Flexis 32-bit Microcontrollers

MCF51MM256/128

Integrated analog and ultra-low power with USB connectivity

Energy Efficient Solutions optimized for low power

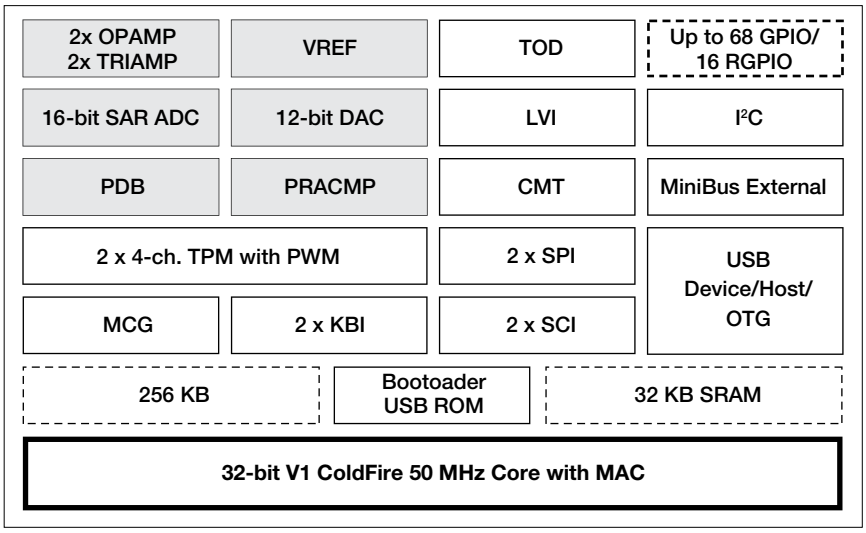
Target Applications

- Blood Glucose Meters
- Blood Pressure Monitors
- Heart Rate Monitors
- One Lead ECG
- Telehealth Devices
- Pulse Oximeters
- Implantables
- Clinical Equipment
- Test/Measurement
- Instrumentation

Overview

The MCF51MM256/128 provides ultra-low-power operation, USB connectivity, graphic display support and unparalleled measurement accuracy, all in a single 32-bit microcontroller, allowing device designers to create more fully featured products at a lower cost. The MCF51MM256/128 is ideal for medical applications or any other application requiring a significant amount of precision analog such as instrumentation and industrial control. The MCF51MM256/128 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 microcontroller includes USB 2.0 controller with host, device and On-The-Go (OTG) support, multiple serial interfaces and an external bus interface.

MCF51MM256 Block Diagram



The MM256/128 devices, like other USB microcontrollers in Freescale's Controller Continuum, are supported by the medical applications USB stack. This complimentary USB stack provides support for several classes, including MSD, HID, CDC and Personal Healthcare Device Class (PHDC), while the Medical Connectivity Library enables inter-device communication (IEEE 11073 compliant). Additionally, Freescale's MQX software enables real-time operating system (RTOS) functionality and a USB stack.

Freescale's Tower System provides the user with a modular, reconfigurable demonstration

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and development platform. The MM quick peripheral user guides and application notes have been developed to save development time while building their own application. The MCF51MM256/128 is part of the Freescale Flexis microcontroller series. The Flexis series includes complementary families of 8-bit S08 and 32-bit V1 ColdFire microcontrollers with a common set of peripherals and development tools to deliver the ultimate in migration flexibility.

Product Selector Guide

Part Number	Temp. Ranges	Package
MCF51MM256CML	-40°C to +85°C	104 MAPBGA
MCF51MM256CLL	-40°C to +85°C	100 LQFP
MCF51MM256CMB	-40°C to +85°C	81 MAPBGA
MCF51MM256CLK	-40°C to +85°C	80 LQFP
MCF51MM128CMB	-40°C to +85°C	81 MAPBGA
MCF51MM128CLK	-40°C to +85°C	80 LQFP
MCF51MM256VML	-40°C to +105°C	104 MAPBGA
MCF51MM256VLL	-40°C to +105°C	100 LQFP
MCF51MM256VMB	-40°C to +105°C	81 MAPBGA
MCF51MM256VLK	-40°C to +105°C	80 LQFP
MCF51MM128VMB	-40°C to +105°C	81 MAPBGA
MCF51MM128VLK	-40°C to +105°C	80 LQFP

Development Tools

TWR-MCF51MM-KIT

The TWR-MCF51MM-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-MCF51MM: A standalone development board featuring the MCF51MM256VLL microcontroller.
- TWR-SER: A serial connectivity board to that supports both USB and RS232.
- TWR-ELEV: Two (2) elevator boards to connect the MCU to additional Tower peripheral modules.
- MED-EKG: A sensor module that detects EKG data (for use with Flexis MM parts only)
- USB Cable: For connectivity to a PC.
- DVD: Includes all you need to get up and running in minutes. Comes complete with tools, software, lab supplements and other helpful resources.

Features	Benefits
CPU and System Configuration	
• 32-bit V1 ColdFire CPU offering 46 MIPS at 50 MHz • 1.8V to 3.6V single supply	• Offers high performance across the entire voltage range
On-Chip Memory	
• Up to 256 KB flash • Up to 32 KB SRAM • Mini FlexBus (external bus interface)	• Allows the user to take full advantage of in-application re-programmability benefits in any environment • Security circuitry helps to prevent unauthorized RAM access • Glueless connection to external memory devices
Power Management	
• Low-power operation mode	• Low-power Stop 2 current: 750 nA with 32K 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 (I^2C) • Dual synchronous SPI • (1 x 16-bit FIFO SPI)	• USB device/host/On-The-Go controller • On-chip transceiver and 3.3V regulator reduce 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. • I^2C port enables increased system memory by using an additional I^2C EEPROM • Two SPIs allow 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 • Complimentary Freescale MQX software solutions, RTOS, USB, file system and strong third-party alliance network • Medical applications USB stack • Tower development system	• Real-time trace and debug support • Value-added tools, software stacks and RTOS • Standardize with the "Continua Ready" personal health care device (PHDC) USB solution • The Freescale Tower System is a modular, reconfigurable demonstration and development platform

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, an award-winning rapid application development tool integrated into the CodeWarrior tool suite.

Freescale MQX™ RTOS

The Freescale MQX RTOS provides medical industry proven real-time performance within a small, configurable footprint. This RTOS is designed to allow you to configure and balance code size with performance requirements. The easy-to-use API and out-of-box experience ensures first-time RTOS users can start developing their application on the day software is installed.

Learn more: For current information about Freescale products and documentation, please visit **www.freescale.com/medical**.

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