Actel®

eZone single-chip FPGA news

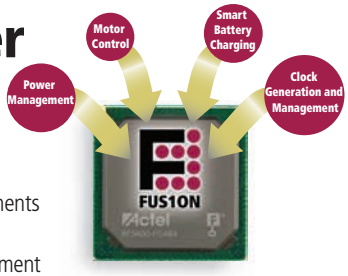
Fall 2007

innovative programmable logic solutions

Today's portable designers face the challenge of keeping up with standards and form-factors that continue to emerge and evolve.

Programmable logic is the obvious solution. Discover how Actel is opening the way for FPGAs in portable applications. Actel's 5 µW IGLOO™ FPGAs now offer up to a 1000 times reduction in power that is not only acceptable, but also preferable for use in portable applications (page 2). ARM processors, the industry standard for low-power portable electronics, are now optimized for FPGAs (page 4). In addition to taking power to new lows with IGLOO devices and offering the only Cortex-M1 implementation suitable for portable devices, Actel is going one step further, focusing initially on portable storage solutions (page 5).

Low-Cost System Manager



Intelligent, power-efficient system and power management implementations now start as low as $1.20. Actel's recently released reference design combines the award-winning, mixed-signal Fusion Programmable System Chip (PSC) with the optimized, configurable CoreABC microcontroller to provide a complete system management solution using a fraction of the Fusion part's logic tiles. As a result, the small and flexible, yet sophisticated, design eliminates the need for a variety of discrete components typically used in system management applications, while also offering additional chip real estate that can be custom-configured for the end application (page 7).

THIS ISSUE

Actel News

Sep 17, 2007 Actel Addresses Rapidly Expanding Portable Market with Industry's Lowest Power FPGAs

Sep 17, 2007 Actel Offers Free, Optimized ARM® Cortex-M1 Processor for Industry's Lowest Power FPGA Family

Sep 10, 2007 Mindray Selects Actel Low-Power Flash FPGAs for Demanding Medical Equipment Applications

Aug 27, 2007 Magna Electronics Chooses Actel's ProASIC3 FPGAs to Enable Automotive Vision Systems

Aug 27, 2007 Actel Drives FPGAs "Under the Hood" Into Critical Automotive Powertrain and Safety Systems

Aug 20, 2007 Actel FPGAs Bring Clarity to Visibility Enhancement Technology Platform from LYYN AB

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Integrated Design Environment
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Rick Lain's View Point

It has never been a better time for Actel in Asia.

With tightening power, space, and cost budgets for consumer, industrial, medical, and telecommunications applications, Actel's industry-leading flash-based FPGAs are attractive alternatives for designers due to several advantages they offer, including ultra-low power, security, single chip, small packaging, and total system cost. Consuming at least 200x and up to 1000x less static power than competitive FPGA offerings and delivering more than 20x the battery life of the current leading PLDs in portable applications, our IGLOO FPGAs are ideal for the Asian marketplace.

For designers of portable applications, we also recently announced the ARM Cortex-M1 processor-enabled IGLOO FPGAs. The combination of the industry's lowest power FPGA family, with a pervasive, industry-standard 32-bit soft ARM processor, now gives designers the ideal, low-power platform for rapidly deploying portable products. Combining Cortex-M1 with IGLOO FPGAs provides a single-chip solution that reduces cost, power, board space, and design complexity.

Armed with industry-changing FPGA solutions, it has never been a better time for Actel in Asia.

Rick Lain
Area Sales Director, Asia Pacific Region
Actel Corporation

Actel FPGAs for Portable Devices
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Actel's IGLOO FPGAs Address the Rapidly Expanding Portable Market

For the first time, Actel's IGLOO FPGAs create the opportunity for designers of portable applications to use reprogrammable, fast time-to-market FPGAs in ultra low-power applications. Actel is delivering IP and reference platforms in the areas of storage, display, and control solutions.

Details of the storage solutions are on page 5 of this edition of eZone. Details of display solutions will follow by the end of 2007. Make sure to register for product updates to get the latest product releases.

The use of programmable logic in portable applications enables designers to build a standard platform of peripherals and use the FPGA to create several variations of the same product, allowing faster time-to-market for the simple version and an upgrade to the higher price point for a full-featured or high-end product. The ability to leverage hardware and software design costs across multiple product models can lead to significant savings in product development costs.

IGLOO FPGAs are unlike any other FPGA on the market. In portable electronics, there are usually several power modes. Think of a camcorder as an example. When recording, everything is on – the lens, controls, display, storage, etc. In playback, some of the functions will not be used. In standby, very few of the functions are used. With the use of the Flash*Freeze™ pin, IGLOO devices have the ability to reach a standby current of 5 µW in the smallest device. The device can then power up with the release of this single pin and be instantly on, with previous register and memory contents intact. In addition, IGLOO devices can operate in low-frequency mode to provide simple operations in low-power mode.

Actel is also the leader in small footprint packages for programmable logic. Four times the logic and three times the I/O per mm² compared to competitors. IGLOO FPGAs have the broadest offering of small footprint packages, with 0.5 mm chip-scale packages, 1 mm pitch BGA, and more chip-scale offerings than all other programmable logic families.

Beginning Development with IGLOO FPGAs

IGLOO Development Kit comes with everything you need to work on your first IGLOO design, including FREE software, a built-in programmer, and debug support. Since this is focused on low-power applications, you have the ability to run the device at 1.2 V and measure the core voltage and I/O bank voltages individually.

Check your power budget before building your own prototype.

To learn more about IGLOO FPGAs, visit: actel.com/ezone/fall07

Actel takes power to new lows

Almost every programmable logic company has claimed one of the following in the past few years: lowest power programmable leader, optimized for low power, lowest dynamic power, optimized for battery life, and up to 60% less current.

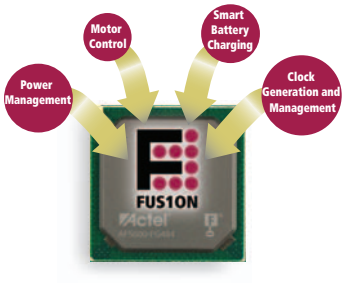
Low power is not about percentage improvement over previous generations of high-power devices; it should not be dependent on incremental benefits gained by powering off the device, since at some point you have to switch the device on. Designers using programmable logic have been denied true low-power devices for too long.

Actel is REDEFINING POWER in Programmable Logic!

Actel's approach to power is about tens, hundreds, and thousands of times lower power than any other device. For example:

- IGLOO devices provide **20 times longer battery life** than the nearest "low-power" SRAM competitor.
- IGLOO devices have **15 times lower power** than the industry's leading low-power CPLD.
- IGLOO devices offer **at least 200 times lower power** than the SRAM FPGA vendor who claims "optimized for low power."

Take a Basic Flash-Based FPGA and Add Analog



Take the low-power FPGA core and add additional components to create the Fusion Programmable System Chip (PSC), with nonvolatile memory for storage, FlashROM for security keys and revision control, and built-in clock sources, including RCOSC, XTAL support, and PLLs. Then add analog support with high-voltage analog I/Os at -12 V to +16 V input tolerance and up to 25 mA high-drive outputs. A single Fusion PSC now enables system power management, with the ability to integrate functions such as power management, thermal management, clock generation and distribution, SRAM FPGA management, and diagnostics and prognostics.

Add the Leading Industry-Standard Low-Power Processor

Actel's partnership with ARM on the co-development of the Cortex-M1 processor means that the first processor optimized for FPGAs is fully optimized for all of Actel's third-generation nonvolatile flash-based FPGAs: IGLOO, ProASIC3, and Fusion families.

Cortex™
Intelligent Processors by ARM®

Actel Redefining Power
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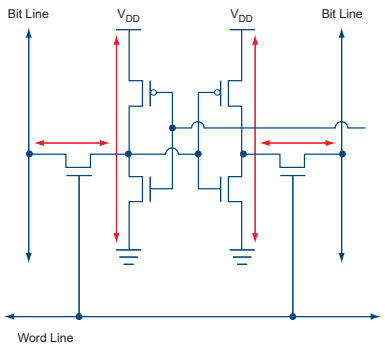
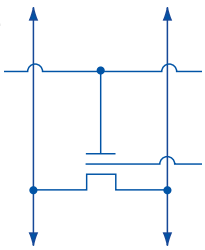
The Flash Advantage

SRAM cells have inherently higher leakage than Flash cells.

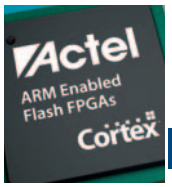


An SRAM FPGA cell has multiple paths for leakage to travel. Add to this the fact that SRAM FPGAs need not only the actual logic cells for your design, but also millions of configuration cells to remember your design. All of this adds to the static current of your device.



A flash cell has no direct leakage path, and since the cell knows its job at power-up, it does not need additional configuration cells to remember. This leads to flash cells having **thousands of times lower leakage** than an SRAM.

To learn more about Redefining Power, visit: actel.com/ezone/fall07



Cortex-M1
The Full Story
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Cortex-M1
Development Platforms

All the software for the development of a Cortex-M1 design on Actel FPGAs is supplied for FREE by Actel. In order to prototype the design, a starter kit is useful to test your design on silicon and experiment with different features of Actel's flash-based devices.

Actel's starter kits include all the tools for processor and FPGA development: Actel's Libero IDE FPGA development environment, CoreConsole IP configuration tool, SoftConsole for processor software development, and FlashPro3 programmer. The kit also comes with complete documentation, board-level schematics, user's guide, tutorials, and design examples.

M1-Enabled IGLOO Starter Kit

The IGLOO Starter Kit contains an M1AGL600 device in a FG484 package. The board has the ability to demonstrate Flash*Freeze technology and measure power consumption of the device.

M1-Enabled ProASIC3 Starter Kit

The ProASIC3 Starter Kit contains an M1A3P1000 device.

M1-Enabled Fusion Starter Kit

The Fusion Starter Kit contains an M1AFS600 device. The Fusion mixed-signal PSC can be used to develop system management and power management applications.

SoftConsole Includes Cortex-M1 Debug Support
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1. **ARM Processors Now Optimized for FPGAs** – Recognizing that processor usage in FPGAs is growing, ARM collaborated with Actel to design Cortex-M1, the first ARM processor developed specifically for use in FPGAs.
2. **Cortex-M1 is FREE** – This core is FREE for use in Actel flash-based FPGAs, and requires no license fees, no royalties, and no price adder, reducing cost of entry.
3. **No Commitment** – Cortex-M1 in Actel FPGAs is available without contracts to negotiate, reducing hassle and red tape, allowing designers to get to work sooner on their project.
4. **Cortex-M1 is Small and Fast** – This soft core offers an optimal balance between processor hardware and software speed in flash-based FPGAs.
5. **Cortex-M1 in the Only True Nonvolatile Flash FPGAs** – Actel Flash FPGAs offer users low-power, single-chip, live-at-power-up, firm-error-immune, and highly secure solutions.
6. **Build Your Own Processor** – In Actel FPGAs, Cortex-M1 is fully implemented in the FPGA fabric so you can select only the peripherals needed, program the processor to the board, and be ready to code the application.
7. **Design ARM MCU in Seconds** – Drag and drop Actel-supplied IP or custom IP into Actel's easy-to-use processor design tool, and link seamlessly to FPGA layout tools.
8. **Migrate Existing Code** – Cortex-M1 can run existing Thumb® code, allowing easy reuse of the huge volume of available industry-standard ARM software.
9. **Cortex-M1 in the World's First Mixed-Signal PSC** – Cortex-M1 is available in Actel's Fusion PSC—the world's only mixed-signal PSC.
10. **Cortex-M1 Simple Path to ASIC** – Cortex-M1 is a member of ARM's next-generation processor family and is fully upward-compatible with Cortex-M3, giving users a real path to ASIC implementation when needed.

Cortex-M1 now available from Actel at no extra charge

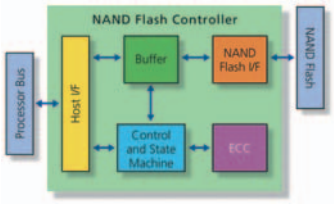
To learn more about Cortex-M1, visit: actel.com/ezone/fall07

Portable Storage Applications with Low-Power FPGAs

Storage is an integral part of portable electronic devices. Handheld devices will continue to use storage devices of increasing capacities in the future. The storage devices are broadly classified as flash storage devices and hard disk drives (HDD). Actel offers several CompanionCore IP cores that can readily be used in your design on Actel's low-power, flash-based FPGAs.

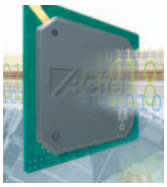
Flash Storage Devices are widely used today and are competing in capacity with HDD-based microdrives. The flash devices come in many different forms, supporting multiple protocols and standards.

- **Secure Digital (SD)** is the latest flash memory card format and is designed for use in portable devices.
- **CompactFlash (CF)** is a very small removable mass storage device for portable devices, and provides TrueIDE functionality compatible with ATA/ATAPI-4 and PCMCIA-ATA.
- **NAND Flash** memory technology allows greater storage densities and lower costs due to its faster erase and write times and a smaller chip area per cell than the NOR Flash.



Hard Disk Drives (HDD) are used in devices that require very high storage capacities, such as video recorders and camcorders. The controllers are also used in video/audio playback equipment that uses CD or DVD.

- **Advanced Technology Attachment (ATA)** is the standard used to interface to these storage devices. With the introduction of Serial ATA, the original standard is now called Parallel ATA (PATA).
- **Consumer Electronics-ATA (CE-ATA)** is the interface standard that was derived from MMC, with the addition of ATA commands, small form factor, and power-conscious designs used in the latest consumer electronic devices.



Register to learn about new IP cores as they become available.

actel.com/updates

Portable Storage Development Boards

As standards and platforms continue to emerge and evolve, designers need to be able to adapt quickly. Reprogrammable FPGAs offer the flexibility required to address these changing standards, and they speed time-to-market.

Working with its partners, Actel offers three different platforms of storage controllers and interfaces that can be programmed into the FPGA and made to work with industry-leading processors, such as the Marvell PXA and Freescale i.MX.

Each board is described below, including the specific IP that it demonstrates. The boards use a mixture of IGLOO and ProASIC3 devices. The IP will work on all Actel's third-generation flash-based devices: IGLOO, ProASIC3, and Fusion.

Marvell PXA3xx Platform

The first platform is a storage daughter card for Marvell® Semiconductor's "Littleton" PXA300/310 Handheld Platform Development Kit, and is targeted at smart phones, GPS devices, and PDAs.

The daughter card, jointly developed with Arasan Chip Systems, extends the processor's capability. This solution enables Actel's IGLOO AGL600 device to act as a bridge function and provides additional peripheral support for SD, MicroSD, and CE-ATA storage standards.

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iW-Rainbow-G3 Handheld

The second board is a full-featured Freescale i.MX27 processor development platform from iWave Systems for PDA, point-of-sale terminals, rugged data communication devices, and GPS applications.

The platform supports wireless streaming, Media codec and security features, and can demonstrate the IGLOO AGL125 FPGA as an ultra-low-power SD/MMC or CE-ATA controller.

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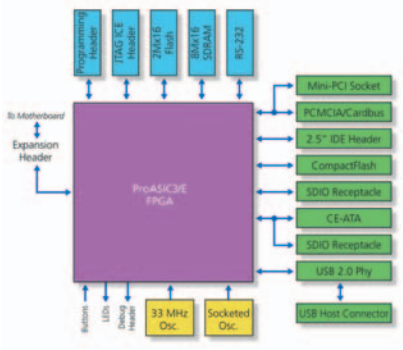
Storage Interface Board

PalmChip's storage daughter card interfaces to the Marvell PXA270 processor, and serves as a reference design for X-Scale and ARM processors.



The Actel FPGA serves as a bridge from the processor bus to multiple storage interfaces, including ATA 6, CE-ATA, SD 1.1/2.0, MMC, CompactFlash 3.0, and CardBus 2.1/PCMCIA.

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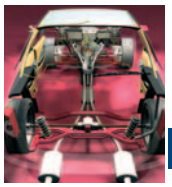
To learn more about Portable Storage, visit: actel.com/ezone/fall07



Introducing Automotive ProASIC3 T-Grade *Learn More*

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Ten Points to Consider When Using Logic in Your Next Automotive Design.

View All Ten

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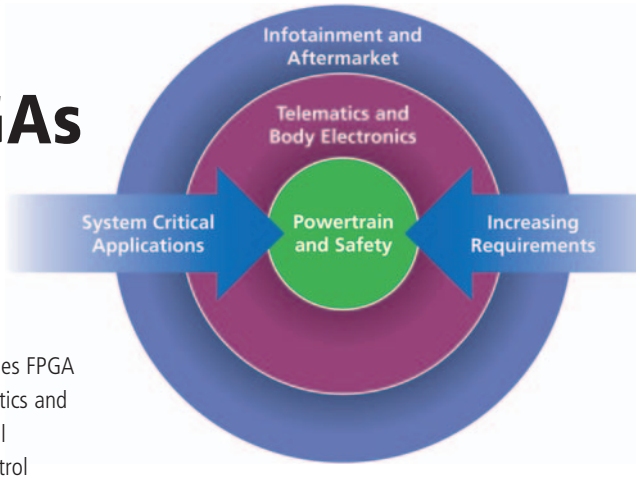
ProASIC®3

Automotive T-Grade FPGAs

- **AEC-Q100–compliant offerings:**
  - **Grade 1:** –40°C to 125°C ambient with absolute maximum junction 135°C
  - **Grade 2:** –40°C to 105°C ambient with absolute maximum junction 115°C
- **Devices:** 60 k, 125 k, 250 k, and 1 M system gates
- **Packages:** VQ100, FG144, FG256, and FG484

Actel Delivers Industry's First AEC-Q100, Grade 1 FPGAs



Leveraging Advanced Flash Technology for the Most Demanding Applications

AEC-Q100, Grade 1 qualification now enables FPGA technology to move beyond in-cabin telematics and infotainment applications into system-critical applications such as powertrain, engine control modules, and safety systems. Automotive ProASIC3 devices are ideally suited to address the changing and emerging standards within these system-critical applications.

Giving automotive manufacturers a flexible, highly reliable alternative to costly and complex ASIC technology, Actel's low-power ProASIC3 FPGA family has achieved AEC-Q100 Grade 2 and Grade 1 qualification—passing a series of critical stress tests designed to ensure the quality, reliability, and endurance of semiconductors in automotive applications. Actel's AEC-Q100 Grade 1 ProASIC3 devices represent the industry's first FPGAs to achieve this quality level. The company also announced support for the Production Part Approval Process (PPAP)—a process used by the automotive industry to ensure the availability of specific, in-depth documentation for all parts used in the automotive supply chain.

Combining optimized, award-winning IP and world-class software with personalized support, Actel provides an integrated solution to automotive manufacturers. The Actel automotive IP offering includes the following soft cores: ARM7™, Cortex-M1, LIN, CAN, I2C, SPI, 8051, Z80, 6809, Reed Solomon, DES/3DES/AES, and many others.

The Actel solution combines a best-in-class silicon platform with all the tools a designer needs to deliver tomorrow's products.

To learn more about Actel Automotive FPGAs, visit: actel.com/ezone/fall07

Comments on Actel's Automotive Success

***Delphi Corporation**, a leading global supplier of mobile electronics and transportation systems, will be using the Actel ProASIC3 FPGA in a production engine control module being designed into a heavy-duty diesel engine.*

It's one thing to ensure that a device can operate in a car navigation or entertainment system, but to deliver an FPGA for system-critical applications with a zero defect goal is an entirely different animal. Until now, automotive manufacturers have engaged in the costly and complex design of application-specific devices because it was the only way to get the low-power, reliability, and endurance needed for the most demanding automotive systems. The flexibility of the ProASIC3 family enables widespread adoption of flash-based FPGAs in system-critical automotive applications.

Martin Mason, Director of Silicon Product Marketing, Actel Corporation

The low-power FPGAs required for high-temperature automotive applications are now critical for next-generation automotive electronics applications. An FPGA achieving an AEC-Q100 Grade 1 qualification will enable automotive manufacturers to leverage FPGA technology in system-critical and space-constrained automotive applications.

Mike Williams,
Research Vice President, Gartner

Magna Electronics is designing automotive vision systems using Actel's ProASIC3 FPGA. The low-power, single-chip ProASIC3 FPGAs satisfy the needs of applications with extreme space constraints and limited ventilation. In addition, the highly integrated solution allows advanced driver assistance systems to be developed more cost effectively.

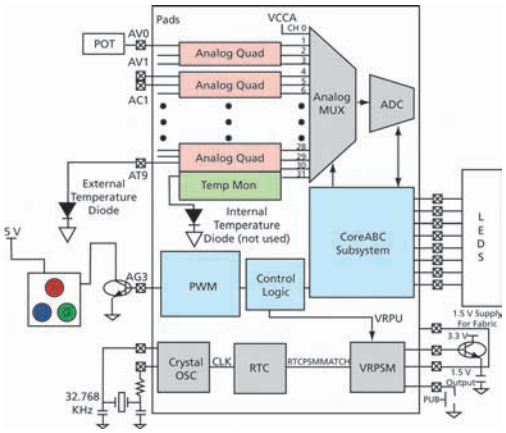
"As we deliver the driver assistance technologies that consumers are demanding, we need reliable components with sophisticated functionality in a very small form factor. The small size and proximity of these systems also require devices with extremely low power and endurance. The ProASIC3 FPGA provides the small footprint, low power, and reliability we need to create our innovative driver assistance systems."

François Truc,
Vice President and General Manager, Magna Electronics

Power-Efficient System Management Solution
at $1.20 for embedded applications

System Management applications fall into two distinct categories: standards-based and proprietary solutions for telecommunications at the high end, and a demand for low-cost, less complex solutions at the low end, primarily in embedded applications.

Last year, Actel addressed the high-end system management needs with Fusion mixed-signal PSCs. Utilizing the larger Fusion devices, Actel released Fusion-based MicroTCA reference designs for both the power module and advanced mezzanine cards. In addition, to allow customer development at the high end and demonstration of its system management capabilities, Actel released the advanced system management board, which includes several reference designs and tutorials.



To complement these high-end solutions and address the needs of embedded applications, Actel has released a reference design that enables intelligent, power-efficient system and power management implementations starting at $1.20. This low price is reached through the dramatic levels of integration made possible by the Fusion device, which reduces system cost and board space.

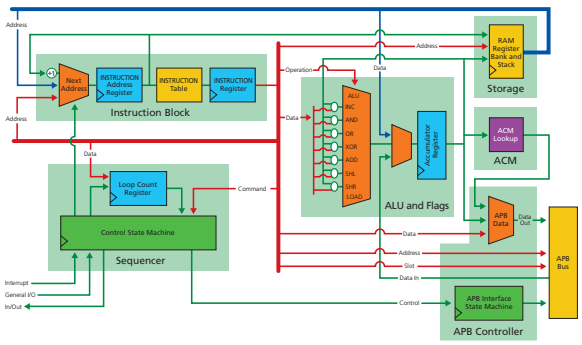
The design combines the award-winning, mixed-signal Fusion PSC with the optimized, configurable, free CoreABC microcontroller, providing a complete system management solution using a fraction of the Fusion part's logic tiles. The solution is delivered in the form of a free reference design and tutorial. The reference design is implemented on the Fusion Starter Kit, a lower cost development platform than the original system management kit. However, the reference design can be used on either kit.

The reference design leaves resources for customization and requires less than 17% of a Fusion AFS250 device and 50% of an AFS090 device. This leaves available resources for tasks such as glue logic, clock generation and management, and further integration, resulting in savings in bill-of-materials, power, and board area. This low-cost solution from Actel brings intelligent system and power management to the masses.

CoreABC Configurable Soft Processor

CoreABC is very small, fully configurable, and uses only 241 tiles in its smallest implementation.

It is ideal for any processor application needing only a small number of instructions. CoreABC is available independent of this reference design for free from Actel, and is easy to configure and use within the CoreConsole development environment. It can be either RTL or software programmable, supports the advanced peripheral bus or APB interface, and can use any cores compatible with this industry-standard bus architecture. CoreABC costs start at less than 10 cents per instantiation, and can be used to customize your own system management design.



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Reference Design
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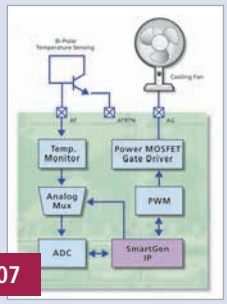
Fusion Performs Intelligent Thermal Management

The importance of thermal management in electronics has increased as system speed increases and the relative size of systems decreases. Traditionally, thermistors, thermocouples, and discrete temperature measurement integrated circuits (ICs) have been used to measure system temperature; however, if the temperature needs to be measured in multiple locations on the board, the cost of these devices can quickly add up. This, in turn, has created a pressing need to develop effective, compact, and inexpensive methods of thermal management for applications ranging from high-speed computer systems, telecom network switching boxes, and industrial temperature control to portable electronics, biomedical devices, motor control, and automotive.

In addition, the need to promptly and accurately correct temperature has led to the development of intelligent systems with active cooling systems and the ability to load balance their operation to regulate temperature.

Among other system management tasks, today's mixed-signal PSC represent one type of intelligent thermal management system, enabling design engineers to accurately measure temperatures at a number of locations cheaply and easily.



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