

78K0 family

Product Letter

μPD78006x

8-bit Microcontrollers

Description

The μPD78006x are highly integrated single-chip members of NEC's successful 78K0 microcontroller family. They provide on-chip CPU, ROM, RAM and peripheral functions such as 8-bit A/D converter, full-duplex UART and external memory access. They are available with both Mask ROM and Flash memory.

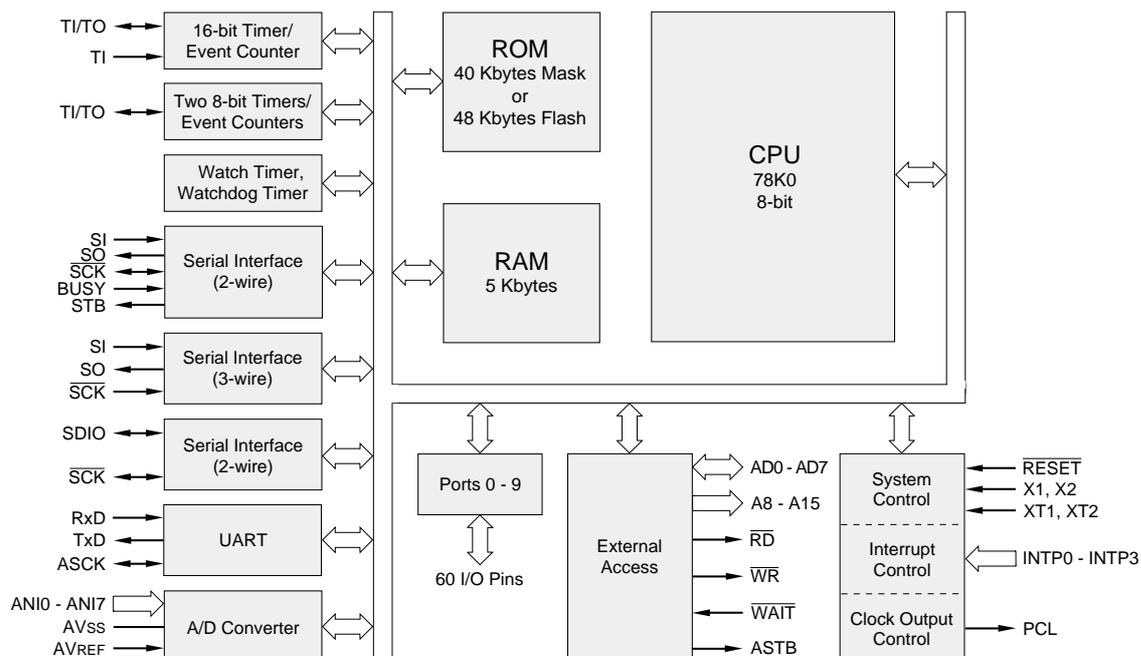
Applications

Thanks to its on-chip peripherals, the μPD78006x subfamily is very well suited for a wide range of different applications, for example washing machines, refrigerators, telephones, and AV appliances. The device provides generous 5 Kbytes RAM which can also be used for loading and executing frequently changing program code.

Features

- Mask ROM (40 Kbytes) and Flash memory (48 Kbytes) versions
- 5 Kbytes internal RAM (includes 1 Kbyte high-speed RAM)
- Hardwired bit manipulation instructions, multiply and divide instructions
- 8-channel A/D converter with 8-bit resolution
- 4 serial interfaces (UART and CSI)
- 60 I/O ports
- Two 8-bit and one 16-bit timer/event counter capable of PWM output
- Interrupt controller
- Watchdog timer
- Minimum instruction execution time from 0.24 μs to 122 μs
- Clock prescaler
- 32.768 kHz subsystem clock with watch timer
- Wide supply voltage range: 2.7 to 5.5 V
- Two power saving modes: HALT, STOP
- 80-pin LQFP (14 x 14 mm², 0.65 mm pin pitch)

Block Diagram



Functional Block Description

CPU	The common core of the 78K0 family is a powerful 8-bit CPU. The 0.35 μm process technology ensures an excellent power/performance ratio for the $\mu\text{PD78006x}$. The instruction set consists of 63 optimized commands including fast multiply and divide instructions. Bit manipulation operations are supported on all registers and in the entire RAM address space.
Memory	The $\mu\text{PD78006x}$ devices provide a remarkable large RAM area of 5 Kbytes, which is divided into 1 Kbyte high-speed memory and 4 Kbytes internal expansion RAM. External memory can be addressed via a dedicated peripheral. The memory map of the Flash ROM version can be adapted to that of the Mask ROM device by a memory size switching register. The flash memory variant can be programmed with the device already mounted in the target system.
Ports	The $\mu\text{PD78006x}$ devices provide a total of 60 CMOS I/O lines. For input only, all I/O ports feature internal pull-up resistors which can be enabled by software.
A/D Converter	An 8-channel A/D converter with 8-bit resolution is incorporated in the devices. The conversion, based on successive approximation, can be started by hardware or software. An interrupt request is issued when the result is ready to be fetched.
Serial Interface	All $\mu\text{PD78006x}$ devices come with 4 independent serial interfaces: one UART, two 3-wire CSIs, and one 2-wire CSI. In addition to the standard mode, the user-programmable UART features a special IR data transfer mode for office equipment applications, etc. To decrease the CPU load during communication, one of the 3-wire CSIs incorporates auto-transmit/receive function.
Timer	Five timer channels are provided: one 16-bit timer/event counter, two 8-bit timers/event counters, a watchdog and a watch timer. All timers are capable of PWM output, the 16-bit timer can be utilized as a programmable pulse generator. The watchdog timer has interval functionality and is capable of generating non-maskable or maskable interrupts in case of a malfunction.
Clock Generator	Controlled by the processor clock control register (PCC), the clock generator provides the operating frequency to be supplied to the CPU core and integrated peripheral hardware. It requires an external crystal or ceramic resonator (1 to 8.38 MHz) and supports an additional resonator for the subclock mode. Optionally the operating frequency can be prescaled. In STOP mode, the operation of the main system is suspended, resulting in ultra-low power consumption.
Clock Output	A clock signal downscaled from the main or subsystem oscillator can be provided at an output pin. The scaling factor can be controlled by a dedicated 4-bit register.
Interrupt Controller	The interrupt controller can handle three different kinds of interrupt request from 19 sources, with the watchdog being the only one which can trigger a non-maskable interrupt.

Ordering Information

Devices

Part Number	Mask ROM (Kbytes)	Flash (Kbytes)
μPD780065GC-8BT	40	-
μPD78F0066GC-8BT	-	48

Documentation

Doc Reference	Devices	Type
U13919EE	NEC Microcontroller	Data Book (CD-ROM)
U12326EJ	78K0	Instruction Manual
U13420EJ	μPD78(F)006x	User's Manual
U13732EJ	μPD780065	Product Information
U13419EJ	μPD78F0066	Product Information

Tools

Order Number	Devices	Description	Type
78K0-NS-PCI-SET	78K0	Toolset* with PCI Interface Card	Hardware & Software
78K0-NS-PCMCIA-SET	78K0	Toolset* with PCMCIA Interface Card	Hardware & Software
IE-780066-NS-EM4	μPD78(F)006x	Probe Board	Hardware
IE-78K0-NS-P01	78K0	Emulation Board	Hardware
DSWIN-I3HD-780XX	78K0	Simulator	Software
FLASHMASTER	Flash Memory Devices	Flash Programmer	Hardware
NP-80GC-TQ	80GC style packages	Emulation Probe	Hardware
NQPACK080SB	80GC style packages	Board Socket	Hardware
YQPACK080SB	80GC style packages	Probe Adapter	Hardware
HQPACK080SB	80GC style packages	Chip Adapter	Hardware
YQSOCKET080SBF	80GC style packages	Height Adapter	Hardware
FA-80GC-8BT	80GC style packages	Programming Adapter	Hardware

* Includes in-circuit emulator, power supply, PC interface, C compiler/assembler and debugger

For further information on NEC's 78K family or other NEC products, please visit our European website at www.nec.de

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