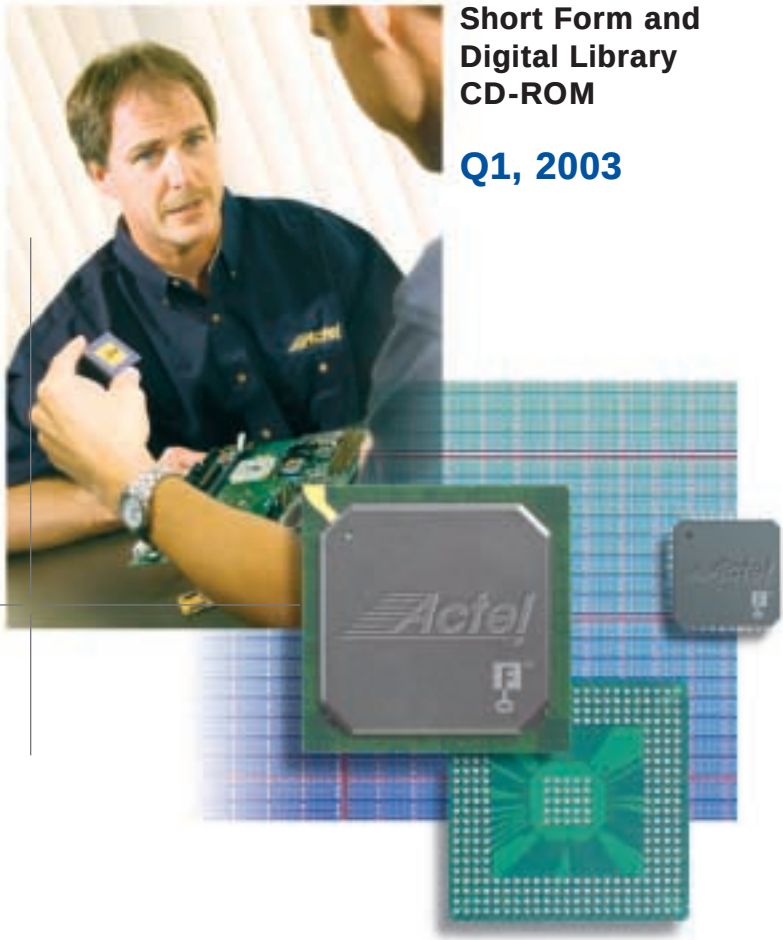
Products & Services

Short Form and Digital Library CD-ROM

Q1, 2003



Axcelerator Family of FPGAs

The World's Fastest FPGA

Actel's newest FPGA family, Axcelerator, offers high performance and unprecedented design security at densities of up to 2 million equivalent system gates. Based upon Actel's new AX architecture, Axcelerator has several system-level features, such as embedded SRAM (with embedded FIFO control logic), PLLs, segmentable clocks, chip-wide highway routing, PerPin FIFOs, and carry logic.

Based upon .15µ, 7 layers of metal CMOS antifuse process technology, Axcelerator offers a level of performance previously only available in ASIC technology.

- 350 MHz system performance
- 500+ MHz internal performance
- 500+ MHz embedded FIFOs
- PLL output up to 1 GHz and 8 PLLs per device
- 6 levels of logic at 156 MHz+
- 1.5V, 1.8V, 2.5V and 3.3V mixed voltage operation
- 8 I/O banks per device
- 8 global clocks per device
- 4.5kbit variable-aspect RAM blocks with built-in FIFO control
- 64-bit PerPin FIFO on every I/O
- Intelligent low power operation
- Secure programming technology prevents reverse engineering and design theft

	AX125	AX250	AX500	AX1000	AX2000
System Gates	125,000	250,000	500,000	1,000,000	2,000,000
Dedicated Registers	672	1,408	2,688	6,048	10,752
Max Registers (core)	1,344	2,816	5,376	12,096	21,504
Embedded RAM bits	29,184	71,168	95,232	198,912	338,688
Embedded RAM Blocks (4,608 bits)	4	12	16	36	64
Max User I/Os	168	248	336	516	684
Max Number of LVDS Pairs	84	124	168	258	342
PLLs	8	8	8	8	8
Global Clocks	8	8	8	8	8
Packages	CS 180 FG 256 FG 324	PQ 208 FG 256 FG 484	PQ 208 FG 484 FG 676	BG 729 FG 484 FG 676 FG 896	FG 896 FG 1152

ProASIC PLUS Family of Reprogrammable Flash FPGAs

The Capabilities of ASICs with the Flexibility of FPGAs

Actel's next-generation Flash product, ProASIC PLUS with FlashLock, expands on all the features and benefits offered by the ProASIC 500K family. Based on .22µ Flash technology, ProASIC PLUS offers the unique combination of reprogrammability and nonvolatility in a high-density programmable logic product. ProASIC PLUS combines the advantages of ASICs with the benefits of FPGAs, enabling engineers to leverage their existing ASIC or FPGA design flows and tools.

- Maximum design security
- Reprogrammable
- Nonvolatile
- Live at power-up
- ASIC design flow
- Very low power
- PLLs and LVPECL I/O

	APA075	APA150	APA300	APA450	APA600	APA750	APA1000
System Gates	75,000	150,000	300,000	450,000	600,000	750,000	1,000,000
Max Registers	3,072	6,144	8,192	12,288	21,504	32,768	56,320
Embedded RAM bits	27k	36k	72k	108k	126k	144k	198k
Embedded RAM Blocks (256x9)	12	16	32	48	56	64	88
Max User I/Os	158	242	290	344	454	562	712
Packages	PQ 208 FG 144 TQ 100	PQ 208 BG 456 FG 144 FG 256 TQ 100	PQ 208 BG 456 FG 144 FG 256 FG 484	PQ 208 BG 456 FG 144 FG 256 FG 484	PQ 208 BG 456 FG 256 FG 676	PQ 208 BG 456 FG 676 FG 896	PQ 208 BG 456 FG 896 FG 1152

ProASIC FPGAs

The Nonvolatile Reprogrammable Gate Array

Based on a .25µ standard Flash/CMOS process, ProASIC™ 500K devices combine high density and low power with nonvolatility and reprogrammability. With a unique architecture offering predictable performance, improved utilization, and greater routing efficiency, ProASIC 500K devices allow designers to easily meet performance goals.

- Consumes half the power of equivalent SRAM-based FPGAs
- Embedded two-port SRAM with dedicated FIFO control logic
- Individually selectable I/Os for slew rate control and voltage selection
- Design with ASIC or FPGA methodology and tools

	A500K050	A500K130	A500K180	A500K270
System Gates	100,000	290,000	370,000	475,000
Max I/Os	204	306	362	440
Embedded RAM	14k	45k	54k	63k
Max Flip-Flops/ Logic Tiles	5,376	12,800	18,432	26,880

eX FPGAs

Low Power, Single-Chip Solution

With a focused combination of features, eX can meet all of your power, speed, package, and price requirements. Optimized for wired and mobile e-appliances, eX enables designers to use a flexible single-chip PLD for their traditional low-density ASIC requirements without the long leadtimes and costly NRE charges.

- Very low current consumption (<400µA typical standby)
- Ideal for low power consumer electronics
- Extremely small chip-scale packages minimize board area
- Fast time to market
- Low cost for high volume production
- Design security strongly discourages reverse engineering or design theft

	eX64	eX128	eX256
System Gates	3,000	6,000	12,000
Max I/Os	84	100	132
Dedicated Flip-Flops	64	128	256
Combinatorial Cells	128	256	512

SX-A / SX FPGAs

Reducing the Cost of Performance

Actel's SX-A/SX devices can match the speed and performance of an ASIC or be used to generate system wide savings by integrating multiple functions into a low-cost, single-chip solution. Providing a combination of performance, security, and low-power, SX-A/SX decreases the premium for performance while providing a solution highly secure from reverse engineering.

- 350 MHz internal clock frequency
- 3.8 ns clock-to-output (pin-to-pin)
- 66 MHz, 64-bit 3.3V/5.0V PCI performance (Target, Master, Master/Target)
- 2.5V, 3.3V and 5.0V mixed voltage support
- Low power consumption (<1w @ 200MHz)
- Hot-swappable I/Os (SX-A)
- Complete BST/JTAG support
- 100% resource utilization with 100% pin loading

	A54SX08/08A	A54SX16/16P/16A	A54SX32/32A	A54SX/72A
System Gates	12,000	24,000	48,000	108,000
Max I/Os	130	180	249	360
Dedicated Flip-Flops	256	528	1,080	2,012
Logic Modules	768	1,452	2,880	6,036

FPGAs for Space Applications

A History of Serving the Space Market

Dedicated to providing FPGAs for space applications that meet the stringent radiation and quality requirements of the space community, Actel is the world's leading supplier of space FPGAs. Over the last six years, Actel devices have been on board more than 50 launches and have been accepted for mission critical flight-unit applications on over 100 satellites.

Actel continues its commitment to the space community with the RT54SX-S FPGA family. Designed specifically for space, the RT54SX-S family is built on a foundation of hardened latches, eliminating the need for software-generated TMR or other SEU mitigation techniques.

- Total dose capabilities from 10k to 1M rad
- Latch-up immune
- RadHard FPGAs suitable for critical command and data handling functions
- SEUs to meet your mission requirements
- RadTolerant 54SX FPGAs offer low cost, high densities, and performance
- Pin compatible commercial devices for easy and inexpensive prototyping
- RadTolerant for space applications

	RTSX-S	RadTolerant SX	RadTolerant	RadHard
Products	RT54SX32S RT54SX72S	RT54SX16	RT1020, RT1280 RT1425, RT1460 RT14100	RH1020 RH1280
Gates	32,000-72,000	16,000	2,000-20,000	4,000-16,000
Max I/Os	227-212	179	69-228	69-176
Logic Modules	2,880-6,036	1,452-2,880	310-1,377	547-1,452

Latch-Up (LET) — Immunity (no SEL below 80 LET min)

All Actel space electronics offerings are "immune" to single-event latch-up phenomenon, as they are tested to a *minimum* of 80 LET with no incidents.

FPGAs for Military/Aerospace Applications

Because Failure is Not an Option

Actel's Military/Aerospace FPGA products deliver reliable and secure performance. From military temperature tested plastic devices to fully QML qualified Class Q, Actel FPGAs offer a wide range of device sizes, screening levels, packaging choices, and price points.

Long known for its antifuse technology, Actel has expanded its FPGA core technology to the Flash-based, reprogrammable, nonvolatile realm. ProASIC^{PLUS} now provides the military/aerospace community with a range of high density, nonvolatile, reprogrammable FPGAs. ProASIC^{PLUS} devices are excellent alternatives to ASICs as they are live at power-up and do not require external design storage, eliminating high ASIC NREs and continuing Actel's commitment to the military/aerospace community.

- Very low Failures-In-Time (FIT) rates
- Full QML certification
- Military temperature plastic devices from 2,000 to 72,000 gates
- Pin compatible commercial devices for easy and inexpensive prototyping
- Ceramic packages from 2,000 to 72,000 gates available in commercial temperature through QML Class Q (MIL-STD-883 Class B Equivalent) and E-Flow (MIL-STD-883 class S level screening)

Family	MIL-STD-883 Class B/ QML Class Q/DSCC SMD Ceramic Devices	Military Temperature Tested Plastic Devices	On-Chip Performance
ProASIC^{PLUS}	Planned*	Planned*	to 150 MHz
SX-A/S	32,000 to 72,000 gates	8,000 to 72,000 gates	to 250 MHz
SX	16,000 to 32,000 gates	8,000 to 32,000 gates	to 240 MHz
MX	36,000 gates	2,000 to 36,000 gates	to 125 MHz
DX	10,000 to 20,000 gates	6,500 to 30,000 gates	to 55 MHz
XL	8,000 gates	2,500 to 8,000 gates	to 50 MHz

* Currently available in commercial and industrial temperature ranges.

MX FPGAs

Featuring very low power consumption and the industry's highest design security, MX FPGAs offer designers a reliable, single-chip ASIC alternative. Providing an efficient, flexible 5.0V architecture, MX is an ideal platform for integrating your legacy PLDs into a single, low cost device. MX is a high volume platform that enables solutions without compromising on cost and time.

- Industry leading price/performance combination at 5.0V
- 3.3V and 5.0V mixed voltage support
- 250 MHz internal frequency
- PCI compliant at 3.3V and 5.0V (A42MX24, A42MX36)
- Two-port SRAM (10 2,560-bit blocks in A42MX36)
- Low power mode (A42MX09, A42MX16, A42MX24, A42MX36)

Optimized for Your 5.0V System Requirements

	A40MX02	A40MX04	A42MX09	A42MX16	A42MX24	A42MX36
System Gates	3,000	6,000	14,000	24,000	36,000	54,000
Max I/Os	57	69	104	140	176	202
Max Flip-Flops	147	273	516	928	1,410	1,822
Logic Modules	295	547	684	1,232	1,890	2,438

Secured by Actel

Actel FPGAs and Design Security

Look for this symbol to ensure your valuable IP is secure.

All ProASIC and ProASIC PLUS devices are secured by Actel's unique FlashLock™ technology. ProASIC PLUS devices also have a 79 to 263-bit Flash-based lock to secure programmed IP and configuration data.

The Actel FuseLock™ advantage ensures that unauthorized users will not be able to read back the contents of an Actel antifuse FPGA. Combined with special hidden security fuses that prevent internal probing and overwriting, Actel antifuse FPGAs keep your valuable IP yours.

Secure systems and their underlying silicon technologies are becoming increasingly vital in preventing corruption, intrusion, and ultimately the theft of your valuable IP. Without taking the necessary precautions, corporations experience major security breaches, resulting in design theft and other malicious damage. To increase awareness of this growing problem, Actel, the industry's leader in secure programmable technology, has launched an informative campaign to help its customers protect their Intellectual Property.

For more information, please visit Actel's Security Resource Center at http://www.actel.com/products/security/index.html

The Actel solution is a range of nonvolatile, single-chip FPGAs that offer virtually unbreakable design security to meet your most demanding design requirements.

- All Actel FPGAs maintain your data internal to the chip. There is no external bitstream or boot-up PROM that can be compromised.
- No optical change is visible in a programmed antifuse, making invasive analysis effectively impossible even with access to SEMs and other advanced technologies.
- Actel's ProASIC Flash technology is secured with a powerful security key.
- It is impossible to determine the state of a given Flash element via invasive methodologies without destroying the element itself.

Everything You Need to Get the Job Done

Actel Libero™ Integrated Design Environment (IDE)

Libero IDE is the most comprehensive and powerful FPGA development software available, providing all necessary design tools to help you bring your Actel FPGA product to market quickly with the highest possible device performance.

By combining Actel's internally developed tools with industry standard products from Mentor Graphics,™ Model Technology,™ Synplicity,® and SynaptiCAD,™ Libero IDE provides "one stop shopping" and a development environment that ensures complete tool compatibility and interoperability, a streamlined design flow, project and file management, plus the passing of all design data between tools from schematic/HDL entry to place-and-route and all the way through device programming. Silicon debug capability is also featured as part of the suite.

Actel Designer Software

Actel's Designer software includes all of the tools required for a complete design implementation system. After completing design entry and functional verification using your favorite electronic design package, simply import your Actel netlist into the software. For use without Libero IDE, Designer software is compatible with the most popular design entry and verification packages from industry leaders such as Synopsys, Mentor Graphics, Cadence, Model Technology, and Synplicity.

Actel Designer software provides several powerful tools to facilitate completing your design quickly and reducing your time to market. These tools enable you to lock pins before layout, create design macros, plus capture and execute design scripts. Designer software also includes static timing analysis and power analysis tools that enable you to do exhaustive verification of your design without having to buy additional tools.

Availability

Libero IDE is available in Silver, Gold, and Platinum editions. Designer is available in Gold and Platinum editions. Libero IDE and Designer Platinum are also available for a limited time free evaluation. See www.actel.com for more information.

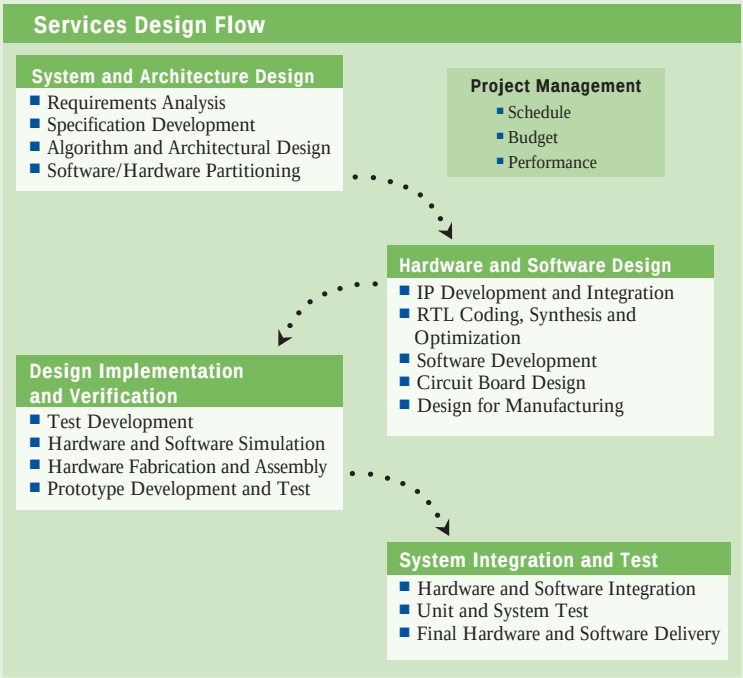
Function	Tool	Vendor
Schematic Draw	ViewDraw	Mentor Graphics
Synthesis	Synplify	Synplicity
Testbench	WaveFormer Lite	SynaptiCAD
Simulation	Model*Sim*	Mentor Graphics
Project Manager, HDL, Editor	Libero IDE	Actel
Timing/Constraints, Macro Generation, Power Analysis, Netlist and Chip Viewer, Chip Edit, Pin Edit, Place-and-Route, Programming, Debug	Libero IDE and Designer	Actel

Protocol Design Services

Make Protocol Your Product Design Outsourcing Partner!

Actel's Protocol Design Services organization offers a broad range of efficient solutions to help solve today's unique design challenges and get products to market faster. Protocol has a successful history on providing hardware and software design services to companies throughout the world. Protocol has participated in the development of optical networks, switches and routers, cellular phones, digital cameras, PCs, embedded DSP systems, automotive electronics, navigation systems, software compilers, custom processors and military electronics.

Services Design Flow



Protocol Design Services Solutions:

- FPGA, ASIC, and Board Design
- IP Development
- PCI and USB Design and Integration
- Cost-Reduction Solutions
- Software Development
- Communication Systems Design
- Consumer Product Design
- Prototype and Production Units

Make Protocol Your Product Design Outsourcing Partner!

Contact Protocol Design Services at (973) 770-4700 or send email to design.services@actel.com

Enabling System Level Integration

Actel provides general-purpose access to pre-verified, general-purpose soft logic core IP implemented in its silicon. Actel's IP program comprises a four-fold approach:

1. Internal IP core program to develop high demand functions
2. Third-party partnerships with established core suppliers, such as Mentor Graphics and Inicore, to provide validated IP blocks
3. ACTgen, a parameterizable function generator for adders, multipliers, comparators, and other functions
4. Design Services for IP customization and system-level integration services

CorePCI is Actel's flagship IP solution to help engineers deliver designs on time.

CorePCI

PCI demands fast silicon with proven functionality. Actel's PCI cores help you solve even the most challenging design problems.

- PCI Specification 2.2 compliant
- Available for antifuse, Flash and HiRel designs
- Zero wait-state burst mode transfers
- Supports Actel SX, SX-A, RTSX, ProASIC and ProASIC^{PLUS} families
- Silicon-proven 33 or 66 MHz performance*
- 32-bit or 64-bit PCI bus width and datapath
- Memory, I/O, and configuration support
- Backend support options for synchronous DRAM, SRAM, and generic I/O subsystems
- Flexible backend data flow control
- Target, Master, Master/Target and Target+DMA functions
- Verilog and VHDL design source
- Comprehensive testbench
- Supported by common synthesis and simulation tools for Verilog and VHDL

Actel has five other cores in addition to the flagship PCI product:

CoreUART	Serial Communications Controller
CoreASYNC	Asynchronous Backend Interface for PCI Bus
CoreSDRAM	SDRAM Controller
CoreARBITER	PCI Bus Arbiter for processing PCI bus requests from master devices
CoreCRC	Parameterized Cyclic Redundancy Code Generator/Checker
Core 8b/10b	8b/10b Encoder/Decoder Interface

*33 MHz is supported across all families, 66 MHz is supported on SX, SX-A and Axcelerator families.

Finishing the Job

Silicon Explorer II

Actel's antifuse FPGAs contain internal probe circuitry that provides built-in, no-cost access to every node in a design, enabling 100% real-time observation and analysis of a device's internal logic nodes without design iteration. Silicon Explorer II, an easy-to-use integrated verification and logic analysis tool for the PC, accesses the probe circuitry, enabling designers to complete the design verification process at their desks.

- Real-time access into internal nodes without design iteration
- PC-hosted 18-channel logic analyzer that connects easily to a desktop or laptop
- Up to 100 MHz asynchronous or 66 MHz synchronous sampling rate
- Graphical user interface for viewing and analysis
- Portable and easy to use
- 100% node observability built into all Actel antifuse parts
- Serial port connection, no plug-in card

With Silicon Explorer II, the designer will be able to improve productivity and decrease time-to-market by removing the guesswork typically associated with the process of system verification.

Programming

Actel offers programming options including Silicon Sculptor II single site and Flash Pro for PC. When the design is ready to go to production, Actel has a programming solution for that, too. Actel offers volume programming services through distribution partners.

Silicon Sculptor II is a robust, compact, single device programmer with stand-alone software for the PC. This device programmer is designed to allow concurrent programming of multiple units from the same PC with speeds faster than those of Actel's previous programmers.

- Programs all Actel packages
- Universal Actel socket adapters
- Calibration (test only)

Flash Pro is a compact, cost-effective, easy way to program Actel's Flash devices. Flash Pro eliminates incompatibility problems, expensive redesign costs, and offers faster time-to-market with its ISP capability. This portable Flash device programmer connects to a PC through a parallel port and is controlled by an easy-to-use GUI.

For more information about Actel's products and services, call 1.888.99.ACTEL or visit our website at http://www.actel.com

www.actel.com

Actel Corporation
955 East Arques Avenue
Sunnyvale, CA USA 94086
Telephone 408.739.1010
Facsimile 408.739.1540

Actel Europe Ltd.
Maxfli Court, Riverside Way
Camberley, Surrey GU15 3YL
United Kingdom
Telephone +44 0 1276.401450
Facsimile +44 0 1276.401490

Actel Japan
EXOS Ebisu Building 4F
1-24-14 Ebisu Shibuya-ku
Tokyo 150, Japan
Telephone +81 0 3.3445.7671
Facsimile +81 0 3.3445.7668