a RF signal from the M9312B RF Out connector.

M9343A		
Connectors	**Type**	**Description**
Sync	SMB male	Intended for future use.
Ext 1	SMB male	Provides an input or output signal used for trigger and events.
Ext 2	SMB male	Outputs the trigger signal to the M9312B Trig 1 connector.
Ext Clk In	SMB male	Inputs a 100 MHz signal from the M9043A Chassis 100 MHz Out 4 connector.
Aux Port		This port is reserved for future use.
USB Port		This port is reserved for future use. It cannot be used with USB devices.
I+, I- (Input)	SMP male	Accepts the in-phase component of I/Q modulation required for external differential I/Q.
Q+,Q- (Input)	SMP male	Accepts the quadrature-phase component of I/Q modulation required for external differential I/Q.
I+, I- (Output)	SMP male	Outputs the in-phase component of I/Q modulation provided by the internal baseband generator.
Q+,Q- (Output)	SMP male	Outputs the quadrature-phase component of I/Q modulation provided by the internal baseband generator.
Trig 1	SMP male	Provides an input or output signal for trigger and events.
Trig 2	SMP male	Provides an input or output signal for trigger and events.
Sync	SMP male	Accepts a bidirectional signal used for synchronization with other modules.
LO 2 In	SMA female	Accepts a LO signal between 400 MHz and 3.2 GHz for use by the 400 MHz to 3.2 GHz modulator.
LO 2 Out	APC female (3.5 mm)	Outputs a copy of the LO 1 In signal to the M9343A LO 2 In connector.

RF 2 Out	SMA female	Outputs a modulated RF signal from the 0.4 to 3.2 GHz modulator. This signal is routed to the M9312B RF 2 In connector.
LO 1 In	APC female (3.5 mm)	Accepts a LO signal between 0.4 and 20 GHz that can be used by the 3.2 to 20 GHz modulator. The range from 0.4 to 3.2 GHz is only usable by the LO 2 Out connector.
RF 1 Out	APC female (3.5 mm)	Outputs a modulated RF signal from the 3.2 to 20 GHz modulator to the M9314B RF 1 In connector. Output can be switched on or off.

M9347A

Connectors	Type	Description
Synth 2 Out	SMA female	For Dual Channel configuration, this connector outputs a synthesized signal to the M9312B LO 1 In connector.
Clock In	SMA female	Accepts a 4.8 GHz or 19.2 GHz signal from the M9043A Chassis 19.2 GHz Out 2 connector.
Ref Out	SMA female	Outputs a 100 MHz, 4.8 GHz or 19.2 GHz clock signal.
Ref In	SMP male	Accepts a 100 MHz signal from the M9312B 100 MHz Out connector.
Synth 1 Out	SMA female	Outputs a synthesized signal to the M9312B LO 1 In connector.
Mark 1	SMP male	Provides a DDS1 mark signal.
Mark 2	SMP male	Provides a DDS2 mark signal.
Ctrl M	uHDMI female	The master used for synchronization.
Ctrl S	uHDMI female	The slave used for synchronization.

Setup and Calibration Services

Assistance	
One day startup assistance	Gain access to a technical expert who will help you get started quickly with the VXG Microwave Signal Generator and its powerful software tools. The flexible instruction format is designed to get you to your first measurements and familiarize you with ways to adapt the equipment to a specific application. Included in base configuration.
Calibration and traceability	
Calibration cycle	A one-year calibration cycle is recommended.

Support and Warranty

Warranty	
Global warranty	Keysight's warranty service provides standard coverage for the country where product is used. – All parts and labor necessary to return to full specified performance – Recalibration for products supplied originally with a calibration certificate – Return shipment
Support	
Self-test utility	A self-test utility runs a set of internal tests which verifies the health of the modules and reports their status.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

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