



## NXP 80C51-based MCUs LPC92x1

# 20-pin, 8-bit MCUs with enhanced RC oscillator and temp sensor

Building on the success of the LPC900 family, these high-performance MCUs use an accelerated 80C51 CPU to enhance performance. They offer high integration and are available in small, 20-pin packages.

### Key Features

- ▶ Accelerated 80C51 CPU
- ▶ 2/4/8-KB code Flash
- ▶ 256-Byte RAM
- ▶ System supervisory functions (POR, enhanced brownout detection)
- ▶ Two 16-bit timers
- ▶ System timer/RTC, Watchdog timer
- ▶ 8-bit ADC/DAC (LPC9241/9251)
- ▶ On-chip temperature sensor (LPC9241/9251)
- ▶ Two analog comparators
- ▶ Enhanced UART, I<sup>2</sup>C-bus
- ▶ Internal RC oscillator trimmed to a  $\pm 1\%$  accuracy with clock doubler option
- ▶ Clock switching on the fly
- ▶ 18 configurable I/O pins
- ▶ Temperature range: -40 to + 85 °C
- ▶ Small, 20-pin packages: TSSOP20, DIP20

### Application

- ▶ Consumer
- ▶ Industrial products

- ▶ Battery-powered devices
- ▶ Security systems
- ▶ HVAC
- ▶ Protocol conversion

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.

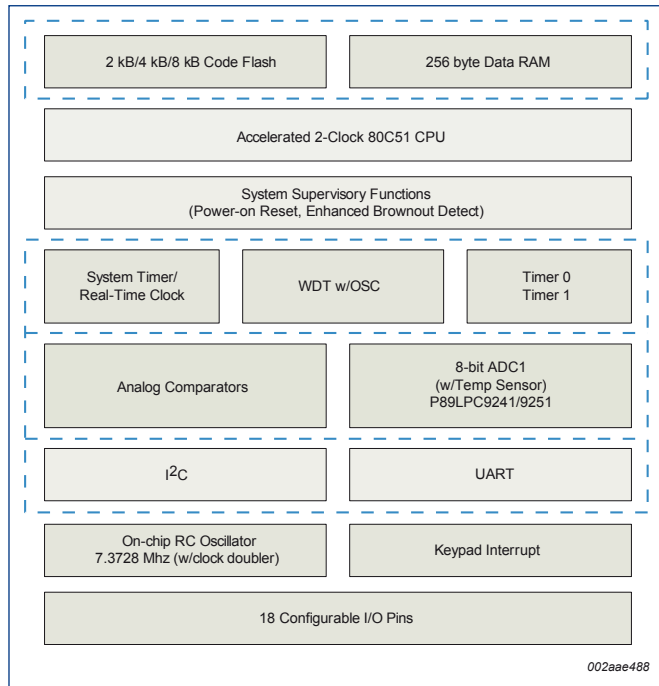
Integrated features such as byte-erasable Flash memory, enhanced timing functions, and power monitoring make these microcontrollers well suited to a very wide range of applications. On-chip features combine to reduce chip count, save board space, and lower overall cost.

The LPC92x1 microcontroller has 2/4/8 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.

Serial interfaces include a 400-kHz I<sup>2</sup>C bus and an enhanced UART with fractional baud-rate generator, break detect, framing error detection, automatic address detection, and versatile interrupt capabilities.

The LPC9241/9251 has a 4-channel, 8-bit A/D and 1-channel D/A converters. The on-chip temperature sensor operates over a wide range (-40 to +85 °C), and there are two 16-bit counter/ timers, each configurable to toggle a port output on timer overflow or to act as a PWM output.

### LPC92x1 Block Diagram



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. To provide optimal support for active mode with minimal power, there is on-the-fly clock switching for 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 be optionally configured as an interrupt. 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 18 I/O, each with a V<sub>DD</sub> operating range of 2.4 to 3.6 V and a tolerance to 5 V. These MCUs are pin-to-pin compatible with P89LPC920/921/922/924/925 devices housed 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](http://www.nxp.com/microcontrollers).

### Selector Guide

Type	Memory		I/O pins	ADC	DAC	Temp. Sensor	Serial interfaces		Temperature range (°C)	Package
	Flash	RAM					I <sup>2</sup> C-bus	UART		
P89LPC9201	2K	256 B	18				•	•	-40 to +85	TSSOP20
P89LPC9211	4K	256 B	18				•	•	-40 to +85	TSSOP20
P89LPC922A1	8K	256 B	18				•	•	-40 to +85	TSSOP20 DIP20
P89LPC9241	4K	256 B	18	4ch/8b	1x8b	•	•	•	-40 to +85	TSSOP20
P89LPC9251	8K	256 B	18	4ch/8b	1x8b	•	•	•	-40 to +85	TSSOP20

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