Agilent

E8267C PSG Vector Signal Generator
E8257C PSG Analog Signal Generator
E8247C PSG CW Signal Generator

Aerospace and defense systems
Component measurements
Satellite communications
Broadband microwave

- First microwave signal generator with integrated vector modulation up to 20 GHz
- Frequency coverage up to 110 GHz for analog and CW applications
- Highest output power in the industry
- Best phase noise performance
- Ramp sweep and scalar analyzer interface now available

Agilent Technologies

The next generation of PSG signal generators is here

The Agilent PSG signal generators offer the features you need to be successful in today's complex technical environment. Whether working on aerospace and defense applications such as radar systems and satellite communications, terrestrial microwave radio for broadband wireless access, or performing component tests, the PSG is the solution for you.

E8267C

Realistic signal simulation for radar, satellite communication and broadband wireless

Contains all features of the E8257C, plus

- Integrated microwave vector signal generator operating up to 20GHz
- Internal baseband generator achieves 80 MHz RF modulation bandwidth
- External I/Q inputs achieves 160 MHz RF modulation bandwidth
  Optional extended bandwidth to 1 GHz
- Flexible waveform sequencing

E8257C

Advanced communication testing of receiver quality, transmitter sensitivity and selectivity

Contains all features of the E8247C, plus

- Flexible analog modulation formats: AM, FM, ΦM and pulse
- Internal modulation with sine, square, triangular, ramp, and noise waveforms
- Narrow pulse modulation (20 ns) down to 10 MHz

E8247C

CW generator for LO substitution for testing transmitters and receivers

- Industry leading high output power
- Enhanced phase noise
- Superior level accuracy
- Code compatibility with other Agilent microwave signal generators[1]
- Ramp sweep capability with fast sweep rate
- Automatic operation with the 8757D scalar network analyzer

1. 80 to 100% code compatibility with Agilent 8340/8341, E824x/E825xA, 836xxB/L, and 837xx microwave signal generators.

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High output power

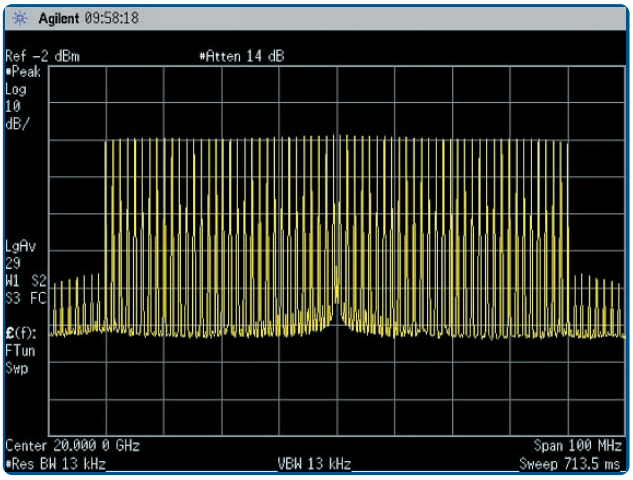
Enhanced phase noise

Superior level accuracy

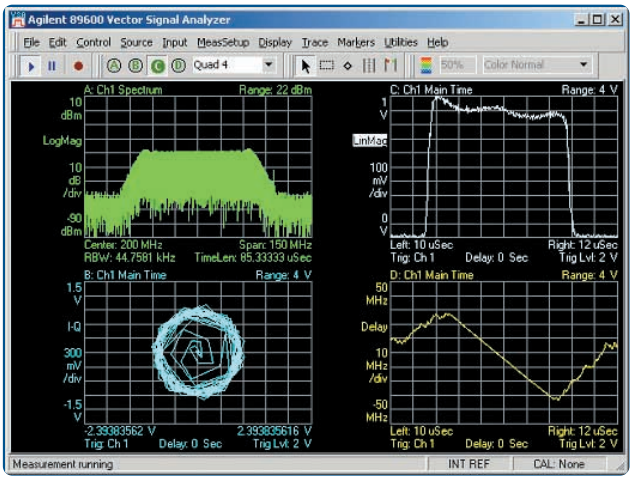
Ramp sweep

Narrow pulse modulation

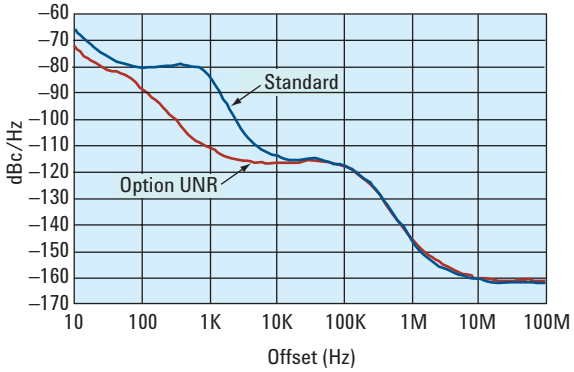
and more...



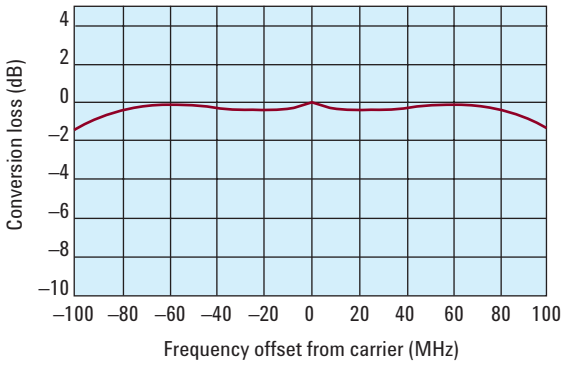
Multitone signal (64 tones generated)



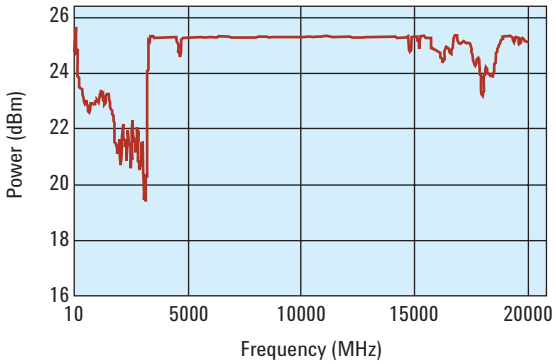
FM chirp radar pulse



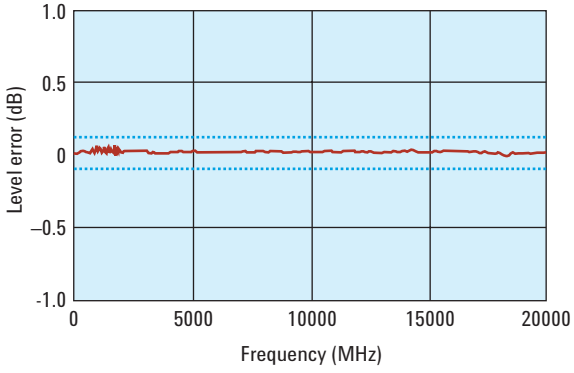
Standard and Option UNR phase noise at 10 GHz from 10 Hz to 100 MHz (all models)



External I/Q modulation bandwidth (E8267C only)



Typical maximum available power (all models)



Typical level accuracy +5 dBm (all models)

Now, with the performance you need

Specifications

	E8267C	E8247C and E8257C
Frequency range	250 kHz to 20 GHz	250 kHz to 20 GHz or 250 kHz to 40 GHz
Frequency resolution	.001 Hz	.001 Hz
High output power at 20 GHz	+18 dBm (+23 dBm typical)	+20 dBm (+25 dBm typical)
Enhanced phase noise option with carrier frequency = 10 GHz	-74 dBc/Hz (-84 dBc/Hz) at 100 Hz offset -98 dBc/Hz (-115 dBc/Hz) at 1 kHz offset	
CW Level accuracy	± 10 dBm	± 10 dBm
2 to 20 GHz	± .8 dB	± .8 dB
20 to 40 GHz	N/A	± .9 dB
Standard pulse modulation	(not available on the E8247C)	
Frequency ≥ 3.2 GHz		
On/Off ratio	80 dB	80 dB
Rise/Fall time	10 ns (6 ns typical)	10 ns (6 ns typical)
Optional pulse modulation	(not available on the E8247C)	
10 MHz to 3.2 GHz		
On/Off ratio	80 dB	80 dB
Rise/Fall time	10 ns (6 ns typical)	10 ns (6 ns typical)
Pulse width	≥ 20 ns	≥ 20 ns
RF modulation bandwidth		
Int. baseband generator	80 MHz	
Ext. I/Q inputs	160 MHz	
Wideband ext. I/Q inputs (un-calibrated)	1 GHz	
Internal hard drive	6 GB (1.2 Gsamples)	N/A
Baseband memory	160 MB (32 Msamples)	N/A
Baseband sample rate	Up to 100 Msamples/s	N/A
Ramp sweep time	10 ms to 100 s	10 ms to 100 s
RF output connector	3.5 mm (m)	3.5 mm (m) used on 20 GHz models 2.4 mm (m) used on 40 GHz models
(Optional Type-N connector for RF output available on 20 GHz models only)		
Connectivity	10BaseT LAN, GPIB, and RS-232	
Dimensions	7" H x 16.8" W x 19.6" D	

Refer to the PSG data sheets, literature number 5988-6632EN and 5988-7454EN for a complete listing of specifications.

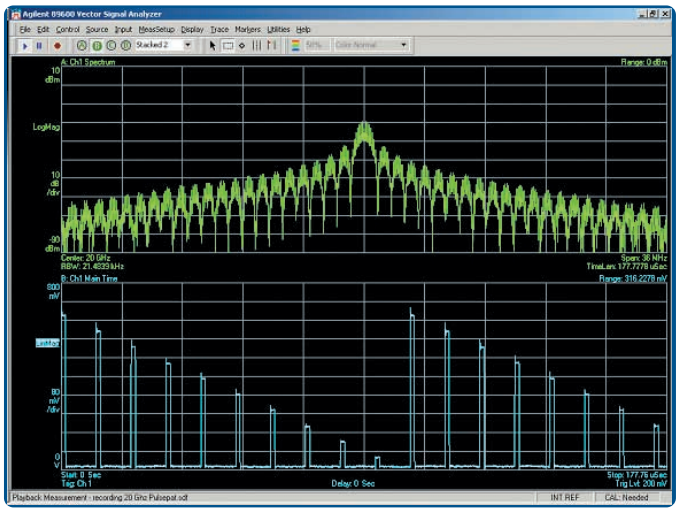
Modulation formats

AM, FM, ΦM, Pulse modulation, QAM (4, 8, 16, 64, 256), PSK, MSK, FSK (2, 3, 4, ... level), and Custom I/Q (e.g. 128 QAM)

Applications

Two-tone signal and multitone signal generation. Optional Signal Studio software for complex pulse pattern generation.

The new PSG vector signal generator can help you simulate real-world environments



Custom pulse waveform created with MATLAB® and generated with the E8267C PSG

The new E8267C PSG vector signal generator, a member of Agilent's next-generation of performance signal generators, opens new doors in the testing and characterization of microwave components and systems in a single integrated instrument.

Many systems that operate at microwave frequencies need modulation bandwidths ranging from tens to hundreds of mega-hertz, whether they are pulsed radar sets or broadband wireless communication systems employing vector modulation to transfer high data rate signals. The E8267C has features that enable the generation of these signals and include:

- Internal I/Q modulation capability which enables users to input external baseband analog I/Q signals up to 160 MHz RF modulation bandwidth through BNC ports on the front panel.
- Optional wideband I/Q inputs with RF modulation bandwidth of 1 GHz. Although uncalibrated, these inputs are useful for many broadband applications. Typical plots of frequency response are provided in the PSG vector data sheet.
- Optional internal baseband generator, which operates in dual mode, combining the capabilities of a 32 Msample, deep memory arbitrary waveform generator with the sophisticated coding power of a real-time baseband generator.
- Standard two-tone and multitone applications are built into the optional internal baseband generator of the PSG vector signal generator. Users can press a few simple soft keys to quickly generate multitone waveforms, and define relative tone spacing, relative tone power and phase relationships. These capabilities eliminate the issues associated with combining multiple continuous wave signal generators, and significantly reduce test costs.
- Compatibility with industry-standard software packages – including Agilent's Advanced Design System (ADS) soft-ware and other industry standard software packages such as MATLAB and Excel® – which makes it easy to generate customized arbitrary waveform files. Once a waveform file has been developed, engineers can use Agilent's free PSG/ESG Download Assistant PC software. This software works entirely in the MATLAB environment. Developers can use these functions to download MATLAB I/Q data into the volatile memory of the signal generator and play it back with a single command. Also, customers can use Agilent's Intuilink, a free connectivity software, that allows easy transfer of measurement data and images from instruments into PC (Microsoft Word® and Excel) with little or no programming.

Ease of use and flexibility to meet your diverse requirements

1. **Soft keys** Softkeys activate the function indicated by the displayed label to the left of each key.
2. **Frequency key** You can change the RF output frequency or use the menus to configure frequency attributes such as frequency multiplier, offset, and reference.
3 **Amplitude key** You can change the RF output amplitude or use the menus to configure amplitude attributes such as power search, user flatness, and leveling mode.
4. **Menu keys** These hardkeys access softkey menus enabling configuration of list and step sweeps, utility functions, the LF output, and various analog modulation types.
5. **Trigger key** This hardkey initiates an immediate trigger event for a function such as a list or step sweep.
6. **Ext 1 INPUT** This BNC input connector accepts a ±1 Vp signal for AM, FM, and ΦM. This connector can also serve as burst envelope input providing linear control as follows: 0 V = 100% amplitude, –1.00 V = 0% amplitude.
7. **Ext 2 INPUT** This BNC input connector accepts a ±1 Vp signal for AM, FM, ΦM, and pulse modulation. With AM, FM, or ΦM, ±1 Vp produces the indicated deviation or depth. With pulse modulation, +1 V is on and 0 V is off.

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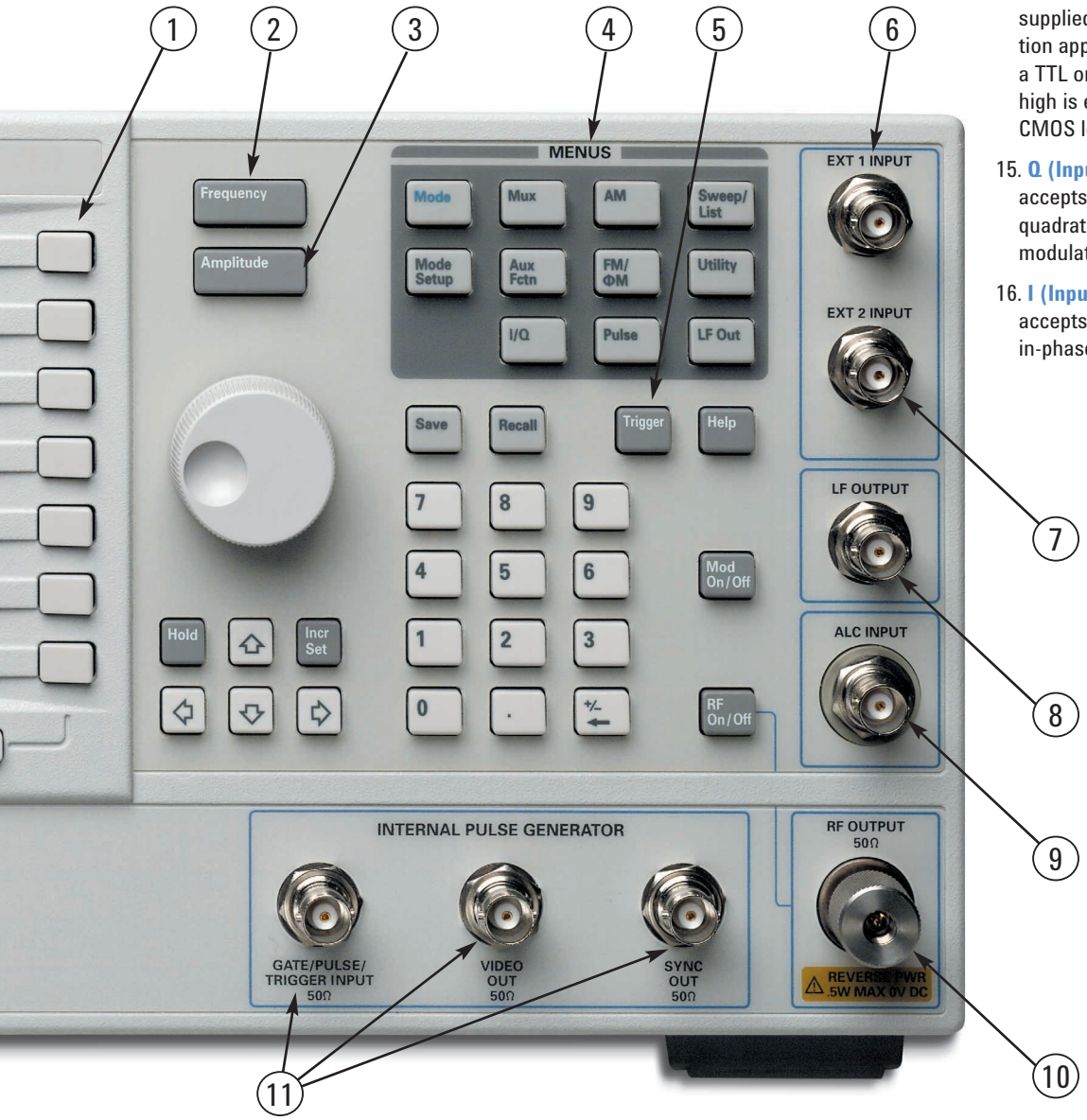
8. **LF OUTPUT** This BNC connector is the output for modulation signals generated by the low frequency (LF) source function generator. This output is capable of driving 3 Vp (nominal) into a 50 Ω load.
9. **ALC INPUT** This connector is used for negative external detector leveling. This connector accepts an input of –0.2 mV to –0.5 V. The nominal input impedance is 120 kΩ and the damage level is +15 V.
10. **RF OUTPUT** This female 2.4 mm(f) connector is the output for RF signals.
11. **INTERNAL PULSE GENERATOR BNC connectors** GATE/PULSE TRIGGER input – accepts input signal for external fast pulse modulation. Also accepts external trigger pulse input for internal pulse modulation. Nominal impedance 50 Ω. Damage levels are 5 V_{rms} and 10 V_{peak}. VIDEO OUT – Outputs a signal that follows the RF output in all pulse modes. TTL-level compatible, nominal source impedance 50 Ω. SYNC OUT – Outputs a synchronizing pulse, nominally 50 ns width, during internal and triggered pulse modulation. TTL-level compatible, nominal source impedance 50 Ω.
12. **SYMBOL SYNC** (Input connector)- The CMOS compatible SYMBOL SYNC connector accepts an externally supplied symbol sync for vector modulation applications. The expected input is a TTL or CMOS bit clock signal.
13. **DATA CLOCK** The TTL/CMOS compatible DATA CLOCK connector accepts an externally supplied data-clock input for digital modulation applications. The expected input is a TTL or CMOS bit clock signal where the rising edge is aligned with the beginning data bit. The falling edge is used to clock the DATA and SYMBOL SYNC signals.
14. **DATA** The TTL/CMOS compatible DATA connector accepts an externally supplied data input for vector modulation applications. The expected input is a TTL or CMOS signal where a CMOS high is equivalent to a data 1 and a CMOS low is equivalent to a data 0.
15. **Q (Input connector)** This connector accepts an externally supplied, analog, quadrature-phase component of I/Q modulation.
16. **I (Input connector)** This connector accepts an externally supplied, analog, in-phase component of I/Q modulation.



Easy creation of complex waveforms for your application

Do you want to simplify your radar receiver characterization?

The new E8267C PSG vector signal generator utilizes I/Q modulation to simulate pulsed signals in a single integrated instrument. Now, arbitrary waveforms representing pulsed radar signals can be defined in the time domain using Agilent's Signal Studio for pulse building, Advanced Design System (ADS), or even MATLAB software. Using vector modulated arbitrary waveforms eliminates many of the synchronization issues associated with pulsing modulated signals using traditional analog techniques. Also, the PSG vector signal generator's deep playback memory and waveform sequencing facilitates the generation of complex pulse test patterns for radar receiver tests.

Features of the E8267C PSG that are useful for radar test:

- Arbitrary vector waveform generation
- Flexible waveform sequencing for complex pattern generation
- Mass storage for archiving pulse waveforms
- Narrow pulse modulation specified down to 10 MHz
- Signal Studio software for pulse building used for simplified custom pulse shaping, pulse compression, and pulse sequences

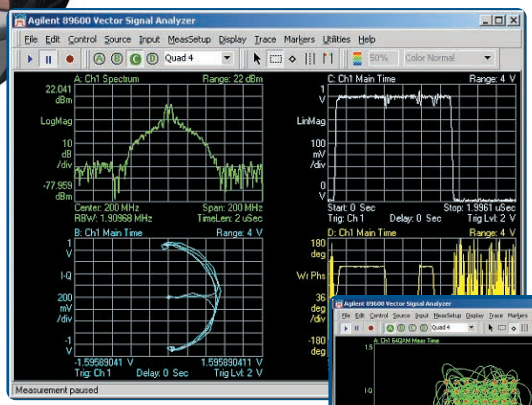
Do you need digital signals for your satellite, point-to-point, LMDS, and MMDS applications?

From subsystem tests through manufacturing and post-launch verification, there is a need to ensure that each module or radio will function properly when it is integrated into the end-to-end communications system. Traditionally, either "golden devices" or a combination of test equipment was used to generate the desired microwave test signals. These types of solutions are generally un-calibrated and cost intensive. With the PSG vector signal generator you are investing in a guaranteed performance in a single integrated instrument. The PSG E8267C is able to adapt to your test environment and help you overcome interoperability challenges with a broad range of capabilities.

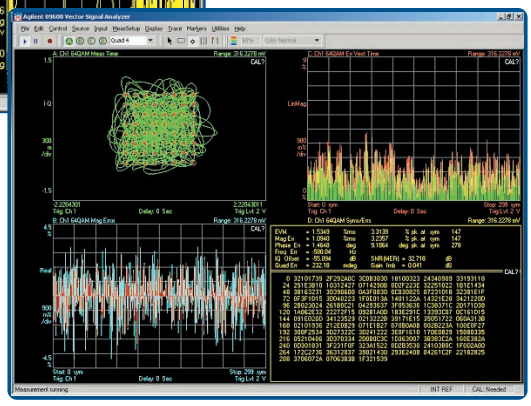
Features of the E8267C PSG for microwave communication systems:

- Internal baseband generator with 80 MHz of RF bandwidth
- Flexible modulation with simplified setups for basic formats
- Extended RF modulation bandwidth to 1 GHz
- Deep waveform playback memory for playback of long complex signals
- Maximum 50 Msymbol/s for high data rate applications

Note: *For vector modulation above 20 GHz, combine an Agilent ESG vector signal generator to provide IF vector signal (or other RF vector signal generator) with the E8247C or E8257C equipped with Option H30 or H34 which provides IF up-conversion to 46 GHz. Please consult your Agilent sales representative for further information about this solution.*



Barker coded radar pulse



64 QAM signal at 20 GHz

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Cost-effective testing of microwave components

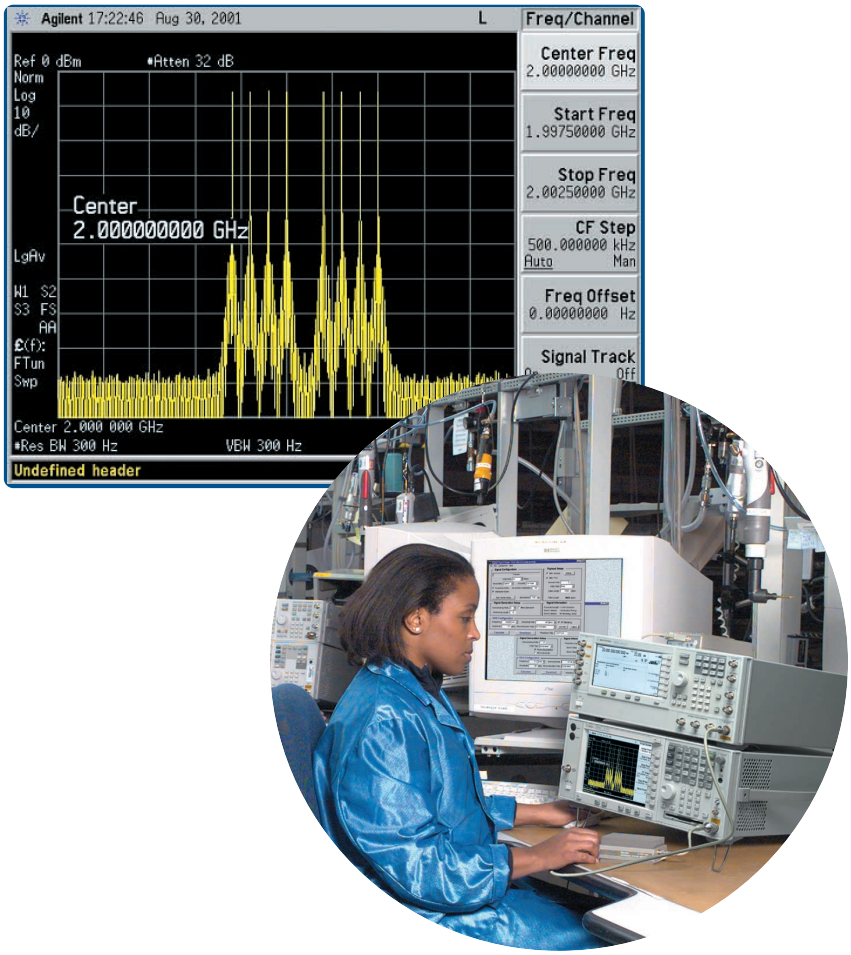
For component or subsystem testing, speed and accuracy are critical and it is imperative to continuously improve test processes and reduce costs. The PSG signal generators deliver with high performance and innovative capabilities that exceed other microwave signal generators. To simplify non-linear device characterization, the PSG vector signal generator provides application specific personalities for performing two-tone and multitone signal generation. The issues associated with combining multiple signal generators no longer need to be addressed and the cost of test is significantly reduced. High throughput ramp sweep has been added to perform frequency and power sweeps for stimulus response applications. The new PSG operates automatically with the 8757D scalar network analyzer providing faster sweeps and more dynamic range than our previous solutions. The PSG's industry standard high output power provides 10-20 dB more dynamic range for your scalar measurements. The new PSG is SCPI code compatible with existing Agilent microwave sources, and it is compatible with Agilent's millimeter wave source modules that can extend frequency up to 110 GHz.

Component manufacturers will now be able to accurately test their products with the signal environment in which the component will ultimately be used, reducing costly failures during system verification.

Features of the PSG signal generators for component characterization:

- Multitone signal generation with a single instrument
- Industry leading performance for high output power and enhanced phase noise
- Convenient sweep modes: analog ramp sweep, digital step sweep, and list sweep
- 8757 scalar network analyzer compatibility
- Backwards code compatibility with Agilent 836xxB/L, 837xxB, E824x/E825xA, and 8340/8341 signal generators
- Frequency coverage up to 110 GHz using Agilent 83550A Series of millimeter wave source modules

Designed for component manufacturing with more speed and dynamic range



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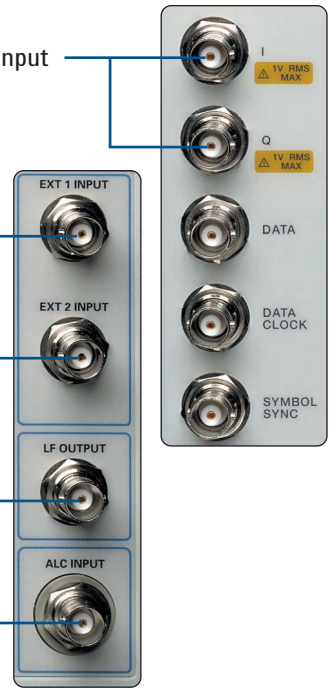
Connectivity for your demanding test applications

External I/Q input

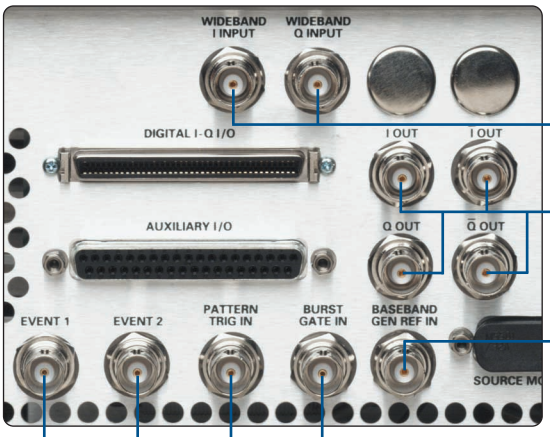
External modulation inputs for AM, FM, and ΦM

Low frequency output

Precision BNC connector



Internal pulse generator BNC connectors



1 GHz RF modulation BW I/Q inputs

Differential and single-ended I/Q outputs

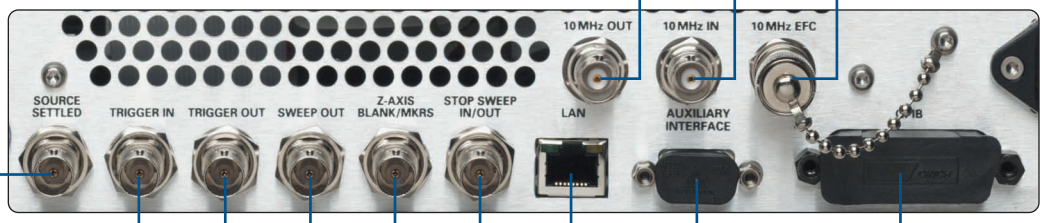
External baseband reference

Wide array of input and output timing signals including markers

Internal frequency reference

External frequency reference

Electronic frequency control of the internal 10 MHz reference



Trigger signals

Ramp sweep/scalar analyzer control signal

GPIB interface

RS-232 interface

10BaseT LAN interface

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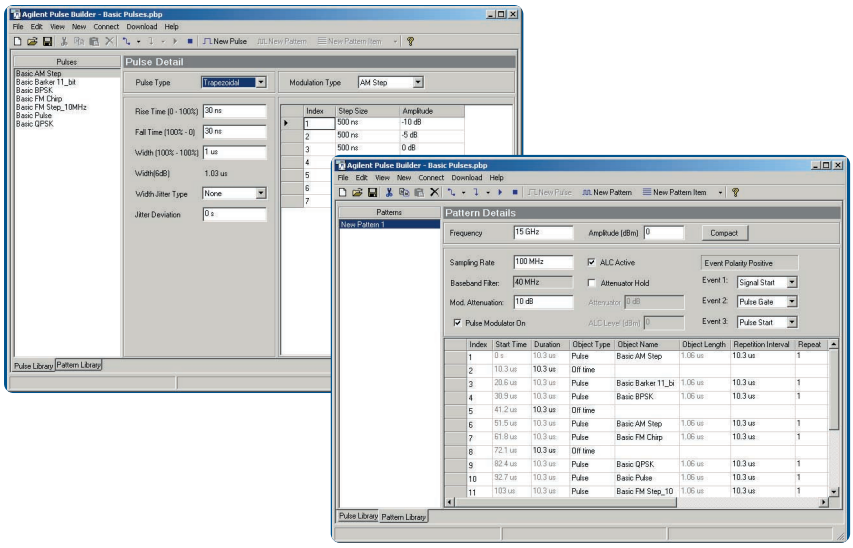
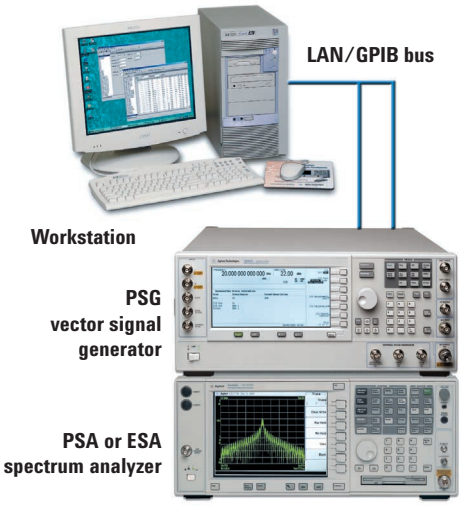
Striving to meet all your measurement needs



Signal Studio software

Signal Studio is a collection of independent software applications that enable users to create waveform files for specific applications. The intuitive, easy-to-use graphical interface allows various signal parameters to be set for flexible waveform generation. Signal Studio downloads the waveforms into the PSG vector signal generators equipped with baseband generators and then configures the instrument to automatically generate the signal.



Setup for utilizing Signal Studio software for pulse building to apply pre-distortion to calculated waveforms for improved image rejection and RF flatness.

Signal Studio software for pulse building

The Signal Studio software for pulse building is the first of a collection of PC applications that is compatible with the new PSG vector signal generator. Agilent is introducing this application on the PSG vector, which allows radar system developers to create optimized pulsed signals using the I/Q signals from the baseband generator.

When utilizing this Signal Studio software, the mathematics required to calculate the I/Q waveform samples will be transparent to the user. By simply setting a few high-level pulse parameters like rise time, ramp profile, intra-pulse modulation — even the novice user can create complex radar waveforms. When combined with an Agilent ESA or PSA spectrum analyzer, the Pulse Builder software applies pre-distortion to the calculated waveform to improve image rejection and RF flatness. Corrections can also be applied to custom I/Q user data that has been imported to the software For further information about Agilent's Signal Studio software for pulse building refer to **www.agilent.com/find/signalstudio**.

Agilent Technologies is committed to providing the latest emerging communications formats. Signal Studio software enables you to support new applications so you can develop custom waveforms quickly. The list of supported applications will grow as industry requirements evolve.

The Signal Studio software for pulse building allows:

- Easy navigation of the intuitive user interface
- Creation of a pulse library
  - Construction of custom pulse shapes
  - Applying intra-pulse modulation
- Building a pattern library
- Application of baseband pre-distortion
  - Improve image rejection
  - Optimization of RF modulation flatness
- Automation using the COM-based API

Compatibility for waveform development

- Signal Studio software for pulse building
- Agilent Advanced Design System (ADS)
- PSG/ESG Download Assistant for direct download from MATLAB to signal generator
- Intuilink connectivity for screen capture and simple downloads from Microsoft Excel and Word

PC connectivity

- 10BaseT LAN and GPIB

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PSG ordering structure

Model-option	Description
E8267C-520	250 kHz to 20 GHz vector
E8257C-520	250 kHz to 20 GHz analog
E8247C-520	250 kHz to 20 GHz CW
E8257C-540	250 kHz to 40 GHz analog
E8247C-540	250 kHz to 40 GHz CW
x = 4,5, or 6	
E82x7C-1E1	Attenuator (included with E8267C)
E82x7C-1EA	High output power (included with E8267C)
E82x7C-1E6	Narrow pulse modulation below 3.2 GHz (E8257C and E8267C only)
E82x7C-UNR	Enhanced phase noise
E82x7C-007	Ramp sweep/scalar interface
E82x7C-1EM	Rear panel connectors
E82x7C-1ED	Type-N connector (20 GHz models only)

E8267C PSG vector options

Model-option	Description
E8267C-002	Internal baseband generator (32 Msamples)
E8267C-005	6 GB internal hard drive
E8267C-015	Wideband external I/Q inputs
E8267C-420	Signal Studio software for pulse building

Product literature

Agilent PSG Signal Generators, Brochure,
Literature number 5988-7538EN

Agilent E8267C PSG Vector Signal Generator, Data Sheet,
Literature number 5988-6632EN

Agilent E8247C/E8257C PSG Analog/CW Signal Generator, Data Sheet,
Literature number 5988-7454EN

Agilent PSG Vector Signal Generator Self Guided Demo,
Literature number 5988-8087EN

Agilent E8247C/E8257C PSG Analog/CW Self Guided Demo,
Literature number 5988-2414EN

Agilent E8267C PSG Vector Configuration Guide,
Literature number 5988-7541EN

Agilent E8247C/E8257C PSG Analog/CW Configuration Guide,
Literature number 5988-7879EN

Agilent PSG Series Product Note: Millimeter Head,
Literature number 5988-2567EN

Agilent PSG Two-tone and Multi-tone, *Application Note AN 1410,*
Literature number: 5988-7689EN

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Agilent Technologies' Test and Measurement Support, Services, and Assistance
Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise
Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

Agilent T&M Software and Connectivity
Agilent's Test and Measurement software and connectivity products, solutions and developer network allows you to take time out of connecting your instruments to your computer with tools based on PC standards, so you can focus on your tasks, not on your connections. Visit
www.agilent.com/find/connectivity
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Online Assistance:
www.agilent.com/find/assist

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