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LAB
5

MCF51MM256

Accelerometer demo





Get to Know the TWR-MCF51MM-KIT

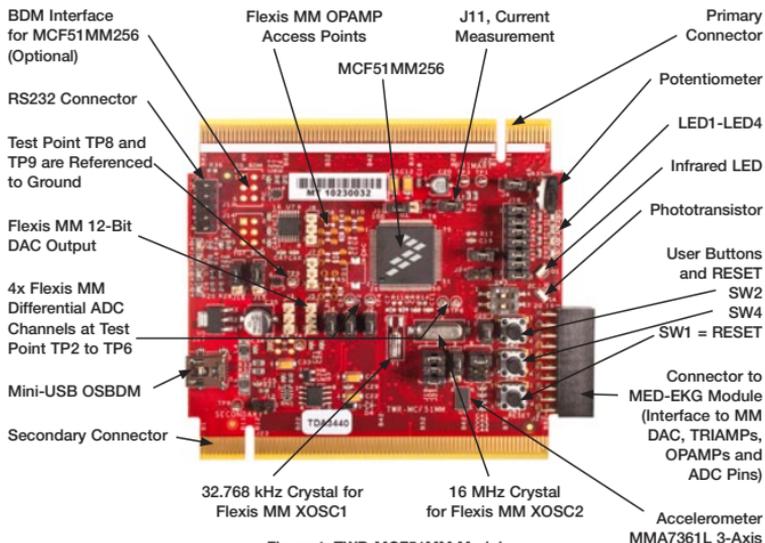


Figure 1: TWR-MCF51MM Module



TWR-MCF51MM-KIT Freescale Tower System

The TWR-MCF51MM module is part of the Freescale Tower System, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Take your design to the next level and begin constructing your Tower System today.



Introduction

This lab is a step-by-step guide to running the accelerometer demo with MCF51MM256. The MCF51MM256 samples the accelerometer's analog outputs (X, Y, Z axes) with its on-chip A/D converter and sends digitized values to the computer via its UART interface. The Serial Grapher Utility GUI displays the data in run time and draws the corresponding waveform as you tilt the orientation of the TWR-MCF51MM module. The results can be raw, averaged or filtered as you press the SW2 button from the TWR-MCF51MM module.

Required Material

- Tower System—Built according to TWR-MCF51MM-KIT Quick Start Guide
- Two mini-USB Cables—One for TWR-SER and one for TWR-MCF51MM
- LAB5.zip—Located at the “Software” tab, under the “Labs” section in your DVD. Follow the lab guide for installation
- Computer Installed with:
 - CodeWarrior for Microcontrollers v6.3
 - MCF51MM256 service pack
 - P&E Embedded Multilink toolkit.
Install this from the “Software” tab, “Development Tools” section in the DVD
- An Additional RS232 Cable (not provided)—Unlike Lab 3, the Serial Grapher display is sent via the UART RS232 port from the TWR-SER instead of the USB
- If you do not have a serial port on your PC, you may need to purchase a serial to USB port cable

This lab demonstrates

- Project build, download and run in CodeWarrior IDE
- Using Serial Grapher Utility tool to display accelerometer’s X, Y, X data in run time
- Example code using MCF51MM256 SCI peripheral for UART transmission

The following lab assumes the user has loaded the DVD at f:\ and has extracted all zipped files under working folder d:\work. Please replace the path if your environment is different.

Step-by-Step Guide

Configuring the Hardware

1. TWR-SER module must be configured in RS232 mode. To do this, the following jumper headers must have a jumper connecting pin 1 and pin 2: SER_SEL (J15), TXD_SEL (J19), and RXD_SL (J17).
2. Assemble the Tower System and configure the TWR-MCF51MM module jumpers to the default settings as shown in Step 2 of the Quick Start Guide (QSG).

Connecting to the Computer

3. Make connections from the Tower System to the computer in the following order:
 - a) Connect the serial port on the TWR-SER module to a serial port on your PC.
 - b) Connect the TWR-SER USB port to a USB port from the PC.
 - c) Connect the TWR-MCF51MM USB port to another USB port from the PC.
4. If Windows prompts you to install the OSBDM driver for the debugger. Follow

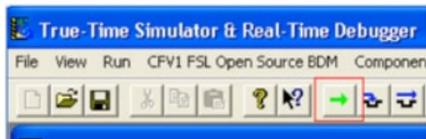
the prompts to automatically detect and install the driver. If Windows cannot locate the driver automatically, please specify the following path: C:\Program Files\Freescale\CodeWarrior for Microcontrollers V6.3\Drivers\Osbdm-jm60.

Programming the MCF51MM256

5. Open CodeWarrior for Microcontrollers v6.3. Use the Windows Start Menu > All Programs > Freescale CodeWarrior > CodeWarrior Development Studio for Microcontrollers V6.3 > CodeWarrior IDE.

NOTE: It is important to open the correct CodeWarrior product and version. Multiple CodeWarrior programs can be installed on the same computer.

- Unzip the file “LAB5.zip” located on the “Software” tab, under the “Labs” section in the DVD to your working folder. In CodeWarrior, open the lab project by selecting File > Open. Open d:\work\LAB5\cfv1mm256_accelerometer\cfv1mm256_accelerometer.mcp
- In CodeWarrior, click on the  Debug icon on the project panel toolbar to compile and download code to the internal flash of MCF51MM256. Click OK to the message “loading a new application will stop the execution of the current one.” This will start the erasing and programming process and will finally show the debugger window.
- To start the application, click the green arrow button from the debugger window as shown in the red highlight below. Or, close the debugger window and press the SW1 RESET button from the TWR-MCF51MM module.



Displaying Run Time Accelerometer Data

- Run the Start menu > Programs > P&E Embedded Multilink Toolkit > Utilities > Serial Grapher Utility. Select COM1 and the baud rate at 19200, and then click “Open Serial Port and Start Demo.” NOTE: your computer may have a different COM number for the RS232 I/O.
- Once the application is running on the TWR-MCF51MM module, you should see the green LED1 (labeled as D9) is turned on. The Serial Grapher GUI should also be printing out three waveforms as shown below.



11. The red waveform is the X-axis, the green waveform is the Y-axis, and the blue is the Z-axis data. As you rotate the Tower System at various dimensions, the waveforms will also move up or down. The on-board accelerometer is a Freescale product. Please search “MA7361L” online for the data sheet. The data sheet outlines the corresponding output voltages based on the various orientations.



12. On the TWR-MCF51MM module, push the SW2 button, then both of the LED 1 (D9) and LED 2 (D10) lights will be turned on. In this mode, the waveforms are printed as averaged results. If you move your Tower System around, you will notice waveforms will become smoother. This show how you can apply software averaging to help approximate results.



13. Press the SW2 button again. LED 1, LED 2 and LED 3 (D11) will all be turned on. In this mode, the waveforms are filtered by a software routine. You can keep pressing SW2 to repeat the various modes.



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For information on Freescale's Environmental Products program, visit freescale.com/epg.

To learn more about the **TWR-MCF51MM-KIT** and other Freescale medical products, please visit freescale.com/mcf51mm, freescale.com/medical and freescale.com/tower.

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Doc Number: MCF51MM256LAB5 / REV 0

