V850	family			
Product Letter				



Description	The single-chip V853 microcontroller is a memb It integrates CPU, ROM, RAM and peripheral fur wide, the external bus 16 bits wide. Controller n	er of NEC's 32-bit RISC V850 family. nctions on chip. The internal bus is 32 bits nemory options are listed in Table 1.	
Applications	Like other V850 series controllers, the V853 device is used for real-time control applications, such as servo motor control in computer peripherals and machine tools, for engine management control, consumer electronics and multimedia. Flash memory, a variety of serial communication channels and AD/DA converters make it the perfect choice for compact communication terminals and complete control systems. Typical benefits of Flash memory are individually programmed devices in the final production process and field upgradability. With their low power consumption and power-saving modes, V853 devices are also ideal for portable applications.		
Features	 Small 32-bit RISC CPU core 30 ns minimum instruction execution time (33 MHz max. clock) 16-Mbyte linear address space 1-Mbyte external address space 	 Up to 8 Kbytes internal RAM Interrupt controller Real-time pulse unit/timers Serial interface with baud rate generator A/D and D/A converters 	

- PWM
- · Clock generator
- Power save functions
- Mask ROM, Flash versions
- 100-pin LQFP package

Block Diagram

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control



32 general-purpose registers

74 instructions optimized for embedded

• DSP functionality with 16-bit multiplication

and saturation logic in a single clock cycle



Functional Block Description

CPU	The internal CPU, based on Harvard architechture, is a very compact 32-bit RISC engine. Most instructions are executed in a single clock cycle under control of a 5-stage pipeline. It also includes a 16 x 16-bit hardware multiplier with 32-bit result and saturation logic. A 32-bit barrel shifter and bit manipulation instructions accelerate complex bit operations.
Bus Control Unit (BCU)	The BCU initiates the bus cycles based on the physical addresses generated by the CPU. When an instruction stored in external memory is executed and no bus cycle initiation is requested by the CPU, the BCU creates a prefetch address to prefetch an instruction code which is then inserted in the internal instruction queue.
RAM	The internal RAM, with a capacity of 4 or 8 Kbytes, is mapped from address FFFFE000H. The CPU can access any data in one clock cycle.
ROM	The internal ROM (96 or 128 Kbytes) or Flash ROM (128 or 256 Kbytes) is mapped from 00000000H. The CPU can access any instruction from the ROM/Flash ROM in one clock cycle.
PROM Programming	The Flash memory can be written and erased electrically.
Ports	The V853 has 67 input/output port pins that can be used alternatively as control pins.
Interrupt Controller	The interrupt controller handles the interrupt request issued by internal peripheral hardware and external sources. Up to 8 interrupt priority levels can be specified for each interrupt request.
Clock Generator	The clock generator produces the CPU operating clock. The internal frequency can be selected as 5x or 1x of crystal frequency by using the internal PLL or 1/2x crystal frequency without PLL. An external clock can be used instead of the clock generator. A clock-out signal is available.
Real-time Pulse Unit (RPU)/Timers	The RPU includes a 5-channel 16-bit timer/counter unit.
Serial Interface	The serial interface includes two channels of CSI (Clocked Serial Interface) and two channels which can be operated in the UART (Asynchronous Serial Interface) or the CSI mode. The UART transfers data via the TxD and RxD pins. The baud rate is determined by the on-chip dedicated baud rate generator. The CSI transfers data via the SO, SI and SCK pins at a baud rate determined by the on-chip dedicated baud rate generator or an external clock.
A/D Converter	An 8-channel A/D converter with 10-bit resolution and a 2-channel 8-bit D/A converter are integrated.
PWM	A 2-channel PWM unit with different operating modes is available on chip.

Ordering Information

Devices	Part Number	Max. freq.	ROM	Flash	RAM
		(MHz)	(Kbytes)	(Kbytes)	(Kbytes)
	µPD703004AGC-25	25	96	-	4
	µPD703004AGC-33	33	96	-	4
	µPD703003AGC-25	25	128	-	4
	µPD703003AGC-33	33	128	-	4
	µPD70F3004AGC-25	25	-	128	4
	µPD70F3004AGC-33	33	-	128	4
	µPD70F30025AGC-25	25	-	256	8
	µPD70F30025AGC-33	33	-	256	8
	µPD7030025AGC-25	25	256	-	8
	µPD7030025AGC-33	33	256	-	8

Documentation	Doc Number	Devices	Туре
	U13919EE2V0CD00	NEC Micro-Components	CD-ROM
	U10243EJ6V0UM00	V850	Architecture Manual
	U10913EJ5V0UM00	V853	User's Manual
	U13188EJ2V1DS00	V853 Mask	Data Sheet
	U13189EJ2V0DS00	V853 Flash	Data Sheet

Tools	Order Number	Devices	Description	Туре
	V850-IAR-Toolset	V850	ICE + C Compiler	Hardware & Software
	IE-703003-MC-EM1	V853	Emulation Board	Hardware
	CPDW95/NT-CDR-V800	V850	C/C++ Compiler (GHS)	Optional Software
	FA100-GC	100-pin LQFP	Programming Adapter	Hardware
	SC100SDN	V850	Emulation Probe Extension	Optional Hardware
	StartWARE-GHS-V850/SA1	V850	Starter Kit	Hardware & Software
	FlashMASTER	V850	Programmer	Hardware

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