

78K0S family

Product Letter

μPD7891xx

8-bit Microcontrollers

Description

The single-chip μPD7891xx microcontrollers are members of NEC's recently introduced 8-bit 78K0S family. They integrate CPU, ROM, RAM and peripheral functions such as an ADC on chip. Flash memory is available as well as the memory options listed in the ordering information table.

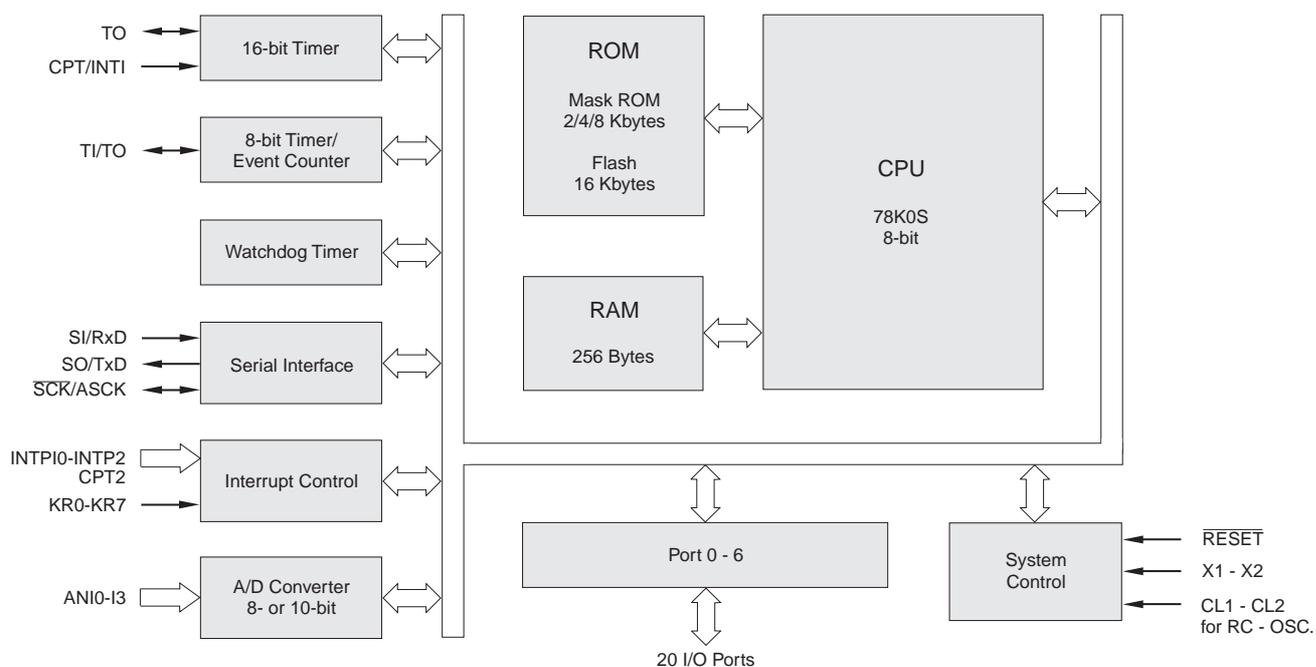
Applications

μPD7891xx devices are designed for use in compact household appliances, washing machines, refrigerators and battery chargers. Their excellent cost/performance ratio makes them an ideal choice for classical 4-bit applications.

Features

- Mask ROM and Flash versions (μPD78F9116 and μPD78F9136)
- RC oscillator versions
- Variable minimum instruction execution time: 0.4 μs to 1.6 μs (5 MHz clock)
- Bit manipulation instructions
- 4 channel A/D converters with 8-Bit or 10-Bit resolution
- Serial interface switchable between UART and 3-wire serial I/O
- 8/16-bit timer/counter
- Watchdog timer
- 20 I/O ports
- Interrupt controller
- Power supply voltage: 1.8 – 5.5 V
- 28-pin SDIP or 30-pin SSOP packages

Block Diagram



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Functional Block Description

CPU	The core of the 78K0S family is a powerful 8-bit CPU. The 0.35 μm process technology ensures a good power performance ratio for the $\mu\text{PD7891xx}$. The CPU executes a set of 47 optimised instructions. Eight 8-bit general registers can be concatenated to four 16-bit registers, enabling also 16-bit operations. Bit manipulation operations are supported on registers and the entire RAM address space.
Ports	The $\mu\text{PD7891xx}$ devices have 4 CMOS input pins, 12 CMOS input/output pins and 4 N-channel open-drain pins (withstand voltage 12 V) . All ports feature internal pull-up resistors, which can be enabled via software when the port is used for input. All output pins can directly drive LEDs.
Serial Interface	All devices have a serial interface which can be operated either in asynchronous serial interface (UART) mode or in 3-wire clocked serial interface (CSI) mode. The device has a dedicated baud rate generator for UART mode, allowing data transfer over a wide range of different baud rates. In addition, the baud rate can be defined by scaling the input clock. The UART also features full-duplex operation. In three-wire serial I/O mode, a function to select the clock phase or data phase is incorporated.
Timer/Event Counter	$\mu\text{PD7891xx}$ devices have 8/16-bit timer/event counters on chip (see table). The timers can be used as interval timers and external event counters, or to generate square waves of arbitrary frequency. Three internal registers control the timer modes.
Multiplier	Calculation of 8-Bit values with 16-bit result can be performed.
Clock Generator	The clock generator provides the operating frequency supplied to the CPU and peripheral hardware. It requires an external crystal (1 to 5 MHz) or ceramic resonator (0.4 to 4 MHz). The system clock, controlled by the processor clock control register (PCC), uses this source to generate the internal operating frequency. Optionally the operating frequency can also be prescaled. Executing the STOP instruction stops oscillation.
A/D Converter	Four channel 8 or 10-Bit converters are incorporated in the chip. An external analog value within the reference voltage range can be converted by successive approximation into a 10-Bit (8-Bit) digital value. The minimum conversion time is less than 15 μs at 5 MHz.

Ordering Information

Devices

Part Number	Mask ROM (Kbytes)	Flash (Kbytes)	A/D Converter	Oscillator
μPD789101	2	–	4-channel 8-bit	Ceramic
μPD789102	4	–	4-channel 8-bit	Ceramic
μPD789104	8	–	4-channel 8-bit	Ceramic
μPD789111	2	–	4-channel 10-bit	Ceramic
μPD789112	4	–	4-channel 10-bit	Ceramic
μPD789114	8	–	4-channel 10-bit	Ceramic
μPD78F9116	–	16	4-channel 10-bit	Ceramic
μPD789121	2	–	4-channel 8-bit	RC
μPD789122	4	–	4-channel 8-bit	RC
μPD789124	8	–	4-channel 8-bit	RC
μPD789131	2	–	4-channel 10-bit	RC
μPD789132	4	–	4-channel 10-bit	RC
μPD789134	8	–	4-channel 10-bit	RC
μPD78F9136	–	16	4-channel 10-bit	RC

Note: Device orders must specify the package code GS: (30-pin SSOP), CT (28-pin SDIP)

Documentation

Doc Number	Devices	Type
U11933EE3V0CD00	NEC Microcontrollers	CD-ROM
U13045EJ1V0UM00*	μPD7891xx	User's Manual
U11047EJ2V0UM00	78K0S	Instruction Manual
U12185EJ1V0PM00*	μPD78910x	Product Information
U13013EJ1V0PM00*	μPD78911x	Product Information
U13025EJ1V0PM00*	μPD78912x	Product Information
U13015EJ1V0PM00*	μPD78913x	Product Information
U13036EJ1V0PM00*	μPD78F9136	Product Information

* Preliminary document

Tools

Order Number	Devices	Description	Type
78K0S-TOOLSET*	78K0S	In-circuit Emulator + SW	HW & SW
DSWIN-I3HD-789xx	78K0S	Simulator	Software
IE-789136-NS-EM1	μPD78(P)91xx	Emulation Board	Hardware
NP-28CT	μPD78(F)91xxCT	Emulation Probe	Hardware
NP-36GS & NGS-30	μPD78(F)91xxGS	Emulation Probe & Target Adapter	Hardware
FA-28CT	μPD78F1xxCT	Programming Adapter	Hardware
FA-30GS	μPD78F1xxGS	Programming Adapter	Hardware
FLASHMASTER	μPD78Fxxxx	Flash Programmer	Hardware

* TOOLSET includes In-circuit Emulator, C Compiler, Assembler and GUI Debugger.

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