LIN Master Solutions

Target Applications

> CAN/LIN gateways

> Body controllers

> LIN network controllers

HC9S12X, HC9S12, HC908AZ and HC908GZ Mean Greater Flexibility
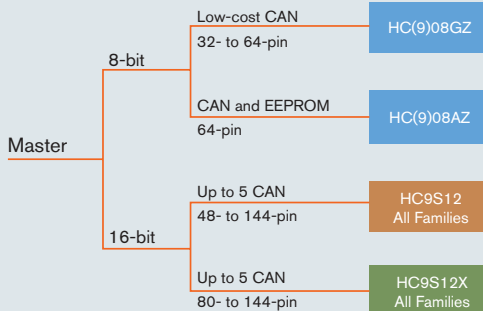
Overview

Freescale Semiconductor's HC908, HC9S12 and HC9S12X families of microcontrollers (MCUs) are ideal for all LIN master nodes with a wide range of on-chip peripherals and enhanced LIN features. Freescale's HC908, HC9S12 and HC9S12X set a standard for functionality versus cost in LIN applications.

These devices are automotive-qualified and include a range of peripherals, both standard and enhanced, to meet the requirements of LIN master node applications. Combined with unrivaled versatility, HC908, HC9S12 and HC9S12X MCUs are ideally suited for LIN.

MCUs in these families are available with a variety of modules, memory sizes in Flash and ROM, and multiple package types.

All products are fully LIN 2.0 and J2602 compliant.

WHICH FLASH OR ROM LIN MCU?

	Low-cost CAN 32- to 64-pin	HC(9)08GZ
8-bit	CAN and EEPROM 64-pin	HC(9)08AZ
Master	Up to 5 CAN 48- to 144-pin	HC9S12 All Families
16-bit	Up to 5 CAN 80- to 144-pin	HC9S12X All Families

Features	Benefits
Second-Generation Flash or Low-Cost ROM Memory Options	
> Embedded fully automotive Flash > Range of memory from 8 KB to 512 KB > 10K write/erase cycles at -40°C to +125°C	> Qualified for high temperatures, shock, vibrations and humidity as required by the automotive industry
> Low-cost ROM versions available—contact your sales representative	> Cost-reduction path for high-volume stable programs
> Ultra-fast programming: 64 bytes in 2 ms*	> Reduced production programming 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

*(HC08), 64 bytes in 0.8 ms (S12)

Features	Benefits
MSCAN Embedded CAN Controller	
> Implementation of the CAN protocol: version 2.0 A/B	> Receive buffer first-in, first-out (FIFO) structure allows greater flexibility of application code and reduced risk of buffer overflow (HC9S12)
> Low-power sleep mode	> Listen-only mode (HC9S12)
> Triple transmit buffer scheme allows multiple messages to be set up in advance to achieve optimized real-time performance	> Increased hardware filtering (HC9S12)
> Optimized design for maximum price/performance ratio	

Features	Benefits
SCI—LIN SCI Controller	
> Programmable 8-bit or 9-bit character length	> Suitable for LIN or normal SCI break
> Programmable baud rates	> Suitable for a number of communication rates from 48 bps–76,800 bps; encompasses LIN baud rates
> Separately enabled transmitter and receiver	
> Full-duplex operation	

Features	Benefits
Enhanced SCI—LIN SCI Controller	
> Programmable 8-bit or 9-bit character length	> Enhanced generation of LIN break symbols without extra software steps on each message
> Programmable baud rates	> Capable of communication rates up to 115,000 bps, encompassing all LIN baud rates
> Separately enabled transmitter and receiver	
> Interrupt-driven operation with eight interrupt flags	> Full-duplex operation allows simultaneous transmission and reception of data

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Development Tools

Freescale understands the critical importance that development tools play in the success of your microcontroller (MCU) design. That is why we provide a comprehensive selection of hardware and software development tools: Everything from high-quality, downloadable software to advanced emulators is available to speed your HC08 MCU-based design to market time. These tools form a critical part of the complete system solution that makes it easy to use our products, a solution that includes silicon, software, development tools, reference designs and service, all in one package.

HC08 Demonstration Boards (Order Number: DEMO908xxxx)

Freescale's cost effective demo boards provide everything that a designer needs to develop and evaluate applications for the targeted HC08 MCU family.

> Integrated debugging and Flash programming capabilities
> RS-232 communication port(s)
> User I/O for developing application code
> MCU breakout headers for access to the MCU's I/O and bus lines
> User manual and cables included

> Large prototyping area for custom circuit design and evaluation
> Some EVBs include Zero Insertion Force (ZIF) sockets
> Universal power supply
> CodeWarrior Development Studio for HC(S)08, Special Edition included

HC08 Evaluation Boards (Order Number: M68EVB908xxxx or EVB908xxxx)

Advance application development platforms that allow designers to conduct detail evaluation of HC08 MCUs.

> Integrated debugging and Flash programming capabilities
> Demonstration code written in C
> User I/O for developing application code
> Quick start guide, user manual and cables included

> RS-232 communication port
> Header connectors for access to the MCU's I/O and bus lines
> CodeWarrior™ Development Studio for HC(S)08, Special Edition included

MON08 MULTLINK (Order Number: USBMULTILINK08)

The MON08 Multilink is an easy-to-use, low-cost development tool for Freescale HC08 Flash MCUs. It provides in-circuit emulation, debugging and Flash programming through the HC08's standard MON08 serial debug/breakpoint interface.

> Universal development tool for all MON08 HC08s
> Real-time, in-circuit emulation and debug
> Fast in-circuit Flash programming
> Autodetects baud rate and frequency
> Provides optional overdrive clock to target
> Supports 2V to 5.5V HC08s

> Automatically cycles power for security checks (up to 125 mA)
> Standard MON08, 16-pin target application interface
> USB interface
> CodeWarrior Development Studio for HC(S)08, Special Edition included

Cyclone Pro (Order Number: M68CYCLONEPRO)

The Cyclone Pro is a stand-alone programmer with push buttons and LEDs to control operation, but also has all the capabilities of the MON08 and BDM Multilink cables. Cyclone Pro is the universal in-circuit debugging, Flash programming, and real-time emulation development tool for Freescale HC08, HCS08, HC12, and HCS12 MCUs.

> Fast, in-circuit stand-alone programming
> Simple push button and LED user interface
> Host-based programming with scripting capability to execute a series of commands
> Automates programming of test routines, test execution, erase and final software programming

> Real-time, in-circuit emulation and debug
> Integrated BDM and MON08 interfaces
> CodeWarrior Development Studio for HC(S)08 and HCS12, Special Edition included

HC08 Programming Adapters (Order Number: M68CPA08xxxx)

HC08 Programming Adapters are designed to work with in-circuit programmers that use the standard 16-pin MON08 interface. The M68CPA08xxxx are ideal for programming engineering samples and small volumes of prototype MCUs.

> Standard 16-pin MON08 header
> Package-specific ZIF sockets
> ZIF Socket breakout header

> Jumper wires
> CodeWarrior Development Studio for HC(S)08, Special Edition included

Third-Party Hardware and Software

Freescale works closely with a broad range of companies to provide extensive development support from adapters to C compilers to real-time operating systems. The software and development tool selector guide (Order Number: SG1011) has a summary listing of these solutions along with contact information.

16-bit Development Tools

M68MULTILINK12

Universal HC12/HCS12 in-circuit emulator; debugger and Flash programming through BDM interface

M68KIT912DP256

Includes M68MULTILINK12 and an MC9S12DP256 evaluation board; SCBDMPGMR12, 16-bit BDM stand-aloneprogrammer; evaluation boards from Metrowerks; compiler/debuggers from Cosmic, Metrowerks and IAR; BDM debugger from Lauterbach, Hitex and Nohau; emulators from Hitex, Lauterbach, iSystems and Nohau; programmers from Hitex, Nohau, I Systems, Noral, P&E Microcomputer, Lauterbach and Promik

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Need a CAN to LIN master MCU?
MSCAN and LIN SCI?

HC(9)08GZ

Pin-compatible with non-CAN HC(9)08GRxxA?

Need a CAN to LIN master MCU?
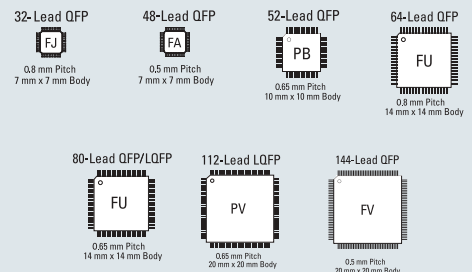*And an embedded EEPROM?*

HC(9)08AZ, HC9S12 or HC9S12X

Application Notes:
A Selection of More Than 300 Available

AN2103	Local Interconnect Network (LIN) Demonstration
AN2205	Car Door Keypad Using LIN
AN2206	Security and Protection on the HCS12 Family
AN2250	Audio Reproduction on HCS12 Microcontrollers
AN2264	LIN Node Temperature Display
AN2767	LIN 2.0 Connectivity on Freescale 8/16-bit MCUs Using Volcano LTP
AN2342	Opto Isolation Circuits for In-Circuit Debugging of 68HC9(S)12 and 68HC908 Microcontrollers
AN2396	Servo Motor Control Application on a Local Area Interconnect Network (LIN)
AN2573	LINkits LIN Evaluation Boards
BCANPSV2.0	Bosch Controller Area Network (CAN) Version 2.0 Protocol Standard
EB386	HCS12 D-Family Compatibility

Device and Package Options

> Huge range of package solutions available

32-Lead QFP	48-Lead QFP	52-Lead QFP	64-Lead QFP
FJ	FA	PB	FU
0.8 mm Pitch 7 mm x 7 mm Body	0.5 mm Pitch 7 mm x 7 mm Body	0.65 mm Pitch 10 mm x 10 mm Body	0.8 mm Pitch 14 mm x 14 mm Body

80-Lead QFP/LQFP	112-Lead LQFP	144-Lead QFP
FU	PV	FV
0.65 mm Pitch 14 mm x 14 mm Body	0.65 mm Pitch 20 mm x 20 mm Body	0.5 mm Pitch 20 mm x 20 mm Body

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Learn More: For more information about Freescale's LIN products and services, please visit us at **www.freescale.com/lin**.

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