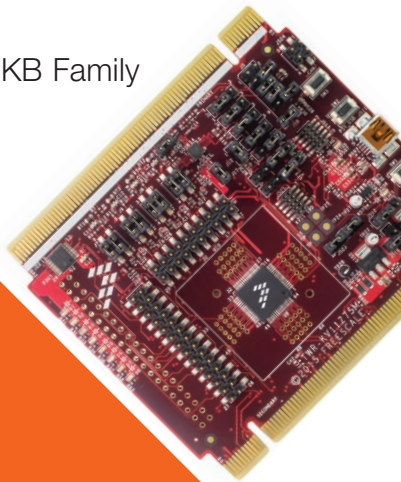




# TWR-KV11Z75M Quick Start Guide

Development Kit for  
Kinetis KV1x 64 KB and 128 KB Family

Tower System  
Development Board  
Platform



## Get to know the TWR-KV11Z75M

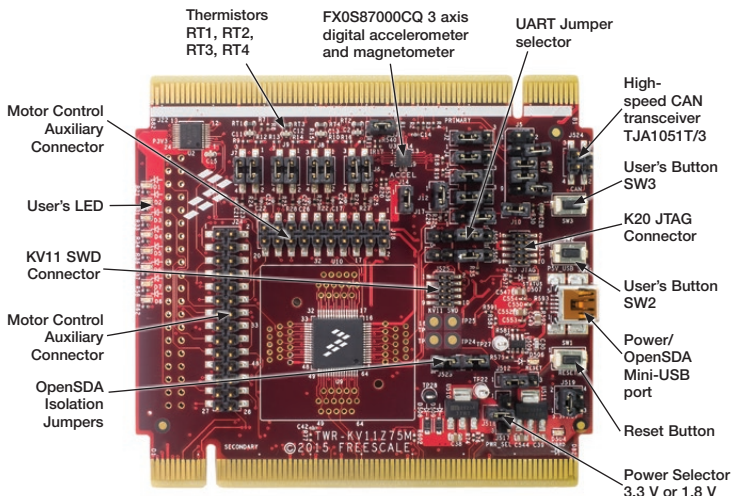


Figure 1: Front side of TWR-KV11Z75M

### TWR-KV11Z75M Tower System Module Freescale Tower System

The TWR-KV11Z75M module is part of the Freescale Tower System, a modular development platform that enables rapid prototyping and tool reuse through reconfigurable hardware. Take your design to the next level and begin constructing your Tower System platform today.



# Introduction to TWR-KV11Z75M Tower System Module

The TWR-KV11Z75M Tower System Module is a standalone development kit that can be used in conjunction with the Tower System development platform and the TWR-MC-LV3PH motor control module. To watch a video on how to configure the board, go to [freescale.com/TWR-KV11Z75M](http://freescale.com/TWR-KV11Z75M).

## **This Quick Start Guide will teach you to:**

- Easily program precompiled examples for the KV1x MCU
- Run an IAR Embedded Workbench project featuring an ADC/FIR filter application
- Spin the 3-phase BLDC motor of the TWR-MC-LV3PH module while monitoring the motor with the FreeMASTER tool

## **TWR-KV11Z75M Tower System Module Features**

- MKV11Z128VLH7 MCU (ARM® Cortex®-M0+ 75 MHz, 128 KB flash, 2x12-bit ADCs, 6x FlexTimer, 1x FlexCAN, 64 LQFP)
- OpenSDA(1) debug circuit with Mini USB connector and virtual serial port
- FX0S87000CQ 3 axis digital accelerometer and magnetometer
- Eight LEDs with connected buffers to PWM channels for dimming
- Two pushbuttons for user input or interrupts
- Four thermistors
- Two motor control auxiliary connectors

## **Tools Required**

- IAR Embedded Workbench V7.40.2 or higher
- Freescale FreeMASTER for real-time debug monitoring and data visualization

<sup>(1)</sup> Refer to the OpenSDA User Guide available at [freescale.com](http://freescale.com)

## Software Installation Instructions

### 1

### Download Software and Tools

Download installation software and documentation under **“Jump Start Your Design”** at [freescale.com/TWR-KV11Z75M](http://freescale.com/TWR-KV11Z75M).



### 2

### Install the Software and Tools

- Install the IDE toolchain IAR Embedded Workbench® for ARM® v7.40.2 or later, 30-day free evaluation license at [iar.com/Freescale](http://iar.com/Freescale).
- Install the ARM® mbed™ USB Serial driver at [mbed.org/handbook/Windows-serial-configuration](http://mbed.org/handbook/Windows-serial-configuration)

**Note:** The Tower board has to be connected to your PC via a mini USB cable when installing the driver.

- Install the free debug monitoring and data visualization tool Freescale FreeMASTER v1.4, or later, at [freescale.com/FreeMASTER](http://freescale.com/FreeMASTER).

# TWR-KV11Z75M Tower System Module Initial Configuration

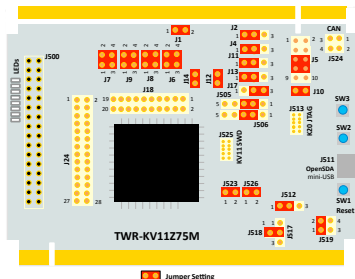
## 3 Default Jumper Settings

See the default jumper settings in the table below. Refer to the TWR-KV11Z75M User Guide at [freescale.com/TWR-KV11Z75M](http://freescale.com/TWR-KV11Z75M) for detailed jumper descriptions.

Option	Setting	Option	Setting
J1	OPEN	J14	ON
J2	1-2	J17	2-3
J4	1-2	J18	OPEN
J5	5-6, 7-8	J24	OPEN
J6	1-2, 3-4	J505	2-3
J7	1-2, 3-4	J506	2-3
J8	1-2, 3-4	J512	1-2
J9	1-2, 3-4	J517, J518	1(J518) - 2(J517)
J10	ON	J519	1-2
J11	1-2	J524	OPEN
J12	ON	J523	ON
J13	1-2	J526	ON

## 4 Verification of Jumper Setting

TWR-KV11Z75M comes preloaded with the CMSIS-DAP OpenSDA Applications (MSD flash programmer and debug) and the accelerometer demo. Plug in the USB cable in TWR-KV11Z75M and computer, tilt TWR-KV11Z75M left or right to make corresponding LEDs blink.



TWR-KV11Z75M Jumper Map: Default Configuration

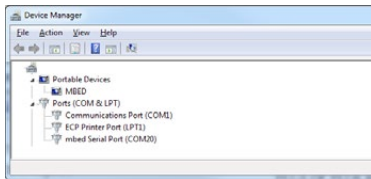
**Note:** Please refer to detailed Jumper Map on page 11

## TWR-KV11Z75M Tower System Module Demo

### 5 Program a Precompiled Example Using the CMSIS-DAP

#### 1) OpenSDA MSD Application

Plug in the USB cable to TWR-KV11Z75M. Drivers will be installed automatically. After driver installation in device manager in control panel, Windows will detect two new peripherals: MBED CMSIS-DAP Debug Driver and MBED Serial Port.



2) Drag-and-drop a binary (.bin) file onto MBED virtual hard disk to program the internal flash of KV1x. For example: go to “Precompiled Examples” folder in Quick Start Package and Drag-and-Drop

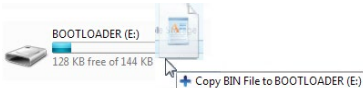
“Thermistor\_lab.bin” file onto MBED virtual hard disk.



3) Unplug and plug back the USB cable. LEDs D1 to D8 will blink. Touch thermistor RT1 or RT3 located along with the primary elevator of the board, above jumpers J6, J7, J8, J9 to heat. An affected pair of LEDs will blink faster.

**Note:** To reinstall the CMSIS-DAP OpenSDA MSD Application

- Press and hold the reset (SW1) button while plugging in the USB cable; then release it. Windows will detect a new BOOTLOADER drive and automatically install requested drivers.



- Drag-and-Drop “CMSIS-DAP\_OpenSDA.bin” file from OpenSDA Applications folder in the Quick

Start Package to the BOOTLOADER drive in my computer/disk drive. Unplug and plug back the USB cable. Computer will detect a new MBED drive and automatically install the required drivers.

**Note:** Refer to the TWR-KV11Z75M User Guide (TWRKV11Z75MUG) at [freescale.com/TWR-KV11Z75M](http://freescale.com/TWR-KV11Z75M) for detailed jumper description.

## 6 Debug your First IAR Project

### 1) Launch IAR EWARM and Build the Thermistor Project

Open the IAR project file Thermistor\_lab.eww following the path. Project Labs\build\iar\kv1x\Thermistor\_lab in the Quick Start Package.

Note: For making sure that the project is compatible with Hardware tool, please select the following configuration:

- Target Device: Freescale MKV11Z128xxx7
- Linker Configuration File: KV11\_128KB\_PFLASH.icf
- Debug Driver: CMSIS-DAP
- Debugger HW Interface: SWD
- Flashloader Configuration: FlashKV1128K.board

Clean the project before selecting the action Rebuild All.

**Note:** The compilation may return warning messages without consequence.

### 2) Run IAR EWARM Debug Mode Download and Debug the Thermistor project.

Start the debug session by selecting the GO option from the toolbar. LEDs D1 to D8 will blink. Touch thermistor RT1 or RT3 located along with the primary elevator of the board, above jumpers J6, J7, J8, J9 to heat. An affected pair of LEDs will blink faster. From the toolbar, suspend the demo using Break option, select Stop to return to the Edition Mode.

## Running BLDC Motor

### 7 TWR-KV11Z75M and TWR-MC-LV3PH Set Up

1) Connect TWR-KV11Z75M and TWR-MCLV3PH with the jumper setup shown in the table below following the black and white markings on the Tower System elevators. Connect the motor to the three-prong connectors (J5) of the motor module.

2) Plug in the USB cable to TWR-KV11Z75M. Drag-and-Drop “BLDC\_Sensorless.bin” file onto MBED virtual hard disk to program the internal flash of KV1x.



3) Plug the 24 V power supply included in the TWR-MC-LV3PH kit into the barrel connector (J1) of the motor module.

4) Unplug and plug back the USB cable and continue with instructions on the page 10 “Monitor the Project with FreeMASTER”.

**Note:** Refer to the TWR-KV11Z75M User Guide (TWRKV11Z75MUG) at [freescale.com/TWR-KV11Z75M](https://www.freescale.com/TWR-KV11Z75M) for detailed jumper description

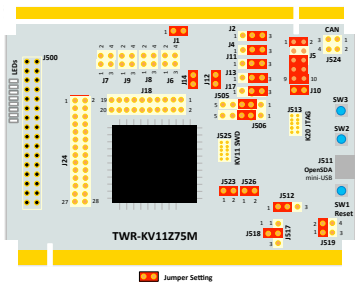
### TWR-KV11Z75M Jumper Settings: Running BLDC Motor

Option	Setting	Option	Setting
J1	ON	J14	ON
J2	3-2	J17	2-3
J4	3-2	J18	OPEN
J5	5-6, 7-8	J24	OPEN
J6	OPEN	J505	2-3
J7	OPEN	J506	2-3
J8	OPEN	J512	1-2
J9	OPEN	J517, J518	1(J518) - 2(J517)
J10	ON	J519	1-2
J11	3-2	J524	OPEN
J12	ON	J523	ON
J13	3-2	J526	ON

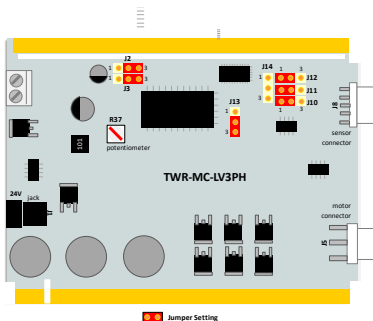
### TWR-MC-LV3PH: Jumper Settings

Option	Setting	Option	Setting
J2	2-3	J12	1-2
J3	2-3	J13	2-3
J10	1-2	J14	OPEN
J11	1-2		





TWR-KV11Z75M Jumper Map: Running BLDC Motor



TWR-MC-LV3PH Jumper Map

## 8 Working with IAR EWARM

1) Compile the BLDC Sensorless Demo with IAR EWARM

Open the IAR project file BLDC\_Sensorless.eww following the path Project Labs\build\iar\KV1x\BLDC\_Sensorless in the Quick Start Package.

Clean the project before selecting the action Rebuild All.

**Note:** The compilation may return warning messages without consequence.

2) Run IAR EWARM Debug Mode

Download and Debug the project BLDC\_Sensorless.

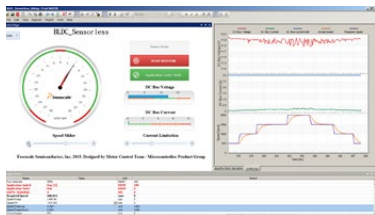
Start the debug session by selecting the GO option.

## 9 Monitor the Project with FreeMASTER

Launch Freescale FreeMASTER from the Windows Start menu.

**Note:** At first start-up, you may have an error message regarding the COM connection.

Open the FreeMASTER project file BLDC\_Sensorless.pmp following the path Project Labs\Freemaster\BLDC\_Sensorless in the Quick Start Package. The BLDC Sensorless Application interface will appear in FreeMASTER to monitor and control the speed, the voltage and the current consumption of the motor.



In the Project Options, set the COM port affected as the mbed Serial Port (information available in Device Manager) and set the baud rate/speed to 9600 bps (check the option Do not Open Port at Startup to avoid error messages at FreeMASTER startup).

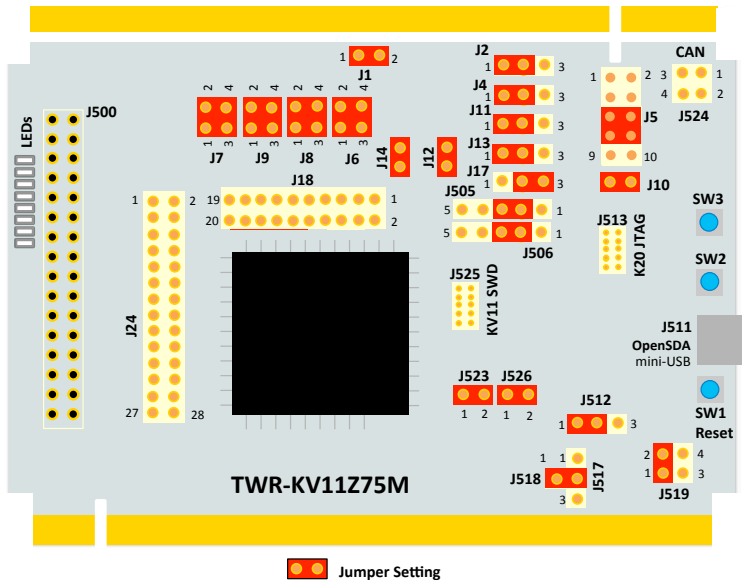
From the toolbar, select the action Start the Communication.

Press button SW2 of the TWR-KV11Z75M board to spin the motor clockwise. Continue to push button SW2 to increase the speed of the motor. Press button SW3 to decrease the speed and stop the motor before spinning it counterclockwise.

Or simply select in FreeMASTER speedometer the requested speed and the motor will spin automatically.

In IAR EWARM, from the toolbar, suspend the demo using the Break option, or select Stop to return to the Edit Mode.

# TWR-KV11Z75M Jumper Map





## et Started



Download installation software and documentation under  
“**Jump Start Your Design**” at [freescale.com/TWR-KV11Z75M](http://freescale.com/TWR-KV11Z75M).

## Support

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

## Warranty

Visit [freescale.com/warranty](http://freescale.com/warranty) for complete warranty information.

For more information, visit  
[freescale.com/TWR-KV11Z75M](http://freescale.com/TWR-KV11Z75M),  
[freescale.com/Kinetis](http://freescale.com/Kinetis) or [freescale.com/Tower](http://freescale.com/Tower)

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