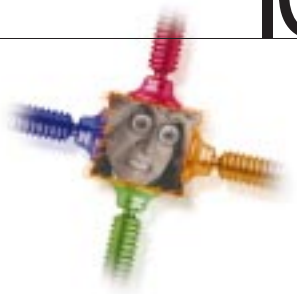


OH, THE PRESSURE!

"Because of time-to-market pressures, the complexity of their projects, and the difficulty of finding the right answers to their questions, engineers today are in pain, and they are looking for something–anything–to help them relieve the pain."

–Jim Williams, Linear Technology

Firewire IC targets hot portable applications

by Maury Wright

Texas Instruments claims that interest in IEEE 1394 Firewire is heating up, especially in portable and notebook applications, in which the high-speed interface offers the only viable digital video connection.

hot product

Whereas 1394 support still hasn't landed in core logic, TI's new PCI4450 integrates CardBus and 1394 support for notebook computers, virtually eliminating the price premium for 1394.

To address this market, TI has developed the PCI4450 IC, which integrates both a CardBus interface—a virtual requirement in notebooks—and a 1394 open-host-controller interface (OHCI) link-layer controller. The IC includes two 1394 ports, supports 400-Mbps data rates, and requires an external 1394 physical-layer IC. It also includes Zoom Video support in the CardBus interface. Production will commence in the first quarter of next year, and price is $20 (1000). TI believes its aggressive pricing will result in 1394-enabled systems with bill-of-material costs within $10 of non-1394 systems.

▸**Texas Instruments**, Denver, CO. 1-800-477-8924 ext 4500, www.ti.com. Circle No. 479

CompactPCI handles avert live-insertion mishaps

Self-locking handles prevent accidental board extraction in CompactPCI and VME-64ext applications.

The high-leverage, self-locking (HLS) injector handles from Schroff comply with the IEEE 1101.10 standard for CompactPCI and VME-64ext systems. The handles provide high leverage for inserting boards into high-pin-count backplanes. They feature an extended alignment pin, a keying option, and a secure positive lock that prevents accidental ejection of the board. This safety lock is a must for live-insertion applications. Schroff also offers the HLT, a sibling of the HLS. A long-profile design, the HLT has a snap lock in the inserted position. You can obtain the handles with an optional microswitch configuration, useful for detecting ejection in live-insertion applications. Unit prices start at $3.95.—by Bill Travis

▸**Schroff Inc,** Warwick, RI. 1-401-732-3770, www.schroffus.com. Circle No. 480

ACCESS WEB FROM ANY PHONE

The VoxML voice-markup language from Motorola's Internet and Connectivity Services Division lets you access online content from any phone. Applications using VoxML let you use natural-voice commands to access personal banking information, weather forecasts, sports scores, stock quotes, and internal company information using wireless or wire-line phones or computers. Motorola, 1-603-305-4641.

Portable PC accepts CompactPCI modules

A partnership between Dolch Computer Systems (www.dolch.com) and National Instruments (NI) has produced a compact portable PC that accepts eight 3U-size CompactPCI modules. Among the modules that work in the unit are ones that conform to NI's PXI standard. PXI is an instrumentation-specific superset of the 3U version of CompactPCI.

The PXI-1025 Megapac PC is similar in shape to the "lunch-box" PCs of a decade ago but is considerably smaller. The unit is easy to maintain: You exchange not only the CompactPCI modules, but also the power supply and CPU without removing a cover. The triple-width CompactPCI module runs Windows 98 or NT on a Pentium-series µP. You can choose among an ac-powered unit that delivers 300W, a unit that accepts inputs of 85 to 265V ac or 10 to 32V dc, and another ac/dc-input supply that includes battery backup for uninterruptible operation.

Other features of the $7990 PC include an (approximately 10-in. diagonal) 800×600-pixel, back-lit, color flat-panel display; a connection for an external monitor; serial, parallel, and universal serial bus ports; a 4-Gbyte hard drive; a rear-facing, 3.5-in. floppy-disk drive; and optional IEEE 488 and Ethernet ports.

—by Dan Strassberg

▸**National Instruments,** Austin, TX. 1-800-258-7033, fax 1-512-683-8411, www.natinst.com.

◎Circle No. 481

Although it resembles the "lunch-box" PCs of yesteryear, the PXI-1025 Megapac is much smaller. The unit lets you swap the CPU, the power supply, and the CompactPCI modules without removing any covers.

FIBRE CHANNEL PCI CARDS OFFER COPPER OR GBIC CONNECTION

With bandwidth requirements on the rise, 1999 could be the year of Fibre Channel with its 100-Mbyte/sec data rates, and Hewlett-Packard appears poised to dominate the IC and board-level business. HP already holds a dominant market position in ICs and has just introduced two PCI boards to the market.

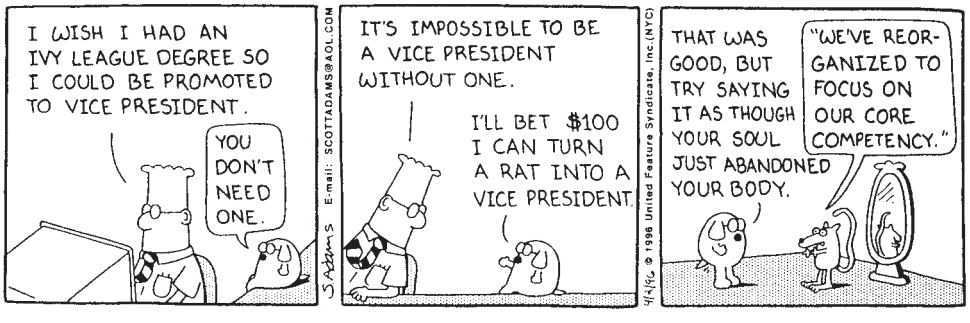
The HHBA-5100A and 5101A use HP's Tachyon TL (formerly, Tachyon Lite) controller IC and work in 32- or 64-bit PCI slots. The 5100A implements a DB9 connector for twisted-pair copper wiring, and the 5101A includes a gigabit-interface-converter (GBIC) receptacle. Numerous vendors sell GBIC modules that house transceivers for media choices that range from twisted-pair to long-wavelength optical fiber. (For more Fibre Channel information, see "Fibre Channel finally fills the gap in I/O subsystems," *EDN*, April 9, 1998, pg 58).

Available now, the boards sell for $750 and include Unix, Windows NT, and Netware drivers. GBIC modules range in price from $30 for copper models to $250 for long-distance optical models.

—by Maury Wright

▸**Hewlett-Packard Co,** Santa Clara, CA. 1-800-537-7715, ext 10050, www.hp.com/go/fibrechannel. ◎Circle No. 482

DILBERT *By Scott Adams*



FACTOID▸The Leonid storm, which will be caused by the earth moving through a trail of dust from the comet 55P/Tempel-Tuttle on November 17, should generate 200 to 5000 meteors per hour.

SRAMs take a new approach

Hiding inside MoSys' low-power SRAMs is something you might not expect—DRAM. The company constructs its memory arrays not of six-transistor or four-transistor/two-resistor SRAM cells, as do most other SRAM manufacturers, but of one-transistor, one-capacitor DRAM structures. Advantages of this approach include lower cost per bit at equivalent process lithographies and manufacturing volumes and reduced active-power consumption. However, because MoSys' memories are fundamentally DRAM, they still require refresh, resulting in higher standby-current draw than some ultralow-power SRAM alternatives.

MoSys' first-generation one-transistor SRAMs required a custom system controller to initiate refresh operations, but this second-generation architecture automatically takes care of refresh without the need for system intervention. Internal cache circuitry also eliminates collisions between external access requests and in-progress refresh operations. The results are memories that the company claims are fully pinout- and backward-compatible with true SRAM alternatives.

Devices now available for sampling are the 3.3V, $7 (100,000) MC80364K64, a 64k×64-bit pipeline-burst SRAM (PBSRAM) in a 128-pin QFP, and the $5 (100,000), 3.3V MC803128K32, a 128k×32-bit PBSRAM in a 100-pin QFP. Operating speeds reach 133 MHz, and the company plans variants with as much as 166-MHz speed and flow-through output as well as no-latency versions of its devices (known as NoBL or ZBT by other manufacturers) with first availability by the end of this year; higher densities should follow in 1999.—by Brian Dipert

▸**MoSys Inc**, Sunnyvale, CA. 1-408-731-1826, fax 1-408-731-1893, www.mosys com.
◎Circle No. 483

USB controller gets hard-wired

Fairchild Semiconductor's USB100 single-chip controller focuses on mouse, joystick, trackball, and digital-game-pad peripheral applications. Because it doesn't target general-purpose use, the USB100 replaces the generic embedded-controller core in many alternative approaches with more easily user-configured state-machine logic. In many cases, using the controller lets you design your peripheral device with little or no knowledge of the Universal Serial Bus (USB). As a result, you don't have to wade through the mind-numbing, several-hundred-page USB and Human Interface Device specifications, yielding less development time.

Fairchild omits the one-time-programmable memory of other USB controllers with 512 bytes of reprogrammable EEPROM. By enabling you to trim the current settings for a mouse's LED and phototransistors, for example, the USB100 lets you account for component-to-component parameter variations. USB100 packaging options in the system-manufacturing line include $1.20 (1 million), 18-pin and $1.40, 24-pin DIPs. Fairchild also supplies reference files and descriptor tables for 2- and 3-D mice and for joysticks.

The EEPROM-based USB100 is now in production, and ROM versions are under development and should be available in the first quarter of 1999. The companion USB100EVAL kit costs $99 and includes software, documentation, chip samples, a serial-port-based device programmer, and a demonstration board.—by Brian Dipert

▸**Fairchild Semiconductor,** Sunnyvale, CA. 1-888-522-5372, fax 1-972-910-8036, www.fairchildsemi.com.◎Circle No. 484

HIGH-SPEED SOCKETS ACCOMMODATE RIMM

Sockets with transmission speeds of 800 MHz, with 1.6-Gbytes/sec peak bandwidth, accommodate Rambus-inline-memory-module (RIMM) systems. The RIMM sockets from Molex feature gold plating, metal fork locks to secure connectors to the pc board while soldering, and dual latches for easy module removal. The sockets offer 184 circuits (pins) on a 1-mm pitch, with 30-µin. gold plating in the contact area. RIMMs fit the same physical, power, and thermal profiles of 100-MHz synchronous-DRAM systems. To meet Rambus' electrical requirements, Molex uses 3-D mechanical-design tools and 3-D electromagnetic finite-element analysis for its design iterations and Spice modeling to evaluate the connector's performance. The sockets cost $1.95 (25,000).—by Bill Travis

Sockets from Molex for RIMM assemblies offer 1.6-Gbytes/sec peak bandwidth.

▸**Molex Inc**, Lisle, IL. 1-630-969-4550, fax 1-630-969-1352, www.molex.com.
◎Circle No. 485

FACTOID▸Microscopic particles hitting a spacecraft at 44 miles/sec are vaporized into electrically charged plasma that could short or damage spaceborne electronics.

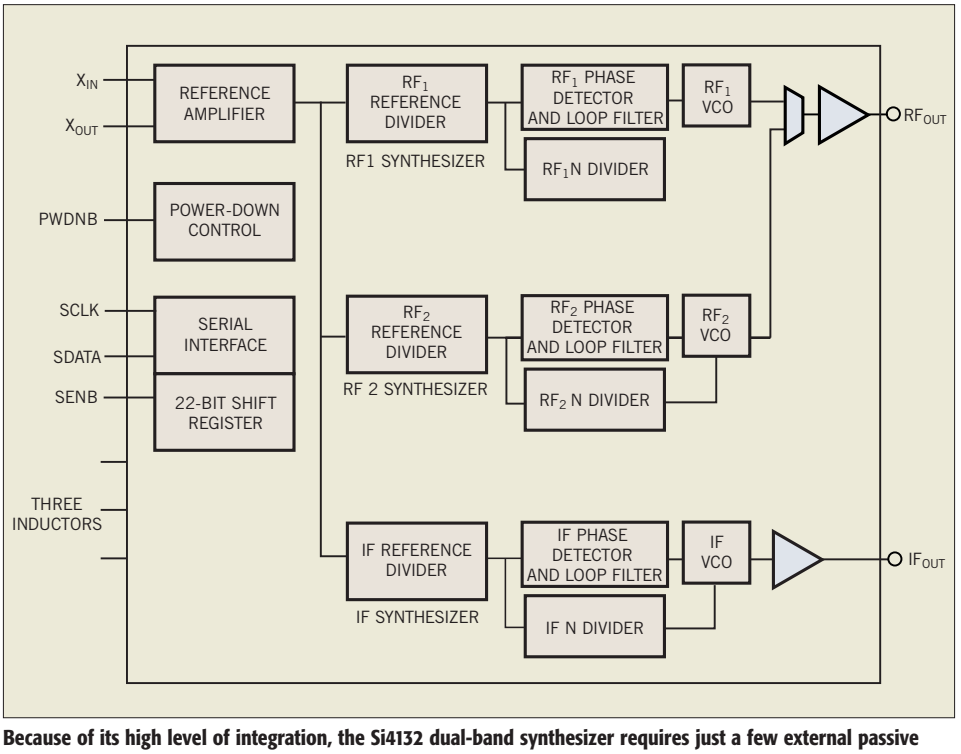
RF synthesizers further succumb to integration's allure

Critical RF/IF functions can require a significant number of ICs and associated passive components, thus making it harder for you to realize those desirable smaller form-factor communications systems. The Si4132 dual-band frequency synthesizer from Silicon Laboratories can push you toward that shrinkage goal, because it includes a sophisticated dual-band RF/IF PLL pair in a 24-pin package. With this IC, you can achieve dual-band RF synthesis from 600 to 1300 MHz and 1300 to 1600 MHz, as well as IF synthesis from 50 to 600 MHz, appropriate for cellular-phone, personal-communications-service, cordless-phone, and local- and wide-area-network designs.

The device includes three VCOs, resonators, loop filters, reference and VCO dividers, and phase detectors. In addition to normal supply bypassing, this IC requires four passive components, including three inductors. You can implement the inductors using pc-board traces because of their nanohenry values. By using a proprietary self-tuning architecture, the Si4132 requires no external adjustments or trims to compensate for tolerance matching. You control the operation of this IC via a serial port. Operating voltage for the $6.50 (10,000) device is 2.7 to 3.6V, and current consumption is 18 mA at 3V and 1 mA in standby mode.

—by Bill Schweber

▸**Silicon Laboratories,** Austin, TX. 1-512-416-8500, fax 1-512-416-9669, www.silabs.com.
◎Circle No. 486



Because of its high level of integration, the Si4132 dual-band synthesizer requires just a few external passive components and provides critical RF/IF functions.

NT WORKSTATION SPORTS 450-MHz XEON PROCESSORS

Announced simultaneously with Intel's (www.intel.com) fastest Pentium II μP, the Compaq Professional Workstation SP700 combines support for the new 450-MHz Slot 2 Xeon processor with the second generation of Compaq's Highly Parallel System Architecture (HPSA). The dual-processor HPSA includes parallel memory buses that provide 1.6-Gbyte/sec peak bandwidth and dual-peer PCI buses offering 267-Mbyte/sec aggregate bandwidth.

The system also includes Advanced Graphics Port 2× support, and Compaq offers a range of storage and graphics options. Along with standard I/O and Universal Serial Bus ports, a dual-port 1394 interface comes standard with the SP700, allowing for connection of digital video devices. Prices for the system start at $3849 with a single 450-MHz processor, a 4-Gbyte Ultra-Wide SCSI disk, and 128 Mbytes of memory.

—by Maury Wright

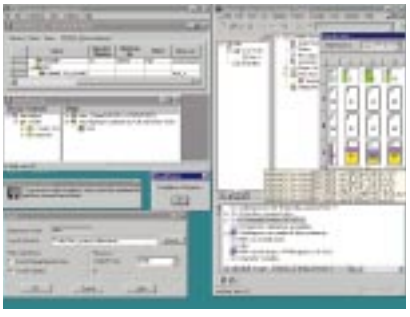
▸**Compaq Computer Corp**, Houston, TX. 1-800-345-1518, www.compaq.com.
◎Circle No. 487

FACTOID▸Philo Farnsworth, one of the key contributors to the development of television, recalled that his idea for line-by-line image scanning—which we now take for granted—came to him in 1921, when he was 15 years old and looking over a field he had just plowed in neat rows.—*Tube: the Invention of Television* by David E Fisher and Marshall Jon Fisher, Counterpoint Books, 1996.

Hordes of tools emerge for programmable-logic design

The Quartus design-tool system is Altera's answer to what designers will need for the company's new Raphael high-density programmable-logic chips. To handle core-based, design-team-developed designs, the Quartus tools include new features that make the company's programmable-logic-chip design environment look more like an ASIC-design environment.

For chip compilation, Altera has created the nSTEP compiler, which includes multiprocessor support and incremental compilation. A heterogeneous multiprocessor-design network significantly reduces compilation times for large chips. Changes you make after an initial compilation result in resynthesis and replacement of only the affected logic during a subsequent compilation. The nSTEP tool also analyzes your design and partitions logic functions into the appropriate types of blocks—look-up-table-based, product-term-based, or embedded memory—in a Raphael-based design.



Quartus' graphical user interface lets you launch and control other EDA vendors' tools in your programmable-logic chip design.

For design verification and debugging, some higher capability versions of Quartus include SignalTap for capture and analysis of any signal within a Raphael chip. SignalTap logic analysis includes a signal-capture megafunction (with functionality like a logic analyzer), JTAG communications cable, and a waveform editor within Quartus. You select which signals you want to monitor and define trigger points for signal analysis. SignalTap then puts the signal-capture block into your design (with a small size increase). You run your Raphael chip at system speed with data from the SignalTap analysis stored in Raphael's embedded-array blocks. The data then goes to Quartus, which analyzes and displays it on the waveform viewer. Quartus will be available early next year for Windows and Unix platforms. Tool prices start at $1395; a typical system costs around $4000.

Joining Vantis' DesignDirect tool suite is DesignDirect-CPLD, a set of CPLD tools supporting mixed HDL and schematic chip design. Along with design-entry capability, the tools include both VHDL and Verilog synthesis and simulation tools. Running from either a graphical user interface or script, DesignDirect-CPLD accepts design constraints, such as pin assignments and logic grouping, from third-party EDA tools or from a built-in constraints editor. You can input a design netlist from a range of tool vendors and output VHDL, Verilog, and standard-delay-format netlists for many third-party simulators.

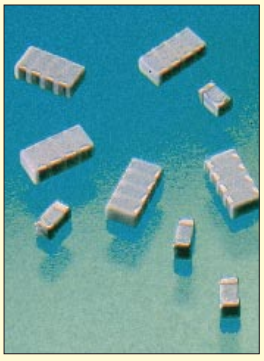
DesignDirect-CPLD includes Exemplar's (www.exemplar.com) Leonardo Spectrum synthesis tool and HdlInventor HDL editor. You also get Model Technology's (www.model.com) ModelSim for VHDL and Verilog simulations. Another handy DesignDirect-CPLD tool is Performance Analyst, an interactive static-timing analyzer. Along with the usual propagation, setup-and-hold, and maximum-frequency analyses, Performance Analyst includes explicit output enable/disable analysis for bus-oriented designs and detailed point-to-point investigation of your design's slowest paths. You can get a minimal DesignDirect-CPLD, minus the ModelSim simulator, for as little as $495. A full HDL-capability version, with simulator, starts at $1495.

In the updated-design-tool category, Minc offers a new version of Abel Designer. For designing simple programmable devices using Abel, this version offers full 32-bit native-Windows support, updated device kits for many programmable-logic families, and a simplified installation procedure. Prices start at $1995.—by Jim Lipman

▸Altera, San Jose, CA. 1-408-544-7000,www.altera.com.
◎Circle No. 488

RC NETWORK SQUEEZES INTO 0603 SIZE

The |Z| chip from AVX Corp is an impedance-matching series-resistor-capacitor chip, packaged in an 0603-size surface-mount format. The chip is suitable for line-termination applications in products such as handheld and notebook computers. The device saves system power by blocking dc current in termination and matching circuits. AVX manufacturers the |Z| chip by using a resistive electrode material that creates the resistor value, rather than by screening a capacitor onto a resistor network. The electrode material also acts as the capacitor's electrode plate. The chip is available in capacitor values of 33, 47, 68, 100, and 150 pF with ±20% tolerance and in resistor values of 22, 33, 47, 51, 80, 100, and 150Ω with ±10% tolerance. The 25V capacitor provides near-NP0 (±30 ppm/°C) performance. The |Z| chip costs $0.05 (100,000).—by Bill Travis



Using an RC network such as AVX's |Z| chip rather than a resistor saves system power by eliminating the dc current in the terminating resistor.

▸**AVX Corp**, Myrtle Beach, SC. 1-843-946-0414, fax 1-843-448-1943, www.avxcorp.com.
◎CIRCLE NO. 489

FACTOID▸3575 start-ups were launched in Silicon Valley in '97.

RF LNA ATTENUATOR LETS YOU STEP LIVELY

Using 900-MHz MRFIC0930 or 1.8/1.9-GHz MRFIC1830 GaAs low-noise amplifiers from Motorola, you get built-in variable-gain function with two-step gain control of 1 or 19 dB, which you set via a digital line. As a result, you may not need an external variable-gain circuit to improve your front end's dynamic range. The 2.7V ICs

Designed as low-noise amplifiers for 900-MHz and 1.8/1.9-GHz applications, these 2.7V RF devices include switchable front-end gain of 1 or 19 dB.

feature a noise figure of 1.7 and 2.1 dB for the lower and higher frequency devices, respectively. Reverse-isolation specifications are 41 and 38 dB for these $2.75 (10,000) low-noise amplifiers, available in SO-8 and Micro-8 surface-mount packages.—by Bill Schweber

▸**Motorola Semiconductor Products Sector**, Phoenix, AZ. 1-602-413-4991, fax 1-602-413-7986, www.motorola.com/wireless-semi/. ◎CIRCLE NO. 490

Test-executive software is standard but customizable

Engineers who develop applications for testing high-volume manufactured items, such as PC main boards, no longer have to roll their own test-executive software. National Instruments (NI) has come to the rescue with the Test Stand shrink-wrapped package. Test Stand implements routine but necessary executive tasks in a way that lets test-application developers customize their applications to their hearts' content.

Few test engineers want to develop test executives, which sequence tests and report test results. Writing such software is time-consuming and not especially creative. The engineers' companies would be better off if the engineers could spend their time instead on solving measurement problems. Unfortunately, until now, there has been little test-executive software on the market. Test Stand fills the void by allowing developers to write their tests in any language that produces executable files or dynamic-link libraries (DLLs). Packages that produce such files include C/C+, Visual Basic, and NI's LabView and LabWindows/CVI. By using Test Stand, developers can reuse software modules and combine them in applications without regard to the language in which the source code is written.

NI reports that benchmark tests demonstrate the speed of Test Stand's multithreaded 32-bit execution engine. According to the company, the execution engine can call test sequences in less than 1 msec. The software offers flexible report generation, including the ability to publish test results and summaries of test statistics to Web pages on company intranets. Test Stand costs $2995. The price for a two-day training course is $1295.

—by Dan Strassberg

▸**National Instruments,** Austin, TX. 1-800-258-7033, fax 1-512- 683-8411, www.natinst.com. ◎Circle No. 491

Innovating an innovation

AMD's 16-Mbit AM29DL160 and 32-Mbit AM29DL320 flash-memory families make incremental but useful enhancements to the original simultaneous-read/write architecture that won *EDN*'s 1997 digital-IC Innovation of the Year award. At each density point, the company now offers four products, each subdividing the array into two independently functioning banks, which you can simultaneously program, erase, or read. Bank 1-versus-bank 2 sizes for the AM29DL160 are 0.5/15.5, 2/14, 4/12, and 8/8 Mbytes. Bank-size options for the AM29DL320 are 0.5/31.5, 4/28, 8/24, and 16/16 Mbytes.

AMD also adds the Secure Silicon Sector, a 64-kbyte block for storing security codes, such as to prevent cellular-phone cloning, system-manufacturing information, or any other code or data. You can optionally bypass the internal high voltage pump by externally applying 9V, analogous to Intel's (www.intel.com) SmartVoltage technology. This option enables approximately 50% higher theoretical programming performance, according to the company.

The AM29DL160 series comes in 48-lead TSOP and 48-ball FBGA package options; prices begin at $8.25 (10,000). Price for the AM29DL320 in the same packages begins at $15.75. AMD's Data Management Software, freely downloadable from the company's Web site, enables EEPROM emulation using one of the flash-memory banks.—by Brian Dipert

▸**AMD Corp**, Sunnyvale, CA. 1-408-732-2400, fax 1-408-774-7216, www.amd.com. ◎Circle No. 492

FACTOID▸According to Cisco's annual report, e-mail messages outnumber regular mail messages 10-to-1.

Multichannel digital delay isolator immunizes I/O from signal ailments

It's a challenge getting close to your digital signals in a data-acquisition system without succumbing to any of their problems: switching transients, ground loops, and common-mode voltages. To solve these problems, you can use per-channel optoisolators or Burr-Brown's ISO508 IC, which uses capacitive barrier isolation to yield significantly lower power consumption and pc-board-area demands.

The eight-channel, 24-pin DIP operates synchronously or asynchronously at data-transfer rates as high as 2M words/sec. It offers 1500V isolation and a double-buffered internal design with three-state outputs to simplify system integration and eliminate timing-skew problems. Typical power consumption is less than 12 mW per channel. The ISO508 costs $8.19 (1000).

—by Bill Schweber

▶**Burr-Brown Corp**, Tucson, AZ. 1-520-746-1111, fax 1-520-746-7401, www.burr-brown.com. ◎Circle No. 493

You get 1500V isolation for digital I/O at low power consumption by using the Burr-Brown eight-channel ISO508 capacitive-isolator IC, which supports 2M-word/sec data rates and contains double-buffered registers.

IC SLICs extend POTS ringing range

Although digital-subscriber-line (xDSL) and higher speed interconnects garner headlines, the ever-present analog plain-old-telephone-service (POTS) line still needs attention and interfacing, especially with applications such as wireless local loop, Pairgain, integrated services digital network, and small-office/home-office private-branch-exchange designs. Harris Semiconductor's RSLIC18 family of ringing subscriber-line interface-circuit (SLIC) ICs for termination line cards deliver ringing voltages as high as 100V, thus allowing you to ring local loops as high as 1500m/500Ω or more. Despite the higher voltage rating, the family members dissipate just 50 mW, important in high-density and heat-challenged installations.

The POTS loop is not forgotten: Harris' RSLIC18 family can ring long loops with as much as 100V capability to support the many analog telephone-company-line applications still extant and growing.

The five members of the family offer different combinations of features, but all units support five ringer-equivalence-number operation, sine or trapezoidal ringing waveforms, and an integrated codec ringing interface. The other mix-and-match features available include an integrated battery switch; silent polarity reversal, loop-back test capability; and longitudinal balance as high as 58 dB. The devices come in 28-lead surface mount packages, are fabricated in a high-voltage dielectric isolation process, and cost approximately $4 (1000). Harris also offers evaluation boards and reference designs for these devices, which meet all applicable international regulatory requirements.—by Bill Schweber

▶**Harris Corp,** Semiconductor Sector, Melbourne, FL. 1-800-442-7747, www.semi.harris.com. ◎Circle No. 494

TIMING-GENERATOR BUFFERS GO WITH THE FLOW OF SPREAD-SPECTRUM PC CLOCKS

As motherboard clocks speed up, EMI containment to meet regulatory requirements is an increasingly severe design challenge. Spread-spectrum clocks ease the pain by spreading the RF energy around a narrow band but bring a new set of potential concerns to your design (see "Intentional clock modulation," EDN, Aug 3, 1998, pg 24). A series of "spread-aware" zero-delay buffers from IC Works operate properly, despite the spread-clock signal they receive. By using a narrow spread-spectrum clock generator, you can reduce your measured EMI at the frequency of concern by about 10 dB—enough to make the difference between a regulatory pass or fail grade or eliminate the need for additional shielding and board layers.

Initial products are the 10-input W132-10 zero-delay buffer with external feedback and the eight-output W152-XX with external feedback and ×2, ×4, and /2) integer-multiplication options. A proprietary PLL loop design allows the spreading signal to pass through yet not cause a PLL tracking-skew problem. Cycle-to-cycle jitter is less than ±300 psec. The W132-10 costs $4, and the W152 series costs $3.75 (10,000).

—by Bill Schweber

▶**IC Works,** San Jose CA. 1-408-922-0202, fax 1-408-922-0833, www.icworks.com. ◎Circle No. 495

FACTOID▶28% of all software in use in North America is pirated, according to a 1997 survey by the Business Software Alliance.

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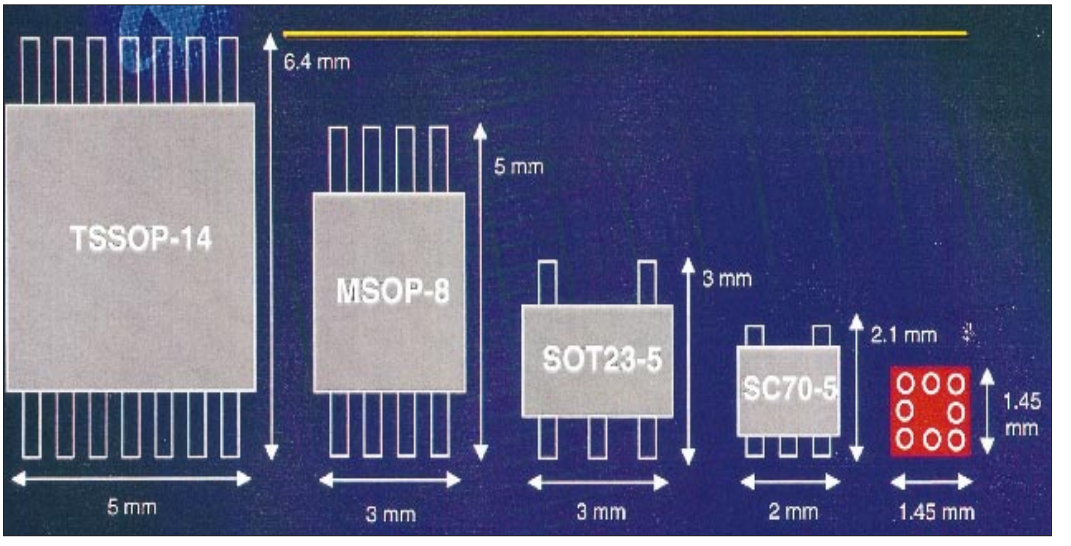
Dual op amp virtually vanishes, delighting designers

Ever-smaller packages for basic analog functions are the relentless trend. National Semiconductor, which this year introduced a single op amp in the SC70 package ("Never say never to smaller linear ICs," *EDN*, April 9, 1998, pg 12), now has put two op amps in a Micro-SMD package that measures 1.45× 1.45×0.9 mm for a footprint *half* that of the SC70 housing. With the LMC6035 family, the die is the package: The die includes a top coat, bumps, reflow, and an epoxy back coat and is then marked, tested, and cut.

Each op amp in the dual device operates to as low as 2V and is specified at voltages of 2.7 to 15V as well as for 2 kΩ and 600Ω loads. The op amps feature rail-to-rail output swing, 1.4-MHz gain-bandwidth product, and 20-fA input current, and they deliver 0.01% distortion at 10 kHz. The LMC6035IBP costs 36 cents (1000).—by Bill Schweber

▶**National Semiconductor Corp**, Santa Clara, CA. www.national.com/design. ◎Circle No. 496



Going, going, almost gone: National's LMC6035 dual op amp in a Micro-SMD package has a footprint that is half that of the SC70 package and approximately 20% of the ubiquitous SOT23.

Hot-swap controller IC is critical to accomplishing successful RAID

When you're building a redundant-array-of-independent-disks (RAID) system, your ability to hot-swap drives contributes to system availability. The HIP1012 dual power-distribution controller targets RAID systems, providing accurate overcurrent protection via active current limiting for both 5/12 and 3.3/5V buses. An internal time-out in this 14-pin SOIC eliminates "nuisance" trips by delaying the protection trip action until that undesired condition has existed for a user-programmed interval. The IC disconnects both loads from the power rails if the overcurrent condition exists beyond the time-out period; in addition, it immediately disconnects power if the current value is more than three times the set limit level, giving you an additional level of protection. You can use inexpensive N-channel MOSFETs with this $4.85 (1000) device as your current valve.

—by Bill Schweber

▶**Harris Corp, Semiconductor Sector,** Melbourne, FL. 1-407-729-4984, fax 1-407-729-5321,www.semi.harris.com.◎CIRCLE NO. 497