



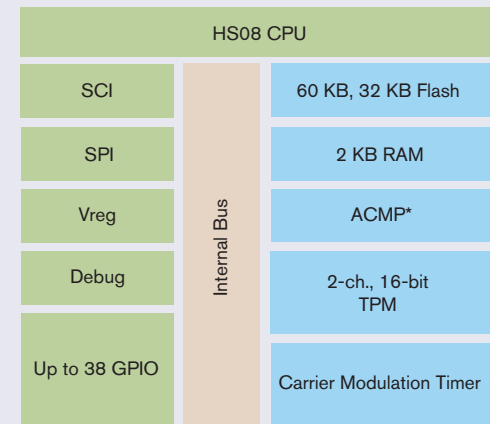
MC9S08Rx60/32

Target Applications

- > Universal remote controls
- > Handheld instruments
- > Portable consumer devices

Overview

Freescale Semiconductor's HCS08 family of microcontrollers (MCUs) is part of the popular and rapidly growing HC08 Family with advanced technology for long battery life, high performance and additional enhancements such as advanced on-chip development support. Using Freescale's industry-leading 0.25µ Flash, the Rx60/32 offers an upward migration path from Freescale's 68HC05 and 68HC08 architectures for applications that need lower power, more peripherals and higher performance. Other features include a carrier modulation timer for infrared remote control communications, a serial communications interface (SCI), an analog comparator and two programmable timer channels.



*ACMP not available in 28-pin packages

	MC9S08RCxx	MC9S08RDxx	MC9S08RExx	MC9S08RGxx
ACMP	✓		✓	✓
SCI		✓	✓	✓
SPI				✓

Features

8-bit HCS08 CPU Core

- > Low-power technology
 - Multiple power management modes including 100 nA powerdown
 - Optional autowake-up from Stop 2 or Stop 3 modes with internal timer that typically requires only 300 nA additional current
 - 1.8V operation
- > High performance when needed
 - 125 µs minimum instruction cycle time down to 1.8V at 8 MHz bus
- > C-optimized architecture with multiply and divide instructions

Benefits

- > Extends battery life with flexible power management
- > Designed to provide the higher performance required of many 8-bit applications, while allowing low-power 1.8V operation
- > C-optimized architecture produces extremely compact code with full 16-bit stack-pointer and stack-relative addressing
- > Multiply and divide instructions increase performance while reducing code size

On-Chip Debug Interface

- > Single-wire background debug module (BDM)
- > On-chip trace buffer with nine flexible trigger modes and multiple hardware breakpoints
- > Nonintrusive emulation
- > Real-time emulation of microcontroller functions at full operating voltage and frequency range with no limitations as compared to traditional emulators
- > Real-time in-circuit emulation and debug without expensive and cumbersome box emulators
- > Read/write memory and registers while running at full speed
- > Bus state analysis without the expense of a traditional emulator

Integrated Third-Generation Flash Memory

- > In-application reprogrammable
 - Self-timed, fast programming
 - Fast Flash page erase: 20 µs (512B)
- > Can program 8 bits in 20 µs while in burst mode
- > 10K write/erase cycles minimum; 100K typical
- > 15-year minimum data retention; 100 years typical
- > Internal program/erase voltage generation
- > Flash granularity: 512B Flash erase/ 2B Flash program
- > Flexible block protection and security
- > Ultra-fast programming reduces system cost
- > Command programming interface virtually eliminates complex programming algorithms
- > Flexibility/maximum creativity: Flash-based systems can be reprogrammed many times during the development cycle or late into the manufacturing cycle and can make in-application upgrades in the field
- > Flash can easily be used for data EEPROM

Carrier Modulation Timer

- > Consists of a carrier generator, modulator and transmitter, which generate infrared pulses
- > Remote control communications

Timer with Two Programmable Channels

- > Each channel programmable for:
 - Input capture, output compare or buffered pulse-width modulation (PWM)
 - PWM can be edge- or center-aligned
- > Flexible, programmable timer system
- > Center-aligned PWM designed to allow noise minimization by distributing the edges of PWM

Features

Benefits

Two Serial Communications Interfaces

- > One asynchronous serial communications interface (SCI)
 - Flexible 13-bit modulo-based baud rate generator
 - Double-buffered receive and transmit
- > One synchronous serial peripheral interface (SPI)

- > Asynchronous communication between the MCU and a terminal, computer or a network of microcontrollers with accurate band rate matching
- > High-speed communication between multiple MCUs or between MCU and serial peripherals

Analog Comparator

- > Full rail-to-rail supply operation
- > Selectable interrupt on rising edge, falling edge, or either rising or falling edge of comparator output
- > Option to compare unknown input to a fixed internal bandgap reference voltage or external user-supplied reference

- > Designed to help reduce overall system costs

System Protection

- > Selectable low-voltage detect/reset at nominal 1.8V
- > Low-battery warning
- > Computer operating properly (COP) watchdog timer

- > Designed to help reduce overall system costs
- > Designed to provide a simple, efficient method of data exchange between devices

Up to 39 Input/Output (I/O) Lines

- > Programmable pull-ups
- > High-current drivers
- > Eight keyboard interrupts

- > Designed to help reduce overall system costs
- > Designed to allow direct drive of LED and other circuits to eliminate external drivers and reduce system costs

Cost-Effective Development Tools

For more information on development tools, please refer to the Freescale Development Tool Selector Guide (SG1011).

DEMO9S08RG60 Cost-effective demonstration board in a small form factor with a serial port, switches, LEDs, BDM header and I/O header
\$49

USBMULTILINKBDM Universal HCS08/HCS12 in-circuit emulator, debugger, Flash programmer; USB PC interface
\$99

M68CYCLONEPRO HC08/HCS08/HC12/HCS12 stand-alone Flash programmer or in-circuit emulator, debugger, Flash programmer; USB, serial or Ethernet interface options
\$499

CWX-H08-SE CodeWarrior™ Special Edition for HC(S)08 MCUs; includes integrated development environment (IDE), linker, debugger, unlimited assembler, Processor Expert™ auto-code generator, full-chip simulation and 16 KB C compiler
Free

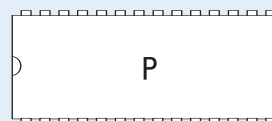
Application Notes

- AN2616 Getting Started with HCS08 and CodeWarrior Using C
- AN2596 Using the HCS08 Family On-Chip Debug System
- AN2497 HCS08 Background Debug Mode Versus HC08 Monitor Mode
- AN2688 Implementing a 10-bit Sigma-Delta Converter Using the HC9S08Rx MCU Family Analog Comparator

Package Options

Part Number	Package	Temp. Range
MC9S08RD32CDWE	28 SOIC	-40°C to +85°
MC9S08RD60CDWE	28 SOIC	-40°C to +85°C
MC9S08RD32CPE	28 PDIP	-40°C to +85°C
MC9S08RD60CPE	28 PDIP	-40°C to +85°C
MC9S08RC32CFJ	32 LQFP	-40°C to +85°C
MC9S08RC60CFJ	32 LQFP	-40°C to +85°C
MC9S08RD32CFJ	32 LQFP	-40°C to +85°C
MC9S08RD60CFJ	32 LQFP	-40°C to +85°C
MC9S08RE32CFJ	32 LQFP	-40°C to +85°C
MC9S08RE60CFJ	32 LQFP	-40°C to +85°C
MC9S08RC32CFG	44 LQFP	-40°C to +85°C
MC9S08RC60CFG	44 LQFP	-40°C to +85°C
MC9S08RD32CFG	44 LQFP	-40°C to +85°C
MC9S08RD60CFG	44 LQFP	-40°C to +85°C
MC9S08RE32CFG	44 LQFP	-40°C to +85°C
MC9S08RE60CFG	44 LQFP	-40°C to +85°C
MC9S08RG32CFG	44 LQFP	-40°C to +85°C
MC9S08RG60CFG	44 LQFP	-40°C to +85°C
MC9S08RG32CFJ	32 LQFP	-40°C to +85°C
MC9S08RG60CFJ	32 LQFP	-40°C to +85°C

16-Lead DIP



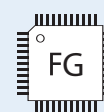
16-Lead DIP



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