

Top Products of 2002

The list for 2002 offers a comprehensive mix of hardware, software, and test instruments, with technologies supporting architectures ranging from baseband to optical.

Technology advances even during difficult years, as evidenced by an impressive collection of new products making up the Top Products of 2002. Selected by the editors of *Microwaves & RF*, the top 13 products of 2002 (see table) represent the diversity of technologies employed by this magazine's readers, from software to hardware, and from RF and baseband through millimeter-wave frequencies and optical signals. The list is a true "boiling pot" of

manufacturers, a mixture of the old and the new, and the large and the small.

Among the smallest of the Top Products comes from north of the border, in the form of the SE4100 Global Positioning System receiver (Rx) integrated circuit (IC) from SiGe Semiconductor (Ottawa, Ontario, Canada). Based on silicon-germanium (SiGe) process technology, IC integrates an intermediate-frequency (IF) filter, voltage-controlled oscillator (VCO), oscillator tank circuitry, low-noise amplifier (LNA), phase-locked loop (PLL), and crystal oscillator within a package measuring just 4×4 mm. The first product in the company's line of PointCharger Global Positioning System (GPS) devices, the chip draws less than 10-mA current from a +2.7-VDC supply. When coupled with a commercial baseband IC from ST Microelectronics, the chip forms a GPS Rx solution that consumes less than 120 mW of power.

The "other" GPS Rx on the list is from Valence Semiconductor (Irvine, CA), but is based on complementary-metal-oxide-semiconductor (CMOS) process technology. The company's VS7001 Rx IC, which is designed for supply voltages from +2.3 to +3.6 VDC, consumes less than 30-mW power at +2.3 VDC.

Maxim Integrated Circuits (Sunnyvale, CA) contributed their MAX5886-MAX5888 line of low-power digital-to-analog converters (DACs) to the list. Designed for multicarrier signal generation in cellular base stations, the DACs offer 14-b typical resolution at sampling rates to 500 MSamples/s with noise levels to -160 dBc/Hz and outstanding dynamic-range performance.

Analog Devices, Inc. (Wilmington, MA) continued to advance the state of direct-digital-synthesis (DDS) technology with their 9954 DDS IC. It consumes only 180-mW power when operating at an update rate of 400 MSamples/s. The IC features on-chip 1024×32 b random-access memory (RAM), an integral 14-b DAC, a PLL clock multiplier, an on-chip crystal oscillator, and a high-speed comparator. In spite of the integration, it is designed to operate on only +1.8 VDC. The DDS has a 32-b phase accumulator for tun-

JACK BROWNE
Publisher/Editor

tions. VSS2002 offers models for encoders/decoders, filters, modulators, demodulators and comprehensive libraries for Enhanced Data-Rate for GSM Evolution (EDGE), code-division-multiple-access (CDMA), and WLAN systems.

Version 2.0 of the CST Design Studio, which is based on an open design environment, breaks large problems into a series of smaller-but-related problems. The software allows an electromagnetic (EM)-based system to be broken down into smaller components or blocks, each described by its own generalized S-parameter matrix. The software uses Visual Basic for Applications (VBA) macro language to simplify customization. Its component-object-model (COM) interface enables seamless integration of a variety of other software tools, including Matlab and MS Excel.

Several oscilloscopes made the 2002 list, including the WaveMaster 8500 digital storage oscilloscope (DSO) from

Top Products at a glance (listed alphabetically)

1. Agilent Technologies' 54854A/54855A Infinium Scopes and InfiniiMax probes (October Cover, p. 102)
2. Analog Devices' December Cover
3. Applied Wave Research's Visual System Simulator 2002 (February Cover, p. 116)
4. Computer Access Technology's Merlin Mobile Bluetooth protocol analyzer (October, p. 107)
5. Communications Techniques' CR-40 clock recovery unit (April, p. 94).
6. Computer Simulation Technology's CST Design Studio, Version 2.0 (May Cover, p. 144)
7. ExtremeSpectrum's 100-Mb/s ultrawideband (UWB) Trinity chip set (July, p. 98)
8. Frequency Electronics' FE-205A, FE-405A, and FE-505A digital oven-controlled crystal oscillators (DOCXOs) (March Cover, p. 100)
9. LeCroy Corp.'s Wavemaster 8500 Digital Storage Oscilloscope (May, p. 166)
10. Maxim Integrated Circuits' MAX5886-MAX5888 family of DACs (November Cover, p. 95).
11. RF Micro Devices' 802.11b WLAN chip set (August Cover, p. 102)
12. SiGe Semiconductor's SE4100 SiGe GPS receiver IC (October, p. 108)
13. Synergy Microwave's VCISO-based clock translators (September Cover, p. 110).
14. Valence Semiconductor's VS7001 CMOS GPS receiver IC (June, p. 108).

LeCroy Corp. (Chestnut Ridge, NY) and the 4-GHz 54854A and 6-GHz 54855A Infinium oscilloscopes and InfiniiMax probe system from Agilent Technologies (Santa Rosa, CA). The WaveMaster employs the X-Stream architecture to eliminate trade-offs between fast processing the memory requirements for storing long records. Based on the company's proprietary SiGe front-end ICs, the scope can dig-

ital signals at 10 GSamples/s on four channels, then send the data to a CMOS acquisition memory that can store as many as 48 million points of acquired data. The effective sampling rate can be increased to 20 GSamples/s when only two channels are used.

The Infinium scopes each deliver sampling rates to 20 Gb/s on four independent measurement channels, with generous acquisition memories, but it is

perhaps the probe system that is the news here. The probes incorporate extremely wideband amplifiers (3.5-, 5-, and 7-GHz bandwidths are currently available) to overcome the bandwidth-limiting effects of accessories, such as wireless extensions, added to the tip of a probe. As a result, these probes can provide true wideband responses through 7 GHz of bandwidth, without the limitations of conventional active probe systems.

One of the more interesting measurement tools introduced in 2002 came from Computer Access Technology Corp. (Santa Clara, CA), with the Merlin Mobile Bluetooth protocol analyzer. Designed for full-featured protocol analysis according to Version 1.1 of the Bluetooth standard, the entire instrument fits within a standard 16-b Type II PC card measuring just $5.3 \times 2.1 \times 0.4$ in. ($135 \times 54 \times 10.5$ mm). The analyzer can capture and analyze Blue-

tooth signals within a piconet, evaluating the baseband, LMP, L2CAP, SDP, RECOMM, TCS, and OBEX layers of the Bluetooth protocol stack. It also provides standard decoding functions for HDLC, PPP, BNEP, HID, and AT commands, and can create custom decoding functions. The Merlin Mobile protocol analyzer supports point-to-point and point-to-multipoint piconets, and allows time stamping of events with 100-ns resolution.

Two of the award winners were aimed at clock timing in high-speed optical circuits, the CR-40 clock-recovery unit (CRU) from Communication Techniques, Inc. (Whippany, NJ) for use in OC-768/STM-256 high-speed optical communications systems operating at 40 Gb/s, and the CTM-8-OCXX and CTS-8-OCXX series of clock translators from Synergy Microwave Corp. (Paterson, NJ). The CR-40 CRU is based on a high quality-factor (Q) single-pole dielectric-

resonator filter with bandpass response centered at the clock frequency. Jitter generation for the CRU is less than 15 mUI root mean square (RMS), while the typical phase noise of a 39.813-GHz recovered clock signal is -74 dBc/Hz offset 10 kHz from the carrier.

Synergy's clock translators are based on the use of surface-acoustic-wave (SAW) technology within voltage-controlled SAW oscillators (VCSOs) to provide precise output clock frequencies with low phase noise when fed with different-frequency input signals. For example, the model CTS-C1-12 clock translator operates with an input frequency of 51.84 MHz and provides an output signal at the SONET frequency of 622.08 MHz. For an input signal at +10 dBm, the output signal level is +6 dBm. The output jitter is typically only 3 ps. The clock translators are available for use with single or multiple input signals (the S and M in the product codes). **MRF**