Flexis 8-bit Microcontrollers

MC9S08MM128

Integrated analog and ultra-low power with USB connectivity

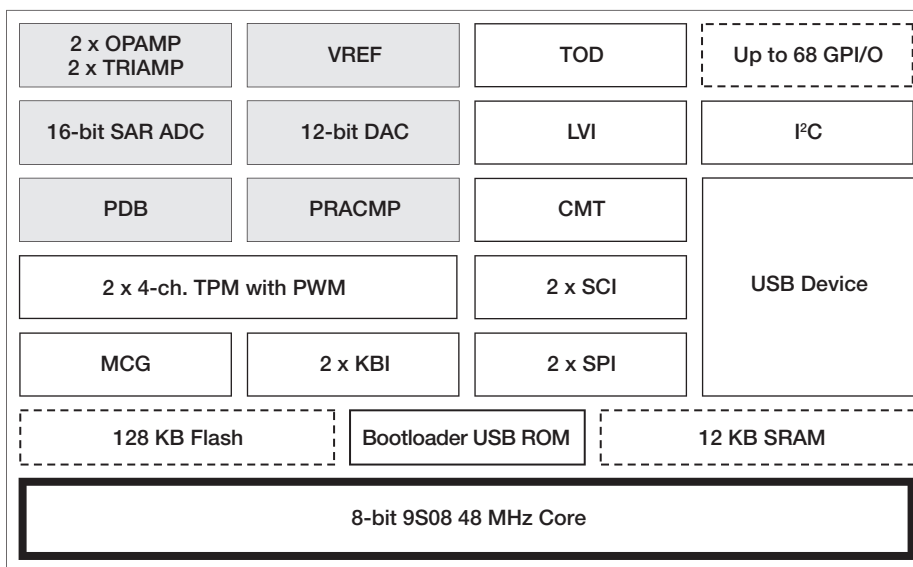Energy Efficient Solutions
optimized for low power ™

Target Applications

- Blood glucose meters
- Blood pressure monitors
- Heart rate monitors
- Telehealth devices
- Pulse oximeters
- Implantables
- Clinical equipment
- Test/measurement
- Instrumentation

Overview

The MC9S08MM128/64 provides ultra-low-power operation, USB connectivity and unparalleled measurement accuracy, all in a single 8-bit microcontroller, allowing device designers to create more fully featured products at a lower cost. The MC9S08MM128/64 is ideal for medical applications or any other application requiring a significant amount of precision analog such as instrumentation and industrial control. The MC9S08MM128/64 provides designers with high-resolution ADC and DAC modules, general purpose operational amplifiers and trans-impedance amplifiers integrated into a fully featured microcontroller. The rich peripheral set of this highly integrated

MC9S08MM128 Block Diagram

2 x OPAMP 2 x TRIAMP	VREF	TOD	Up to 68 GPIO
16-bit SAR ADC	12-bit DAC	LVI	I²C
PDB	PRACMP	CMT	USB Device
2 x 4-ch. TPM with PWM		2 x SCI	
MCG	2 x KBI	2 x SPI	
128 KB Flash	Bootloader USB ROM	12 KB SRAM	
8-bit 9S08 48 MHz Core			

microcontroller includes a USB 2.0 device controller and multiple serial interfaces, including SPI, SCI and I²C.

The MC9S08MM128/64 devices, like other USB microcontrollers in the Freescale Controller Continuum, are supported by Freescale's USB stack with Personal Healthcare Device Class support. This complimentary USB stack provides support

for various classes, such as MSD, HID, CDC and PHDC, while the Medical Connectivity Library enables inter-device communication (IEEE® 11073 compliant).

Development is made easy with the Freescale Tower development system. This modular development platform provides the user with a reconfigurable demonstration and development system. In addition to the

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development hardware, technical collateral such as application notes and white papers are available to speed development time and get products to market faster.

Freescale makes processor migration easy by offering a wide range of pin and peripheral compatible devices. The MC9S08MM128/64 is part of Freescale's Flexis microcontroller series, which includes complementary families of 8-bit S08 and 32-bit V1 ColdFire microcontrollers that have a common set of peripherals and development tools to deliver the ultimate in migration flexibility.

Development Tools
TWR-S08MM128-KIT

The TWR-S08MM128-KIT is a full featured modular development platform using the Freescale Tower System that allows for quick code development and easy prototyping. The standard kit includes the following components:

- TWR-S08MM128: A stand-alone development board featuring the MC9S08MM128VLK microcontroller
- TWR-SER: A serial connectivity board that supports both USB and RS232
- TWR-ELEV: Two (2) elevator boards connect the MCU to additional Tower peripheral modules
- MED-EKG: A sensor module that detects EKG data (for use with the Flexis MM parts only)
- USB cable: For connectivity to a PC

Package Options

Part Number	Temp Ranges (Ta)	Package
MC9S08MM128CMB	-40°C to +85°C	81 MAPBGA
MC9S08MM128CLK	-40°C to +85°C	80 LQFP
MC9S08MM128CLH	-40°C to +85°C	64 LQFP
MC9S08MM64CLH	-40°C to +85°C	64 LQFP
MC9S08MM32CLH	-40°C to +85°C	64 LQFP
MC9S08MM32ACLH	-40°C to +85°C	64 LQFP
MC9S08MM128VMB	-40°C to +105°C	81 MAPBGA
MC9S08MM128VLK	-40°C to +105°C	80 LQFP
MC9S08MM128VLH	-40°C to +105°C	64 LQFP
MC9S08MM64VLH	-40°C to +105°C	64 LQFP
MC9S08MM32VLH	-40°C to +105°C	64 LQFP
MC9S08MM32AVLH	-40°C to +105°C	64 LQFP

Features	Benefits
CPU and System Configuration	
• 8-bit 9S08 CPU operating at 48 MHz • 1.8V to 3.6V single supply	• Offers high performance across the entire voltage range
On-Chip Memory	
• Up to 128 KB flash • Up to 12 KB SRAM	• Allows the user to take full advantage of in-application re-programmability benefits in any environment • Security circuitry helps to prevent unauthorized RAM access
Power Management	
• Low-power operation modes	• Low-power Stop 2 current: 390 nA to 600 nA with 12K of SRAM enabled and active POR • 6 uS wake-up time from Stop 3 • 32 kHz oscillator for low power time keeping • Rapid response to interrupts from the low-power sleep mode
Precision Analog Peripherals	
• 16-bit ADC • 12-bit DAC • Programmable delay block • Operational and trans-impedance amplifiers • VREF (voltage reference)	• High-resolution and high-accuracy ADC provides accurate signal acquisition • Digital-to-analog converter with clock gating optimized for low power usage • PDB precisely triggers ADC and DAC blocks to complete sensor biasing and measurement (i.e. glucometry strips) • OPAMPS allow signal filtering and amplification, TRIAMPS are optimized for converting current inputs into voltages that can be read by the ADC • VREF accuracy is 33 ppm/°C
Communication Peripherals	
• USB 2.0 controller • Dual asynchronous SCIs • Inter IC-BUS (I²C) • Dual Synchronous SPI ○ (1 x 16-bit FIFO SPI)	• USB device controller • On-chip transceiver and 3.3 volt regulator reduces system cost • Serial communication interface provides a simple, efficient method of data exchange between devices. Option to connect analog comparator to SCI for opto isolation applications • I²C port enables increased system memory by using an additional I²C EEPROM • Having two SPI allows two separate dedicated devices, for example, one SPI dedicated to a ZigBee® transceiver and the other to MCUs or peripherals, SPI FIFO allows better performance to drive a graphic LCD
Software and Tools	
• Background debug mode (BDM) for in-circuit debugging • Medical applications USB stack • Tower development system	• Real-time trace and debug support • Standardize with the "Continua Ready" PHDC USB solution • Tower System is a modular, reconfigurable demonstration and development platform

- DVD: Includes all you need to get up and running in minutes. Comes complete with tools, software, lab supplements and other helpful resources.

CodeWarrior Development Studio for Microcontrollers 6.3/CodeWarrior 10
Special Edition Complimentary
CodeWarrior Development Studio for Microcontrollers is a single tool suite that supports software development whether it is targeted at Freescale's 8-bit or 32-bit microcontrollers. Designers can further accelerate application development with the help of Processor Expert, which is an award-winning rapid application development tool integrated into the CodeWarrior tool suite.

Learn more: For more information, visit **freescale.com/S08MM**, **freescale.com/medical** and **freescale.com/Tower**.

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