MC68HC908MR32/16

Target Applications

- Appliance compressors
- Smart appliances
- Industrial compressors (HVAC)
- Variable speed pumps (well, gas)
- HVAC blowers and fans
- General-purpose drives
- Exercise equipment
- Electric-powered recreational vehicles
- Medical scanners/pumps
- Printers/scanners/fax machines
- Electric lawn equipment
- Throttle control
- Seat module control
- Uninterruptable power supplies

Overview

Higher performance, advanced integration and reduced system costs are among the benefits generated by the MC68HC908MR32 and the MC68HC908MR16, Freescale Semiconductor's highly integrated 8-bit Flash microcontrollers (MCUs) designed for enhanced electronic motion control. Engineered for applications as varied as smart appliances, automotive subsystems, industrial controls and uninterruptable power supplies, the MC68HC908MR32 and the MC68HC908MR16 include 6-channel, 12-bit pulse-width modulation (PWM) for a comprehensive AC motor timer solution supporting both center- and edge-aligned modes with automatic dead-time insertion and patented dead-time compensation capability. This leading-edge technology promotes versatility, while lowering costs with greater flexibility allowing configuration for several drive topographies in various motor types.

HC08 CPU	10-ch.,10-bit ADC
32 KB/16 KB Flash	SCI
768B RAM	SPI
6 x 12-bit PWM	4-ch. + 2-ch., 16-bit Timer
LVI	Up to 44 GPIO

Features	Benefits
High-Performance 68HC08 CPU Core	
> 8 MHz bus operation at 5V operation for 125 ns minimum instruction cycle time	> Object code compatible with the 68HC05
> Efficient instruction set, including multiply and divide	> Easy to learn and use architecture
> 16 flexible addressing modes, including stack relative with 16-bit stack pointer	> C-optimized architecture provides compact code
> Fully static, low-voltage, low-power design with wait and stop modes	
Integrated Second-Generation Flash Memory	
> In-application reprogrammable	> Cost-effective programming changes and field software upgrades via in-application programmability and reprogrammability
> Extremely fast programming, encoding 64B in as fast as 2 ms	> Reduces production programming costs through ultra-fast programming
> Flash programming across the 68HC08's full operating supply voltage with no extra programming voltage	> Byte-writable for data as well as program memory
> 10K write/erase cycles minimum over temperature	> Protects code from unauthorized reading and guards against unintentional writing/erasing of user-programmable segments of code
> Flexible block protection and security	
10-bit Analog-to-Digital Converter (ADC)	
> 10 channels	> Provides single or continuous conversion
> Single conversion in 17 μs	> Generates an interrupt when input signal exceeds a software programmable limit
12-bit Pulse-Width Modulation for Motor Control (PWMMC)	
> Three complementary or six independent PWM signals	> Provides multiple motor or multiphase control capability
> Programmable output polarity	> Reduces system cost through integration of digital-to-analog circuitry
> Edge- or center-aligned waveforms	> Includes patented distortion correction circuitry that dramatically reduces system noise and improves efficiency of the drive without the need for external current sensors
> Automatic dead-time generation/compensation	
> 20 mA sink on all PWMMC pins	
> Programmable fault detection	> Allows direct drive of the optocoupling stage
	> Guarantees immediate shutdown of the PWM outputs, ensuring motor and consumer safety
Clock Generation Module with Phase-Lock Loop (PLL)	
> Programmable clock frequency in integer multiples of external crystal reference	> Provides high performance using low-cost, low-frequency reference crystals
> Crystal reference of 1 MHz to 8 MHz	> Reduces generated noise while still providing high performance (up to 32 MHz internal clock)
> External clock option with or without PLL	

Features	Benefits
Six Programmable 16-bit Timer Channels	
> 125 ns resolution at 8 MHz bus	> Provides input capture, output compare or unbuffered PWM
> External clock input pin	
> Free-running counter or modulo up-counter	> Pairing timer channels provides a buffered PWM function
Serial Communications Interface (SCI)	
> UART asynchronous communications system	> Asynchronous communication between the microcontroller (MCU) and a terminal, computer or a network of microcontrollers
> Flexible baud rate generator	
> Double-buffered transmit and receive	
> Optional hardware parity checking and generation	
Serial Peripheral Interface (SPI)	
> Full-duplex, three-wire synchronous transfers	> High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals
> Maximum master bit rate of 4 MHz for 8 MHz system clock	
	> Cost-effective serial peripheral expansion to EEPROM, high-precision ADCs and digital-to-analog converters (DACs), real-time clocks, etc.
Computer Operating Properly (COP) Watchdog Timer	
	> Provides system protection in the event of runaway code by resetting the MCU to a known state
Low-Voltage Inhibit (LVI)	
	> Improves reliability by resetting the MCU when voltage drops below trip point
Up to 44 Bidirectional Input/Output (I/O) Lines	
> 10 mA sink/source capability on all I/O pins	> High-current I/O allows direct drive of LED and other circuits to eliminate external drivers and reduce system costs
> 15 mA sink capability on eight I/O pins	
> Keyboard scan with selectable interrupts on five I/O pins	> Keyboard scan with programmable pull-ups eliminates external glue logic when interfacing to simple keypads
> Software programmable pull-ups on I/O pins	

Cost-Effective Development Tools

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

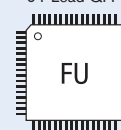|	
FSICEKITMR32 *$2,195*	Complete FSICE high-performance emulator kit; includes emulator module, cables, head adapters and programming adapters
M68EM08MR32 $495	Emulation module for FSICE system
M68CYCLONEPRO $499	HC08/HCS08/HC12/HCS12 stand-alone Flash programmer or in-circuit emulator, debugger, Flash programmer; USB, serial or Ethernet interface options
USBMULTILINK08 $99	Universal HC08 in-circuit debugger and Flash programmer; USB PC interface
M68CPA08QF5264 $199	Programming adapter for MON08 cables and single MCU: 52-pin 0.65 mm QFP packages, 64-pin 0.5 mm QFP packages and 64-pin 0.8 mm QFP packages
M68CPA08P40B56 $99	Programming adapter for MON08 cables and single MCU: DIP packages up to 40 pins and SDIP packages up to 56 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
MC68HC908MR32CFU	64 QFP	-40°C to +85°C
MC68HC908MR32VFU	64 QFP	-40°C to +105°C
MC68HC908MR32CB	56 SDIP	-40°C to +85°C
MC68HC908MR32VB	56 SDIP	-40°C to +105°C
MC68HC908MR16CFU	64 QFP	-40°C to +85°C
MC68HC908MR16VFU	64 QFP	-40°C to +105°C
MC68HC908MR16CB	56 SDIP	-40°C to +85°C
MC68HC908MR16VB	56 SDIP	-40°C to +105°C

64-Lead QFP

FU

56-Pin Plastic SDIP

B

Application Notes

AN1857	A 3-Phase AC Induction Motor Control System
AN1218	HC05 to HC08 Optimization
AN1844	Using 68HC908MR32 in Place of MC68HC908MR24
AN1837	Non-Volatile Memory Technology Review
AN2093	Creating Efficient C Code for the MC68HC08
AN1752	Data Structures for 8-bit MCUs
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
AN1050	Designing for Electromagnetic Compatibility (EMC) with HCMOS Microcontrollers
AN1705	Noise Reduction Techniques for Microcontroller-Based Systems

And many more—see our Web site at **www.freescale.com/mcu**.

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