

## NEC Electronics Announces 8-bit Microcontroller Lineup for Lighting Applications

### MCUs Use Inverter Control to Help Save Energy

**KAWASAKI, Japan, SANTA CLARA, Calif., (U.S.A.), DUESSELDORF, Germany, December 11, 2008**

— Following the release of the world's first microcontroller (MCU) with four-channel constant-current drive for LED lighting systems, NEC Electronics Corporation (TSE:6723) this month began shipment of 14 new 8-bit All Flash® MCUs for energy-efficient lighting applications. Designed specifically for fluorescent and LED lighting devices requiring low cost, high efficiency and intelligent control, NEC Electronics' extremely low-power-consuming 78K0/Ix2 devices stand apart from the competition by having two unique 16-bit timers with high-speed pulse-modulation (PWM) output, three channels of internal comparators, a one-channel operational amplifier with programmable gains and an extended operating temperature range of –40 to +105 degrees Celsius. The 14-device lineup includes 78K0/IY2 MCUs in 16-pin packages, 78K0/IA2 MCUs in 20-pin packages and 78K0/IB2 MCUs in 30-pin packages.

As energy costs for lighting equipment rise, and consumers become more eco-conscious about global warming, lighting has become an area of focus for energy conservation. By switching from incandescent to fluorescent bulbs, and by using an MCU rather than a dedicated integrated circuit (IC) to provide inverter control and dimming functions, lighting manufacturers can control illumination at a fine-grained level and provide communication functions that enable illumination and ambient conditions to be adjusted via remote control, delivering further energy savings and added value.

LED-based lighting systems, which consume less power than other lighting systems, are becoming more popular as major advances in brightness levels are made. However, providing high-brightness illumination in LEDs requires functions to control dimming and manage color, thermal conditions and communication, and this need has increased the popularity of MCUs for system control.

NEC Electronics' 78K0/Ix2 MCUs are well positioned to take on the challenges of controlling fluorescent and LED-based lighting systems by offering outstanding features in a single chip.

#### (1) Inverter and LED dimming control function

Two 16-bit PWM timers and a built-in high-speed oscillator that drives the timers at a maximum clock speed of 40 megahertz (MHz) enable fine-grained inverter control. These timers, each capable of two outputs, make it possible for the MCUs to drive four-channel LEDs with precise dimming and color control.

#### (2) Instantaneous control of PWM timer output

Built-in comparators with outputs linked to the PWM timer automatically detect abnormal conditions, such as over-current and over-voltage conditions, and immediately shut down PWM output—without CPU intervention—providing much faster protection against damage than an interrupt-based mechanism.

#### (3) Internal power factor correction (PFC) control

An external interrupt and built-in comparators linked to the 16-bit timers fulfill hardware requirements for power factor correction (PFC), while NEC Electronics' high-performance 78K0 core—along with the on-board hardware multiplier—tackle the software computation, eliminating the need for a dedicated PFC control IC and thereby reducing system cost and space.

#### (4) Best-in-class low power consumption

With the same low-power technologies used in NEC Electronics' low-power 16-bit MCUs, the new 8-bit devices consume only 0.3 micro-amps ( $\mu\text{A}$ ) during standby operation and 260  $\mu\text{A}$  during operation at 1 MHz, which helps reduce system standby power consumption to meet energy efficient regulations.

(5) Extended operating temperature range

The new devices are qualified for an extended temperature range from  $-40$  to  $+105$  &  $176^{\circ}\text{C}$ , exceeding the extreme ambient temperatures demanded by lighting devices.

(6) Built-in inter-lighting communications peripheral

A dedicated circuit, including a Manchester encoder/decoder in the digital addressable lighting interface (DALI)-compliant UART, enables lighting control for multiple networked lighting devices.

All in all, these new MCUs with dimming functionality are ideal for lighting equipment products, the market for which is growing as a result of increased awareness of the need for energy efficiency.

Further information can be found at <http://www.am.necel.com/micro/>.

(As a further proofpoint to NEC Electronics' commitment to delivering the highest quality and support to its customers, on a worldwide basis, NEC Electronics Corporation was ranked the number one supplier of 32-bit MCUs in 2007, according to the Gartner Dataquest April 2008 rankings report.)

#### **Pricing and Availability**

Prices for samples of NEC Electronics' new MCUs will vary depending on memory capacity, package type, and number of pins. Mass production of all 14 devices is expected to begin May 2009 and increase to a combined volume of one million units per month by fiscal year 2011. (Pricing and availability are subject to change without notice.)

#### **About NEC Electronics**

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).

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