

A FLASH MCU SOLUTION

68HC908GR16
8-bit Microcontroller**TARGET APPLICATIONS**

- Sensors
- Industrial and consumer communications
- Home appliances
- Security systems

The 68HC908GR16 utilizes integrated second generation FLASH and is enhanced with embedded, on-chip functions that eliminate the need for external serial components. The 32 kHz phase-locked loop provides cost savings by replacing the need for expensive, high-speed crystals or noisy oscillators. The on-chip timebase module (TBM) further reduces costs by eliminating the need for external real-time clock and wakeup circuitry. Other features of the 68HC908GR16 are an analog-to-digital converter (ADC), a serial communications interface (SCI), a serial peripheral interface (SPI), low-voltage inhibit (LVI) and a watchdog timer.

HC08 CPU

KBI

16K Flash

8-ch 10-bit
ADC

1K RAM

E SCI

PLL

SPI

COP

2-ch 16-bit
2-ch 16-bit
Timer

LVI

Up to 37 GPIO


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FEATURES**BENEFITS****HIGH-PERFORMANCE 68HC08 CPU CORE**

- 8 MHz bus operation at 5V operation for 125 nsec minimum instruction cycle time
- 4 MHz bus operation at 3V for 250 nsec minimum instruction cycle time
- Efficient instruction set including multiply and divide
- 16 flexible addressing modes including stack relative with 16-bit stack pointer
- Fully static low-voltage, low-power design with wait and stop modes
- Object code compatible with the 68HC05
- Easy to learn and use architecture
- C optimized architecture provides compact code

INTEGRATED SECOND GENERATION FLASH MEMORY

- In-application re-programmable
- Extremely fast programming, encoding 64 bytes in as fast as 2 msec
- FLASH programming across the 68HC08's full operating supply voltage with no extra programming voltage
- 10K write/erase cycles minimum over temperature
- 100K write/erase cycles typical
- Flexible block protection and security
- Cost-effective programming changes and field software upgrades via in-application programmability and re-programmability
- Reduces production programming costs through ultra-fast programming
- Allows re-programmable battery-powered applications
- Byte-writable for data as well as program memory
- Protects code from unauthorized reading and to guard against unintentional erasing/writing of user-programmable segments of code

10-BIT ANALOG-TO-DIGITAL CONVERTER

- 8 channels
- Single conversion in 17 μ sec
- Fast, easy conversion from analog inputs like temperature, pressure and fluid levels to digital values for CPU processing

CLOCK GENERATION MODULE WITH PLL

- Programmable clock frequency in integer multiples of external crystal reference
- Crystal reference of 32 kHz to 100 kHz
- External clock option with or without PLL
- Provides high-performance using low-cost, low-frequency reference crystals
- Reduces generated noise while still providing high-performance (up to 32 MHz internal clock)

FOUR PROGRAMMABLE 16-BIT TIMER CHANNELS

- 125 nsec resolution at 8 MHz bus
- Free-running counter or modulo up-counter
- Each channel independently programmable for input capture, output compare or unbuffered PWM
- Pairing timer channels provides a buffered PWM function

TIMEBASE MODULE

- 8 user-selectable periodic real-time interrupts
- Optionally operate in low-power stop mode
- Provides auto wakeup from low-power stop mode to maintain real-time clock or check external device status such as sensors

**For More Information On This Product,
Go to: www.freescale.com**

Freescale Semiconductor, Inc.

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68HC908GR16

PART NUMBER	DESCRIPTION	RESALE*
EASY-TO-ORDER DEVELOPMENT TOOL KITS		
KITMMEVS08GZ16	Cost-effective real-time in-circuit emulator kit	\$1450
KITMMDS08GZ16	High-performance real-time in-circuit emulator kit	\$3950
INDIVIDUAL DEVELOPMENT TOOL COMPONENTS		
M68MDS0508	High-performance emulator	\$2950
M68MMPFB0508	MMEVS platform board	\$395
M68EML08GZ16	Emulation module daughter board	\$495
M68CBL05C	Low-noise flex cable	\$120
M68TC08GZ16FJ32	32-pin QFP target head adapter	\$200
M68TC08GZ16FA48	48-pin DIP target head adapter	\$200
M68TQP032SAI	32-pin TQPACK	\$70
M68TQP048SDI	48-pin TQPACK	\$70

APPLICATION NOTES
AND ENGINEERING BULLETINS

- EB368/D In-circuit Programming of 68HC908GR8 FLASH Memory
 - AN1218/D HC05 to HC08 Optimization
 - AN1831/D Using MC68HC908 On-Chip Programming Routines
 - AN1837/D Non-Volatile Memory Technology Review
 - AN2093/D Creating Efficient C Code for the MC68HC08
 - AN1752/D Data Structures for 8-Bit MCUs
 - AN1219/D M68HC08 Integer Math Routines
 - AN1705/D Noise Reduction Techniques for MCU-Based Systems
 - AN1259: System Design and Layout Techniques for Noise Reduction in MCU-Based Systems
 - AN1263: Designing for Electromagnetic Compatibility with Single-Chip Microcontrollers
 - AN1050: Designing for Electromagnetic Compatibility (EMC) with HCMOS Microcontrollers
 - AN1705: Noise Reduction Techniques for Microcontroller-Based Systems
- And many more—see our Web site at <http://www.motorola.com/mcu>

FEATURES

BENEFITS

ENHANCED SERIAL COMMUNICATIONS INTERFACE

- UART asynchronous communications system
- Flexible baud rate generator
- Double buffered transmit and receive
- Optional hardware parity checking and generation
- Enables high-speed asynchronous communication

SERIAL PERIPHERAL INTERFACE

- Full-duplex 3-wire synchronous transfers
- High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals
- Maximum master bit rate of 4 MHz for 8 MHz system clock
- Cost-effective serial peripheral expansion to EEPROM, high-precision A/D and D/A converters, real-time clocks, etc.

COMPUTER OPERATING PROPERLY WATCHDOG TIMER

- Issues reset in the event of runaway code

SELECTABLE TRIP POINT LOW-VOLTAGE INHIBIT

- Improves reliability by resetting the MCU when voltage drops below trip point
- Two trip points allow optimum operation in both 5V and 3V nominal systems
- Integration reduces system cost

UP TO 37 BIDIRECTIONAL INPUT/OUTPUT (I/O) LINES

- 10 mA sink/source capability on all I/O pins
- 15 mA sink capability on two I/O pins
- Keyboard scan with selectable interrupts on four I/O pins
- Software programmable pullups on thirteen I/O pins
- High-current I/O allows direct drive of LED and other circuits to eliminate external drivers and reduce system costs
- Keyboard scan with programmable pullups eliminates external glue logic when interfacing to simple keypads

PACKAGE OPTIONS

PART NUMBER	PACKAGE	TEMPERATURE RANGE
MC68HC908GR16CFJ	32 QFP	-40 to 85°C
MC68HC908GR16VFJ	32 QFP	-40 to 105°C
MC68HC908GR16MFJ	32 QFP	-40 to 125°C
MC68HC908GR16CFA	48 QFP	-40 to 85°C
MC68HC908GR16VFA	48 QFP	-40 to 105°C
MC68HC908GR16MFA	48 QFP	-40 to 125°C
SAMPLE PACKS	PACKAGE	TEMPERATURE RANGE
KMC908GR16MFJ	32 QFP	-40 to 125°C
KMC908GR16MFA	48 QFP	-40 to 125°C

32-Lead QFP



48-Lead QFP



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68HC908GR16FS/D
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For More Information On This Product,
Go to: www.freescale.com

* All prices are manufacturer's suggested resale for North America.