

## Features

- 80C52 Compatible
  - 8051 Instruction Compatible
  - Four 8-bit I/O Ports (44 Pins Version)
  - Three 16-bit Timer/Counters
  - 256 bytes Scratch Pad RAM
  - 11 Interrupt Sources With 4 Priority Levels
- ISP (In-System Programming) Using Standard  $V_{CC}$  Power Supply
- Integrated Power Monitor (POR/PFD) to Supervise Internal Power Supply
- Boot ROM Contains Serial Loader for In-System Programming
- High-speed Architecture
  - In Standard Mode:
    - 40 MHz ( $V_{CC}$  2.7V to 5.5V, Both Internal and External Code Execution)
    - 60 MHz ( $V_{CC}$  4.5V to 5.5V and Internal Code Execution Only)
  - In X2 Mode (6 Clocks/Machine Cycle)
    - 20 MHz ( $V_{CC}$  2.7V to 5.5V, Both Internal and External Code Execution)
    - 30 MHz ( $V_{CC}$  4.5V to 5.5V and Internal Code Execution Only)
- 128K bytes On-chip Flash Program/Data Memory
  - 128 bytes Page Write with auto-erase
  - 100k Write Cycles
- On-chip 8192 bytes Expanded RAM (XRAM)
  - Software Selectable Size (0, 256, 512, 768, 1024, 1792, 2048, 4096, 8192 bytes)
- Dual Data Pointer
- Extended stack pointer to 512 bytes
- Variable Length MOVX for Slow RAM/Peripherals
- Improved X2 Mode with Independant Selection for CPU and Each Peripheral
- Keyboard Interrupt Interface on Port 1
- SPI Interface (Master/Slave Mode)
- 8-bit Clock Prescaler
- Programmable Counter Array with:
  - High Speed Output
  - Compare/Capture
  - Pulse Width Modulator
  - Watchdog Timer Capabilities
- Asynchronous Port Reset
- Two Full Duplex Enhanced UART with Dedicated Internal Baud Rate Generator
- Low EMI (inhibit ALE)
- Hardware Watchdog Timer (One-time Enabled with Reset-Out), Power-Off Flag
- Power Control Modes: Idle Mode, Power-down Mode
- Power Supply: 2.7V to 5.5V
- Temperature Ranges: Industrial (-40 to +85°C)
- Packages: PLCC44, VQFP44



## 8-bit Flash Microcontroller

**AT89C51RE2**





## Description

AT89C51RE2 is a high performance CMOS Flash version of the 80C51 CMOS single chip 8-bit microcontroller. It contains a 128 Kbytes Flash memory block for program.

The 128 Kbytes Flash memory can be programmed either in parallel mode or in serial mode with the ISP capability or with software. The programming voltage is internally generated from the standard  $V_{CC}$  pin.

The AT89C51RE2 retains all features of the Atmel 80C52 with 256 bytes of internal RAM, a 10-source 4-level interrupt controller and three timer/counters.

In addition, the AT89C51RE2 has a Programmable Counter Array, an XRAM of 8192 bytes, a Hardware Watchdog Timer, SPI and Keyboard, two serial channels that facilitates multiprocessor communication (EUART), a speed improvement mechanism (X2 mode) and an extended stack mode that allows the stack to be extended in the lower 256 bytes of XRAM.

The fully static design of the AT89C51RE2 allows to reduce system power consumption by bringing the clock frequency down to any value, even DC, without loss of data.

The AT89C51RE2 has 2 software-selectable modes of reduced activity and 8-bit clock prescaler for further reduction in power consumption. In the Idle mode the CPU is frozen while the peripherals and the interrupt system are still operating. In the power-down mode the RAM is saved and all other functions are inoperative.

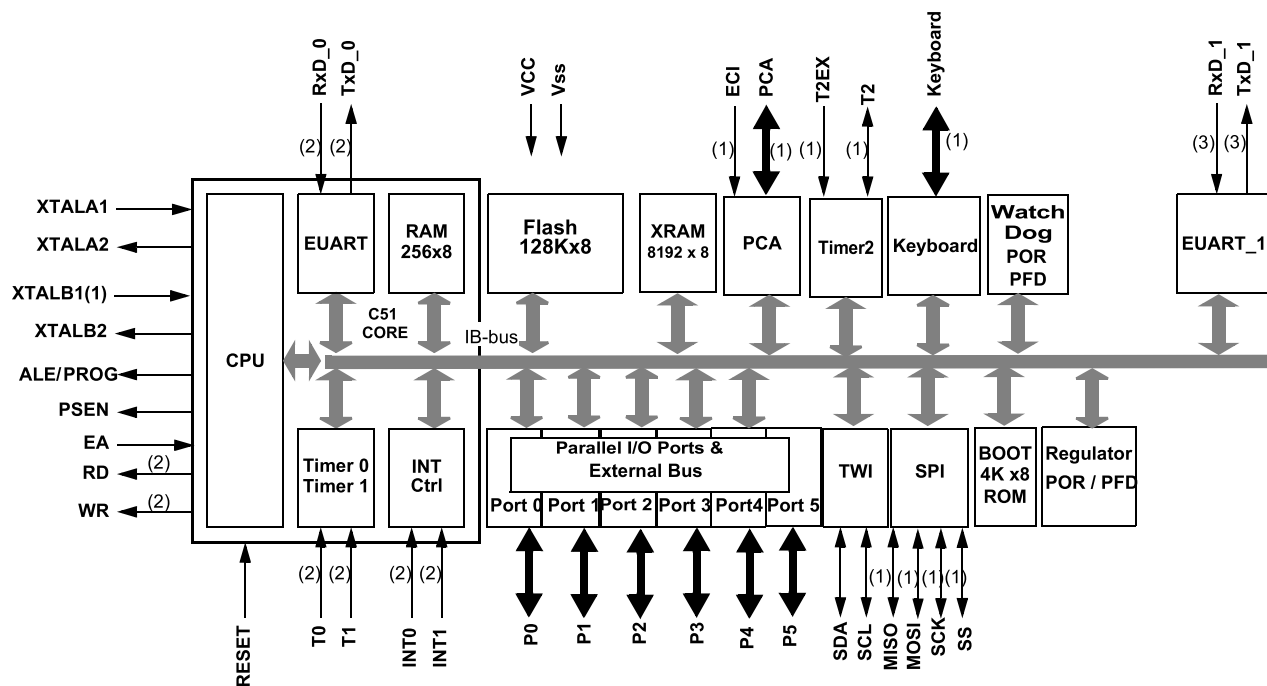
The added features of the AT89C51RE2 make it more powerful for applications that need pulse width modulation, high speed I/O and counting capabilities such as alarms, motor control, corded phones, smart card readers.

**Table 1.** Memory Size and I/O pins

AT89C51RE2	Flash (bytes)	XRAM (bytes)	TOTAL RAM (bytes)	I/O
PLCC44 VQFP44	128K	8192	8192 + 256	34

## Block Diagram

Figure 1. Block Diagram



- (1): Alternate function of Port 1
- (2): Alternate function of Port 3
- (3): Alternate function of Port 6

# Pin Configurations

