# E·XFL



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#### What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "<u>Embedded -</u> <u>Microcontrollers</u>"

#### Details

Product Status	Obsolete
Core Processor	HC08
Core Size	8-Bit
Speed	8MHz
Connectivity	SCI, SPI
Peripherals	LVD, POR, PWM
Number of I/O	24
Program Memory Size	16KB (16K × 8)
Program Memory Type	FLASH
EEPROM Size	
RAM Size	512 x 8
Voltage - Supply (Vcc/Vdd)	3V ~ 5.5V
Data Converters	A/D 10x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	28-SOIC (0.295", 7.50mm Width)
Supplier Device Package	28-SOIC
Purchase URL	https://www.e-xfl.com/product-detail/nxp-semiconductors/mc908qc16cdzer

Email: info@E-XFL.COM

Address: Room A, 16/F, Full Win Commercial Centre, 573 Nathan Road, Mongkok, Hong Kong

## HC08 QC Family Fact Sheet

#### Overview

Freescale's general market QC family of small-package, 8-bit microcontrollers is based on the popular HC08 core. The QC family members have strong analog capabilities, a complete set of serial modules and robust memory options. The QC family is fully local interconnect network (LIN) 2.0 and J2602 compliant and can function as LIN slaves for applications that require a cost-effective hardware solution.

A variety of small packages (16-, 20- and 28-pin), combined with optimized peripheral sets and a powerful HC08 CPU, make this an attractive low-end controller family for a wide range of applications.

#### **Typical Applications**

One of the QC family's primary features, ideal for the automotive industry is LIN, a UART-based, single-master, multiple-slave networking architecture. With up to 16 KB of flash memory, high-pin-count packages and an additional timer with three-phase motion control, the QC is also a cost-effective solution for low-end consumer and industrial applications.

Application Segments	Specific Application Examples
Roof	Sensor, light sensor, light control, sun roof
Steering wheel	Cruise control, wiper, turning signal, climate control, radio
Seat	Seat position motors, occupancy sensor, control panel
Engine	Sensors, small motors
Climate	Small motors, control panel
Door	Mirror, central ECU, mirror switch, window lift, seat control switch, door lock
Industrial control	Robots, stepper motors, factory automation equipment
Motion	Camera zoom control, door openers, treadmills, toys

Features	Benefits
Second-Generation Flash or Cost-Effective ROM	I Memory Options
<ul> <li>Embedded, fully automotive-qualified flash available</li> <li>Range of memory from 4 KB to 16 KB</li> <li>10K write/erase cycles at -40°C to +125°C</li> </ul>	<ul> <li>Qualified for high temperatures, shock, vibration and humidity</li> <li>Cost-reduction path for high-volume, stable programs</li> </ul>
Ultra-fast programming: 64 bytes in 2 ms	<ul> <li>Reduced production costs through ultra-fast programming at operating voltage</li> </ul>
Flash block protection	<ul> <li>Helps protect code from unauthorized reading and to guard against unintentional writing/ erasing of user-programmable segments of code</li> </ul>
Flash reprogrammable in circuit	Allows real-time flash updates
Internal Clock Oscillator	
<ul> <li>1 MHz, 2 MHz and 3.2 MHz nominal bus frequencies</li> <li>Fully trimmable internal oscillator</li> <li>Less than 0.4 percent oscillator accuracy within a LIN frame</li> </ul>	<ul> <li>Eliminates the cost for external clock components</li> <li>Reduces board space</li> <li>Eliminates or reduces EMI generated from external clocks</li> <li>Allows option of external RC and external crystal</li> </ul>
Enhanced SCI-LIN Controller	
<ul> <li>Full-duplex operation</li> <li>Programmable 8-bit or 9-bit character length</li> <li>Programmable baud rates</li> <li>Separately enabled transmitter and receiver</li> <li>Interrupt-driven operation with eight interrupt flags</li> <li>Capable of communication rates up to 115.000 bps. encompassing all LIN baud rates</li> </ul>	<ul> <li>Simultaneous transmission and reception of data</li> <li>Finely adjustable baud rate prescalers allow precise control of baud rate</li> <li>ESCI arbiter allows measurement of LIN synchronization data without separate timer hardware</li> <li>Enhanced detection of LIN break symbols to prevent false interrupts</li> </ul>

- Selectable timeout periods (40 µs to three minutes)
- Dedicated low-power, 32 kHz internal oscillator separate from the main system clock sources
- Full-duplex operation

- Accessible in all modes of operation (run, wait and stop)
- Flexibility to exit from low-power stop mode without external signals
- Provides simultaneous transmission and reception of data

Root Part Number	Flash	ROM Available	RAM	UART	SPI	Analog (ADC)	Timer	Clock	Pin Count	Additiona Features	Operating Voltage	Market Focus
908QC16	16 KB	1	512B	1xESCI	1	Up to 10-ch., 10-bit ADC	4-ch. + 2-ch.	OSC	16, 20, 28	16 MHz CPU, COP, LVI, POR, KBI	3.3 to 5.0	LIN/J2602, Watchdog, General Market
908QC8	8 KB	1	384B	1xESCI	1	Up to 10-ch., 10-bit ADC	4-ch. + 2-ch.	OSC	16, 20, 28	16 MHz CPU, COP, LVI, POR, KBI	3.3 to 5.0	LIN/J2602, Watchdog, General Market
908QC4	4 KB		384B	1xESCI	1	Up to 10-ch., 10-bit ADC	4-ch. + 2-ch.	OSC	16, 20, 28	16 MHz CPU, Cop, LVI, Por, KBI	3.3 to 5.0	LIN/J2602, Watchdog, General Market





#### t-Effective Develo m+ Toolo

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Cost-Effective Development 100	15
<b>DEMO908QC16</b> Cost-effective demonstration board wi built-in USB-MON08 cable for debugg programming with potentiometer, LED serial port for debugging and program	<b>\$75*</b> ith jing and s and a ming
FSICEKITQC16E Complete FSICE high-performance kit includes emulator module, cables, heat adapters and programming adapters	<b>\$1,695</b> * ad
EML08QCBLTYE Emulation module for FSICE system	\$495*
M68CYCLONEPROE HC08/HCS08/HC12/HCS12 stand-alo flash programmer, in-circuit emulator, debugger, flash programmer or Ethern interface options	<b>\$499*</b> ne et
<b>USBMULTILINK08E</b> Universal HC08 in-circuit debugger an flash programmer	<b>\$99</b> * d
PAS08W1628T28E Programming adapter for MON08 cab and single MCU: 7.5 mm SOIC package to 28 pins, 5.3 mm SOIC packages up 16 pins and TSSOP packages up to 24	\$195* les ges up to 8 pins
PAS08P40B3256E Programming adapter for MON08 cab single MCU: DIP packages up to 40 p SDIP packages	<b>\$170*</b> les and ins and
CodeWarrior® (Standard Edition: CWS-H08-STDED Professional Edition: CWS-H08-PRO Special Edition: CWX-HXX-SE) CodeWarrior is a comprehensive tool s for fast and easy MCU development. T software tool provides the capabilities required by engineers in the developm cycle to utilize the capabilities of the H architecture. Key features include: pro- manager, assembler, compiler, debugg full-chip simulation, flash programming and Processor Expert <sup>™</sup> technology, w provides automatic C-code generation for most HC08 on-chip peripherals.	D-CX, DED-CX, Set This ICO8 ject Jer, J gr, J hich

CodeWarrior Special Edition can be downloaded free\*\* of charge at www.freescale.com/codewarrior.

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

\*Manufacturer Suggested Resale Price \*\*Subject to License Agreement and Registration

### 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
AN2396	Servo Motor Control Application on a Local Area Interconnect Network (LIN)
AN2623	LIN Temperature Sensor Using the MC68HC908QY/QYMCU

### **Device and Package Options**

Part Number	Package	Temperature
MC908QC16CDTE	16TSSOP	-40°C to +85°C
MC908QC16VDTE	16TSSOP	-40°C to +105°C
MC908QC16MDTE	16TSSOP	-40°C to +125°C
MC908QC16CDSE	20TSSOP	-40°C to +85°C
MC908QC16VDSE	20TSSOP	-40°C to +105°C
MC908QC16MDSE	20TSSOP	-40°C to +125°C
MC908QC16CDRE	28TSSOP	-40°C to +85°C
MC908QC16VDRE	28TSSOP	-40°C to +105°C
MC908QC16MDRE	28TSSOP	-40°C to +125°C
MC908QC8CDTE	16TSSOP	-40°C to +85°C
MC908QC8VDTE	16TSSOP	-40°C to +105°C
MC908QC8MDTE	16TSSOP	-40°C to +125°C
MC908QC8CDSE	20TSSOP	-40°C to +85°C
MC908QC8VDSE	20TSSOP	-40°C to +105°C
MC908QC8MDSE	20TSSOP	-40°C to +125°C
MC908QC8CDRE	28TSSOP	-40°C to +85°C
MC908QC8VDRE	28TSSOP	-40°C to +105°C
MC908QC8MDRE	28TSSOP	-40°C to +125°C
MC908QC4CDTE	16TSSOP	-40°C to +85°C
MC908QC4VDTE	16TSSOP	-40°C to +105°C
MC908QC4MDTE	16TSSOP	-40°C to +125°C
MC908QC4CDSE	20TSSOP	-40°C to +85°C
MC908QC4VDSE	20TSSOP	-40°C to +105°C
MC908QC4MDSE	20TSSOP	-40°C to +125°C
MC908QC4CDRE	28TSSOP	-40°C to +85°C
MC908QC4VDRE	28TSSOP	-40°C to +105°C
MC908QC4MDRE	28TSSOP	-40°C to +125°C

Part Number	Package	Temperature
MC908QC16CDXE	16S0IC	-40°C to +85°C
MC908QC16CDYE	20S0IC	-40°C to +85°C
MC908QC16CDZE	28S0IC	-40°C to +85°C
MC908QC8CDXE	16S0IC	-40°C to +85°C
MC908QC8CDYE	20S0IC	-40°C to +85°C
MC908QC8CDZE	28S0IC	-40°C to +85°C

Automotive customers should request parts beginning in S instead of MC.

16-Lead TSSOP	16-Lead SOIC
DT	
25.6 mil/0.65 mm Pitch 5.0 mm x 4.4 mm Body	50 mil/1.27 mm Pitch 10.30 mm x 7.5 mm Body

20-Lead SOIC 888888888 DY .

25.6 mil/0.65 mm Pitch 6.50 mm x 4.4 mm Body 50 mil/1.27 mm Pitch 1.28 mm x 7.5 mm Body

28-Lead TSSOP 。 DR

20-Lead TSSOP

DS

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

DZ 50 mil/1.27 mm Pitch 18.0 mm x 7.5 mm Body

28-Lead SOIC

Learn More:

For current information about Freescale products and documentation, please visit www.freescale.com.



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