Overview
Freescale Semiconductor’s MC908QB8/4 microcontrollers (MCUs) help reduce system cost by eliminating the need for external low-voltage inhibit (LVI), external drivers with high-current input/output (I/O) and external data EEPROM and help reduce programming cost with fast Flash programming. Other valuable features include a 10-bit analog-to-digital converter (ADC) and an internal clock oscillator. It helps maximize efficiency and speed time to market with the ability to change code in-application with Flash and free professional-quality development tools including a C compiler, simulator, assembler, linker, Flash programmer and auto-code generator, all specifically geared to function with Freescale’s QY/QB lines of MCUs.

Target Applications
- Discrete replacement
- Appliances
- Control systems
- Home and industrial security systems
- Motion control

Features

<table>
<thead>
<tr>
<th>High-Performance 68HC08 CPU Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 8 MHz bus operation at 5V operation for 125 ns minimum instruction cycle time</td>
</tr>
<tr>
<td>- 4 MHz bus operation at 3V operation for 250 ns minimum instruction cycle time</td>
</tr>
<tr>
<td>- Efficient instruction set, including multiply and divide</td>
</tr>
<tr>
<td>- 16 flexible addressing modes, including stack relative with 16-bit stack pointer</td>
</tr>
</tbody>
</table>

Benefits
- Easy to learn and use architecture
- Object compatible with 68HC05
- Allows for efficient, compact modular coding in assembly or C compiler

Integrated Second-Generation Flash Memory
- In-application reprogrammable
- Extremely fast programming
  - As fast as 32 µs/byte
  - Up to 100x faster than most embedded Flash
- Flash easily used for data EEPROM
  - 10K minimum write/erase cycles across temperature
  - 100K typical
  - Byte writeable
  - No restrictions or special instructions to access data in Flash program memory
- Flexible block protection and security

Benefits
- Cost-effective programming changes and field software upgrades via in-application programmability and reprogrammability
- Virtually eliminates scrap, costly rework and cost of socket
- The benefits of Flash at competitive one-time programmable (OTP) prices
- Helps to reduce production programming costs through ultra-fast programming
- Helps to reduce power and speed application when writing nonvolatile data is required
- Virtually eliminates the need and cost for external serial data EEPROM
- Easily performs table lookup and data manipulation without slow and cumbersome special table instructions
- Helps to protect code from unauthorized reading
- Guards against unintentional writing/erasing of user-programmable segments of code

Internal Clock Oscillator
- 3.2 MHz nominal bus frequency
- ± 25 percent trimmable
- ± 5 percent accurate to 125°C
- ± 2 percent typical

Benefits
- Can eliminate the cost of all external clock components
- Helps to reduce board space
- Can eliminate electromagnetic interface (EMI) generated from external clocks
- Allows option of external radio controller (RC), external clock or external crystal/resonator

Up to 13 Bidirectional Input/Output (I/O) Lines
- High-current drive
- Programmable pull-ups/keyboard interrupt

Benefits
- High-current I/O allows direct drive of LED and other circuits to virtually eliminate external drivers and reduce system costs
- Keyboard scan with programmable pull-ups virtually eliminates external glue logic when interfacing to simple keypads
Features | Benefits
---|---
10-bit Analog-to-Digital Converter (ADC) | > Fast conversion in <10 μs  
> Easy interface to analog inputs, such as sensors

Four Programmable 16-bit Timer Channels | > Each channel independently programmable for input capture, output compare or unbuffered pulse-width modulation (PWM)  
> Pairing timer channels provides a buffered PWM function

System Protection | > COP watchdog timer with autowake-up from stop capability  
> Low-voltage inhibit with selectable trip points  
> Provides system protection in the event of runaway code by resetting the MCU to a known state  
> Helps to reduce power usage while automatically providing wake-up to check external sensors or perform periodic servicing  
> Designed to improve reliability by resetting the MCU when voltage drops below trip point

Enhanced Serial Communications Interface (ESCI) | > UART asynchronous communications system with peripheral devices  
> Enables synchronous serial communications with peripheral devices  
> Allows full-duplex, asynchronous, NRZ serial communication between the MCU and remote devices

Serial Peripheral Interface | > Full-duplex 3-wire synchronous transfers  
> Maximum master bit rate of 4 MHz for 8 MHz system clock  
> High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals  
> Cost-effective serial peripheral expansion to applications including EEPROM, high-precision analog-to-digital and digital-to-analog converters, and real-time clocks

Package Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Temp. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC908QB4CPE</td>
<td>16 DIP</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>MC908QB4VPE</td>
<td>16 DIP</td>
<td>-40°C to +105°C</td>
</tr>
<tr>
<td>MC908QB4MPE</td>
<td>16 DIP</td>
<td>-40°C to +125°C</td>
</tr>
<tr>
<td>MC908QB4CDWE</td>
<td>16 SOIC</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>MC908QB4VDWE</td>
<td>16 SOIC</td>
<td>-40°C to +105°C</td>
</tr>
<tr>
<td>MC908QB4MDWE</td>
<td>16 SOIC</td>
<td>-40°C to +125°C</td>
</tr>
<tr>
<td>MC908QB4CDTE</td>
<td>16 TSSOP</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>MC908QB4VDTE</td>
<td>16 TSSOP</td>
<td>-40°C to +105°C</td>
</tr>
<tr>
<td>MC908QB4MDTE</td>
<td>16 TSSOP</td>
<td>-40°C to +125°C</td>
</tr>
<tr>
<td>MC908QB8CPE</td>
<td>16 DIP</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>MC908QB8VPE</td>
<td>16 DIP</td>
<td>-40°C to +105°C</td>
</tr>
<tr>
<td>MC908QB8MPE</td>
<td>16 DIP</td>
<td>-40°C to +125°C</td>
</tr>
<tr>
<td>MC908QB8CDWE</td>
<td>16 SOIC</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>MC908QB8VDWE</td>
<td>16 SOIC</td>
<td>-40°C to +105°C</td>
</tr>
<tr>
<td>MC908QB8MDWE</td>
<td>16 SOIC</td>
<td>-40°C to +125°C</td>
</tr>
<tr>
<td>MC908QB8CDTE</td>
<td>16 TSSOP</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>MC908QB8VDTE</td>
<td>16 TSSOP</td>
<td>-40°C to +105°C</td>
</tr>
<tr>
<td>MC908QB8MDTE</td>
<td>16 TSSOP</td>
<td>-40°C to +125°C</td>
</tr>
</tbody>
</table>

**Cost-Effective Development Tools**

For more information on development tools, please refer to the Freescale Development Tool Selector Guide (SG1011).

**DEMO908QB8**
Cost-effective demonstration board with potentiometer, LEDs, serial port, LIN ports and built-in USB-MON08 cable for debugging and programming

**$75**

**FSICEKITQBLTY**
Complete FSICE high-performance emulator kit; includes emulator module, cables, head adapters and programming adapters

**$1,695**

**M68EM808QBLTY**
Emulation module for FSICE system

**$495**

**M68CYCLONEPRO**
HC08/HCS08/HCS12 stand-alone Flash programmer or in-circuit emulator, debugger, Flash programmer; USB, serial or Ethernet interface options

**$499**

**USBMULTILINK08**
Universal HC08 in-circuit debugger and Flash programmer; USB PC interface

**$99**

**M68CPA08W1628T20**
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 20 pins

**$149**

**M68CPA08P40B56**
Programming adapter for MON08 cables and single MCU: DIP packages up to 40 pins and SDIP packages up to 56 pins

**$99**

**CWX-H08-SE**
CodeWarrior™ Special Edition for HC(S)08 MCUs; includes integrated development environment (IDE), linker, debugger, unlimited assembler, Processor Expert™ auto-code generator, full-chip simulation and 16 KB C compiler

**Free**

**Learn More:** For more information about Freescale’s products, please visit [www.freescale.com](http://www.freescale.com).