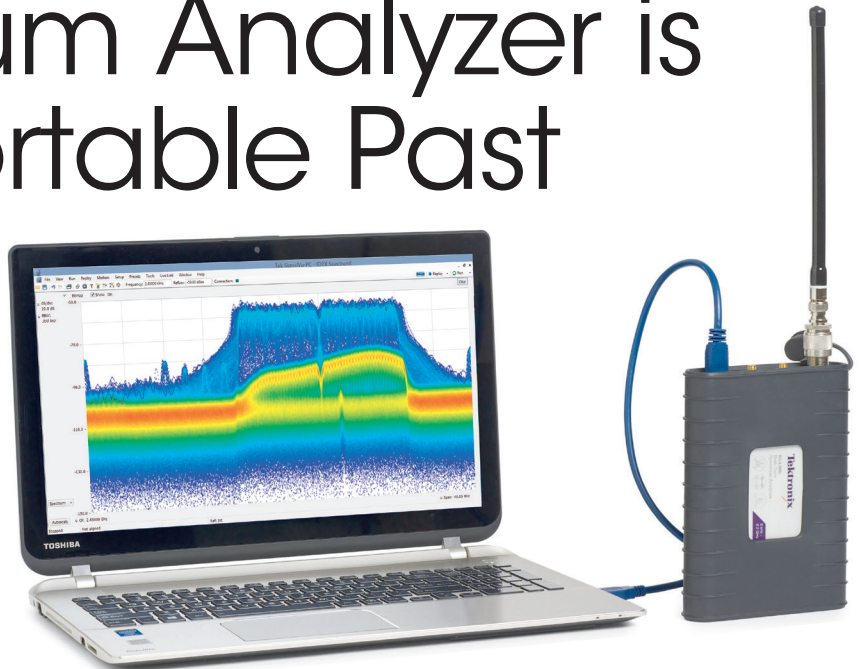


Spectrum Analyzer is Truly Portable Past 6 GHz

Fitting into a housing about the size of an old-fashioned transistor radio, this very modern spectrum analyzer teams with a computer to accurately scrutinize spectrum past 6 GHz.



1. The RSA306 spectrum analyzer works with measurement software running on a laptop or other PC to form a lightweight, portable measurement system ranging from 9 kHz to 6.2 GHz.

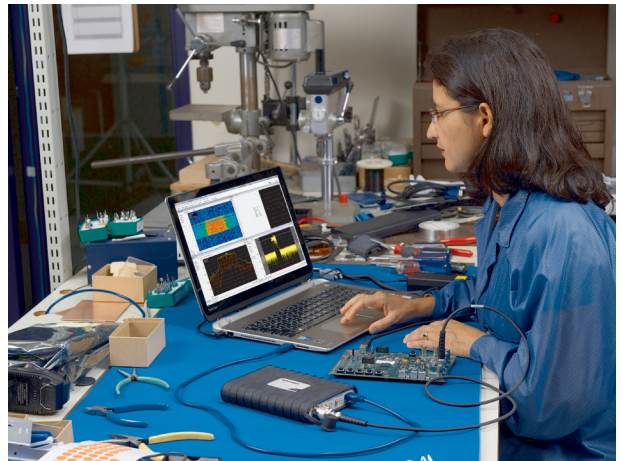
SPECTRUM ANALYZERS have long been among the most popular, invaluable RF/microwave test equipment. By offering as much measurement power in the RSA306 portable spectrum analyzer for such a low price, Tektronix (www.tek.com) now makes this instrument more accessible to a greater number of users.

As an added bonus, this truly is a “green” measuring tool, requiring only 4 W of operating power for spectrum measurements from 9 kHz to 6.2 GHz. The compact instrument works with the processing functionality of a PC and Tektronix’s supplied SignalVu-PC software to provide all of the capabilities of a full-sized spectrum analyzer at a fraction of the size and price.

The compact RSA306 (*Fig. 1*) is not the spectrum analyzer of years past—which is to say, one of those hefty portable units with carrying handles (the 492 and 494 series) upon which Tektronix built its reputation. This new, portable instrument weighs a mere 1.2 lb and is the firm’s first spectrum analyzer with a Universal Serial Bus (USB) 3.0 connection, but it certainly won’t be Tektronix’s last. It is designed for use with a laptop or other PC running with the proper measurement software.

The essential spectrum-analyzer functionality is contained within the RSA306’s portable-radio-sized housing; it relies on the computer for control, processing, and screen display to show captured signals across an instantaneous real-time bandwidth of 40 MHz. The analyzer has a frequency range of 1 kHz to 40

MHz. The RSA 306 measures just $5.0 \times 7.5 \times 1.2$ in. ($127 \times 190.5 \times 30.5$ mm), making it a perfect fit for both field and laboratory. It uses a Type-N female RF/microwave input connector and SMA female connectors for the external frequency reference input and trigger/sync input signals.



2. The RSA306, PC, and software combine to provide a flexible benchtop measuring system that can perform an extensive amount of signal analysis.

Portable Spectrum Analyzers

The RSA306 (Fig. 2) achieves a frequency accuracy of 3 ppm across its full operating temperature range; amplitude measurement ranges from -160 to $+20$ dBm. Absolute amplitude measurement accuracy is ± 1 dB + the absolute amplitude accuracy for room-temperature measurements (from $+18$ to $+28^\circ\text{C}$). The spectrum analyzer can perform stepped measurements, with dwell times per step from 50 ms to 100 s.

Resolution-bandwidth (RBW) filter range spans from 10 Hz to 10 MHz and can achieve in-phase/quadrature (I/Q) measurement resolution of 17.9 ns for an acquisition bandwidth of 40 MHz. This rugged little analyzer minimizes noise: its second-harmonic distortion is typically less than -55 dBc from 10 to 300 MHz at a reference level of 0 dBm, and typically less than -50 dBc from 10 MHz to 3.1 GHz at a reference level of -40 dBm.

The analyzer's displayed average noise level (DANL) is specified as -130 dBm/Hz from 100 kHz to 42 MHz; -145 dBm/Hz from 2 to 5 MHz; -160 dBm/Hz from beyond 5 MHz to 1 GHz; -158 dBm/Hz from beyond 1 GHz to 2 GHz; -155 dBm/Hz from beyond 2 GHz to 4 GHz; and -150 dBm/Hz from beyond 4 GHz to 6.2 GHz. The instrument's phase noise for a carrier of 10 MHz is -108 dBc/Hz offset 1 kHz from the carrier; -118 dBc/Hz offset 10 kHz from the carrier; -120 dBc/Hz offset 100 kHz from the carrier; and -122 dBc/Hz offset 1 MHz from the carrier.

At the other extreme, the RSA306's phase noise for a 6-GHz carrier is -70 dBc/Hz offset 1 kHz from the carrier; -75 dBc/Hz offset 10 kHz from the carrier; -85 dBc/Hz offset 100 kHz from the carrier; and -105 dBc/Hz offset 1 MHz from the carrier.

It is important to remember that the PC contributes to the performance of the RSA306 spectrum analyzer, not just to controlling the analyzer. The RSA306 requires a PC with Windows 7 or Windows 8 or 8.1 with a 64-bit operating system and a USB 3.0 connection to link the PC with the spectrum analyzer. To take full advantage of the RSA306's features and performance, an Intel Core i7 4th generation processor is required.

The portable analyzer ships with SignalVu-PC software, which will run on most laptop or desktop PCs and provides tremendous flexibility in the measurement and analysis of signals within the RSA306's range. In addition to using SignalVu-PC for running tests and programming control of the RSA306, the software can be used with an included application programming interface (API) to execute its own extensive set of commands and measurements.

Also, a MATLAB driver is available for the SignalVu-PC API. As a result, the RSA306 can be operated with the MATLAB mathematical analysis software, as well as the Instrument



3. With its light weight and low power consumption, the RSA306 and the SignalVu-PC software can tackle a wide range of in-the-field measurements to 6.2 GHz.

Control Toolbox, both developed by The MathWorks (www.mathworks.com).

By leveraging the SignalVu-PC software, the RSA306 can perform many measurements beyond a traditional spectrum analyzer. The basic software provides spectrum-analyzer functionality with three signal traces and a spectrogram trace, along with five markers with power, relative power, integrated power, and other functions.

The software also supports basic vector analysis functions—amplitude, frequency, and phase versus time, as well as I and Q versus time. The software enables AM/FM radio monitoring and measurements, multichannel power measurements, adjacent-channel leakage ratio (ACLR) measurements, and use of the

complementary cumulative distribution function (CCDF) to plot statistical variations in signal levels.

On top of that, the software can be used for spectrum mask testing with the RSA306, to simplify signal monitoring of a portion of spectrum of interest. Mask testing helps find intermittent interference or other types of spectrum violations. The software can be used to color-code signals of interest, using a mask to identify a particular portion of spectrum. When equipped with option SVP for the SignalVu-PV software, the compact RSA306 spectrum analyzer can even make pulsed signal measurements.

The SignalVu-PC MAP option allows the RSA306 to perform interference hunting and signal-strength analysis. This software can create a geographical map on the PC screen, showing different sources of interference received by the RSA306. This software option makes it possible to draw a line or an arrow on a mapped measurement to indicate the direction the measurement antenna was pointing.

Other SignalVu-PC software options cover various WLAN 802.11 testing capabilities, orthogonal frequency-division-multiplexing (OFDM) analysis, general-purpose modulation analysis, audio analysis, and settling-time (frequency and phase) measurements. Option SVM supports analysis of a wide variety of digital modulation formats.

Though compact and light in weight, the RSA306 is rugged enough for continuous field use, meeting MIL-STD-28800 Class-2 environmental requirements for shock and vibration. It can very much be thought of as a wideband radio module, working with software-defined-radio (SDR) architectures (Fig. 3).

The RSA306 should be given a warmup time of about 30 minutes after connecting it to a PC. P&A: \$3490; stock. **ttw**

TEKTRONIX, INC., 14200 SW Karl Braun Dr., P.O. Box 500, Beaverton, OR 97077; (877) 977-0425; www.tektronix.com