



## [The 37th annual microprocessor directory: a universe explored](#)

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Even after 37 years of documenting the companies and their processors that target embedded-system applications, the annual *EDN* Microprocessor/Microcontroller Directory continues to grow. Companies each year continue to launch software-programmable processor architectures in an attempt to enable embedded-system developers to build applications with lower prices and smaller energy budgets yet deliver more features than ever before. Since the 36th edition of the directory, several companies have launched processors that have paved the way to even lower power consumption and prices.

This directory represents an effort to collect all of the processing options available to embedded-system developers and help them quickly narrow the list of candidate processors for their projects. *EDN* is constantly uncovering companies that did not exist or participate in previous editions of the directory. If you notice an overlooked company, please let that company and us know that you missed them and would like to see them in the directory. If this directory helps you find or choose a device or core, please let the vendor know how you found its part.

This directory is but a small excerpt of the Embedded Processing Directory, which comprises hundreds of pages of material. You can visit the full version [here](#). The material is updated on a regular basis as new processors become available.

### **Actel**

[Actel](#) offers low-power and mixed-signal flash FPGAs. Actel flash FPGAs support ARM and 8051

processors, including a license- and royalty-free, 32-bit, FPGA-optimized ARM Cortex-M1 soft processor as well as a hard-gate, 100-MHz, 32-bit Cortex-M3 on Actel's SmartFusion intelligent mixed-signal FPGA. Actel's low-power ProASIC3L FPGAs feature 40 and 90% lower dynamic and static power, respectively, than the company's ProASIC3 FPGAs.

## **Advanced Micro Devices**

[AMD](#) (Advanced Micro Devices) processors support scalable, x86-based, low-cost, and feature-rich products and energy conservation. AMD introduced the Opteron 4000 Series platform for enterprise-class embedded systems, such as networking and storage devices, as well as the compact ASB (advanced-system-bus) 2 and high-performance AM3 platforms for embedded systems spanning industrial controls to digital signage, point-of-sale, and kiosk systems.

## **Altera**

[Altera](#) offers programmable products targeting communications, industrial, military, imaging and video, and test applications. Products include CPLDs, FPGAs, and HardCopy ASICs, as well as embedded processors and development tools. The 32-bit Nios II soft embedded processors feature three configurations trading processing performance and core size. Altera also supports third-party processor options from leading embedded-processor vendors for use in its devices.

## **Altium**

[Altium](#) provides next-generation electronics-design software. Altium Designer supports interactive FPGA-system design for vendor-independent electronic-product development using soft, hybrid, and discrete processors. It includes a number of royalty-free 8- and 32-bit, FPGA-based soft processors, such as the 8051, Z80, PIC, and FPGA-independent TSK3000 core. The software features support for processors, such as ARM7, Nios II, and Microblaze.

## **Analog Devices**

[Analog Devices'](#) ADuC precision analog microcontrollers combine ARM7 or 8052 microcontroller cores with integrated precision converters, references, and sensor peripherals to target automation, industrial, and automotive applications. Blackfin processors combine signal-processing capabilities with control functions in a single 16/32-bit core. Target applications include audio and video consumer products, medical electronics, video surveillance, VOIP (voice-over-Internet Protocol), and industrial instrumentation and control.

## **Applied Micro Circuits Corp**

[AMCC](#) (Applied Micro Circuits Corp) offers embedded Power Architecture processors targeting control-plane, imaging, wireless-access, industrial-control, storage, and networking applications. Applied Micro offers hardware- and software-reference designs to help designers in the wireless-access-point and the ATCA (Advanced Telecom Computing Architecture) AMC (advanced-mezzanine-card) market. The Titan core uses Intrinsic's Fast14 logic to reach clock speeds as high as 2 GHz at 2.5W, and it supports coherent multiprocessing.

## **ARM**

[ARM](#) licenses semiconductor IP (intellectual property), including processors, peripherals, interconnect, and physical libraries targeting mobile, automotive, consumer-entertainment, imaging,

networking, storage, security, and wireless applications. The company's range of processors includes the ARM7, ARM9, ARM10, and ARM11 families and the Cortex family featuring Thumb-2 technology. ARM also offers the SecurCore processor family, the Mali family of graphics processors, TrustZone technology, and Jazelle execution-environment-acceleration software.

## **ASIX Electronics**

[ASIX Electronics](#) offers non-PCI (Peripheral Component Interconnect)-Ethernet controllers, USB (Universal Serial Bus) 2.0-to-Ethernet NIC (network-interface-card) controllers, and network SOCs (systems on chips) targeting embedded-networking applications, such as home appliances, factory/building automation, industrial equipment, security systems, remote-control/monitoring/management, and streamingmedia applications.

## **Atmel**

[Atmel](#) offers microcontrollers and microprocessors employing its proprietary 8- and 32-bit AVR and ARM's Cortex-M3, ARM7, and ARM9. Over the previous year, the company introduced the ATtiny4/5/9/10 in a package measuring 2×2 mm. The 32-bit pico Power AVR UC3L supports 165 µA/MHz operation in active mode; power ranges to 9 nA with all clocks stopped. Atmel QTouch Library and Atmel QTouch Studio expand and support all AVR microcontrollers.

## **austriamicrosystems**

[austriamicrosystems](#) offers high-performance analog ICs with a focus on power management, sensors and sensor interfaces, and portable audio. The company's ARM922T-based AS3524/25/27 analog integrated-microcontroller ICs combine strong calculating power, high-performance-audio features, and system-power-management options for battery-powered devices.

## **Beyond Semiconductor**

[Beyond Semiconductor](#) licenses two families of 32-bit processor cores as Verilog RTL (register-transfer-level). All processors include Linux and eCos operating-system support. The superscalar BA14 features dual-issue, out-of-order execution. With DSP instructions and an optional double-precision floating-point unit, it targets applications with demanding performance requirements.

## **Broadcom**

[Broadcom](#)'s integrated processors target data-networking and communications applications, as well as security, storage, 3G (third-generation)-wireless infrastructure, and high-density computing. The Broadcom broadband CMP (chip-multiprocessing) systems integrate as many as four 64-bit MIPS processor cores onto a single die.

## **Cambridge Consultants**

[Cambridge Consultants](#)' XAP4 and XAP5 processor soft-IP (intellectual property) cores target applications such as wireless sensors, and their architecture minimizes the size of program and data memories to achieve small die area, especially when memory is embedded on-chip or integrated in an SIP (system in package).

## **Cast**

[Cast](#) offers IP (intellectual-property) cores for general-purpose 8-, 16-, and 32-bit processors. A configurable 8051 core executes instructions with one clock per cycle. Additional cores include 8-bit Z80 and 16-bit 68000- and 80186EB-compatible devices. Cast's 32-bit APS cores require as few as 7000 gates, perform at 0.6 Dhrystone MIPS/MHz, and use as little as 18  $\mu$ W/MHz of power.

### **Cavium Networks**

[Cavium Networks](#)' processors target intelligent processing for networking, communications, and digital homes. Cavium Networks offers integrated, software-compatible processors ranging in performance from 100 Mbps to 40 Gbps that enable secure, intelligent functions in enterprise, data-center, broadband/consumer, access, and service-provider equipment.

### **Cirrus Logic**

[Cirrus Logic](#) supplies high-precision analog- and mixed-signal and embedded processors for the audio and industrial markets. In the general-purpose-processor segment, Cirrus Logic offers highly integrated ARM9- and ARM7-based embedded processors targeting industrial and networked consumer applications.

### **Coreworks**

[Coreworks](#)' five-stage-pipeline, modified-32-bit-Harvard-architecture FireWorks features a high-speed programming interface and DSP instructions. The programming interface is accessible using the Core Access Networks infrastructure, which includes FaceWorks, a network-interface core, and the RAL (remote-access library), a software package for building remote data-exchange and -control applications.

### **CPU Technology**

[CPU Technology](#) offers multicore SOC (system-on-chip) devices as well as development tools that target computers and peripherals, communication/wired, general-purpose, imaging and video, industrial, medical, military/aerospace, mobile/wireless, and test-and-measurement applications. The Acalis family of field-programmable multicore chips provides security functions that protect IP (intellectual property) without affecting performance.

### **Cyan Technology**

[Cyan Technology](#)'s low-power, 16-bit, embedded-communications, flashbased eCOG1k microcontroller implements a 25-MHz RISC Harvard architecture that includes internal flash memory, RAM, and cache. The external-memory interface supports addressability of 32 Mbytes of external memory.

### **Cybernetic Micro Systems**

[Cybernetic Micro Systems](#) produces ASICs to interface to peripherals. The 100-pin, 8-bit P-51 microcontroller either sits between the host computer and the peripheral device or becomes the peripheral device. With a dualport RAM interface on the host side in a PC104/ISA (industry-standard-architecture) format, the P-51 looks like memory to the host, but it has the intelligence and capability of an 8051.

### **Cypress**

[Cypress](#)' PSoC (programmable system on chip) integrates configurable digital and analog peripherals, an 8- or 32-bit microcontroller, and three types of embedded memory. This year, Cypress introduced the 8051-based PSoC 3 and the ARM Cortex-M3-based PSoC 5 architectures. The new second-generation TMA300 PSoC-based TrueTouch touchscreen-controller family can simultaneously interpret as many as 10 inputs.

## **Digi International**

[Digi International](#) offers net-centric Net+ARM processors based on ARM7 and ARM9 cores. Digi supports development for the 32-bit Net+ARM microprocessor with its royalty-free Net+OS advanced networking software, development tools, and real-time operating system. Support for Linux and Microsoft Windows Embedded CE 6.0 is available.

## **Digital Core Design**

[DCD](#) (Digital Core Design) provides VHDL- and Verilog-synthesizable, ISO 9001:2000-certified IP (intellectual-property) cores of 8-, 16-, and 32-bit processors and bus interfaces, as well as fixed- and floating-point arithmetic co-processors. The company's DP8051XP/DP80390XP soft core is 100%-binary-compatible with the industry-standard, 8-bit 8051 microcontroller. DCD's microcontrollers implement fast 16- and 32-bit integer operations and single- and double-precision floating-point operations.

## **E2V**

[E2V](#)'s microprocessor products range from the 68K family to PowerPC devices and support peripherals. In addition to test and service facilities, the company offers long-term availability on the complete family of products. The high-reliability products comply with the AS/EN 9100 aerospace standard and the AQAP 2110 military standard.

## **EM Microelectronic**

[EM Microelectronic](#) offers ultralow-power, low-voltage digital-, analog-, and mixed-signal ICs targeting battery-operated and field-powered devices in consumer, automotive, and industrial applications. EM Microelectronic's 4- and 8-bit microcontrollers target battery-operated devices, such as fire alarms, medical-monitoring devices, sports-activity monitors, radiocontrolled clocks, intelligent sensors, data loggers, metering devices, intelligent terminals, card readers, measurement devices, and scales.

## **Energy Micro**

[Energy Micro](#), a fabless semiconductor company, offers 32-bit microcontrollers that consume ultralow power. New processor products include the ARM Cortex-M3-based EFM32 Gecko microcontroller family and the EFM32 Tiny Gecko product family. The EFM32 consumes less than 180  $\mu$ A/MHz while executing real-life code from flash. Its standby current consumption is typically 900 nA when running a real-time clock, power-on reset, brownout detection, and full RAM and CPU retention and less than 20 nA in its deepest sleep mode.

## **EnSilica**

[EnSilica](#) offers a portfolio of IP (intellectual property), including the eSi-RISC family of highly configurable 16- and 32-bit embedded processors, the eSi-Comms range of communications IP, and

cryptographic and processor-peripheral IP. The eSi-RISC family includes the 16-bit eSi-1600, the 32-bit eSi-3200, and the 32-bit eSi-3250 processors. The processor cores benefit from selectable Harvard/von Neumann memory and configurable-cache options.

## **Freescale Semiconductor**

[Freescale Semiconductor](#) offers communications and embedded processors, sensors, RF components, and analog/power-management technology for automotive, consumer, industrial, and networking applications. The PowerQUICC (quad-integrated-communications-controller) and QorIQ processors target data- and control-plane processing for wireless and wire-line infrastructure, industrial control, enterprise networking, and home and SOHO (small-office/home-office) networking markets. Freescale this year introduced the 2.5-GHz, 64-bit e5500 core; the quad-core P3041 processor; new P1 and P2 QorIQ processors; and Kinetis ARM Cortex-M4 and ColdFire+ microcontrollers.

## **Fujitsu Semiconductor America**

[Fujitsu Semiconductor America](#) offers 8-, 16-, and 32-bit microcontrollers, including general-purpose and application-specific versions. Most of the microcontrollers include onboard-flash, ROM, ADC, DAC, CAN (controller-area-network), USB (Universal Serial Bus), and LCD controllers to target automotive, communications, computer-peripheral, industrial, and consumer applications.

## **GainSpan**

[GainSpan](#), a provider of low-power, embedded-Wi-Fi semiconductor and software, offers SOCs (systems on chips) with flash memory, SRAM, and a processor in a single package; embedded and serial-to-Wi-Fi software; and integrated development environments with a hardware-debugging interface and enterprise-level 802.11b/g certification. GainSpan embedded Wi-Fi finds use in mobile/wireless, industrial, and medical applications.

## **Hyperstone**

[Hyperstone](#) offers the general-purpose E1 processors, the HyNet networking processors, and NAND-flash controllers that the company based on a unified RISC/DSP architecture. Manufacturing tools for the S7(B) and F4 NAND-flash-memory controllers include reference designs, development utilities, and operating firmware that implements Hyperstone's patented flash-management techniques.

## **IBM**

[IBM](#) Global Engineering Solutions offers the 32-bit PowerPC 4xx family of embedded cores, along with 32- and 64-bit power- and performance-optimized microprocessors. IBM's PowerPC 405, 440, and 460 families of embedded cores offer scalable performance for custom-SOC (system-on-chip) integration. The cores are available in both fab-optimized and fully synthesizable versions.

## **Imec**

[Imec](#)'s flexible ADRES (architecture for dynamically reconfigurable embedded system) comprises a tightly coupled VLIW (very-long-instruction-word) processor and a coarse-grained, reconfigurable array. The architecture includes computational, storage, and routing resources in a topology to form the ADRES array. A script-based technique allows designers to generate instances for the

communication topology, supported operation set, resource allocation, and timing of the target architecture.

## **Imsys**

[Imsys](#) develops reconfigurable-processor platforms that accept programs written in Java, C/C++, assembler, and microcode. The company offers Internet-enabled reference modules with complete operating- and file-system environments. The integrated hardware and software platform targets wired and wireless communications; graphics-display technologies; and image processing in telecom, automotive, industrial automation, and consumer electronics.

## **Infineon Technologies AG**

[Infineon Technologies AG](#) provides 8-, 16-, and 32-bit microcontrollers for automotive- and industrial-control systems with dedicated hardware peripherals. Infineon introduced the 32-bit Audo Max family for automotive-power-train and -chassis applications. Infineon added high- and low-end derivatives to the XE166 and XC2000 families of 16-bit digital-signal controllers. The company introduced 8-bit devices that operate at ambient temperatures as high as 150°C. Infineon also introduced the low-cost, low-pincount, 8-bit XC82x and XC83x microcontroller families.

## **Innovasic Semiconductor**

[Innovasic Semiconductor](#) supplies extended-life microcontrollers for industrial applications. The 32-bit fido1100 communications controller targets real-time Ethernet applications with silicon-embedded RTOS-like features, including single-cycle task switching, scheduling, and programmable peripherals. Innovasic supplies 16-bit 186 microcontrollers for new and legacy applications. All Innovasic products come with an obsolescence-protection guarantee.

## **Integrated Device Technology**

The [IDT](#) (Integrated Device Technology) Interprise family of integrated communications processors delivers data processing at line-rate speed. IDT based the processor cores on the 32-bit MIPS ISA (instruction-set architecture). Interprise processors target SOHO (small-office/home-office) routers, Ethernet switches, WAPs (wireless-access points), and VPN (virtual-private-network) equipment.

## **Intel**

[Intel](#)'s Atom, the company's smallest and lowest-power processor, targets small devices and low power and maintains the Intel Core 2 Duo instruction set. Intel's N270 processor and 945GSE Express chip set target the low-power needs of embedded-system markets, such as digital signage, interactive clients, thin clients, digital security, residential gateways, print imaging, and industrial control.

## **Kawasaki Microelectronics**

[K-Micro](#)'s (Kawasaki Microelectronics') processors target the consumer-electronics, computer, office-automation, networking, and storage markets. K-Micro's computing subsystem includes a MIPS32 24Kf processor, the Sonics Silicon-Backplane and Sonics3220 Smart interconnects, the SafeNet SafeXcel security engine, and an off-chip OCP (Open Core Protocol) interface.

## **Lattice Semiconductor**

[Lattice Semiconductor](#)'s open-source LatticeMico32 soft microprocessor core combines a full 32-bit-wide instruction set with 32 general-purpose registers. Designers can customize the microprocessor core. The Wishbone buses provide a standard mechanism for connecting the microprocessor to a variety of peripherals and memory controllers. Lattice also provides the open-source, 8-bit LatticeMico8, 8051, 68xx series, PIC, and 6502 microcontrollers through its partners.

### **Marvell Technology Group**

[Marvell Technology Group](#), a fabless semiconductor company, ships more than 1 billion chips a year. Marvell's microprocessor and DSP architectures target high-volume storage, mobile and wireless, networking, consumer, and "green" products.

### **Maxim Integrated Products**

[Maxim Integrated Products](#) offers 8-, 16-, and 32-bit microcontrollers for embedded-system applications. In the last two years, Maxim has acquired Innova Card, Teridian Semiconductor, and the Zatarra and Crimzon product lines from Zilog. Evaluation kits, application notes, reference designs, and technical documents are available to support customers through the development process.

### **Microchip Technology**

[Microchip](#) this year expanded its eXtreme Low Power portfolio of 8- and 16-bit PIC microcontrollers with several new families, including devices featuring 50  $\mu\text{A}/\text{MHz}$  active current consumption and sleep currents as low as 20 nA. The mTouch sensing portfolio includes a royalty-free technology for projected capacitive touch sensing. The company added agency-certified Wi-Fi modules and low-power, less-than-1-GHz radios and modules to its wireless portfolio. Microchip acquired SST's (Silicon Storage Technology's) FlashFlex 8051 microcontrollers.

### **Nethra**

[Nethra Imaging](#), a fabless semiconductor company, focuses on image-, video-, and signal-processing applications, including video, medical, and military markets. In addition to the Am2045 massively parallel processor, Nethra also provides image-processor chips, integrated with leading CMOS image-sensor devices, for consumer, surveillance, and professional cameras.

### **Netronome**

[Netronome](#) develops programmable products for intelligent flow processing in network and communications devices. The company's products include NFPs (network-flow processors) and acceleration cards that scale to 100 Gbps. The NFP and acceleration-card family targets carrier-grade and enterprise-class communications products that require deep-packet inspection, flow analysis, content processing, virtualization, and security.

### **NXP**

[NXP](#)'s ARM portfolio comprises Cortex, ARM7-, ARM9-, and 80C5-based microcontrollers. The ARM Cortex-M0-based devices include the lowest-priced, 32-bit microcontroller. The ARM Cortex-M-based microcontroller devices feature a high level of integration and low power consumption. This year, NXP acquired Jennic's portfolio of 802.15.4 and Zigbee low-power RF products.

## **Oki Semiconductor**

[Oki Semiconductor](#)'s Advantage microcontroller family comprises ARM-core-based products ranging from the ML671000 with a built-in USB (Universal Serial Bus) controller to the highperformance, 120-MHz, ARM946Ebased 6200 series with instruction and data caches.

## **PMC-Sierra**

[PMC-Sierra](#)'s MIPS-based processors target metropolitan-transportation, storage-area-networking, wireless-equipment, VOIP (voice-over-Internet Protocol), Internet-routing-equipment, enterprise-switch, and multifunction- and laser-printer applications. The MSP (multiservice-processor) family targets use in CPE (customer-premises equipment), such as wired and wireless VOIP-terminal adapters, home gateways, voice-enabled routers, and NAS (network-attached storage).

## **Rabit Semiconductor**

[Rabbit Semiconductor](#), a Digi International company, provides high-performance, 8-bit microprocessors and development tools for embedded control, communications, and Ethernet connectivity. Rabbit offers embedded-design systems, including low-cost development kits, and technical support for both hardware and software.

## **Ramtron**

[Ramtron](#)'s FRAM (ferroelectric-random-access-memory)-enhanced Versa 8051 microcontrollers combine a high-performance SOC (system on chip) with nonvolatile FRAM. FRAM writes at bus speed with virtually unlimited endurance and low power for guaranteed data integrity in systems that require rapid and frequent writes and low power consumption.

## **Renesas Electronics America**

[Renesas Electronics America](#) is the result of a merger between Renesas Technology and NEC Electronics. Processor offerings extend from low-power, 8- and 16-bit microcontrollers to high-performance, 32-bit microprocessors. The R8C/Tiny targets electronic ballasts, handheld power tools, and motor-control systems. R8C/3x devices target automotive- body-control applications. The H8S/2153 targets advanced communication equipment, and the H8SX/2164 targets baseboard-management- controller applications. The 32-bit V850 series microcontrollers feature low-voltage operation and DSP functions.

## **Samsung Electronics**

[Samsung](#) offers 16- to 32-bit processors targeting handheld-system applications, including smartphones, VOIP (voice-over- Internet Protocol) phones, portable GPS (global-positioning-system) devices, gaming systems, and PDAs (personal digital assistants). Samsung's family of mobile application processors features ARM-based RISC cores.

## **Semtech**

[Semtech](#) offers 8- to 22-bit microcontrollers that interface sensors and radio transceivers and target autonomous, battery-operated, wireless devices. The Radio Machine device for ISM (industrial/scientific/medical)-band-transceiver interfacing includes a low-power RISC core with the BitJockey, a serial interface for radio protocols, and a UART. The Sensing Machine device for sensor

interfacing includes a low-power RISC core with the high-resolution ZoomingADC sigma-delta ADC and a programmable preamplifier.

## **Silicon Laboratories**

[Silicon Laboratories](#) offers 8-bit, mixed-signal microcontrollers that combine high-performance, 8051-compatible cores with precision analog peripherals in tiny-footprint packages. This year, the company expanded its F9xx family to include devices that deliver lower power consumption in active mode, sleep mode, and deep-sleep mode as low as 10 nA without the real-time clock operating and with full RAM retention. Silicon Labs also introduced the F8xx and F99x families of capacitive touch-sense microcontrollers.

## **Silicon Storage Technology**

[SST](#) (Silicon Storage Technology), now a wholly owned subsidiary of Microchip Technology, offers microcontrollers that implement the 8051 instruction set and are pin-for-pin-compatible with standard 8051 devices. FlashFlex microcontrollers are available in single- or dual-block configurations, and they are ISP (in-system-programmable) and IAP (in-application-programmable). These microcontrollers target consumer, communication/wired, imaging and video, audio, industrial, and motor-control applications.

## **STMicroelectronics**

[STMicroelectronics](#) offers a portfolio of 8-bit microcontrollers, 32-bit ARM-based microcontrollers, and 32-bit ARM-based embedded microprocessors. STMicro's 8-bit microcontrollers feature an advanced STM8 8-bit core for industrial and appliance applications. The STM32 are Cortex-M cores in more than 130 fully compatible devices. ARM926 cores power the 32-bit, embedded Spear microprocessors, which are available in single- and dual-core families.

## **Stretch**

[Stretch](#), a fabless semiconductor company, provides software-configurable processors. Design engineers can configure Stretch's off-the-shelf processors by using standard C/C++-programming methods and Stretch software-development tools. The Stretch S6 SCP (software-configurable-processor) engine powers the Stretch S6000 family of SCPs, which incorporate the Tensilica Xtensa LX VLIW (very-long-instruction-word) processor core, a second-generation ISEF (instruction-sextension fabric), and a tightly coupled programmable accelerator.

## **Synopsys**

[Synopsys](#)' DesignWare ARC processors include the 32-bit DesignWare ARC 600 and 700 families of configurable RISC/DSP cores, configurable extensions and software, and development tools. All DesignWare ARC cores use a 16/32-bit ISA (instruction-set architecture) that provides both RISC and full DSP capabilities. The DesignWare ARC cores are synthesizable. The DesignWare ARC Sound and ARC Video subsystems combine with optimized codecs and Synopsys' Sonic Focus audio-enrichment software to target audio and video products.

## **Systemyde International**

[Systemyde International](#) provides microprocessor IP (intellectual property), with emphasis on Z80-, Z180-, and Z8000-compatible architectures. As the original designer of all five generations of Rabbit

microprocessors, Systemyde also provides these designs in IP form. Systemyde IP comes in Verilog HDL that can target either ASIC or FPGA implementations.

## **Tensilica**

[Tensilica](#) offers 32-bit, customizable data-plane processors, DSPs, and standard processor cores. All of Tensilica's processor cores come with software-tool chains that automatically match any changes the designer makes. Xtensa 8 has all the basic configurable capabilities, and Xtensa LX3 offers designers opportunities to bypass the system bus with direct FIFO (first-in/ first-out) and GPIO (general-purposeinput/ output) capabilities. This year, Tensilica introduced its second-generation ConnX Baseband Engine DSP for LTE (long-term-evolution) handsets and base stations. Tensilica also introduced its third-generation Diamond Standard controller cores and its HiFi EP DSP core.

## **Texas Instruments**

[Texas Instruments](#)' microcontroller portfolio includes ultralow-power, 16-bit MSP430, Stellaris 32-bit ARM Cortex-M3, and real-time-control TMS320C2000 microcontrollers. More than 500 devices provide a broad range of price, performance, and peripherals to target medical, industrial, renewable-energy, metering, motor-control, automotive, and other applications. TI introduced the MSP430 Value Line microcontroller family. Its microprocessor portfolio includes the high-performance Sitara ARM Cortex-A8 and ARM9 microprocessors targeting industrial, medical, and consumer applications.

## **Tiempo**

[Tiempo](#) offers technology for use in semiconductors requiring low power, highly secure operating characteristics, or both. Its patented clockless, delay-insensitive approach to chip design is available as IP (intellectual-property) cores that designers can implement using standard EDA tools and formats.

## **Tilera**

[Tilera](#) offers high-performance multicore processors targeting embedded networking, security, and multimedia-processing applications. The Tile processor family targets applications requiring intensive packet processing for layers 2 through 7 and for HD (high-definition)-video applications. The Tile64 processor SOC (system on chip) has 64 full-featured processor cores plus a rich suite of system-integration blocks.

## **Toshiba America Electronic Components**

[Toshiba](#) offers 32-bit ARM processors and 8/16/32-bit CISC microcontrollers that target cell phones, MP3 players, cameras, medical devices, and automotive electronics. Toshiba offers highly integrated 8-, 16-, and 32-bit CISC microcontrollers with embedded SuperFlash memory and 32- and 64-bit, MIPS-based TX RISC microprocessors. TX RISC microcontrollers suit calculation-intensive applications that require large memory capacity and DSP-like functions, such as consumer digital-camera lenses, digital camcorders, and automotive-air-bag systems.

## **Ubicom**

[Ubicom](#) develops communications and media processors and software platforms that target real-time interactive applications and multimedia-content delivery in homes. The company provides to OEMs

optimized system-level products, including wireless routers, access points, bridges, VOIP (voice-over-Internet Protocol) gateways, connected digital-photo frames, streaming-media devices, and other network devices.

## **Via Technologies**

[Via Technologies](#), a fabless supplier of power-efficient x86 processor platforms, targets the PC, client, ultramobile-system, and embedded-system markets. The company supports a spectrum of computing and communication platforms, including its ultracompact main boards.

## **Western Design Center**

[Western Design Center](#) licenses its 65xx brand microprocessor IP (intellectual property). The company's product line includes the 8-bit W65C-02SRTL and 8/16-bit W65C816SRTL licensable IP. In addition to IP, Western Design Center offers 8- and 8/16-bit processor devices.

## **Xilinx**

[Xilinx](#) provides programmable-logic products, including embedded processors, FPGA platforms, and development tools that target aerospace, defense, wired- and wireless-communications, automotive, audio- and video-broadcast, industrial-control, test-and-measurement, and consumer applications. Virtex FPGAs include the 32-bit, hard-core PowerPC. The configurable, 32-bit MicroBlaze soft core is available for use with Spartan and Virtex FPGAs.

## **XMOS**

[XMOS](#) provides a software-defined silicon, programmable chip based on an array of high-performance, event-driven processors. You create designs in high-level languages, delivering hardware performance from a software-based design flow. XMOS devices blend a high-performance processor architecture with a responsive I/O structure to provide designers with custom silicon.

## **Zilog**

Ixys last year acquired [Zilog](#). The company offers the 8-bit Z8, Z8 Encore!, and Z80 Acclaim microcontroller families targeting the industrial and consumer markets. Zilog offers single-board computers and application-specific software stacks targeting energy-management, monitoring, metering, and motion- detection applications.