IC VENDORS SEEK GREEN APPLICATIONS

BY RICK NELSON • EDITOR-IN-CHIEF
Semiconductor vendors introduced a slew of chips and components toward the end of 2010. Their product introductions, many of which occurred during the Electronica show in November in Munich, suggest trends that will carry on through 2011: the increasing power of multicore processors, a proliferation of sensors and sensor-interface chips, increasingly innovative human-to-machine-interface devices, compact optical and wireless transceiver devices, low-power LEDs and drivers, and even sophisticated circuit-protection devices (see sidebar “Circuit-protection devices complement ‘green’ ICs”).

If you could use one adjective to describe most of these new products, that word would be “efficient,” with the chip vendors looking to enable increasing efficiency in applications including telecommunications, automotive electronics, mobile consumer devices, consumer appliances, medical electronics, and solar and wind farms.

At Electronica, STMicroelectronics Chief Executive Officer Carlo Bozotti cited “green” technologies as among the key trends that his company plans to harness for continued semiconductor success in the future (see sidebar “Semiconductor executives assess where we’re going”). Products his company highlighted at the show included the high-performance, low-power MP45DT01 digital-output stereo microphone. The MEMS (microelectromechanical-system) device targets audio applications across a range of market segments, including cell phones, portable media players, games, digital cameras, security systems, learning devices, and hearing aids. The microphone uses sensor technology from Omron that is inherently less susceptible to mechanical vibration, temperature variations, and EMI (electromagnetic interference).

Other devices from STMicro addressing low-power applications include extensions of its STM8L EnergyLite ultralow-power microcontroller family, with three new variants—the STM8L151, the STM8L152, and the STM8L162—each offering 64 kbytes of flash memory, effectively doubling the maximum program/data memory available to developers using the 8-bit STM8L family. The STM8L152 adds an enhanced LCD controller that supports larger segments, and the STM8L162 is the first device in a new line featuring on-chip 128-bit AES (Advanced Encryption System) encryption, according to the company.

In addition, STMicro highlighted its SPV1001, which contains a low-loss power switch and a precision controller and directly replaces the bypass diodes that prevent hot-spot effects in solar panels. The SPV1001 saves the energy that the diodes normally lose.

STMicro augmented its sensor portfolio with a new automotive-grade three-axis low-g accelerometer. Combining low power consumption and a small footprint with high precision and robust performance, the accelerometer targets automotive applications, including vehicle tracking, event recording, abuse monitoring, and dead-reckoning for enhanced navigation capabilities. STMicro’s AIS328DQ senses acceleration along all three axes and converts the motion and tilt information into a high-resolution digital signal that it transmits to a microcontroller through a standard SPI (serial-peripheral interface) or I2C (inter-integrated-circuit) interface.

The company also introduced the low-power S-Touch FingerTip touchscreen controller for smartphones. The device includes noise cancellation to support on-cell LCD technology without requiring a ground-shielding layer between the display and the touch sensor, enabling smartphones to have thinner touchscreen-LCD modules. In addition, STMicro released details of a patented high-efficiency circuit and dedicated optimized power components for use in boost or buck converters in switched-mode power supplies for computers and telecom equipment. The company’s new design, BC2 (back-current circuit), now allows the use of competitively priced silicon diodes in place of expensive SiC (silicon-carbide) devices. STMicro also announced a family of six silicon-based rectifiers and free-wheel diodes for BC2 applications.

**ENABLING INCREMENTAL GAINS**

Fairchild was also touting efficiency and green applications. Mark Thompson,
Fairchild’s president, chief executive officer, and chairman, at an Electronica press conference suggested that efficiency is a key concern of the company’s power-conversion, industrial, and automotive group and the mobile, consumer, and communications group. Efficiency, Thompson said, was once a concern only of engineers; today, it’s a concern of consumers and governments, which often mandate efficiency standards.

Chip makers such as Fairchild are not necessarily targeting the huge efficiency gains that engineers could achieve with breakthrough technologies such as all-electric vehicles. Rather, they are often looking to enable incremental gains that result in slow but steady improvements. Commenting on the automotive segment, Thompson suggested that gains in efficiency will come with the increasing adoption of brushless dc motors, which is also occurring in consumer appliances. For the next decade, Thompson expects, hybrid and all-electric vehicles will remain a small part of the market, with gains in fuel efficiency coming incrementally as auto manufacturers replace hydraulic and other parasitic loads in, for example, power-steering mechanisms and water pumps with higher-efficiency Fairchild power-module-based alternatives. In other areas, the company is looking to improve the sleep-mode efficiency of power supplies and is pursuing continual improvements in smartphones, with the innovations Fairchild provides decoupled from the big cores the manufacturers are using.

The pursuit of such applications has required some changes in Fairchild’s business approach, Thompson said, explaining that, as its standard-product emphasis has dwindled, the company is turning to a distribution-centered approach in favor of more emphasis on a direct sales force. The aim, he added, is not to target a particular part, such as a MOSFET, but rather an application, such as solar. Toward that end, Fairchild focuses on a deliberately diversified but not too diverse application spectrum. Industrial accounts for 30% of the company’s revenue, consumer for 25%, computing for 23%, handsets and communications for 16%, and automotive for 5%. Such a mix accounts for seasonal and other variations in each segment.

Fairchild introduced the FAN9612 BCM (boundary-conduction-mode) interleaving PFC (power-factor-correction) controller (Figure 1), which provides more than 96% power-conversion efficiency for ac/dc power supplies. Applications include power supplies for digital TVs, desktop and entry-level server computers, front-end telecom systems, and industrial-power systems operating at 100 to 1000W. The company reports that an interleaving technique boosts the device’s maximum output to 1000W from the typical 300W level of lower-cost BCM PFC converters. Interleaving also enables a reduction of the input-filter size, reducing board space by as much as 10%.

Other new devices from Fairchild include the 2.5A FOD3120 and 1A FOD3150 output-current gate-drive optocouplers for use in solar inverters, motor drives, and induction-heating applications; 2.8 to 36V AccuPower integrated current-limiting load switches, which provide full protection to systems and loads that may encounter large current conditions; and the FAN5400 family of USB-compliant, lithium-ion switching chargers with USB OTG (On-The-Go) capabilities.

**POWER CONVERTERS**

Micrel focused on power ICs at Electronica, as well, including the MIC26xxx SuperSwitcher II fully integrated power-converter line, which comprises three dc/dc buck regulators featuring the company’s proprietary Hyper Speed Control architecture. The MIC26400, MIC26600, and MIC26950 devices operate with an input supply voltage of 4.5 to 26V and deliver an output current of 5, 7, and 12A, respectively. Micrel also highlighted its MIC2176-1/2/3 family of constant-frequency, synchronous buck controllers featuring a digitally modified adaptive on-time control architecture. The MIC2176 family operates over an input supply range of 4.5 to 75V and can supply as much as 15A of output current. The output voltage is adjustable to 0.8V with a guaranteed accuracy of ±1%, and the device operates at a constant switching frequency of 100, 200, and 300 kHz. Micrel’s Hyper Speed Control architecture allows for fast transient response; reduces output capacitance; and enables high-input-voltage, low-output-voltage operation. The controller targets distributed-power systems; networking/telecom infrastructure; and printer-, scanner-, graphics-, and videocard applications.

For portable-system applications, Mi-
The innovations that vendors presented at Electronica 2010 ran the gamut from ICs and components to test-and-measurement equipment. Manufacturers presented circuit-protection devices that might, at first glance, seem important yet less eye-catching than, for example, multicore DSPs. Nevertheless, Tyco Electronics presented a couple of such devices worth a closer look.

Low-power devices often find their way into battery-powered products, which require protection from overcurrent situations that could damage the battery and lead to safety problems. Tyco is addressing such applications with an MHP (metal-hybrid-polymetric-positive-temperature-coefficient) device that protects lithium-ion batteries in high-power applications, providing bimetal protection with built-in arc-suppression technology. It addresses applications such as those involving consumer power tools in which a drill bit gets stuck, resulting in a potentially damaging overcurrent condition.

The device serves battery applications at ratings higher than 30V dc and 30A; it includes a bimetal device, which opens and closes as fault conditions occur and clear, in parallel with an MHP device that suppresses arcing when the bimetal device opens, thereby avoiding the likelihood that the bimetal contacts can weld shut. You can install the compact device in a battery pack.

Tyco also introduced an RTP (reflowable-thermal-protector) device (Figure A) that offers simplified thermal protection in an SMD (surface-mount-device) package.

Competitive devices can’t withstand reflow temperatures; after all, melting is the operational mechanism by which such devices work. However, Tyco’s new product, suitable for automotive and industrial operations, is a robust, vibration-insensitive, dc-rated, lead-free device that can withstand up to three 260°C reflow passes without opening. During reflow, a fuselike support mechanism holds the circuit-protection mechanism in place, even though its solder connection melts. On initial power-up, the support mechanism opens, arming the device. Subsequently, the device opens if the junction temperature exceeds 200°C. Note that the device is a temperature-sensing—not a current-sensing—device. It provides protection due to copper-loss heating in resistive faults, such as a failed FET in resistive mode, in which overcurrent is not a factor.

The MIC23153 implements a patented architecture that delivers a high-efficiency light load for portable products and green-home and -office appliances. The MIC23153 features internal MOSFETs that can deliver 2A output current and that consume just 23 µA of quiescent current in a 2.5×2.5-mm thin-MLF package. The MIC23153 achieves as much as 93% peak efficiency and 87% efficiency under a 1-mA load. In addition, the MIC23153 offers an adjustable soft start to minimize battery-transient loading.

Micrel’s LED-related products include the MIC3201/02/03 family, which can drive as many as four 1A HB LEDs (high-brightness light-emitting diodes) in series at more than 90% efficiency with ±5% current accuracy from input voltages of 4.5 to 20V. With its hysteretic-control architecture and high-side current-sense scheme, the MIC3201 can provide constant current with changes in input voltage and output load. The MIC3201’s operating frequency is adjustable to 1 MHz to allow...
flexibility in the design. The MIC3201 features a dedicated PWM (pulse-width-modulated) dimming pin, an enable pin for very-low-power shutdown, overtemperature protection, and undervoltage lockout. The MIC3201 has an internal power switch and requires no external compensation. In addition to enhanced power-driving capability and reliability, the MIC3201 comes in an exposed-pad SOIC-8L package.

Micrel also highlighted the MIC28xx series of high-efficiency white-LED drivers to drive multiple LEDs and extend battery life for portable display backlighting and keypad backlighting in mobile devices. The MIC2842A architecture boosts efficiency by avoiding the switching losses that occur in traditional charge pumps or inductive boost circuits. The MIC2843A provides six linear drivers, which maintain constant current for as many as six white LEDs. With a typical dropout voltage of 40 mV at 20 mA, the MIC28xx devices allow the battery to directly drive the LEDs, eliminating the switching noise and losses that occur with the use of boost circuitry.

Low-power Ethernet products were also on display. Micrel’s KSZ8051/8031 family of low-power, small-package, single-port 10/100-Gbps PHY transceivers provides the MII (media-independent interface) or RMII (reduced media-independent interface) to transmit and receive data over standard Category 5 UTP (unshielded-twisted-pair) cable or fiber. Micrel based the device on its enhanced mixed-signal design, which halves power consumption compared with the previous generation. The devices feature high integration, including on-chip termination and an integrated regulator; reduced system cost; and simplified system design. Micrel also exhibited the KSZ8873/KSZ8863 series of highly integrated, three-port switch-on-chip ICs, which, according to the company, offer the industry's smallest footprint.

LOW-POWER CONVERTERS

Linear Technology Corp addressed green applications with power-management as well as data-converter chips. It introduced three families of low-power, 16-bit, 25M- to 125M-sample/sec ADCs that dissipate approximately half the power of competing 16-bit products. The single-channel LTC2165 and two-channel LTC2185 simultaneously sampling parallel ADCs, offer a choice of full-rate CMOS or DDR CMOS/LVDS (low-voltage-differential-signaling) digital outputs with programable digital output timing, programable LVDS output current, and optional LVDS output termination. The LTC2195 family includes two-channel, simultaneously sampling ADCs with serial LVDS outputs. The low-power, 16-bit ADCs target applications such as handheld test instruments, radar/LIDAR systems, portable medical-imaging systems, PET and SPECT scanners, smart-antenna systems, and low-power communications systems.

For power applications, Linear announced the LTC3112 synchronous buck-boost converter (Figure 3), which delivers as much as 2.5A of output current from a range of power sources, including single- or multiple-cell batteries, supercapacitor stacks, and wall adapters. Its 2.7 to 15V input range and 2.5 to 14V output range provide a regulated output with inputs higher than, lower than, or equal to the regulated output. The LTC3112 incorporates a low-noise buck-boost topology that provides a continuous, jitter-free transition between buck and boost modes. You can synchronize the LTC3112’s default 750-kHz switching frequency to an external 300-kHz to 1.5-MHz clock.

Also for power applications, Linear introduced the LT3692 monolithic, dual-output, step-down switching regulator that can deliver as much as 3.5A of continuous output current from each channel; the LTM4628 μModule regulator, which contains two step-down 8A dc/dc-converter circuits with the induc-tors, MOSFETs, and other necessary components in a 15x15x4.32-mm LGA package; and the six-output LTM8008 six-output dc/dc μModule regulator, which operates from –40 to +150°C and includes a 3 to 72V input SEPIC and six linear regulators in a 15x15x2.82-mm LGA package.

SPECTRAL EFFICIENCY

Texas Instruments chose Electronica to reaffirm its commitment to the high-performance embedded-processing market with the introduction of the TMS320C66x fixed- and floating-point DSP cores plus four scalable C667x multicore DSP devices, which can help enable green initiatives, such as the smart grid. The company built the new DSPs with multiple 1.25-GHz DSP cores. According to Ramesh Kumar, TI’s worldwide business manager for multicore and media-infrastructure DSP, they are the industry’s first 10-GHz DSPs with 320 GMACS (billion multiply/accumulate operations per second) and 160 Gflops (billion floating-point operations per second) of performance on a device. TI based the C667x DSP family on the company’s new KeyStone multicore architecture, which maximizes the throughput of on-chip data flows and eliminates the possibility of bottlenecks, so that developers can fully use the processing power of the DSP cores.

TI is also introducing a wireless-base-station SOC with 4G-class performance. The company built the device as a wireless data engine from its inception; the new TMS320TCl6616 base-station SOC employs the new TMS320C66x DSPs and KeyStone multicore architecture. The TCI6616 also performs both fixed- and floating-point math.
The C667x DSP family includes three pin-compatible multicore DSPs in two-, four-, and eight-core versions, the TMS320C6672, TMS320C6674, and TMS320C6678, respectively, as well as a four-core communications SOC, the TMS320C6670. Using TI’s C667x multicore DSPs, infrastructure developers can now more easily design integrated, software-upgradable, power- and cost-efficient platforms in mission-critical markets involving public safety and defense, medical and high-end imaging, test and automation, high-performance computing, core networking, and smart grids.

Kumar singles out advanced imaging products for wafer inspection, LCD inspection, solar-cell inspection, smart cameras for factory automation, ultrasound systems, and industrial microscopes as key targets for the new multicore devices. In the test-and-measurement area, he highlights vector signal analyzers, spectrum analyzers, vector signal generators, base-station analyzers, audio/video-quality testers, impairment generators, mobile-phone service testers, and traffic generators and analyzers as instruments that could employ the new multicore DSPs. TI also offers the MCSDK (multicore-software-developer kit) and a suite of multicore tools, as well as an ecosystem of software and hardware partners. The new C667x multicore DSPs are also software-compatible with TI’s C6000 DSPs, enabling vendors to reuse their software.

TI developed the TCI6616 base-station SOC to incorporate field-proven PHY technology, an autonomous packet-processing engine, and programmable DSPs. The company implemented these elements as configurable coprocessors, which enable SDR (software-defined radio). SDR allows operators to rationally migrate to emerging standards without needing external components. Autonomous packet processing in the TCI6616 manages packets from both core and radio networks, offloading packet processing and freeing cycles for algorithms that enhance spectral efficiency.

Another company addressing smart-grid and related green applications is Samsung Electro-Mechanics. Last fall, Chief Executive Officer Jong-Woo Park commented that, in the smart-grid sector, Samsung is now involved in power conversion, including photovoltaic inverters and smart meters for remote measuring, and module services. The company is also participating in various test-bed projects that the South Korean government has organized, and it plans to expand into drive motors, electric-power-control systems, quick chargers, and parts for automotive electrical systems by leveraging its power-supply and motor technologies. The future strategy is to expand into energy; environmental protection; electric-vehicle parts; and biotechnology, for which the company is adapting MEMS technology it obtained through its ink-jet-printer business, by taking advantage of convergence and modularization.

Other key product categories at Electronica included sensors and sensor interfaces, which exhibit Austrianmicrosystems highlighted in its often-crowded booth. Thomas Reiner, director of marketing communications, describes the company as focused on power management, audio, and sensors and sensor interfaces, with sensing being the broadest application the company supports. The company also works on routing sensor data to its appropriate destination; on the Electronica floor, for example, Johnsy Varghese, marketing manager for wireless, demonstrated wireless transceivers for applications such as body-area networking.

In addition to acquiring, conditioning, and transmitting environmental information, a key focus for Austrianmicrosystems is indicating user intent to the digital domain, according to Alfred Binder, marketing manager for the company’s industry- and medical-business unit. Binder demonstrated the company’s EasyPoint technology, which represents Austrianmicrosystems’ first foray beyond ICs to a complete module, which can replace joysticks and trackballs on mobile devices. An EasyPoint device comprises a mechanical stack incorporating a navigation knob with a magnet and a 2-D encoder in the form of a contactless sensing IC. Cursor-travel rate in response to user inputs is proportional to how far off center the user nudges the navigation knob, making it easy to scroll forward and reverse through a video or navigate around a map. According to Binder, the performance aspects of the EasyPoint device will become increasingly attractive as mobile-device-processor speeds continue and users expect more control over the experiences the devices offer. EasyPoint works with sealed devices; the magnetic field from the magnet that attaches to the EasyPoint knob can penetrate an aluminum casing to the internal EasyPoint Hall-effect sensor and decoder IC.

An EasyPoint device is a 2-D Hall-effect device; travel of the navigation knob in the third dimension activates the binary “select” function of a mouse-button click. But the company also offers full 3-D Hall-effect capabilities with its HallinOne 3-D magnetic-encoder family, which it introduced at Electronica and which it developed in cooperation with Fraunhofer IIS (Institute for Integrated Circuits), the license holder of the HallinOne technology.

Austrianmicrosystems’ new AS540x implementation of the technology makes the absolute-position information of a simple two-pole magnet directly accessible over an SPI or a PWM interface. A HallinOne device uses two “pixel cells” in a differential mode to eliminate external influences from stray magnetic fields. Austrianmicrosystems’ AS540x IC contains an EEPROM to enable system designers to program and linearize the IC. The HallinOne device targets industrial and automotive applications. Andreas Pfingstl, marketing manager in the automotive-business unit, demonstrated the device with steering-wheel and clutch-pedal application as well as a gear-shift-by-wire application.

**PURSUITING ULTRASOUND**

At Electronica, Analog Devices focused on data converters. The company announced products with embedded data-conversion technology, including eight-channel Doppler ultrasound receivers; a differential amplifier that attenuates high-voltage signals down...
During a panel discussion at Electronica, semiconductor executives addressed the question, “What lessons have we learned from the crisis?” Participants included Peter Bauer, chief executive officer of Infineon; Henri Richard, senior vice president of global sales and marketing for Freescale (standing in for Freescale Chief Executive Officer Rich Beyer); Carlo Bozotti, chief executive officer of STMicroelectronics; and Rick Clemmer, chief executive officer of NXP. The discussion centered on how the current economic crisis differs from the one that occurred in 2001, to what extent relations with suppliers have changed, and what consequences and risks arise through the sometimes-long delivery times and allocations.

The executives echoed some variation of a common belief that the tech industry was probably entering a more normal period of growth—in the 5 to 10% yearly range—for at least the next several years. However, they also pointed out that their abilities to predict the future were limited, with their abilities to influence it being even less so. But Freescale’s Richard pointed out that it was unrealistic for the semiconductor industry, which disruptive innovation founded and fueled, to simultaneously expect to be the beneficiary of ongoing stability coming from its investors and customers.

Looking at the past few years’ worth of economic turmoil, Infineon’s Bauer clarified his perceived view of it versus the earlier 2001-era “dot-bomb” upheaval. In the dot-bomb case, the root cause was “irrational exuberance” on the supply side, fueled by what ended up being unrealistically high demand projections from customers. Once the market belatedly realized that dot-com momentum had slowed and that the investment bubble was about to burst, it reacted with a brusqueness that led to abrupt order cancellations throughout the supply chain, leaving semiconductor suppliers and their foundry and manufacturing-equipment partners with abundant unsold inventory and capacity that took many years to be consumed.

This time, on the other hand, the fundamentals of customer demand were solid, but the United States and then the rest of the world faced a credit-availability crisis that paralyzed ongoing business viability throughout the economy. STMicroelectronics’ Bozotti commented that events in late 2007 had great personal relevance for him, as he was negotiating with Intel to spin off his company’s flash-memory group into the jointly owned Numonyx, which Micron Technology subsequently acquired. The lack of available credit greatly complicated and extended the duration of the spin-off and merger transaction. Early 2008 was characterized by severe, unprecedented currency fluctuation, he said. By late 2008, the world market had entered a major economic crisis. Throughout this time, only three countries—Brazil, India, and China—experienced positive economic growth. Several panelists hoped that the countries’ increasing effect on the world economy would in the future counterbalance potential irregularities in historically strong markets, such as the United States.

Irrational exuberance is not a phenomenon solely restricted to the early days of this decade. However, this time, the panelists said, semiconductor vendors’ customers are exhibiting the phenomenon. The executives all believed that credit-crunch concerns—not any fundamental cessation in customer demand—drove the temporary lull in IC sales that began in late 2007. As such, once preliminary indicators of a market rebound occurred, IC demand returned with a vengeance to refill the supply chain.

The panelists all bemoaned their customers’ unrealistic expectations of their abilities to respond with nearly instantaneous speed and nearly infinite shipment volumes. These items have coupled with the inevitable order cancellations of recent days as the supply chain again becomes satiated. Panelists also grumbled about their foundries’ and manufacturing-equipment suppliers’ failure to invest sufficiently over the past few years, which has increased leadtimes. Freescale’s Richard spoke about the fact that Freescale took an equipment vendor to task for its poor product availability. The vendor responded by pointing out that each piece of equipment included approximately 100 Freescale microcontrollers and that Freescale’s processor shortages were hampering the company’s ability to build systems to turn around and sell back to Freescale.

Near-term “normalization” bumps aside, the long-term prognosis appears to be positive, with the executives showing enthusiasm for budding consumer demand in the Brazilian, Russian, Indian, and Chinese economies. But plenty of semiconductor “homes” continue to exist in more mature markets, too. Freescale’s Richard, for example, pointed out that the US automobile market for many years ran at a 16 million- to 18 million-unit-per-year sales clip, much faster than population and household growth trends would suggest. Ultimately unsustainable financing schemes, such as home-equity loans, fueled this growth. Conversely, over the past several years, US car buyers have purchased only approximately 9 million cars. However, given that car vendors must sell approximately 12 million cars per year just to maintain the status quo—that is, replace those that wear out—more robust automobile demand will inevitably return.

Richard believes that economists are not sufficiently factoring into their forecasts the reality that the digital-savvy demographic population that grew up during the 1980s is now coming into full stride as consumers, with the potential result being tremendous sales opportunities. STMicroelectronics’ Bozotti revealed that his company is tracking trends in affordable health care; safe, secure data protection; and energy conservation.

Read more on this topic at www.edn.com/110106cs.
to the input range of ADCs; an ultra-low-power radio SOC that integrates an ADC, a microcontroller, and an RF transceiver; MEMS iSensor 6°-of-freedom inertial-measurement units; and a three-axis MEMS iSensor vibration-analysis system with an integrated Blackfin processor. Although the word “green” did not appear in a presentation from company executives, the need for efficiency was obvious in many applications the executives cited, including portable health-care equipment, automotive electronics, and wireless communications.

Analog Devices introduced the ADuCRF101 radio SOC, which includes an ISM-band RF transceiver; a six-channel, 12-bit SAR ADC that operates at 1M sample/sec; and a 32-bit ARM Cortex-M3 RISC microcontroller with SRAM and flash memory. The ultra-low-power radio SOC operates at 1.8 to 3.6V and features six sleep modes.

Analog Devices also highlighted the AD9278 and AD9279 fourth-generation octal ultrasound receivers, which reduce the power and board area for clockwise Doppler processing. The AD9278 is suitable for high-end and midrange systems, offering high image quality, fine resolution, and deep penetration, whereas the AD9278 targets use in portable ultrasound systems.

Other companies addressing low power for green- and portable-system applications at Electronica include Avago, Maxim, Renesas, and Rohm.

Avago announced a line of fiber-optic transmitters and receivers for harsh temperature environments. The HFBR-152xETZ/252xETZ fiber-optic modules provide reliable data transmissions over cost-effective plastic or silica fiber in the −40 to +85°C extended-industrial temperature range. Designers can use the devices to implement system control or drives in wind turbines and solar farms, traction inverters in trains, and other industrial applications and medical systems.

For similar renewable-energy applications, Avago announced the ACNV-4506 optocoupler, which meets the creepage and clearance distances for applications involving 1700V IGBTs (insulated-gate bipolar transistors). The optocoupler is available in a 500-μm, 10-pin DIP as well as a gull-wing-lead option for standard surface-mount processes, both with 13-mm creepage and clearance that meets the IEC (International Electrotechnical Council) 60664-1 standard. The package provides a minimum CMR (common-mode rejection) of 30 kV/μsec.

For automotive applications, Avago announced an optocoupler with extended-temperature operation for use in hybrid and electric vehicles. The highly integrated ACPL-38JT incorporates an IGBT driver for signal switching, along with desaturation detection and fault-status-feedback systems for constant signal protection. The device is part of the Avago R2Coupler family of optocouplers with reinforced insulation. Avago also announced high-power cyan LEDs for traffic signals. The new ASMT-JC11 and ASMT-AC00 1-W LEDs offer high lumen output and high energy efficiency in small-footprint packages. This combination of features targets traffic signals; sign backlighting; and architectural-, commercial-, and decorative-lighting applications.

Maxim highlighted medical, LED, energy-measurement, power-line-communications, and automotive applications. The company demonstrated an infusion pump that includes more than 20 Maxim parts, as well as a development kit for blood-glucose meters that uses the MAX1358 precision analog front end. Maxim also showcased its eight-channel MAX2079 front end for ultrasound applications.

For LED applications, Maxim highlighted its MR16 lamp drivers. A related demo employed the company’s MAX2990/MAX2991 power-line data-communications chip set to control RGB (red/green/blue) LEDs at video rates. It also displayed the 71M6543 utility-metering and 78M6612 energy-measuring devices in a smart-grid demonstration. For automotive-infotainment applications, Maxim highlighted its GMSL (gigabit-multimedia-serial-link) technology.

Also at Electronica, EnOcean GmbH announced its ECT 310 ultra-low-voltage dc/dc converter, which enables batteryless wireless modules to use heat produced by operating machinery, radiators, or the human body as their power source. The ECT 310 works as an interface between thermoelectric converters and EnOcean modules. The converter converts input voltages of 20 mV to 3 and 4V levels. Vicor presented its PFM (pulse-frequency-modulation) VI Brick module, an isolated ac/dc converter with PFC. With its adaptive-cell architecture, it enables high efficiency over worldwide ac mains, delivering 330W at 48V SELV (safety extra-low voltage) in a package having a 9.5-mm profile.

Renesas introduced its RX600 microcontrollers, which reduce standby-mode power consumption by approximately 90%. It also reduced the size of its 16-bit IO-Link microcontrollers by 56% and introduced power MOSFETs in compact HSON-8 packages for automotive applications.

Figure 4 Rohm and Oki Semiconductor jointly developed a dedicated chip set for Intel Atom E600 series processors targeting low-power portable applications (courtesy Rohm).
TEAMING UP ON ATOM

Many of the product introductions touted at Electronica resulted from teamwork—the cooperative efforts of Austriamicrosystems and Fraunhofer IIS on the HallinOne technology, for example, and STMicro’s use of Omron MEMS technology. In another example, Rohm announced a collaboration with its affiliate, Oki Semiconductor, on the development of a dedicated LSI circuit family to support the Intel Atom processor E600 series (Figure 4). The chip set comprises a power-management IC, a clock-generator IC, and an I/O-hub IC. The companies exploited Rohm’s analog technology plus Oki’s low-power logic capabilities.

Rohm’s power-management IC supplies all of the voltage rails for the Intel Atom EG20T processor platformcontroller hub as well as for the DDR2 memory and BIOS-storage SPI flash that connect to the Atom chip. It also controls start-up and power-down sequencing that eliminates the need for an external microcontroller or a CPLD (complex programmable-logic device). Rohm’s clock-generator IC provides all of the clocks the Atom requires; the controller hub; and the commonly employed external SATA (serial-advanced-technology-attachment), USB, and similar interfaces.

Oki Semiconductor’s contribution includes two application-specific I/O hubs, the ML7223(V) and the ML7213. The ML7223(V) serves telecom-terminal applications, such as Web-enabled media phones. It integrates industry-standard I/Os, such as USB, SATA, SD (secure digital)-Host, and UART (universal asynchronous receiver/transmitter), as well as application-specific functions, including an IPsec (Internet Protocol-security) hardware accelerator and echo and noise cancellers for hands-free operation. The ML7213 primarily serves in-vehicle information and entertainment applications. It includes a built-in MediaLB (media local bus), an SDVO (serial-digital-video-output) converter, and a video-input interface as well as industry-standard I/O.

GREEN CONSEQUENCES

Sometimes, green initiatives can lead to unintended consequences. For example, car makers are offering a start/stop feature, which, with other engine-management programs, could ultimately cut fuel consumption by as much as 20%. STMicroelectronics cites a Strategy Analytics study saying that annual demand for vehicles featuring start/stop should reach almost 20 million units by 2015. Customer demand in Europe initially led this drive.

Unfortunately, in a car with start/stop, the supply voltage for onboard electrical equipment can fall to as low as 6V when a user turns off and restarts the engine. The TDA7850LV audio power amplifier enables in-car-entertainment equipment to operate without interruption during the power-supply dip (courtesy STMicroelectronics).

You can expect many more green innovations throughout the coming year. For example, Rick Clemmer, executive director, president, and chief executive officer of NXP, says that the company is focusing on CFL (compact-fluorescent-lamp)-IC drivers and will begin to ramp up production in the first quarter of this year (Reference 1). As 2011 progresses, expect vendors to develop new power-saving devices or those like STMicro’s TDA7850LV that mitigate the unwanted side effects of green technology.

REFERENCE