

## NEC Electronics Expands lineup of 32-bit Microcontrollers with Built-in Ethernet Interface and Large Capacity Memory

### All Flash Microcontroller with Ethernet, USB2.0, and CAN functionality

**KAWASAKI, Japan, DUESSELDORF, Germany, SANTA CLARA, Calif. (U.S.A.), February 17, 2009**— NEC Electronics Corporation today announced that it has developed nine new 32-bit All Flash® microcontrollers (MCUs) with built-in Ethernet interface and embedded flash memory. The new products are ideal for remote and supervisory control of industrial devices and building-management systems and include six 128-pin variants, named V850ES/JH3-E and three 144-pin variants, named V850ES/JJ3-E.

The new products have the following features: (1) Integrated Ethernet media access controller (MAC) channel, eliminating the need for an external Ethernet controller; (2) Up to 512 kilobytes (KB) of flash memory and up to 124 KB of random access memory (RAM), making it possible to run network software using on-chip memory alone; (3) Peripheral functions including full speed USB 2.0 interface and CAN interface.

Originally deployed as a networking technology for office computers, servers, and office automation equipments, Ethernet is now the world's most widespread wired local area network (LAN) technology. Over the next few years, Ethernet is expected to be further used for remote and supervisory control of industrial devices, building-management systems, home networks, and utility meters for the gas, water, and electricity. Factory Automation equipments in particular has been a field in which designers traditionally used proprietary network architectures but with the growing popularity of Ethernet, more and more developers are moving to Ethernet to facilitate network communication.

To add Ethernet functionality in the past, designers typically had to add a separate Ethernet controller in addition to high-capacity external memory for network software, which is why NEC Electronics designed its new MCUs with those features built-in. The large amount of integrated memory eliminates the need for any external memory by making it possible for systems to run network software using onboard memory alone. The integration of the Ethernet and large memory allow designers to build systems at lower cost than using external components.

The new product has the following significant features:

(1) On-chip Ethernet media access controller (MAC)

Each of the new MCUs integrates one-channel IEEE 802.3-compliant 10/100Base-T Ethernet MAC (note). This eliminates the need for an external Ethernet controller, making it possible to build a connected system at low-cost.

(2) Up to 512 KB of embedded flash memory and 124 KB of RAM

With up to 512 KB of flash memory and up to 124 KB of RAM, the V850ES/Jx3 family of MCUs can execute 103 Dhrystone million instructions per second (MIPS) at a clock speeds of 50 MHz. This makes it possible to run network software and system control program using its internal memory only, thereby facilitates the overall development process.

(3) Extensive variety of peripheral functions

The new products include full-speed USB 2.0 interface, CAN interface, a motor control timer, and a real-time counter. These features allow designers to implement industry-standard communication technologies and to reduce external components and trim system development costs.

#### (4) Network software

NEC Electronics provides a wide array of network software, including an optimized Ethernet driver, and a lightweight transmission control protocol/Internet protocol (TCP/IP) stack.

NEC Electronics believes this new lineup of MCUs to be optimized for creating networked products in such fields as Industrial Ethernet applications, I/O converters and modules, industrial routers and hubs, test & measurement equipment, security control panels, utility meters, and connected industrial motor drives, and plans to market them actively.

See [appendix](#) for additional specifications of the new products.

#### **Pricing and Availability**

The sample prices of these new products vary depending on memory capacity, package type, and number of pins. For example, the 144-pin V850ES/JJ3-E MCU with 512 KB of Flash memory and 124 KB of RAM is priced at U.S. \$ 12 per unit. Mass production of these new products is scheduled to begin in December 2009 and is expected to reach a monthly production of 1,000,000 units by 2011. Pricing and availability are subject to change.

#### **Exhibition at Embedded World 2009**

NEC Electronics plans to show demos of its new MCUs in booth 9-447 at the Embedded World 2009 in Nuremberg, Germany, from March 3-5.

(Note)

Ethernet MAC:

Ethernet Media Access Controller (MAC) (10/10 Obase-T) compliant with IEEE802.3 definition. A function that controls transmission of data unit and error detection when controlling data transmission.

(Remark 1) All Flash, V850ES/JH3-E and V850ES/JJ3-E are trademarks or registered trademarks of NEC Electronics Corporation in Japan, the U.S and other countries.

(Remark 2) SuperFlash memory technology used in NEC Electronics' 32-bit devices is licensed from Silicon Storage Technology Inc. SuperFlash is registered of Silicon Storage Technology in the U.S., Japan, and other countries.

About NEC Electronics Corporation

NEC Electronics Corporation (TSE: 6723) specializes in semiconductor products encompassing advanced technology solutions for the high-end computing and broadband networking markets; system solutions for the mobile handset, PC peripheral, automotive and digital consumer markets; and multi-market solutions for a wide range of customer applications. NEC Electronics Corporation has subsidiaries worldwide including [NEC Electronics America, Inc.](#) and [NEC Electronics \(Europe\) GmbH](#). More information about NEC Electronics worldwide can be found at [www.necel.com](http://www.necel.com).

## Main Specifications of the V850ES/JH3-E

Model name		V850ES/JH3-E					
		μPD70F3778	μPD70F3779	μPD70F3780	μPD70F3781	μPD70F3782	μPD70F3783
Internal memory	Flash memory (KB)	256	384	512	384	512	512
	RAM (KB)	60	60	60	60	60	60
	Data memory (KB)	16	16	16	64	64	64
Clocks	Main system clock	24 to 50 MHz					
	Sub system clock	32.768 kHz					
	Watchdog timer internal oscillator clock	220 kHz					
	Min. instruction execution time	20 ns (at 50 MHz)					
I/O ports		84 (5V Tolerant: 48)					
Timers	16-bit timers	13					
	Realtime counter	1					
	Watchdog timer	1					
10-bit A/D converters		10					
Serial interfaces	CSI/UART	1					
	CSI/UART/I2C bus	2					
	CSI w/FIFO /UART	1					
	CSI w/FIFO /UART/I2C bus	1					
	CSI/UART w/FIFO	2					
	CSI w/FIFO	1					
	UART/I2C bus/CAN	1					
Ethernet Controller		1 (10/100 Base)					
USB controller		USB 2.0 function controller (full speed): 1					
DMA controllers		4					
Interrupt	External	22					

sources	Internal	79	83
Power save function	HALT/IDLE1/IDLE2/STOP/Sub clock/Sub IDLE		
Other functions	Low-voltage detection circuit, real time output, motor control timer, key return function, etc.		
On-chip debugging	Yes		
Operating power supply voltage	2.85 to 3.6 V @ 50MHz		
Package	128-pin LQFP (14x20 mm)		