# MC9S08GW64

LCD segment MCU for flow meters
and energy metering applications

**freescale**
semiconductor

# Get to Know the TWR-S08GW64

Tamper Switch (SW4)

User Switch (SW3)

User Switch (SW5)

Reset Switch

IRQ Switch

USB Controller

MC9S08GW64

Primary Connector

Potentiometer to Control the Vrms

Potentiometer to Control Irms
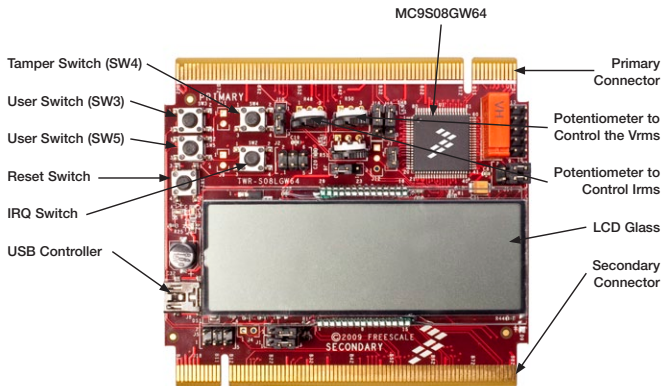
LCD Glass

Secondary Connector

Figure 1: TWR-S08GW64

## TWR-S08GW64-KIT
## Freescale Tower System

The TWR-S08GW64 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. The TWR-S08GW64-KIT comes with two elevator modules (TWR-ELEV) and a prototype module (TWR-PROTO).

# Introduction

TWR-S08GW64 demonstrates energy metering and flow metering capabilities of the MC9S08GW64. The MC9S08GW64 device is a 3.3V microcontroller with the following components:

- 8-bit HCS08 core
- Up to 20 MHz cpu at 3.6–2.1V, 10 MHz at 3.6–1.8V
- Integrated LCD driver
- Independent RTC with 32 bytes of RAM
- Programmable delay block (PDB)
- Two 16-bit ADC
- Dedicated port for AMR

The MC9S08GW64 is available in two pin packages: 64-pin and 80-pin LQFP, across this temperature range: -40°C to +85°C for industrial applications. TWR-S08GW64 contains an on-board display that allows developers to explore software development using the integrated LCD driver.

This demo board is fitted with the MC9S08QE8 and the MC9S08JM60 microcontrollers. The MC9S08QE8 is used to generate the sine waves which mimic the behavior of the current and voltage in a real energy meter. The MC9S08JM60 is used as a bridge to communicate between the debugger running on the PC and the MC9S08GW64 and MC9S08QE8 microcontrollers. Selection between these MCUs is based on the jumper setting discussed in the next section.

This Quick Start Guide is designed to provide step-by-step guidelines for developing applications using the MC9S08GW64 within minutes.

# Step-by-Step Installation Instructions

After completing the steps in this Quick Start Guide, refer to the TWR-S08GW64 Lab tutorial document (TWR-S08GW64LAB) included in the Training section of the DVD to learn more about the key benefits that the MC9S08GW64 provides to your application.

## STEP 1 — Install Software and Tools

Please insert the provided DVD into your computer. After the initial screen appears, install CodeWarrior development tools in the order listed below. Follow the prompts through the installation of each component, answering each prompt with the default input.

1. Install CodeWarrior Development Studio for Microcontrollers v10.0 Edition

2. Install the service pack for the MC9S08GW64 by following these steps:

   • Open the CodeWarrior window from the Start menu.

   • Select the required workspace and click "OK."

   • Go to the Help menu in the current window.

   • Select "Install New Software" in the drop down menu.

   • Ensure you have the link below in your "Work With" textbox: **http://freescale.com/lgfiles/updates/Eclipse/MCU/com.freescale.mcu.updatesite**

To correctly install, you should:

1. Check two options "Eclipse Platform Patch to include FSL Updater Support for Locked Files" and "FSL Updater Service Pack" in the dialog to install.

2. After 10.0 restart, please check GW64 service pack "MCU10.0 MC9S08GW64_32 SP" to complete the installation and restart CodeWarrior.

3. Install the CodeWarrior project files by selecting the Training tab and clicking the "Lab 1: Demo." This will begin the extraction of the related project files.

   Place them in your workspace.

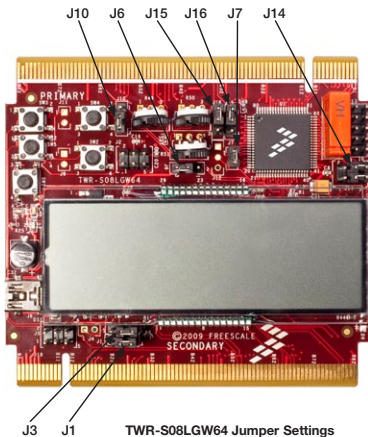## STEP 2 Set Up the TWR-S08GW64 Module

1. Remove the TWR-S08GW64 module from the anti-static pouch. Make sure the jumpers are in the default positions (see diagram).

2. This symbol indicates no jumper is installed.

3. Connect the provided USB cable from a free USB port on your computer to the mini-B USB connector on the TWR-S08GW64 module. Allow the PC to automatically configure the USB drivers as needed. The USB drivers for your TWR-S08GW64 module were pre-loaded in the CodeWarrior installation.

4. Connect the debugger to the jumper J2. The debugger should be connected as shown:
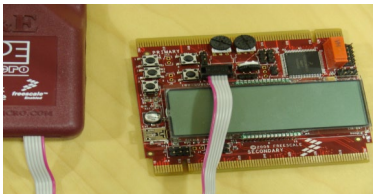


**Connection between the debugger and the demo board**

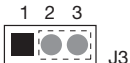## STEP 3 Set Jumper Configuration



J6

3 2 1

J6 selects between battery power and regulated power to GW64.

Connect between 2 and 3 in J6 to get power from the regulator.



J7

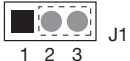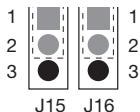J7 connects the output of J6 to the MCU power pin.

Connect the J7.



1 2 3

J3

J1

1 2 3

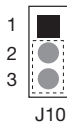J1 and J3 select BKGD (background debugging data) and Reset of the debugger to either QE8 or GW64.

Connect between 2 and 3 in both J1 and J3 to select GW64.

**TWR-S08LGW64 Jumper Settings**

J10  J6  J15  J16  J7  J14

PRIMARY
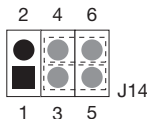
TWR-S08LGW64

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SECONDARY

J3  J1

J15 and J16 select the input to ADC1 and ADC2 respectively.

Connect between 1 and 2 for both J15 and J16 to connect the output of QE8 to ADC1 and ADC2.

J14 selects the output of GW64 between the debugger serial term or RS232.

Connect between 4 and 6 and between 3 and 5 for J14 to connect to RS232.

J10 selects Switch 4 to be connected to tamper 0/1.

Connect between 2 and 3 for J10 to connect to tamper 1.

# Start CodeWarrior and Debug Environment

1. From the CodeWarrior window that is open on your terminal, select the "File" menu.

2. From the CodeWarrior "File" menu, select "File > Import" and in the window that appears, expand "General" and select "Existing Projects into Workspace" and click "Next."

3. Browse in the window that appears in the workspace. Select "Demo_Borad_Application_Software" by checking the respective box and then clicking "Finish."

4. The project is successfully imported.

5. Select "Project>Build Project." This will compile the specified project.

6. Open the "main.c" file to review the code. The main portion of the C code for this example is contained here.

7. Select the active project. Choose "Run> Debug Configurations" from the main menu. Double click on "CodeWarrior Download." Click on the "Debugger" tab. Select "CodeWarrior Debugger for HCS08" from the drop down menu.

8. Click on the HCS08 tab and select the target processor "MC9S08GW64." Click the "Connection" tab. Under Physical Connection, select "P&E HCS08 Multilink\Cyclone Pro" from the drop down menu. Click "Apply." Close the run configuration window.

9. From the main menu, select "Run>Debug" to launch the code into the target processor.

**STEP 5**

## Run and Debug Example Code on the TWR-S08GW64 Module

1. From the debug window, choose "Resume." The program will be executed in real–time.

2. From the debug window, choose "Suspend." The program execution will stop. The next instruction to be executed is highlighted in the source window.

3. From the debug window, choose "Step over." The instruction highlighted in the source window will be executed and the program execution will be stopped immediately.

4. From the main menu, choose "Resume." The application will restart from where it was previously stopped.

5. Now that you have successfully completed the software and hardware setup, test your TWR-S08GW64 module by running the Tower System module application pre-loaded in the microcontroller's on-chip flash memory. For more detailed information on how to use the demonstration code, please refer to the TWR-S08GW64 Lab tutorial.

Additional information can be found in the documentation and training tab of the enclosed DVD.

MC9S08GW64 documents:
• MC9S08GW64 Reference Manual
• MC9S08GW64 Data Sheet

TWR-S08GW64-KIT documents:
• Tower Module Schematics
• Tower Module LCD Glass Specifications

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