

GLEICHMANN Newsletter

Empowered by Innovation

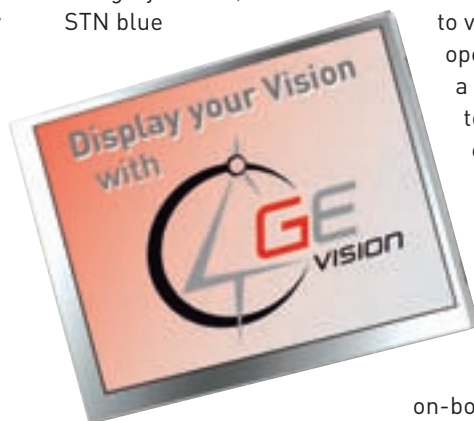


LCD Modules from GE-Vision

Do you need 10,000 or more LCD modules? No problem. But - what about smaller quantities? And - maybe you need some customization? Now it is looking really gloomy. There are very few large manufacturers that address the needs of small to medium-sized customers and when they do, it is normally expensive. To put an end to this dilemma and in future be able to offer reasonably priced LCD modules with customer specific modifications starting with batches of 500 pieces, Gleichmann Electronics has brought into being its own brand - GE-Vision.

The product offering of GE-Vision's character modules ranges from 1 x 8 characters to 4 x 40 characters, whereby, for many of these

modules, controllers with different character fonts are available. Graphic modules with a resolution of 80 x 32 to 320 x 240 pixels are provided. Almost all module types are offered in all popular LCD technologies such as STN yellow-green and grey modes, STN blue



mode as well as FSTN positive and negative. A white LED backlight is available for practically all

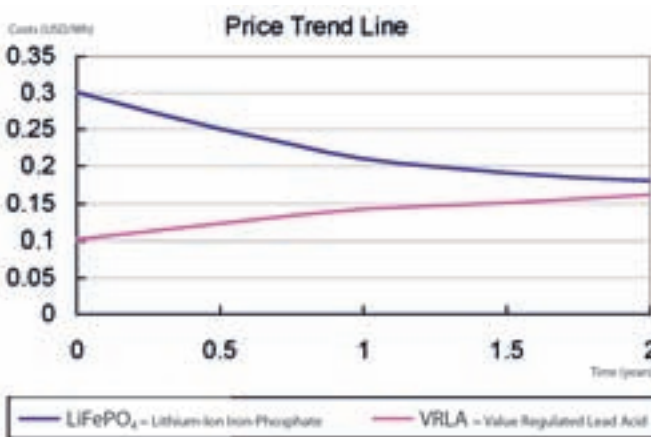
modules as standard. Furthermore, many modules are already available with RGB backlight. This innovative technology enables the drive of a monochrome display with numerous background colors using an appropriate PWM control in order, for example, to visualize certain operating conditions of a machine control or to perform design oriented requirements. Moreover, almost all of GE-Vision's standard modules offer the necessary mounting options in order to implement an on-board DC/DC converter for generation of the LCD voltage. Likewise, optional on-board temperature compensation is provided.

(Continued on page 2)

Massive Price Increase for Lead Acid

Not only the "Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS) is currently a cause of concern for users of lead acid batteries, but also the prices, which have increased significantly in recent months.

For example, the price for 12V / 7Ah lead acid batteries increased by approximately 50 percent from January to September 2007. This development makes it increasingly difficult for equipment manufacturers to make long



Whereas the prices for LiFePO₄ batteries continually decrease, costs for lead acid batteries are steadily increasing.

term, reliable calculations. In the meantime a way out of this misery is, in many

cases, offered with lithium-ion batteries.

(Continued on page 2)

Spotlights



Optocouplers for IPM drive

NEC Electronics introduces a new IC output optocoupler that is designed for driving Intelligent Power Modules (IPM) in general purpose inverter and motor control applications. The PS9513 is coming in a new white DIP package that features 5000 V isolation, 8 mm creepage distance and a CMR as high as 15 kV/μs (min). This high speed optocoupler has an open collector output and allows a maximum output voltage of 35 V. The PS9513 is fully RoHS compliant using nickel-palladium-gold as leadfree pin-plating material. Common international safety certificates are available, e.g. UL and VDE (DIN EN60747-5-2).

Highlights

- LCD Modules from GE-Vision
- Massive Price Increase for Lead Acid Batteries
- Touch it! - GUIs for Next Generation Designs
- SEmulation: Turbocharging the FPGA/ASIC Development Process
- IO-Link Provides Efficient Point-To-Point Communication
- V850 All Flash ... more of everything
- The high voltage 3-phase inverter: The newest addition to the motor control starter kit
- Think 3-phase inverter control ... think NEC! Introducing new V850E/ix3 MCU family for complete solution
- Lithium-Ion Batteries as Replacement for Lead Acid Batteries
- One of industry's lowest on-state resistance PowerMOSFET
- Personal Profile of David Gregg - Gleichmann Sunrise Ltd.

LCD Modules from GE-Vision (Continued from page 1)

Customer specific services include, among other things, printed circuit board layout changes, mounting of pin rows according to customer specification as well as various cable solutions or also printed circuit board changes relating to size and form factor with additional

mounting options. Even full custom solutions or also one-to-one copies of obsolete modules of other manufacturers can be provided at attractive prices. This is where the technical competence of our production partner takes effect. Our partner combines, under one

roof, practically all production processes right up to the manufacturing of the backlights.

The operating temperature range of the modules is specified with -20°C to +70°C. Therefore, the respective components are ideally suited for the high require-

ments of European industrial customers. Many demonstration systems are already available from stock. A comprehensive product catalog will be available soon.

 **+49 7249 910-5961**
RFED@msc-ge.com
Response number 142

Massive Price Increase for Lead Acid (Continued from page 1)

It is well known that lead acid batteries are used in applications where weight is not so important, but on the other hand, as far as possible, safe and maintenance-free components over a long period of time are necessary. The relatively simple charging technology has,

up to now, also supported the decision for heavy, but robust lead acid batteries. And last but not least the excellent price-performance ratio. Indeed, in the past the price difference between lead acid and lithium-ion batteries was immense. But, in the meantime this has

been put into perspective by a price development move in the opposite direction and the significant advantages of lithium-ion technology such as: smaller size, lighter weight and greater energy density. Additionally, lithium-ion batteries are considered to be the most

environmentally-friendly energy alternative. More on the topic of lithium-ion batteries compared to lead acid batteries can be found starting on page 10.

 **+49 711 78336-173**
batteries@msc-ge.com
Response number 143

Touch it! - GUIs for Next Generation Designs

An increasing number of today's new equipment designs use graphical user interfaces (GUIs). They provide enhanced functionality as well as allowing intuitive and simple operation. NEC Electronics' new Touch it! Development Kit – now available from Gleichmann Electronics – is designed to make touch-controlled TFT project development as easy as possible.

Mechanical devices such as keyboards, switches and knobs as well as display devices such as dials and counters are useful - they are everywhere, but they are so limiting. And what about reliability, ease of use and usability, performance, aesthetics and differentiation? It is no surprise that GUIs based on touch-controlled TFT-LCDs are seen as the ideal solution. They offer many new design possibilities for next generation

designs of all kinds of applications such as: electric cookers, security systems, industrial drives, medical patient monitors, photocopyers and self checkout machines in supermarkets, where the customer is permitted to scan and pay for their own goods.

A graphical user interface supports interaction between a human and an electronic device. For this



purpose GUIs use graphics, controls, widgets (graphical elements such as windows, buttons, menus and

scroll bars) as well as text to represent information and actions available to the user. If a system is equipped with the addition of a touch screen then all of these elements are brought together, with the display serving as a combined input and output device.

Birth of the GUI

The history of the GUI can be traced back to the mid-1960s. At that time Douglas

Engelbart, a pioneer of graphical user interfaces at Stanford Research Institute, embarked upon the task of developing computer-based

technologies for manipulating information directly. Engelbart reasoned that the state of our current technol-

ogy controls our ability to manipulate information, and that fact in turn will control our ability to develop new, improved technologies. This was based on his slightly easier to explain theory that the sophistication of a language dictates and limits the sophistication of the thoughts of a speaker of that language.

Engelbart developed the precursor to today's GUI, using text-based hyperlinks, controlled by another of the inventions he worked on, which was essentially a wooden box with wheels inside it (now known as a computer mouse). In the following decades, Xerox PARC took this a stage further for their Xerox Alto computer. Hyperlinks were replaced with graphics and the originator of graphical user interfaces, as we know them today, was born.

Enhanced functionality, thanks to GUI

We all know what GUIs are, how they work and what they can do for us. There is no big scary learning curve involved therefore; mass market acceptance is there from the outset. The technology, the know-how and the support you need to implement your solutions are already available and therefore, no fundamental new developments are necessary. GUI technology can be integrated into new design projects not just to replace your existing user interface, but provide lots of additional features. So the question is - where do you start?

Touch it! Development Kit

Compliance with ISO9241 - we will come back to that later - must be achieved by the designer. NEC Electronics' new Touch it! is a development kit designed to make your touch-controlled TFT project development as easy as possible. The box includes everything required to get going immediately, such as 32-bit V850 All Flash microcontroller with large embedded Flash memory, TFT-LCD controller / driver, the 3.5" color TFT itself, including built-in touch-screen, plus RTOS, graphics libraries and software examples. To enable future expansion and upgrades, the kit has also been designed in a modular way so that additional boards may be connected for extra functionality.

At the heart of the system is an NEC Electronics V850ES/JG2 All Flash 32-bit

microcontroller, offering 20MHz performance, 640K Flash, 48K RAM and an abundance of general purpose peripherals. Memory sizes from 64K Flash with 6K RAM up to a huge 1M Flash with 60K of RAM are available in the V850 All Flash family, so the actual device used in the final design can easily be tailored exactly to the end application's functionality and graphics output requirements. In case you have not used V850 before do not worry, according to Gartner Dataquest it is now the number one selling 32-bit microcontroller in the world. An external bus interface is also provided, enabling additional external memory or graphic controller ICs to be connected.

The kit is supplied with NEC Electronics' new NL2432HC22-41K 3.5" transfective Quarter VGA



color LCD-TFT module, which includes driver LSIs for the TFT array, touch screen and backlight and is qualified to industrial specifications. As well as offering low power, high

luminance, and high contrast, the display is based on NEC Electronics' Super-Reflective Natural Light TFT Technology for optimum performance in any light environment. Connectors are also provided on the board making it easy to switch to larger displays if desired.

The system software is based on NEC Electronics' partner Segger's embOS Real Time Operating System, offering a fully featured multitasking system for graphics, touch screen / user input and any communications to other boards, and the Segger emWIN graphics library to handle character and graphic display routines, fast drawing of circles and polygons, string / value output routines, management of multiple windows, optional widgets for a PC-style look and feel, and touch screen support.

Demonstration versions are supplied, as well as an appetizer version of the IAR Workbench 'C' compiler suite, and application as well as function-based program examples.

ISO9241 - ergonomic factors, performance and users' satisfaction

So that just leaves us with ISO9241, which is a standard defining the various components of quality for a human-machine interface (HMI) system. ISO9241 is about effectiveness and whether or not the user interface does what the user wants it to do. It is also about efficiency and how easy the interface is to learn and use. Finally it is about satisfaction, based on the user's opinions having used the system.

And what has this got to do with your new design? Well, for new projects the designer needs to know how to measure these ISO components on the new touch screen controlled TFT user interface. Touch it! provides all necessary components

for your next touch-controlled TFT development project.

+49 7249 910-153
display@msc-ge.com
Response number 144

Gleichmann Electronics Research' SEmulator™: Turbocharging the FPGA/ASIC Development Process

Today's complex, multi-million gate SoC designs consume a lot of development time and hence money with every simulation, synthesis or place & route run. At the same time, the pressure to be profitable and early to the market, shortens design cycles and leaves almost no margin for errors.

With the SEmulator®, Gleichmann Electronics Research introduces a new method of FPGA / ASIC design, promising shorter development times, higher design security and therefore lower design costs.

SEmulator® is a synthetic word that combines the words Simulator and Emulator. It describes the basic functionality of the SEmulator® very well. The SEmulator® provides bridging functionality between the domain of digital hardware simulation and the world of FPGA prototyping. Design blocks can easily be moved between these two domains.

SEmulation, simulator controlled emulation, combines digital hardware simulation with emulation in a rapid prototyping system. It allows the step-by-step transfer of functional blocks from the simulator (software) into the FPGA (hardware) without leaving the simulation environment and without the need to recompile the complete design for every minor modification, thus shortening the development time.

As opposed to high end hardware accelerators, the SEmulator® requires just little more than a standard FPGA development board (Hpe®_midi): the only additional hardware is a child board for a fast PCI Express link to the Host PC (see "Commercial position of SEmulation").

Co-simulation with real hardware

The SEmulator system allows co-simulation of real hardware blocks (e.g.,

board. You can use child boards to implement interfaces between the Hpe® and other systems. In the context of a complete system you will simply develop better RTL code.

Simulation acceleration

A nice side effect of moving more and more design blocks into FPGAs is reduced hours of simulation time to seconds of SEmulation time. (see "SEmulator benchmarks").

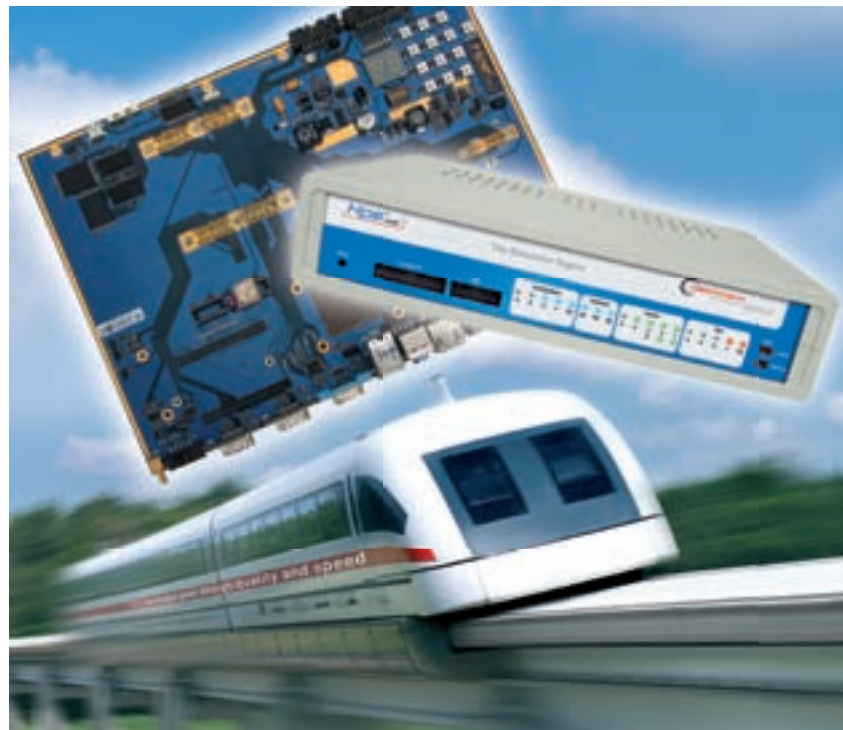
ality takes the Hpe® family of FPGA and ASIC development systems far beyond that claim. The Hpe® systems consist of a baseboard with numerous on-board interfaces that can be equipped with one or more FPGA modules. A variety of FPGA modules allow configuring the Hpe® to target applications ranging anywhere from 600,000 to 55 million ASIC gate equivalents. Both baseboard as well as FPGA modules can be populated with application specific child boards.

More than 1000 user I/Os and numerous on-board interfaces allow customization as well as interfacing with other systems.

The Hpe®_midi may be used as hardware engine for the revolutionary SEmulator® development tool, drastically reducing design cycles by seamless transition from software simulation to hardware emulation. Virtually any hardware might be included in

your digital simulation, even if a simulation model is not available (hardware-in-the-loop).

Hpe®_midi caters for all foreseeable target system development requirements: equipped with copious amounts of Flash, SRAM and EEPROM memory, a comprehensive range of communication and graphic inter-

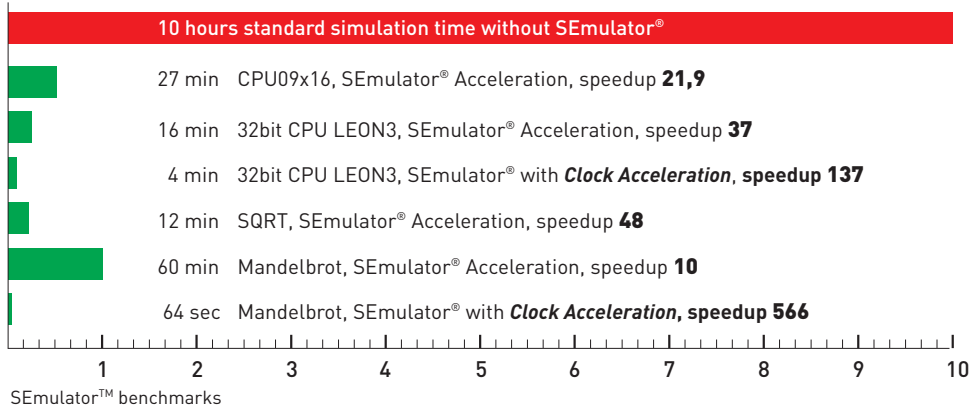


Ethernet, display controllers) with an existing HDL simulation. This approach allows integrating real hardware early in the design cycle co-simulating hardware blocks, where no simulation model is available. For instance, a newly developed peripheral block could be co-simulated with an existing CPU (without a simulation model) that could be located on a child

Hpe®_midi – The SEmulator® hardware engine

Hpe®_midi is a powerful and versatile development and rapid prototyping system for custom integrated circuits, notably FPGA and ASIC.

Hpe® is short for Hardware Prototyping and Evaluation Board, yet its function-

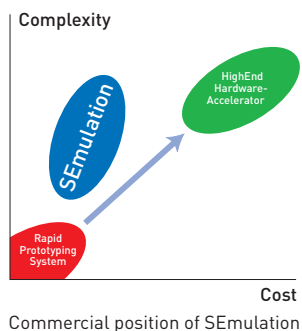


faces, a comfortable human interface and removable Hpe®_modules integrating one or more FPGAs as well as various Hpe®_child boards allowing easy customization and interfacing with other systems.

prototypes into products. In close cooperation with the University of Hagenberg and other universities, GE-Research develops FPGA and ASIC design tools as well as System-on-Chip (SoC) solutions. The first Hardware Accelerator and Co-Simulator prototype was developed by Dr. Markus Pfaff back in 1999. Since then it was a long and stony way to shipping the first Hardware Accelerator and Co-Simulator HAC1 in 2005 and soon after the HAC2 in 2006. At the same time GE Research successfully established its

Express link to the Host PC. Together with the Gleichmann Electronics design centre in Eching near Munich, Germany we employ more than 10 engineers with many years experience in the field of FPGA and ASIC design. By the end of 2007 GE-Research will relocate to new facilities allowing aggressive growth for the years to come.

GE-Research has formed many partnerships with companies to complement its know-how for complex and future-oriented solutions,



LED Applications from CML Innovative Technologies

Gleichmann Electronics is now also official distributor for the complete LED product portfolio from CML Innovative Technologies, one of the largest worldwide suppliers of miniature lighting solutions for a wide range of markets and applications. CML is not only a designer and manufacturer of a wide range of socketed LED lamps for signal technology, but for many years also gives significant importance to LED modules and LED displays. Supplementary products, such as



automotive applications, light pipes, LED drivers, traffic lights, inspection tools, architecture lighting, small incandescent light sources and accent lighting, round off the company's product portfolio. CML's products will be sold by Gleichmann Electronics in the whole of Europe.

SEmulator®

Key Features

- Cost efficient high speed rapid prototyping system
- Configurable between 600k and 55 million ASIC gate equivalents
- Customizable with application specific child boards
- Numerous interfaces on baseboard
- Professional enclosure protecting the sensitive hardware
- Powerful and free software tools
- Optional hardware acceleration and hardware-in-the-loop
- Develop better RTL code in the context of a complete system
- Reduce hours of simulation time to seconds of SEmulation time

About Gleichmann Electronics Research

Gleichmann Electronics Research (GE-Research), part of the German-based MSC/Gleichmann group with more than 1,600 employees, was founded in October 2004 in Hagenberg, Austria with the goal to turn research

Hardware Prototyping and Evaluation system Hpe®_compact on the market. The SEmulator® combines these two product lines and turns them into one. As opposed to expensive high end hardware accelerators, the SEmulator® is based on the configurable and customizable Hpe®_midi FPGA/ASIC prototyping system extended with a fast PCI

e.g. Altera for automotive and other FPGA/ASIC applications, Mentor Graphics in the field of digital simulation and Videantis® for comprehensive video solutions, to name just a few of them.

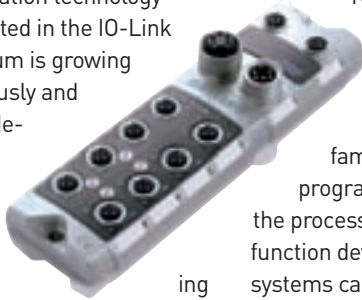
+49 8165 999 5678
marketing@ge-research.com
Response number 145

+49 6233 347-125
rojo@msc-ge.com
Response number 141

IO-Link Provides Efficient Point-To-Point Communication

The number of leading manufacturers from the field of automation technology represented in the IO-Link consortium is growing continuously and IO-Link devices are now gaining increasing acceptance in the market place. This pleasing development is not least due to highly flexible hardware components such as NEC Electronics' V850 microcontroller (MCU) family. Because these MCUs are available in a wide range of versions, they can be easily and cost effectively adapted to the requirements of different field busses.

It is a fact that, within a short period of time, IO-Link has established itself as a new manufacturer-independent communication standard for point-to-point communication between I/O devices and the sensor / actuator level. But, what makes IO-Link in practice so interesting for the user? Well, with IO-Link in addition to the process data also parameter setting and diagnosis data can be transferred via a simple, unshielded standard 3-conductor cable. Therefore, shielded cable, multiple pin



connectors, additional inputs for diagnosis, etc. are not required. Moreover, the integration of the IO-Link devices is achieved in a form familiar to the SPS-programmer, namely via the process illustration and function devices. Overriding systems can communicate direct with IO-Link, if the SPS is capable of data set routing. The parameter setting of the IO-Link units typically takes place direct from the engineering station and what is more, unit information and diagnosis messages, e.g. for remote maintenance or visualization, can be retrieved.

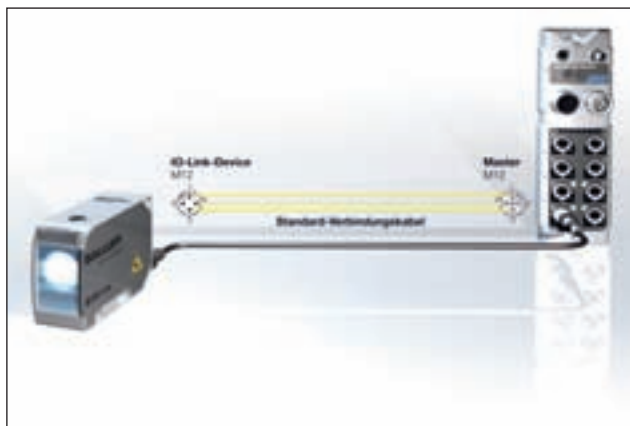
The IO-Link master acts as gateway, which provides the functionality of the IO-Link devices to the SPS via the field bus. The latter enables

a seamless integration of the individual sensors and actuators. It is our experience that for units such as the IO-Link master it is useful to provide graphical user interfaces via STEP7. The integrations standard, Tool Calling Interface (TCI) offers an interesting approach to a solution, because with it simple IO-Link XML unit descriptions right up to EDD or FDT/DTMs can be integrated.

All of the named features are combined in the IO-Link Master from Balluff, one of the world's leading sensor manufacturers. Depending on the version, the IO-Link Master is designed for communication via PROFINET or PROFIBUS. NEC Electronics' 32-bit V850 microcontroller serves as basis for the IO-Link communication. The decision

the V850 family. For example, the program of a device with a small memory and 64 I/O pins can be transferred, almost without changes, to a device with 144 pins and a larger memory. By subsequent upgrades or downgrades, this results not only in cost savings by the software development but also, as a rule, an optimization of the component costs.

An increasing number of semiconductor manufacturers are designing microcontroller and ASIC solutions dedicated for IO-Link. This underlines the enormous growth potential for IO-Link based equipment in the coming years. Please contact us and we will be happy to provide you with more detailed information on this interesting topic.



in favor of this microcontroller was based not least on its versatile serial interface and I/Os. Among other things, the address data bus of the V850 simplifies the connection of bus specific communication devices such as the ERTEC200. Furthermore, the far-reaching compatibility of the different V850 microcontrollers enables a simple porting of the software within

You would like to know more, please visit us at



booth 210 · hall 6

+49 711 78336-149
NECMicro@msc-ge.com

Response number 146

V850 All Flash... more of everything

Since the introduction of our All Flash microcontroller range in 2004, over 300 new Flash-based 8-, 16- and 32-bit general purpose and application-specific devices have now been introduced. This impressive line-up is further enhanced by the addition of eleven new 32-bit V850 All Flash products, offering the rich functionality of the world's favourite high performance CPU combined with the flexibility of market-leading Flash technology and an abundance of peripherals.

These devices are designed to extend the performance, memory and peripheral mix of the existing V850 All Flash H Series range, ideal for 5 V applications requiring a high number of A/D channels, and the J Series range, combining high performance with low power.

Both the new V850ES/Hx3 line-up and the addition of V850ES/JG3 to the V850ES/Jx3 line-up take performance to a new level, with a 1.6 times speed increase compared to their second generation predecessors, running at 32 MHz.

As well as a performance increase, V850ES/Hx3 also benefits from the addition of new peripherals. Two new internal oscillators have been added, offering 240 kHz and

8 MHz operation. Two more 16-bit timers have also been added to bring the total timer count into double figures on larger devices, with one capable of controlling a 3-phase motor now included as a standard peripheral. Other enhancements include an I2C interface as well as a Spread Spectrum Clock Generator (SSCG) to measure and man-



V850 32-bit microcontroller

age radiant noise, decreasing EMI emissions without external components.

No sacrifice has been made on any other peripherals either – the V850ES/Hx3 family still benefits from up to 24 channels of 10-bit A/D conversion, multiple serial interfaces, watch timer, watchdog timer, low voltage interrupt and on-chip debug.

In terms of memory, RAM sizes have also been increased from previous generations, now ranging from 8 kB up to 32 kB on-chip, with

Flash sizes from 128 kB up to 512 kB with package sizes including 64, 80, 100- and 144 pins.

How about V850ES/JG3? Our J Series devices have always been known for high performance from a low supply voltage, and as already mentioned they now offer 32 MHz... from 3 V!

For memory hungry applications, V850ES/JG3 also offers up to 1024 kB Flash on board, with a huge 60 kB RAM also embedded in a 100-pin package. Like its sister device

V850ES/JJ3, which comes in a 144-pin package, in addition to the high performance core and huge memory options, V850ES/JG3 offers a wide variety of general purpose functions on-chip, with a combination of multiple high performance 16-bit timers, 12 channels of 10-bit A/D conversion, D/A conversion, DMA controller, Real Time Output, an external bus, multiple serial interfaces, watch timer, watchdog timer, low voltage interrupt and on-chip debug.

Both V850ES/Hx3 and V850ES/Jx3 provide an ideal entry point for exploiting 32-bit performance in next-gen-

eration designs such as:

- Access control
- Point of sale
- Industrial controls and drives
- Heating, ventilation and air-conditioning
- PC peripherals
- Home automation
- Home appliances
- Factory automation
- Metering
- Medical appliances
- Test, measurement and instrumentation

And to turn next-generation innovation into production as fast as possible, they are supported by NEC Electronics low-cost fully featured 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 KickStart 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.



The high voltage 3-phase inverter: The newest addition to the motor control starter kit

NEC Electronics understands that there's more to a solution than products alone; therefore we offer an extensive range of easy to use, feature rich development solutions to 'enable

you to get to market in no time'.

Over the past two years, NEC Electronics has introduced a range of starter kit products specifically for motor control, including

- Individual motor control ASSP microcontroller reference boards
- μ PD78F0714 and V850ES/IK1
- A common interface board
- Provides the control and monitoring interface to and from the power unit
- User interface and controls (4-digit LED display, control switches and potentiometer)

+49 7249 910-437
NECMicro@msc-ge.com
Response number 147

One of NEC Electronics' most recent developments is the V850E/Ix3™ line of six microcontrollers, which operate at 64 MHz, execute 86 Dhrystone MIPS and have two identical dedicated 3-phase inverter control functions able to drive two independent sinusoidal vector drives simultaneously.

The new V850E/Ix3 microcontrollers provide a complete solution for a range of advanced 3-phase inverter control applications including, air conditioners, ventilation systems, regenerators, washers/dryers, pump control and high-end ovens etc.

Multi-function timer control

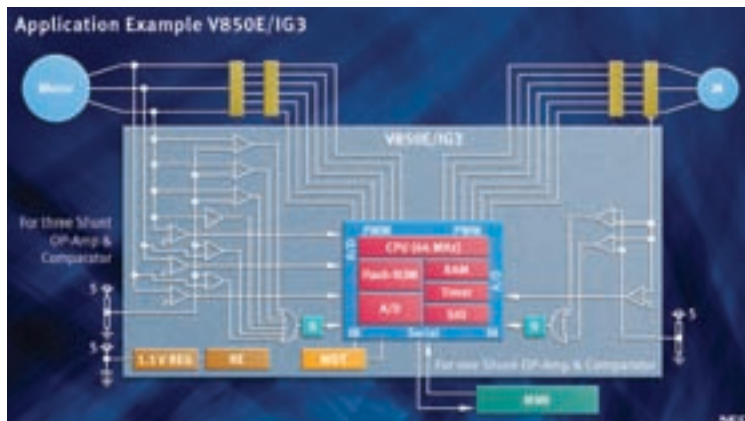
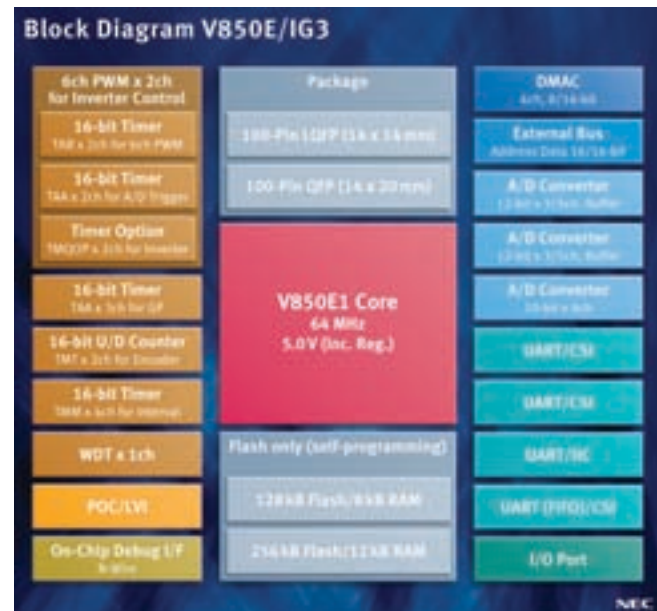
At the heart of the system, the 16-bit inverter timer is an up/down counter with four double-buffered compare registers, one for the PWM carrier cycle and the rest for

PWM cycle. The V850E/IG3 micro-controller's two high-speed 12-bit A/D circuits with independent sample and hold have multiple sources for triggering including the inverter timer. Two double-buffered compare registers can be employed to produce A/D triggering at any two points within the PWM cycle. The A/D circuit is equipped with five double-buffered conversion result registers. In scan mode, five measurements can be performed within one PWM cycle and all measurements stored in separate buffers.

One of the more unique features of this microcontroller is the analog front end of embedded op amps and analog comparators. For motor safety, two sets of analog comparators are used to monitor A/D input voltage against two variable thresholds that can be set on the microcontroller

purpose hardware to support system tasks. A total of 13 available 16-bit timers,

with multiple functions such as UART, UART with FIFO, clocked serial interface (CSI)



three waveforms with independent duty cycles. A variable dead-time interval can be inserted to prevent accidental shoot-through of the power transistors and the interrupts generated at the half-way point in the PWM cycle, and the timer overflows can be 'culled' (counted before they are acknowledged).

Vector control made easy

In vector control, precise current measurements must be performed within every

pins and also to produce a total hardware shutdown if non-safe operating conditions are detected. All this in addition to standard safety functions such as Low Voltage Interrupt (LVI), Power on Clear (POC) and watchdog timer.

Use it for motor control or for general purpose – choice is yours!

In addition to motor control-specific peripherals, the V850E/Ix3 microcontroller has a large set of general-

including the motor control timer, can be configured in up to nine different modes of operation to control the PWM output, interval timer, input capture, one-shot pulse generation, pulse-width measurement, external event count, external trigger-pulse output, six-phase inverter PWM output and encoder counter. An additional 10-bit/8-channel A/D converter is provided for other analog device interfacing such as potentiometers and temperature sensors.

A 16-bit address bus and 16-bit data bus are available for external memory access on the V850E/IG3, and an on-chip direct-memory access controller (DMAC) can be used for high-speed data transfer between various memory devices, I/O registers or serial ports without CPU intervention. Other peripherals include four high-speed serial interfaces

and IIC. Ultimate integration enabling lower system cost

The variety and number of specialized and general-purpose peripherals make the V850E/IX3 microcontroller an ideal single-chip solution for motor and system control implementation. The 32-bit RISC architecture-based 86 MIPS performance and 64 MHz operating speed exceeds the requirements of a vector-controlled sinusoidal motor drive.

One of the most unique features of V850E/Ix3 is its ability to control two 3-phase motors simultaneously (see application example on the left for detail). The on-chip op amps, comparators, pull-up resistors, internal voltage regulator and POC and LVI circuits allow a drastic reduction in external component count, resulting in a more compact and less expensive motor control system design.

+49 7249 910-437
NECMicro@msc-ge.com
Response number 149

Lithium-Ion Batteries as Replacement for Lead Acid

Lead acid batteries, which up to now have been used by all automobile manufacturers, rank as the number 1 cause in the breakdown statistics. Therefore, the replacement of lead acid batteries with lithium-ion iron-phosphate (LiFePO₄) cells is an ongoing endeavor. LiFePO₄ cells not only have a significantly higher energy density (Figure 1), but they also feature a longer lifetime and a distinctly more favorable temperature behavior compared to lead acid batteries. Whereby with lead acid batteries only 40 percent of the original energy is available at 0°C with LiFePO₄ cells even at temperatures down to -20°C the decrease in the original energy available is much less. In addition, the reduced weight of LiFePO₄ cells in comparison to their energy is an advantage, which in the meantime is not just valued by racing car and motorbike manufacturers.

The only reason why LiFePO₄ cells, despite all of their advantages, have not as yet made a breakthrough in mass markets in the price advantage of lead acid batteries, which up till now was unbeatable. However, a reversal of this trend is clear. Due to the worldwide shortage of raw materials, the price for lead acid batteries has been steadily increasing by approximately four percent per month and there is no end in sight to this surge of price increases. On the other hand, the price for LiFePO₄ cells is developing in the opposite direction. No wonder, lithium is produced from salt and has almost unlimited availability.

Zentrum (BMZ) in Karlstein near Aschaffenburg, Germany, it is therefore assumed that at least 50 percent of the automobile manufacturers will change to LiFePO₄ cells within the next years. Sven Bauer, Managing Director of BMZ is convinced, "It will not be customer satisfaction, reduced weight, longer lifetime, volumes or temperature stability that will force the market penetration of LiFePO₄ technology, but the decision will be influenced by price." Sven adds, "In our opinion, with current peaks of more than 100A per single cell and many thousands of charge and discharge cycles, LiFePO₄ batteries are not only suitable for use in automobiles but also ideally suited for use in military applications, electric vehicles, robotics or emergency power supplies. At the present time, we are observing an increased interest from this circle of customers for this relatively new technology."

By the way, LiFePO₄ cells are not the only lithium-ion technology offered by Gleichmann Electronics as an alternative to lead acid batteries. The generic term lithium-ion is used

for many different technologies, which are in some ways significantly different in their characteristics and key features. So far, only few battery users know the wide range of possibilities, which lithium-ion based cells offer for many various applications.

A prime example of this is the 18650 form-factor (approximately 18mm in diameter and 65mm in length), which has effectively established itself in the past few years as the standard in the field of lithium-ion cells. It offers ideal conditions for the implementation of intelligent, customized battery packs. Gleichmann Electronics, in close cooperation with BMZ, has already designed

in the varied projects. The many different technical aspects and advantages, which are offered by the various lithium-ion technologies, are demonstrated in the example (Figure 2) of a 12V / 7Ah lead acid battery measuring 151mm x 65mm x 95mm.

Industry standard 18650 form-factor

A LiCo cell with 2.55Ah currently guarantees the highest capacity in our program. Indeed LiCo technology always requires a safety circuit for short-circuit, overcharge and deep-discharge, but this disadvantage is put into perspective by the very high capacity compared to other lithium-ion technologies.

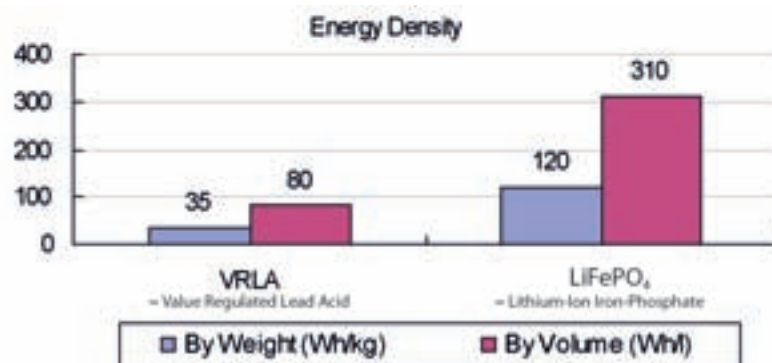


Figure 1: LiFePO₄-based batteries have more than 300 percent higher energy density than VRLA batteries

a large number of individual battery packs with LiFePO₄ cells in an 18650 form-factor, but also with lithium-ion manganese (LiMn) and lithium-ion cobalt (LiCo) cells. Each customer has his own individual requirements, which are reflected

Twenty-four of these cells in the form factor of the lead acid battery in question results in a performance capacity of up to 15Ah. In reality this naturally means, among other things, a massive space and weight saving. The possible range of

| | Voltage [V] | Capacity [Ah] | Current Peaks [A] | Weight [kg] | Lifetime* |
|---------------------|-------------|---------------|-------------------|-------------|-------------------|
| PBQ 12-7 | 12 | 7 | 105 | 2.6 | 2 years |
| LiCo | 14.4 | 15 | 30 | 1.2 | 500 cycles @ 75% |
| LiMn | 14.4 | 9.6 | 120 | 1.1 | 300 cycles @ 80% |
| LiFePO ₄ | 13.2 | 6.6 | 180 | 1.0 | 1500 cycles @ 86% |

* valid for use under normal conditions (23°C and in each case the specified standard capacity)

Figure 2: Different lithium-ion technologies enable a wide range of alternatives to the classical lead acid battery

applications for this battery includes: wheelchairs, lawn-mowers, stair lifts, bed controls, garden tools, electric bikes or scooters as well as medical equipment. A LiMn cell in 18650 form-factor can not achieve the capacity of a LiCo cell, however, this

technology is finding rapidly increasing use, because all of the safety requirements can also be met without safety circuits. Even ten times its intrinsic capacity of maximum 1.6Ah as current peak is not a problem. The range of applications

naturally overlap with LiCo technology, whereby LiMn cells moreover, can also be utilized in electric motor control. As you can see, nowadays, finding a suitable replacement for lead acid batteries is not so difficult. That is, of course, assuming

that you have the necessary know-how and plenty of experience like our partner BMZ and the team from Gleichmann Electronics.

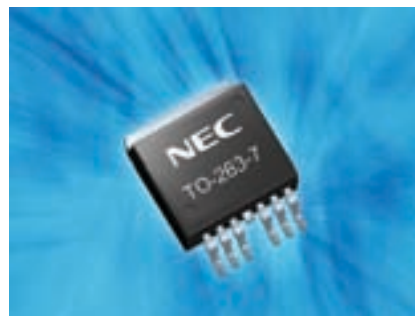
+49 711 78336-173
batteries@msc-ge.com
Response number 150

One of industry's lowest on-state resistance PowerMOSFET

NEC Electronics Europe introduced the TO-263-7 PowerMOSFET series as the newest addition to the company's NP Series of low-voltage power-management devices. As part of the NP Series, the new MOSFET devices feature an innovative fabrication process and advanced packaging solutions designed to reduce leakage current, manage heat dissipation more efficiently and enable one of the industry's lowest on-state resistances $R_{ds(on)}$, of 1.5 m Ω (maximum). These new PowerMOSFET are ideal for applications such as automotive, low-voltage DC motor control and uninterruptible power supplies, where high current capability, as well as stringent power management and reliability are required.

With the increasing demand for power-management

devices some new key challenges emerge, including a demand for smaller cell sizes that reduce overall chip costs and a lower $R_{ds(on)}$ for optimized heat dissipation. Thanks to a combination of advanced architecture and packaging, NEC Electronics'



Reliable – the TO-263-7

new NP-Series PowerMOSFET are high-quality, proven power-management solutions.

The TO-263-7 PowerMOSFET series is manufac-

tured in the UMOS-4 process, which is a trench technology and achieves an ultra-fine design rule of 0.25 μm . This results in higher cell density, up to 160 M cells/inch², enabling chip designers to lower on-resistance over a given area of silicon. The new

PowerMOSFET also features an advanced packaging developed by NEC Electronics using an unique multi-bonding technology that doubles the number of bonding wires from two to four wires.

The additional wires allow the NEC Electronics MOSFET to manage high currents with very low on-resistance in relatively small packages by limiting the on-resistance yet still

improving current-carrying capabilities. With an ultra-low on-state resistance of $R_{ds(on)} = 1.5 \text{ m}\Omega$, max. ($V_{ds} = 40 \text{ V}$; $V_{gs} = 10 \text{ V}$), the new TO-263-7 PowerMOSFET also helps to reduce the amount of the PCB dedicated to handling heat dissipation.

The NP Series is part of NEC Electronics' family of low-voltage switching devices that provides efficient power management for power supplies, automotive systems, motor control, office, robotic and uninterruptible power applications.

Additional information about NEC Electronics PowerMOSFET products can be found at our homepage.

+49 211 92593-13
power-devices@msc-ge.com
Response number 151



David Gregg is 36 years old, married, and has two children an 11 year old daughter and a 6 year old son. He started university in Grenoble (France) for a 2-year Electronics Degree, followed by 2 years in Cov-

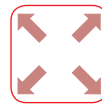
Personal Profile of David Gregg – Gleichmann Sunrise Ltd.

entry (England) for a Master of Science in Electronics and Computer Aided Engineering. He spent his final year (fifth year) at Université Paris Jussieu (France) for a business orientated degree (DESS).

After a period in a research lab at Coventry University, David started as an electronics engineer with ABB Kent Meters in England and rapidly became

an ASIC design engineer. He joined Sunrise Electronics (now Gleichmann Sunrise) 9 years ago in 1998 and worked in close collaboration with NEC to promote their ASIC lines, from simple gate arrays to leading edge cell-based technology. David provided a technical interface between the end customer and NEC's ASIC group. This led to a product manager role at Sunrise Electronics and recently to

increased field sales responsibilities. Having grown up in the French Alps, David is always looking forward to winter so he can blow the dust off his snowboard. But, while waiting for the snow you can often find him either on a mountain bike or flying some rather large kites (generally known as power kites for kite buggying or kite surfing) on some wide sandy beach in the south of England.



11-10_2007-R50-3499 ©GE

Our Commitment to Support

Please send me more information about:

- 8/16/32-bit Microcontroller and Tools
- SOC Light + (ARM based ASSPs)
- TFTs/LCDs
- Power Mosfet
- Optocoupler
- Discrete Products
- ASICs
- RF (Radio Frequency)
- Gleichmann Linecard
- Gleichmann Batteries

Please send me detailed information about the following microcontroller topics:

- Building Management
- Motor Control
- Industrial Automation
- Health Care
- _____



Please copy and fax to +49 7249 910-328 · Contact your regional sales office

| | |
|--------------|--|
| Name/Surname | |
| Company | |
| Address | |
| Phone | |
| E-Mail | |



Seminar

ZigBee™ Communication – made simple

Your new product needs to communicate via ZigBee™? You want to implement a new IEE802.15.4 based wireless protocol? Our experts will show you how to quickly, simply and cost-effectively reach your goal.

At our cost-free, one-day seminar you will learn the many varied application possibilities of ZigBee™ solutions (e.g. from a simple, small sensor up to a complex, high-performance 32-bit MCU based router) from NEC Electronics in combination with RF devices from Uniband Electronic Corporation (UBEC).

Deepen your knowledge and understanding of wireless communications in a hands-on session with the ZigBee™ experts from NEC Electronics on

- | | |
|----------------------------------|------------------------------------|
| Nov. 5, 2007 in Zurich | Nov. 14, 2007 in Dusseldorf |
| Nov. 6, 2007 in Stuttgart | Nov. 21, 2007 in Cambridge |
| Nov. 7, 2007 in Munich | Nov. 22, 2007 in Reading |
| Nov. 13, 2007 in Hannover | Nov. 28, 2007 in Prague |



Registration and Inquiries:

+49 7249 910 - 435 · marketing-micros@msc-ge.com

Gleichmann Sales Offices
 Headoffice Frankenthal
 Tel. +49 6233 347-0
 Frankenthal@msc-ge.com

Düsseldorf
 Tel. +49 211 92594-0
 Dueseldorf@msc-ge.com

Eching
 Tel. +49 8165 9995-60
 GADE@msc-ge.com

Munich
 Tel. +49 89 945532-60
 GE.Muenchen@msc-ge.com

Stutensee
 Tel. +49 7249 910-0
 Stutensee@msc-ge.com

Stuttgart
 Tel. +49 711 78336-0
 Stuttgart@msc-ge.com

Gleichmann Sunrise UK Ltd.
 Tel. +44 1908 263999
 sales@ge-sunrise.com

Gleichmann Belgium
 Tel. +32 2 452 64 51
 Belgium@msc-ge.com

Gleichmann Ultratec AG
 Tel. +41 433 5533-66
 info@ge-ultratec.ch

Gleichmann Electronics Turkey
 Tel. +90 216 4112333
 Turkey@msc-ge.com

Gleichmann Electronics CZ s.r.o.
 Tel. +420 516 411494-15
 Blansko@msc-ge.com

Our products are also available through our sister company MSC

Berlin
 Tel. +49 30 720089-0
 Berlin@msc-ge.com

Hamburg
 Tel. +49 4106 7764-0
 Hamburg@msc-ge.com

Hannover
 Tel. +49 511 616847-0
 Hannover@msc-ge.com

Jena
 Tel. +49 3641 6825-0
 Jena@msc-ge.com

Wiesbaden
 Tel. +49 611 97320-0
 Wiesbaden@msc-ge.com

Nuremberg
 Tel. +49 911 43970-0
 Nuernberg@msc-ge.com

MSC Vertriebs GmbH
 Wiener Neudorf
 Tel. +43 2236 205066-0
 Wien@msc-ge.com

MSC Schweiz AG
 Montreux@msc-ge.com
 Tel. +41 21 965 3500

MSC-Vertriebs-CZ s.r.o.
 Praha@msc-ge.com
 Tel. +420 296 580260

MSC Iberia S.L.
 Barcelona@msc-ge.com
 Tel. +34 93 582 44 45

Madrid@msc-ge.com
 Tel. +34 91 721 69 51

MSC (France) S.A.R.L.
 Paris@msc-ge.com
 Tel. +33 16480 5555

MSC Budapest Kft.
 Budapest@msc-ge.com
 Tel. +36 1250 90-40

MSC Nederland BV
 Netherlands@msc-ge.com
 Tel. +31 78 6920-150

MSC Polska Sp. z o.o.
 Gliwice@msc-ge.com
 Tel. +48 323 3054-50

MSC-Mibatron s.r.l.
 Bucuresti@msc-ge.com
 Tel. +40 31 102 34 66
 +40 21 230 25 30