

MC68HC908GR8/4

Target Applications

- > Sensors
- > Industrial and consumer communications
- > Home appliances
- > Security systems

Overview

Freescale Semiconductor's MC68HC908GR8 and MC68HC908GR4 microcontrollers (MCUs) use integrated second-generation Flash and are enhanced with embedded, on-chip functions that eliminate the need for external serial components. The 32 kHz Phase-Lock Loop (PLL) provides cost savings by replacing the need for expensive, high-speed crystals or noisy oscillators. The on-chip timebase module (TBM) further reduces costs by eliminating the need for external real-time clock and wake-up circuitry. Other features of the MC68HC908GR8 and the MC68HC908GR4 include an analog-to-digital converter (ADC), a serial communications interface (SCI), a serial peripheral interface (SPI), low-voltage inhibit (LVI) and a watchdog timer.

HC08 CPU	KBI
8 KB/4 KB Flash	6-ch., 8-bit ADC
384B RAM	SCI
PLL	SPI
COP	2-ch., 16-bit 1-ch., 16-bit Timer
LVI	Up to 21 GPIO

Features

High-Performance 68HC08 CPU Core

- > 8 MHz bus operation at 5V operation for 125 ns minimum instruction cycle time
- > 4 MHz bus operation at 3V for 250 ns minimum instruction cycle time
- > Efficient instruction set, including multiply and divide
- > 16 flexible addressing modes, including stack relative with 16-bit stack pointer
- > Fully static, low-voltage, low-power design with wait and stop modes

Benefits

- > Object code compatible with the 68HC05
- > Easy to learn and use architecture
- > C-optimized architecture provides compact code

Integrated Second-Generation Flash Memory

- > In-application reprogrammable
- > Extremely fast programming, encoding 64B in as fast as 2 ms
- > Flash programming across the 68HC08's full operating supply voltage with no extra programming voltage
- > 10K write/erase cycles minimum over temperature
- > 100K write/erase cycles typical
- > Flexible block protection and security

- > Cost-effective programming changes and field software upgrades via in-application programmability and reprogrammability
- > Reduces production programming costs through ultra-fast programming
- > Allows reprogrammable battery-powered applications
- > Byte-writable for data as well as program memory
- > Protects code from unauthorized reading and guards against unintentional writing/erasing of user-programmable segments of code

8-bit Analog-to-Digital Converter (ADC)

- > 6 channels
- > Single conversion in 17 μ s

- > Fast, easy conversion from analog inputs, such as temperature, pressure and fluid levels, to digital values for CPU processing

Clock Generation Module with Phase-Lock Loop (PLL)

- > Programmable clock frequency in integer multiples of external crystal reference
- > Crystal reference of 32 kHz to 100 kHz
- > External clock option with or without PLL

- > Provides high-performance using low-cost, low-frequency reference crystals
- > Reduces generated noise while still providing high-performance (up to 32 MHz internal clock)

Four Programmable 16-bit Timer Channels

- > 125 ns resolution at 8 MHz bus
- > Free-running counter or modulo up-counter

- > Each channel independently programmable for input capture, output compare or unbuffered pulse-width modulation (PWM)
- > Pairing timer channels provides a buffered PWM function

Features

Benefits

Timebase Module

- > Eight user-selectable periodic real-time interrupts
- > Optionally operate in low-power stop mode
- > Provides autowake-up from low-power stop mode to maintain real-time clock or check external device status such as sensors

Serial Communications Interface

- > UART asynchronous communications system
- > Flexible baud rate generator
- > Double-buffered transmit and receive
- > Optional hardware parity checking and generation
- > Enables high-speed asynchronous communication

Serial Peripheral Interface

- > Full-duplex, three-wire synchronous transfers
- > Maximum master bit rate of 4 MHz for 8 MHz system clock
- > High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals
- > Cost-effective serial peripheral expansion to applications including EEPROM, high-precision analog-to-digital and digital-to-analog converters, and real-time clocks

Computer Operating Properly Watchdog Timer

- > Issues reset in the event of runaway code

Selectable Trip Point Low-Voltage Inhibit

- > Improves reliability by resetting the MCU when voltage drops below trip point
- > Two trip points allow optimum operation in both 5V and 3V nominal systems
- > Integration reduces system cost

Up to 21 Bidirectional Input/Output (I/O) Lines

- > 10 mA sink/source capability on all I/O pins
- > 15 mA sink capability on two I/O pins
- > Keyboard scan with selectable interrupts on four I/O pins
- > Software programmable pull-ups on 13 I/O pins
- > High-current I/O allows direct drive of LED and other circuits to eliminate external drivers and reduce system costs
- > Keyboard scan with programmable pull-ups eliminates external glue logic when interfacing to simple keypads

Application Notes

AN1050 Designing for Electromagnetic Compatibility (EMC) with HCMOS Microcontrollers

AN1218 HC05 to HC08 Optimization

AN1219 M68HC08 Integer Math Routines

AN1259 System Design and Layout Techniques for Noise Reduction in MCU-Based Systems

AN1263 Designing for Electromagnetic Compatibility with Single-Chip Microcontrollers

AN1705 Noise Reduction Techniques for Microcontroller-Based Systems

AN1752 Data Structures for 8-bit MCUs

AN1831 Using MC68HC908 On-Chip Programming Routines

AN1837 Non-Volatile Memory Technology Overview

AN2093 Creating Efficient C Code for the MC68HC08

EB368 In-Circuit Programming of 68HC908GR8 Flash Memory

Cost-Effective Development Tools

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

FSICEKITGR8
\$2,195

Complete FSICE high-performance emulator kit; includes emulator module, cables, head adapters and programming adapters

M68EML08GZ
\$495

Emulation module for FSICE system

M68CYCLONEPRO
\$499

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

USBMULTILINK08
\$99

Universal HC08 in-circuit debugger and Flash programmer; USB PC interface

M68CPA08QF324448
\$199

Programming adapter for MON08 cables and single MCU: 32-pin 0.8 mm QFP packages, 44-pin 0.8 mm QFP packages and 48-pin 0.5 mm QFP packages

M68CPA08W1628T20
\$149

Programming adapter for MON08 cables and single MCU: 7.5 mm SOIC packages up to 28 pins, 5.3 mm SOIC packages up to 16 pins and TSSOP packages up to 20 pins

CWX-H08-SE
Free

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

Package Options

Part Number	Package	Temp. Range
MC68HC908GR8CFA	32 QFP	-40°C to +85°C
MC68HC908GR8CP	28 DIP	-40°C to +85°C
MC68HC908GR8CDW	28 SOIC	-40°C to +85°C
MC68HC908GR4CFA	32 QFP	-40°C to +85°C
MC68HC908GR4CP	28 DIP	-40°C to +85°C
MC68HC908GR4CDW	28 SOIC	-40°C to +85°C

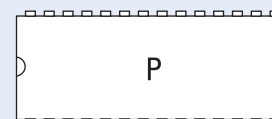
28-Lead SOIC



32-Lead QFP



28-Pin DIP



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