Issue 1/2006

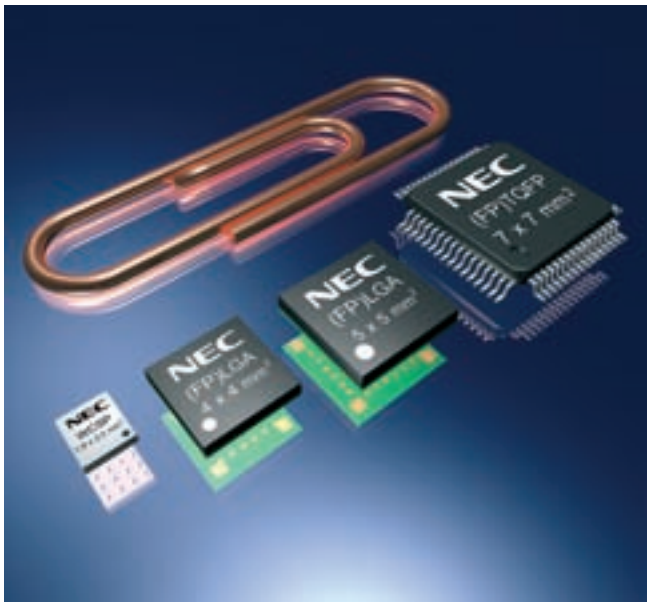
Gleichmann Electronics

GLEICHMANN Newsletter

Empowered by Innovation NEC

2 mm world's smallest microcontroller

Within many applications the need for space saving is increasingly becoming a top priority. In part due to pcb costs, but mainly driven by the fact that many applications that historically never needed a microcontroller, are now requiring one for improved intelligence. This fact is especially true for the varied range for sensor applications. Whether a temperature sensor within a buildings heating system; or a position sensor within an industrial production line or even a bio-sensor for healthcare monitors, the introduction of a microcontroller provides ability for signal conditioning, mathematical calculations and human-machine interface.



The 1.9 mm x 2.2 mm KY1+ is pictured on the left

In general terms, when selecting anything that is very small, whether a car or a television, there may be compromise in terms of the feature set. For microcontrollers this may be in the form of number of I/O, types of peripherals or size of addressable memory.

NEC Electronics is introducing the world's smallest microcontroller with no compromise. The 78K0S/KY1+ devices provide the best space saving with the new Chip Scale Package (CSP), at 2 mm x 2 mm. These devices form part of our 8-bit low pin count microcontroller K_Line Flash microcontrollers with following feature set:

Small things come from big ideas

- 10 MHz 78K0S core
- 1 KB, 2 KB, 4 KB Flash sizes (128 B RAM)
- 4 x 10-bit A/D (< 3 µS conversion time)
- 14 I/Os
- Power-on-clear (POC)
- Low voltage indicator (LVI)
- 8 MHz internal oscillator
- PWM timers, WDT

NEC Electronics releases it's new 4 mm x 4 mm 36-pin KB2 and 5 mm x 5 mm 64-pin KE2 fine pitch land grid array (FPLGA) packages with increased performance and lower power consumption. These devices form part of the 8-bit K-Line Flash microcontrollers with following feature set :

- Increased performance 20 MHz 78K0 core
- Wide Operating range 1.8 V to 5.5 V
- Memory sizes 8 KB to 128 KB (512 B to 7 KB RAM)
- Up to 8 x 10-bit A/D (< 3µS conversion time)
- Up to 55 I/Os
- Power-on-clear (POC),
- Low voltage indicator (LVI)
- 8 MHz & 240 KHz internal oscillators
- CSI's/UART's
- PWM timers, WDT

+49 7249 910-436
NECMicro@msc-ge.com

Response number 300

Spotlights

New MCU Scout

Now available – the new issue of the MCU Scout containing the latest information regarding NEC Electronics' microcontroller products. Contact us to receive the new issue!

RoHS compliance

With NEC Electronics at your side, meeting the July 1, 2006 RoHS-compliance deadline should not be a problem for you at all. Meet our experts present at the Embedded World show to clarify your open questions related to WEEE/RoHS compliance.

Contents

More choice, less compromise – introducing V850 All Flash

Following closely behind the recent introduction of NEC Electronics' highly popular 78K All Flash 8-bit microcontroller families is a new range of general purpose 32-bit devices ... V850 All Flash. And just like its 8-bit cousins, the V850 All Flash range provides all the familiar benefits of a Flash-only line-up from NEC Electronics:

- Attractive price
- Smart programming features
- Secure code
- Secure self programming
- EEPROM Emulation

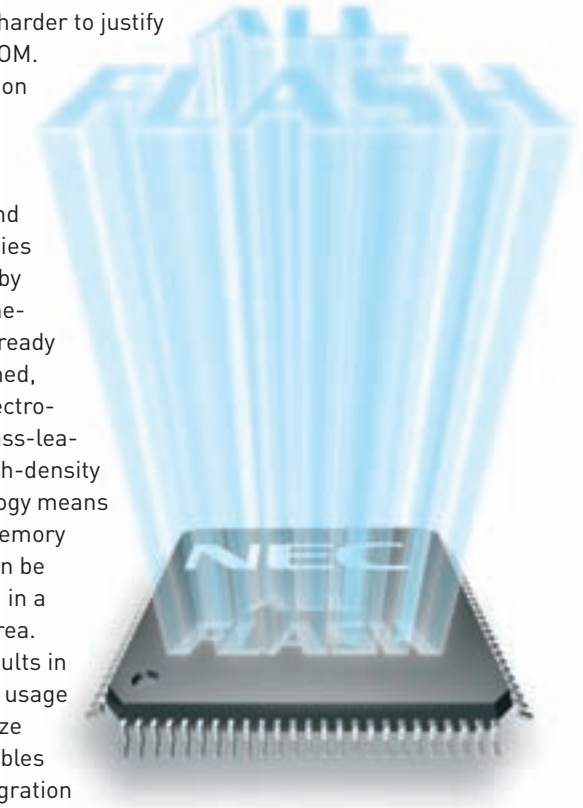
NEC Electronics' V850

All Flash general purpose microcontrollers combine 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.

At the heart of the V850 All Flash range is the V850ES RISC CPU core, offering an impressive 29 MIPS at 20 MHz. V850ES was designed as the ideal platform to turn the latest market trends, customer requirements and engineering ambitions such as networking, touch control, graphical user interfaces, voice synthesis or inverter control to name but a few, into reality.

In addition to the high performance core, the peripheral set offers an abundance of general purpose functions on-chip, with a combination of multiple high performance 16-bit timers, up to 24 channels of 10-bit A/D conversion, D/A conversion, availability of 3-phase motor control functions, multiple serial interfaces, integrated safety functions and on-chip debug.

Increasing pressure on designers to minimise development times and also to contribute to improving procurement and production efficiencies mean it's getting harder to justify mask ROM. In addition to the design advantages and flexibilities offered by Flash memory already mentioned, NEC Electronics' class-leading high-density technology means large memory sizes can be realised in a small area. This results in smaller usage of die size and enables the integration of more functions on-chip, which both contribute significantly to a reduced overall system cost.



A wide memory mix is on offer, ranging from 64 Kbytes of Flash with 4 Kbytes of RAM in a 64-pin package for entry level 32-bit applications, to a huge 640 Kbytes of Flash with 48 Kbytes of RAM in a 144-pin package for memory hungry designs.

The V850 All Flash range offers a total of 23 new devices. This kind of choice and versatility allows you to choose exactly the performance, peripherals and memory mix you require. More choice means less compromise, and the general purpose nature of the peripheral sets mean that you can be sure to get the ideal fit for your application.

NEC Electronics' V850 All Flash range is the ideal upgrade platform for exploiting 32-bit performance in a wide variety of applications such as:

- Access control
- Point of sale
- Industrial motors
- PC peripherals
- Home automation
- Home appliances
- Factory automation
- Power meters
- Medical appliances
- Instrumentation

The V850 All Flash range is made up of three microcontroller families, all with a similarly large set of general-purpose features but with variations to suit different power sources, analog requirements and special timer requirements for motor-based systems:

Spotlights

Successful Certification

NEC Electronics Europe successfully implemented the environmental management system for the complete Sales and Marketing organization across Europe. TÜV Industries Service GmbH audited the newly established environmental management system and confirmed compliance to Quality (ISO9001:2000) as well as Environmental (ISO14001:2004) management system standards.

Structured ASIC

Now available to you – our new Structured ASIC brochure containing the latest information regarding NEC Electronics' Structured ASIC technology. Contact us to receive a printed version of this new brochure!

V850ES/Hx2

These devices are ideal for applications with a 5 V power supply. The 100-pin version also features 16-channels of 10-bit A/D conversion and is perfectly suited to applications with a large number of analog inputs.

V850ES/Jx2

For lower power applications using a 3 V supply, this family offers high performance operation, complex system control and numerous functions (including digital-to-analog conversion), all onboard a single chip.

V850ES/Ix2

The growing demand for reduced energy consumption in industrial and consumer applications using motors finds a perfect solution in these devices. Ideal for 3-phase motor control designs requiring 32-bit performance, highly integrated functionality and a strong regard for cost-sensitivity. V850 All Flash microcontrollers are supported by NEC Electronics' market-leading low-cost CUBE tools. IECUBE offers full emulation and trace functionality whilst MINICUBE makes best use of on-chip debug, enabling almost any application to get up and running very quickly. A low cost demonstration kit is also available to enable effortless evaluation and initial development. All tools are supported by the IAR 'C' Compiler suite and come supplied with an appetizer version so you can start developing immediately. For all V850 devices, additional software support is also available via the Greenhills Workbench if you prefer.

V850 All Flash samples will begin rolling out at the end of 2005, and tools for all devices are available now, so why not give them a try and start implementing the next generation features that will give your product the competitive edge!

+49 7249 910-436
NECMicro@msc-ge.com
Response number 290

Introducing 32-bit ... for free!

The EB-V850ES/HG2 V850 All Flash Demonstration Kit provides on-board debugging, Flash programming and the real-time execution of application programs, making it ideal for the development of simple applications as well as the demonstration of V850's capabilities!

With its easy-to-use device demonstration capabilities, you can easily evaluate input and output functions such as push buttons, 7-segment LED outputs, A/D reference voltages, I/O lines, analog inputs, serial interfaces and so on. The board is also ready prepared for all the I/O ports to be connected to your own user hardware for more application-specific evaluation. The kit's on-board debug function allows Flash programming and memory manipulation without the need to connect to additional hardware. It's also easy to connect the kit to our low-cost MINICUBE emulator to take advantage of the on-chip debug features of the device itself. The demonstration kit comes complete with NEC Electronics' FPL Flash programming software, an appetizer version of the IAR Systems Embedded Workbench and C-SPY debugger. All of this plus the inclusion of a USB cable means you will be up and running in no time, without the need for an external power supply!

+49 7249 910-436
NECMicro@msc-ge.com
Response number 303

Introducing the all new low pin count motor ASSPs

To meet the growing demand for low end 3-phase motor control in applications such as pumps, portable air conditioning, washing machines, fans, power tools, AC drives to name but a few, NEC have introduced two 8-bit low pin count motor ASSPs to compliment the 78K0 range.

NEC Electronics has recently announced the addition of two new Application Specific Standard Products (ASSP's) namely, the µPD78F0711 and µPD78F0712 consisting of carefully defined functions supporting specific motor control applications. These products are designed for use in domestic and low end industrial electronic products such as washing machines, fans, dishwashers, power tools, air-conditioners, pumps and general 3-phase motor control applications. Designed to meet requirements of next generation consumer applications, the 30-pin motor ASSP's provide an ideal balance between cost and performance. These low pin products are ideally suited to entry level designs allowing developers to take advantage of the powerful feature set without having to commit to high costs. The new ASSPs allow maximum design capability with the flexibility of low cost.

µPD78F0711/2 are both the latest members of NEC's well established 78K0 family of microcontrollers. The peripheral set includes a powerful motor control timer function capable of controlling a 3-phase motor, with 3 x 10-bit PWM compare registers, an 8-bit dead-time generation timer and two A/D trigger compare registers. Alongside its 20 MHz 8-bit core, uPD78F0711/2 boasts a 30-pin package (32-pin SDIP package also available), 8/16 Kb of single voltage embedded flash memory and 768 Bytes of Random-Access Memory (RAM), providing just the right mix to support a vast array of motor control applications including fans and compressors.

A powerful motor control device

In addition these devices also benefit from On Chip Debug (OCD) function which aids the developer. This offers a powerful and unobtrusive method for developing and debugging the product in situ via a serial connection. All these features, combined with a number of 8- and 16-bit timers, provide a powerful motor control device. Increasingly required is the ability to retain operational parameters after power has been removed. Both µPD78F0711 and µPD78F0712 have the ability to self program the on-chip Flash memory without the need for additional supply voltages enabling it to emulate EEPROM memory and thus removing the need for an additional external device. Both devices are scheduled to start sampling in the first quarter of 2006 with mass production to follow in summer.

For related products, visit our motor control mall on our homepage or talk directly to one of our motor control experts at Embedded World 2006, hall 12, booth 348

+49 7249 910-436
NECMicro@msc-ge.com

Response number 305

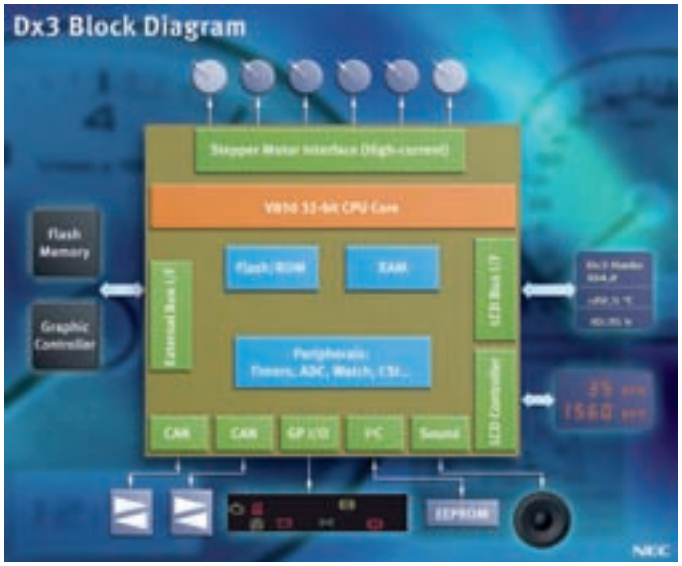
D_Line for innovative instrument clusters

One for all – from low to high-end

Developed in NEC Electronics' 0,15 µm technology, Dx3 combines enhanced features with NEC Electronics' latest Flash technology and proven quality standards. Dx3 is offered in three sub-families:

- Entry-level version running at 16 MHz for cost-sensitive applications (under planning)
- Mid-range variant running at 24 MHz
- High-end derivatives with 48 MHz CPU (64 MHz under evaluation) for solutions with complex graphics demands.

The family concept provides scalable memory options from 128 Kbytes to 2 Mbytes Flash and up to 84 Kbytes RAM. The entry-level version is offered in a 100-pin QFP, the other two in 144-pin QFP packages. For applications with extensive graphics demands, the roadmap includes a 1 Mbyte Flash device with an external 32-bit bus interface in a 208-pin QFP package to connect external memory or a graphics controller.



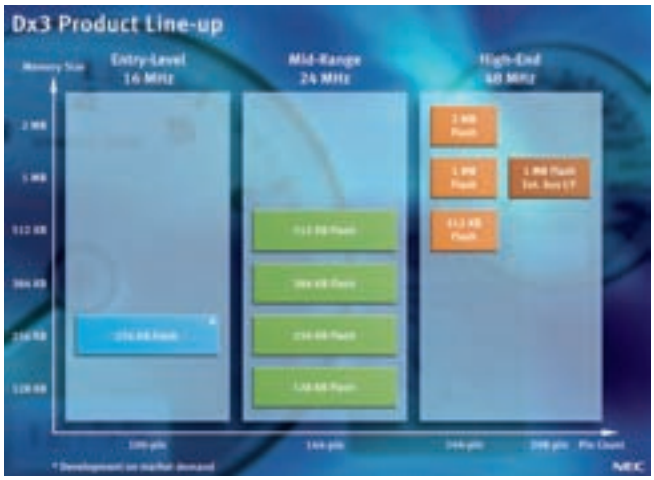
Details that make the difference

The V850E/Dx3 is based on the established 32-bit RISC CPU V850. It includes application-specific peripherals that shortlist the Dx3 for a variety of dashboard applications:

- Up to 6 integrated stepper motor controllers drive up to six 360° cross coil/ stepper motors with up to 30 mA per coil
- The on-chip LCD controller/driver drives up to 160 LCD segments (40 x 4). All LCD outputs are shared with ports and can be selected bit-wise
- Parallel 8-bit LCD bus interface to connect chip-on-glass displays
- Sound generator to produce sounds composed of a program mable tone frequency and PWM signal for volume control
- Up to 16 A/D converter channels (10-bit resolution)
- Up to two CAN interfaces (32 message buffers each)
- Serial interfaces: up to three CSIs, two UARTs (LIN compatible) and two I2Cs
- Up to seventeen 16-bit timers providing up to 16 PWMs, a watch timer including clock correction and a watchdog timer
- Features like clock generator, DMA, interrupt controller and an internal ring oscillator to reduce the number of external components

The V850E/Dx3 – more flexibility, more scalability, less system cost

The V850E/Dx3 was developed to add value to your development in terms of flexibility, scalability and system cost. The Dx3 family lets you react easily to changing requirements. Re-use of core and peripheral software, pin-to-pin compatibility and standard



core support are some of the features that underline the benefits of the Dx3.

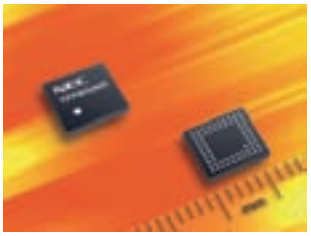
- Scalability in terms of memory size and peripherals gives you ample flexibility throughout the development phase.
- Software compatibility thanks to reuse of core and peripheral macros within the complete family. Moreover, software once developed for microcontroller families like the F_Line or S_Line can be easily integrated with little effort.
- Car makers' standard software is fully supported by driver and OSEK compatibility within the D_Line, F_Line and S_Line.
- High integration of applicationspecific functions let you reduce overall system cost and development effort.
- Common tool set is available for the Dx3 family, reducing investment cost in the event of a switch to another device option.

+49 7249 910-436
NECMicro@msc-ge.com
Response number 295

World's smallest gate array ASICs in TFPBGA packages

NEC Electronics has now released Tape Fine-Pitch Ball Grid Array (TFPBGA) packages also for its successful gate array ASIC series. The very small out- line TFPBGA packages start at 4.38 mm edge length and make these the smallest gate array devices currently available.

Gate array ASICs are widely used in many market segments where they offer a cost-efficient alternative to numerous FPGA products. They are also preferred when it comes to implementing digital designs where the emphasis lies on short time to market. The TFPBGA packages are poised to make a significant impact on the space requirements of such designs.


Really small: 65-pin TFPBGA package

Initially, the TFPBGA package offer extends to gate array ASICs with 48 to 144 balls, with corresponding package edge lengths of just 4.38 mm to 7 mm. A mere 0.65 mm high, TFPBGA packages also have an extremely low profile. They are easily implemented wherever space is at a premium, like for example MMC cards or memory sticks.

The target markets for custom logic devices in TFPBGA packages include a wide range of industrial, security, medical and consumer applications. The inexpensive TFPBGA packages are RoHS-compliant and are available with NEC Electronics' popular CMOS-N5, CMOS-9HD and CMOS-10HD gate array series.

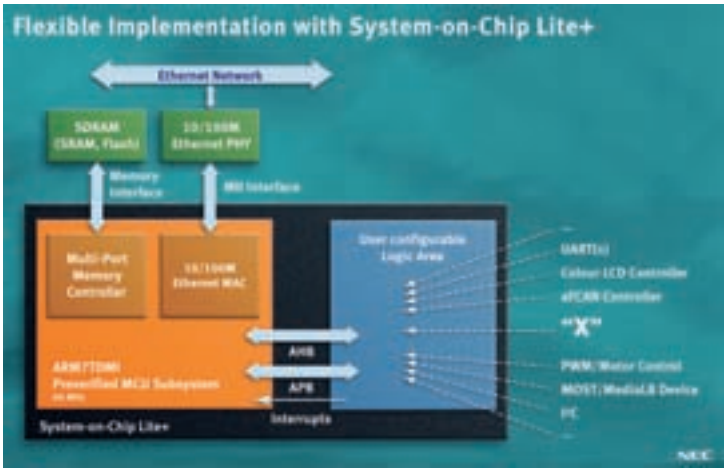
For more details please visit our homepage or simply contact us at our booth on the Embedded World 2006 show in Nuremberg.

+49 7249 910-437
NEC@msc-ge.com
Response number 301

ARM7TDMI-S™ + „X“ ... think creative!

The ARM7TDMITM CPU core is around already quite some time now and well-established; meanwhile even with a whole bunch of standard products available on the market. However, what these standard products can't offer to you is the freedom to be creative and to invent an individual MCU that ideally matches your specific system requirements while at the same time saving costs, efforts, power dissipation and PCB area.

System-on-Chip Lite+ offers this possibility to let you be creative without compromises. You can use your own proprietary function blocks and in addition generic IP function blocks already available from the market to expand the capabilities of the MCU. With System-on-Chip Lite+ the pre-verified basis is a fully-fledged 60 MHz ARM7TDMI-S™ CPU combined with a multi-port memory controller, a 10/100M Ethernet MAC, an interrupt con- troller and other basic features like a watchdog timer, a timer and a UART.



The creative part of System-on-Chip Lite+ comes from you. Your proprietary know-how can be securely implemented within the large, so-called user defined logic area of the System-on-Chip Lite+ chip, which is directly connected to the ARM7TDMI-S CPU via the AMBA™ AHB and APB busses. This is as well true when adding additional, off-the-shelf function blocks.

The „design-in“ process of these additional features and functions itself is quite simple: By using the FPGA-based System-on-Chip Lite+ development board, which is a 1 : 1 functional representation of the System-on-Chip Lite+ device, all additional functions can be pre-verified in-system together with your software. Only then NEC Electronics takes over and produces your own, proprietary ARM-7TDMI-S™-based MCU. Besides many implementations of customer proprietary and rather basic functions like additional UARTs, timers, SPI and I2C interfaces, NEC Electronics has already successfully implemented such sophisticated function blocks like a Colour LCD controller, a PWM/motor control function block for 3-phase, brushless DC motors, a MOST/Media LB device interface and an aFCAN controller.

At the Embedded World 2006 the Colour LCD Controller will be demonstrated live at the NEC Electronics booth. Moreover, besides the µClinux embedded operating system, also the Segger embOS® and the ENEA Embedded Technology OSE real-time operating systems will be demonstrated on the System-on-Chip Lite+ development board and on the low-cost System-on-Chip Lite+ „Start it!“ starter kit.

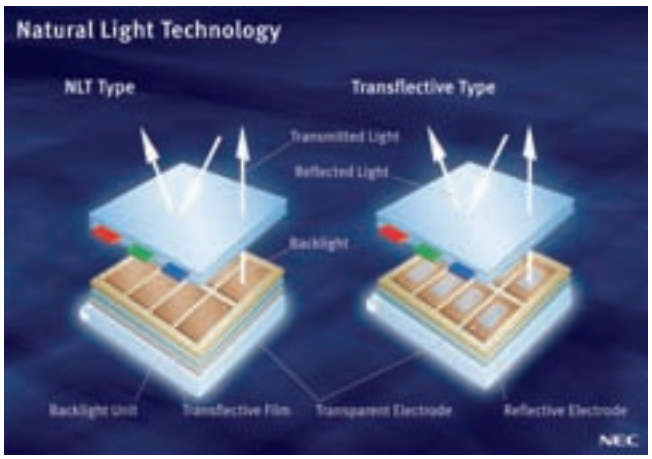
+49 7249 910-436
NECMicro@msc-ge.com
Response number 304

Vivid colours under direct sunlight

As bold and vivid as your imagination, NEC's thin-film transistor LCDs are your window to the world. With reflective analog and digital panels, sizes 5.5 to 21.3 inches, and QVGA to UXGA resolutions, NEC Electronics makes it easy to bring your vision to life. From medical equipment to POS to gaming and beyond, NEC Electronics offers a display to meet your specifications. Especially for outdoor application and sunlight readability, NEC Electronics offers a variety of transflective displays, manufactured in its proprietary „Natural Light Technology“. Three key features distinguish this unique technology:

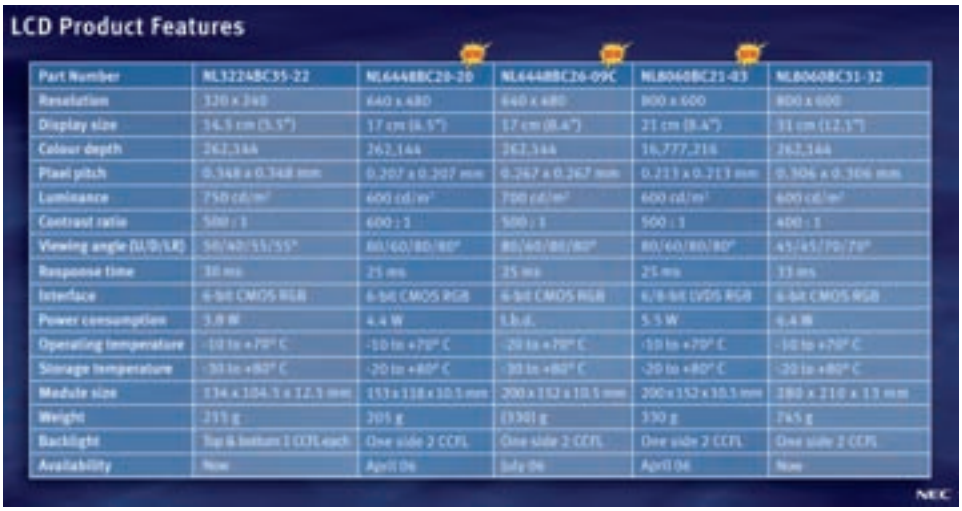
High luminance of up to 750 cd/m2, high contrast of 600 : 1 and low levels of reflectivity on the screen surface enable a variety of information and pictures to be reproduced in clear and vivid color, even in high ambient light conditions.

As with all LCD modules in NEC LCD Technologies' standard industrial lineup, backward compatibility with its predecessors with respect to outer dimensions, position of mounting holes, and centre of the screen enables the new module to be replaced easily – without



the need for making any system-level modifications as a result of interface incompatibility. On the left a brief overview on existing transflective displays – NEC LCD Technologies will continue to enhance its line-up of LCDs adopting NLT technology for a variety of industrial applications and range of environmental conditions.

+49 7249 910-152
Display@msc-ge.com
Response number 302



Part Number	NL3224BC35-22	NL6448BC20-20	NL6448BC26-09C	NL8060BC21-03	NL8060BC31-32
Resolution	320 x 240	640 x 480	640 x 480	800 x 600	800 x 600
Display size	14.5 cm (5.5")	17 cm (6.5")	17 cm (6.4")	21 cm (8.4")	31 cm (12.1")
Colour depth	262,144	262,144	262,144	16,777,216	262,144
Pixel pitch	0.348 x 0.348 mm	0.207 x 0.207 mm	0.267 x 0.267 mm	0.213 x 0.213 mm	0.306 x 0.306 mm
Luminance	750 cd/m²	600 cd/m²	700 cd/m²	600 cd/m²	600 cd/m²
Contrast ratio	500 : 1	600 : 1	500 : 1	500 : 1	400 : 1
Viewing angle (U/D/L/R)	50/40/55/55°	80/60/80/80°	80/60/80/80°	80/60/80/80°	45/45/70/70°
Response time	30 ms	25 ms	25 ms	25 ms	33 ms
Interface	6-bit CMOS RGB	6-bit CMOS RGB	6-bit CMOS RGB	6/8-bit LVDS RGB	6-bit CMOS RGB
Power consumption	3.0 W	4.4 W	t.b.d.	5.5 W	6.4 W
Operating temperature	-10 to +70° C	-10 to +70° C	-20 to +70° C	-10 to +70° C	-10 to +70° C
Storage temperature	-30 to +80° C	-20 to +80° C	-30 to +80° C	-20 to +80° C	-20 to +80° C
Module size	134 x 104.5 x 12.5 mm	153 x 118 x 10.5 mm	200 x 152 x 10.5 mm	200 x 152 x 10.5 mm	280 x 210 x 13 mm
Weight	215 g	305 g	(330) g	330 g	745 g
Backlight	Top & bottom 1 CCFL each	One side 2 CCFL	One side 2 CCFL	One side 2 CCFL	One side 2 CCFL
Availability	Now	April 06	July 06	April 06	Now

NEC

Extended range of 8.4“ TFT-LCD module line-up

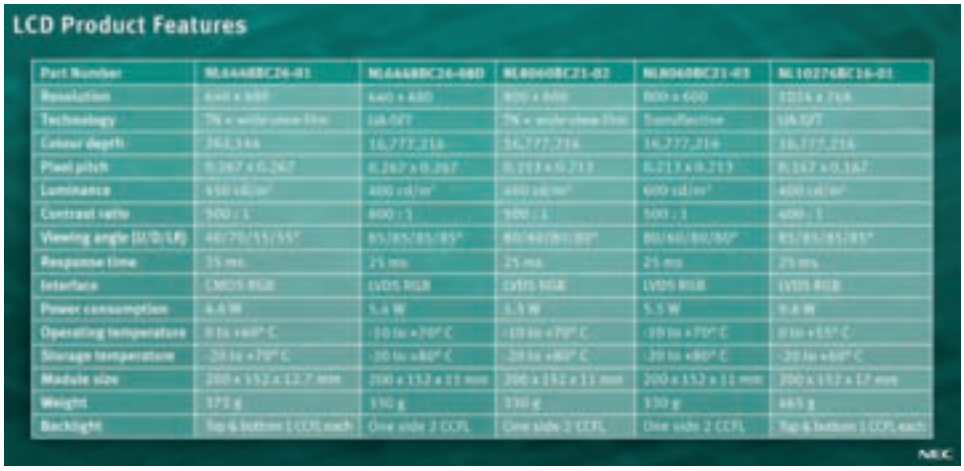
EC LCD Technologies Ltd. has now expanded the choice of 8.4“ (21.4 cm) displays in its extensive range of colour TFT modules. Several new models offer compatible form factors with existing displays in the same screen size, allowing developers to enhance system performance or upgrade equipment without changing mechanical design.

New developments in this family include a choice of SVGA (800 x 600 pixels) resolution in addition to VGA (640 x 480 pixels). These displays have fast response times of 25 ms (typ). Variants offer very wide viewing angles of up to 85° from the normal and high contrast ratios of up to 600 : 1 make them suitable for a wide range of ambient lighting conditions. Some variants use NLT (transreflective) technology with anti-reflective coatings ideal for daylight viewing. These panels are suitable for a wide range of applications such as monitors in process control and display terminals for control or information systems.


Enhanced system performance with the NL6448BC26-08D

Edge lighting with two high efficiency cold-cathode fluorescent lamps with high luminance options ensure even backlighting making these displays suitable for applications demanding superior picture quality, such as control panel applications or information systems. Lamps can easily be replaced if needed. Models in this range are available with a 6-bit digital interface or the industry standard single link LVDS digital port with 8-bit or 6-bit RGB data plus dot clock and data enable signals. Scan direction is reversible.

The table on the left shows the new and existing products in details.



Part Number	NL6448BC26-01	NL6448BC26-08D	NL8060BC21-02	NL8060BC21-03	NL1027ABC16-01
Resolution	640 x 480	640 x 480	800 x 600	800 x 600	1024 x 768
Technology	TN + wide view film	UA-SFT	TN + wide view film	Transflective	UA-SFT
Colour depth	262,144	16,777,216	16,777,216	16,777,216	16,777,216
Pixel pitch	0.267 x 0.267	0.267 x 0.267	0.213 x 0.213	0.213 x 0.213	0.167 x 0.167
Luminance	650 cd/m²	400 cd/m²	400 cd/m²	600 cd/m²	400 cd/m²
Contrast ratio	500 : 1	800 : 1	500 : 1	500 : 1	400 : 1
Viewing angle (U/D/L/R)	40/70/55/55°	85/85/85/85°	80/60/80/80°	80/60/80/80°	85/85/85/85°
Response time	35 ms	25 ms	25 ms	25 ms	25 ms
Interface	CMOS RGB	LVDS RGB	LVDS RGB	LVDS RGB	LVDS RGB
Power consumption	4.4 W	5.4 W	5.5 W	5.5 W	9.8 W
Operating temperature	0 to +60° C	-10 to +70° C	-10 to +70° C	-10 to +70° C	0 to +55° C
Storage temperature	-20 to +70° C	-20 to +80° C	-20 to +80° C	-20 to +80° C	-20 to +60° C
Module size	200 x 152 x 12.7 mm	200 x 152 x 11 mm	200 x 152 x 11 mm	200 x 152 x 11 mm	200 x 152 x 17 mm
Weight	370 g	330 g	330 g	330 g	665 g
Backlight	Top & bottom 1 CCFL each	One side 2 CCFL	One side 2 CCFL	One side 2 CCFL	Top & bottom 1 CCFL each

NEC

+49 7249 910-152
NECMicro@msc-ge.com
Response number 293

II-2_2006-RSO-2250 ©GE

Our Commitment to Support

Please send me more information about:

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

Please send me detailed information about the following microcontroller topics:

- ☐ Low Pin Count
- ☐ Building Management
- ☐ Motor Control
- ☐ Industrial Automation
- ☐ Health Care
- ☐ _____

NEC

Please copy and fax to +49 7249 910-328

Name/Surname	
Company	
Department	
Address	
ZIP/City	
Phone	
Fax	
E-mail	
Position	
Branch	
Company Size	

Gleichmann Electronics

+49 7249 910-437*
NECMicro@msc-ge.com

* or contact your regional sales office

Gleichmann Sales Offices

Headquarters Frankenthal
Phone +49 6233 347-0
Frankenthal@msc-ge.com

Düsseldorf Office
Phone +49 211 92594-0
Duesseldorf@msc-ge.com

Eching Office
Phone +49 8165 9995-600
GADE@msc-ge.com

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

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

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

Gleichmann Electronics UK Limited
Phone +44 1908 399770
Miltonkeynes@msc-ge.com

Belgium Office
Phone +32 2 452 64 51
Belgium@msc-ge.com

Gleichmann Electronics Schweiz AG
Phone +41 32 366 8576
Biel@msc-ge.com

Gleichmann Electronics Turkey
Phone +90 216 411-2333
Turkey@msc-ge.com

Gleichmann & Co. Electronics CZ s.r.o
Phone +420 516 411 494-15
Blansko@msc-ge.com

Our products are also available through our sister company MSC

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

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

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

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

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

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

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

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

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

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

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

MSC Vertriebs GmbH Sales Office Austria
Phone +43 2236 205066-0
Wien@msc-ge.com

MSC Schweiz AG
Phone +41 41 785 8200
Rotkreuz@msc-ge.com

Phone +41 21 965 3500
Montreux@msc-ge.com

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

MSC (Scotland) LTD.
Phone +44 1506 460555
Livingston@msc-ge.com

MSC (UK) LTD.
Phone +44 1273 622446
Brighton@msc-ge.com

www.msc-ge.com