68HC(9)08GRxxA

Target Applications

Various automotive applications including:

> HVAC

> Light leveling

> Mirrors

> Body control

Overview

Freescale Semiconductor's 68HC08GRxxA family of microcontrollers (MCUs) targets where a single MCU family covering 4 KB–60 KB memory will be required for a LIN platform—maximizing reuse and further reducing costs. This family is available in the popular QFP package with options of 32, 48 or 64 pins, 28-pin SOIC and PDIP, with a choice of 30 family members. Additionally, the GRxxA Family has enhanced LIN SCI and up to a 10-bit ADC. A further advantage for designers is that the HCO8GRxxA Family is fully pin-compatible with the LIN master family, HC08GZ with MSCAN, allowing real flexibility and an opportunity for scalable systems.

All products are fully LIN 2.0 and J2602 compliant.

HC08 CPU	Up to 60 KB Flash
Up to 24-ch., 8- or 10-bit ADC	Up to 2 KB RAM
Up to 53 GPIO	ESCI/SCI
COP	SPI
Wake-Ups	Clock Generator Module
Up to 2+6-ch., 16-bit Timer	

High-End LIN Slave Family

Features	Benefits
Second-Generation Flash or Low-Cost ROM Memory Options	
> Embedded fully automotive Flash > Range of memory from 4 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
Enhanced SCI—LIN SCI Controller	
> Programmable 8-bit or 9-bit character length	> Full-duplex operation allows simultaneous transmission and reception of data
> Programmable baud rates	> ESCI arbiter allows measurement of LIN synchronization data without separate timer hardware
> Separately enabled transmitter and receiver	
> Interrupt-driven operation with eight interrupt flags	> Finely adjustable baud rate prescalers allow extremely precise control of baud rate
> Capable of communication rates up to 115,000 bps, encompassing all LIN baud rates	> Enhanced detection of LIN break symbols to prevent false interrupts
Clock Generation Module and PLL	
> Supports 1 MHz–8 MHz crystals	> User selection of having the oscillator enabled or disabled during stop mode
> User-selectable clockout feature with divide by 1, 2 and 4 crystal frequency	
High-Performance 68HC08 CPU Core	
> Efficient instruction set, including multiply and divide	> Object code compatible with the 68HC05
> 16 flexible addressing modes, including stack relative with 16-bit stack pointer	> Easy-to-learn, easy-to-use architecture
> Fully static low-voltage, low-power design with wait and stop modes	> C-optimized architecture provides compact code

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HC08 Demonstration Boards (Order Number: DEMO908GZ60)

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.

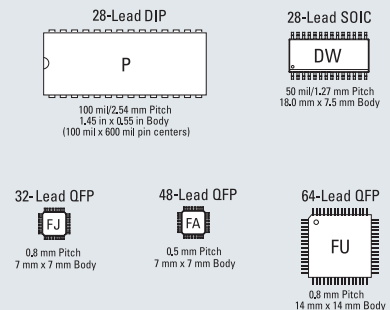### Data Sheets

MC68HC908GR60A

MC68HC908GR16A

MC68HC908GR8A

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
AN2295	Developer's Serial Bootloader for M68HC08 and HCS08 MCUs
AN2505	Using Two Channels of the HC08 TIM to Achieve a Full-Duplex Software SCI
AN2545	Using MC68HC(9)08GR/GZ On-Chip Flash Programming Routines
AN2573	LINkits LIN Evaluation Boards
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 2.0 Mirror Slave Unit MCUs Using Volcano LTP

Device and Package Options

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

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

68HC(9)08GRxxA FAMILY PERIPHERAL OPTIONS

	FLASH	ROM	RAM	CAN	ESCI	SCI	SLIC	SPI	TIMER (UP TO)	ADC (UP TO)	OPERATING VOLTAGE	TEMP.	PACKAGE
908GR60A	60 KB	-	2 KB	-	1	-	-	1	2+6-ch., 16-bit	24-ch., 10-bit	5V/3.3V	-40°C to +125°C	32/48/64 QFP
908GR48A	48 KB	-	1.5 KB	-	1	-	-	1	2+6-ch., 16-bit	24-ch., 10-bit	5V/3.3V	-40°C to +125°C	32/48/64 QFP
908GR32A	32 KB	-	1.5 KB	-	1	-	-	1	2+6-ch., 16-bit	24-ch., 10-bit	5V/3.3V	-40°C to +125°C	32/48/64 QFP
908GR16A	16 KB	-	1 KB	-	1	-	-	1	2+2-ch., 16-bit	8-ch., 10-bit	5V/3.3V	-40°C to +125°C	32/48 QFP
908GR8A	8 KB	-	384B	-	-	1	-	1	1+2-ch., 16-bit	6-ch., 8-bit	5V/3.3V	-40°C to +125°C	28 PDIP/SOIC, 32 QFP
908GR4A	4 KB	-	384B	-	-	1	-	1	1+2-ch., 16-bit	6-ch., 8-bit	5V/3.3V	-40°C to +125°C	28 PDIP/SOIC, 32 QFP
08GR60A	-	60 KB	2 KB	-	1	-	-	1	2+6-ch., 16-bit	24-ch., 10-bit	5V/3.3V	-40°C to +125°C	32/48/64 QFP
08GR48A	-	48 KB	1.5 KB	-	1	-	-	1	2+6-ch., 16-bit	24-ch., 10-bit	5V/3.3V	-40°C to +125°C	32/48/64 QFP
08GR32A	-	32 KB	1.5 KB	-	1	-	-	1	2+6-ch., 16-bit	24-ch., 10-bit	5V/3.3V	-40°C to +125°C	32/48/64 QFP
08GR16A	-	16 KB	1 KB	-	1	-	-	1	2+2-ch., 16-bit	8-ch., 10-bit	5V/3.3V	-40°C to +125°C	32/48 QFP
08GR8A	-	8 KB	384B	-	-	1	-	1	1+2-ch., 16-bit	6-ch., 8-bit	5V/3.3V	-40°C to +125°C	28 PDIP/SOIC, 32 QFP
08GR4A	-	4 KB	384B	-	-	1	-	1	1+2-ch., 16-bit	6-ch., 8-bit	5V/3.3V	-40°C to +125°C	28 PDIP/SOIC, 32 QFP

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

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