



A Tradition of Support

Freescale's services and tools help make it simple to integrate MC9S12NE64 microcontrollers and slash time to market. Years of supporting the 68HC11 and 68HC12 have taught us a lot about what designers need. You can choose from online training, a large library of application notes, technical FAQs and high-quality, cost-effective hardware and software tools.

Metrowerks CodeWarrior Integrated Development Environment (IDE)

Simply by registering on the Freescale or Metrowerks' Web site, designers may access a free special edition of Metrowerks CodeWarrior Development Studio. The CodeWarrior integrated development environment (IDE) establishes a new standard for MCU development. Here's what's inside:

- > Project manager for up to 32 files
- > Built-in "stationery" templates with sample assembly and C code for fast project creation
- > Full-chip simulation and Flash programming, which lets you start software development without waiting for target hardware or evaluation board
- > Highly optimized ANSI C compiler and C source-level debugger
- > Over 60 optimization strategies to boost performance and reduce code size

- > Processor Expert™ rapid application design tool from UNIS that provides optimized and tested automatic C code generation and verifies the design based on actual MCU resources to help catch potential problems before you begin debugging
- > Compiler upgrade to 32 KB, 64 KB or unlimited memories
- > Standard Edition includes advanced data visualization software
- > Professional Edition includes additional advanced tools, such as code coverage, performance analysis and Processor Expert custom bean-generating wizard

MC9S12NE64 Demonstration Board (DEMO9S12NE64)

The MC9S12NE64 demonstration board turns work into play with easy-to-use, fun demo code for the 112-pin MC9S12NE64 device. The Connector, our MC9S12NE64 game, includes application source code and demonstrates the power of single-chip Ethernet solutions.

In addition, the demo board has all the usual components, including the device itself, switches, LEDs, a potentiometer, an Ethernet port, a universal power supply, access to user I/O via the MCU breakout header and software demos with application code. The CodeWarrior tools are included, too, as well as a preprogrammed Flash monitor. Everything to get you started writing and debugging code.

MC9S12NE64 Evaluation Board (EVB9S12NE64)

For designers who want to dive right in, Freescale has the MC9S12NE64 evaluation board. In addition to the MC9S12NE64 game, The Connector, the evaluation board includes the 112-pin MC9S12NE64 device, an Ethernet port, a potentiometer, an IrDA port, an LCD display port, a keyboard port, 512 KB SRAM, switches, LEDs, a large breadboard area, access to user I/O via the MCU breakout header and a universal power supply.

Now It's Up to You

With the Ethernet added to your design capabilities, the only limit on designing more powerful industrial control, Web server and Internet end-node applications may be your own creativity.

Freescale has freed you from the barriers to the Ethernet in cost-sensitive, industrial applications with a cost-effective, scalable, flexible single-chip solution. Freescale supports its advanced MC9S12NE64 as only the developers of the popular HCS08, HCS12 and 56800/E hybrid controller families know how. Give us the opportunity to show you how simple it can be! To learn more, visit our Web site at www.freescale.com.



MC9S12NE64 16-bit Microcontrollers

Single-Chip Ethernet Connectivity

Ethernet isn't just for offices anymore. Engineers working on applications such as networked appliances, security systems, industrial control and Web radio are dreaming about a single-chip, Flash-based Ethernet solution with embedded 10/100 Ethernet media access controller (EMAC) and Ethernet physical layer (EPHY). Now it's here: the MC9S12NE64 from Freescale Semiconductor, a subsidiary of Motorola.

The MC9S12NE64 is a 16-bit microcontroller that can be matched with a third-party TCP/IP stack of your choice to achieve a low-cost end-node Ethernet solution with fast design turns courtesy of Metrowerks' CodeWarrior™ tools.

MC9S12NE64 Flash-based microcontrollers extend Freescale's design-winning tradition into the low-cost end of the Ethernet market. Designers of networked appliances, industrial controls, security systems, lighting controls, power supply monitors and vending machine remote access now have a better way to deliver powerful, cost-effective solutions.



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BRNE64
REV 0

Launched by Motorola
freescale
semiconductor

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freescale
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Strength at Its Core

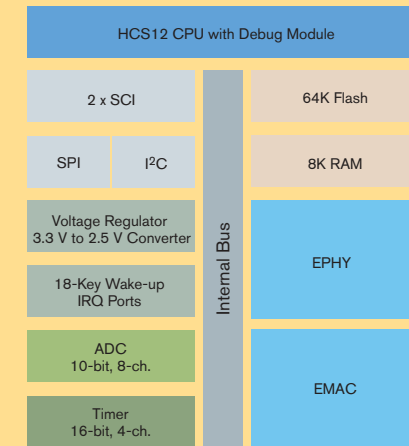
The MC9S12NE64 is based on the powerful HCS12 core, which integrates third-generation Flash technology. Its rich offering of Ethernet connectivity features makes the MC9S12NE64 the odds-on favorite to replace noisy, multichip solutions with full-featured Ethernet connectivity.

- > Object code compatible with the 8-bit 68HC11 and 68HC12 families
- > Compact code optimized for C
- > Up to 25 MHz bus rate (40 ns minimum instruction cycle)
- > Flexible addressing modes for efficient pointer manipulation and looping control

Serial, real-time emulation is now standard operating procedure over a single debug pin. The on-chip debug module has a trace and trigger capability that was once the province of expensive emulators. But the advantages of on-chip debugging don't stop there.

- > Virtually no limitations on frequency or voltage like traditional emulators have; real-time emulation of all MCU functions is possible at full operating voltage and frequency range
- > Four bus capture modes provide flexible data acquisition
- > Instead of cumbersome emulator cables, a single, dedicated pin provides nonintrusive debugging
- > The emulator's expensive bus analyzer is replaced by nine flexible triggers and buffer hardware
- > Internal registers and memory can be viewed and changed while running application code
- > Single-step, run or trace application code on the target processor

BLOCK DIAGRAM



Part # **MC9S12NE64VTU**
 Package 80 TQFP-EP
 Temp. -40°C to 105°C
 Part Production
 MOQ 90

Part # **MC9S12NE64CPV**
 Package 112 LQFP
 Temp. -40°C to 85°C
 Part Production
 MOQ 60

One Chip Does It All

Multichip Ethernet solutions are expensive, take longer to get to market due to design complexity and can inject reliability problems based on the greater number of interconnects—not a recipe for success in the industrial control and end-node Ethernet markets.

Flexibility is also important for the economy-minded designer. The IEEE® 802.3 EMAC helps keep your design options open by handling Ethernet protocol filtering, offering two receive buffers and one transmit buffer—both resizable and using shared RAM. From a purely financial perspective, a free EMAC software driver simplifies development. TCP/IP stacks ranging from the most basic to the fullest featured are available from third-party vendors.

The integrated IEEE 802.3 10/100 EPHY is just as finely tuned as the EMAC to the industrial market. In addition to a fully integrated transceiver interface, the EPHY offers full and half-duplex operation and autonegotiates data transfer speed between the 10 Mbps and 100 Mbps options. It supports a direct interface to the transformer and RJ45 socket, providing 100 meter operation.

Freescale didn't stop at integrating EPHY and EMAC on a single chip. We also provide four chip-to-chip interfaces, including an I²C bus designed to provide effective data exchange, which eliminates the need for an address decoder and reduces the number of chip-to-chip connections.

In addition to the I²C-bus interface, the MC9S12NE64 has two SCI channels and one SPI channel for chip-to-chip communications.



Additional Features

- > Supply voltage/performance
 - 3.3 V ±5 percent operation
 - -40°C to +85°C, -40°C to +105°C
- > 25 MHz HCS12 core
- > Memory
 - 64 KB Flash
 - 8 KB RAM
- > Communications
 - 10/100 EMAC
 - 10/100 EPHY
 - Two serial communications interfaces (SCIs)
 - Serial peripheral interface (SPI)
 - Inter-integrated circuit (I²C)
- > Embedded peripherals
 - 8-channel, 10-bit analog to digital converter (ADC)
 - 4-channel, 16-bit timer
 - Computer operating properly (COP)
 - Keyboard interrupts
 - Up to 70 general-purpose input/outputs (GPIOs)
- > Available packages
 - 80 TQFP-EP
 - 112 LQFP



Ethernet Applications for the Network Designer

The benefits of the MC9S12NE64 stretch far beyond ease of use, performance and attractive pricing. In industrial and end-node Ethernet applications, end-users expect products with long life spans and that can be configured and serviced remotely. Scalability, expandability and flexibility are key.

Technology headroom comes standard with the MC9S12NE64. In addition to handling Ethernet protocol filtering and resizable receive and transmit buffers, the MC9S12NE64 supports Flash programming for fast time to market. Other benefits include in-field updates, remote e-mail message distribution, remote Web server hosting, remote operation monitoring and remote device control.

It's a fast, cost-effective way to build a Web-enabled server on a chip.

