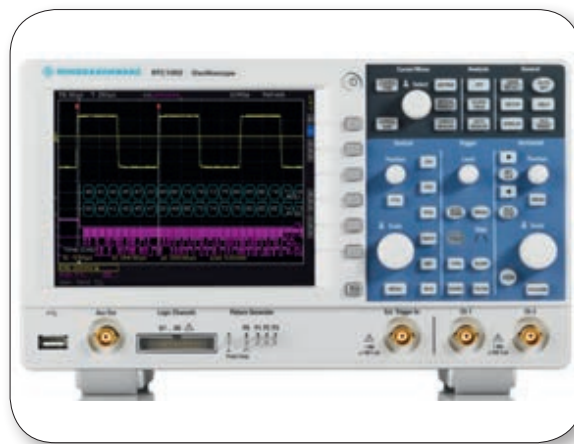


# New oscilloscopes address expanding development needs

By **Alix Paultre**, Editor

*This article introduces a new series of oscilloscopes which feature all necessary functions to thoroughly test the behavior of complex embedded systems.*



*Figure 1. Directly addressing the need for a highly functional cost-effective T&M device, the RTC1000 oscilloscope series offers a compact eight-in-one instrument.*

■ Test & Measurement is arguably one of the most difficult disciplines to master in electronic design engineering. Your math must be good, and your imagination broad, to create a great design, but if you can't dial that great design in and make it a viable product, you will die a penniless beggar (or worse, have to share credit with your buddy that can use the 'scope better than you).

T&M is undergoing another renaissance, as it must whenever industry goes through any disruptive change. You can only test a system with a device that has a higher resolution/speed/capacity than the one being tested. In other words, if your ruler lines aren't smaller than the features on what you are trying to measure, you will only be as precise as those markings.

This requirement is exacerbated by the nowadays (actually always) need to test at almost every stage of development and production. It is almost impossible to attain six-sigma reliability without intelligent oversight at every step, from the bench to the box. That means everyone in the process must have (and use

properly) test equipment that is accurate, fast, and functional. This can get expensive, obviously. This cost issue is also a barrier for small shops that may only need one device, but can't afford the latest bells-and whistles machine.

The good news is that the same advances that are driving electronic product development are also impacting the T&M space. High instrument integration enables compact form factors and the ability to create a competitive system for the average user at a price they can afford. One example of this trend can be found in the Rohde & Schwarz RTC1000 oscilloscope series.

Directly addressing the need for a highly functional cost-effective T&M device, this compact eight-in-one instrument can act as an eight-channel logic analyzer, a four-channel pattern generator, and a protocol analyzer for I2C, SPI, UART/RS-232, CAN, and LIN, as well as a digital voltmeter, component tester, spectrum analyzer, and counter. Available in models from 50 MHz to 300 MHz, they offer bandwidth upgrades via software license all the way to 300 MHz bandwidth. The

two-channel oscilloscopes have maximum sample rates of 2 Gsample/s and a memory depth of 2 Msample. All models come as standard with LAN and USB interfaces. This convergence also enables more functionality to be put into larger systems as well. For example, to serve more professional users with greater needs, Rohde & Schwarz used the same integrated approach to create the RTM3000 and RTA4000 series, with 10-bit vertical resolution to enable power measurement that fulfills the stringent requirements demanded by advanced electronics development.

Operating with bandwidths of 100 MHz, 200 MHz, 350 MHz, 500 MHz, and 1 GHz, the RTM3000 oscilloscope has a 5 Gsample/s 10-bit ADC, with 40 Msample (80 Msample interleaved) per channel acquisition memory (with an optional 400 Msample segmented acquisition memory), and the RTA4000 oscilloscope offers bandwidths of 200 MHz, 350 MHz, 500 MHz, and 1 GHz. The RTA4000 is also suited for analyzing serial protocols, with an acquisition memory depth up to 1 Gsample, and the same 10-bit ADC, but with even more memory and a 100 Msample (200



Figure 2. The RTA4000 series is also ideal for analyzing serial protocols, with an acquisition memory depth up to 1 Gsample.

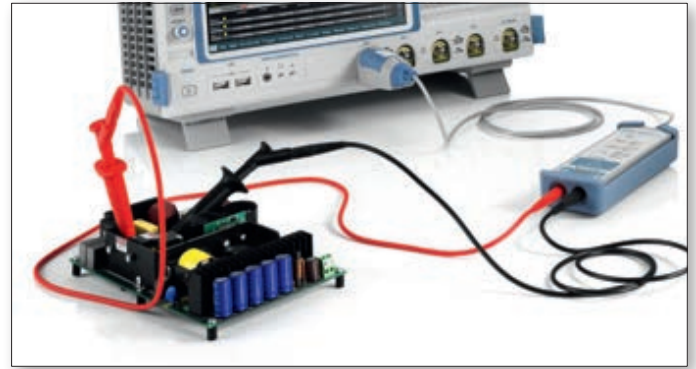


Figure 3. The RT-ZHD probes use high levels of internal system integration to help eliminate erroneous readings.

Msample interleaved) per channel acquisition memory, and standard 1 Gsample (1,000 Msample) segmented acquisition memory. Power measurements, such as ripple and noise measurements of a DC line, demand an oscilloscope with high vertical resolution, low noise and excellent DC gain linearity. The 10-bit ADCs of the RTM3000 and RTA4000 series support 1024 vertical positions, 4x better than legacy 8-bit oscilloscopes, and essential for ripple and noise measurements. While the R&S RTM3000 series comes in two- and four-channel models, the R&S RTA4000 series oscilloscopes are exclusively four-channel models. The expanding demand for compact, highly efficient switched-mode power supplies, inverters, and electric drives demands the use of leading-edge semiconductors and components, creating new challenges for T&M equipment. It doesn't help to have great bench T&M gear if your probes aren't able to deliver good, clear, and precise information to the device. One example of how companies are addressing this need is the new family of high-voltage differential probes from Rohde & Schwarz, that enable measurements with

extremely high signal integrity. The RT-ZHD high-voltage differential probes are well suited for measurements on modern power semiconductors, and with a bandwidth of up to 200 MHz, they can even measure very fast switching edges. The four models have maximum peak voltages from 750 V to 6000 V, and exhibit excellent common-mode rejection across the entire frequency range that effectively suppresses fast-switching common mode signals.

With an integrated offset compensation that operates independently of probe attenuation and the oscilloscope's vertical settings, they can measure very small ripple voltages with a large DC component. With an offset compensation of up to 2000 V, they cover a very large range of measurement applications, and have a DC measuring accuracy of  $\pm 0.5$  percent. The probes also feature an integrated ProbeMeter that measures DC offset with  $\pm 0.1$  percent accuracy, with the readings displayed directly on the oscilloscope. The RT-ZHD probes also use high levels of internal system integration to help eliminate erroneous read-

ings, and enable the oscilloscope to automatically recognize the configured attenuation factor and other probe settings to display the correct voltages and reliably detect incidents such as overvoltage. Probe functions can also be accessed via the SCPI remote control interface, making the probes a good choice for automated tests as well. Two other examples are the R&S RT-ZD002 and R&S RT-ZD003 differential probes with maximum input voltages up to 700 V and 1400 V, respectively. These 25 MHz probes boast very low inherent noise for their class of around 7 mV (RMS) and 14 mV (RMS), respectively. Their BNC interface makes them a perfect fit for R&S RTC1000, R&S RTB2000 and all standard oscilloscopes.

The pressures of T&M on the electronics engineer will never go away, as the field is caught up in a perpetual "Red Queen's Race" of constant change as T&M devices strive to stay ahead of the embedded systems they are testing. The latest highly-integrated cost-effective devices available today can help you stay ahead of the pack. ■