

V850 Family

V850E/IA3/IA4

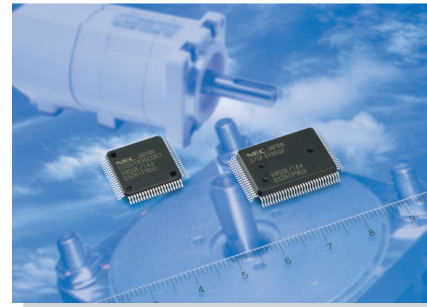
32-Bit Microcontrollers for High-Performance Inverter Systems

Product Overview

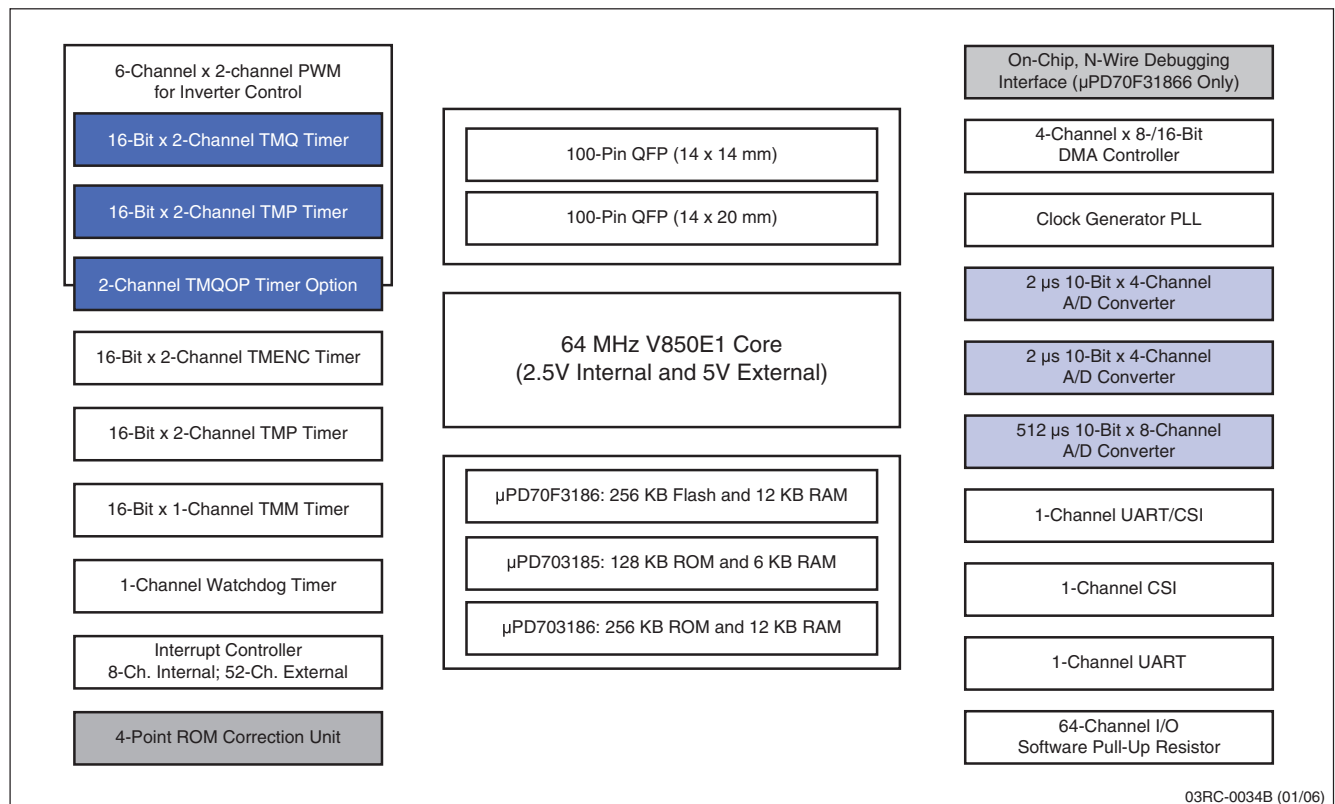
The 32-bit, single-chip V850E/IA3™ and V850E/IA4™ RISC microcontrollers (part numbers μ PD703183 / 70F3184 and μ PD703185 / 703186 / 70F3186) from NEC Electronics contain a six-phase inverter timer for pulse-width modulation and an added dead-time timer for high-performance inverter systems. The V850E/IA3 controller has one inverter timer and the V850E/IA4 has two. Both devices have a built-in high-speed CPU, multi-function timers, high- and low-speed A/D converters, high-speed serial interfaces, operational amplifiers and comparators, software pull-up resistors and other peripherals. For low-cost compact debugging, the V850E/IA4 also has a built-in, on-chip debugging function to support an N-wire-type emulator.

Applications

- Outdoor air-conditioner units
- Large home appliances
- General-purpose inverters
- AC servos
- Robotics equipment
- Uninterruptible power supplies (UPS)
- Power-assisted bicycles



Block Diagram



V850E/IA3/IA4

32-Bit Microcontrollers for
High-Performance Inverter Systems

Features

- High-performance V850E1 CPU core
 - 86 MIPS up to 64 MHz
 - On-chip interrupt controller with fast interrupt response time of 62.5 ns (at 64 MHz)
- Built-in multifunction inverter timer
 - 16-bit timer counter for PWM carrier
 - Four compare registers for PWM duty
 - Interrupt culling function
 - Instant or anytime PWM carrier and duty rewrite of all or selected compare registers
 - 16-bit timer / counter that can trigger A/D conversion
- Two built-in, high-speed A/D conversion circuits
 - Operational amplifiers: six on the V850E/IA4 and five on the V850E/IA3
 - x2.5 or x5 gain
 - 10V/ μ s slew rate for drive current measurement
 - Built-in comparators for current overload detection: six on the V850E/IA4 and five on the V850E/IA3
 - 10-bit resolution with 2 μ s conversion time at 64 MHz
 - Internal pull-up resistors selectable in 1-bit units
- Built-in delta-sigma low-speed A/D converter
 - Selectable by 8 or 10 bits in first order for thermostat processing
 - Four continuous conversion modes with average processing available through one input port
- Safety functions
 - Hi-Z switching of the inverter timer output terminals with built-in comparators, external interrupts, software, watchdog timer, clock monitor, and other peripherals
 - Detection of main clock malfunction by internal CR oscillator
- Other built-in functions
 - ROM correction
 - DMA control of internal RAM and internal I/O
 - PLL with built-in multiplication by eight
 - UART with maximum transfer speed of 1.25 Mbps
 - CSI with maximum transfer speed of 8 Mbps

Compact Software Development Tools

- IE-V850E1-CD-NW N-wire-type emulator for on-chip debugging of the μ PD70F3186
 - Compact and reasonably priced
 - PCMCIA interface
 - Basic functions
 - Write to internal flash ROM (μ PD70F3186)
 - Run/break commands
 - Read/write or dump memory / internal registers
- Full-function in-circuit emulator

Family	Part Number	Flash Memory	Mask ROM	RAM	Package
V850E/IA3	μ PD703183	—	128 KB	6 KB	80-pin QFP
	μ PD70F3184	256 KB	—	12 KB	
V850E/IA4	μ PD703185	—	128 KB	6 KB	100-pin QFP
	μ PD703186	—	256 KB	12 KB	
	μ PD70F3186	256 KB	—	12 KB	

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