

## 8-bit Microcontrollers

# MC908QC16/8

### Target Applications

> Various applications including:

- Mirrors
- Climate control
- Wiper control
- Lighting
- Window lift
- Sunroof
- Appliances
- Control systems
- Home and industrial security systems
- Motion control

### Overview

Freescale Semiconductor's MC908QC family of microcontrollers (MCUs) is positioned to support HC08 core small-package 8-bit microcontrollers and the low-end LIN market. QC devices are low voltage with on-chip in-circuit Flash memory programmable down to 1.8 volts. The functionality is completed with strong analog capabilities, a complete set of serial modules and robust memory options. These products are fully LIN 2.0 and J2602 compliant. They are intended to be used as LIN slaves where the application requires cost-effective hardware solutions. A variety of small packages (16-, 20- and 28-pin), together with the optimized peripheral sets and the powerful HC08 CPU, make this an ideal low-end controller.

### Cost-Effective LIN Family

Features	Benefits
<b>Second-Generation Flash or Cost-Effective ROM Memory Options</b>	
<ul style="list-style-type: none"> <li>&gt; Embedded, fully automotive Flash</li> <li>&gt; Range of memory from 8 KB to 16 KB</li> <li>&gt; 10K write/erase cycles at -40°C to +125°C</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Qualified for high temperatures, shock, vibrations and humidity as required by the automotive industry</li> <li>&gt; Cost-reduction path for high-volume stable programs</li> </ul>
<ul style="list-style-type: none"> <li>&gt; Ultrafast programming: 64 bytes in 2 ms</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Reduced production programming costs through ultrafast programming at operating voltage</li> </ul>
<ul style="list-style-type: none"> <li>&gt; Flash block protection</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Helps protect code from unauthorized reading and to guard against unintentional writing/erasing of user-programmable segments of code</li> </ul>
<ul style="list-style-type: none"> <li>&gt; Flash reprogrammable in circuit</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Allows real-time Flash updates</li> </ul>
<b>Internal Clock Oscillator</b>	
<ul style="list-style-type: none"> <li>&gt; 1 MHz, 2 MHz and 3.2 MHz nominal bus frequency</li> <li>&gt; Fully trimmable internal oscillator</li> <li>&gt; Less than 0.4 percent oscillator accuracy within a LIN frame</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Eliminates the cost of all external clock components</li> <li>&gt; Helps to reduce board space</li> <li>&gt; Eliminates or reduces EMI generated from external clocks</li> <li>&gt; Allows option of external RC and external crystal</li> </ul>
<b>Enhanced SCI—LIN SCI Controller</b>	
<ul style="list-style-type: none"> <li>&gt; Programmable 8-bit or 9-bit character length</li> <li>&gt; Programmable baud rates</li> <li>&gt; Separately enabled transmitter and receiver</li> <li>&gt; Interrupt-driven operation with eight interrupt flags</li> <li>&gt; Capable of communication rates up to 115 kbps, encompassing all LIN baud rates</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Full-duplex operation allows simultaneous transmission and reception of data</li> <li>&gt; ESCI arbiter allows measurement of LIN synchronization data without separate timer hardware</li> <li>&gt; Finely adjustable baud rate prescalers allow extremely precise control of baud rate</li> <li>&gt; Enhanced detection of LIN break symbols to prevent false interrupts</li> </ul>
<b>High-Performance CPU</b>	
<ul style="list-style-type: none"> <li>&gt; Efficient instruction set, including multiply and divide</li> <li>&gt; 16 flexible addressing modes, including stack relative with 16-bit stack pointer</li> <li>&gt; Fully static, low-voltage, low-power design with WAIT and STOP modes</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Object code compatible with 68HC05</li> <li>&gt; Easy to learn and use architecture</li> <li>&gt; C-optimized architecture provides compact code</li> </ul>
<b>Periodic Wake-Up Module</b>	
<ul style="list-style-type: none"> <li>&gt; Selectable timeout periods (40 μs to three minutes)</li> <li>&gt; Exit from low-power STOP mode without external signals</li> <li>&gt; Dedicated low-power 32 kHz internal oscillator separate from the main system clock sources</li> <li>&gt; Accessible in all modes of operation (RUN, WAIT and STOP)</li> <li>&gt; Full-duplex operation allows simultaneous transmission and reception of data</li> </ul>	<ul style="list-style-type: none"> <li>&gt; ESCI arbiter allows measurement of LIN synchronization data without separate timer hardware</li> <li>&gt; Finely adjustable baud rate prescalers allow extremely precise control of baud rate</li> <li>&gt; Enhanced detection of LIN break symbols to prevent false interrupts</li> </ul>

HC08 CPU	8 KB/16 KB
Internal Clock Oscillator	Up to 512 KB RAM
1 x 2-ch., 16-bit Timer	Up to 10-ch., 10-bit ADC
1 x 4-ch., 16-bit Timer	Up to 24 GPIO
Periodic Wake-Up Module	ESCI
Computer Operating Properly	SPI
Wake-Ups	
LVI	
KBI	
POR	

## Cost-Effective Development Tools

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

<b>DEMO9S08QC16 \$75*</b>	Cost-effective demonstration board with potentiometer, LEDs, serial port and built-in USB-MON08 cable for debugging and programming
<b>FSICEKITQC16 \$1,695*</b>	Complete FSICE high-performance emulator kit; includes emulator module, cables, head adapters and programming adapters
<b>EML08QCBLTYE \$495*</b>	Emulation module for FSICE system
<b>M68CYCLONEPRO \$499*</b>	HC08/HCS08/HC12/HCS12 stand-alone Flash programmer or in-circuit emulator, debugger and Flash programmer; USB, serial or Ethernet interface options
<b>USBMULTILINK08 \$99*</b>	Universal HC08 in-circuit debugger and Flash programmer; USB PC interface
<b>PAS08W1628T28 \$149*</b>	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 28 pins
<b>PAS08P40B3256 \$99*</b>	Programming adapter for MON08 cables and single MCU: DIP packages up to 40 pins and SDIP packages
<b>CWX-H08-SE Free</b>	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

\*Manufacturer Suggested Resale Price

## Data Sheets

MC908QC16

### Device and Package Options

Part Number	Package	Temp. Range
MC908QC16CDRE	28 TSSOP	-40°C to +85°C
MC908QC16CDSE	20 TSSOP	-40°C to +85°C
MC908QC16CDTE	16 TSSOP	-40°C to +85°C
MC908QC16CDXE	16 SOIC	-40°C to +85°C
MC908QC16CDYE	20 SOIC	-40°C to +85°C
MC908QC16CDZE	28 SOIC	-40°C to +85°C
MC908QC16VDRE	28 TSSOP	-40°C to +105°C
MC908QC16VDSE	20 TSSOP	-40°C to +105°C
MC908QC16MDRE	28 TSSOP	-40°C to +125°C
MC908QC16MDSE	20 TSSOP	-40°C to +125°C
MC908QC8CDRE	28 TSSOP	-40°C to +85°C
MC908QC8CDSE	20 TSSOP	-40°C to +85°C
MC908QC8CDTE	16 TSSOP	-40°C to +85°C
MC908QC8CDXE	16 SOIC	-40°C to +85°C
MC908QC8CDYE	20 SOIC	-40°C to +85°C
MC908QC8CDZE	28 SOIC	-40°C to +85°C
MC908QC8VDRE	28 TSSOP	-40°C to +105°C
MC908QC8VDSE	20 TSSOP	-40°C to +105°C
MC908QC8MDRE	28 TSSOP	-40°C to +125°C
MC908QC8MDSE	20 TSSOP	-40°C to +125°C

### Application Notes: A Selection of More Than 300 Available

AN2767	LIN 2.0 Connectivity on Freescale 8/16-bit Using Volcano LTP
AN2575	MC68HC908EY16 ESCI LIN Drivers
AN2884	LIN 2.0 Door Lock Slave
AN2885	LIN 2.0 Mirror Slave Unit
AN2573	LINKits LIN Evaluation Boards
AN2560	MC68HC908EY16 IR Receiver for Remote Control of LIN Robot
AN2470	MC68HC908EY16 Controlled Robot Using the LIN Bus
AN2343	HC908EY16 LIN Monitor
AN2264	LIN Node Temperature Display
AN2205	Car Door Keypad Using LIN
AN2295	Developer's Serial Bootloader for M68HC08 and HCS08 MCUs
AN2312	MC68HC908QY4 Internal Oscillator Usage Notes
AN2317	Low-Cost Programming and Debugging Options for M68HC08 MCUs
AN2438	ADC Definitions and Specifications

16-Lead TSSOP



25.6 mil/0.65 mm Pitch  
5 mm x 4.4 mm Body

16-Lead SOIC



50 mil/1.27 mm Pitch  
10.3 mm x 7.5 mm Body

20-Lead TSSOP



25.6 mil/0.65 mm Pitch  
6.5 mm x 4.4 mm Body

20-Lead SOIC



50 mil/1.27 mm Pitch  
1.28 mm x 7.5 mm Body

28-Lead TSSOP



25.6 mil/.65 mm Pitch  
9.7 mm x 4.4 mm Body

28-Lead SOIC



50 mil/1.27 mm Pitch  
18 mm x 7.5 mm Body

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

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Document Number: MC908QC168FS

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