

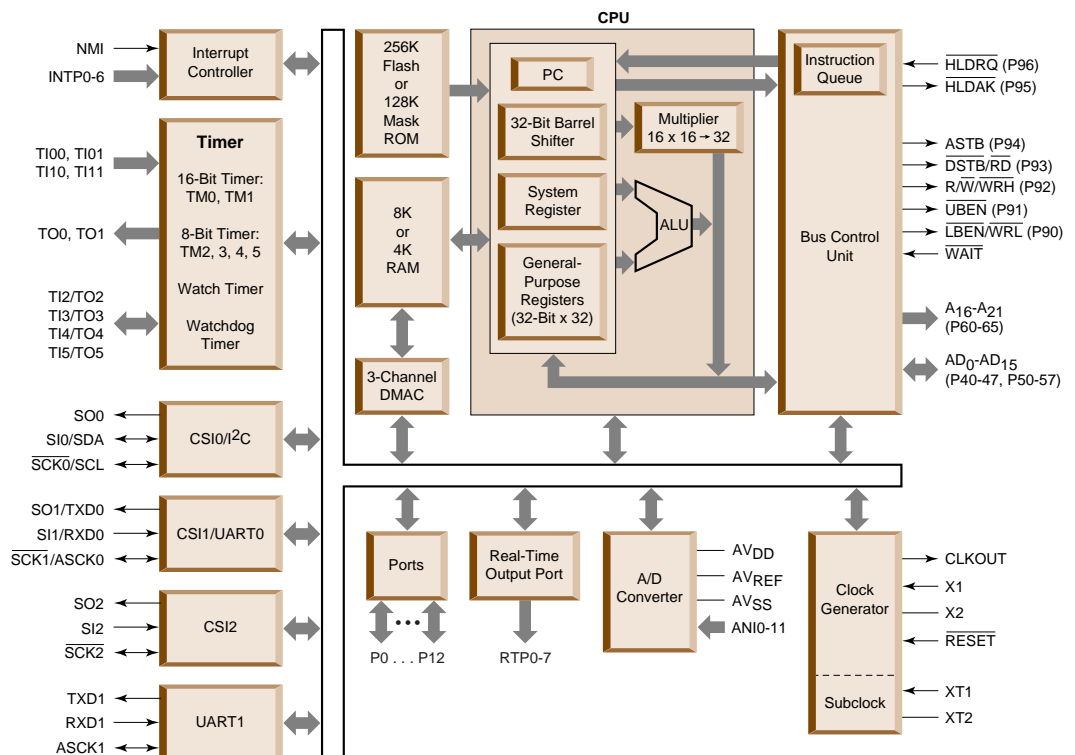
V850/SA1™ 32-BIT RISC MICROCONTROLLER

The low-power, high-performance, and cost-effective V850/SA1 microcontroller features the advanced 32-bit RISC engine of NEC's V850™ family. Fabricated using NEC's 0.35-micron process technology, the device offers 256K on-chip flash memory and delivers 19 Dhrystone MIPS performance at 3 volts. An integrated subclock allows 90 μW power consumption at 32 kHz. The V850/SA1 microcontroller's fully static architecture is highly optimized for power-conscious applications that require embedded real-time control. Versions of the V850 core are available for ASIC development.

SPECIFICATIONS

- **Clock frequency**
 - DC to 17 MHz
 - 32-kHz subclock
- **Performance consumption**
 - 45 mW at 13.5 MHz
 - 90 μW at 32 kHz (subclock)
- **Single-cycle MAC instruction**
- **Performance**
 - 19 Dhrystone MIPS
 - 600 MIPS/W
- **Two-cycle multiply-and-accumulate (MAC) operation**
- **2.7–3.6-volt operation**
- **0.35-μm CMOS process technology**
- **Package**
 - 100-pin plastic QFP (14 mm x 14 mm)
 - 121-pin FPBGA (12 mm x 12 mm)

BLOCK DIAGRAM



FEATURE DESCRIPTION

CPU

- **Highly integrated microcontroller**
 - 32-bit arithmetic logic unit (ALU)
 - 32 general-purpose 32-bit registers
 - 32-bit barrel shifter
- **Single-cycle 16 x 16-bit → 32-bit hardware multiplier**
- **Powerful RISC instruction set**
 - 74 16- and 32-bit RISC instructions
 - Two-cycle MAC function for DSP applications
 - Saturated arithmetic instructions (over/under-flow detection function)
 - Single-cycle 32-bit shift instructions
 - Bit manipulation instructions
 - Load and store instructions with 8-/16-/32-bit data

MEMORY

- 256KB single-cycle internal flash memory or 128KB mask ROM
- 4KB RAM for mask ROM internal version
- 8KB RAM for flash memory internal version
- 4MB linear address space external expansion
- Idle state insertion for slow memory

EXTERNAL BUS INTERFACE

- Multiplexed 22-bit address/16-bit data bus
- Multiprocessor capability
- Programmable and external wait functions

INTERRUPTS

- 32 software traps
- 29 maskable interrupts plus one NMI
- Eight programmable priority levels on maskable interrupts

PERIPHERALS

- 13 input ports and 72 I/O ports
- **Real-time pulse unit**
 - Two 16-bit timer registers
 - Two 16-bit capture/compare registers
 - Four 8-bit timer registers with four 8-bit compare registers
 - Three watchdog timer control registers
 - One watchdog timer
- **Real-time output port with one 8-bit channel or two 4-bit channels**
- **Serial interface**
 - One-channel clocked serial interface /universal asynchronous receiver transmitter (CSI/UART)
 - One-channel CSI/I²C™
 - One-channel CSI
 - One-channel UART
- **Analog-to-digital (A/D) interface**
 - 12-channel A/D converter with 10-bit resolution
 - 5.6-μs conversion time
- **Three-channel DMA**
 - Internal RAM to peripherals
 - Peripherals to internal RAM
- **Clock generator**
 - Direct clock (no PLL)
 - 32-kHz subclock

OTHER

- **Power saving features**
 - Halt/idle/stop modes
 - Clock output stop function
 - Fully static operation

ORDERING INFORMATION

Part Number	Internal ROM	Package
μPD70F3015GC-17-8EU	128K masked ROM	100-pin plastic LQFP (fine pitch) 14mm x 14mm
μPD70F3015YG-17-8EU	128K masked ROM	100-pin plastic LQFP (fine pitch) 14mm x 14mm
μPD70F3017GC-17-8EU	256K flash memory	100-pin plastic LQFP (fine pitch) 14mm x 14mm
μPD70F3017YG-17-8EU	256K flash memory	100-pin plastic LQFP (fine pitch) 14mm x 14mm
μPD70F3017S2-17-YJC	256K flash memory	121-pin FPBGA 12mm x 12mm
μPD70F3017YS2-17-YJC	256K flash memory	121-pin FPBGA 12mm x 12mm



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or visit our Web site at **www.nec.com**

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