NXP 5-V 80C51 Flash microcontrollers P89CV51Rx2 with ISP and IAP

80C51 with up to 64 KB of Flash, a SPI, and fast erase times

Designed to be drop-in software-compatible replacements for the popular NXP microcontroller P89C51RD2, making it easy to upgrade designs with additional memory, an SPI interface, and faster erase times. Backward-compatible ISP and IAP functions also increase design flexibility

Key features

- High-performance 8051 CPU with 12- or 6-clock operation
- Up to 40-MHz operation in 12-clock and up to 20-MHz in 6-clock mode
- Up to 64 KB of on-chip Flash user-code memory with ISP and IAP
- 128-byte page erase for efficient use of code memory as non-volatile data storage
- 1 KB of Data RAM
- Three 16-bit timers
- Peripherals (PCA, timers, UART) may use either 6-clock or 12-clock mode while the CPU is in 6-clock mode
- Programmable Watchdog timer
- SPI interface and enhanced UART
- PCA with PWM and capture/compare functions
- 32 configurable I/O
- Operating range: 4.5 to 5.5 V
- Available in extended temperature range: -40 to +85 °C
- Ten interrupt sources with four priority levels
- PLCC and TQFP packages

Applications

- Peripheral controller for digital tasks
- Industrial control

NXP P89CV51Rx2 series devices are 80C51 microcontrollers with up of 64KB of Flash and 1 KB of Data RAM. They are drop-in, software-compatible replacements for the popular P89C51RD2 devices. As upgrades for the P89C51RD2 device, they add an SPI interface, offer additional memory, and deliver faster erase times. The boot codes for In-System Programming (ISP) and In-Application Programming (IAP) are backward compatible.

Each device in the series operates in a default 12-clock mode, selectable to a 6-clock mode. The SFR bit can be used to change clock modes on the fly, and the device peripherals can use either clock mode when the CPU is in 6-clock mode. In 12-clock mode, the operating frequency is up to 40 MHz, and in 6-clock mode is up to 20 MHz.

The Flash program memory supports three programming modes: parallel, serial ISP, and IAP. Parallel programming makes

NXP founded by Philips

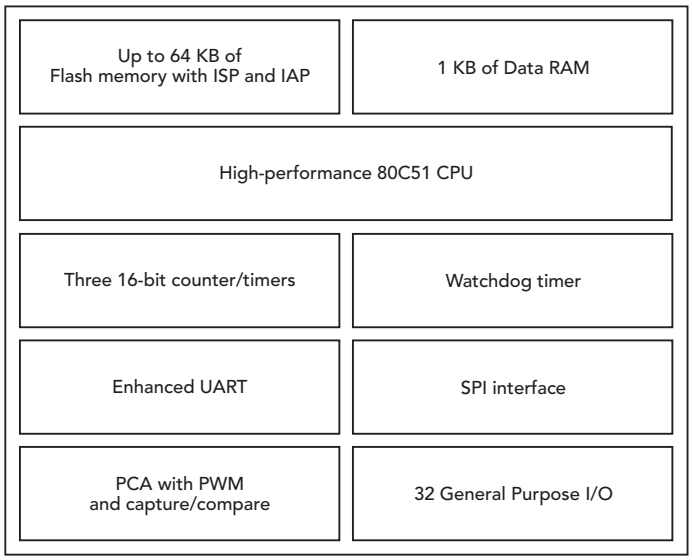
it possible to program groups of devices at high speed, for reduced programming costs and faster time-to-market. Serial ISP lets the device be programmed, under software control, once the product has shipped, so firmware can be updated in the field. IAP allows the Flash program memory to be reconfigured while the application is running, for added design flexibility.

The P89CV51Rx2 uses a page size of only 128 B, compared to a page size of 4 KB in the P89C51RD2. Using a smaller page size means IAP function calls can be used to erase and reprogram the pages, making it practical to use the code memory for non-volatile data storage. Each page erase is 30 ms or less.

The block erase time is also faster in the P89CV51Rx2, requiring only 150 ms for the entire user-code memory.

To maintain compatibility with 8- and 16-KB firmware, the IAP and ISP codes use multiple page-erase operations. To control entry into ISP mode following a reset, the P89CV51Rx2 uses a single Status bit operates in much the same way as the Status byte on the P89C51RD2, with zero/non-zero values.

On-chip features include an SPI interface, an enhanced UART, a programmable counter array (PCA) with PWM and capture/compare functions, three 16-bit counter/timers, and an integrated Watchdog timer. There are 32 configurable I/O, and there are eight interrupt sources with four priority levels.



P89CV51Rx2 block diagram

Several versions are available, supporting a variety of temperature ranges, with package options of PLCC and TQFP, DIP and PDIP.

Third-Party Development Tools

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

P89CV51Rx2 selection guide

Type	Memory		I/O pins	Serial interfaces		Temperature range (°C)	Package
	Flash	RAM		SPI	UART		
P89CV51RB2FBC	16 K	1 K	32	•	•	-40 to 85	TQFP44
P89CV51RB2FA	16 K	1 K	32	•	•	-40 to 85	PLCC44
P89CV51RC2FA	32 K	1 K	32	•	•	-40 to 85	PLCC44
P89CV51RC2FBC	32 K	1 K	32	•	•	-40 to 85	TQFP44
P89CV51RD2FA	64 K	1 K	32	•	•	-40 to 85	PLCC44
P89CV51RD2FBC	64 K	1 K	32	•	•	-40 to 85	TQFP44

Date of release: May 2007
Document order number: 9397 750 15973
Printed in the USA