

## Quick Start Guide

### **TWR-S08PT60**

5-Volt S08P Family of 8-bit MCUs for Industrial and Appliance Applications



**TOWER SYSTEM**

# Get to Know the TWR-S08PT60



## TWR-S08PT60 Freescale Tower System

The TWR-S08PT60 module is a part of the Freescale Tower System, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Elevate your design to the next level and begin constructing your Tower System today.

## TWR-S08PT60 Features

The TWR-S08PT60 Tower System module demonstrates the capability of the MC9S08PT60 8-bit MCU targeted for industrial and home appliance applications. It can function as a stand-alone, low-cost platform for the evaluation of MC9S08PT60 devices. There is an OSBDM module on the TWR-S08PT60 which can be used to debug MC9S08PT60 devices on both the TWR-S08PT60 module and external customer boards.

The MC9S08PT60 is part of the 5-volt S08PT family of MCUs, offering exceptional EFT/ESD performance, more durability and reliability for harsh industrial and user interface environments and alignment with the IEC60730 appliance safety standard. The S08P family is pin compatible and integrates a touch-sensing interface (TSI), EEPROM and a motor control flex timer to simplify designs and help reduce system costs.

### MC9S08PT60 Features

- 8-bit S08L core
- Up to 20 MHz CPU at 2.7–5.5 V
- 60 KB flash, 4 KB RAM, 256B EE
- 12-bit ADC, 16-ch.
- Analog comparator
- 16-ch. touch-sensing input
- Multiple timers, motor control, PWM capable
- Rich connectivity, including SCI, SPI and I<sup>2</sup>C
- 57 GPIOs, including 8-pin, 20 mA drive and 2-pin true open-drain

# Step-by-Step Installation Instructions

In this quick start guide, you will learn how to set up the TWR-S08PT60 module and run the lab code.

## 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 detailed below. Follow the prompts through the installation of each component, answering each prompt with the default input.

1. Install CodeWarrior Development Studio for Microcontrollers v10.1. Also install CodeWarrior MCU v10.1 Update 1.0.1 (CW\_MCU\_V10.1\_Update\_1.0.1.zip) or newer by following the instructions in **CodeWarrior\_Service\_Pack\_Update\_Procedure.pdf** found on the DVD.
2. Install CodeWarrior Service Pack for MC9S08PT60 by following these steps:
  - Open the CodeWarrior application from the Windows Start menu
  - Select the required workspace and click **“OK”**
  - Go to the **Help** menu in the current window
  - Select **“Install New Software”** item from the drop down menu
  - In the **“Install”** dialog, click the **“Add”** button in the upper right corner
  - In the **“Add Site”** dialog, fill your favorite site name as the update location in the **“Name”** text box and click the **“Archive”** button
  - In the **“Repository archive”** browse dialog, select the zip archive containing the Service Pack Updater Archive and click **“Open”**
  - Open the **“Work with:”** drop down list and select the update location you have just added
  - Select (check) the MCU Service Pack **“MCU V10.1 Service Pack for MC9S08PT60”** and uncheck **“Contact all updates sites during install to find required software”** item, then click **“Next”**

- Wait for the Updater to open the archive and the **“Install/Install Details”** dialog will appear. Select the Service Pack and click **“Finish.”** This will automatically install all the Service Pack dependencies
  - Select the **“I accept the terms of the license agreement”** button and click **“Finish”**
  - You will be asked to restart CodeWarrior again. Select **“Yes”**
3. Install PEMICRO Embedded Multilink Toolkit (Terminal Window version 2.03 or newer is required for labs).
  4. Create a local workspace (folder) on your computer, for example, PT60Lab.
  5. Install four CodeWarrior project files by selecting the Training tab and unzip these files to the local workspace that was just created on your computer.


## 2 Set up the TWR-S08PT60 Module

Remove the TWR-S08PT60 module from anti-static pouch. Ensure the jumpers are in the default positions as shown in the Default Jumper Options table on the following pages of this quick start guide.

After ensuring the jumpers are in the default positions, connect provided USB cable from a free USB port on your computer to the mini-B USB connector on the TWR-S08PT60 module. Allow the PC to automatically configure the USB drivers as needed. USB drivers for your TWR-S08PT60 module were pre-loaded in the CodeWarrior installation.




## Step-by-Step Installation Instructions (cont.)

### 3 Start CodeWarrior and Debug Environment






1. Start CodeWarrior by selecting it from the Windows Start menu.
2. From the CodeWarrior main menu, choose **“File > Switch Workspace”** and select **“Other...”** The Workspace Launcher dialog appears where the current (default) workspace name is displayed on **“Workspace:”** edit text box. If this workspace is not the one on your computer that contains lab projects, click **“Browse...”** to launch the **“Select Workspace Directory”** dialog. In this dialog, browse to the project folder (workspace) containing the lab projects and select it by clicking **“OK.”** The project folder appears on the **“Workspace”** text box. Click **“OK”** to allow CodeWarrior to configure and switch to the desired workspace.
3. Click **“File > Import...”** menu item to open **Import** dialog. In the **Import** dialog, double click **“General”** and select the **“Existing Projects into Workspace”** item followed by selecting **“Next.”** The Import Projects dialog appears.
4. In the **“Select root directory”** dialog, click **“Browse...”** Browse to and select the project folder **“TWR-S08PT60\_Lab1\_6”** followed by clicking **“OK.”** The project name will appear in the Projects list and will be checked. Ensure **“Copy projects into workspace”** is unchecked, and click **“Finish.”**
5. When the Remote System Missing dialog appears, click **“Yes”** until the Welcome window appears. Close this window.
6.  Click the fast view icon at the bottom left of the window which will pop up on the fast view menu. Select **“CodeWarrior Projects”** from this menu to view the opened projects.

- Click the lab project name to highlight it. Click the **“Project > Clean...”** menu item to bring up the Clean dialog. In this dialog, check **“Clean projects selected below.”** Select and check the project name. Check **“Start a build immediately”** and **“Build only the selected projects”** followed by pressing **“OK.”** This will start the project building process. When you see the **“Finished building: ...”** message in Console view, the project building process is complete.
- Click the **“Run > Debug Configurations...”** menu item and the Debug Configurations dialog will pop up. In the Debug Configurations dialog, expand **“CodeWarrior Download”** and select **“S08PT60\_PnE MultiLink or OSBDM Connection.”**
- Click **“Debug”** to download code to the PT60. This starts the launching progress until the debugger perspective appears and stops at the line of `main()` in the source view.

## 4 Run and Debug Lab Code on TWR-S08PT60 Module

-  From the main menu, choose **“Run > Resume”** or click the **Resume** icon in the Debug view toolbar. The program will be executed in real time.
-  From the main menu, choose **“Run > Suspend”** or click the **Suspend** icon. The program execution will stop. The next instruction to be executed is highlighted in the source window.
-  From the main menu, choose **“Run > Step Into”** or click the **Step Into** icon. The instruction highlighted in the C source window will be executed and the program execution will be stopped immediately.

## Step-by-Step Installation Instructions (cont.)

-  From the main menu, choose “**Run > Step Over**” or click the **Step Over** icon. The debugger will execute the current statement and advance to the next statement in the source code. If the current statement is a routine call, program execution continues until it reaches:  
**end of the called routine, breakpoint, watchpoint, or an eventpoint that stops execution**
-  From the main menu, choose “**Run > Step Return**” or click the **Step Return** icon. The debugger will execute the rest of the current routine and stop program execution after the routine returns to its caller. This command causes execution to return up the call chain.
-  From the main menu, choose “**Run > Restart**” or click the **Restart** icon. The debugger goes back to the beginning of the program and begins execution again. This behavior is equivalent to killing execution and starting a new debugging session.
-  From the main menu, choose “**Run > Reset**” or click the **Reset** icon. The debugger will reset the target.
-  Click on instruction stepping mode icon, you can debug the program in Disassembly View instead of the source view.
- Now that you have successfully completed the software and hardware setup, you may continue to explore TWR-S08PT60 labs by following TWR-S08PT60 Labs Tutorial.



## 5 Program Your Own Boards with TWR-S08PT60

You can also use TWR-S08PT60 OSBDM to program your own boards by following the steps below.

1. Configure J16 and J28 jumpers as below:

Jumper	Setting	Description
J16	open	OSBDM to on-board PT60
J28	open	OSBDM to on-board PT60

2. Connect J16 pin 1 to pin 1 of the target board BDM connector. Connect J28 pin 1 to pin 4 of the target board BDM connector. Connect pin 2 of J23 to the pin 2 of the target board BDM connector. Connect pin 6 of J23 to the pin 6 of the target board BDM connector.
3. To power the target board using the OSBDM, ensure that a jumper on J27 is installed correctly per the power supply level and J29 is close to the default jumper settings. If you want your target board to be powered by itself instead of

the OSBDM, ensure that both J27 and J29 are open, then apply power to your target board.

4. Connect the provided USB cable from a free USB port on your computer to the mini-B USB connector on the TWR-S08PT60 module. Allow the PC to automatically configure the USB drivers as needed. USB drivers for your TWR-S08PT60 module were pre-loaded in the CodeWarrior installation.
5. Follow steps 3 and 4 to download CodeWarrior to your own board.

## 6 Learn More

After completing the steps in this quick start guide, take a look at the TWR-S08PT60 Labs Tutorial document (TWR-S08PT60\_LAB) included in the Training section of the Getting Started DVD to learn more about how the MC9S08PT60 benefits your application.

## TWR-S08PT60 Default Jumper Options

The following is a list of all default jumper options.

Jumper	Setting	Description
J1	1 – 2	USB to UART2 (Rx)
J2	1 – 2	USB to UART2 (Tx)
J5	2 – 3	UART (SCI0 Tx)
	5 – 6	UART (SCI0 Rx)
	11 – 12	Infrared (Tx)
	14 – 15	Infrared (Rx)
J6	3 – 5	UART (Rx to Tx)
J7	1 – 2	Potentiometer
J9	2 – 3	Accelerometer default address
J12	open	Accelerometer INT1
J15	open	Accelerometer INT2

(continued from previous page)

Jumper	Setting	Description
J16	1 – 2	OSBDM to on-board PT60 (BKGD)
J17	2 – 3	External clock (EXTAL)
J18	2 – 3	External clock (XTAL)
J20	2 – 3	TWRPI to PT60
J21	2 – 3	TWRPI to PT60
J22	2 – 3	TWRPI to PT60
J25	2 – 3	Power supply 5-volt selection
J26	2 – 3	Power supply 3.3-volt selection
J27	2 – 3	Power supply level selection
J28	1 – 2	OSBDM to on-board PT60 (/RESET)
J29	1 – 2	Power supply for PT60 and IDD measurement

Note: For some particular labs, special connections are required. For more information on these connections, consult the TWR-S08PT60 labs tutorial.

Visit [freescale.com/TWRS08PT60](http://freescale.com/TWRS08PT60) for information on the TWR-S08PT60, including:

- TWR-S08PT60 quick start guide
- TWR-S08PT60 labs tutorial
- TWR-S08PT60 user guide

## Support

Visit [freescale.com/support](http://freescale.com/support) for a list of phone numbers within your region.

## Warranty

One (1) year limited warranty. Please visit us at [freescale.com/warranty](http://freescale.com/warranty) for complete warranty information.

For more information, visit [freescale.com/Tower](http://freescale.com/Tower)

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