Quick Start Guide

TWR-56F8400

The Ultimate Solution in Performance and Precision for Energy-Efficient Innovation

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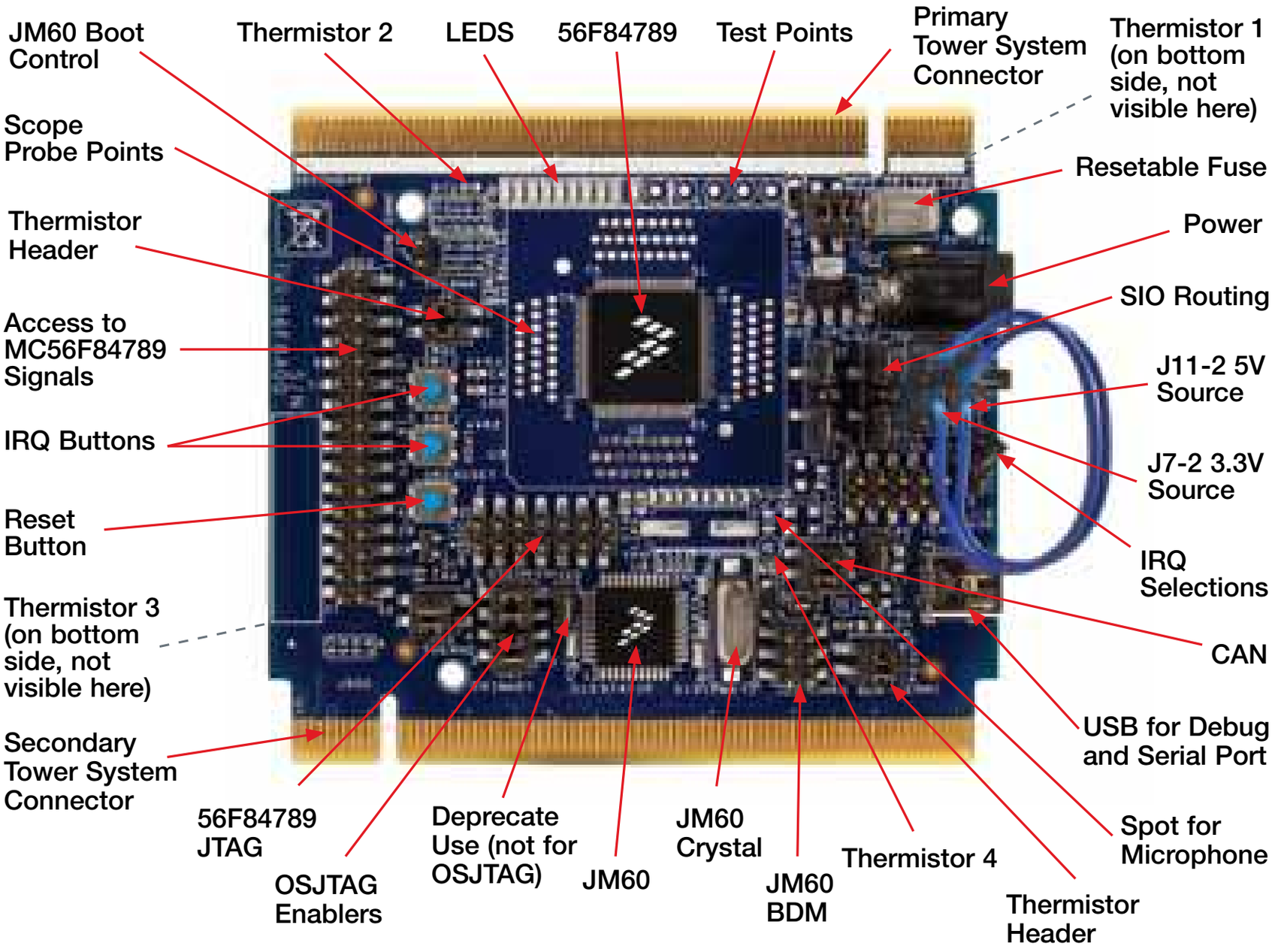
TOWER SYSTEM

Get to know the TWR-56F8400



TWR-56F8400 is part of the Freescale Tower System portfolio, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware.

TWR-56F8400 Introduction

The TWR-56F8400 is a stand-alone development board that can be used in conjunction with the Tower System peripheral boards, including the LV3PH motor control kit (TWR-MC-LV3PH module). The MC56F84789 comes pre-loaded with an application demonstrating the ADC and an FIR filter application that will sense heat at the four corners of the module. Other demo applications are available at **freescale.com/TWR-56F8400**.

The module features serial I/O 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 its header. The MC56F84789 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.

An advanced version of firmware (31.21) is preloaded into the JM60 USB controller, allowing simultaneous use of the USB as a debug channel and a generic serial port for testing.

MCF5225x Features

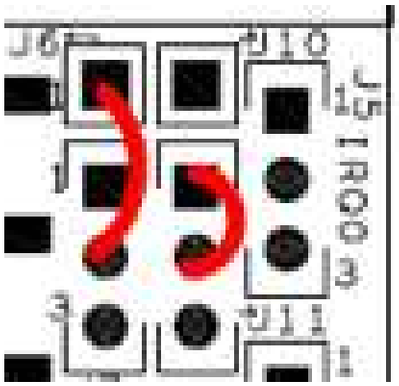
- 100 MHz/100 MIPS 32-bit core for fast control loop execution via single-cycle math computations and parallel moves
- Fractional arithmetic supported for greater speed
- DMA controller for reduced core intervention when shifting data from peripherals
- High-res PWM with 312 pico-second resolution for accurate adjustment of the control loops
- 2x12-bit high-speed ADCs with 3.3 MSPS resolution, reducing 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
- 5-volt tolerant I/O for cost-effective board design
- Memory resource protection unit to ease safety certification
- Freescale FlexMemory for simplified data storage

Step-by-Step Installation Instructions

1 Connect the Wires

Connect the enclosed wires in the upper right portion of the TWR-56F8400 module to power the board via USB.

The configuration to power the board in stand-alone mode with just the USB cable providing power, control and communications is shown below. All other shunts are pre-installed at the factory in the desired configuration.



Connect J6-1 to J7-2.

Connect J11-1 to J-11-2.

2 Run the Thermistor Demo

Plug the USB cable from your computer to the TWR-56F8400 module. The LED lights will flash in groups of two. Ensure there are no other debug pods plugged into your USB ports.

Touch one of the thermistors, or apply heat to it. The LED flashing pattern indicates which thermistor is warming.

3 Create an Application for MC56F84789

Install CodeWarrior from the enclosed DVD and run the program.

- From the menu, select “File,” “NEW” “Bareboard Project.”
- Assign a project name, such as “ProjDSC” and select “Next.”

Step-by-Step Installation Instructions

- Expand the 56800E (DSC) drop box, expand 56F847xx, select “MC56F84789,” then select “Next.”
- Select all of the check boxes on “Connection to be used,” select “Next” twice.
- Select Processor Expert, then select “Next.”
- Holding down the control key, select all pin variants and configurations, select “Next,” select “Finish.”

4 Build Your Application

Wait for Processor Expert to finish loading. Observe the activity in the lower right of the IDE screen, such as progress indications.

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

5 Load Your Application

When finished building, right click on the project name. Select debug as Codewarrior download. Select “OSJTAG” and click “OK.”

Observe the activity in the lower portion of the IDE screen, such as progress indications.

Once the debugger runs, it will stop in the main program for you to take control.

6 Debug Your 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.”

Step-by-Step Installation Instructions

Look for a red square at the top of the screen, among the debug controls. Mouse over them to the left and find “resume” or use F8 to resume.

7 Resume Your Application at a Breakpoint

The code will run up to the break point that you set in the steps above. 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 software directory or develop your own project.

For project importing, exporting and running directions, see the note in the software directory.

LED Group to Thermistor Mapping

LED pair flashing in response to heat on pre-loaded app	Thermistor (see board photo with callouts)
0, 1	RT 1 upper right, bottom of board
2, 3	RT 2 upper left, left of LED furthest to the left
4, 5	RT 3 lower left, bottom of board
6, 7	RT 4 lower right, just right of pin 2 of JM60 BDM 6-pin header

PWR-56F8400 Configuration

Jumper	Function	Shunts	Description
J1	Thermistor RT1 Connect	**1-2, 3-4**	Connect RT1 circuit to the MC56F827 DSC
		open	Disconnect RT1 circuit from the MC56F84789 DSC
J2	Thermistor RT2 Connect	**1-2, 3-4**	Connect RT2 circuit to the MC56F827 DSC
		open	Disconnect RT2 circuit from the MC56F84789 DSC
J4	IRQ1 Select	**1-2**	Connect SW1 to MC56F84789 DSC pin GPIOC2/ TXD0/TB0/XB_IN2/CLKO0
		2-3	Connect SW1 to MC56F84789 DSC pin GPIOF6/ TB2/PWMA_3X/PWMB_3X/XB_IN2
		open	Disconnect SW1 from the MC56F84789 DSC
J5	IRQ0 Select	**1-2**	Connect SW2 to MC56F84789 DSC pin GPIOF8/RXD0/TB1/CMPD_O
		3-4	Connect SW2 to MC56F84789 DSC pin GPIOF7/TB3/CMPC_O/SS1_B/XB_IN3
		open	Disconnect SW2 from the MC56F84789 DSC

TWR-56F8400 Configuration

Jumper	Function	Shunts	Description
J6 and J7	3.3V Source Select	**J6-1 to J7-2**	Connect the on-board 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 3.3V rail from the motor control connector)
		J7-2 to J7-3	Connect P3_3V_ELEV to the P3_3V power rail (power the 3.3V rail from the Tower System connector)
		J7-2 open	Disconnect the P3_3V power rail—no power
J8	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 System connector to MC56F84789 DSC pin GPIOF8/RXD0/TB1/CMPD_O
		2-3	Connect RXD_SEL from the USB serial bridge to MC56F84789 DSC pin GPIOF8/RXD0/TB1/CMPD_O
		Pin 2 open	Disconnect MC56F84789 DSC pin GPIOF8/RXD0/TB1/CMPD_O
		3-4	Connect RXD_SEL from the USB serial bridge to MC56F84789 DSC pin GPIOF5/RXD1/XB_OUT9
		4-5	Connect ELEV_RXD1 from the Tower System connector to MC56F84789 DSC pin GPIOF5/RXD1/XB_OUT9
		Pin 4 open	Disconnect MC56F84789 DSC pin GPIOF5/RXD1/XB_OUT9

TWR-56F8400 Configuration

Jumper	Function	Shunts	Description
J9	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 System connector to MC56F84789 DSC pin GPIOC2/TXD0/TB0/XB_IN2/CLKO0
		2-3	Connect TXD_SEL from the USB serial bridge to MC56F84789 DSC pin GPIOC2/TXD0/TB0/XB_IN2/CLKO0
		Pin 2 open	Disconnect MC56F84789 DSC pin GPIOC2/TXD0/TB0/XB_IN2/CLKO0
		3-4	Connect TXD_SEL from the USB serial bridge to MC56F84789 DSC pin GPIOF4/TXD1/XB_OUT8
		4-5	Connect ELEV_TXD1 from the Tower System connector to MC56F84789 DSC pin GPIOF4/TXD1/XB_OUT8
		Pin 4 open	Disconnect MC56F84789 DSC pin GPIOF4/TXD1/XB_OUT8
J10 and J11	5V Source Select	J10-1 to J11-2	Connect the power in barrel connector (through fuse F1) to the input of the 3.3V voltage regulator
		J11-1 to J11-2	Connect P5V_TRG_USB (the switched USB 5V) to the input of the 3.3V voltage regulator
		J11-2 to J11-3	Connect P5V_ELEV to the input of the 3.3V voltage regulator
		J11-2 open	Disconnect the input of the 3.3V voltage regulator
J12	Unused	**open**	Unused

PWR-56F8400 Configuration

Jumper	Function	Shunts	Description
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 MC56F84789 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 MC56F827 DSC
		open	Disconnect RT3 circuit from the MC56F84789 DSC
J20	RESERVEC /OSBDM/ OSJTAG Enable	**1-2**	Reserved-deprecated
		open	Reserved-deprecated
J21	OSBDM/ OSJTAG Connect to JTAG	**1-2, 3-4, 5-6, 7-8**	Connect the OSBDM/OSJTAG debug signals (JTAG) to the MC56F84789 DSC JTAG pins
		open	Disconnect OSBDM/OSJTAG from the MC56F84789 DSC
J23	Thermistor RT4 Connect	**1-2, 3-4**	Connect RT4 circuit to the MC56F827 DSC
		open	Disconnect RT4 circuit from the MC56F84789 DSC

Quick Start Guide

Learn more at **freescale.com/TWR-56F8400** and **freescale.com/DSC**

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

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