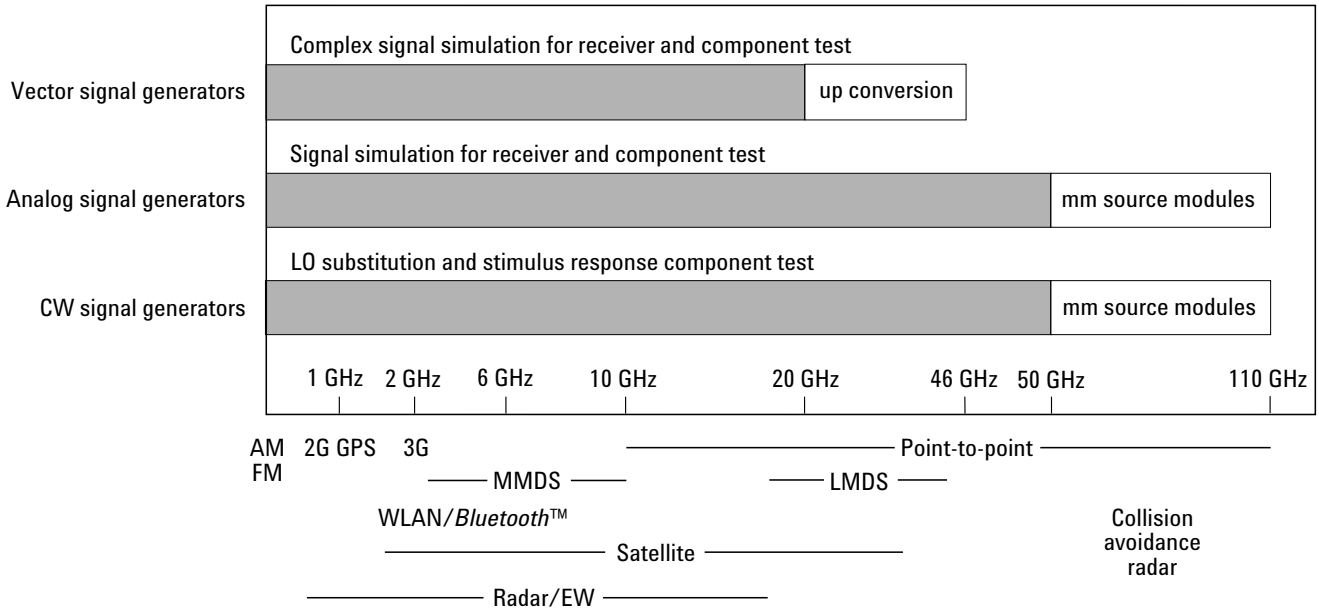
Agilent Signal Generators
Vector, Analog, and CW Models

Selection Guide

Agilent Technologies

Signal Generators For Every Application and Budget

Agilent Technologies' signal generators give you greater measurement confidence with their high-performance, frequency accuracy, spectral purity, and modulation. With frequency ranges from DC to 110 GHz, Agilent signal generators test low-frequency navigation signals, cellular mobile radio, or millimeter-wave satellite systems. Designed for R&D, automated manufacturing, portable installation, or maintenance, Agilent signal generators provide the performance, reliability, quality, and support you demand.



Vector signal generators

Model	Frequency range	Key feature/Application
E4438C ESG	250 kHz to 1, 2, 3, 4, 6 GHz	Same as the E4434B/35B/36B/37B ESG plus wider RF modulation bandwidth, improved internal baseband generator with more comprehensive capability for 3G (W-CDMA, 1xEV-DO, cdma2000, etc.) and adds GPS, WLAN formats.
E4430B/31B/32B/33B ESG	250 kHz to 1, 2, 3, 4 GHz	Internal baseband generator for arbitrary waveform and real-time signal generation of 2G, 3G (W-CDMA, 1xEV-DO, cdma2000, etc.), *Bluetooth*, and custom I/Q formats.
E4434B/35B/36B/37B ESG	250 kHz to 1, 2, 3, 4 GHz	Same as the E4430B/31B/32B/33B ESG, adds enhanced phase noise performance.
E8267C PSG	250 kHz to 20 GHz	Microwave custom I/Q modulation, complex pulse generation, two-tone, multi-tone, and NPR tests.

Analog signal generators

Model	Frequency range	Key feature/Application
E4400B/20B/21B/22B ESG	250 kHz to 1, 2, 3, 4 GHz	Superior level accuracy, wideband FM and phase modulation, electronic attenuator. Reliable and repeatable receiver and component test.
E4423B/24B/25B/26B ESG	250 kHz to 1, 2, 3, 4 GHz	Same as the E4400B/20B/21B/22B ESG, adds enhanced phase noise performance.
E8257C PSG	250 kHz to 20, 40 GHz	Low phase noise, high output power for component and receiver test (in channel and out of channel).
8648A/B/C/D	9 kHz to 1, 2, 3, 4 GHz	General purpose, low-cost receiver (including pager test) and component test. Semi-automated and automated manufacturing test with remote interface.
8644B/64A/65B	100 kHz to 2 GHz 252 kHz to 4, 6 GHz	Low phase noise at wide offsets for out of channel receiver tests.
8645A	252 kHz to 2 GHz	Fast frequency switching for frequency agile radios.
83650B	10 MHz to 50 GHz	50 GHz receiver test.

CW signal generators

Model	Frequency range	Key feature/Application
E8247C PSG	250 kHz to 20, 40 GHz	Low phase noise, LO substitution, stimulus response test.
83650L	10 MHz to 50 GHz	50 GHz LO substitution and stimulus response test.

Millimeter-wave source modules

Model	Frequency range	Key feature/Application
83554A to 83558A	26.5 GHz to 110 GHz	Frequency extension to 110 GHz for the E8247C PSG, E8257C PSG, 83650B, 83650L.

Vector Signal Generators

Vector signal generators are designed to simulate the complex modulation formats that are used in today's modern communications systems. Whether this is for wireless at RF or complex pulse generation at microwave frequencies, Agilent provides the largest selection of vector signal generators. A wide range of digital modulation (PSK, QAM, FSK, MSK) capabilities include standards-compliant formats such as 802.11g, W-CDMA, 1xEV-DO, and GSM, along with flexible custom I/Q formats for proprietary systems such as microwave point-to-point. Wide RF modulation bandwidth signals are created up to 160 MHz calibrated and 1 GHz uncalibrated using the external I/Q inputs. With the internal arbitrary waveform or real-time baseband generator, bandwidths up to 80 MHz are possible. In addition, all the vector signal generators include excellent analog performance as well; level accuracy, output range, spectral purity, AM, FM, ΦM, and pulse.

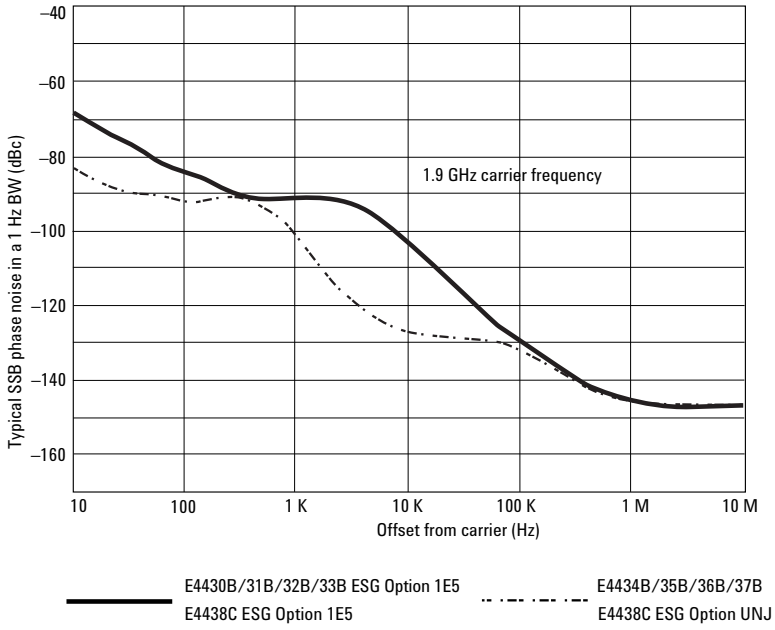
E8267C PSG vector signal generator (250 kHz to 20 GHz)

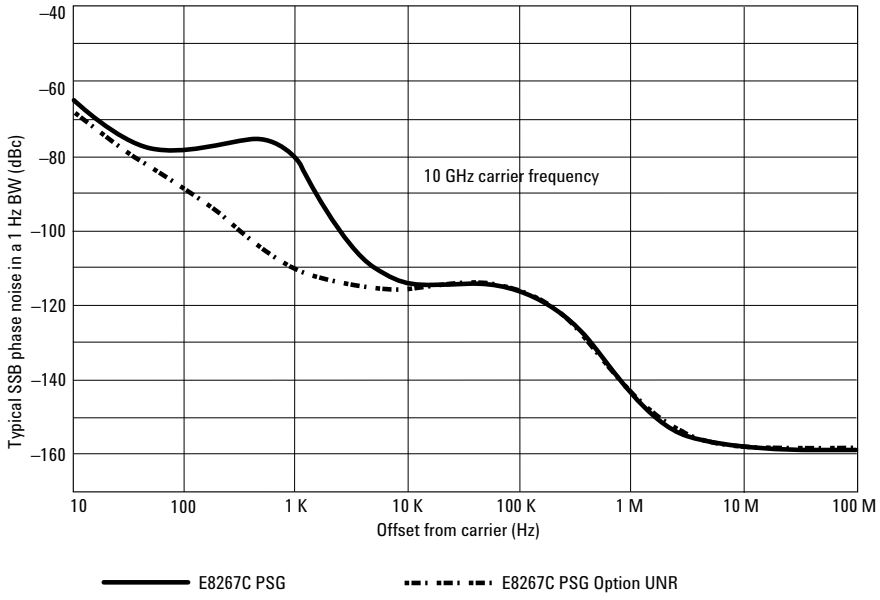
E4438C ESG vector signal generator (250 kHz to 6 GHz)

Vector signal generators

	E4438C ESG	E4430B/31B/32B/33B ESG	E4434B/35B/36B/37B ESG	E8267C PSG
Frequency				
Range	250 kHz to 1, 2, 3, 4, 6 GHz	250 kHz to 1, 2, 3, 4 GHz	250 kHz to 1, 2, 3, 4 GHz	250 kHz to 20 GHz
Resolution	0.01 Hz	0.01 Hz	0.01 Hz	0.001 Hz
Accuracy	Same as reference oscillator	Same as reference oscillator	Same as reference oscillator	Same as reference oscillator
Switching speed	< 14 ms	< 50 ms	< 65 ms	< 15 ms
Output level				
Range	+17 to –136 dBm	+17 to –136 dBm	+17 to –136 dBm	+18 to –135 dBm
Accuracy	±0.5 to 1.5 dB	±0.5 to 1.5 dB	±0.5 to 1.5 dB	±0.6 to 2.0 dB
Spectral purity level				
Harmonics	< –32 dBc	< –30 dBc	< –30 dBc	< –28 to < –55 dBc
Spurious > 3 kHz offset	< –62 to < –80 dBc	< –53 to < –65 dBc	< –65 to < –80 dBc	< –50 to < –80 dBc
SSB phase noise	See chart	See chart	See chart	See chart
Modulation				
AM rate	dc to 10 kHz	dc to 10 kHz	dc to 10 kHz	dc to 100 kHz
AM depth (max)	100%	100%	100%	40 dB/100%
FM rate	dc to 10 MHz	dc to 10 MHz	dc to 10 MHz	dc to 1 MHz
FM deviation (max)	1 to 64 MHz	10 to 40 MHz	10 to 40 MHz	8 to 32 MHz
ΦM	Yes	Yes	Yes	Yes
Pulse	Yes	Yes	Yes	Yes
Pulse width (ALC on)	5 µs	8 µs	8 µs	1 µs
Pulse width (level hold)	4 µs	8 µs	8 µs	20 ns
On-off ratio	> 80 dB	> 80 dB	> 80 dB	> 80 dB
Rise/fall	150 ns	150 ns	150 ns	10 ns
Waveforms	Sine, square, ramp, triangle, pulse, noise	Sine, square, ramp, triangle, pulse, noise	Sine, square, ramp, triangle, pulse, noise	Sine, square, ramp, triangle, noise, swept sine, dual sine
Digital modulation				
PSK	BPSK, QPSK, OQPSK, π/4DQPSK, 8PSK, 16PSK, D8PSK	BPSK, QPSK, OQPSK, π/4DQPSK, 8PSK, 16PSK, D8PSK	BPSK, QPSK, OQPSK, π/4DQPSK, 8PSK, 16PSK, D8PSK	BPSK, QPSK, OQPSK, π/4DQPSK, 8PSK, 16PSK, D8PSK
QAM	4, 16, 32, 64, 256	4, 16, 32, 64, 256	4, 16, 32, 64, 256	4, 16, 32, 64, 256
FSK	2, 4, 8, 16	2, 4, 8, 16	2, 4, 8, 16	2, 4, 8, 16
MSK	Phase offset 0 to 100°	Phase offset 0 to 100°	Phase offset 0 to 100°	Phase offset 0 to 100°
RF modulation BW	160 MHz using ext. I/Q inputs, 80 MHz using internal baseband generator	27 MHz using ext. I/Q inputs, 22 MHz using internal baseband generator	27 MHz using ext. I/Q inputs, 22 MHz using internal baseband generator	160 MHz or up to 1 GHz (uncal.) using ext. I/Q inputs, 80 MHz using internal baseband generator
Internal baseband generator	Yes	Yes	Yes	Yes
modes	Arbitrary waveform and real-time	Arbitrary waveform and real-time	Arbitrary waveform and real-time	Arbitrary waveform and real-time
Waveform playback memory	32 Msa/160 MB/ 4,096 segments/ 16,384 sequences	1 Msa/4 MB/ 128 segments/ 128 sequences	1 Msa/4 MB/ 128 segments/ 128 sequences	32 Msa/160 MB/ 4,096 segments/ 16,384 sequences
Clock sample rate	100 MHz	40 MHz	40 MHz	100 MHz
Formats	W-CDMA, cdma2000, 1xEV-DO, TD-SCDMA (TSM), CDMA, GSM, EDGE, WLAN (802.11a/b/g), *Bluetooth*, GPS, PDC, PHS, DECT, TETRA formats	W-CDMA, cdma2000, 1xEV-DO, CDMA, GSM, EDGE, *Bluetooth*, PDC, PHS, DECT, TETRA formats	W-CDMA, cdma2000, 1xEV-DO, CDMA, GSM, EDGE, *Bluetooth*, PDC, PHS, DECT, TETRA formats	—
Sweep modes				
Digital	Step, list	Step, list	Step, list	Step, list
Analog (ramp)	—	—	—	Frequency, power
Price	$$$	$$	$$ to $$$	$$$$
Additional features/ Applications	• 6 GB non-volatile waveform storage • Differential and single-ended I/Q outputs • AWGN calibrated noise • Enhanced multitone • 10BaseT LAN, GPIB, RS-232 • Electronic attenuator (4 GHz) • Internal function generator • Dual-tone sinewaves with low frequency generator • dcFM	• 4 MB non-volatile waveform storage • Electronic attenuator • Internal function generator dual-tone sinewaves with low frequency generator • dcFM	• 4 MB non-volatile waveform storage • Electronic attenuator • Internal function generator • Dual-tone sinewaves with low frequency generator • dcFM	• 6 GB non-volatile waveform storage • Differential and single-ended I/Q outputs • Pulse builder software • 10BaseT LAN, GPIB, RS-232 • Internal function generator • dcFM • Scalar network analyzer compatibility

Vector signal generators
SSB phase noise charts





Analog Signal Generators

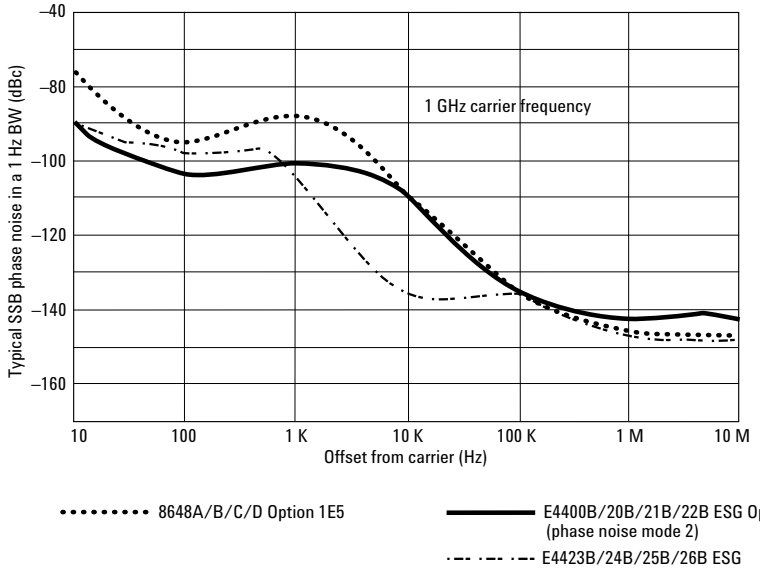
Agilent's analog signal generators range from economy RF to high performance microwave. They offer a wide range of performance for analog modulation (AM, FM, ΦM, pulse) for testing receivers and components. Whether you need repeatable and reliable performance for manufacturing high-volume, low-cost products, or have more demanding requirements for your sensitivity, adjacent channel, and intermodulation tests, these analog signal generators will meet your needs. You will find excellent spectral purity at wide offsets and close in for many radar and phase noise measurement applications, superior level accuracy, high output power, as well as digital and analog (ramp) sweep providing network analyzer compatibility. Using the millimeter-wave source modules, Agilent's offering of analog signal generators cover up to 110 GHz.

	E4400B/E4420B/E4421B/E4422B ESG	E4423B/E4424B/E4425B/E4426B ESG	8648A/B/C/D	8644B/8664A/8665B
Frequency				
Range	250 kHz to 1, 2, 3, 4 GHz	250 kHz to 1, 2, 3, 4 GHz	9 kHz to 1, 2, 3, 4 GHz	100 kHz to 1, 2, 3, 4, 6 GHz
Resolution	0.01 Hz	0.01 Hz	1 (10 display) Hz	0.01 Hz
Accuracy	Same as reference oscillator	Same as reference oscillator	Same as reference oscillator	Same as reference oscillator
Switching speed	< 50 ms	< 65 ms	< 75 ms	< 100 ms
Output level				
Range	+17 to –136 dBm	+17 to –136 dBm	+20 to –136 dBm	+16 to –140 dBm
Accuracy	±0.5 to 0.9 dB	±0.5 to 0.9 dB	±1.0 to 2.0 dB	±1.0 to 3.0 dB
Spectral purity level				
Harmonics	< –30 dBc	< –30 dBc	< –30 dBc	< –30 dBc
Spurious	< –53 to < –65 dBc	< –65 to < –80 dBc	< –48 to < –60 dBc	< –90 to < –105 dBc
SSB phase noise	See chart	See chart	See chart	See chart
Modulation				
AM rate	dc to 10 kHz	dc to 10 kHz	dc to 25 kHz	dc to 100 kHz
AM depth (max)	100%	100%	100%	100%
FM rate	dc to 10 MHz	dc to 10 MHz	dc to 150 kHz	dc to 800 kHz
FM deviation (max)	5 to 40 MHz	0.5 to 4 MHz	100 to 800 kHz	10 to 20 MHz
ΦM	Yes	Yes	Yes	Yes
Pulse	Yes	Yes	External	No
Pulse width (ALC on)	2 µs	2 µs	—	—
Pulse width (level hold)	0.4 µs	0.4 µs	—	—
On-off ratio	> 80 dB	> 80 dB	> 80 dB	—
Rise/fall	< 10 ns	< 10 ns	< 10 ns	—
Waveforms	Sine, square, ramp, triangle, pulse, noise	Sine, square, ramp, triangle, pulse, noise	Sine, square, ramp, triangle	Sine, square, ramp, triangle, Gaussian
Sweep modes				
Digital	step, list	step, list	—	step
Analog (ramp)	—	—	—	—
Price	$ to $$	$$	$	$$$ to $$$$
Additional features/ Applications	• Internal function generator • Low frequency generator • dcFM	• Enhanced phase noise performance • Internal function generator • Low frequency generator • dcFM	• Pager encoder • dcFM • Remote and memory interfaces • Electronic attenuator (8648A)	

Analog Signal Generators – Continued

	8645A	E8257C PSG	83650B	83554A/55A/56A/57A/58A
Frequency				
Range	252 kHz to 2 GHz	250 kHz to 20, 40 GHz	10 MHz to 50 GHz	26.5 to 110 GHz
Resolution	0.01 Hz	0.01 Hz	1 Hz	Same as driver source
Accuracy	Same as reference oscillator	Same as reference oscillator	Same as reference oscillator	Same as driver source
Switching speed	< 15 µs	< 15 ms	< 15 ms	Same as driver source
Output level				
Range	+16 to –137 dBm	+20 to –135 dBm	+10 to –110 dBm	+9 to –5 dBm
Accuracy	±1 dB	±0.6 to 2.0 dB	±0.6 to 1.7 dB	±2.5 dB
Spectral purity level				
Harmonics	< –30 dBc	< –28 to < –55 dBc	< –30 to < –50 dBc	—
Spurious	< –100 dBc	< –50 to < –80 dBc	< –52 to < –60 dBc	—
SSB phase noise	See chart	See chart	See chart	—
Modulation				
AM rate	dc to 100 kHz	dc to 100 kHz	dc to 100 kHz	Same as driver source
AM depth (max)	100%	40 dB/100%	50 dB/100%	Same as driver source
FM rate	dc to 10 MHz	dc to 10 MHz	100 kHz to 8 MHz	Same as driver source
FM deviation (max)	10 to 20 MHz	8 to 32 MHz	8 MHz	—
ΦM	No	Yes	No	No
Pulse	Yes	Yes	Yes	Yes
Pulse width (ALC on)	0.5 µs	1 µs	1 µs	Same as driver source
Pulse width (level hold)	0.5 µs	20 ns	15 ns	Same as driver source
On-off ratio	> 35 dB	> 80 dB	> 80 dB	Same as driver source
Rise/fall	< 100 ns	10 ns	10 ns	50 ns
Waveforms	Sine, square, ramp, Gaussian	Sine, square, ramp, triangle, noise, swept sine, dual sine	Sine, square, ramp, triangle, noise,	—
Sweep modes				
Digital	Step	Step, list	Step, list	Same as driver source
Analog (ramp)	Frequency	Frequency, power	Frequency, power	Same as driver source
Price	$$$$	$$$	$$$$	$$
Additional features/ Applications	• dcFM	• Scalar network analyzer compatible • Frequency extension to 110 GHz with mm source module	• Network analyzer compatible, • Frequency extension to 110 GHz with mm source module • Scan modulation	• Internal/external leveling

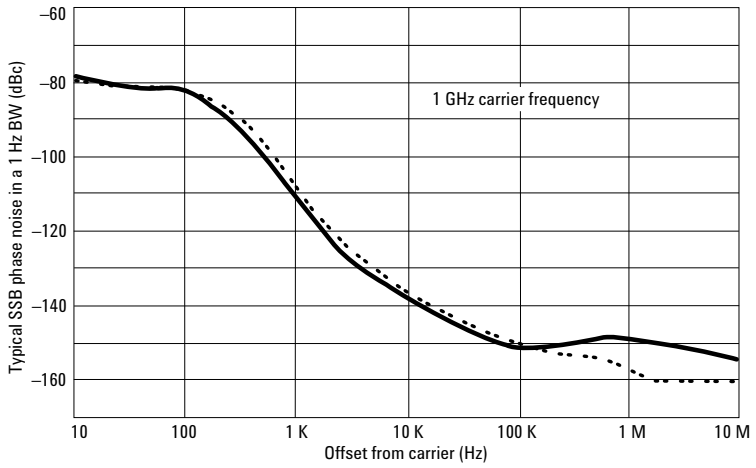
Analog signal generators
SSB phase noise charts



8648A/B/C/D Option 1E5

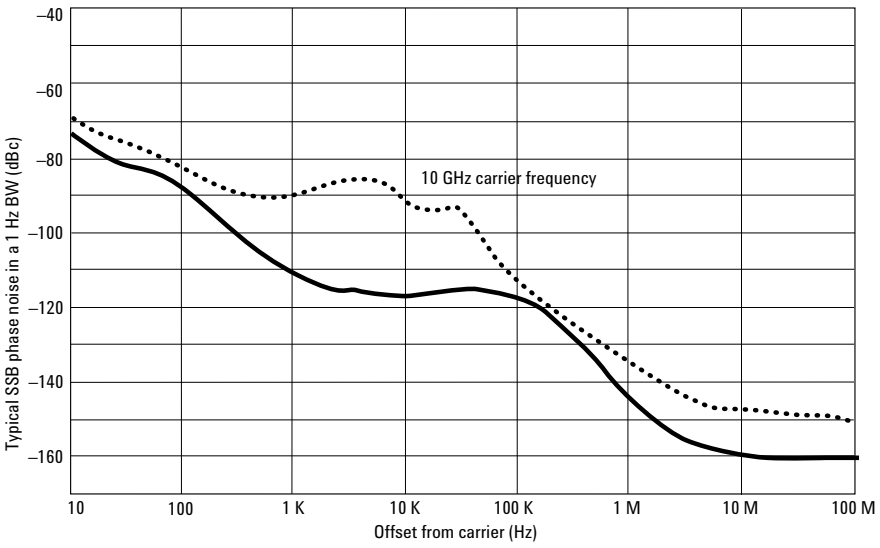
E4400B/20B/21B/22B ESG Option 1E5 (phase noise mode 2)

E4423B/24B/25B/26B ESG



8644B

8664A/65B Option 004



83650B

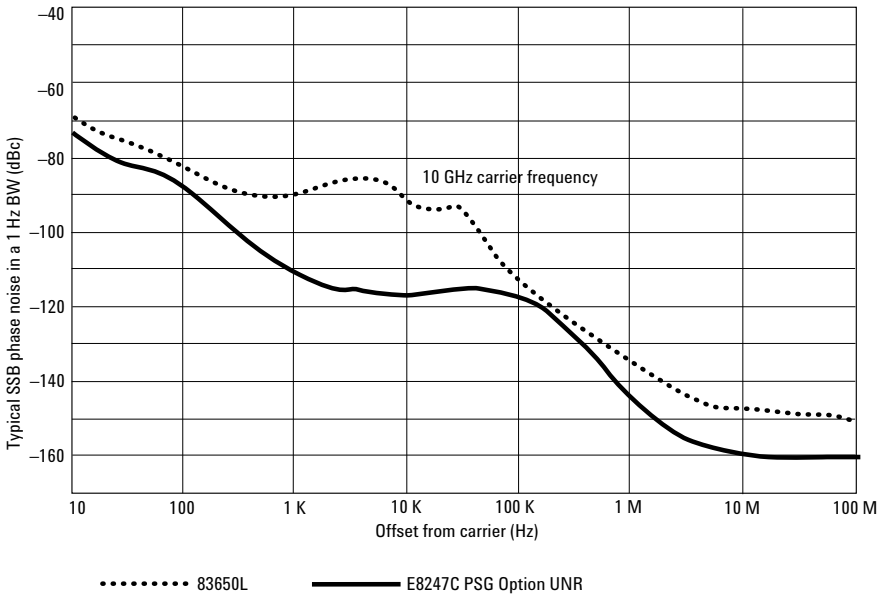
E8257C PSG Option UNR

CW Signal Generators

Continuous wave or (CW) signal generators are ideally suited for local oscillator substitution tests where no modulation is required. In addition, using the analog (ramp) sweep, stimulus response tests can be made up to 110 GHz with the millimeter-wave source modules. With high output power and excellent phase noise, Agilent's CW signal generators provide the cost-effective performance needed.

	E8247C PSG	83650L	83554A/55A/56A/57A/58A
Frequency			
Range	250 kHz to 20, 40 GHz	10 MHz to 50 GHz	26.5 to 110 GHz
Resolution	0.001 Hz	1 Hz	Same as driver source
Accuracy	Same as reference oscillator	Same as reference oscillator	Same as driver source
Switching speed	< 15 ms	< 15 ms	Same as driver source
Output level			
Range	+20 to –135 dBm	+20 to –110 dBm	+9 to –5 dBm
Accuracy	±0.6 to 2.0 dB	±0.6 to 1.7 dB	±2.5 dB
Spectral purity level			
Harmonics	< –28 to < –55 dBc	< –30 to < –50 dBc	—
Spurious	< –50 to < –80 dBc	< –52 to < –60 dBc	—
SSB phase noise	See chart	See chart	—
Sweep modes			
Digital	Step, list	Step, list	dc to 100 kHz
Analog (ramp)	Frequency, power	Frequency, power	—
Price	$$	$$$$	$$
Additional features/ Applications	• User flatness (level) correction • Scalar network analyzer compatible • Frequency extension to 110 GHz with mm source module	• User flatness (level) correction • Network analyzer compatible • Frequency extension to 110 GHz with mm source module	• Internal/external leveling • Pulse modulation

CW signal generators
SSB phase noise chart



Ordering Information

For the most up-to-date ordering information, please refer to the specific products configuration guide or datasheet, on the web at:
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(fax) (82 2) 2004 5115
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Taiwan:
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