

System@IC News

SEMICONDUCTOR SOLUTIONS NEWS FROM NEC ELECTRONICS IN EUROPE ISSUE 4/2006

SPOTLIGHTS

Seasonal greetings



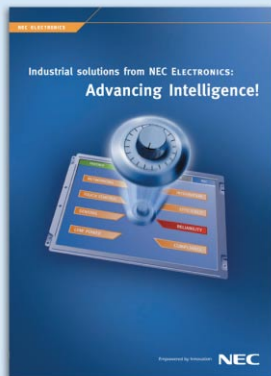
We wish you a merry Christmas and a happy New Year!

European Quality Centre

The new European Quality Centre has been established at NEC ELECTRONICS EUROPE'S headquarters in Düsseldorf to provide enhanced quality assurance and failure analysis service to automotive customers in the region.

Industrial solutions

Among the many markets we serve, Industrial represents a major share of our global business. This new brochure details the numerous dedicated Industrial solutions and services from NEC ELECTRONICS, including details of key trends and the advanced technologies supporting them. It can be downloaded from our website under www.eu.necel.com.

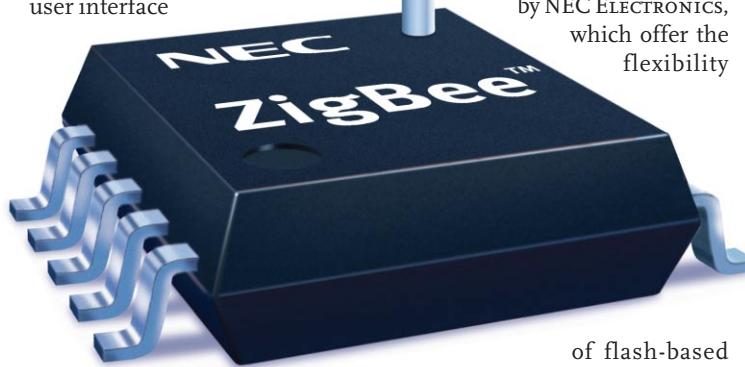


Out-of-the-box Zigbee™

NEC ELECTRONICS CORPORATION, SKYLEY NETWORKS INC., and UNIBAND ELECTRONIC CORPORATION (UBEC) is introducing development kits, including both software, hardware, and tools, that enable OEMs and system developers to quickly and easily develop low power, wireless peer-to-peer mesh networks ideal for the rapidly growing field of industrial automation and building management systems, lighting controls, automated meters, sensors, and security systems.

Effortless network development

A key feature of NEC ELECTRONICS' new Zigbee™ kits is the availability of the SKYLEY software development kit (SDK) featuring an easy to use graphical user interface



(GUI), which allows effortless network development, and includes a network sniffer, network viewer, node setting tool, and node monitor tool, for easy implementation of peer-to-peer mesh networks.

The development of a wireless application cannot be completed in isolation. Because of the nature of connectivity applications it is very important that developers are able to test their prototypes in an environment similar to that in which they will finally be used. Multiple nodes may need to be set up and communications

monitored between these nodes. Inherently this demands a working knowledge of both wireless technology and networking. Developers of wireless applications no longer need to have a deep understanding of these areas in order to establish quite complex mesh networks. By using the SKYLEY SDK, nodes can be easily set up, wireless traffic monitored, and networks viewed and debugged easily on a laptop.

A multi-chip solution from a single vendor

The hardware platform, consists of several evaluation boards based on All Flash™ microcontrollers by NEC ELECTRONICS, which offer the flexibility

combination of technologies to fulfil their requirements.

Real applications straight out of the box

Included with the development kit is the 802.15.4 MAC driver software and the Zigbee™ protocol stack. Combined with the SKYLEY SDK developers can begin programming real applications straight out-of-the-box.

The kits will be certified for compliance with the Enhanced ZigBee™ Standard, to be unveiled by the ZigBee™ Alliance early next year.

The complete kits are available from NEC ELECTRONICS including all of the described components. The kits for the 8-bit 78K0, 16-bit 78K0R and 32-bit V850ES will be available in early 2007.

*Ashish Sethi
Solution Marketing
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Response number 329

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Empowered by Innovation



Huge embedded memory for V850 All Flash

For the last year, NEC ELECTRONICS' V850 All Flash general-purpose microcontrollers have combined the rich functionality of a well-established high performance MCU with the flexibility of Flash memory, making it ideally suited to both entry level and next-generation 32-bit designs, and in no small part contributing to NEC ELECTRONICS' position as the worldwide number one 32-bit microcontroller provider!

This line-up is now being further enhanced by the introduction of V850ES/JJ3, which takes V850 All Flash to new levels by embedding up to 1 MB of Flash memory on-chip!

Part of the V850 All Flash J Series family, V850ES/JJ3 is ideally suited to lower power applications using a 3 V supply and with a hunger for memory, offering high performance operation, complex system control and numerous functions (including digital-to-analog conversion) all in a single device. Available in a 144-pin package, V850ES/JJ3 offers either 768 K or 1 M Flash, both with an equally attractive 60 K RAM onboard.

At the heart of the micro is the V850ES RISC CPU core, offering an impressive 29 MIPS at 20 MHz, enabling V850ES/JJ3 to deliver on the latest application trends requiring large amounts of embedded Flash such as graphical user interfaces, multi-language products, voice synthesis and recognition, or the use of complex communications protocols.



NEC ELECTRONICS' V850ES/JJ3

In addition to the high performance core, V850ES/JJ3 offers an abundance of general purpose functions on-chip, with a combination of multiple high performance 16-bit timers, up to 16 channels of 10-bit A/D conversion, D/A conversion, DMA, Real Time Output, multiple serial interfaces, integrated safety functions and on-chip debug.

Alongside the other V850 All Flash lines, including the H Series, which is suited to applications requiring a large number of analog lines, and I Series, boasting dedicated 3-phase motor timers, the J Series microcontroller family is the ideal upgrade platform for exploiting 32-bit performance in a wide variety of applications such as:

- ▶ Access control
- ▶ Point of sale
- ▶ Industrial controls and drives
- ▶ PC peripherals
- ▶ Home automation
- ▶ Home appliances
- ▶ Factory automation
- ▶ Power meters
- ▶ Medical appliances
- ▶ Instrumentation

With the addition of these latest devices, NEC ELECTRONICS now boasts a comprehensive line-up of 208 All Flash microcontrollers, ranging from cost-efficient 8-bit devices, to market leading power/performance 16-bit devices, to high performance 32-bit devices, with a wide selection of memories and pin counts to suit the needs of diverse applications. All of these are supported by NEC

ELECTRONICS' market-leading low-cost CUBE tools. IECUBE offers full emulation and trace functionality whilst the new MINICUBE2 makes best use of on-chip debug as well as full Flash programming, all in a single tool supporting 8-, 16- and 32-bit microcontrollers, enabling almost any application to get up and running very quickly. Both tool chains are supported by the IAR 'C' Compiler suite with an appetizer version available so you can start developing immediately. For all V850 devices, additional software support is also available via the GREENHILLS Workbench if you prefer.

Samples for V850ES/JJ3 are available now, with mass production rolling out from May 2007, so why not see what 1 M Flash can do for your application today? For more information, please visit our homepage.

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Solution Marketing
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www.eu.necel.com/eu_3021
Response number 330

Now over 200 All Flash microcontrollers available

With the introduction of two new 32-bit V850/JJ3 microcontrollers NEC ELECTRONICS' high end range now boasts up to 1 MB of embedded Flash memory. Combined with the introduction of 14 new 16-bit 78K0R/Kx3 microcontrollers announced earlier this year, NEC ELECTRONICS now has 208 All Flash microcontrollers available and over 1000 microcontrollers in total.

Adding to the 16-bit and 32-bit microcontroller line

V850 J Series microcontrollers all boast large Flash memory sizes to meet the needs of ever increasing software footprint for 32-bit industrial applications. In addition J series microcontrollers include an abundance of peripherals. The latest 78K0R/Kx3

microcontrollers boast a class leading power/performance ratio removing the need for customers to compromise power consumption for performance.

Unified Tools for All Flash microcontrollers

With this wide range of microcontrollers now available it is important that developers can easily mix and match a variety of different controllers to meet the complexity now demanded of industrial products. The MINICUBE2 on-chip debug and flash programming tool enables developers to use multiple variants of 8-bit, 16-bit, and 32-bit microcontrollers without worrying about acquiring a number of debug tools. A single MINICUBE2 now supports on-chip debug features

for the entire range of 208 All Flash microcontrollers. Users only need flick a switch and the MINICUBE2 will support a different All Flash microcontroller. NEC ELECTRONICS has extended their unified tool strategy to ICE tools as well in the fully featured IECUBE tools that include more extensive debug options.

Start development now with easy to use starter kits

Earlier this year NEC ELECTRONICS launched the V850 All Flash Starter Kit, a low cost kit designed to introduce developers to the power of V850 32-bit microcontrollers. In addition a new 78K0R starter kit is now available allowing developers to become familiar with the latest line of 16-bit high performance, low power

microcontrollers from NEC ELECTRONICS. The 78K0R starter kit, COOL-IT, includes several demonstration programs to illustrate simple motor control, etc. It even includes the possibility to run the device from a capacitor to demonstrate the low power efficiency of 78K0R devices. The COOL-IT 78K0R starter kit is priced at 24.99 Euros to allow easy entry and will be available in January 2007. 78K0R devices are sampling now.



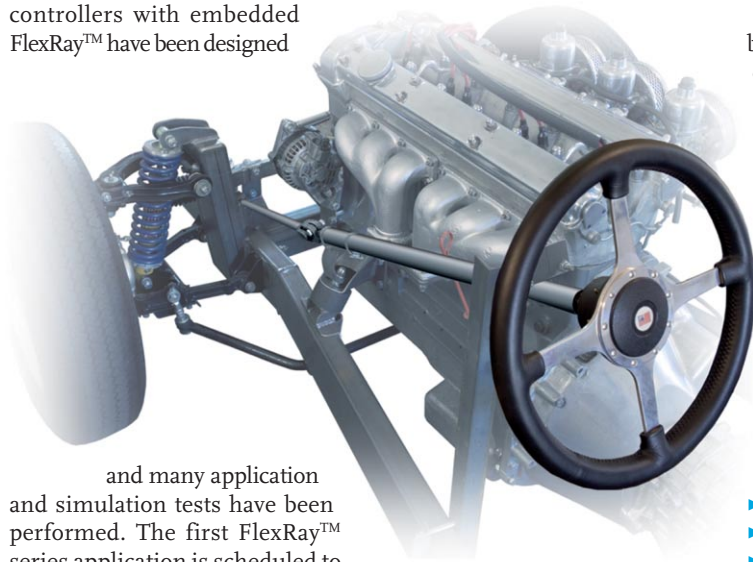
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www.eu.necel.com/eu_3022
Response number 331

AUTOSAR FlexRay™ driver now available for microcontrollers

FlexRay™ is fast becoming a standard interface for NEC ELECTRONICS. Since joining the FlexRay™ consortium nearly 4 years ago, the first two microcontrollers with embedded FlexRay™ have been designed

To cover these application fields, NEC ELECTRONICS have extended their successful 32-bit V850 MCU family with devices that



and many application and simulation tests have been performed. The first FlexRay™ series application is scheduled to be running on a NEC ELECTRONICS V850 MCU in 2008.

After this year's launch of FlexRay™ in a volume-produced car by BMW, several other OEMs have decided to implement a FlexRay™ network in their cars within the next few years. Most OEMs are initiating the introduction of FlexRay™ in a small pilot project connecting a few ECUs. After this preliminary phase, new applications will be implemented and connected with FlexRay™, especially in the car chassis area. These new applications will be „real“ FlexRay™ applications, since it will not be possible to realize them with today's network protocols due to a lack of high bandwidth, and inadequate deterministic behavior and/or safety features.

The next step will be the connection of other segments, for example driver assistance systems, to the FlexRay™ network to enable the exchange of information and creation of vehicle management functions. Some OEMs are planning to migrate their overloaded CAN networks to FlexRay™ simply to gain higher data rates and to implement new network architectures such as a FlexRay™ backbone.

feature an embedded FlexRay communication controller (FRCC) in different performance and memory ranges.

Upper-range FlexRay™ MCU: V850E/PHO3

The V850E/PHO3 (nickname Phoenix-FS) is NEC ELECTRONICS' first MCU with embedded FlexRay™. This powerful 32-bit RISC microcontroller is particularly suited for high-performance chassis applications in the automotive industry. The Phoenix-FS has a peripheral set compatible with its predecessor, the V850E/PHO2 (nickname Phoenix-F), providing an easy upgrade path from Phoenix-F, as well as a scalable solution. It is optimized for inverter control applications requiring control of up to two 3-phase brushless DC motors simultaneously, for example in electronic power steering, braking or vehicle dynamics control. Equipped with an embedded FRCC that is based on the BOSCH E-Ray IP-Module, the Phoenix-FS is designed for advanced network architectures and

future x-by-wire applications. Its on-board safety features, eg. CRC, ECC on flash and RAM, meet the highest safety requirements.

The ES1.0 version, used to build the first FlexRay™ ECUs for evaluation purposes, has been available since the end of 2005. Recently the Phoenix-FS ES2.0 version was released. Featuring the latest FlexRay™ IP-Module, E-Ray R1.0 (FlexRay™ Spec. v2.1), this microcontroller goes into mass production in 2008, and will then be found in several chassis domains like electronic power steering, damping and vehicle dynamics control applications.

Features:

- ▶ V850E @ 128 MHz with FPU
- ▶ 1 MB/60 kB Flash/RAM
- ▶ FlexRay™ (2 ch, v2.1)
- ▶ 2 x CAN (32 + 32 message buffer)
- ▶ 2 x CSI, 2 x buffered CSI, 2 x UART,
- ▶ 2 x ADC (10 + 10 ch), 10 bit, 2 μs
- ▶ 2 x real-time pulse unit for motor control
- ▶ 357-pin FPBGA

Mid-range FlexRay™ MCU: V850E/CAG4-M

As a leading semiconductor manufacturer for automotive

gateway microcontroller, NEC ELECTRONICS will naturally be enlarging the CarGate family with the addition of an embedded FlexRay™ device. Called CAG4-M, this device will feature up to 6 x CAN, FlexRay™, and an integrated MediaLB™ interface for MOST®. Samples will be available in 2007.

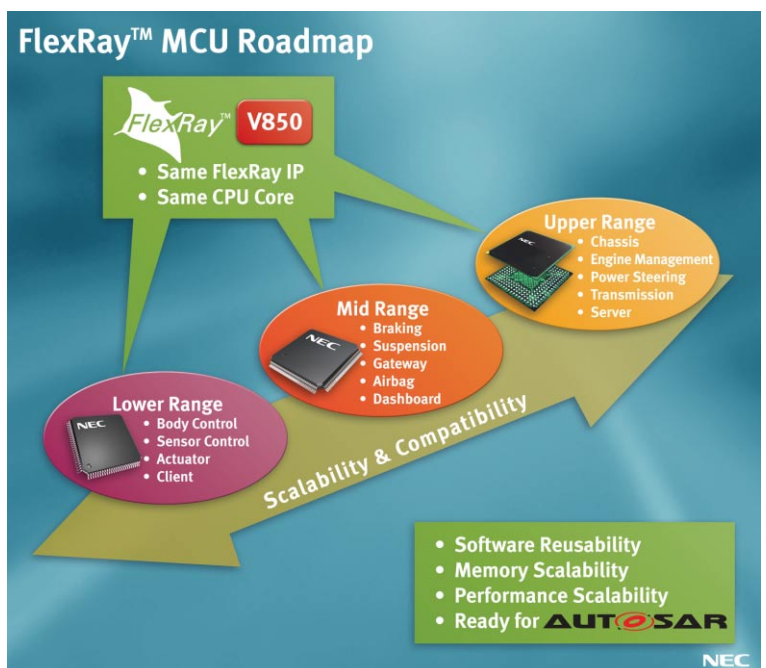
Apart from gateway applications, the CAG4-M is also intended for other high-performance applications in the field of vehicle chassis and body electronics.

Features:

- ▶ V850E @ 80 MHz with FPU
- ▶ 512 kB/60 kB Flash/RAM
- ▶ FlexRay (2 ch, v2.1)
- ▶ 3-wire MediaLB interface
- ▶ 6 x CAN (6 x 48 message buffer; mirror mode)
- ▶ 4 x CSI, 6 x LIN-UART, I2C
- ▶ ADC: 10 ch, 10 bit, 2 μs
- ▶ 144-pin QFP

Lower-range FlexRay™ MCU: V850E/PJ3

NEC ELECTRONICS is planning to serve FlexRay™ applications in the chassis and body electronic segments, where performance, memory and/or peripheral set requirements are lower. The device targeting these applications is the V850 MCU PJ3. The PJ3 is



a cost-optimized solution ideally suited for applications like sensors or control of small actuators in the vehicle chassis and body electronic segment.

Features:

- ▶ V850E @ 64 MHz
- ▶ 256 kB/16 kB Flash/RAM
- ▶ FlexRay™ (2 ch, v2.1)
- ▶ 1 x CAN (32 message buffer)
- ▶ 2 x CSI, 2 x buffered CSI, 2 x UART
- ▶ Motor control timer
- ▶ ADC: 2 x 14 ch, 12 bit
- ▶ 144-pin QFP

All NEC ELECTRONICS FlexRay™ microcontrollers offer fast access to the FRCC via a 32-bit non-multiplex synchronous interface, which reduces CPU load to a minimum!

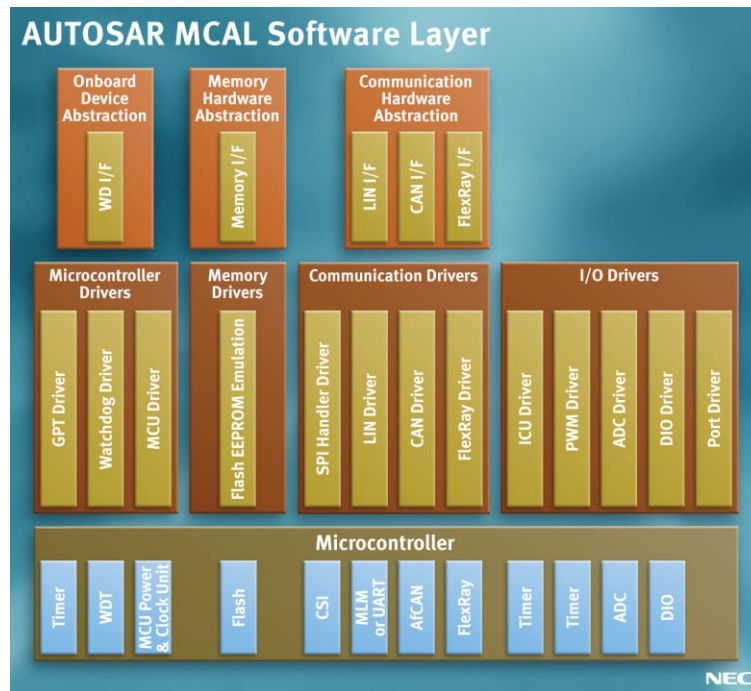
FlexRay™ controller testing activities

NEC ELECTRONICS conducts extensive in-house evaluation of the FRCC at the simulation and application levels. In addition to NEC ELECTRONICS in-house testing activities, all microcontrollers undergo the FlexRay conformance test (CT), a fundamentally important test showing correct functionality with regard to the FlexRay™ CT specification [1]. The FRCC incorporated in the Phoenix-FS ES2.0 has already successfully passed this test! Furthermore NEC ELECTRONICS is an active member of the JASPAR consortium, which conducts several stress and interoperability tests capable of proving that the V850 MCU also runs correctly in an inhomogeneous FlexRay network.

For the OEMs, the timing behavior of the FlexRay™ controller is critical, as the FlexRay™ protocol has very tough timing constraints, such as low quartz tolerance, clock tree jitter, propagation delay, asymmetry buffer behavior and slew rate of pin pads. Together deviations in these criteria have to be below

2.5 ns measured at the FlexRay™ controller TX pin for 10 bits [2]. Measurements on the Phoenix-FS ES1.0 have already confirmed

microcontroller hardware. NEC ELECTRONICS employees are currently members of the following workgroups:



that all timing constraints can be met with NEC ELECTRONICS microcontroller technology.

AUTOSAR and tool environment

NEC ELECTRONICS joined the AUTOSAR partnership as a premium member in March 2004. As NEC ELECTRONICS' main area of expertise is microcontrollers, the focus of its

- ▶ SPAL (special peripheral abstraction layers)
- ▶ Memory management
- ▶ Configuration
- ▶ FlexRay™
- ▶ CAN/LIN
- ▶ Mode management
- ▶ Gateways
- ▶ Operating system

Already NEC ELECTRONICS is systematically bringing the AUTOSAR standard and methodology to bear on the product development process.

The goal is clear:

to enable NEC ELECTRONICS to provide system solutions (hardware and software) that not only support, but also enhance the implementation of AUTOSAR-compatible software. The current plan is for NEC ELECTRONICS to have the AUTOSAR MCAL software layer for V850 microcontrollers on the market by early next year.

In June 2006 NEC ELECTRONICS introduced a FlexRay™ driver that

is compatible with AUTOSAR v1.0. Further enhancements are already on-going and the next version, compatible with AUTOSAR v2.0, will be available at the beginning of 2007.

To facilitate the introduction of AUTOSAR on the market, NEC ELECTRONICS is developing an AUTOSAR Starter Kit. This Starter Kit will contain both hardware and software. The hardware, which is already available, is based on the Phoenix-FS microcontroller. The software will contain – in addition to the above-mentioned FlexRay™ driver – a complete Micro Controller Abstraction Layer (MCAL), and a configuration tool.

The AUTOSAR Starter Kit (see picture of board below) will be ideal for software engineers who would like to start working with AUTOSAR, and is the perfect way to create first

FlexRay™ applications. It will include the following features:

Hardware:

- ▶ PCB with V850/PHO3 („Phoenix-FS“)
- ▶ Interfaces for FlexRay™, CAN, CSI, UART
- ▶ Interface for an external FPGA
- ▶ Motor control interface
- ▶ Display and LEDs for signaling test results

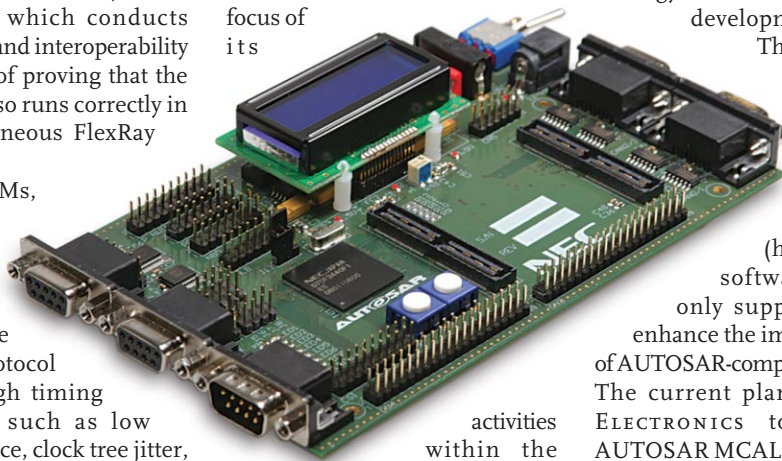
Software:

- ▶ AUTOSAR MCAL software
- ▶ AUTOSAR configuration tool
- ▶ Demo application
- ▶ Documentation
- ▶ Availability: 1H/2007

References:

- [1] FlexRay™ Communications System Data Link Layer Conformance Test Spec.v2.1
- [2] FlexRay™ Electrical Physical Layer Spec. v2.1

Holger Schmerling
Engineering
Automotive Business Unit



activities within the AUTOSAR partnership is on software modules that are either very close to, or directly interact with

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Response number 332

Ultra high luminance 12.1" TFT colour LCD module for industrial use

NEC ELECTRONICS EUROPE has begun shipping samples of its new 12.1" (31 cm diagonal) super video graphics array (SVGA), amorphous silicon, thin film transistor liquid crystal display (TFT LCD) module, part number NL8060BC31-36. The new LCD enables display of vivid colours even in environments with high ambient light such as outdoors in sunny weather or indoors in direct sunlight.

This new 12.1" model boasts a high-intensity back-light system

and improved efficiency of back-light use due to optimized design, resulting in luminance of 1100 cd/m², the highest luminance level in the class of color LCD modules for industrial use. Accordingly, high brightness can be maintained even when a touch panel is installed. Furthermore, it achieves a wide operating temperature range of -10° C to +70° C. These new enhanced features make this new model ideal for installation in ATMs, vending machines, point-

of-sales systems, for gas-stations and for GPS navigators.

NEC LCD TECHNOLOGIES has long been addressing the challenge of securing high visibility of LCDs for industrial use in environments with high ambient light and has succeeded in overcoming such issues through applica-



NEC ELECTRONICS' NL8060BC31-36

tion of its proprietary Natural Light Technology (based on transmissive LCD technology). However, in cases where a touch panel is required there is often a decrease of light-transmittance and surface reflection causing deterioration in LCD screen visibility. For such application the new NL8060BC31-36 is the perfect solution.

NEC LCD TECHNOLOGIES will also begin selling another three new amorphous silicon TFT colour LCD modules. The new products comprise of a 12.1" (31 cm diagonal) super video graphics array (SVGA) TFT colour LCD module, part number

NL8060BC31-42, an 8.4" (21 cm diagonal) super video graphics array (SVGA) TFT colour LCD module, part number NL8060BC21-04 and a 7.0" (18 cm diagonal) wide quarter video graphics array (WQVGA) TFT colour LCD module, part number NL4823BC37-05. All three new models achieve high brightness of 400 cd/m², a high contrast ratio of 600 : 1, a wide viewing angle of 160 degrees horizontally and 140 degrees vertically (contrast ratio greater than 10 : 1), a quick response time of 25 ms and a wide operating temperature range of -20° C to +70° C.

Frank Jammers
C-LCD Product Unit
Industrial Business Group

www.eu.necel.com/eu_3024

Response number 333

Main Specifications of the 12.1" LCD Module	
Part Number	NL8060BC31-36
Drive system	Amorphous silicon TFT active matrix
Display area	246.0 mm x 184.5 mm, diagonal screen size of 12.1" (31 cm)
Pixel	800 (H) x 600 (V) pixels
Pixel pitch	0.308 mm (H) x 0.308 mm (V)
Display colour	262,000 colours
Luminance	1100 cd/m ²
Contrast ratio	600 : 1 (typ.)
Viewing angle (U/D/L/R)	45°/55°/70°/70°
Response time	33 ms (typ.) (T _{ON} + T _{OFF} : from 10% to 90%)
Interface	6-bit CMOS RGB
Operating temperature	-10° C to +70° C
Storage temperature	-20° C to +80° C
Polarizer surface	Clear
Module size	280.0 mm x 209.0 mm x 17.0 mm
Weight	900 g
Power supply voltage	3.3 V/5.0 V
Power consumption	13.7 W (typ.)

New PowerMOSFET with leading-edge 0.25-micron UMOS-5 process technology

NEC ELECTRONICS introduced a high-performance PowerMOSFET fabricated with NEC ELECTRONICS' newest and most advanced process technology for MOSFET. The new PowerMOSFET will enable smaller and more powerful batteries to power the next generation of portable electronics devices.

The 0.25-micron UMOS-5 process, one of the world's most advanced MOSFET technologies, enables a 30-percent smaller size compared to former technologies

and an industry-leading low on-state resistance of 5.3 milliohms (mΩ) per mm square. This advanced battery protection solution will allow manufacturers to design powerful, cost-effective lithium-ion (Li-ion) batteries that can deliver higher output current while remaining protected against overheating.

The growing use of advanced features in cell phones, digital still cameras and portable game players has resulted in rapidly increasing power requirements

for these portable consumer electronics devices. Battery manufacturers need cost-effective, small format components that deliver higher performance with lower power consumption levels. As a leading provider of PowerMOSFET for Li-ion batteries, NEC ELECTRONICS remains committed to delivering high-performance, reliable devices to ease



Designed for lithium-ion batteries

New PowerMOSFET with leading-edge 0.25-micron UMOS-5 process technology

the development process and enable manufacturers to meet the demands for batteries to power the next generation of portable electronics devices.

NEC ELECTRONICS' UMOS-5 process technology represents one major advance. Compared to the established UMOS-4 process technology the structure of the

gate electrode is improved, and therewith the channel width can be doubled. This major advance helps battery manufacturers to design low-cost, high-performance batteries in smaller packages, or higher performing batteries in packages of the same size. In addition, the low on-state resistance, 5.3 mΩ/mm², marks a new

industry low in PowerMOSFET for Li-ion batteries.

Samples of the UPA2450CTL PowerMOSFET are available in January. Mass production is scheduled to begin in spring 2007 (availability is subject to change). More information about the new PowerMOSFET and other devices of the NEC ELECTRONICS Power-

MOSFET portfolio can be found at the URL mentioned below.

Ulf Bross
PowerMOSFET
Power Semiconductors Product Unit

www.eu.necel.com/eu_3025
Response number 334

10 Mbit/s high-speed optocouplers in new 8 mm creepage package



High speed, new package and fully RoHS compliant: PS9587

NEC ELECTRONICS (EUROPE) is offering new series of high-speed optocouplers. The PS9587 series is a 10 Mbit/s optocoupler with a GaAlAs LED on the input side and an open collector output. The output side consists of a photo diode and a signal processing circuit on one chip. With the new package and its extended dimensions the PS9587 series are ideally suited for high safety applications. The optocouplers are supplied in an

8-pin DIP package with 8 mm creepage and isolation voltage of 5000 VRMS. The PS9587 has an internal shield between input and output side that allows a common mode transient immunity (CMTI, CMTI) of minimum 15 kV/μs.

It is designed for high speed logic data interfaces with 5 V supply voltage line. The maximum propagation delay time (t_{PLH}/t_{PHL}) is 75 ns, the pulse width distortion 10 ns and the data rate 10 Mbit/s.

PS9587 Features

Surface Mount ("Gull-Wing Type")	Through Hole	Special Feature
PS9587L2	PS9587L1	
PS9587L2-V	PS9587L1-V	VDE Approval

NEC

Ideally suited for industrial applications

These optocouplers are ideally suited for factory automation networks, test and measurement equipment, communication interfaces and many other applications in harsh industrial environments.

Fully RoHS compliant

All parts are fully RoHS compliant using nickel-palladium-gold plating. Common international safety certificates are available.

Pricing and availability

The high-speed optocouplers are available now. For price and delivery details contact NEC ELECTRONICS.

Dr. Robert Podgorsek
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www.eu.necel.com/eu_3026
Response number 335



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