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R80251XC

Configurable, internally 32-bit microcontroller

MAJOR FEATURES

- The fastest 80251 CPU in the market, up to 4 times faster than the 80C251 from Intel®
- External Memory Interface that addresses up to 16 MB of Program and Data Memory
- Special Function Registers (SFR) interface that services from 51 to 114 External SFRs
- Interrupt Controller with 4 priority levels
- Power Management Unit with power-down modes (IDLE/STOP)
- Native On-Chip Debug Support (OCDS) interface
- Up to 3 Timers/ Counters
- Programmable Counter Array
- Full-duplex asynchronous Serial0 and Serial1 interfaces
- Watchdog timer
- SPI Master/Slave interface
- I²C-bus Master/Slave interface with SMBus extension
- Real Time Clock
- Software Reset

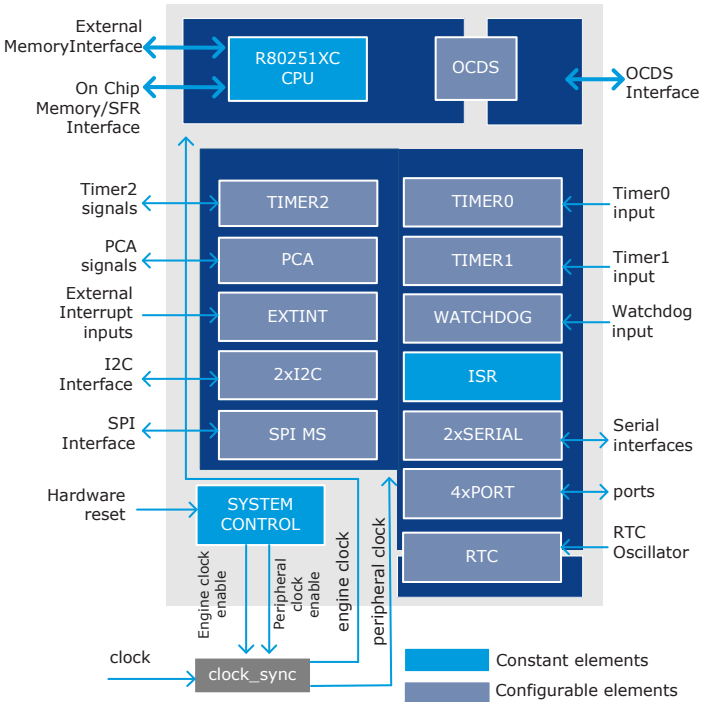
OVERVIEW

The **R80251XC** is a fast, configurable, single-chip internally 32-bit microcontroller IP core compatible to the MCS® 251 and MCS® 51 instruction set.

This highly efficient design runs an average of 3.18 times faster than the **80C251** at the same clock frequency. The Dhrystone benchmark score varies from 0.098 to 0.39 DMIPS/MHz, depending on working mode, which translates to speed improvement of 41.8 over the standard 80C51 and of 3.8 over the **80C251** at the same frequency.

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 interrupts, interfaces for serial communication (UART, I2C and SPI), timers, I/O ports, power management unit, watchdog timer and real-time clock. Integrated on-chip debugging using the native OCDS and the **EASE-8051** debugging system is also available.

BLOCK DIAGRAM



R80251XC

BENEFITS

- Executes instructions at one clock per cycle (versus two for standard 80C251) or at up to 3.80 times performance increase in terms of DMIPS
- Alternate port functions, such as external interrupts and the serial interface are separated, providing extra port pins when compared with the standard 80C251
- Backward binary compatibility with 80C51 architecture (allowing for firmware re-use)
- Both drop-in replacement or enhanced performance available

APPLICATIONS

- 32-bit data processing applications
- High speed control systems
- Mixed-signal SoC control

CONFIGURABILITY

- Number of 8-bit I/O ports
- Number of 16-bit timers
- Programmable Counter Array implementation
- Number or serial ports
- Implementation of Watchdog timer
- Number of I2C master-slave interfaces
- SPI master-slave interface support
- On-chip Debug Support (OCDS)
- For OCDS:
  - Number of hardware breakpoints: 2 to 8
  - Program trace
  - Data & program trace
- Software Reset
- Real Time Clock

RELATED PRODUCTS

EASE-8051 – R80251XC compatible, KEIL™-optimized application debugging environment

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

I²C – a serial interface that meets the Philips® I²C-bus specification and supports all transfer modes from and to the I²C-bus.

STANDARD DELIVERABLES

- VHDL/Verilog source code
- Synthesis support for Synopsys® and Cadence® 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 **R80251XC**)
- 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
- One-year maintenance
- On-site support and training

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