Signal generators deliver low-noise and frequency coverage to 40 GHz

Agilent Technologies
Manufacturers of broadband components used in military and satellite systems, as well as Microwave Multiport Distribution Service (MMDS), Local Multipoint Distribution Service (LMDS), and point-to-point microwave systems, require test equipment with broadband frequency coverage and exceptionally low noise. As one of the fundamental components of these test systems, synthesized signal generators have the responsibility of delivering spectrally-clean stimulus signals, often in an array of complex modulation formats, with a high level of accuracy. The PSG Series of signal generators from Agilent Technologies was designed to meet these requirements in production test environments.
There are two basic models in the PSG Series. The PSG-L Series is optimized for use as a precision local oscillator and does not include modulation. The PSG-A Series is designed for applications requiring analog modulation including AM, FM, phase, and pulse. Both models are available with measurement frequency coverage to 20 GHz or 40 GHz. The lower frequency range of all models is 250 kHz, which eliminates the need for an additional RF source when making measurements at RF frequencies. The PSG-A Series also includes an additional low frequency RF output with frequency coverage from 0.1 Hz to 10 MHz.
Phase noise of all models is extremely low. For example, at a 1 kHz offset from a 10 GHz carrier, phase noise is -85 dBc/Hz, and -112 dBc at a 10-kHz offset. An option for the PSG Series improves this performance even further at offsets closer than 10 kHz from the carrier. The result is phase noise of -98 dBc/Hz at a 1 kHz offset, and -110 dBc at a 10-kHz offset, at a 10 GHz carrier frequency. Minimum frequency resolution is 0.01 Hz and output power range is -20 to +13 dBm at 20 GHz and -20 to + 9 dBm at 40 GHz.

The instruments have digital sweep capability, which allows them to address a wide range of swept stimulus requirements, and it provides either a step function (start, stop, number of points, or dwell) or a list function (arbitrary points) for both frequency and amplitude, either separately or at the same time. The instruments also have an interface compatible with Agilent's 83550 series millimeter heads for coverage to 110 GHz, and the millimeter-wave frequency is shown on the instrument's display.

When sweeping power, the maximum sweep range is limited to the minimum ALC power to the maximum leveled output power, and no step attenuator changes are required. The swept frequency capability includes a 0-to-10 VDC output sweep to coordinate any scalar analyzer display.

All models in the series have extremely-high level accuracy of &#177 0.7 dB (2 to 20 GHz), which significantly reduces test uncertainty. Flatness can be corrected by the user to ensure that power and frequency calibration are maintained at any point in the frequency list, which can reduce uncertainties introduced by transmission line components.

Instrument routines can be programmed in Visual Basic, Visual C++, Agilent-VEE, or LabView, and executed on an external PC via 10Base-T Ethernet, GPIB, or RS-232 interfaces. The instruments are SCPI code-compatible with Agilent's 8370 Series and 8360 Series signal generators as well.

The user interface of the PSG Series is menu-driven and is easily viewed on the 7 &#215 3.5-in. LCD display, with up to 22 parameters viewable at once. In addition, a save/recall function allows test setups, frequency lists, and correction arrays to be stored for later use.

The PSG Series can be adapted to serve specific applications through several available options. The 115 dB step attenuator option enables accurate output power at levels as low as -110 dBm, with usable performance to -135 dBm. Another option increases the output power to typically +23 dBm at 20 GHz and +17 dBm at 40 GHz, levels which are sufficient to drive any Agilent millimeter-wave extension module without the need for external amplifiers.

The PSG Series synthesized signal generators range in price from $20,000 to $42,000 and are available in 30 days. Agilent Technologies, Test and Measurement Organization, 5301 Stevens Creek Blvd., MS 54LAK, Santa Clara, CA 95052, www.agilent.com.

PSG-A and PSG-L Series specifications

Measurement frequency range = 250 kHz to 20 or 40 GHz
Maximum output power = +13 dBm at 20 GHz, +9 dBm at 40 GHz
Optional maximum output power (typical)= +23 dBm at 20 GHz, +17 dBm at 40 GHz
Phase noise (10 GHz carrier)= -110 dBc/Hz at 20 kHz offset
Optional phase noise (10 GHz carrier)= -98 dBc/Hz at 1 kHz offset
Level accuracy=0.07 dB
Digital sweep functions= List and step
Minimum frequency resolution=0.01 Hz
Harmonic suppression (at +10 dBm output)= -55 dBc (2 to 20 GHz, -40 dBc (20 to 40 GHz
Spurious suppression (less than +10 dBm output, typical)= -85 dBc (250 MHz to 3.2 GHz), -80 dBC (3.2 to 10 GHz), -74 dBC (10 to 20 GHz), -68 dBc (20 to 40 Ghz)

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