8-bit Microcontrollers

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 control	Camera zoom control, door openers, treadmills, toys

Cost-Effective LIN Family	
Features	**Benefits**
Second-Generation Flash or Cost-Effective ROM Memory Options	
• Embedded, fully automotive-qualified flash available • Range of memory from 4 KB to 16 KB • 10K write/erase cycles at -40°C to +125°C	• Qualified for high temperatures, shock, vibration and humidity • Cost-reduction path for high-volume, stable programs
• Ultra-fast programming: 64 bytes in 2 ms	• Reduced production costs through ultra-fast programming at operating voltage
• Flash block protection	• Helps protect code from unauthorized reading and to guard against unintentional writing/ erasing of user-programmable segments of code
• Flash reprogrammable in circuit	• Allows real-time flash updates
Internal Clock Oscillator	
• 1 MHz, 2 MHz and 3.2 MHz nominal bus frequencies • Fully trimmable internal oscillator • Less than 0.4 percent oscillator accuracy within a LIN frame	• Eliminates the cost for external clock components • Reduces board space • Eliminates or reduces EMI generated from external clocks • Allows option of external RC and external crystal
Enhanced SCI—LIN Controller	
• Full-duplex operation • Programmable 8-bit or 9-bit character length • Programmable baud rates • Separately enabled transmitter and receiver • Interrupt-driven operation with eight interrupt flags • Capable of communication rates up to 115,000 bps, encompassing all LIN baud rates	• Simultaneous transmission and reception of data • Finely adjustable baud rate prescalers allow precise control of baud rate • ESCI arbiter allows measurement of LIN synchronization data without separate timer hardware • Enhanced detection of LIN break symbols to prevent false interrupts
Periodic Wake-Up Module	
• 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	Additional Features	Operating Voltage	Market Focus
908QC16	16 KB	✓	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	✓	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

freescale semiconductor

Cost-Effective Development Tools

DEMO908QC16 **$75***
Cost-effective demonstration board with built-in USB-MON08 cable for debugging and programming with potentiometer, LEDs and a serial port for debugging and programming

FSICEKITQC16E **$1,695***
Complete FSICE high-performance kit includes emulator module, cables, head adapters and programming adapters

EML08QCBLTYE **$495***
Emulation module for FSICE system

M68CYCLONEPROE **$499***
HC08/HCS08/HC12/HCS12 stand-alone flash programmer, in-circuit emulator, debugger, flash programmer or Ethernet interface options

USBMULTILINK08E **$99***
Universal HC08 in-circuit debugger and flash programmer

PAS08W1628T28E **$195***
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

PAS08P40B3256E **$170***
Programming adapter for MON08 cables and single MCU: DIP packages up to 40 pins and SDIP packages

CodeWarrior®
(Standard Edition: CWS-H08-STDED-CX, Professional Edition: CWS-H08-PROED-CX, Special Edition: CWX-HXX-SE)
CodeWarrior is a comprehensive tool set for fast and easy MCU development. This software tool provides the capabilities required by engineers in the development cycle to utilize the capabilities of the HC08 architecture. Key features include: project manager, assembler, compiler, debugger, full-chip simulation, flash programming and Processor Expert™ technology, which provides automatic C-code generation for most HC08 on-chip peripherals. **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	16SOIC	–40°C to +85°C
MC908QC16CDYE	20SOIC	–40°C to +85°C
MC908QC16CDZE	28SOIC	–40°C to +85°C
MC908QC8CDXE	16SOIC	–40°C to +85°C
MC908QC8CDYE	20SOIC	–40°C to +85°C
MC908QC8CDZE	28SOIC	–40°C to +85°C

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

16-Lead TSSOP

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

16-Lead SOIC

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

20-Lead TSSOP

25.6 mil/0.65 mm Pitch
6.50 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
18.0 mm x 7.5 mm Body

Learn More: For current information about Freescale products and documentation, please visit **www.freescale.com**.

Document Number: 68HC908QCFS
REV 5

freescale semiconductor