



Ideas take wing
“When you’re
improvising, when
you’re winging it,
ideas easily flow
to the top. That was
not possible in the
British professional
army.”

—author and historian
David McCullough,
praising colonial
insurgents in Boston
during 1775

USB-to-UART bridge supports legacy upgrades

By Robert Cravotta

DESIGNS THAT INCLUDE USB support are becoming more pervasive, especially for consumer and industrial applications. To simplify and enable legacy-system upgrades to support the USB

interface, Silicon Laboratories now offers the CP2102, a highly integrated, single-chip USB-to-UART bridge. It integrates a UART interface that supports speeds as high as 1 Mbps with transmitting/receiving buffers and modem-handshake signals, a USB 2.0 full-speed transceiver, 1 kbyte of EEPROM, a 48-MHz internal oscillator, and a voltage regulator in a 5×5-mm package. Royalty-free host and device drivers come with the CP2102 that eliminate the need for additional software when upgrading a system from RS-232 to USB.

The CP2102EK evaluation kit includes a wizard for customizing nonstandard baud rates and storing OEM VID (vendor-ID) and PID (prod-

uct-ID) information, and royalty-free device drivers for PC and Macintosh platforms. The CP2102 is available now in a 28-pin MLP that is pin-compatible with the CP2101. Prices begin at \$2.42 (10,000). The CP2102EK evaluation kit is available now for \$49.

► **Silicon Laboratories**, 1-877-444-3032, www.silabs.com.



The single-chip CP2102 provides a highly integrated USB-to-UART bridge.

Transceiver IC incorporates antenna tuning

TARGETING APPLICATIONS requiring a basic point-to-point RF link, the 4-dBm-output IA4420 and the similar 8-dBm-output IA4421 EZRadio ICs from Integration Associates packs all the functions you need, except for crystal and decoupling components. The integral automatic antenna tuning matches the output to the transmission line and antenna, eliminating the need to do this matching in production and ensures maximum output power. The auto-tuning also adjusts to dynamic changes in RF load, such as the effect of a user's hand. You can achieve bit rates as high as 115 kbps in analog mode and 256 kbps in digital mode using these ICs.

These ISM (industrial, scientific, and medical) band devices operate at 433, 868, and 915 MHz, and the 4420

also operates at 315 MHz—all from a 2.4 to 5.5 V supply and include automatic frequency control as well as data-recovery and timing functions. Internal blocks of the zero-IF architecture include a PLL, a power amplifier, a low-noise amplifier, I/Q downconverter mixers and demodulator, and the requisite filters and amplifiers. Many features are software-programmable to match your preferences and the application's needs; for example, you can set receiver bandwidth to match deviation, data rate, and crystal tolerance. The 16-lead EZRadio ICs sell for \$2 (high quantities).

—by Bill Schweber

► **Integration Associates**, 1-650-969-4100, www.integration.com.

FPGAs, CPLDs strive to beat the heat

STATIC-POWER CONSUMPTION is an increasingly important issue for FPGAs—along with any semiconductor devices built on modern less-than-130-nm processes—and vendors are belatedly making serious efforts to address the issue (see “Heat wave: FPGAs confront increasing, evolving power consumption,” *EDN*, Aug 5, 2004, pg 61).

Xilinx’s new Spartan-3L product family, for exam-

ple, comprises three devices that the company fabricates on the low-power-consumption “corner” of the 90-nm foundry process. Xilinx has also begun testing a two-part Hibernation mode on the Spartan-3L spin that further reduces quiescent current, although it comes with trade-offs that limit its practical usefulness.

By driving the FPGA’s PROG_B input low, thereby putting the Spartan-3L device in configuration mode, and by setting the HSWAP_EN input high, thereby disabling weak internal pull-ups for I/O buffers, you can reduce quiescent current as much as 68%

below normal standby levels. You can externally switch off the core and auxiliary voltages powering the chip and keep V_{CC0} active to hold the I/O buffers in a well-behaved tri-state condition with ESD structures powered. These additional actions cause quiescent current to fall 98% below its normal level.

However, because either “hibernation” option flushes the device’s internal RAM contents, your system needs to undertake a time- and power-consuming FPGA-reconfiguration sequence upon exiting from this lowest power mode, so use it sparingly. In this respect, Spartan-3L’s hiberna-

tion mode is conceptually similar to the same-named Windows hibernation mode, which copies system DRAM contents to a hard-drive-housed “snapshot” file before powering down the PC.

Xilinx has also enhanced its 32- and 64-macrocell CoolRunner-II CPLDs; the A variants offer two I/O banks, each of which you can connect to a different V_{CC0} voltage. Historically, only devices with 128 or more macrocells offered multiple I/O banks. These devices could amortize additional silicon cost across the higher logic density and, consequently, larger overall die. However, by optimizing the overall chip layout, the company has now extended this I/O flexibility to its smallest CoolRunner-II variants, thereby enabling them to bridge between subsystems running at different core- and I/O-voltage levels and at no price premium over its predecessors. The XC2C32A-6VQ-44C, now in production, will cost 85 cents (250,000) at the end of this year, and Xilinx will next month ship the \$1.20 XC2C64A-7VQ44C. The XC-3S1000L will sell for \$14

(250,000) by the end of 2005, and the XC3S1500L will sell for \$22 in the same time frame. These Spartan-3L variants are now available in sample quantities, the XC3S4000L will emerge by year-end, and production qualification for all Spartan-3L chips is scheduled for the first quarter of next year.—by Brian Dipert
► **Xilinx**, 1-408-559-7778, www.xilinx.com.

TOOL BLENDS IP, ALGORITHMIC DESCRIPTIONS

The recently introduced Pico Express from Synfora combines configurable IP (intellectual property) with tools that enable designers to explore and build RTL representations from algorithmic C descriptions. The product differs from other new C-synthesis tools in that it allows engineers to use configurable IP as part of the design.

The tool accepts algorithmic descriptions in sequences of nested loops and maps them into a pipelined processor-array architecture that uses previously verified IP blocks. The tool supports multiple local memories and aids in minimizing bus bandwidth. Pico Express 1.3 has a list price of \$125,000 for a design-project license.—by Gabe Moretti
► **Synfora**, www.synfora.com.

DILBERT By Scott Adams



► **Worldwide shipments of handheld PDAs lacking telephone capabilities decreased to 2.1 million units in the third quarter of 2004—an 8.7% drop compared with the same quarter a year ago and a 4.6% decline from this year’s second quarter, according to IDC.**

Audio DSPs recover lost memories

SMALLER AND CHEAPER PACKAGING, along with an overdue embrace of internal ROM, were the key reasons that Analog Devices was able last year to migrate its SHARC audio DSP family into mainstream, cost-sensitive applications (see “SHARC swims toward deeper, more fertile waters,” *EDN*, Dec 11, 2003, pg 18). Unfortunately,

the pin-count-slimming exercise Analog Devices undertook when it developed its first 213xx family members required, among other things,

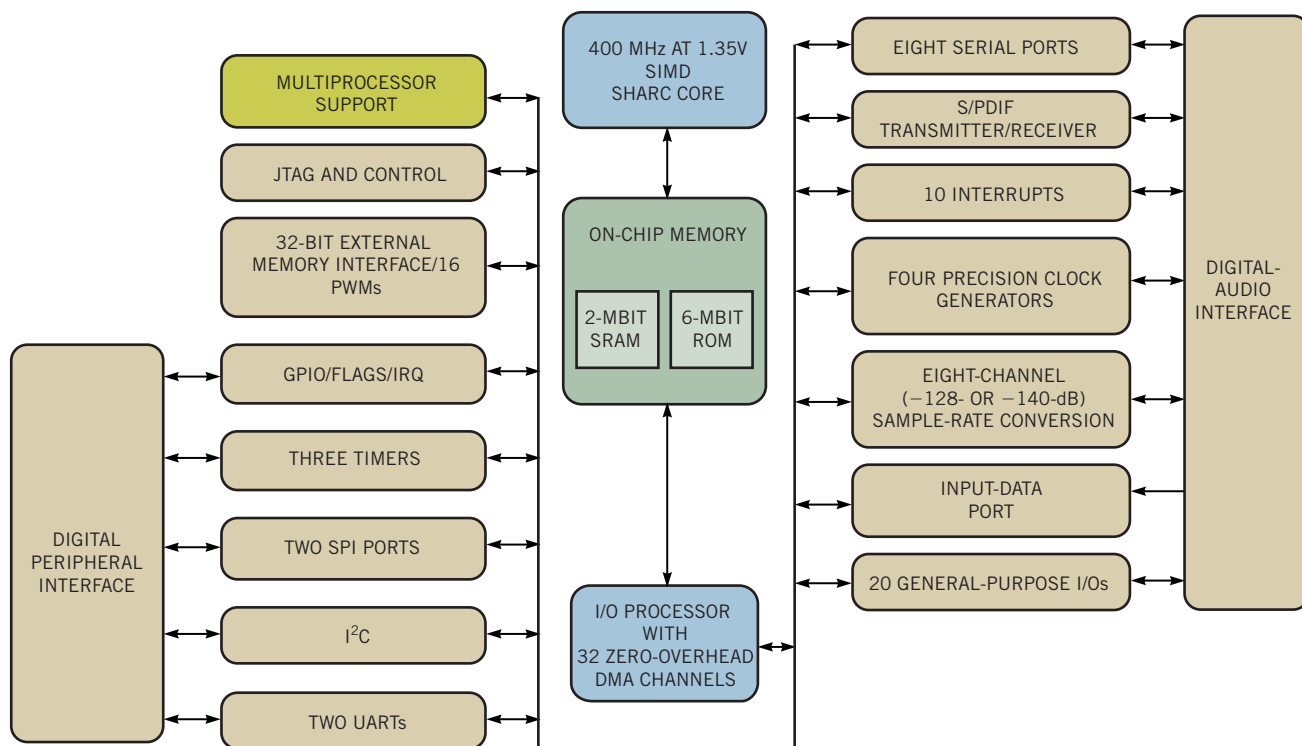
discarding the external DRAM interface. This deletion meant that if you wanted to supplement the ROM-housed algorithms with

additional external RAM-based code or to otherwise employ external volatile memory, you needed to use ultra-expensive SRAM.

Analog’s follow-on \$29.95 (10,000) 21367 and \$34.95 21368 chips, both scheduled to become available for sampling in the next quarter with production slated for next summer, correct this external-memory-interconnect shortcoming. However, they do *not* interface to modern mainstream-DDR SDRAM; instead, the company relies on increasingly rare SDR SDRAM, running at speeds as

high as 200 MHz. By increasing the core operating voltage from 1.2V to 1.35, Analog has boosted the core clock frequency to 400 MHz. The company has also tinkered with the internal memory mix from a combination of 3-Mbit RAM and 4-Mbit ROM in the earlier 213xx spins to an arrangement of 2 Mbits of RAM and 6 Mbits of ROM. Befitting its higher end application intent, the 21368 also includes multiprocessor hooks.—by Brian Dipert

► **Analog Devices**, 1-781-329-4700, www.analog.com.



THIS FEATURE IS AVAILABLE ONLY ON THE ADSP-21368.

Analog Devices’ 21367 and 21368 restore connectivity to external DRAM, boost core clock speeds, and alter the internal RAM-plus-ROM-density mix of lower end 213xx predecessors.

► **In the third quarter of 2004, PalmOne Inc, the top PDA seller, commanded nearly 34.7% of the market, down from a 42% share in the previous quarter, according to IDC. Hewlett-Packard last quarter held the No. 2 slot with a 30.6%, followed by Dell at 8.9%.**

Tools expand support for CPLD and FPGA development

ALTIUM HAS EXPANDED support for system-level FPGA and CPLD development by adding a JTAG interface to its Nexar system. The addition of the JTAG port enables engineers to use their

FPGA-development boards to interactively design and debug digital systems. The universal JTAG interface attaches to the parallel port of a developer's computer and features a set of flying leads that interconnect to the target development board. The interface supports two independent JTAG connections—one to the JTAG programming pins of the target FPGA and the other to four general-I/O pins of the FPGA to establish a secondary soft-JTAG chain inside the device. The Nexar sys-

tem uses this structure to communicate in real time with active design elements, such as its processor cores and virtual instruments, in the circuit within the FPGA.

The interface supports both the Xilinx (www.xilinx.com) ISE and the Altera (www.altera.com) ByteBlaster cable standards. The interface will be available with all new and upgrade licenses for both Nexar and Protel. Both licenses have a list price of \$7995. A unified Nexar-Protel license is available for \$9995.

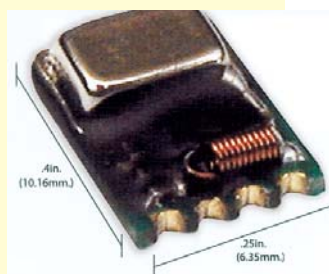
Altium has also added 12 new daughterboards for its NanoBoard prototyping tool to support devices from Actel (www.actel.com), Altera, and Xilinx. The tool works with Nexar's LiveDesign product. By providing target devices on plug-in daughterboards instead of directly on the NanoBoard, Altium aims to lower development cost for companies that work with more than one device family. Prices for the daughterboards range from \$195 for boards supporting CPLD devices to \$695 for the board supporting the Xilinx Virtex-II Pro. A CPLD pack comprising five daughterboards that support CPLD devices is available for \$495.

—by Gabe Moretti

► **Altium**, 1-858-485-4600, www.altium.com.

RF-TRANSMITTER MODULE IS ALMOST INVISIBLE

Measuring just 0.25×0.4 in., the RCT-xxx-AS transmitter module from Radiotronics targets applications such as remote-keyless-entry units and wireless sensors. Supporting data rates to 4800 bps and operating from 2 to 12V supplies, the module is available for 315-, 418-, and 434-MHz



The RCT-xxx provides a basic transmitter for low-data-rate applications in a fingernail-sized module, suitable for simplex or half-duplex links.

bands. These units support basic OOK/ASK (on-on keying/amplitude-shift keying) modulation with output power of 0 dBm at 3V; current consumption is 2.5 mA for a 50% data stream. You can get these devices in hand- or reflow-solder versions, and they sell for \$1.50 (OEM quantities). The manufacturer also offers complementary OOK/ASK receivers.—by Bill Schweber
► **Radiotronics Inc.**, 1-405-794-7730, www.radiotronics.com.

New architecture delivers low noise and power

ROLLING OUT A NEW 16-bit architecture, Dallas Semiconductor touts its MAXQ2000 as the first microcontroller to implement the 16-bit MAXQ core. The 20-MHz MAXQ2000 consumes power at 5 mA with V_{DD} of 2.5V at 25°C for typical operation. To reduce clock noise and maximize clock usage, the MAXQ architecture performs each instruction in one clock cycle without implementing an instruction pipeline, meaning that instruction fetching, decoding, and execution occur in the same clock, including program-branch and return instructions. To reduce clock noise that may adversely affect sensitive analog circuits, the MAXQ core performs almost all digital functions on the positive edge of the system clock; this technique enables a noise-free falling edge for performing analog functions.

The MAXQ2000 targets industrial and medical applications that require an LCD controller. It integrates a 64-kbyte flash, a 2-kbyte SRAM, a 16×16-bit hardware multiplier, an SPI master/slave port, and a 128-segment LCD controller on a single chip. The LCD controller uses four common and 36 segment drivers; each segment pin can also provide general-purpose I/O, many of which support interrupt operation. The MAXQ2000 is available today in a 68-pin QFN starting at \$2.95 (10,000). The evaluation kit includes an LCD daughterboard; a JTAG-interface board; and a time-limited version of the IAR C compiler, debugger, and simulator.—by Robert Cravotta

► **Dallas Semiconductor**, 1-408-737-7600, www.maxim-ic.com.

► **BMW** has sold 12,000 adapters to integrate the iPod into its sound system, according to *Business Week*.

Software allows a team approach to pc-board layout

MENTOR GRAPHICS' NEW XtremePCB allows a number of engineers to concurrently work on the same area of a pc board. In previous versions of Mentor's tools, engineers had to partition the board into private areas and then eventually

integrate the work they had each done. This process could result in a significant amount of redesign because one change could have a ripple effect on the work of other designers. The tool allows engineers to collaborate in real time on a design.

"XtremePCB allowed us to have two designers working simultaneously on the design of a complex board and re-

duce our layout-cycle time by 40 to 50%," says Ian McCormick, CAD manager of Radstone Technology (www.radstone.com), which is using the tool for its rugged COTS (commercial-off-the-shelf) embedded-computer products for defense and aerospace applications.

Mentor based the tool's architecture on a master running on a server and a number

of clients running on an engineer's workstation. The engineer locally adds to or changes the design and then submits the new version to the server. The other members of the team can immediately accept or can defer the changes. An engineer can also reserve a section of the design so that he is the only person who can change a section.

XtremePCB is available as an optional add-on to Board Station RE or Expedition. Prices start at \$50,000 for the session server, and prices for each client seat start at \$15,000 per license.

—by Gabe Moretti

► **Mentor Graphics Corp.**, 1-503-685-8000, www.mentor.com.

ARM PROVIDES SIGNAL-INTEGRITY VIEWS FOR CADENCE TOOLS

Cadence and ARM have announced the availability of SI (signal-integrity) views for ARM Foundry Program Partners. Designers incorporating hard ARM processors in their designs will be able to obtain data to perform detailed voltage-drop and SI analysis. The ARMJ processor-view-support tools are part of the Cadence Encounter digital-IC design platform, including CeltIC for crosstalk analysis and VoltageStorm for power-grid analysis.—by Gabe Moretti

► **ARM**, www.arm.com.

► **Cadence**, www.cadence.com.

Meter provides low-cost EMC assessment

BEFORE YOU TAKE YOUR product to a lab for requisite EMC certifications, it's worth doing a quick but accurate test on home ground. The Smart Fieldmeter from EMC Test Design can help you with that task. The handheld, tripod-compatible, detachable, isotropic probe covers 0.2 MHz to 3 GHz and is calibrated for field-strength values of 0.2 and 600V/m. Battery life is 100 hours, and the unit includes a remote output for datalogging and closed-loop field control. The NIST (National Institute of Standards and Technology)-traceable unit costs only \$2000.



Check your EMC situation before you send a product out for certification with the Smart Fieldmeter.

"It uses older, nonlinear analog techniques but with updated components, rather than a more expensive processor-based design," says its developer, Roman Litovsky.—by Bill Schweber

► **EMC Test Design**, www.emctd.com.

Free Web download helps with pc-board design

Zuken's new Cadstar Express, a free Web download, provides an industry-standard pc-board design product, Cadstar 7.0. The tool, which operates on Microsoft Windows operating systems, offers an advanced place-and-route editor for faster and more accurate routing. Cadstar Express with the XR 2000 editor is a fully functional version of Cadstar 7.0 with a limit of 50 library components and 300 pins.

Visitors to the Web site can also view samples of Cadstar Exchange, an online library containing more than 100,000 components. Targeting design engineers, board designers, students, and hobbyists, Cadstar Express comes with an interactive, do-it-yourself manual that guides users through the design process, enabling full evaluation of the tool suite.

You can download the tool at www.cadstarworld.com/express. For a limited time in North and South America, Zuken is offering 20% off any Cadstar product if you purchase it within 45 days of downloading Cadstar Express.

—by Gabe Moretti

► **Zuken**, 1-978-692-4900, www.zuken.com.

► **The total US Internet-access-services market was \$35.1 billion in 2003, and, of that total, consumer-access services generated nearly two-thirds of the revenue, according to InStat/MDR.**

Optocoupler meshes speed, low power, and channel needs

BY STACKING as many as four LEDs and using an insulating layer on a silicon substrate for flexibility, Agilent Technologies has developed a family of digital optocouplers that provides a previously unavailable combination of performance parameters. The ACSL-6xx0 supports a typical

rate of 15 Mbaud and a guaranteed rate of 10 Mbaud over the full temperature range while operating from a 3.3V supply. It is available in multi-channel and bidirectional configurations. These galvanically isolated devices, targeting consumer, industrial, and

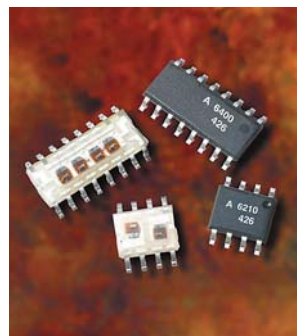
communications applications, come in dual- through quad-channel and unidirectional and bidirectional versions.

Common-mode rejection is 10 kV/ μ sec for these couplers, which can operate with supplies of 3.3 and 5.5V and at -40 to $+100^{\circ}\text{C}$, and the de-

vices meet all relevant safety-agency regulatory approvals agencies. Available configurations now include \$4.14 (10,000), quad-channel, unidirectional models and \$2.53, dual-channel, bidirectional models. Agilent plans triple-channel, unidirectional (3/0 configuration); triple-channel, bidirectional (2/1); and quad-channel, bidirectional (3/1 and 2/2) versions for 2005. The optocouplers come in eight- and 16-lead SOIC packages; the larger quad-channel unit measures $9.9 \times 5.9 \times 1.1$ mm.

—by Bill Schweber

► **Agilent Technologies Inc.**, www.agilent.com.



Pass your digital signals in one or both directions and maintain electrical distance, using members of the ACSL-6xx0 family of optocouplers, which use stacked LEDs for high density in small packages.

Embedded computer delivers precision environments

TIDAL ENGINEERING recently released the Synergy488 Gateway single-board computer and application-specific firmware for aerospace, automotive, medical, and pharmaceutical applications that require controlled environments for testing, screening, and calibrating critical systems and components. The system provides Ethernet, IEEE 488 GPIB (General Purpose Interface Bus), and RS-232 communications features to widely used environmental-test-chamber controllers, including the VersaTenn II/VersaTennIII, Watlow F4/924, Yokogawa UP550/750, Blue M Pro-750/Pro-550, and Partlow 1462. Special versions are also available.

The board has an operating temperature range of -40 to $+85^{\circ}\text{C}$ and consumes less than 5W at 7 to 24V dc. Prices for the 44-MHz version of the Synergy488 with GPIB, RS-232, and 10/100BaseT Ethernet client interfaces start at \$450 (25).

—by Warren Webb

► **Tidal Engineering**, www.tidaleng.com/synergy488.htm.

The new Synergy488 single-board computer and firmware brings GPIB, RS-232, and Ethernet connectivity to popular environmental test chambers.



► **Nokia had 31.2% market share of the cell-phone market in the third quarter of this year, virtually unchanged from a year earlier but up slightly from the two previous quarters, according to InStat/MDR. Nokia shipped 51.4 million handsets in the quarter. Motorola and Samsung were second and third, shipping 23.3 million and 22.2 million units, respectively.**