NXP 80C51-based MCUs
LPC9402

Accelerated 8-bit MCU with universal LCD driver

Equipped with a universal LCD driver, this accelerated microcontroller delivers performance six times that of standard 80C51-based MCUs, and makes it easy to integrate advanced technology into everyday applications.

Key Features

- Accelerated 80C51 CPU
- 8-KB code Flash
- 256-Byte RAM
- LCD driver (32 segments x 4 backplanes)
- System supervisory functions (POR, enhanced brownout detection)
- Two 16-bit timers
- System timer/RTC, Watchdog timer
- Two analog comparators
- Enhanced UART, I^2C-bus, SPI
- Internal RC oscillator trimmed to a ±1% accuracy with clock-doubler option
- Clock switching on the fly
- 23 configurable I/O pins
- Temperature range: -40 to + 85 °C
- Space-saving LQFP64 package

Application

- Consumer
- Industrial products
- Battery-powered devices
- Security systems
- White goods

These 8-bit microcontrollers use an accelerated architecture that executes instructions in two to four clocks, delivering performance that is six times higher than that of a standard 80C51 device.

The integrated LCD driver is applicable to a broad range of systems. Other integrated features such as byte-erasable Flash memory, enhanced timing functions, and power monitoring, make this MCU well suited to a very wide variety of applications, from battery-powered systems to white goods.

The LPC9402 has 8 KB of byte-erasable Flash code memory that can be used to simulate an EEPROM, with a full erase or program taking only 2 ms. It also has 256 bytes of Data RAM.

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The LCD driver provides 32 segments and supports up to four backplanes. It delivers low-power operation and minimizes display overhead by using an on-chip display RAM with auto-increment addressing. It requires no external components, and is compatible with TTL/CMOS components and chip-on-glass technology.

Serial interfaces include a 400-kHz I²C bus, an SPI bus, and an enhanced UART with fractional baud-rate generator, break detect, framing error detection, automatic address detection, and versatile interrupt capabilities.

On-chip features combine to reduce chip count, save board space, and lower overall cost. There are two analog comparators and two 16-bit counter/ timers, each configurable to toggle a port output on timer overflow or to act as a PWM output.

A 7.37-MHz internal RC oscillator with a ±1% tolerance over voltage and ambient temperature lets the microcontroller operate without external oscillator components. Users can adjust the IRC oscillator to other frequencies. When the clock-doubler option is enabled, the output frequency is 14.746 MHz. The on-chip Watchdog timer has a separate on-chip oscillator (nominal 400 kHz), calibrated to ±5% at room temperature, requires no external components, and is selectable from eight values. For optimal support of active mode with minimal power, on-the-fly clock switching is available with the internal RC oscillator, the Watchdog oscillator, and the external clock source. Fast switching maximizes performance.

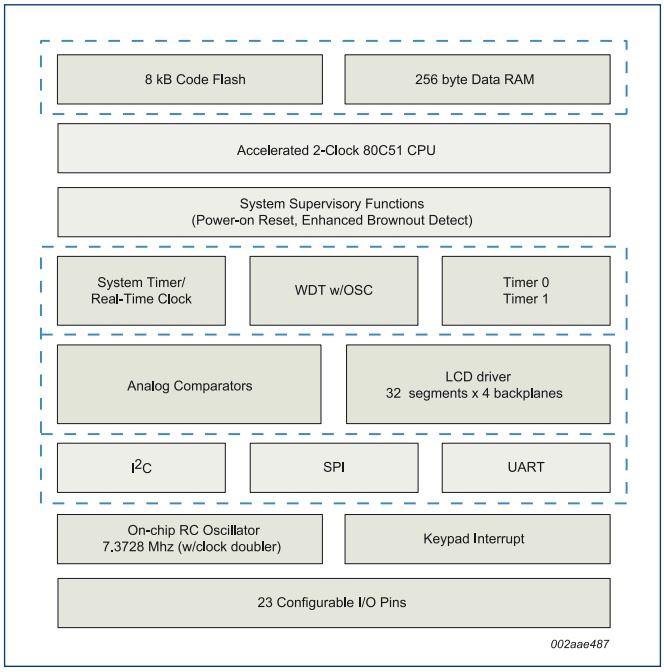
System supervisory functions include Power-on reset (POR) and enhanced brownout detection (BOD). Enhanced low voltage (brownout) detect allows a graceful system shutdown when power fails and can optionally be configured as an interrupt. The integrated real-time clock is equipped with independent power and clock supplies, permitting extremely low power consumption in power-save modes. To reduce power consumption further, each processor supports an idle mode and two different power-down modes. Total power-down current is less than 1 µA.

There are up to 23 I/O, each with a V_{DD} operating range of 2.4 to 3.6 V and a tolerance to 5 V. The operating temperature range is -40 to +85°C. The MCU is pin-to-pin compatible with P89LPC9401 devices in the same packages.

Third-Party Development Tools

Through third-party suppliers, NXP offers a range of development and evaluation tools for its microcontrollers. For the most current listing, please visit www.nxp.com/microcontrollers.

LPC9402 Block Diagram



Selector Guide

Type	Memory		I/O pins	Serial interfaces			Temperature range (°C)	Package
	Flash	RAM		I²C-bus	UART	SPI		
P89LPC9402	8K	256 B	23	•	•	•	-40 to +85	LQFP64

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