Quick Start Guide for TWR-S08MM128-KIT

TOWER SYSTEM

MC9S08MM128

The industry's most complete solution for portable medical applications

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Get to Know the TWR-S08MM128-KIT

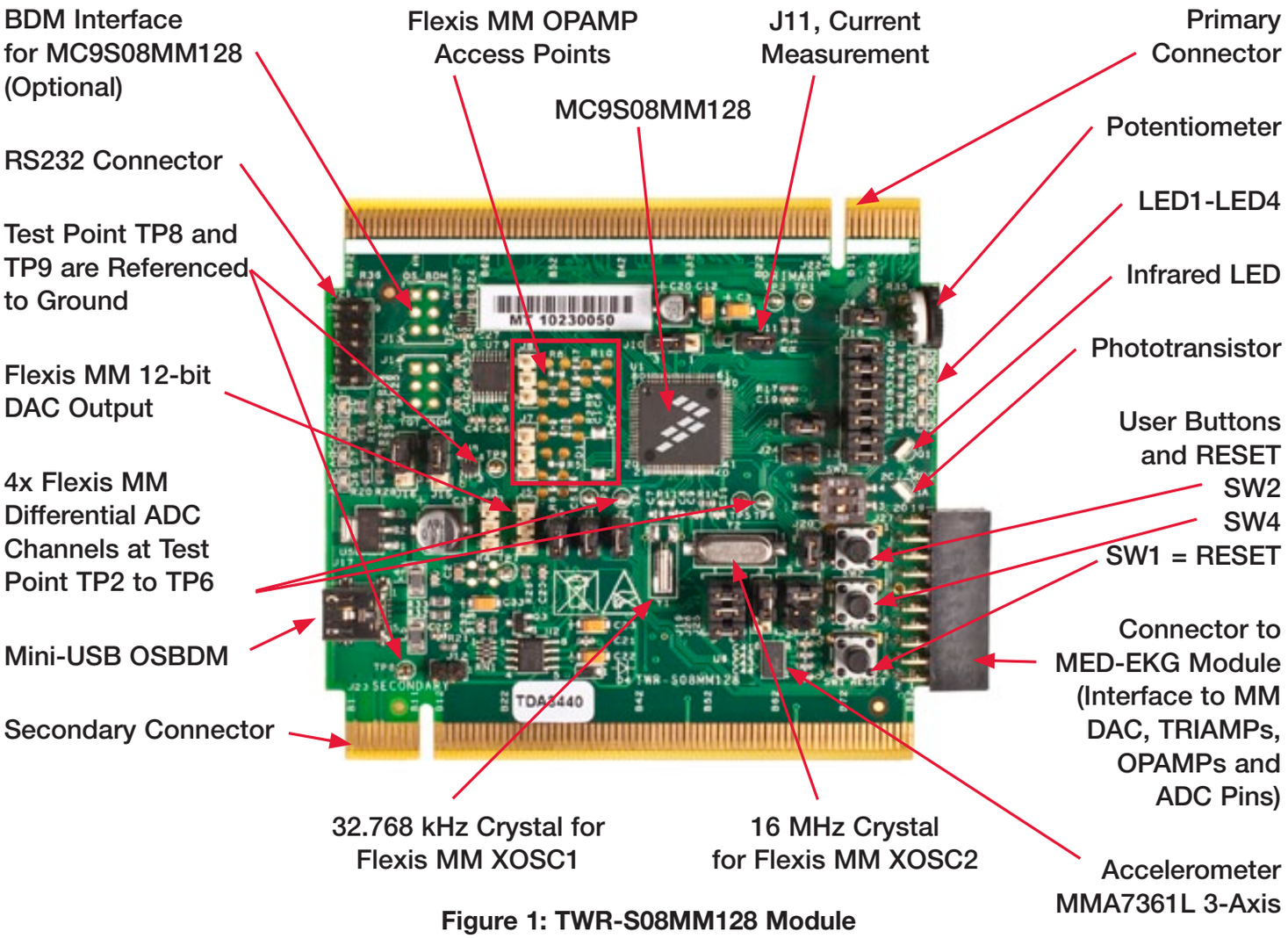
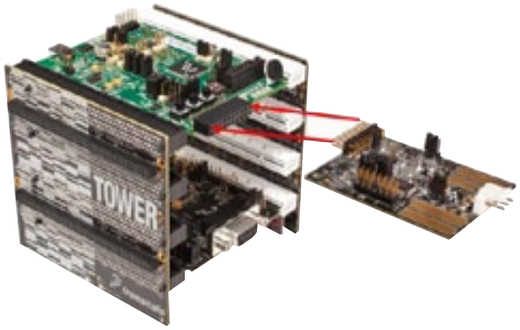


Figure 1: TWR-S08MM128 Module



TWR-S08MM128-KIT
Freescale Tower System

The TWR-S08MM128 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

S08MM is the 8-bit series of the Flexis MM family. It provides ultra low-power operation, USB connectivity and integrated analogs (OPAMPs, TRIAMPs, DAC and ADC)—all in one cost-effective, 8-bit microcontroller. S08MM devices are ideal for portable medical applications or any other application requiring a significant amount of precision analog such as instrumentation and industrial control. The TWR-S08MM128-KIT features the 8-bit MC9S08MM128 and consists of the following components:

- TWR-S08MM128—Also referred to as the Tower System MCU module and features the MC9S08MM128
- TWR-SER—Tower System serial module that features Ethernet, USB, RS232/485 and CAN
- TWR-ELEV—Two Tower System elevator modules (Primary module and Secondary module) that provide structural integrity, communications interfaces and power regulation circuitry with standardized bus
- MED-EKG—Electrocardiograph development kit that showcases an EKG demonstration using the Flexis MM on-chip operational amplifiers and analog modules
- DVD—Includes five lab tutorials, software projects, application notes, board schematics and supporting resources
- Five lab demonstrations—Lab 1 is printed and included in the MED-EKG box of the TWR-S08MM128-KIT. Digital copies of all five labs are included in the DVD in the “Software” tab, under the “Labs” section
- Two mini-USB Cables—One for TWR-SER and one for TWR-S08MM128
- Quick Start Guide—In this Quick Start Guide, you will learn how to build a Tower System, download code to the Flexis MM device and debug using CodeWarrior IDE

NOTE: The official marking for S08MM devices is MC9S08MM. In this document, the MC9 prefix is omitted for simple referencing.

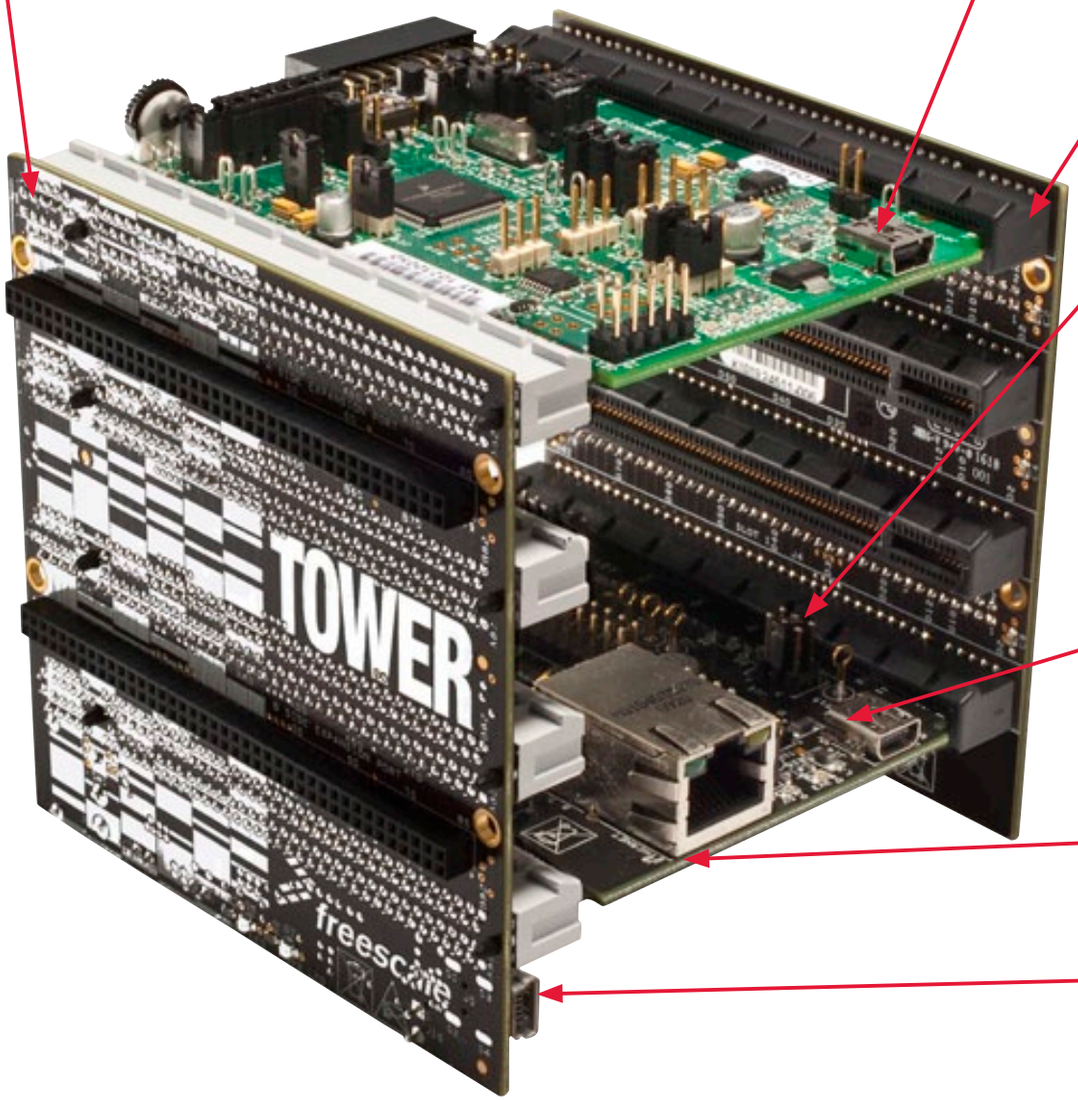
Primary edge of TWR-S08MM128 and TWR-SER must connect to this Primary elevator, which has components on the bottom of the board, including the mini-USB connector.

This mini-USB port is only used for OSBDM interface to program and debug the S08MM128. It does not connect to the S08MM128 USB ports.

Make sure this side is the Secondary elevator.

Set Jumper J16 on TWR-SER module to middle position connecting pins 3 and 4 as shown. This configures the module for USB device mode, which is required by the labs in this kit.

This mini-USB port on the TWR-SER powers the whole Tower System setup. It interfaces with the S08MM128 USB module. Users can test the S08MM128 USB via this mini-USB port.



This is the TWR-SER module.

This is the mini-USB from the Primary elevator. Connection to this is not needed in this kit.

Figure 2: Tower System Assembled

NOTE: Figure 2 is a Tower System without the optional MED-EKG assembly. For details on how to assemble the MED-EKG, please refer to Lab 1 on the DVD.

Step-by-Step Installation Instructions

In this Quick Start Guide, you will learn how to set up the TWR-S08MM128-KIT.

STEP 1 Install Software and Tools

- Install CodeWarrior Development Studio for Microcontrollers V6.3 (Evaluation Version)
- Processor Expert V3.09 (graphical code generator)
- Install Service Pack for S08MM
- Install Flexis MM USB Bootloader GUI (Required for Lab 5)
- Install Freescale USB stack with PHDC v2.5 (USB demos and codes are optional components, but are not needed for labs)
- Install Embedded Multilink Toolkit (GUI required for labs)

Install in the order listed. These programs are included on the DVD. Look under the development tools tab in your DVD. For updates, please visit **freescale.com/s08mm**.

STEP 2 Configure the Hardware

1. Build the Tower System as shown in Figure 2, and make necessary configurations according to the notes that point to the component settings.

(continued on next page)

STEP 2 *(continued from previous page)*

2. Verify the default jumper settings for the TWR-S08MM128 module. Some labs require default settings, please refer to Table 1.

Figure 3: TWR-S08MM128 with Default Jumpers Used in Table 1

NOTE: Please see TWR-S08MM128 schematic for jumper labels and functions.

Jumper Name	Default Setting on TWR-S08MM128 Module
J16	1 and 2
J15	1 and 2
J12	Open
J3	Open
J8	Open
J7	Open
J5	Open
J6	1 and 2
J1	1 and 2
J2	1 and 2
J10	2 and 3
J19	1 and 2, 3 and 4, 5 and 6
J26	2 and 3
J25	6 and 5, nothing on pin 4, 3, 2, 1
J24	Open
J11	1 and 2
J9	1 and 2
J4	1 and 2
J18	1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10, 11 and 12, 13 and 14
SW3	Slider 1 at OFF (Position 1)
	Slider 2 at OFF (Position 2)

Table 1: Default Settings on TWR-S08MM128 Module

STEP 2 *(continued from previous page)*

3. This step is only needed for the Lab 1 EKG demo.

   Verify the MED-EKG module is configured to default settings. This is required to run the MED-EKG demo.

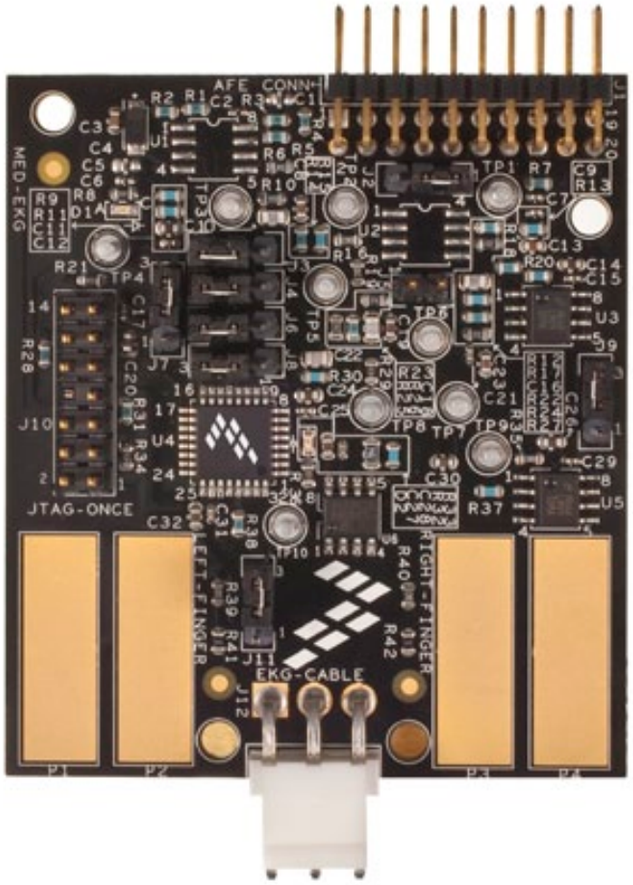


Figure 4: MED-EKG with Default Jumpers Used in Table 2

NOTE: Please see MED-EKG schematic for jumper labels and functions.

Jumper Name	Default Setting on TWR-S08MM128 Module
J2	1 and 2
J3	2 and 3
J4	2 and 3
J5	Open
J6	2 and 3
J7	2 and 3
J8	2 and 3
J9	2 and 3
J10	All open (J10 connects to DSC programmer. It is not needed for this demo.)
J11	2 and 3

Table 2: Default Settings on MED-EKG Module

STEP 3 Connect the Tower System to the Computer

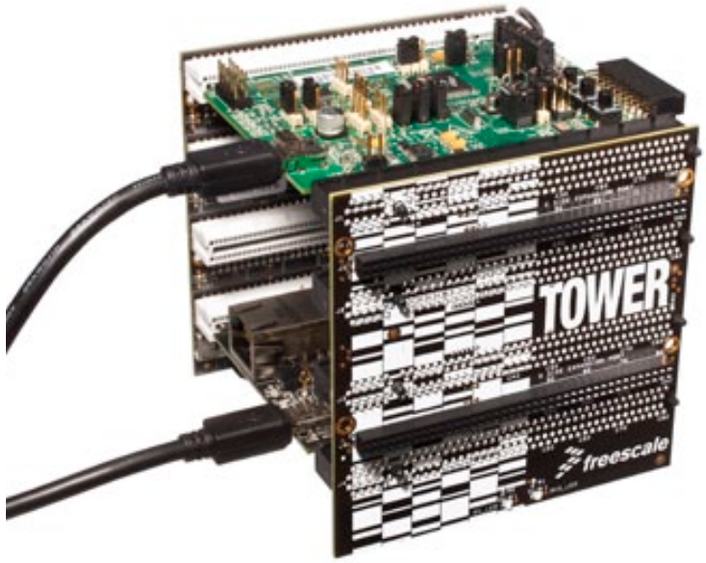
The assembled Tower System now has three USB connectors:

1. The USB connector on TWR-SER connects to the USB peripheral of the S08MM128 MCU.
2. The USB connector on TWR-S08MM128 is used for programming and debugging the S08MM128 MCU. The debugger interface is the Freescale open-source background debug module (OSBDM).
3. The USB connector on the Primary elevator merely powers the Tower System. There is no data through this connector and is not used in this kit.

To power on an assembled Tower System, connect the PC to the mini-USB port (J14) on the TWR-SER module. The S08MM128 is programmed with a blinking LED application, so you should see LED 1 to LED 3 blink the first time the board is powered. LED 1 to LED 3 are located near the potentiometer. When set up as an assembled Tower System, the power source is from the TWR-SER mini-USB. The TWR-S08MM128 mini-USB acts only as an OSBDM function and should not be used to power the system. Be sure to connect TWR-SER USB before the TWR-S08MM128 USB. Do not connect TWR-S08MM128 USB without TWR-SER USB or damage could result.

NOTE: When the TWR-S08MM128 module is used stand-alone, USB port (J17) is both the power source and the debugger interface. When the TWR-S08MM128 module is assembled as a Tower System, the USB port (J17) is only a OSBDM.

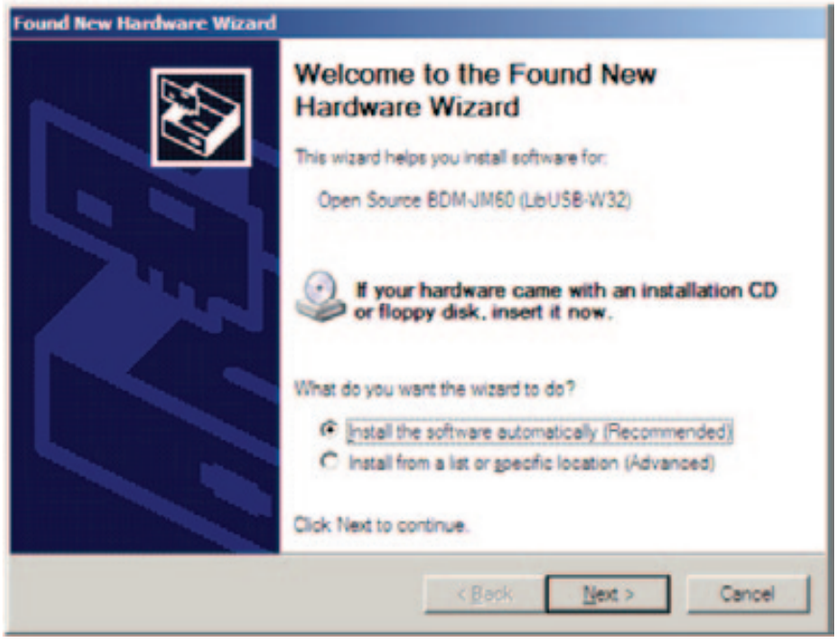
LEDs 1 to 4 correspond to silk-screened labels D9 to D12 on the TWR-S08MM128 module.



STEP 4

Program S08MM128 and Debug Code

1. To program the S08MM128 with a different application, connect the USB from the PC to the TWR-SER, and then connect another USB from the PC to TWR-S08MM128. If this is the first time you have connected the board, a window may appear and ask about installing new hardware for the on-board OSBDM circuit. Install the driver to allow CodeWarrior debugging with OSBDM.



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

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STEP 4

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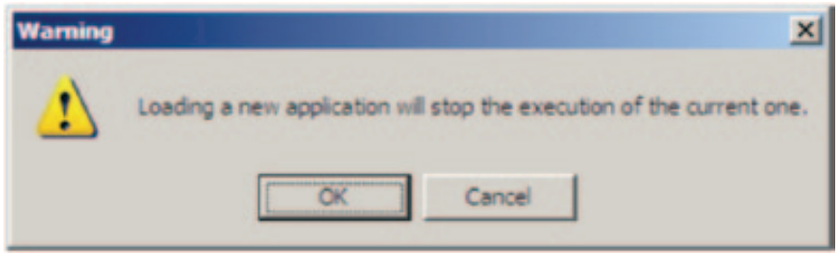
2. Look for the “S08MM POT ADC” application in the DVD under the “Software” tab, “Labs” section. Copy the file to your working directory and unzip it.
3. Start CodeWarrior by selecting it from the Windows Start menu. Make sure you open Version 6.3 if you have multiple versions installed.
4. From the CodeWarrior main menu, choose File > Open and open the following file: d:\work\POT_ADC\S08MM_POT_ADC\POT_ADC.mcp.

   This is the project you just created in number 1 above.
5. In CodeWarrior, click Debug. This will activate the hiwave debugger which also displays the following message. Click OK and CodeWarrior will use the on-board OSBDM circuit to erase and program the S08MM128 internal flash.



6. In the True-Time Simulator and Real-Time Debugger window, click (start and continue) to run the application. Rotate the potentiometer back and forth from the TWR-S08MM128 module. You will see that LED 1 to LED 4 will turn off and on sequentially depending upon the rotation of the potentiometer.
7. In the same debugger window, you can click on this button to halt the application. The source window will stop at the line of code where you halt the application.
8. These buttons allow you to do Single Step, Step Over, Step Out and Assembly Step in your project.

STEP 5 Demonstrate the Labs

- **Lab 1: MED-EKG Development Board Demo**—Set up hardware and run software to read your electrocardiography
- **Lab 2: Interfacing with HealthLink and Google Health**—Send emulated health data to HealthLink and Google Health
- **Lab 3: Low-Power and Measurement Engine Demo**—Explore the energy saving capabilities of the S08MM128 and its powerful built-in analog modules such as OPAMP, DAC and ADC
- **Lab 4: Accelerometer Demo**—Sample accelerometer outputs and display a GUI via the S08MM128 serial function
- **Lab 5: USB Bootloader**—Use a USB bootloader GUI tool to update firmware via the S08MM128 USB interface

NOTE: Lab 1 is printed and included in the MED-EKG box of the TWR-S08MM128-KIT. Digital copies of all five labs are included in the DVD in the “Software” tab, “Labs” section. Under the “Software” tab, click “Next page” to get to the Labs section.

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