LIN Slave Solutions

Target Applications

> Door systems
> Power mirrors
> Window lift
> Roof
> HVAC control
> Fan control
> Light control

More Options and Flexibility for the Low-Cost LIN Bus

Overview

Freescale Semiconductor's HC908 family of microcontrollers (MCUs) provides a wide choice of pin-compatible options to help reduce costs and maximize development reuse. Freescale's HC08 sets a standard for functionality versus cost in LIN applications.

These devices are automotive-qualified and include a range of enhanced peripherals to meet the requirements of LIN slave applications. Combined with unrivaled choice, HC908 is an ideal choice for LIN.

MCUs in this family use the enhanced HC908 central processor unit (CPU08) and 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 LIN SLAVE MCU?

Slave		
Ultra-low-cost software LIN 8- to 16-pin		HC08QT/QY
Low-cost hardware LIN 16-pin		HC08QB
Low-cost hardware LIN 16- to 28-pin		HC08QC
Low-cost hardware LIN with SLIC 16-pin		HC08QL
Mid-range LIN 32-pin		HC08EY
High-functionality LIN 28- to 64-pin		HC08GRxxA

Features	Benefits
Second-Generation Flash or Low-Cost ROM Memory Options	
> Embedded fully automotive Flash > Range of memory from 1 KB to 60 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
Slave LIN Interface Controller (SLIC) Module	
> Full LIN message buffering of identifier and eight data bytes	> Input clock tolerance as high as ±50 percent, allowing internal oscillator to remain untrimmed
> Automatic baud rate and LIN message frame synchronization	> Incoming break symbols allowed to be 10 to 20 bit times without message loss
> Automatic processing and verification of LIN header (SYNCH break and byte)	> Minimizes CPU resource requirement, maintaining performance, even in traffic-intensive applications
> Automatic checksum calculation and verification with error reporting	
> Maximum of two interrupts per LIN message frame	
> Streamlined interrupt servicing through use of a state vector register	
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
Oscillator Modules	
Variety of flexible oscillator modules across six LIN slave families:	
> Internal clock generator (ICG)	> ICG requires no external circuitry
> Clock generation module (CGM) with PLL	> CGM has user-selectable clockout feature with divide by 1, 2, 4 and 8 of the crystal frequency
> Internal RC (IRC) oscillator	> IRC is a very cost-effective trimmable internal oscillator suitable for LIN-based applications

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...opment 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.

Need low cost?
8- to 28-pin software and hardware LIN implementation options?

HC(9)08QY/QB/QC/QL

Internal RC included

Need on-chip oscillator?
Competitive Flash and ROM?

HC(9)08EY

Need ROM and Flash? 4 KB–60 KB?
Pin compatible? 32/48/64 QFP?

HC(9)08GRxxA

Application Notes:
A Selection of More Than 300 Available

AN2103	Local Interconnect Network (LIN) Demonstration
AN2205	Car Door Keypad Using LIN
AN2264	LIN Node Temperature Display
AN2432	LIN Sample Application for the MC68HC908EY16 Evaluation Board
AN2470	NC68HC908EY16 Controlled Robot Using the LIN Bus
AN2498	Initial Trimming of the MC68HC908 ICG
AN2600	A Simple Keypad Using LIN with the MC68HC908QT/QY MCU
AN2623	LIN Temperature Sensor Using the MC68HC908QY/QY MCU
AN2640	HC908QY4/QT4 Microcontroller (MCU) Application Hints
AN2767	LIN 2.0 Connectivity on Freescale 8/16-bit MCUs Using Volcano LTP
AN2884	LIN 2.0 Door Lock Slave
AN2885	LIN 2.0 Mirror Slave Unit

8-Lead SOIC*
50 mil/1.27 mm Pitch
5.3 mm x 7.5 mm Body

8-Pin Plastic DIP*
100 mil/2.54 mm Pitch
0.38 in x 0.25 in Body
(100 mil x 300 mil pin centers)

16-Pin TSSOP
DT
16-Pin TSSOP
25 mil/.64 mm Pitch
5.0 mm x 4.4 mm Body

16-Lead SOIC
DW
50 mil/1.27 mm Pitch
10.35 mm x 7.5 mm Body

16-Pin Plastic DIP
P
100 mil/2.54 mm Pitch
0.75 in x 0.25 in Body
(100 mil x 300 mil pin centers)

20-Lead SOIC
DW
50 mil/1.27 mm Pitch
12.8 mm x 7.5 mm Body

28-Lead SOIC
DW
50 mil/1.27 mm Pitch
18.0 mm x 7.5 mm Body

28-Pin DIP
P
100 mil/2.54 mm Pitch
1.45 in x 0.55 in Body
(100 mil x 600 mil pin centers)

20-Lead TSSOP
25 mil/0.64 mm Pitch
6.5 mm x 4.4 mm Body

28-Lead TSSOP
25 mil/0.64 mm Pitch
9.7 mm x 4.4 mm Body

32-Lead QFP
FJ
0.8 mm Pitch
7 mm x 7 mm Body

48-Lead QFP
FA
0.5 mm Pitch
7 mm x 7 mm Body

64-Lead QFP
FU
0.8 mm Pitch
14 mm x 14 mm Body

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

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