

FLASH!



Motorola 8-bit FLASH Microcontrollers Built on DigitalDNA Technology.

THINK YOU CAN'T AFFORD TO USE ON-CHIP FLASH MEMORY IN YOUR NEXT MICROCONTROLLER APPLICATION? THINK AGAIN.

68HC08 FLASH microcontrollers – built on DigitalDNA technology from Motorola – are single-chip 8-bit solutions that provide the flexibility you need to get your designs into production quickly and efficiently. These low-cost, off-the-shelf devices are designed to make programming and re-programming fast, easy and affordable, whether your application is still in development or already in the field.

Motorola's second generation 8-bit FLASH maximizes production savings due to our incredibly fast FLASH programming capabilities – up to 100 times faster than most embedded FLASH/EEPROM and even faster than most embedded OTP/EPROM. Additionally, our FLASH is suitable for data and program applications and across the full temperature range. Motorola's 68HC08 FLASH microcontrollers offer a cost-effective solution for a variety of applications that previously required separate byte erasable EEPROM.

Motorola's FLASH microcontrollers offer you more than cost-savings; they offer you peace of mind. Once your products are in the field, in-application re-programmability completely eliminates the need to replace OTP or ROM devices in order to respond quickly to changing customer or market requirements or simply to upgrade software or address overlooked bugs. In addition, our FLASH microcontrollers have advanced security features to protect FLASH code – your intellectual property – from unauthorized reading and flexible block protection to keep user programmable segments of code protected from unintentional erasing/writing.

WHAT MAKES MOTOROLA 8-BIT FLASH MICROCONTROLLERS THE SMART CHOICE?

- **Cost-effective programming changes** and field software upgrades via in-application programmability and reprogrammability
- **Simplified programming interface:** FLASHwire single-wire mode or user mode reprogramming through serial ports
- **Reduced production programming costs** through programming up to 100 times faster than most embedded FLASH/EEPROM (2msec for 64 bytes)
- **Suitability for data and program applications** due to write/erase cycle of 10,000 across the full temperature range; combined program and data space memory; and ability to program a byte at a time
- **FLASH programming across the 68HC08's full operating supply voltage** with no extra programming voltage – enabling cost-effective re-programmable battery powered applications
- **Flexible block protection and security**, to protect code from unauthorized reading and to guard against unintentional erasing/writing of user-programmable segments of code
- **0.5 micron FLASH 68HC08s shipping in volume at prices comparable to industry microcontrollers that use OTP memory**



DigitalDNA™
from Motorola

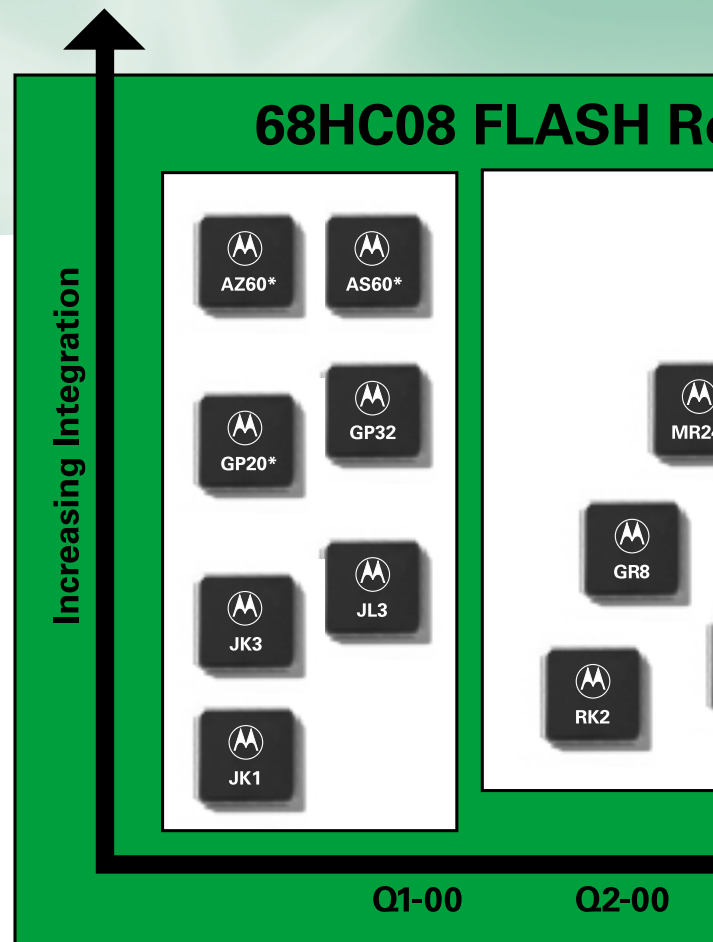
MOTOROLA'S FLASH FUTURE.

Motorola believes on-chip FLASH is the future, and today's second-generation Motorola 68HC08 FLASH microcontrollers are the beginning. The Motorola 2000 roadmap for flexible, cost-effective on-chip FLASH solutions includes a total of 18 devices developed by a team of more than 100 design engineers. With the benefits of Motorola's FLASH at prices comparable to OTPs, why use slower programming FLASH or OTPs from other manufacturers? In fact, Motorola is so confident in our FLASH technology that we plan for all new programmable 68HC08 microcontrollers** to have reprogrammable FLASH instead of just one-time programming capabilities. And in early 2001, Motorola plans to introduce 0.25 micron technology FLASH MCUs to continue reducing costs and expanding Motorola's number one position in the 8-bit MCU market.

Here's a quick rundown of key features of the in-system programmable 8-bit FLASH microcontrollers Motorola expects to release later this year:

68HC908MR32/24/16

- In-System Programmable FLASH
 - 32 Kbytes on 68HC908MR32
 - 24 Kbytes on 68HC908MR24†
 - 16 Kbytes on 68HC908MR16
- 768 Bytes RAM
- 4-channel and 2-channel Programmable 16-bit Timers (Input Capture, Output Compare, or PWM)
- 6-channel 12-bit PWM Optimized for Motor Control
- 10-channel 10-bit Analog to Digital Converter
- Asynchronous Serial Communications Interface
- Synchronous Serial Peripheral Interface
- Low Voltage Inhibit (Reset)
- Phase-Locked Loop
- 37 Bi-directional I/O + 7 Input
- 64 Lead QFP and 56 Lead Shrink DIP Packages



*VISIT OUR WEB SITE AT [HTTP://WWW.MCU.MOTPS.COM](http://www.mcu.motps.com) FOR DETAILS ON OUR

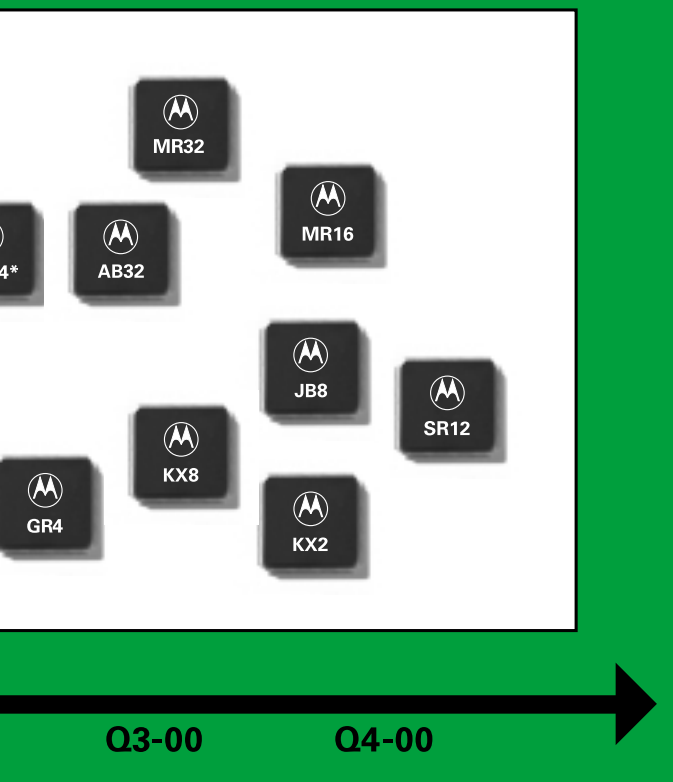
68HC908GR8/4

- In-System Programmable FLASH
 - 8 Kbytes on 68HC908GR8
 - 4 Kbytes on 68HC908GR4
- 384 Bytes RAM
- 3-channel Programmable 16-bit Timer (Input Capture, Output Compare, or PWM)
- Up to 6-channel 8-bit Analog to Digital Converter
- Asynchronous Serial Communications Interface
- Synchronous Serial Peripheral Interface
- Low Voltage Inhibit (Reset) with Selectable Trip Points
- 32 KHz Phase-Locked Loop
- Time Base Module with Auto Wake-up from Stop
- Up to 21 Bi-directional I/O
- 28 Lead DIP and 32 Lead QFP Packages

** ROM VERSIONS OF MANY 68HC08S WILL CONTINUE TO BE AVAILABLE

† DENOTES FIRST GENERATION 68HC08 FLASH TECHNOLOGY

Roadmap



EXISTING LINE OF FLASH MICROCONTROLLERS.

68HC908KX8/2

- In-System Programmable FLASH
 - 8 Kbytes on 68HC908KX8
 - 2 Kbytes on 68HC908KX2
- 192 Bytes RAM
- 2-channel Programmable 16-bit Timer (Input Capture, Output Compare, or PWM)
- 4-channel 8-bit Analog to Digital Converter
- Asynchronous Serial Communications Interface
- Low Voltage Inhibit (Reset) with Selectable Trip Points
- Internal Oscillator Trimmable to 2% Accuracy
- Time Base Module with Auto Wake-up from Stop
- Up to 13 Bi-directional I/O
- 16 Lead DIP and 16 Lead SOIC Packages

ARE MOTOROLA FLASH MCUS AT OTP PRICES IN YOUR FUTURE?

68HC908AB32

- 32 Kbytes In-System Programmable FLASH
- 512 Bytes Byte Erasable EEPROM
- 1 Kbyte RAM
- Dual 4-channel Programmable 16-bit Timers (Input Capture, Output Compare, or PWM)
- 8-channel 8-bit Analog to Digital Converter
- Asynchronous Serial Communications Interface
- Synchronous Serial Peripheral Interface
- Low Voltage Inhibit (Reset)
- Phase-Locked Loop
- Periodic Interrupt Timer
- Up to 51 Bi-directional I/O
- 64 Lead QFP Package

68HC908RK2

- 2 Kbytes In-System Programmable FLASH
- 128 Bytes RAM
- 2-channel Programmable 16-bit Timer (Input Capture, Output Compare, or PWM)
- Internal Oscillator Trimmable to 2%
- Low Voltage Inhibit (Reset)
- Up to 14 Bi-directional I/O
- 1.8 Volt Operation
- 20 Lead SOIC or SSOP Package

68HC908JB8

- 8 Kbytes In-System Programmable FLASH
- 256 Bytes RAM
- Universal Serial Bus
- 3.3 Volt Regulator
- 2-channel Programmable 16-bit Timer (Input Capture, Output Compare, or PWM)
- Low Voltage Inhibit (Reset)
- Up to 37 Bi-directional I/O
- 44 Lead QFP, 20 Lead DIP, and 28 Lead SOIC Packages

FLASH!

68HC908SR12

- 12 Kbytes In-System Programmable FLASH
- 512 Bytes RAM
- Dual 2-channel Programmable 16-bit Timers (Input Capture, Output Compare, or PWM)
- Asynchronous Serial Communications Interface
- 13-channel 10-bit Analog to Digital Converter
- 3-channel PWM
- 32 KHz Phase-Locked Loop
- Temperature and Current Sensors
- SMBus Smart Battery Interface, Multi-Master I²C
- Low Voltage Inhibit (Reset)
- Up to 31 Bi-directional I/O
- 48 Lead QFP, 42 Lead SDIP

MORE THAN MICROCONTROLLERS.

Extensive development support for Motorola 8-bit FLASH microcontrollers includes an In-Circuit Simulator (ICS) kit that allows you to program and debug your 68HC08 FLASH software code. The ICS software development environment, including a full-chip simulator, is available to download free of charge from <http://www.pemicro.com/ics08>. In addition to the ICS, we offer two fully modular real-time in-circuit development kits. The Motorola Modular Evaluation System (MMEVS) which supports traditional code creation and debugging functions, and the Motorola Modular Development System (MMDS), our high-performance emulator with advanced features such as bus state analysis and dual-port memory. Each kit comes with our Windows NT[®]/95/98 MCUEz[™] Integrated Development Environment, cable adapters, programmer, samples, and comprehensive documentation. Buy only the development kit you need, easily creating an economical, integrated solution for designing, debugging and evaluating your Motorola 8-bit FLASH microcontroller applications.

EXPERIENCE COST-EFFECTIVE FLASH TODAY!

In the world of FLASH microcontrollers, experience matters. As the first semiconductor manufacturer to ship volume production FLASH microcontrollers, Motorola has long been a leader in FLASH technology. What does that mean to you exactly? Comprehensive solutions (chips, systems, software, development tools, and technical support) at prices that can be competitive with OTP or ROM devices now – and even more cost-effective over the long term.

FIND OUT MORE.

For more information about Motorola 8-bit FLASH microcontrollers built on DigitalDNA technology, call your Motorola sales representative or authorized distributor today. Or visit our web site at <http://www.mcu.motsp.com>.

WWW.MCU.MOTSPS.COM

