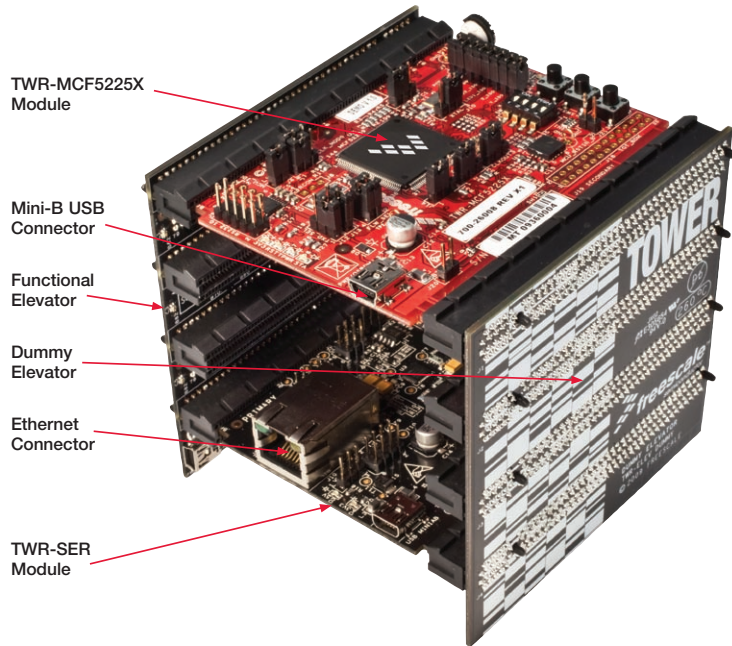




**MCF5225X**  
Connectivity Lab 1



## About the Tower System



TWR-MCF5225X Module

Mini-B USB Connector

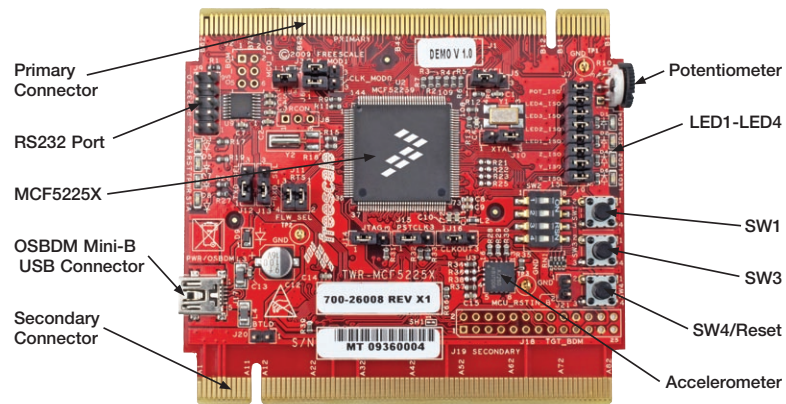
Functional Elevator

Dummy Elevator

Ethernet Connector

TWR-SER Module

## Get to know the TWR-MCF5225X



Primary Connector

RS232 Port

MCF5225X

OSBDM Mini-B USB Connector

Secondary Connector

Potentiometer

LED1-LED4

SW1

SW3

SW4/Reset

Accelerometer



### TWR-MCF5225X-KIT Freescale Tower System

The TWR-MCF5225X 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.

Figure 1: Tower System

# MCF5225X—Lab Tutorial 1 (sheet 1 of 3)

The following labs require the TWR-SER module and the elevator modules.



## HVAC Controller, Freescale MQX RTOS for MCF5225x

This lab will guide you through the general use of Freescale MQX™ operating system under the CodeWarrior™ environment to familiarize you with the general compile and download process as well as provide an understanding of the application.

### Demonstrates

- MQX project in CodeWarrior IDE
- Project build, download and run in CodeWarrior IDE
- MQX shell and serial line console
- MQX GPIO driver (push button and LEDs)

Note: These labs utilize a standard serial cable which is not included in the TWR-SER kit.

### Step by Step Instructions

1. Install CodeWarrior Development Studio for ColdFire® 7.1 Professional Edition (30 day evaluation version available), then install CodeWarrior 7.1.2 patch (or later) and MQX 3.4 or later. Open CodeWarrior.
2. Press the card edge connector of the MCU module into a slot on the elevator—take care to match the primary connector card edges and plug them into a functional elevator. Do the same for the serial module. A module may be placed into any slot on the elevator, but it is recommended to put the MCU module on the top for easier access to the switches and LEDs. Then press the dummy elevator onto the card edges labeled secondary.
3. Make the following connections from the MCF52259 board to the computer. See Figure 1 and Figure 2 on reverse side.
  - a. USB debugger connection (J17 on the TWR-MCF5225X module) to a USB port on PC
  - b. Serial port on the TWR-SER module to a serial port on PC (serial cable not included)
4. The first time you connect the USB debugger cable to your PC, Windows will install a driver for the debugger. Follow the prompts to automatically detect and install the driver.
5. If you did not install the MQX project in the default C:\Program Files\Freescale\MQX3.4\

directory during installation, you must first recompile the MQX libraries to reflect the new path name. See the MQX release notes in the \Freescale\MQX3.4\doc directory for information before continuing on with the lab.

6. Open the lab project by selecting the **File > Open** menu item and opening C:\Program Files\Freescale\MQX3.4\demo\hvac\codewarrior\hvac\_twrmc52259.mcp
7. In the project pane, select “HVAC—Int. Flash Debug” build target. See Figure 3 to the right.
8. Compile the project by pressing the F7 key or by clicking the **Make** icon on the project pane toolbar.
9. Open the “Flash Programmer” tool in the **Tools** menu. Make sure the “Use Custom Settings” checkbox is not selected (i.e. the configuration will be taken from the project). See Figure 4 below.
10. Click the **Load Settings** button and select MCF52259\_INTFLASH.xml.
11. Select the **Erase/Blank Check** page, select “All Sectors” and click **Erase**. See Figure 5 below.
12. Select the **Program/Verify** page and click **Program**. Upon successful programming, the status will display “Completed Successfully.”

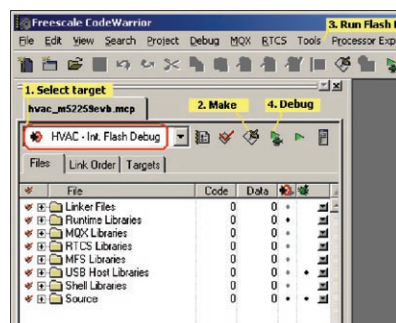


Figure 3: Project Loaded in the CodeWarrior IDE

13. Now start debugger and execute the application by clicking the **Debug** icon. This icon is identified in Figure 3 on right.
14. Once the debug session starts you will see the MQX entry-point function in the code window as seen in Figure 6. Click the **Debug** icon again to run the code, which will look like Figure 7.
15. Start HyperTerminal on the PC (**Start menu > Programs > Accessories > Communications**). Make a connection to the serial port that is connected to the board (usually will be COM1)
16. Set it for 115200 baud, no parity, 8 bits and click OK.

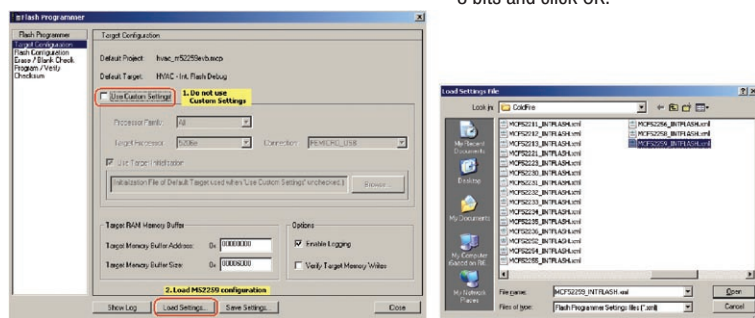


Figure 4: Opening flash programmer tool

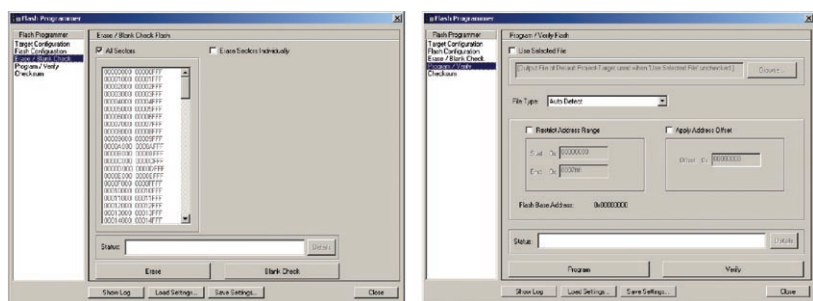


Figure 5: Downloading code with flash programmer tool

17. Press **Enter** in the terminal window on the PC. You should see the **shell>** prompt. Status updates will appear every 15 seconds in the terminal window.
18. Type **help** to see the list of available commands. Use the **info** command to display the current settings (See Figures 10 and 11).
19. A simple HVAC controller has been implemented as the example application to demonstrate the features of the software.
20. The LEDs represent the current state of the HVAC:
  - LED1 represents Fan ON/OFF
  - LED2 represents Furnace ON/OFF
  - LED3 represents A/C ON/OFF
21. Use the **fan** command (**fan on** and **fan off**) to control the fan (LED 1). Use **info** at any time to confirm the status. The **fan on** command forces the fan to be on, while **fan off** puts the fan into automatic mode so that the fan is only on when the HVAC needs to change temperature.
22. Since the default settings for the demo have the “desired temp” and “actual temp” at 20°C, both the furnace or the AC do not need to be turned on.
23. Turn the fan off to put it in automatic mode, and put the HVAC into heat mode using the **hvac** command (**hvac heat**). This turns on the furnace, and with the fan in automatic mode, the fan will only turn on when the desired temperature is higher than the actual temperature.

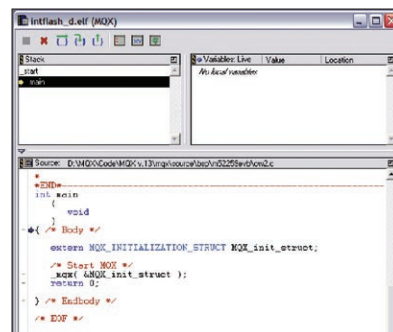


Figure 6: MQX debug entry point

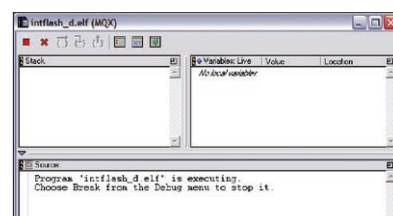


Figure 7: Running MQX code



Figure 8: Hyperterminal console window

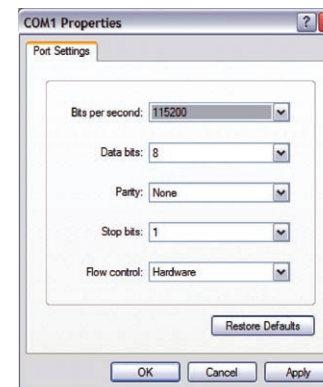


Figure 9: Hyperterminal console window

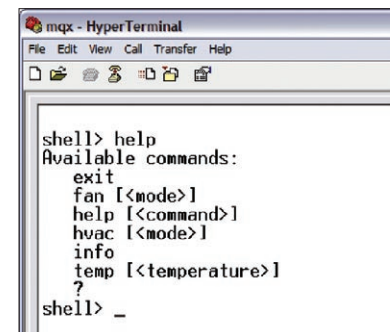


Figure 10: Help command in hyperterminal console window

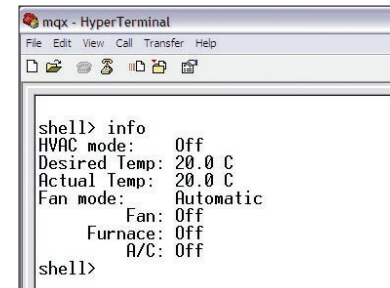


Figure 11: Info command in hyperterminal console window

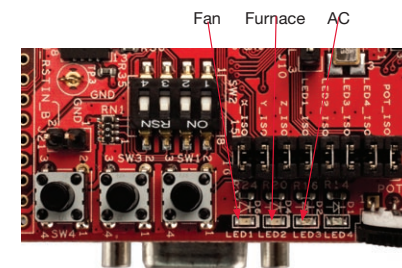


Figure 12: TWR-MCF5225X LEDs

24. Push buttons SW1 and SW3 on the board are used to change the desired temperature. SW1 increases the desired temp and SW3 lowers it. Press SW1 once and then type **info** in the shell.
25. Press SW1 again, type **info** and see that the furnace has turned on and the fan has automatically turned on. The furnace and fan LEDs should be on to indicate this status.
26. Use SW3 to lower the desired temp such that the furnace and the fan turn off. Use the **temp** command to change the desired temperature to 24°C (**temp 24**). The fan and the furnace should turn back on.
27. Experiment on your own with changing temperature and fan settings.
28. Terminate the debug session by pressing Shift-F5 or by selecting **Debug>Kill** in CodeWarrior.

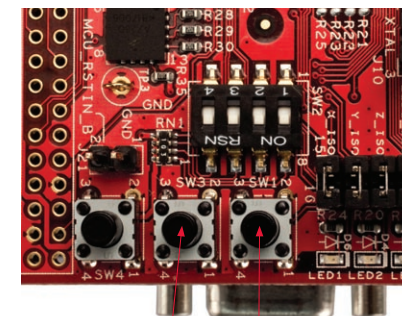


Figure 13: Push buttons on the DEMO and EVB boards



**Learn More:** For more information about MQX and Freescale solutions, please visit [www.freescale.com/mqx](http://www.freescale.com/mqx) and [www.freescale.com/tower](http://www.freescale.com/tower).

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