PSoC
MICROCONTROLLER
PROGRAMMABLE SYSTEMS-ON-CHIP

WHAT ARE PROGRAMMABLE SYSTEMS-ON-CHIP?

There seems to be an accepted definition of System-on-Chip — a custom ASIC with a processor core and the memory and peripherals exactly required for a given system. The cost must be the least expensive way to replace the combination of standard products that would provide the same functionality.

At Cypress MicroSystems, the only thing we drop from this definition is the term "custom ASIC." Our PSoC™ Microcontroller is a standard product, allowing every designer of embedded systems to achieve ASIC cost, size, and efficiency without the expensive, time consuming, and risky overhead of implementing a custom ASIC.

Typical Embedded Applications
• Telecommunications
• Industrial Control
• Industrial Automation
• Consumer Products
• Environmental Monitoring
• Computer Peripherals

IS THIS A PLD?

While Programmable Logic Devices (PLDs) are valuable in developing custom chips, they are typically used as a system prototyping tool or in high-performance, cost-flexible systems. PLDs are flexible and programmable, but they are typically above the sub-$1 to $5 application requirements of embedded systems. PLDs also require a silicon design skill inconsistent with the application design expertise found on typical embedded system projects.

WHAT IS THE CYPRESS SOLUTION?

The Cypress MicroSystems product line is comprised of families of highly tuned microcontroller resources. Built around a high-performance core, a PSoC™ Microcontroller is created by adding a collection of Analog and Digital building blocks that allow efficient implementation of the peripherals used in embedded control applications. By selecting the part number with just the resource combination necessary (memory, analog building blocks, digital building blocks, and pins), the designer ends up with a device that reduces cost, eliminates external chips, and simplifies system design.

BUILDING BLOCKS?

The Cypress MicroSystems PSoC Microcontroller is based upon the concept of PSoC Blocks. PSoC Blocks are digital or analog building blocks that can change function through personalization (e.g. Timer vs. UART or DAC vs. Filter). The PSoC Blocks can also be parameterized to set items such as frequencies, gains, and compare values.

FLASH/EEPROM

Cypress MicroSystems PSoC Microcontrollers are based upon leading-edge Cypress Semiconductor Flash memory technology. The Flash is used to hold the program memory and the personalization and parameterization of a user-defined configuration.

The PSoC Microcontroller's Flash is also designed to simulate EEPROM. With high read/write endurance, user defined blocks of flash can be used to emulate EEPROM memory. By mapping a section of the RAM into the Flash, the programmer can initiate writing the block into the flash for long-term, power-off retention.

FLEXIBILITY

PSoC™ Blocks can be interconnected in two fundamental ways. In parallel, they extend the precision of a function — e.g. a wider timer or a higher precision Analog/Digital Converter(A/D). In serial, PSoC Blocks can be combined to accomplish processing that would require multiple off-processor chips. An example would be to take the output of a sensor through a pre-scaling amplifier, then through a band-pass filter, and then an A/D, all on the MCU chip. Or a hardware Cyclical Redundancy Checking (CRC) generator can be defined in front of the serial output.

Flexibility also extends to assigning peripheral outputs to user selected pins, further simplifying the board layout task.

The ultimate PSoC Microcontroller flexibility is found in the ability to CHANGE THE PERIPHERAL DEFINITION AT RUN-TIME. Most microcontroller designs are state machines. In each state, the peripheral requirement can be different. Only with PSoC Microcontrollers, can a timer become a CRC generator; a DAC become a filter.

USER MODULES — OFF THE SHELF FUNCTIONALITY

To accelerate development, Cypress MicroSystems provides a growing library of User Modules. User Modules are essentially peripherals that a designer can select from a simple "device editor" menu. The device editor also allows the interconnection and pin-assignments to meet the application requirements.

For more information,
Call (425) 415-1523

www.cypressmicro.com

TOTAL TOOLS

Understanding the importance of dependable, functional, and low-cost tools, Cypress MicroSystems introduces the PSoC Designer™ IDE (Interactive Design Enviroment) and the PSoC™ ICE. The PSoC Designer IDE is built upon a Windows-based IDE, and provides a complete, leading-edge development environment.

The PSoC Designer IDE includes:
- *Code Editor* • *Assembler* • *Compiler*
- *Linker/Loader* • *Programmer*
- *Debugger* • *ICE*

Device Editor: The Device Editor is how PSoC Microcontroller works. Using a graphical interface, User Modules are selected and I/O pins are assigned. Upon completion, a new, configured data sheet is created that includes the user-selected User Modules / peripherals and the specified pin-out.

PSoC™ ICE: The PSoC ICE is a multi-functional device used for developing and debugging PSoC Microcontroller applications. The PSoC ICE functions as a traditional ICE debugger as well as the programmer for the processor. Programming can be performed via a programming socket or serially in circuit.

In debugging mode, the ICE provides complex breakpoints, trace memory, and traditional processor resource observation and modification.

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THE DESIGNER'S DILEMMA

- Halfway into the design, you must have another timer or another channel of A/D, or you'd like to trade a timer for a Universal Asynchronous Receiver Transmitter (UART), but there is no way to change processors.

- The processor is cheap, but the other chips are too expensive.

- Every microcontroller choice is a compromise between peripheral mix, memory size, and cost.

- Three weeks to go and Marketing adds a new "can't live without" feature.

- The processor you are using limits your creativity.

PSoC™ Microcontroller eliminates all of these constraints.

Call us now!

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CYPRESS MICROSYSTEMS
A Subsidiary of Cypress Semiconductor

2-1200CYM

Flash-based PSoC™ Microcontroller Customizable, Programmable Systems-on-Chip

An Introduction

CYPRESS MICROSYSTEMS
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Changing the Embedded World™