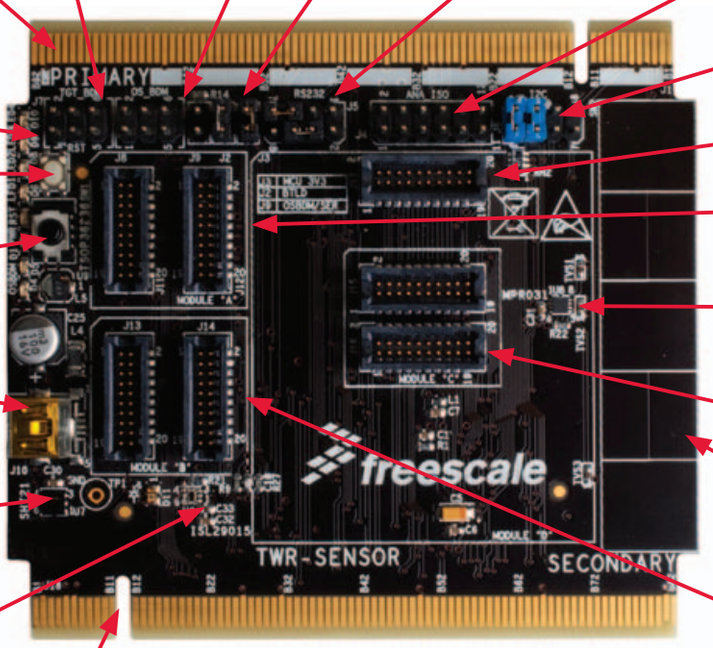
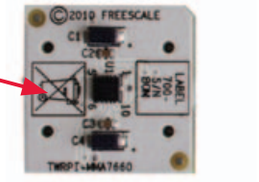
Get to Know the TWR-SENSOR-PAK

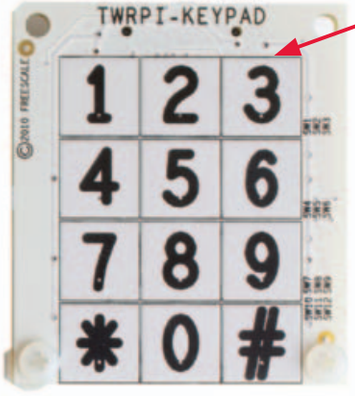


S08JM BDM Header
S08QE BDM Header
Config Jumpers
Serial Config Jumpers
Analog Isolation Jumpers
Primary Elevator Connector
I²C Isolation Jumpers
LEDs
TWRPI Socket "D"
Reset Button
TWRPI Socket "A"
Infrared Receiver
Capacitive Touch Controller MPR031
miniB USB (Power, OSBDM, Communication)
TWRPI Socket "C"
Temperature/Humidity Sensor
Touch Button/Slider Interfaced to MPR031
Ambient Light Sensor
TWRPI Socket "B"
Secondary Elevator Connector

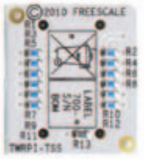


TWRPI-MMA7660 Accelerometer Plug-in

TWRPI-MPL115A Barometer Plug-in



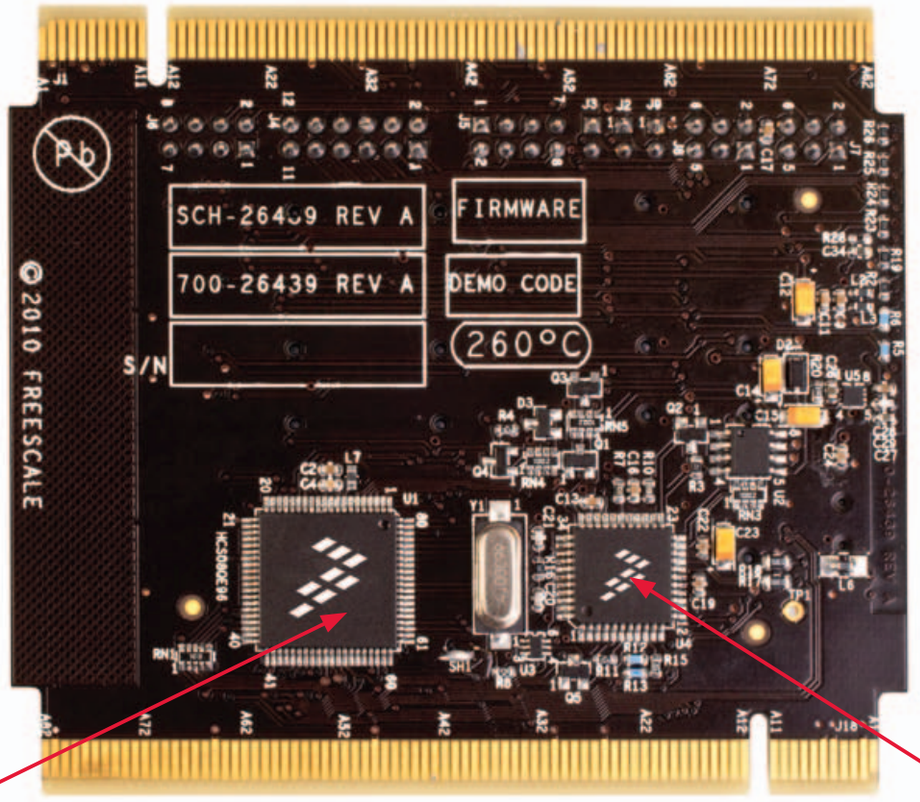
TWRPI-Keypad Capacitive Touch Keypad



TWRPI-TSS Touch Sensing Software Enablement Plug-in

TWRPI-MPR121 Capacitive Touch Controller Plug-in

Get to Know the TWR-SENSOR-PAK



MC9S08QE96CLK

MC9S08JM60CLD

TWR-SENSOR-PAK
Freescale Tower System

The TWR-SENSOR-PAK 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.

How to Assemble the TWR-SENSOR-PAK Module

STEP 1 Locate the TWR-SENSOR module and the five plug-ins included in the TWR-SENSOR-PAK.

- TWRPI-KEYPAD
- TWRPI-TSS
- TWRPI-MMA7660
- TWRPI-MPL115A
- TWRPI-MPR121

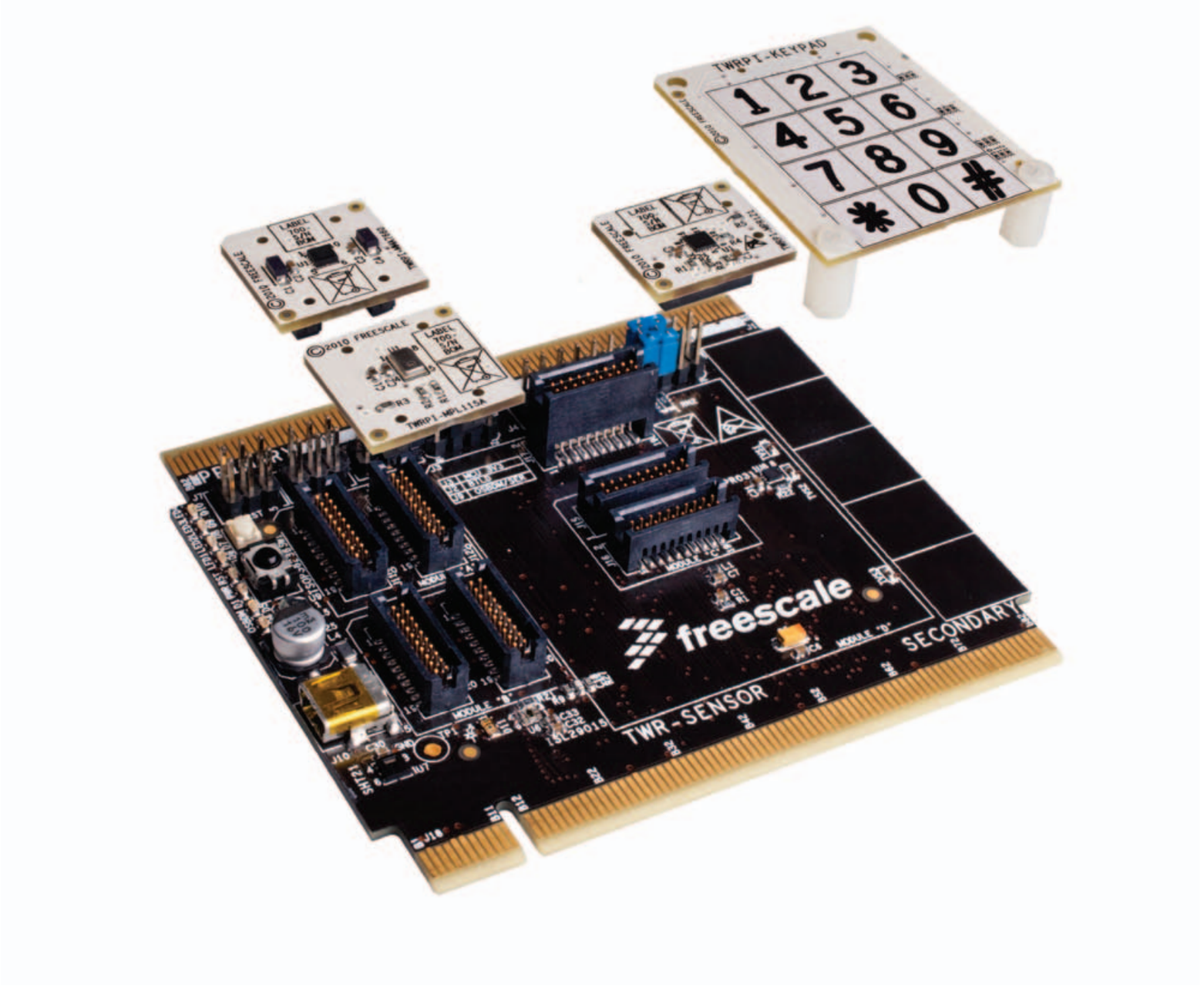
STEP 2 Identify the sensor plug-in modules that you plan to use and insert them into the appropriate sockets.

- Module “A” and “B” sockets are for use with the majority of Freescale Tower plug-ins (TWRPIs) such as the included TWRPI-MMA7660 and TWRPI-MPL115A.
  Module “C” is dedicated for touch-sensing TWRPIs, such as the included TWRPI-MPR121 or TWRPI-TSS.
- Module “D” is dedicated for touch-sensing electrode boards, such as the included TWRPI-KEYPAD.
- All TWRPI sockets are keyed and uniquely sized to only fit the appropriate plug-in with the correct orientation.

STEP 3 If assembling as part of a complete Tower System, proceed to the “How to build your Tower” section.

STEP 4 If using as a stand-alone development tool (not part of an assembled Tower System), proceed to the “Step-by-step installation instructions” section.

How to Assemble the TWR-SENSOR-PAK Module



TWR-SENSOR-PAK Features

Swappable Freescale Sensor Modules

- Touch sense controller (MPR121)
- Accelerometer (MMA7660)
- Pressure sensor (MPL115A)

Keypad Touch Pad Module

On-Board Slider/Touch Pad

- With dedicated touch sense controller (MPR031)

On-Board MCU (MC9S08QE96)

- Stand-alone operation
- Slave MCU mode
- Tower MCU mode (with limited peripheral connectivity)
- Touch sense software evaluation

On-Board Third-Party Sensors

- Sensirion SHT21 temperature/humidity
- Ambient light/proximity
- IR receiver

OSBDM/Serial-to-USB

- On-board MC9S08JM60
- OSBDM support for MC9S08QE96
- Serial-to-USB support

How to Build Your Tower

STEP 1 Ensure that the TWR-SENSOR module configuration and isolation jumpers are set for correct communication with the Tower System. Refer to TWR-SENSOR-PAK Jumper Options.

STEP 2 Locate the Elevator modules, identifiable by the four card edge connectors on each.

STEP 3 Identify each Elevator module as either “functional” or “dummy” (written on the outward facing side of the board).

STEP 4 Locate the other modules you will use in your Tower System.

STEP 5 Identify the “primary” and “secondary” card edges for each module (written along the edge).

STEP 6 Plug the “primary” card edge of each module into the “functional” Elevator.

STEP 7 Place the remaining “dummy” or “functional” Elevator module onto the “secondary” card edges.

Step-by-Step Installation Instructions

Here, you will learn how to set up the TWR-SENSOR-PAK module and run the default FreeMASTER demonstration.

STEP 1 Install software and tools

- Install the FreeMASTER Run-Time Debugging Tool from the included DVD.
- If desired, install CodeWarrior Development Studio for Microcontroller v6.3 from included DVD.

STEP 2 Install the default Tower Sensor plug-ins (TWRPIs)

The following TWRPIs are recommended to fully utilize the included FreeMASTER project file.

- Remove the TWRPI-KEYPAD and the TWRPI-TSS
- Install the TWRPI-MMA7660 (Accelerometer) into Module “A”
- Install the TWRPI-MPL115A (Barometer) into Module “B”
- Install the TWRPI-MPR121 (Proximity Touch) into Module “C”
- Re-install the TWRPI-KEYPAD into Module “D”

For additional details regarding the installation of the TWRPIs refer to the “How to assemble the TWR-SENSOR-PAK module.”

STEP 3 Connect the USB cable

Connect one end of the USB cable to the PC and the other end to the mini-B connector on the TWR-SENSOR. The TWR-SENSOR Virtual SCI driver is located on the included DVD.

STEP 4 Launch FreeMASTER

Launch the installed FreeMASTER application and open the "TWR-SENSOR.pmp”project. A link to the latest FreeMASTER Sensor Project is located on the DVD.

STEP 5 Interact

Interact with the TWR-SENSOR module sensors and view the associated graphs and display gauges within the FreeMASTER application.

STEP 6 Explore additional resources

Explore the additional documentation and software resources in the included DVD and on the TWR-SENSOR-PAK site at **freescale.com/Tower**.

TWR-SENSOR-PAK Jumper Options

The following is a list of all the jumper options. The ***default*** installed jumper settings are shown in bold with asterisks.

Jumper	Name	Setting	Description
J2	BTLD	1-2	Shunt to enable Boot Loader Mode
J3	MCU 3V3	***1-2***	Connects 3V3 to MCU. Use to measure MCU current consumption
J4	ANA EN	1-2	Connects Analog Signal (MA_AN0) from Socket A to the Primary Tower Elevator signal ELEN_MA_AN0
		3-4	Connects Analog Signal (MA_AN1) from Socket A to the Primary Tower Elevator signal ELEN_MA_AN1
		5-6	Connects Analog Signal (MA_AN2) from Socket A to the Primary Tower Elevator signal ELEN_MA_AN2
		7-8	Connects Analog Signal (MB_AN0) from Socket B to the Primary Tower Elevator signal ELEN_MB_AN4
		9-10	Connects Analog Signal (MB_AN1) from Socket B to the Primary Tower Elevator signal ELEN_MB_AN5
		11-12	Connects Analog Signal (MB_AN2) from Socket B to the Primary Tower Elevator signal ELEN_MB_AN6
J5	SERIAL CFG	1-2	Shunt to enable Slave Mode Serial Connection to Tower Elevator UART 0 Connects MCU_RXD2 to ELE_TXD0
		3-4	Shunt to enable Slave Mode Serial Connection to Tower Elevator UART 0 Connects MCU_TXD2 to ELE_RXD0
		5-6	Shunt to enable Slave Mode Serial Connection to Tower Elevator UART 1 Connects MCU_RXD2 to ELE_TXD1
		7-8	Shunt to enable Slave Mode Serial Connection to Tower Elevator UART 1 Connects MCU_TXD2 to ELE_RXD1
		1-3	Shunt to enable Master Mode Serial Connection to Tower Elevator UART 0 Connects MCU_RXD2 to ELE_RXD0
		2-4	Shunt to enable Master Mode Serial Connection to Tower Elevator UART 0 Connects MCU_TXD2 to ELE_TXD0
		5-7	Shunt to enable Master Mode Serial Connection to Tower Elevator UART 1 Connects MCU_RXD2 to ELE_RXD1
		6-8	Shunt to enable Master Mode Serial Connection to Tower Elevator UART 1 Connects MCU_TXD2 to ELE_TXD1

Jumper	Name	Setting	Description
J6	I²C EN	1-2	Shunt to enable Sensor I²C Connection to Tower Elevator I²C 1 Connects SENS_SDA to ELE_SDA1
		3-4	Shunt to enable MCU I²C Connection to Tower Elevator I²C 0 Connects MCU_SDA to ELE_SDA0
		5-6	Shunt to enable Sensor I²C Connection to Tower Elevator I²C 1 Connects SENS_SCL to ELE_SCL1
		7-8	Shunt to enable MCU I²C Connection to Tower Elevator I²C 0 Connects MCU_SCL to ELE_SCL0
		1-3	Shunt to enable Sensor I²C Connection to Tower Elevator I²C 0 Connects SENS_SDA to ELE_SDA0
		2-4	Shunt to enable MCU I²C Connection to Tower Elevator I²C 1 Connects MCU_SDA to ELE_SDA1
		5-7	Shunt to enable Sensor I²C Connection to Tower Elevator I²C 0 Connects SENS_SCL to ELE_SCL0
		6-8	Shunt to enable MCU I²C Connection to Tower Elevator I²C 1 Connects MCU_SCL to ELE_SCL1
J9	OSBDM/SER	***1-2***	Shunt to enable Serial-to-USB Application Unshunt to enable OSBDM

To learn more about the TWR-SENSOR-PAK and other modules within the Tower System, visit **freescale.com/Tower**. To become a member of the online Tower Geeks community, visit **towergeeks.org**.

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Agile Number: 926-78452 REV C

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