



NXP 80C51-based MCUs LPC98x

28-pin, 8-bit MCUs with wide-range power supply and enhanced RC oscillator

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, 28-pin packages.

Features

- ▶ Accelerated 80C51 CPU
- ▶ 2.4 to 5.5 V power supply
- ▶ 4/8 KB code Flash
- ▶ 512 Byte RAM (LPC982/985, 256 Byte RAM on LPC983/980)
- ▶ System supervisory functions (POR, enhanced brownout detection)
- ▶ Five 16-bit timers
- ▶ System timer/RTC, Watchdog timer
- ▶ 8-channel, 10-bit ADC (LPC985, 4-channel, 10-bit ADC on LPC983)
- ▶ Two analog comparators
- ▶ Enhanced UART, I²C-bus, SPI
- ▶ Internal RC oscillator trimmed to a $\pm 1\%$ accuracy with clock-doubler option
- ▶ 400/25 KHz watchdog oscillator
- ▶ On-the-fly clock switching
- ▶ 26 configurable I/O pins
- ▶ Pin remap for UART, I²C, SPI
- ▶ Temperature range: -40 to + 85 °C
- ▶ Small, 28-pin package: TSSOP28, PLCC28

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 LPC98x microcontroller has 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 has 256 bytes of Data RAM. LPC985/982 also has 256 external Data RAM.

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. The Pin Remap feature allows the functions of UART/I²C/SPI interface to be remapped to other pins.

The LPC985 has an 8-channel 10-bit A/D converter (4-channel A/D converter on LPC983). There are five 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 internal RC 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 which provides two options: 400 kHz and 25 kHz, calibrated to ±10% at 400 kHz at room temperature. It 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. 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. 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.

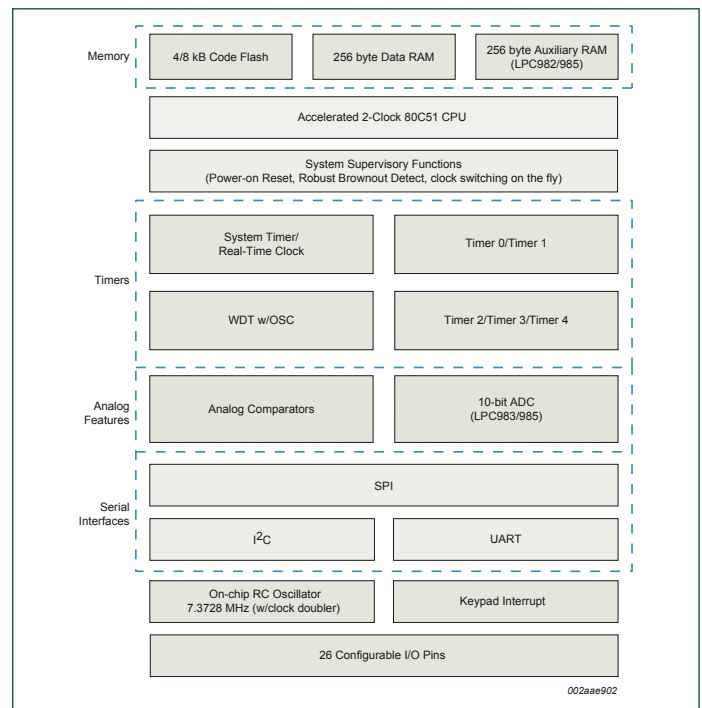
The integrated real-time clock is equipped with independent power and clock supplies, permitting extremely low power consumption in power-save modes. To reduce power consumption further, each processor supports an idle mode and two different power-down modes. Total power-down current is less than 1 µA.

There are up to 26 I/O, each with a V_{DD} operating range of 2.4 to 5.5 V.

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.

LPC98x block diagram



LPC980/982/983/985 selection guide

| Type | Memory | | Timer 2/3/4 | I/O Pins | ADC | Serial interfaces | | | Temperature range (°C) | Package |
|-----------|--------|-------|-------------|----------|-----------|----------------------|------|-----|------------------------|-----------------|
| | Flash | RAM | | | | I ² C-bus | UART | SPI | | |
| P89LPC980 | 4 K | 256 B | • | 26 | | • | • | • | -40 to +85 | TSSOP28 |
| P89LPC982 | 8 K | 512 B | • | 26 | | • | • | • | -40 to +85 | TSSOP28, PLCC28 |
| P89LPC983 | 4 K | 256 B | • | 26 | 4 ch/10 b | • | • | • | -40 to +85 | TSSOP28 |
| P89LPC985 | 8 K | 512 B | • | 26 | 8 ch/10 b | • | • | • | -40 to +85 | TSSOP28, PLCC28 |

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