78K0S family

Product Letter

μPD7890xx

8-bit Microcontrollers

Description

The single-chip μPD7890xx microcontrollers are members of NEC's recently introduced 8-bit 78K0S family. They integrate CPU, ROM, RAM and peripheral functions on chip. An OTP version is available for μPD78901x devices and Flash versions are available for μPD78902x and μPD78904x devices. Memory options are listed in the ordering information table.

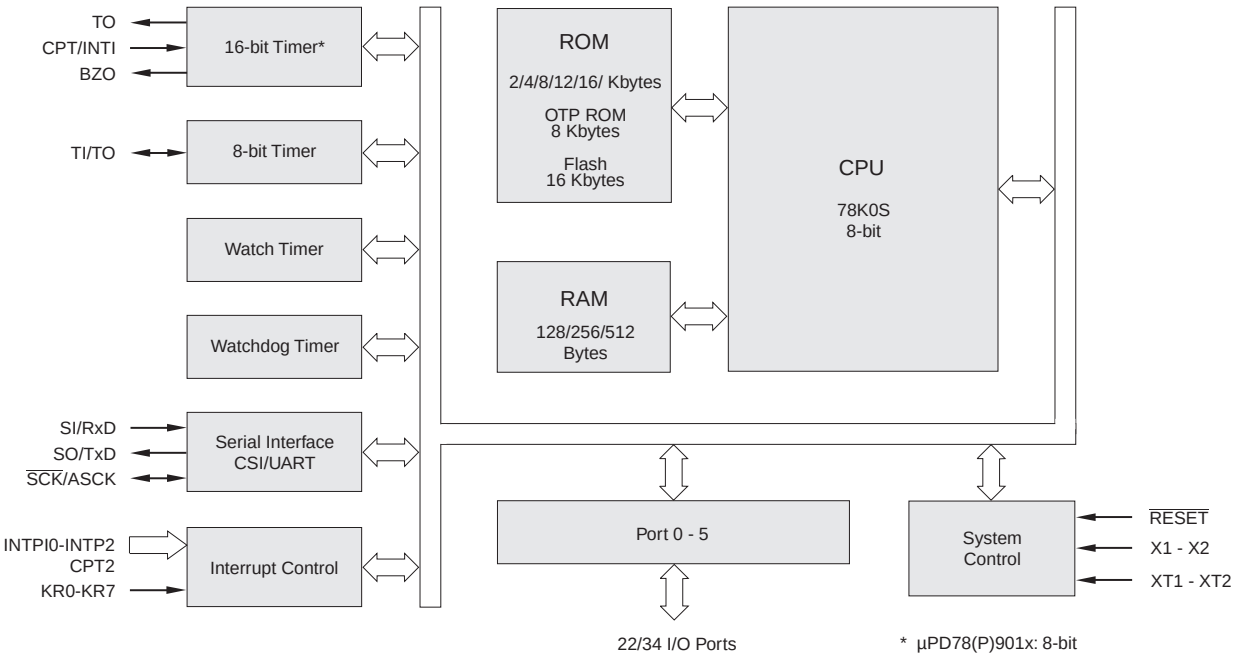
Applications

μPD7890xx devices are designed for use in compact household appliances, car accessories, air conditioners and cordless phones. Their excellent cost/performance ratio makes them an ideal choice for classical 4-bit applications.

Features

- Mask ROM, OTP ROM and Flash EPROM versions
- 0.4 μs min. instruction execution time (5 MHz clock)
- Powerful instruction set
- Bit manipulation instructions
- Serial interface UART/CSI
- 8/16-bit timer/counter
- Watchdog timer
- Watch timer (μPD78904x)
- Buzzer output (μPD78904x)
- Up to 34 I/O ports
- Interrupt controller
- Clock prescaler
- Standby control (HALT, STOP mode)
- Power supply voltage: 1.8 – 5.5 V
- μPD78(P)901x: 28-pin SDIP or SOP packages
- μPD78(F)902x: 42-pin SDIP or 44-pin QFP packages
- Real-time subystem clock (μPD78904x)

Block Diagram



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 µPD78902x. 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.

Memory

µPD7890xx devices offer a rich choice of on-chip memory combinations, including Mask ROM, OTP ROM and Flash EPROM versions (see table). The Flash memory can be written even with the device mounted in the target system.

Ports

The µPD7890xx devices have up to 34 input/output pins (see table). All ports are capable of directly driving LEDs and feature internal pull-up resistors, which can be enabled via software when the port is used for input.

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 CSI mode, 8-bit data transfer is via three lines supporting simultaneous transmit and receive operations to reduce data transfer processing time.

Timer/Event Counter

µPD7890xx devices have 8/16-bit timer/event counters on chip (see table). The timers can be used as interval timers, external event counters and to generate square waves of arbitrary frequency. Three internal registers control the timer modes. On µPD78904x a buzzer output is available.

Watchdog Timer

The watchdog timer also has interval timer functions and can generate non-maskable or maskable interrupts. It is used to detect inadvertent program loops. A non-maskable interrupt can be issued in this case.

Clock Generator

The clock generator provides the operating frequency supplied to the CPU and peripheral hardware. It requires an external crystal or ceramic resonator (1 to 5 MHz). The system clock, controlled by the processor clock control register (PCC), uses this source to generate the internal operating frequency. The operating frequency can also be prescaled. The subsystem clock (32.768 KHz) on µPD78904x allows significant power savings.

Interrupt Controller

The interrupt controller handles various interrupt requests issued by internal peripheral hardware or external devices. The interrupt from the watchdog timer is incorporated as a non-maskable interrupt, which is acknowledged unconditionally. Up to four external and seven internal interrupts are incorporated as maskable interrupts, with a priority of 0 to 10.

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Ordering Information

Devices

Part Number	Mask ROM (Kbytes)	OTP ROM (Kbytes)	Flash (Kbytes)	RAM (bytes)	Timer	Package*	I/O Pins
μPD789011	2	—	—	128	2 x 8-bit	GT, CT	22
μPD789012	4	—	—	128	2 x 8-bit	GT, CT	22
μPD78P9014	—	8	—	256	2 x 8-bit	GT, CT	22
μPD789022	4	—	—	256	8-bit & 16-bit	GB, CU	34
μPD789024	8	—	—	256	8-bit & 16-bit	GB, CU	34
μPD789025	12	—	—	512	8-bit & 16-bit	GB, CU	34
μPD789026	16	—	—	512	8-bit & 16-bit	GB, CU	34
μPD78F9026	—	—	16	512	8-bit & 16-bit	GB, CU	34
μPD789044	8	—	—	512	8-bit & 16-bit**	GB	34
μPD789046	16	—	—	512	8-bit & 16-bit**	GB	34
μPD78F9046	—	—	16	512	8-bit & 16-bit**	GB	34

* Device orders must specify the package code: GT (28-pin SOP), CT (28-pin SDIP), CU (42-pin SDIP), GB (44-pin QFP)

** 8-bit & 16-bit & watch timer

Documentation

Doc Number	Devices	Type
U13919EE1V0CD00	NEC Microcontrollers	CD-ROM
U11047EJ2V0UM00	78K0S	User's Manual
U11187EJ3V0UM00	μPD78(P)901x	User's Manual
U11919EJ2V0UM00	μPD78(F)902x	User's Manual
U11095EJ1V0DS00	μPD78901x	Data Sheet
U10912EJ1V0DS00	μPD78P9014	Data Sheet
U11858EJ1V0DS00*	μPD78F9026	Data Sheet
U11715EJ1V0DS00*	μPD78902x	Data Sheet
U13380EJ1V0PM00*	μPD789046	Product Information

* Preliminary document

Tools

Order Number	Devices	Description	Type
78K0S-TOOLSET	78K0S	In Circuit Emulator & Debugger & C Compiler	Software
DSWIN-I3HD-789xx	78K0S	Simulator	Software
IE-789014-NS-EM1	μPD78(P)901x	Emulation Board	Hardware
IE-789026-NS-EM1	μPD78(F)902x	Emulation Board	Hardware
IE-789046-NS-EM1	μPD78(F)904x	Emulation Board	Hardware
NP-28CT	μPD78(P)901xCT	Emulation Probe	Hardware
NP-28GT	μPD78(P)901xGT	Emulation Probe	Hardware
NP-42CU	μPD78(F)902xCU	Emulation Probe	Hardware
NP-44GB	μPD78(F)902xGB	Emulation Probe	Hardware
FLASHMASTER	μPD78Fxxx	Flash Programmer	Hardware
PG-1500	μPD78Pxxx	PROM Programmer	Hardware

For further information on NEC's 78K0S Series or other NEC products visit our European website at **www.nec.de**

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© Published by NEC Electronics (Europe) GmbH, Printed in Germany, February 1999
Document No. U13379EE2V1PL00

With compliments