Freescale Semiconductor

HC08 Q

FAMILY OF 8-BIT MICROCONTROLLERS

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Flash technology. Low pin count. Fast time to market. Are you ready for the new world of low-end 8-bit microcontrollers?

Demand for low-end microcontrollers is greater than ever. That's why you need a supplier you can count on, with a comprehensive, flexible low-end microcontroller portfolio. But more than that, you need solutions that are enabled for the future.

Motorola is ready, with a trailblazing family of advanced, low-pin-count, 8-bit microcontrollers, built on a proven history of microcontroller leadership.

Meet the HC08 Q family.

Based on the HC08 architecture, the HC08 Q family includes three 8-pin and three 16-pin variations. And it's available now, in production quantities, at a surprisingly low manufacturer's suggested price. Most significantly, the HC08 Q family helps make it simple to incorporate the benefits of Flash technology into your designs, helping to reduce overall system costs and speed your time-to-market.

In addition, a variety of integrated peripherals make HC08 Q microcontrollers versatile enough for a wide range of systems — from computer peripherals to automotive electronics. This family is ideally suited for applications such as discrete replacement, appliances, control systems, home and industrial security systems, fluorescent light ballasts, and electromechanical replacement.

Features and benefits

High-performance 8-bit HC08 CPU:
- Object-code compatible with Motorola's 68HC05 architecture for easy migration
- Enables the higher performance required of many 8-bit applications while saving development time — as fast as 125 nsec minimum instruction cycle time
- Designed to allow efficient, compact modular coding in assembly or C with full 16-bit stackpointer and stack relative addressing
- Efficient instruction set with multiply and divide that is easy to learn and use

Memory:
- In-application, in-circuit re-programmable Flash memory (1.5K to 4K bytes)
- 128 bytes of random access memory (RAM)

Peripherals:
- Two-channel, 16-bit timer with selectable input capture, output compare or pulse width modulation (PWM)
- Internal clock oscillator — reduces board space and system costs by eliminating external components
- Four-channel 8-bit analog-to-digital converter (ADC) (on the QT2/QT4/QY2/QY4) — provides an easy interface to analog inputs such as sensors
- Flexible I/O — allows direct drive of LED and other circuits to eliminate external drivers and help reduce system costs
- System protection features, including watchdog timer and on-chip low voltage detect/reset to help reduce cost and increase reliability
- Space-sensitive packages — 8 PDIP, 8 SOIC, 16 PDIP, 16 SOIC, and 16 TSSOP — with more to come as the family develops
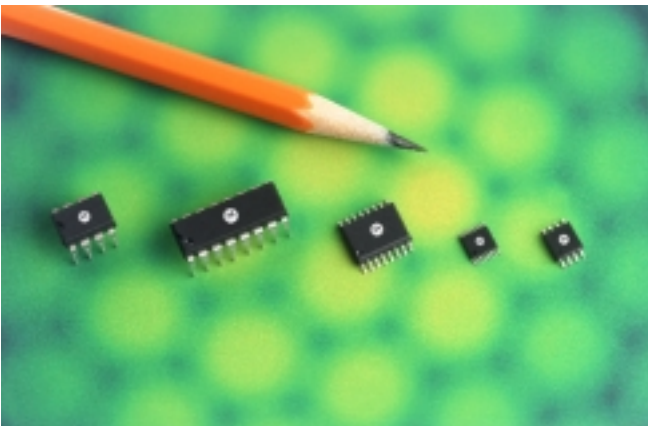
The HC08 Q family offers a variety of low-pin-count, low cost package options.

Take advantage of Motorola's comprehensive application development, debugging, programming and testing environment for the HC08 Q family.

Free* Metrowerks CodeWarrior™ Development Studio Special Edition for HC08

This industry-leading integrated development environment (IDE) enables you to generate highly optimized, ANSI-compliant C code for HC08 Q microcontrollers, featuring over 60 unique strategies to optimize performance or code density.

Also included:
- Processor Expert auto-code generator for on-chip peripherals, designed to allow you to drastically cut development time and improve code quality
- Full-chip simulation to enable software development and debug immediately without waiting for target hardware or requiring an evaluation board
- Comprehensive package also includes assembler, linker, debugger, and Flash programmer

CodeWarrior Development Studio Special Edition for HC08 is available at no charge for developers working with HC08 Q family microcontrollers. Simply download from the web, or order part CDCWSEHC08/D.

68HC908QT4 Demonstration Board (M68DEMO908QT4)

This demo board enables you to use the included CodeWarrior Development Studio Special Edition to modify demo code or develop new code using ASM or C, then program the Flash, and debug in real time — all with no additional hardware.

Features include:
- Battery-powered 8-pin QT4 device
- LEDs for user feedback
- Potentiometer for A/D input
- Push buttons for user input
- Access to all I/O for user-provided prototyping
- Software demo with application code utilizing the A/D, timers, and I/O

Motorola's comprehensive development tools make it simple to incorporate HC08 Q microcontrollers into your designs.

Outstanding 8-bit Flash performance from Motorola, the microcontroller market leader.

All the power of Motorola's advanced 2nd-generation 0.5μ Flash technology — today!

Flash-based systems offer ultra-fast programming, along with maximum flexibility and creativity. With Flash, your design can be reprogrammed many times during the development cycle, or even late into manufacturing. Upgrades can even be made in the field. It's never too late to fix bugs, and it's easy to deliver new features or improve performance, safety and security for your customers.

In 1994, Motorola was among the first to ship embedded Flash in volume quantities. Today, Motorola is the embedded Flash leader, with volume production of our advanced 0.5μ Flash technology for over two years. Thanks to our proven track record in the demanding automotive microcontroller market, our robust Flash meets the most stringent testing requirements.

Flash is the future for the low-end microcontroller market, and Motorola makes it affordable and easy to use today. In fact, our second-generation Flash is cost-competitive with traditional industry OTP offerings.

Other benefits include:
- Up to 100 times faster programming than most embedded Flash
- Easily usable for data EEPROM
- On-chip programming routines for easy in-application and in-circuit reprogramming
- Flexible block protection and security
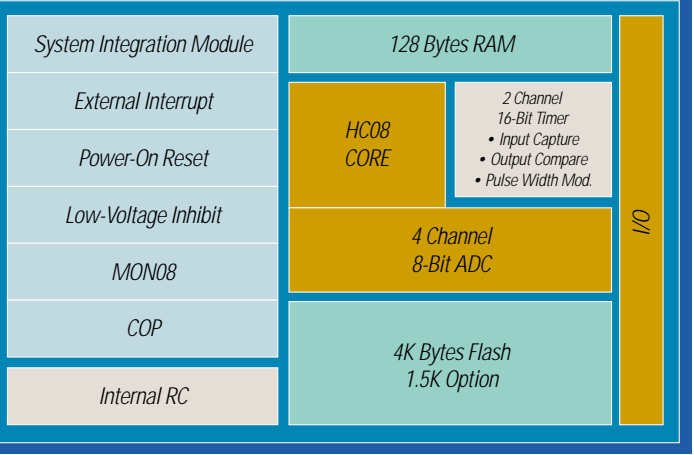- Reduced costs through elimination of scrap, costly rework and cost of installed socket

Speed your time-to-market with ease of use, convenience and outstanding support.

The HC08 Q family is designed for ease of use with silicon, software, development tools, reference designs and service all in one package.

We've included the resources you need, at your fingertips:
- Free* industry-leading CodeWarrior™ development software
- Wide range of hardware tools, from low-cost demo boards to high-performance emulators
- Free* online technical training course, with eleven learn-as-you-go modules
- Comprehensive collection of reference designs
- Fast-growing library of application notes
- Searchable FAQ database
- Broad third-party developer support

HC08 Q MICROCONTROLLER FAMILY

System Integration Module	128 Bytes RAM	
External Interrupt	HC08 CORE	2 Channel 16-Bit Timer • Input Capture • Output Compare • Pulse Width Mod.
Power-On Reset		
Low-Voltage Inhibit		
MON08	4 Channel 8-Bit ADC	I/O
COP		
Internal RC	4K Bytes Flash 1.5K Option	

The HC08 Q family includes six devices based on the HC08 architecture: the 8-pin 68HC908QT1, 68HC908QT2 and 68HC908QT4; and the 16-pin 68HC908QY1, 68HC908QY2 and 68HC908QY4.

Additional development tools include:
- M68MULTILINK08 — universal in-circuit programmer/debugger for all HC08s
- M68CYCLONE08 — includes all M68MULTILINK08 capabilities, plus the ability to function as a stand-alone HC08 programmer, with pushbuttons and LEDs to control operation
- KITMMEVS08QTQY — a traditional real-time ICE emulation system with target cables, upgradeable for all HC08s
- KITMMDS08QTQY — high-performance emulation system with advanced bus state analysis and dual-port ram capabilities to speed complex debugging tasks.

* Free to registered users.

Each member of the HC08 Q family offers very fast Flash programming times, flexible block protection and security features to help lower system costs and to help guard customers' intellectual property contained in software code.

MOTOROLA'S 68HC908QT/QY FAMILY

Common Features

CORE:	0.5 Micron HC08	EXT. INTERRUPTS:	IRQ, KBI, Timer IC
BUS SPEED:	8 MHz (125 ns min instruction)	OSCILLATOR:	- Internal oscillator with 3.2 MHz nominal frequency, trimmable +/-25%, +/-5% accuracy
TIMER:	2-Ch 16-bit timer with IC, OC or PWM		- Optional ext. RC, external clock or external resonator/xtal
VOLTAGE:	2.7 V – 5.5 V		
RAM:	128 bytes		
SCI/SPI:	Software programmable/app note available	OTHER FEATURES:	LVI, COP with auto wakeup from STOP, KBI

Device Features

Versions	68HC908QT1	68HC908QT2	68HC908QT4	68HC908QY1	68HC908QY2	68HC908QY4
FLASH	1.5K bytes	1.5K bytes	4K bytes	1.5K bytes	1.5K bytes	4K bytes
ADC	—	4-Ch, 8-bit	4-Ch, 8-bit	—	4-Ch, 8-bit	4-Ch, 8-bit
PACKAGE	8-Lead SOIC/PDIP	8-Lead SOIC/PDIP	8-Lead SOIC/PDIP	16-Lead SOIC/PDIP/ TSSOP	16-Lead SOIC/PDIP/ TSSOP	16-Lead SOIC/PDIP/ TSSOP
TEMP RANGE	-40 to +85˚C*	-40 to +85˚C*	-40 to +85˚C*	-40 to +125˚C	-40 to +125˚C	-40 to +125˚C

Contact your Sales Representative for Extended Temperature Availability.

No matter what combination of microcontroller processing power and peripherals you need, Motorola has got you covered.

Microcontrollers are being designed into more products and applications, across more and more markets, every day. In fact, by 2010, we expect the average person to interact with over 350 microcontrollers daily.

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