



Platform8051

An Integrated Microprocessor Platform



Implement Your 8051-Based Design with Ease

Actel makes system integration with 8051 designs a breeze. The 8051 is an extremely popular 8-bit architecture and designers of embedded systems have long sought the flexibility of reconfigurable and programmable peripherals. To address this need, Actel has introduced *Platform8051*, a microprocessor intellectual property (IP) platform.

With *Platform8051* Actel offers a system-on-a-chip IP platform that reduces time to market on new designs as well as existing 8051-based electronic products. *Platform8051* has an industry-standard ASM51 microprocessor core along with communications peripherals that are frequently used in embedded systems. The platform is modular and scalable. The result is quick integration, minimized time to market, and a flexible chip design.

Platform8051 is useful in a variety of aerospace, military, industrial, communications, consumer and automotive applications.

Key Features

Platform8051

- A Modular 8-bit Microprocessor Platform Speeds System Design
- Available as Individual Cores, as a Group or as a Complete Set
- Supports Most Actel Device Families

Core8051

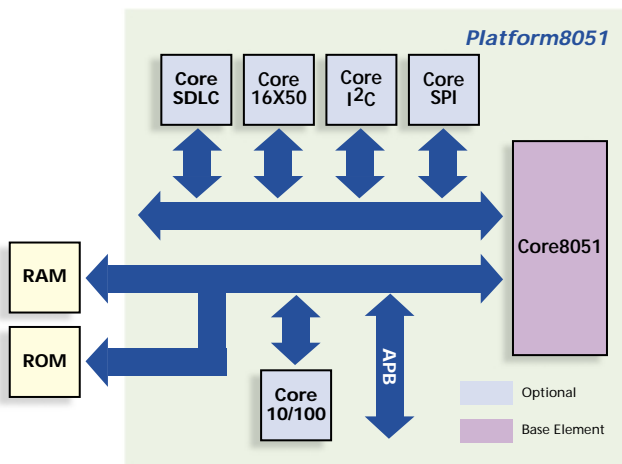
- 100% 80C51/80C31/8051 (ASM51) Instruction-Compatible
- Single-Cycle Instruction Execution
- 8-Bit Arithmetic Logic Unit
- Four 8-Bit Programmable Input/Output Ports
- One Programmable Serial Port
- Two 16-Bit Timer/Counters
- Four Priority-Level Interrupt Controller
- 256-Byte Internal Data Memory Interface
- 64 Kilobyte External Program and Data Memory Interfaces

Peripherals

- Serial Communication Interfaces: SDLC, I²C, SPI, 16550, or 16450
- IEEE 802.3 10/100 Ethernet Media Access Controller

A Complete Platform with Many Features

Embedded system designs have some common elements: sensing, control, monitoring, and communication. There is no need for an engineer to spend time integrating all of those elements for every design. *Platform8051* offers a microprocessor and peripherals that include these common elements. The peripherals are optional elements of the platform; the designer just specifies which components are needed upon ordering. This platform saves the system integrator a significant amount of time.



Platform8051 Block Diagram

A Fast Core with Built-In Peripherals

Legacy 8-bit processors typically operate at only 12 MHz, 16 MHz, and 20 MHz. This is slow by today's standards. Using Actel FPGAs and Core8051, you can easily double your present processor performance without replacing legacy software code. Core8051 performs at 45 MHz on Actel's Axcelerator devices and executes instructions in a single-cycle for most operation codes.

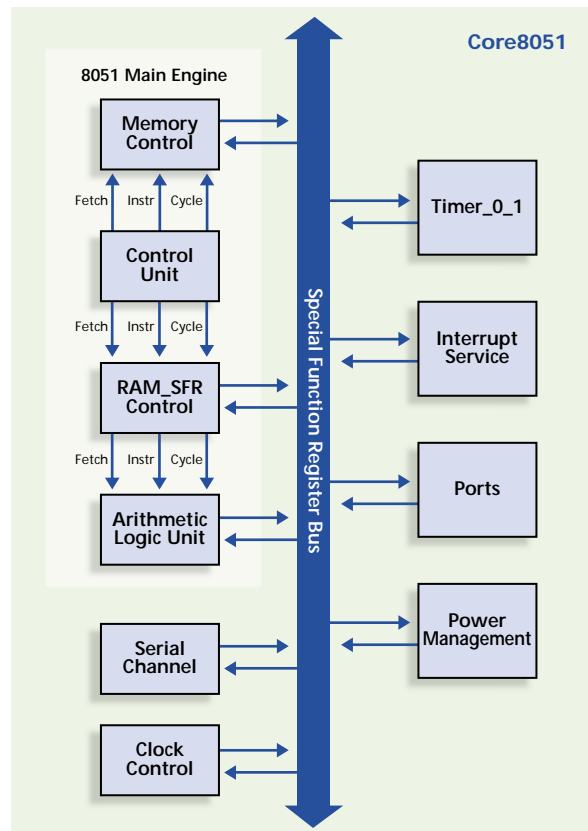
Core8051 is a fully functional 8-bit microprocessor intellectual property core that executes all ASM51 instructions. The core has a robust set of internal peripherals that serve software and hardware interrupts, has an interface for serial communications and includes timers and power management.

High Performance Peripherals

Platform8051 has many peripherals available to communicate with the outside world.

Core10/100 is an Ethernet Media Access Controller that connects Local Area Networks at data rates of 10 or 100 Mb/s. It has a Media Independent Interface (MII) for physical connection and implements Carrier Sense Multiple Access with Collision Detection (CSMA/CD) algorithms per IEEE 802.3. Ethernet is a common standard which is used in computer, communications, industrial, and other applications.

CoreI2C is a bus controller which provides a two-wire serial interface that meets Philips I²C specification. It can transmit or receive in master or slave mode and has a 7-bit addressing format with a fixed data width of 8-bits. It supports data transfers at 100 kb/s and 400 kb/s. I²C is a daisy-chained bus standard which is used in many consumer electronic and embedded applications.



Core8051 Block Diagram

CoreSPI is a serial peripheral interface allowing high-speed synchronous serial data transfers between the 8051 and peripheral devices. This component supports full duplex operation with 8-bit serial data transfer and acts as a master or slave. SPI is a point-to-point bus standard used in a variety of embedded applications.

CoreSDLC is a high-speed synchronous serial data link controller. Operation is similar to the Intel 8XC152 Global Serial Channel working in SDLC mode under CPU control. With Axcelerator it supports data transfers greater than 17 Mb/s. This core is useful for ISDN, frame relay networks, and custom serial interfaces.

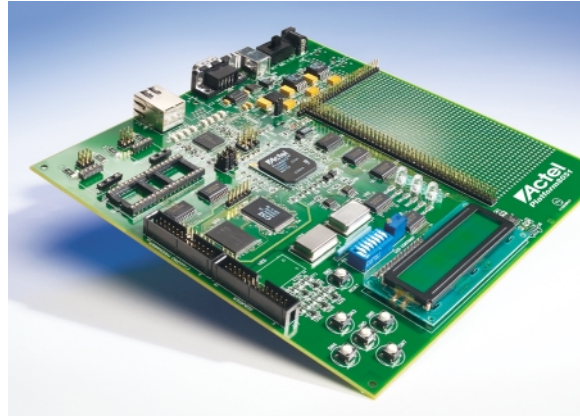
Core16X50 is a UART with or without FIFO support and is used for asynchronous communication. It is 100% software compatible with the Texas Instruments 16550 device and capable of a baud rate greater than 10 Mb/s on Axcelerator devices. It adds additional serial channels to Core8051. The 16X50 is useful as a serial or modem interface.

FPGA Solution

In addition to great IP cores and the world's best FPGAs, Actel provides a complete design solution. *Platform8051* includes core, testbench, documentation, and additional simulation files. The cores are available as RTL, netlist or evaluation versions. All code is compatible with standard synthesis and simulation tools as well as Actel's popular Libero™ and Designer software offerings.

Microprocessor Software Development Tools

The popular 8051 instruction code is supported by a variety of software development tools. Actel has partnered with two companies to provide an outstanding 8051 software code solution. A First Silicon Solutions (FS2) Debugger and on-chip instrumentation (OCI) code is included with each purchase of Core8051 or



Platform8051 Development Board

the *Platform8051*. The debugger includes four hardware execution breakpoints and unlimited software breakpoints. Additional trigger and trace capability is available from FS2. Keil Software provides the PK51 for Core8051, a complete integrated development environment (IDE) which includes an instruction-accurate and cycle-accurate simulator as well as compiler, assembler, linker, and debugger. This IDE is available free for a 30-day evaluation and it may be purchased for a very reasonable price from Keil or FS2.

Platform8051 Development Kit

The *Platform8051* development kit is all you need to get your 8051 design up and running immediately after purchase. It includes an APA600-FG676 evaluation board with a pre-programmed web-server demonstration design. The board includes off-chip memory, interface devices for the *Platform8051* peripherals, and a prototyping area for user communication. Additionally, it includes the Keil IDE evaluation software, Actel Libero software, a universal power supply, a Category 5 cable (for Ethernet), an RS232 cable and an optional FlashPro Lite debug and JTAG connector.

Device Utilization for *Platform8051*

	Example Implementation					
	Axcelerator		ProASIC ^{PLUS}		RTSX-S	
	Device	Util. %	Device	Util. %	Device	Util. %
Core8051	AX250	77%	APA150	74%	RTSX72S	58%
Core10/100	AX500	56%	APA300	81%	RTSX72S	83%
CoreI2C	AX125	30%	APA075	20%	RTSX32S	22%
CoreSPI	AX125	13%	APA075	14%	RTSX32S	10%
CoreSDLC	AX125	47%	APA075	56%	RTSX32S	33%
Core16X50	AX125	50%	APA075	53%	RTSX32S	37%

Where Can I Learn More

Please contact Actel's worldwide staff of sales professionals who are ready to assist you with the purchase of the IP or the evaluation kit and help you instantiate your design on an Actel FPGA.

For more information regarding **Actel's Platform8051 Integrated Microprocessor Platform**, please contact your local **Actel** sales representative.



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