

# MC68HC908LJ12

### Target Applications

- > Portable audio/video devices
- > Personal appliances
- > Air conditioners
- > Microwave ovens
- > Boilers
- > Cameras
- > Medical instruments
- > Remote controls
- > Electric power meters
- > Thermostats

### Overview

Freescale Semiconductor's MC68HC908LJ12 is a fully-integrated microcontroller (MCU) created to make system design easier by eliminating external peripherals, wherever possible. The 32 kHz Phase-Lock Loop (PLL) eliminates the need for expensive, high-speed crystals or noisy oscillators. The integrated second-generation Flash memory programs up to 100 times faster than previous Flash solutions and offers in-application programming. Features include a synchronous serial peripheral interface (SPI), an asynchronous serial communications interface (SCI) with infrared modulator/demodulator, an analog-to-digital converter (ADC), a liquid crystal display (LCD) driver, a real-time clock, an auto wakeup-from-stop feature, low-voltage inhibit (LVI) and a computer operating properly (COP) watchdog timer.

HC08 CPU	
12 KB Flash	2 x 2-ch., 16-bit Timer
512B RAM	SCI
	SPI
LCD	LVI
RTC	COP
6-ch., 10-bit ADC	Up to 32 GPIO

### Features

### Benefits

#### High-Performance 68HC08 CPU Core

- > 8 MHz bus operation (at 5V) for 125 ns minimum instruction cycle time
- > 4 MHz bus operation (at 3.3V) for 250 ns minimum instruction cycle time
- > 2 MHz bus operation (at 2.4V) for 500 ns minimum instruction cycle time
- > Efficient instruction set including multiply and divide
- > 16 flexible addressing modes including multiply and divide
- > Fully static low-voltage, low-power design with wait and stop modes

- > Object code compatible with the 68HC08 Family
- > Easy-to-learn, easy-to-use architecture
- > C-optimized architecture provides compact code

#### Integrated Second-Generation Flash Memory

- > In-application reprogrammable
- > Extremely fast programming; encoding 64 bytes in as fast as 2 ms
- > Flash programming across the 68HC08 devices' full operating supply voltage with no extra programming voltage
- > 10K write/erase cycles minimum over temperature
- > Flexible block protection and security
- > ROM-resident in-circuit programming and emulated EEPROM routines

- > 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 erasing/writing of user-programmable segments of code
- > ROM-resident programming routines simplify user codes

#### 10-bit Analog-to-Digital Converter

- > Six channels
- > Single conversion in 8.5  $\mu$ s

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

#### Clock Generation Module with 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)

#### Two Programmable, Two Channel 16-Bit Timers

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

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

#### Real-Time Clock Module

- > Second, minute, hour, day, day of week, month, year counters
- > Automatic calendar with leap year adjustment
- > 10 ms chronograph counter
- > Alarm and seven periodic interrupts

- > Provides auto-wakeup from low-power stop mode to check external device status (such as status of sensors)
- > Auto-wakeup can be periodic or at a defined time

## Features

## Benefits

### Serial Communications Interface with Infrared Modulator/Demodulator

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| <ul style="list-style-type: none"> <li>&gt; Universal asynchronous receiver/transmitter (UART) communications system</li> <li>&gt; Optional infrared modulator/demodulator</li> <li>&gt; Flexible baud rate generator</li> <li>&gt; Double buffered transmit and receive</li> <li>&gt; Optional hardware parity checking and generation</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Enables asynchronous serial communications with peripheral devices</li> <li>&gt; Built-in infrared modulator/demodulator eliminates external drivers and reduces system costs for remote controller applications</li> </ul> |
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### Serial Peripheral Interface (SPI)

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| <ul style="list-style-type: none"> <li>&gt; Full-duplex, three wire synchronous transfers</li> <li>&gt; Maximum master bit rate of 4 MHz for 8 MHz system clock</li> </ul> | <ul style="list-style-type: none"> <li>&gt; High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals</li> <li>&gt; Cost-effective serial peripheral expansion to EEPROM, high-precision ADC and DAC converters, etc.</li> </ul> |
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### Liquid Crystal Display (LCD) Driver

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| <ul style="list-style-type: none"> <li>&gt; 26 frontplane x 4 backplane configuration</li> <li>&gt; 27 frontplane x 3 backplane configuration</li> <li>&gt; 27 frontplane x 1 backplane configuration</li> <li>&gt; LCD voltages generated by internal circuits</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Direct connection to LCD panel for easy circuit design and lower costs</li> </ul> |
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### Computer Operating Properly (COP) Watchdog Timer

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| <ul style="list-style-type: none"> <li>&gt; Runs from an internal, independent 47 kHz radio-controlled clock</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Issues reset in the event of runaway codes</li> <li>&gt; Independent clock enables COP to operate even in the event of system clock failure.</li> </ul> |
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### Selectable Trip Point Low-Voltage Inhibit (LVI)

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| <ul style="list-style-type: none"> <li>&gt; Three trip points allow optimum operation in 5V, 3.3V and 2.5V nominal systems</li> </ul> | <ul style="list-style-type: none"> <li>&gt; Improves reliability by resetting the MCU when voltage drops below trip point</li> <li>&gt; Integration reduces system cost</li> </ul> |
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### Up to 32 Bidirectional Input/Output (I/O) Lines

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| <ul style="list-style-type: none"> <li>&gt; 8 mA sink/source on four I/O pins</li> <li>&gt; 15 mA sink/source on two I/O pins</li> <li>&gt; Keyboard scan with programmable pull-ups eliminates external glue logic when interfacing to simple keypads</li> </ul> | <ul style="list-style-type: none"> <li>&gt; High current I/O allows direct drive of LED and other circuits to eliminate external drivers and reduce system costs</li> <li>&gt; Keyboard scan with selectable interrupts on eight I/O pins</li> </ul> |
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## Application Notes

- AN2093 Creating Efficient C Code for the MC68HC08
- AN1219 M68HC08 Integer Math Routines
- AN1218 HC05 to HC08 Optimization
- AN1837 Non-Volatile Memory Technology Overview
- AN1752 Data Structures for 8-bit MCUs
- 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

**Learn More:** For more information about Freescale's products, please visit [www.freescale.com](http://www.freescale.com).

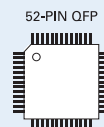
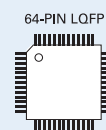
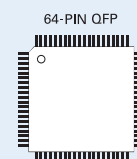
## Cost-Effective Development Tools

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

<p><b>FSICEKITJLJK</b> <b>\$3,195*</b></p>	<p>Complete FSICE high-performance emulator kit; includes emulator module, cables, head adapters and programming adapters</p>
<p><b>M68EML08JLJK</b> <b>\$495*</b></p>	<p>Emulation module for FSICE system</p>
<p><b>M68CYCLONEPRO</b> <b>\$499*</b></p>	<p>HC08/HCS08/HC12/HCS12 stand-alone Flash programmer or in-circuit emulator, debugger, Flash programmer; USB, serial or Ethernet interface options</p>
<p><b>USBMULTILINK08</b> <b>\$99*</b></p>	<p>Universal HC08 in-circuit debugger and Flash programmer; USB PC interface</p>
<p><b>M68CPA08QF80</b> <b>\$199*</b></p>	<p>Programming adapter for MON08 cables and single MCU: 80-pin 0.5 mm QFP and 80-pin 0.65 mm QFP packages</p>
<p><b>M68CPA08QF5264</b> <b>\$199*</b></p>	<p>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</p>
<p><b>CWX-H08-SE</b> <b>Free*</b></p>	<p>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</p>

## Package Options

Part Number	Package	Temp. Range
MC68HC908LJ12CFU	64 QFP (14 X 14)	-40°C to +85°C
MC68HC908LJ12CFB	52 QFP (10 X 10)	-40°C to +85°C
MC68HC908LJ12CPB	64 LQFP (10 X 10)	-40°C to +85°C



\*Price indicated is MSRP.

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