

Synthesizers Shave Phase Noise to 24 GHz

These stable broadband signal sources, which come in three different packages, minimize noise levels across wide bandwidths to 24 GHz and beyond.

FREQUENCY STABILITY, an essential parameter for most RF/microwave applications, is usually synonymous with a signal source capable of low noise levels. The PHS 8400 family of frequency synthesizers from Pronghorn Solutions exemplifies a line of stable signal sources, but with a unique twist: The synthesizers are available in three different form factors—benchtop, modular, and handheld configurations—that will fit any application.

The modular versions of the frequency synthesizers, such as model PHS-8400M (Fig. 1), show how the small size does not force users to sacrifice flexibility. In addition to the expected interconnections for dc power and RF output signals, the frequency synthesizers include a modulation/trigger input, an input/output port to use an external frequency reference or access signals from the PHS-8400M’s internal frequency reference, and even a Universal Serial Bus. The model numbers for the rack-mountable benchtop and miniature handheld versions reflect their different form factors, PHS-8400B and PHS-8400H.

The basic or “starting” frequency range is 0.7 to 24 GHz, but it can also start at 10 MHz, 0.5 GHz, or 1 GHz and stop at 12, 18, 24 GHz or higher, depending on the customer’s needs. As noted, these are stable signal sources, with standard frequency stability of ± 10 ppm. They can be supplied with a 10- or 100-MHz internal crystal-oscillator frequency reference and work with an external frequency reference.



1. The modular version of the model PHS-8400 line of frequency synthesizers (model PHS-8400M) measures a mere 6.00 × 3.54 × 0.70 in. and weighs less than 1 lb., even with its many input, output, and control interfaces.



2. This plot shows phase-noise measurements on a 10.1-GHz carrier for a PHS-8400M frequency synthesizer. Testing is performed with a commercial frequency-downconverter and phase-noise test set from Keysight Technologies.

As expected for a stable source, the noise levels are low, with single-sideband (SSB) phase noise of less than -120 dBc/Hz offset 100 kHz from a 10-GHz carrier and better than -111 dBc/Hz offset 100 kHz from a 24-GHz carrier. Measurements with a commercial phase-noise analyzer from Keysight Technologies (www.keysight.com) reveal that the phase noise at 10 GHz remains low for offsets closer to the carrier (Fig. 2).

The PHS-8400 frequency synthesizers deliver at least +5 dBm output power across the full frequency range, with +7 dBm or more output power through 18 GHz. All three versions of the synthesizer include USB ports, and they ship with software drivers for control with a PC.

The benchtop and handheld models include displays and keypads, while benchtop and modular versions offer SCPI/IVI-compatible SPI and LAN interfaces as options. **mw**

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