Instruments Simplify Mixer Test, Extend Vector Modulation Range

Agilent's PNA series Vector Network Analyzers now operate as high as 67 GHz, and the PSG Vector Signal Generator new provides vector modulated (I & Q) test signals up to 20 GHz

Agilent Technologies has added new capabilities to its PNA Series of vector network analyzers and PSG Series of vector signal generators. The PNA Series now offers the ability to dramatically simplify and improve the accuracy of mixer characterization, and the series has increased its measurement frequency range to 67 GHz. With the PSG Series' new 20 GHz frequency range, the company has introduced the industry's first single-instrument test solution for generating vector-modulated carriers above 6 GHz, reflecting the trend toward complex modulation formats in higher frequency applications.

New PNA Series Features

Of the three key parameters that define mixer performance (conversion loss, conversion phase, and group delay) only conversion loss has been handled well by current instruments and techniques. Effective characterization of conversion phase and group delay has remained elusive for want of a method that does not require cumbersome connection and re-connection, as well as multiple external components. The new frequency-offset measurement capability for the PNA Series removes these obstacles and makes mixer testing simple enough to be performed by people without extensive experience in mixer characterization.

The operator simply enters data in a single dialog box, and firmware ensures that all values are within acceptable ranges. The instru-
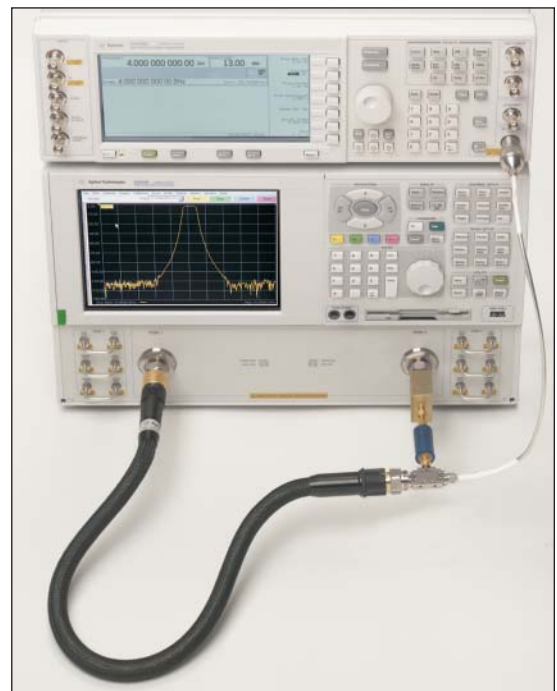
The E8361A PNA series vector network analyzer, shown here connected to the N4694A ECal module, can make measurements to 67 GHz.

ment controls all elements of the test set-up, including the signal sources for the local oscillators and power meters for system calibration. Reciprocal mixers, i.e., mixers with the same conversion loss and group delay in upconversion and downconversion, as well as non-reciprocal types can be accommodated. The new capability can be incorporated in any of the PNA series analyzers, including the new 67-GHz E8361A model. The new instrument embodies all of the features of the PNA series,

The E8267C makes it possible to generate vector-modulated carriers to 20 GHz using a single instrument.

and extends their extremely low trace noise and high dynamic range to 67 GHz.

The PSG Series Reaches 20 GHz

The E8267C vector signal generator in the PSG series makes it possible for the first time to generate vector-modulated carriers above 6 GHz, extending this instrument to 20 GHz. Modulation can be generated by receiving I and Q input signals from an external source, at up to 80 MHz each with an RF modulation bandwidth of 160 MHz (or 1 GHz if optional wideband I/Q ports are specified). Modulation also may be generated internally with the optional baseband generator. Custom waveforms can also be created and downloaded into the instrument with design automation software such as Agilent's Advanced Design System (ADS) or MATLAB.

The baseband generator employs 16-bit digital-to-analog converters operating at 400 MHz, handles symbol rates from 1000 symbols/s to 50 Msymbols/s, has a maximum RF modulation bandwidth of 80 MHz, and a playback memory of 32 Msamples. A wide range of digital formats are supported, including BPSK, QPSK, OQPSK, π/4 DQPSK, 8PSK, 16PSK, MSK with user-selectable phase offsets of 0 to 100 degrees, 4QAM to 256QAM, and FSK with up to 16 levels of deviation.

Agilent Technologies, Test and Measurement Organization
Tel: 800-452-4844, ext. 7775
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