Protect your Design:
Secure your Set-top box
Set-top box designers need to combine low manufacturing cost at very high volumes with reliability and security in order to create a successful product. With their leading high volume pricing and the protection they provide against design theft and pirating, Actel FPGAs are the natural choice to use in set-top box designs. You can use them to interface functions between NTSC and PAL encoders and decoders, system processors, and various external interfaces such as USB2.0 and IEEE1394. Our FPGAs are non-volatile, needing to be programmed only one time. Other FPGAs are SRAM-based, requiring that the binary files containing the design information be loaded into the FPGA every time the system is powered-up. It is very easy to intercept, copy, or reverse engineer these binary files. The construction of Actel FPGAs effectively prevents reverse engineering of a design, offering the most secure solution available for you to use in your set top box design.

The MP3 Player: Appearance is Everything
Size, weight, and appearance are important factors for consumers of MP3 players. Consequently, designers of these products need to minimize component count and form factor. Our small footprint packages give enclosure designers more freedom to choose a compact and eye-catching product packaging style, which in turn will attract more customers. To meet market demands, Actel's eX FPGA package choices include chip-scale packages. The smallest of these

is the CS49, which occupies less than 50mm² of board space while offering up to 128 dedicated registers and 36 I/Os. Our programmable logic has been used to build interfaces between the CPU, the flash memory and the keypad, while also providing error correction algorithms and power control circuits.

Master the Market with a Low Powered Digital Camera
Like many other portable appliances, digital camera designs require low power consumption. Since digital cameras often sit unused on a shelf for weeks or months, it is important to keep the drain on the camera batteries to a minimum. Owners of digital cameras who find themselves constantly changing the camera's batteries will soon take their business elsewhere. To satisfy the need for low power consumption, Actel has designed a family of FPGAs with a standby low power mode of <250µA. In this static mode, as the camera would be most of the time, Actel FPGAs consume less than a fourth of the power of an average CPLD. In dynamic operating mode, Actel FPGAs consume a sixth of the power of the average CPLD, and less than half the power of the closest competing "low power" CPLD. Where conservation of battery power is critical for systems needing very high levels of reliability, Actel FPGAs far surpass other programmable logic. Actel FPGAs have been used to interface from the CPU to the LCD controller, to the keypad, and finally to the image sensor, offering the designer the freedom to create the highest quality digital camera to meet market demands.

e-Appliance FPGA Selector Guide

Part Number	eX64	eX128	eX256	SX08A	SX16A	SX32A
System Gates	3,000	6,000	12,000	12,000	24,000	48,000
Dedicated Registers	64	128	256	256	528	1.080
Maximum Flip-Flops	128	256	512	512	990	1,980
Combinatorial Cells	128	256	512	512	924	1,800
Maximum User I/Os	81	100	132	130	180	249
Low Power Mode	Y	Y	Y	N	N	N
Packages	TQ64, TQ100, CS49, CS128	TQ64,TQ100, CS49, CS128	TQ100, CS128, CS180	PQ208, TQ100 TQ144, FG144	PQ208, TQ100 TQ144, FG144 FG256	PQ208, TQ100 TQ144, TQ176 PG329, FG144 FG256, FG484

For more information about Actel's products, call 1-888-99-ACTEL or visit our Web site at http://www.actel.com
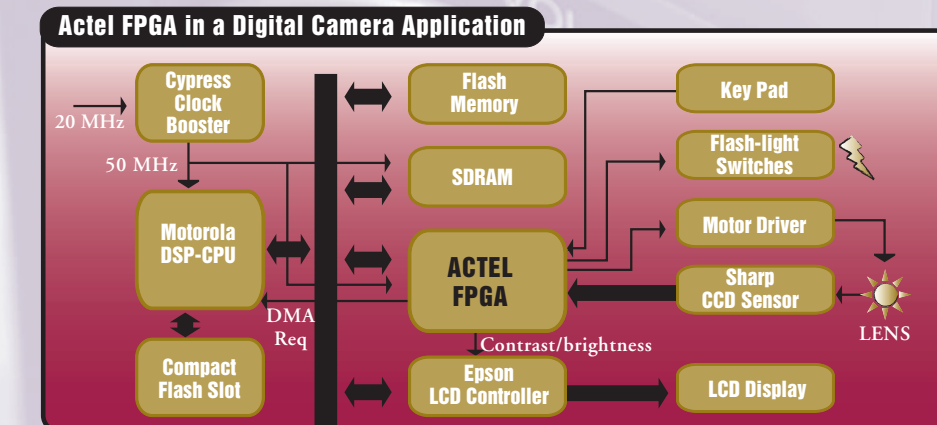
Actel FPGAs for e-Appliances
Low Power, Small Form-Factor Logic

In the rapidly evolving e-Appliance market segment, designers who produce high volume consumer electronics such as digital cameras, personal digital players, and set top boxes are in the difficult position of trying to find products that enable them to reduce board space, power consumption, and cost while maintaining maximum performance. Actel has the winning solution: Actel's e-Appliance FPGAs offer significant reductions in design costs, board area, and power consumption while speeding time-to-market for performance-intensive applications… all this in a single chip.

• *Low power consumption for extended battery life*

• *Small footprint for system portability*

• *Fast time-to-market*

• *Low cost at high volume*

• *High performance*

Actel FPGA in a Digital Camera Application

Actel's e-Appliance FPGAs combine low power consumption with high performance and capacity, enabling kernel hardware functions.

Actel FPGA in an MP3 Application
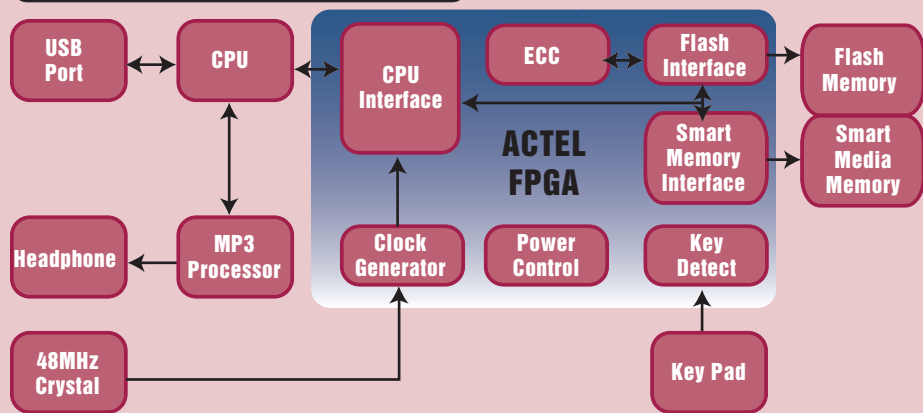
*Actel's e-Appliance FPGAs combine fast time-to-market, low power and small form factor for MP3 market leaders.

Lower Power = Longer Battery Life

Today's market is filled with complex portable devices that use batteries. Designers of consumer electronics know that customers who have to frequently replace batteries in their products will start buying products with low power consumption from other manufacturers. We know power consumption plays an important role in determining the device you will choose for your product. To help you meet the needs of your power sensitive designs, we offer Actel FPGAs, the products that will minimize demands on battery life while maximizing system reliability. Our e-Appliance FPGAs combine low power benefits intrinsic to Actel's antifuse technology with a low power "sleep" mode of less than 250µA standby current to further extend battery life.

All designers know that high power consumption raises the overall system temperature, which, in turn, adversely affects system reliability. System failure rates can double with every 10° C increase in system temperature. So, what do you do when you need high system reliability? You choose components with low power consumption, such as Actel FPGAs. To further increase reliability, our e-Appliance FPGAs reduce high thermal dissipation in the equipment, reducing the need for special cooling apparatus such as fans or heatsinks, which limit system miniaturization and also introduce electrical and audible noise.

The Smaller, the Better

In today's competitive consumer electronics market, it seems that new devices like MP3 players and digital cameras have barely made it to the market before smaller and more function-laden versions are available. We understand that to keep up with this trend of rapidly shrinking products with increased capabilities, you have to use higher density devices with smaller form factors to build your products. Actel's antifuse FPGAs already have the advantage of being a single-chip solution. Since they are nonvolatile, they retain their configuration data indefinitely, eliminating the need for an external storage device. This reduces board space requirements. Using advanced packaging technology for these devices also conserves board space. Actel offers a range of chip scale packages (CSPs) as small as 7mm x 7mm, and thin quad flat packs (TQFPs) that have all the logic necessary to meet performance requirements. With our e-Appliance FPGA single chip solution, we prove that less really is more.

Save Time and Money

The consumer electronics market operates in an extremely narrow window, making it crucial to minimize the development cycle and speed time-to-market. Actel's e-Appliance FPGAs were created to simplify the design and verification phases, enabling you to beat your competition to the market. Actel's automatic place-and-route tools enable up to 100% logic utilization resulting in faster design time. The unique general and local routing structures of Actel's e-Appliance FPGAs enable 100% pin-locking, even at full logic utilization, so your PCB can be developed concurrently with the FPGA. Even verification time is reduced because Actel's e-Appliance FPGAs can be internally probed in the target system and in real time by using the Silicon Explorer II diagnostic tool. To make things even easier, Actel FPGAs offer a push button HDL design flow, providing a comfortable alternative for those of you who are familiar with CPLDs and ASICs, but can do without the long production times and the high NRE charges associated with ASICs.

But the savings don't stop there. Unlike SRAM FPGAs, Actel's antifuse FPGAs retain their configuration data, so the cost of an external PROM is also eliminated. Combining functionality and performance in a single, low cost chip, Actel's e-Appliance FPGAs are the total solution to meet all the requirements of the consumer electronics market--at an affordable price.

The Secure, Single Chip Solution

Protection against pirating and reverse engineering in today's highly competitive technological industry is essential to creating a successful product. Actel's e-Appliance FPGAs offer that security. Their nonvolatility means there is no need for a startup bitstream, eliminating the possibility of configuration data being intercepted. This also prevents in-system errors and accidental data erasures that can otherwise occur during download.
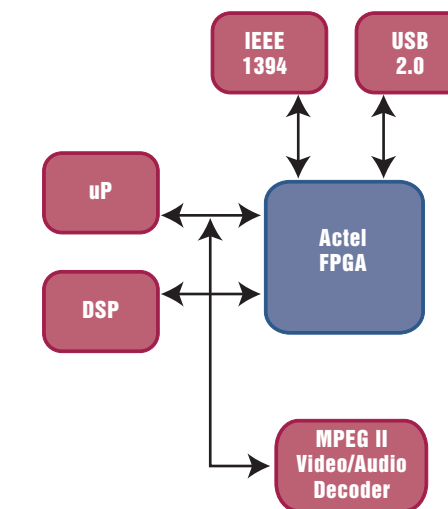
Add to that the inherent security of the antifuse technology itself. The antifuses that form the interconnections within Actel's e-Appliance FPGAs are extremely small, are densely distributed throughout the device, and do not leave an observable signature that can be electrically probed or visually inspected. These safeguards render the e-Appliance FPGAs virtually immune to copying and reverse engineering.

Actel FPGA in a HDTV Application
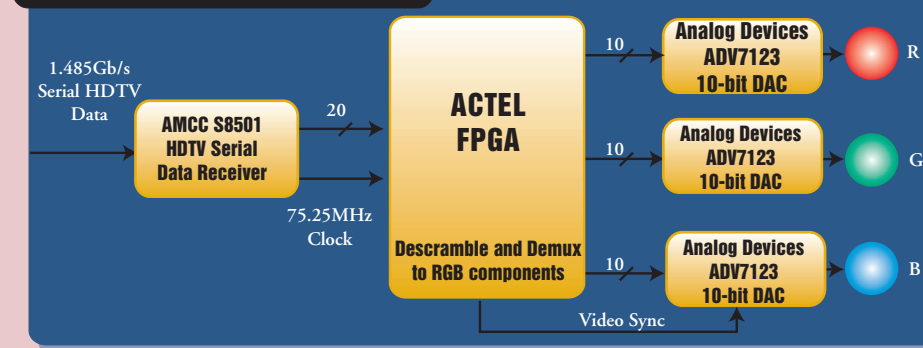
Actel's low cost e-Appliance FPGAs meet performance requirements more easily and cheaply than other FPGAs, enabling designers to get to market faster.

Design Tools and Services

Actel FPGA in a Set Top Box Application

Design Services

The One Stop Design Solution
With a ten-year history of providing hardware and software services, Actel's *Protocol* Design Services group offers its customers design support at all stages of project development. With extensive knowledge of FPGA design and prototyping, services are delivered on time, within budget, and to the customers' specifications.

Development Software

The DeskTOP series brings together the best in silicon, synthesis, and simulation to create a complete and integrated design environment for designing Actel FPGAs. The basic **DeskTOP** is an integrated development environment, including simulation, synthesis, and place-and-route tools, for designs less than 50k gates.

DeskTOP Pro increases the design simulation limit to 400k gates with unlimited synthesis, allowing designers to move up as their skills and density requirements to increase.

DeskTOP Open, which includes simulation up to 400k gates, and place-and-route tools, is ideal for ASIC designers who are starting to use FPGAs in their designs, but have already invested in synthesis tools.

33/66 MHz, 32/64-Bit PCI Cores

Actel offers the most flexible and cost-effective PCI solution in the FPGA market. Actel's CorePCI is available as a portable, soft RTL macro. Designed to be fully compliant to PCI Specification 2.2, the macro is capable of 33/66 MHz, 32/64-bit implementations with fully compliant zero-wait-state PCI transfer.

Designer Series is Actel's suite of FPGA development point tools for PCs and Workstations that includes the ACTgen MacroBuilder, Designer place-and-route software with Timer timing driven place-and route and analysis tools, and the Silicon Sculptor and APS device programming software.

Real-Time Device Verification

Actel's antifuse FPGAs contain internal probe circuitry that provides built-in access to every node in a design, enabling 100% real-time observation and analysis of a device's internal logic nodes without design iteration. The probe circuitry is accessed by Silicon Explorer, an easy to use 18-channel logic analysis system. Silicon Explorer enables designers to complete real time in-system verification at system rates up to 100 MHz, without leaving their desks.

Programming

Actel offers many programming options, including Silicon Sculptor single-site and multisite device programmers that support all Actel device families. For high-volume production programming needs, we offer volume programming services, through our distribution partners.