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MICROCONTROLLER PRODUCTS

Fact Sheet

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NEC Electronics America offers a comprehensive lineup of All Flash™ microcontrollers encompassing 8-bit 78K0/Kx2, 78K0/Kx2-L, 78K0/Lx2 and 78K0/Lx3 devices, high-performance 16-bit 78K0R/Kx3 and 78K0R/Kx3-L devices and 32-bit V850ES™ devices, all of which are designed to meet the price and performance needs of high-volume embedded, consumer and automotive applications. Upon request, in-factory flash programming is performed using NEC Electronics' state-of-the-art 0.15µm flash programming process that enables higher integration in smaller die sizes and increases performance, lowers power consumption and reduces overall unit costs.

NEC Electronics America's diverse 8-bit lineup includes a full range of devices in packages with pins ranging from 16 to 144 and ROM and flash memory capacities ranging from 1 to 128 KB. The 32-bit offering consists of three cores—V850™, V850E and V850ES—that can execute from 29 to 400 million instructions per second (MIPS). With memory sizes ranging from 64 KB to 1 MB and packages with pins ranging from 64 to 176, the 32-bit lineup is a price-performance leader.

By offering high-quality products and numerous product options, in addition to ease of migration from one bit size to another and compatibility of development tools among all lineups, NEC Electronics Corporation (parent company) has become the world's number one supplier of 32-bit microcontrollers and the third largest supplier of microcontrollers overall.*

All microcontrollers offered by NEC Electronics America are fully supported by an extensive variety of third-party and proprietary NEC Electronics development tools.

8-Bit All Flash 78K0/Kx2, 78K0/Kx2-L and 78K0/Lx2, 78K0/Lx3 Microcontrollers

NEC Electronics America's All Flash 78K0/Kx2, 78K0/Kx2-L and 78K0/Lx2 or 78K0/Lx3 microcontrollers support an extensive selection of integrated peripherals for multipurpose and LCD-based designs. With reliability features such as power-on-clear (POC) circuitry, low-voltage indicators (LVIs), enhanced watchdog functions and internal ring oscillators, these devices offer unparalleled operating security. The 78K0/Lx2 and 78K0/Lx3 lineups extend the 78K0/Kx2 offering by adding an LCD driver/controller that supports from 60 to 288 segments. Devices in the 78K0/Lx2 and 78K0/Lx3 lineups can operate at clock speeds as fast as 20 MHz and, with prescaler clock circuits and low-power standby modes such as halt and stop, be put into sleep mode and draw only 0.8 micro-amps (µA) of current. They also use a 5V power supply, have an internal clock speed of 30 kHz and can operate within a temperature range of -40 to 85°C.

* Gartner Dataquest March 2008

The low-power 78K0/Kx2-L microcontrollers are designed specifically for battery-powered applications that require the most efficient power schemes.

- Up to 20 MHz main clock / 32 kHz subclock
- 4–128 KB flash ROM
- 384-byte–7 KB RAM
- 1.8 to 5.5V operation
- 60- to 288-segment LCD driver/controller selectable via the device
- On-chip debugger
- Rich analog peripherals
 - » 8-, 10-, or 16-bit A/D converter
 - » 10-bit D/A converter
 - » Operational amplifier
 - » Comparator (selected devices)
- Low power consumption (78K0/Kx2-L): 2.4 μ A at a clock speed of 32 kHz during halt mode
- Real-time counter
- Applications
 - Consumer: electric toothbrushes, personal audio equipment, intelligent battery chargers
 - Industrial/commercial: fire alarms, security systems, garage door openers, motor controllers
 - Medical: glucose meters, blood pressure measurement devices, exercise equipment
 - Measurement: digital multimeters, thermostats, utility meters

16-bit All Flash 78K0R/Kx3, 78K0R/Kx3-L and 78K0R/Lx3 Microcontrollers

The new 16-bit All Flash 78K0R microcontrollers are targeted at applications that require high performance, flash memory capacities ranging from 16 to 512 KB and RAM capacities ranging from 1 to 30 KB. The 78K0R/Lx3 devices take advantage of the same high-performance 16-bit core as 78K0R/Kx3 microcontrollers, but also have integrated LCD drivers for applications that need to control large numbers of display segments. These devices operate at clock speeds up to 20 MHz and execute 13 Dhrystone MIPS.

The low-power 78K0R/Kx3-L microcontrollers are designed specifically for battery-powered applications that require the most efficient power schemes.

- Rich analog functions
 - 12-bit successive approximation register (SAR) with 3-channel operational amplifier (78K0R/Lx3)
 - Two-channel, 12-bit D/A converter (78K0R/Lx3)
 - 10-bit A/D converter (78K0R/Kx3)
 - Internal reference voltage
- Low power
 - 8.4 mA at 20 MHz clock speed
 - 200 μ A at 1 MHz clock speed
 - <1 μ A at 32.768 kHz clock speed; real-time counter (78K0R/Kx3-L)
 - 5.0 μ A at 32 kHz clock speed during halt mode with LCD on (78K0R/Lx3)
- Selectable internal clock speed of 1, 8 or 20 MHz

- Extensive selection of packages with pins ranging from 44 to 144 and flash memory capacities ranging from 16 to 512 KB

32-Bit V850, V850E and All Flash V850ES Microcontrollers

The 32-bit V850, V850E and All Flash V850ES microcontrollers provide cost-effective solutions for systems that require high-performance, single-chip operation and high integration. With a full range of peripherals and a wide selection of memory configurations, the V850 lineup is well suited for portable electronics, consumer electronics and industrial networking applications. V850E and V850ES microcontrollers have a hardware-based multiply unit that supports 32-bit × 32-bit or 16-bit × 16-bit multiplication instructions and a direct memory access controller (DMAC)-equipped bus interface that provides on-chip support for popular external memory devices, including synchronous DRAM.

- Features
 - Scalable performance—up to 400 MIPS at clock speeds ranging from 4 to 200 MHz
 - Low noise and low power consumption
 - Wide range of peripherals and up to five CAN interfaces
 - Flash memory, RAM, mask ROM and ROMless versions
 - Flash memory capacities ranging from 128 KB to 1 MB
 - Failsafe circuitry for safety-critical applications
- Applications
 - Automotive: audio and body equipment, telematics products, mid-range to high-end instrumentation equipment, low-end multimedia systems, electronic power steering systems, gateways, smart junction boxes, anti-lock braking systems, power trains, engine management control systems
 - Communications: wireless LANs, digital cellular phones, two-way pagers, modems
 - Consumer electronics: answering machines, image and voice compression equipment, speech recognition system, JPEG video, home audio and video systems, home appliance controllers
 - Industrial: utility meters, home security systems, inverter controllers, factory automation equipment, global positioning systems, vending machines, motor controllers
 - Office automation: hard disk drives, DVD-ROMs, scanners, inkjet printers and laser printers

32-bit V850 Microcontrollers

The V850 lineup provides cost-effective solutions for applications that require low power consumption, a full range of peripherals and 32-bit performance.

- 16 to 33 MHz main clock
- 16-bit × 16-bit multiplier
- Up to 512 KB ROM/flash memory
- 2.7 to 5.5V operation
- I²C and CAN interfaces

32-bit V850ES Microcontrollers

The All Flash V850ES lineup takes advantage of process improvements to offer architectural extensions such as a hardware-based multiply unit that supports 32-bit × 32-bit multiplication instructions and a DMAC-equipped bus interface that provides support for external memory devices, including synchronous DRAM. V850ES devices achieve high performance while drawing only 1.3 mW of power per MIPS.

- Execution of up to 69 MIPS
- Main clock speeds up to 32 MHz
- 2.2V operation; 5-volt I/O
- Up to 1 MB of addressable flash memory
- 32-bit × 32-bit multiplier
- ROM, flash memory, DRAM controller, synchronous DRAM controller and CAN interface
- On-chip debugger

32-bit V850E Microcontrollers

The All Flash V850E lineup offers the highest computing performance. With operating frequencies up to 200 MHz, program memory up to 512 MB and a 7-stage pipeline, V850E microcontrollers easily support applications in imaging, data pathways and communications.

- Execution of up to 400 MIPS
- Main clock speeds up to 200 MHz
- 512 MB addressable memory
- 1.8 to 5.5V operation
- 32-bit × 32-bit multiplier
- On-board instruction and data caches
- On-chip debugger

Application-Specific Devices

In addition to multipurpose microcontrollers, NEC Electronics America also offers an extensive variety of 8-, 16- and 32-bit application-specific devices for motor control, lighting, healthcare, building management and other applications that require 8- or 32-bit full-speed USB 2.0 functionality. These devices are designed with dedicated peripherals for each specific application—to make the design process shorter and to reduce system development costs by eliminating the need for external components.

Complete Development Tools Support

- C compilers and relocatable assemblers
- Full-function in-circuit emulators
- System simulators and debuggers
- Starter kits
- On-chip debugging emulators
- Flash programmers and gang programmers
- Reference code generator (Applilet)

NEC Electronics America, Inc.

NEC Electronics America, Inc., headquartered in Santa Clara, California, is a wholly owned subsidiary of NEC Electronics Corporation (TSE: 6723), a leading provider of semiconductor products encompassing advanced technology solutions for the broadband and communications markets; system solutions for the mobile, PC, automotive and digital consumer markets; and platform solutions for a wide range of customer applications. NEC Electronics America offers a local manufacturing facility in Roseville, California, and the global manufacturing capabilities of its parent company. NEC Electronics America is also the marketing and sales channel in the Americas for industrial-type active-matrix LCDs from NEC Technologies, Ltd., a global leader in innovative display technologies. More information about the products offered by NEC Electronics America can be found at www.am.necel.com.

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