

# R8051XC2

The world's fastest, most configurable 8051 microcontroller

## MAJOR FEATURES

- ◆ The fastest 8051 CPU in the market, over 12 times faster than the 80C51 from Intel®
- ◆ External Memory Interface that addresses up to 8 MB of Program and Data Memory
- ◆ Multiplication-Division Unit for 16 x 16-bit multiplication and 32/16- and 16/16-bit division
- ◆ Special Function Registers (SFR) interface that services from 43 to 119 External SFRs
- ◆ Interrupt Controller with either 4 priority levels/18 interrupt sources or 2 levels/6 sources
- ◆ Power Management Unit with power-down modes (IDLE/STOP)
- ◆ Native On-Chip Debug Support (OCDS) interface
- ◆ DMA controller with up to eight independent channels
- ◆ 80C51 and 80C515-like Timers/Counters
- ◆ Full-duplex asynchronous Serial0 and Serial1 interfaces
- ◆ Programmable watchdog timer
- ◆ SPI Master/Slave interface
- ◆ I<sup>2</sup>C-bus Master/Slave interface with SMBus extension

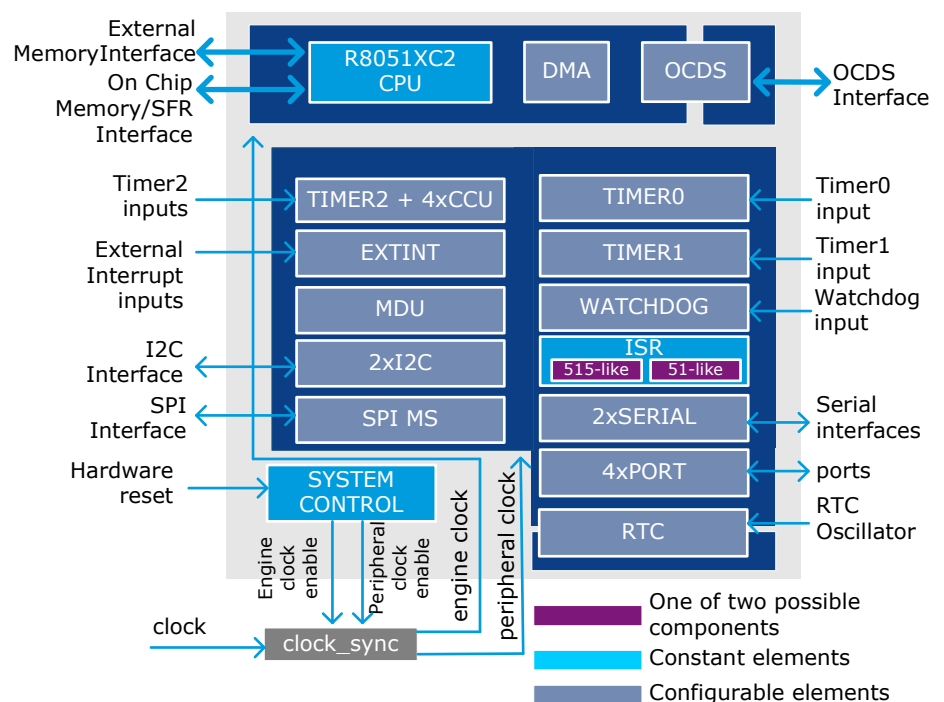
## OVERVIEW

The **R8051XC2** is a fast, configurable, single-chip 8-bit microcontroller core that can be used to implement a variety of designs utilizing the MCS® 51 instruction set.

The Dhrystone2.1 benchmark score for the **R8051XC2** shows speed improvement from 9.4 to 12.1 over the Intel® 80C51 at the same frequency, or 400 times its maximum performance when implemented in 90 nm process at 430 MHz.

A rich set of optional features and peripherals enables designers to closely match the core with their specific application and hardware requirements (FPGA, ASIC, or structured ASIC). These options include memory pointers, interrupts, interfaces for serial communication (UART, I<sup>2</sup>C and SPI), timer system, I/O ports, power management unit, multiplication-division unit, watchdog timer, DMA controller and a real-time clock. Integrated on-chip debugging is realized through the proprietary **EASE-8051** solution.

## BLOCK DIAGRAM



# R8051XC2

## BENEFITS

- ◆ The fastest 8051-compatible microcontroller IP in the market
- ◆ Extensive configurability options
- ◆ Lowest power per DMIPS available
- ◆ Alternate port functions are separated, providing extra port pins
- ◆ KEIL™-compatible, complete application debugging environment

## CONFIGURABILITY

A spreadsheet-like Design Configurator is available to help in the selection of the core's many options.

The configurable options include:

- ◆ Size of external data/program memory
- ◆ Number of DPTR registers, I/O ports, timers and serial ports as well as DMA channels
- ◆ 80C51- or 80C515-like interrupt controller

Optional features include a watchdog timer, multiplication-division unit, I<sup>2</sup>C-bus and SPI interfaces, OCDS support, software reset, external DMA operations support and a real time clock.

The **R8051XC2** can also be delivered in either fixed or downward configurable versions matching 80C51 or 80C515 specifications.

## APPLICATIONS

- ◆ 8-bit data processing applications
- ◆ Low power consumption applications
- ◆ High speed control systems
- ◆ Mixed-signal SoC control

## RELATED PRODUCTS

**EASE 8051** – R8051XC2-dedicated, KEIL™-compatible application debugging environment

**Application Platforms** – complete solutions that integrate the **R8051XC2** microcontroller with USB, Ethernet or HDLC controllers and complementary software IP for rapid development of USB, Ethernet or HDLC applications

**SPI** – a serial bus controller that enables full-duplex, synchronous, serial communication between the 8051 microcontroller and peripheral devices.

**I<sup>2</sup>C** – a serial interface that meets the Philips® I<sup>2</sup>C-bus specification and supports all transfer modes from and to the I<sup>2</sup>C-bus.

## STANDARD DELIVERABLES

- ◆ VHDL/Verilog source code
- ◆ Synthesis support for Synopsys® tools with a set of synthesis scripts
- ◆ Simulation support for Mentor Graphics® and Cadence® tools with a set of scripts and macros
- ◆ Extensive VHDL/Verilog 2001 test bench
- ◆ Documentation:
  - ▶ Design Specification
  - ▶ Verification Specification
  - ▶ Test Plan
  - ▶ Integration Manual
  - ▶ Application Notes
- ◆ Configuration tool (only for the configurable versions of the **R8051XC2**)
- ◆ 30 days of technical support
- ◆ 90 days of warranty against defects

## DELIVERY OPTIONS

- ◆ EDIF netlist for FPGA and low volume production
- ◆ **EASE 8051** – a complete application debugging solution
- ◆ Evaluation system for proprietary **EB5-Tiny** board
- ◆ One-year maintenance
- ◆ On-site support and training

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