

The background of the top half of the page is a vibrant green and blue abstract design. It features a central glowing sphere with a grid pattern, surrounded by dynamic, multi-colored signal waves that suggest digital or radio frequency activity.

Quick Start Guide

TWR-56F8200

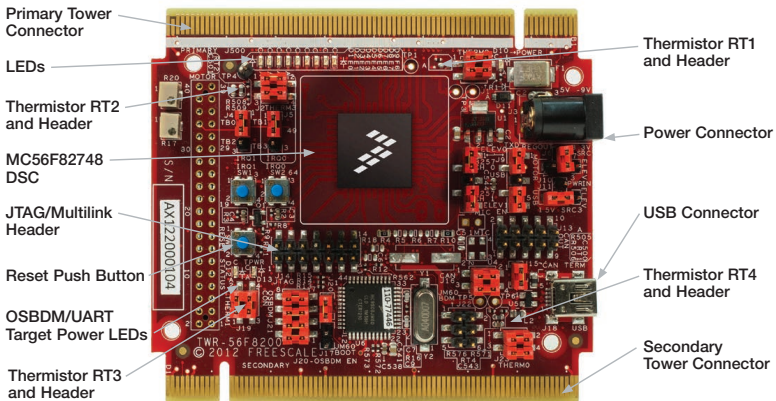
Tower System Module for MC56F823xx
and MC56F827xx



TOWER SYSTEM



Get to know the TWR-56F8200 Board



TWR-56F8200 Freescale Tower System

The TWR-56F8200 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

- The TWR-56F8200 is a standalone development board that can be used in conjunction with the Tower System peripheral boards, including the LV3PH motor control kit (TWR-MC-LV3PH).

The MC56F82748 comes preloaded with an application demonstrating the ADC and a FIR filter application that will sense heat at the four corners of the module. Other demo applications and complete instructions and software on how to turn a 3-phase BLDC motor using the LV3PH motor control kit are available at freescale.com/TWR-56F8200.

- The module features serial communication over USB, CAN circuits and access to each pin. The module can be powered by the Tower System, an external power supply, the USB jack or a board connected to the Tower System. The MC56F82748 is surrounded by easy access scope probes for each pin of the device. All signals are also available on the headers for easy and neat coupling to your project.
- The Universal Multilink is used with the JTAG connector to allow user code to be loaded and debugged. The latest version of firmware is preloaded into the JM60 USB controller.



2748 Features

- 50/100 MHz, 50/100 MIPS 32-bit core for fast control loop execution via single-cycle math computations and parallel moves
- Fractional arithmetic supported for greater speed with four accumulators
- DMA controller for reduced core intervention when shifting data from peripherals
- High-resolution PWM with 312 picosecond resolution for accurate adjustment of the control loops
- 2 x 12-bit high-speed ADCs with 2.5 MSPS resolution reduce jitter on current and voltage reads
- Four analog comparators with integrated 6-bit DACs that can enable emergency shutdown of the PWMs
- Integrated PGAs to increase the accuracy of ADC conversions on small voltages and currents
- Intermodule crossbar directly connecting any input and/or output with flexibility for additional logic functions (AND/OR/XOR/NOR)
- 5 V tolerant I/O for cost-effective board design
- Memory resource protection unit to ease safety certification

Step-by-Step Installation Instructions

In this quick start guide, you will learn how to set up the TWR-56F8200 module and run the default thermistor and LED application.

1 Connect the Jumpers

Ensure the jumpers are connected as shown in the TWR-56F8200 Jumper Options table in the next section to power the board in standalone mode with the USB cable providing power, control and communications. All other jumpers are preinstalled at the factory in the desired configuration.

2 Run the Thermistor Demo

Plug the USB cable from your computer into the TWR-56F8200 module. LEDs E0-E7 will flash in pairs. With a finger, touch one of the on-board thermistors (RT1, RT2, RT3, RT4) placed on each corner of the board. By touching the thermistor, you will increase its temperature. The change in temperature is detected by the DSC and it will update the LED's flashing pattern. The thermistors and the LEDs are related as follows:

| Thermistor | LEDs |
|------------|--------|
| RT1 | E0, E1 |
| RT2 | E2, E3 |
| RT3 | E4, E5 |
| RT4 | E6, E7 |

If you remove a finger from the thermistor, the LED will return to the default flashing pattern.

3 Create a Project

Install CodeWarrior and run the program.

- From the menu, select “File,” “NEW,” “Bareboard Project.”
- Assign a project name such as “ProjDSC” and select “Next.”
- Expand the 56800E (DSC) drop box, expand 56F827xx, select “MC56F82748,” then select “Next.”
- Select all of the check boxes on “Connection to be used.” Select “Next” twice.
- Select Processor Expert, then select “Finish.”

4 Build an Application

Wait for Processor Expert to finish loading. Activity progress can be seen in the lower right of the IDE screen.

Once idle, click on the project name “ProjDSC” and then select the hammer icon to build the project.

5 Load an Application using Universal Multilink

Connect the Universal Multilink to the JTAG Connector J14. Make sure the red wire of the Universal Multilink ribbon cable connects to pin1 of J14 and connect the other end to your PC. When finished building, right-click on the project name. Select “debug as,” “CodeWarrior Download.” Select “PnE U-MultiLink” and click “OK.”

Activity progress can be seen in the lower portion of the IDE screen. Once the debugger runs, it will stop in the main program, allowing you to take control.

6 Debug an Application

Set a breakpoint at the “for” instruction from within the C language program by right-clicking in the margin to the left of the “for” statement and selecting “toggle breakpoint ” from the drop-down list.

From the menu bar at the top of the screen, find and press the green “play/resume” button or use F8 on your keyboard.



7 Resume Your Application at a Breakpoint

The code will run up to the breakpoint that you set in the previous step. When it reaches it, the code will stop in the debugger and display the current location from which the code is running at your breakpoint. You then can resume execution or examine elements of the application in the IDE.

8 Run a Sample Project

Find a desired application in the “MC56F827xx CodeExample” directory or develop your own project.

For project importing, exporting and running directions, see the Getting Started section of the TWR-56F8200 User Manual, available for download at freescale.com/TWR-56F8200.

9 Run 3-Phase BLDC Motor with LV3PH Motor Control Kit

To run the 3-phase low-voltage BLDC motor using the MCLV TWR card, refer to the “Getting Started” chapter of the TWR-56F8200 User Manual.

10 Further Instruction for TWR-MC-LV3PH Motor

To get a TWR-MC-LV3PH motor turning quickly, refer to the “Getting Started” chapter of the TWR-56F8200 User Manual. Here you will find instructions detailing how to program your TWR card with the Motor Spin demo. The software demonstrates how to get the motor spinning and then control the motor speed and direction via the FreeMaster Graphical User Interface. For more information on the TWR-MC-LV3PH motor, visit freescale.com/TWR-MC-LV3PH.

MC56F8200 Jumper Options

The following is a list of all the jumper options. The default installed jumper settings are indicated by the white text within the green boxes.

| Jumper | Option | Setting | Description |
|----------|---|--------------|---|
| J1 | Onboard Thermistor RT1 Connect | 1-2, 3-4 | Connect RT1 circuit to the MC56F82748 |
| | | Open | Disconnect RT1 circuit from the MC56F82748 |
| J2 | Onboard Thermistor RT2 Connect | 1-2, 3-4 | Connect RT2 circuit to the MC56F82748 |
| | | Open | Connect RT2 circuit to the MC56F82748 |
| J4 | Interrupt Request Button IRQ1 Select | 1-2 | Connect SW1 to MC56F82748 pin GPIOC2/TXD0/TB0/XB_IN2/CLK0 |
| | | 3-4 | Connect SW1 to MC56F82748 pin GPIOF6/TB2/PWM3X |
| | | Open | Disconnect SW1 from the MC56F82748 |
| J5 | Interrupt Request Button IRQ0 Select | 1-2 | Connect SW2 to MC56F82748 pin GPIOF8/RXD0/TB1 |
| | | 3-4 | Connect SW2 to MC56F82748 pin GPIOF7/TB3 |
| | | Open | Disconnect SW2 from the MC56F82748 |
| J6 and 7 | Power Choice Selection for 3.3 V Source | J6-1 to J7-2 | Connect the onboard voltage regulator to the P3_3V power rail |
| | | J7-1 to J7-2 | Connect P3_3V_MOTOR to the P3_3V power rail (power the 3.3 V rail from the motor control connector) |
| | | J7-2 to J7-3 | Connect P3_3V_ELEV to the P3_3V power rail (power the 3.3 V Rail from the Tower connector) |
| | | J7-2 open | Disconnect the P3_3V power rail – no power |



| | on | Setting | Description |
|-------------|--|----------------|---|
| J8 | Serial Port Reception RXD Source Select (Note that only one connection can be made to pin 3 at a time.) | 1-2 | Connect ELEV_RXD0 from the Tower connector to MC56F82748 pin GPIOF8/RXD0/TB1 |
| | | 2-3 | Connect RXD_SEL from the USB serial bridge to MC56F82748 pin GPIOF8/RXD0/TB1 |
| | | Pin 2 open | Disconnect MC56F8200 DSC pin GPIOF8/RXD0/TB1 |
| | | 3-4 | Connect RXD_SEL from the USB serial bridge to MC56F82748 pin GPIOF5/RXD1/XB_OUT5 |
| | | 4-5 | Connect ELEV_RXD1 from the Tower connector to MC56F82748 pin GPIOF5/RXD1/XB_OUT5 |
| | | Pin 4 open | Disconnect MC56F82748 pin GPIOF5/RXD1/XB_OUT5 |
| J9 | Serial Port Transmission TXD Source Select (Note that only one connection can be made to pin 3 at a time.) | 1-2 | Connect ELEV_TXD0 from the Tower connector to MC56F82748 pin GPIOC2/TXD0/TB0/XB_IN2/CLKO |
| | | 2-3 | Connect TXD_SEL from the USB serial bridge to MC56F82748 pin GPIOC2/TXD0/TB0/XB_IN2/CLKO |
| | | Pin 2 open | Disconnect MC56F82748 pin GPIOC2/TXD0/TB0/XB_IN2/CLKO |
| | | 3-4 | Connect TXD_SEL from the USB serial bridge to MC56F82748 pin GPIOF4/TXD1/XB_OUT4 |
| | | 4-5 | Connect TXD_SEL from the USB serial bridge to MC56F82748 pin GPIOF4/TXD1/XB_OUT4 |
| | | Pin 4 open | Shunt for BOOTMOD[1]=0 / Un-shunt for BOOTMOD[1]=1 |
| J10 and J11 | 5 V Source Select | J10-1 to J11-2 | Connect the power in barrel connector (through fuse F1) to the input of the 3.3 V voltage regulator |
| | | J11-1 to J11-2 | Connect P5V_TRG_USB (the switched USB 5 V) to the input of the 3.3 V voltage regulator |
| | | J11-2 to J11-3 | Connect P5V_ELEV to the input of the 3.3 V voltage regulator |
| | | J11-2 open | Disconnect the input of the 3.3 V voltage regulator |

| | Option | Setting | Description |
|-----|----------------------------|--------------------|---|
| J12 | Unused | Open | Unused |
| J15 | CAN Termination Enable | 1-2 | Connect the 120 ohm CAN termination resistor |
| | | Open | No CAN termination |
| J16 | CAN Enable | 1-2, 3-4 | Connect the CAN transceiver TXD and RXD to MC56F8200 DSC pins GPIOC11/CANTX/SCL1/TXD1 and GPIOC12/CANRX/SDA1/RXD1 |
| | | Open | Disconnect the CAN transceiver |
| J17 | MC9S08JM60 Bootload Enable | 1-2 | Enable USB bootloading of the MCU flash memory |
| | | Open | Disable bootloading |
| J19 | Thermistor RT3 Connect | 1-2, 3-4 | Connect RT3 circuit to the MC56F82748 |
| | | None | Disconnect RT3 circuit from the MC56F82748 |
| J20 | OSBDM Enable | 1-2 | Enable OSBDM function |
| | | None | Enable USB serial bridge function |
| J21 | OSBDM Connect to JTAG | 1-2, 3-4, 5-6, 7-8 | Connect the OSBDM debug signals (JTAG) to the MC56F82748 JTAG pins |
| | | None | Disconnect OSBDM from the MC56F82748 |
| J23 | Thermistor RT4 Connect | 1-2, 3-4 | Connect RT4 circuit to the MC56F82748 |



Get Started

Download installation software and documentation under
“**Jump Start Your Design**” at freescale.com/TWR-56F8200.

Support

Visit freescale.com/support for a list of phone numbers within your region.

Warranty

Visit freescale.com/warranty for complete warranty information.

For more information, visit freescale.com/Tower
Join the online Tower community at towergeeks.org

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