


Energy
Efficient Solutions
optimized for low power

Quick Start Guide

TWR-K20D72M

Low-Power 32-bit ARM® Cortex™-M4 MCUs with
High-Precision Analog, Connectivity and Scalability



TOWER SYSTEM

Get to Know the TWR-K20D72M

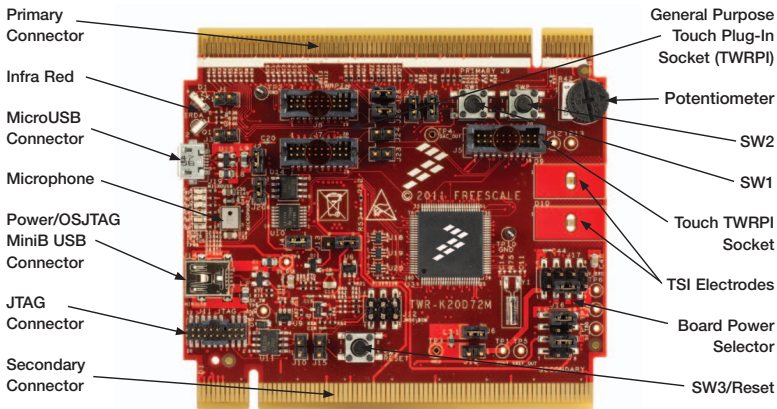


Figure 1: Front side of TWR-K20D72M module.

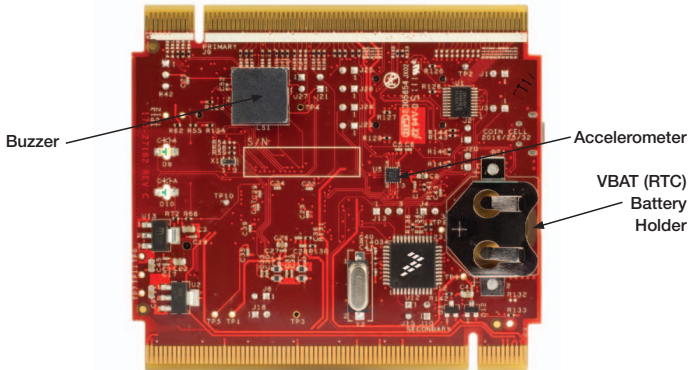
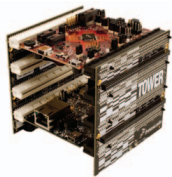


Figure 2: Back side of TWR-K20D72M module.



TWR-K20D72M Freescale Tower System

The **TWR-K20D72M** MCU module is designed to work either in stand-alone mode or as part of the Freescale Tower System, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Begin constructing your Tower System today by visiting freescale.com/Tower for additional Tower System MCU modules and compatible peripherals.

TWR-K20D72M Features

- MK20DX256VLL7 MCU (72 MHz, 256 KB flash, 64 KB RAM, 32 KB FlexNVM, low power, 100 LQFP package)
- USB support with MicroUSB connector on board, no KIT needed for dual role USB feature evaluation
- Two capacitive touch pads
- Socket for capacitive touch pad daughter board (Touch TWRPI)
- Socket for Tower plug-in (TWRPI, e.g. sensor board)
- Three-axis digital accelerometer (MMA8451Q)
- Potentiometer, four LEDs, push buttons, infrared port and battery holder
- Microphone and buzzer
- On-board debug circuit MC9S08JM60 open source JTAG (OSJTAG) with virtual serial port

Step-by-Step Installation Instructions

In this quick start guide, you will learn how to set up the TWR-K20D72M module and run the default demonstration.

1 Install the Software and Tools

Install the P&E Micro Kinetis Tower toolkit to install the OSJTAG and USB-to-Serial drivers. These can be found on the DVD under "Software."

2 Configure the Hardware

Connect one end of the USB cable to the PC and the other end to the Power/OSJTAG mini-B connector on the TWR-K20D72M module. Allow the PC to automatically configure the USB drivers if needed.

3 Press Touch Electrodes

A different tone will beep when either electrode1 or electrode2 is pressed and the associated LED will turn on.

4 Tilt the Board

The board will generate a different tone depending on the tilt angle.

5 Whistle into the Microphone

The board will respond with a tone.

6 Learn More about the Kinetis 72 MHz Family

Find more bare-metal labs and software for the Kinetis K20 MCUs at freescale.com/TWR-K20D72M.

TWR-K20D72M Jumper Options

The following is a list of all the jumper options. The default installed jumper settings are shown in white text within the red boxes.

Jumper	Option	Setting	Description
J6	MCU power connection	ON	Connect on-board 3.3V or 1.8V supply to MCU
		OFF	Isolate MCU from power (connect an ammeter to measure current)
J13	VBAT power selection	1-2	Connect VBAT to on-board 3.3V or 1.8V supply
		2-3	Connect VBAT to the higher voltage between on-board supply or coin cell supply
J18	3.3V VOUT selection	ON	Connect USB 3.3V regulator output to MCU_PWR
		OFF	Disconnect USB 3.3V regulator output to MCU_PWR
J10	JTAG board power selection	ON	Connect on-board 5V supply to JTAG port (supports powering board from JTAG pod supporting 5V supply output)
		OFF	Disconnect on-board 5V supply to JTAG port
J15	OSJTAG bootloader selection	ON	OSJTAG bootloader mode (OSJTAG firmware reprogramming)
		OFF	Debugger mode
J16	VREG IN selection	1-2	Regulator powered by OSJTAG 5V output
		5-6	VBUS signal on Micro-USB connector J19 connects to VREGIN to allow stand-alone USB operation
		6-8	VBUS signal from elevator connector connects to VREGIN to allow USB operation with complete tower kit
J17	Board power selection	1-2	K20 USB regulator 3.3V output powers VBRD (MCU_PWR)
		3-5	3.3V from on-board regulator powers VBRD (MCU_PWR)
		5-7	1.8V from on-board regulator powers VBRD (MCU_PWR)

Jumper	Option	Setting	Description
J2	USB power enable	ON	Connect PTC9 to USB power enable on power switch MIC2026
		OFF	Disconnect PTC9 to USB power enable on power switch MIC2026
J20	USB over-current flag	ON	Connect PTC8 to over-current flag on power switch MIC2026
		OFF	Disconnect PTC8 to over-current flag on power switch MIC2026
J1	Infrared transmitter connection	ON	Connect CMT_IRO (PTD7) to infrared transmitter D1
		OFF	Disconnect CMT_IRO (PTD7) to infrared transmitter D1
J3	Infrared receiver connection	ON	Connect CMP0_IN1 (PTC7) to infrared receiver Q1
		OFF	Disconnect CMP0_IN1 (PTC7) to infrared receiver Q1
J25	Accelerometer I ² C connection	ON	Connect PTB2 to SCL pin of accelerometer
		OFF	Disconnect PTB2 to SCL pin of accelerometer
J26	Accelerometer I ² C connection	ON	Connect PTB3 to SDA pin of accelerometer
		OFF	Disconnect PTB3 to SDA pin of accelerometer
J24	Accelerometer IRQ connection	ON	Connect PTB0 to INT1 pin of accelerometer
		OFF	Disconnect PTB0 to INT1 pin of accelerometer
J23	Accelerometer IRQ connection	ON	Connect PTB1 to INT2 pin of accelerometer
		OFF	Disconnect PTB1 to INT2 pin of accelerometer
J27	Potentiometer connection	ON	Connect potentiometer to ADC1_DMO
		OFF	Disconnect potentiometer to ADC1_DMO
J4	Microphone connection	ON	Connect microphone input to PTB0 (ADC0_SE8)
		OFF	Disconnect microphone input to PTB0 (ADC0_SE8)
J21	Buzzer connection	ON	Connect FTM0_CH3 (PTC4) to buzzer
		OFF	Disconnect FTM0_CH3 (PTC4) to buzzer

Visit **freescale.com/TWR-K20D72M** or **freescale.com/Kinetis** for the latest information on the TWR-K20D72M module, including:

- Bare metal labs
- Software
- Technical documentation

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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