MC9S08JM60

8-bit USB microcontroller

Target Applications

- PC peripherals and I/O modules
- Lighting control systems
- Test and measurement equipment
- Environmental and building automation
- Security and access control panels
- Stationary barcode scanners and barcode printers
- Patient monitoring systems
- Laboratory equipment
- Industrial networking products
- Hospital beds and electric wheel chairs
- Point-of-sale printers

Overview

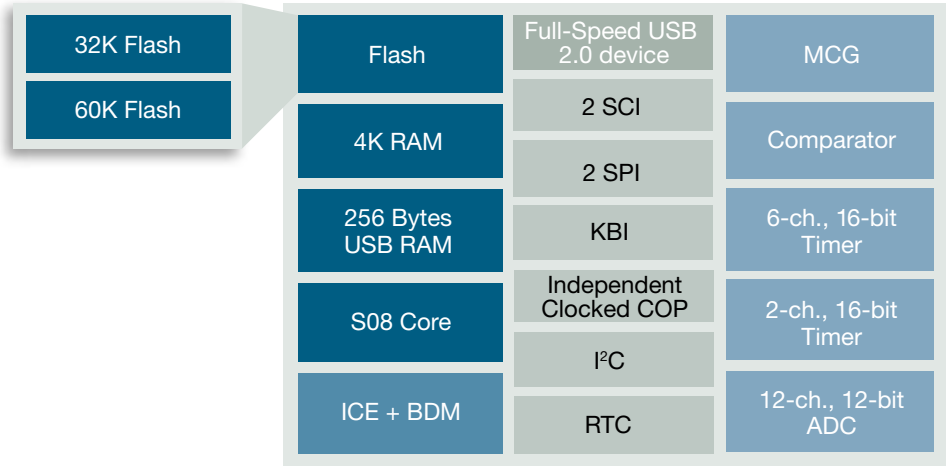
The 8-bit MC9S08JM60 device further extends Freescale's 8-bit embedded USB controller family with up to 60 Kbytes of flash memory, a full-speed USB 2.0 device controller and a 12-channel, 12-bit analog-to-digital converter. The S08 JM family also has several system protection features, such as low-voltage detect and a Computer Operating Properly (COP) module.

The MC9S08JM60 device is well suited for a variety of industrial control and consumer applications. Such applications include PC peripherals, diagnostic equipment, health care monitoring equipment and barcode scanners.

The MC9S08JM60 devices, like the other USB microcontrollers in the Controller Continuum, are supported by the Freescale USB-LITE Stack by CMX. This complimentary USB stack provides support for certain HID and CDC classes. Source code for the complimentary stack is available.

The MC9S08JM60 is software compatible with other devices in the Controller Continuum, providing a direct migration path to higher performing USB microcontrollers.

MC9S08JM60 Block Diagram



Features	Benefits
8-bit HCS08 Central Processing Unit (CPU)	
• Up to 24 MHz internal bus (48 MHz HCS08 core) frequency offering 2.7 to 5.5V across temperature range of -40°C to +85°C	• Offers strong performance throughout the entire voltage range
• Support for up to 32 peripheral interrupt/reset sources	• Allows for software flexibility and optimization for real-time applications
On-Chip Memory	
• Up to 60K flash read/program/erase over full operating voltage and temperature	• Allows user to take full advantage of in-application, re-programmability benefits in virtually any environment
• Up to 4K RAM	• Security circuitry to help prevent unauthorized access to RAM • Flash contents helps to reduce system power consumption
• 256 Byte USB RAM	• Used for data buffering
Power-Saving Modes	
• Wait plus two stop modes	• Allows continuation of sampling application in a reduced power state which reduces system power consumption
• Multi-purpose clock generator (MCG)	• Frequency-locked loop (FLL): Internal or external reference can be used to control the FLL • Phase-locked loop (PLL): Voltage controlled oscillator (VCO). Modulo VCO frequency divider. Lock detector with interrupt capability. • Internal reference clock: Can be selected as the clock source for the MCU. • External reference clock: Provides control for a separate crystal oscillator. Clock monitor with reset capability. Can be selected as the clock source for the MCU. • Reference divider provided • Clock source can be divided by 1, 2, 4 or 8

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Features	Benefits
Peripherals	
• USB Device Module	• Full-speed USB 2.0 (12Mbps) module with dedicated on-chip 3.3V regulator • Supports control, interrupt, isochronous and bulk transfers
• Analog comparators (ACMP)—Analog comparator with option to compare to internal reference	• Requires only single pin for input signal, freeing up other pin for other use • Allows other system components to see comparator result with minimal delay • Can be used for single slope ADC and RC time constant measurements
• Analog to digital converter (ADC)—12-channel, 12-bit resolution	• Output formatted in 12-, 10- or 8-bit right-justified format • Single or continuous conversion • Operation in low power modes for lower noise operation • Asynchronous clock source for lower noise operation
• Two serial communications interface (SCI) modules offering asynchronous communications	• Provides standard UART communications peripheral • Allows full-duplex, asynchronous, NRZ serial communication between MCU and remote devices
• I^2C with up to 100 kbps maximum bus loading; multi-master operation; programmable slave address; interrupt driven byte-by-byte data transfer; supports broadcast mode and 10-bit addressing	• Ability to add an additional I^2C device
• SPI—Two serial peripheral interfaces with full-duplex or single-wire bidirectional; double-buffered transmit and receive; master or slave mode; MSB-first or LSB-first shifting	• Having two SPI allows two separate dedicated devices, for example, one SPI dedicated to a ZigBee® transceiver, and the other to MCUs or peripherals
• Timer pulse width modulation (TPM)—Up to eight channels	• Each channel may be input capture, output compare or edge-aligned PWM • Input capture trigger on either rising or falling edge • Selectable polarity on PWM outputs • Timer clock source selectable as prescaled bus clock, fixed system clock or an external clock pin
Input/Output	
• Up to eight keyboard interrupt (KBI) pins with selectable polarity	• Each KBI pin is programmable as falling edge only, rising edge only, falling edge and low level or rising edge and high level interrupt sensitivity
• 51 general-purpose input/outputs (GPIO) and one input-only and one output-only pin	• Results in a large number of flexible I/O pins that allow vendors to easily interface the device into their own designs
System Protection	
• Watchdog computer operating properly (COP) reset with option to run from dedicated 1 kHz internal clock source or bus clock	• Allows the device to recognize runaway code (infinite loops) and resets the processor to help avoid lock-up states
• Low-voltage detection with reset or interrupt; selectable trip points	• Alerts the developer to voltage drops outside of the typical operating range
• Illegal op code detection with reset	• Allows the device to recognize erroneous code and resets the processor to help avoid lock-up states
• Flash block protection	• Prevents unauthorized access to flash RAM which greatly reduces the chance of losing vital system code for vendor applications
Hardware Development Support	
• Single-wire background debug interface	• This allows the developers to use the same interface for multiple platforms
• Breakpoint capability	• Allows single breakpoint setting during in-circuit debugging (plus two more breakpoints in on-chip debug module)
• On-chip in-circuit emulator (ICE) debug module (containing three comparators and nine trigger modes). Eight deep FIFO for storing change-of-flow addresses and event-only data, debug module supports both tag and force breakpoints.	• Grants full access to built-in chip emulation without the added expense of traditional emulator hardware

Package Options

Part Number	Temp. Range	Package
MC9S08JM60CQH	-40°C to +85°C	64-pin QFP
MC9S08JM60CLH	-40°C to +85°C	64-pin LQFP
MC9S08JM60CGT	-40°C to +85°C	48-pin QFN
MC9S08JM60CLD	-40°C to +85°C	44-pin LQFP
MC9S08JM32CQH	-40°C to +85°C	64-pin QFP
MC9S08JM32CLH	-40°C to +85°C	64-pin LQFP
MC9S08JM32CGT	-40°C to +85°C	48-pin QFN
MC9S08JM32CLD	-40°C to +85°C	44-pin LQFP

Cost-Effective Development Tools DEMOJM

$99 USD*

Cost-effective demonstration kit featuring the JM family daughter cards. Support for USB (host and device) and CAN. Built-in USB-BDM circuitry available for debugging and programming. Other features included in the USB-BDM circuitry include serial communication and simple logic analyzer.

CodeWarrior® Development Studio for Microcontrollers 6.1

Complimentary**

CodeWarrior Development Studio for Microcontrollers is an integrated tool suite that supports software development for Freescale's 8-bit or 32-bit microcontrollers. Designers can further accelerate application development with the help of the Processor Expert™ tool, which is an award-winning rapid application development tool in the CodeWarrior tool suite.

Freescale USB-LITE Stack by CMX

Complimentary**

Freescale is providing a comprehensive USB software solution through a complimentary USB stack. Freescale USB-LITE Stack by CMX enables USB device modes of operation. The USB stack supports several HID and CDC to UART projects. The complimentary stack also interfaces with CodeWarrior Development Studio, providing a productive, comprehensive development environment for designing embedded applications.

* Prices indicated are MSRP
** Subject to license agreement

Learn More: For more information about the JM family, please visit **www.freescale.com/8bit**.

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