

# Scope/Spectrum Analyzers Extend Frequency Ranges

Reaching as high as 6 GHz—and now as low as 9 kHz—these digital storage oscilloscopes with built-in spectrum analyzers can view signals in both the frequency and time domains.

**HIGH-FREQUENCY ENGINEERS** IN need of time- and frequency-domain analysis of different signals typically reach for two instruments: a high-speed oscilloscope and a broadband spectrum analyzer. Or at least, that's what they do if they don't have access to an MDO4000B test instrument from Tektronix ([www.tek.com](http://www.tek.com)). Introduced several years ago, these instruments brought new levels of measurement productivity to the test bench by integrating a spectrum analyzer with a digital storage oscilloscope (DSO), resulting in a mixed-domain oscilloscope (MDO). The product line was recently enhanced, with spectrum analyzer frequency coverage now available across a range as wide as 9 kHz to 6 GHz.

This combination of two popular measurement instruments makes it possible to correlate signals in the frequency domain with the time-domain events that may have caused them. The display screen can show two views of a signal at the same time, with a traditional oscilloscope screen on the top half and a spectrum analyzer display on the bottom. The spectrum analyzer includes its own acquisition system, allowing it to act as a separate instrument (from the oscilloscope) within a common housing. When the time and frequency domains are displayed, the displayed signals are time correlated, triggered by the system trigger event. When just the spectrum analyzer is used, it can be set to "Free Run" for continuous measurements unrelated to the time domain.

The MDO4000B series of high-speed, high-frequency test instruments (*see photo*) can capture and display time-correlated analog, digital, and RF/microwave signals to provide comprehensive analysis of the most complex signals. All models pro-

vide four analog input channels, with analysis bandwidths ranging from 100 MHz to more than 1 GHz per channel. All models offer sampling rates of at least 2.5 GSamples/s per channel, with sampling rates to 5 GSamples/s available for the top two models.

The spurious-free-dynamic-range (SFDR) performance of this latest generation of MDO4000B MSOs has been boosted by about 5 dB from the original line of MDOs, now providing SFDRs of  $-65$  dBc. The phase-noise performance of the analyzers has been improved by as much as 20 dB compared to the earlier models, allowing for enhanced phase-noise analysis and close-in spurious measurements. The new analyzers' maximum RF acquisition time has been doubled over the original line of instruments, from 79 ms to a current capability of 158 ms.

Extending the lower-frequency limit of the spectrum analyzers, from 50 kHz to 9 kHz, also is a benefit for those involved in diagnosing electromagnetic-interference (EMI) issues. In addition, when used with the SignalVu-PC test software from Tektronix, the MDO4000B MDOs offer extremely wide-bandwidth vector-signal-analyzer (VSA) capability.

Each MDO4000B includes four USB 2.0 host ports and an Ethernet port. The instruments are available with optional applications support for VSA measurements, advanced RF triggering, power analysis, limit and mask testing, and high-definition-television (HDTV) and custom video analysis. **TMW**



The MDO4000B series of mixed domain oscilloscopes includes the model MDO4104B-6, shown with the TPA-N-PRE preamplifier, which provides 12-dB gain from 9 kHz to 6 GHz.

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