Quick Start Guide

TWR-K24F120M

Low-power MCU Platform with
High RAM Density for Connectivity
and Sensor Fusion Applications

freescale ™

Kinetis

Get to Know the TWR-K24F120M

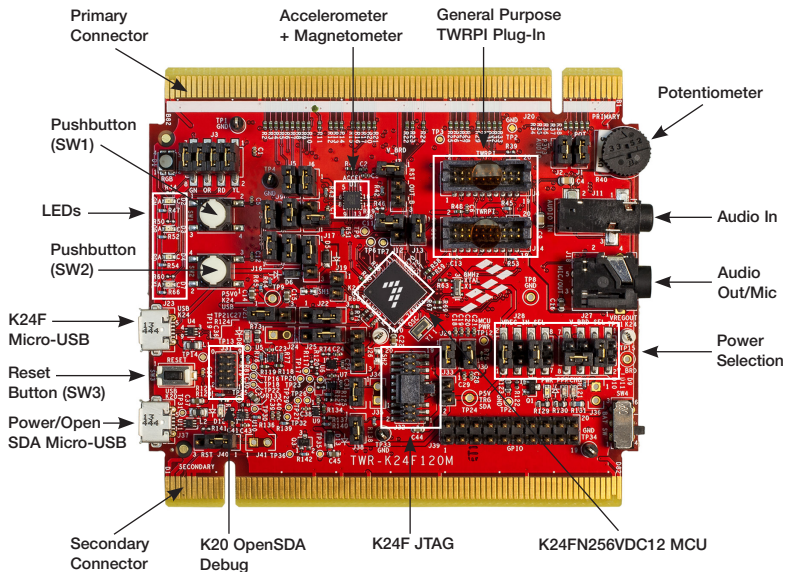Primary Connector

Accelerometer + Magnetometer

General Purpose TWRPI Plug-In

Potentiometer

Pushbutton (SW1)

LEDs

Pushbutton (SW2)

K24F Micro-USB

Reset Button (SW3)

Power/Open SDA Micro-USB

Secondary Connector

K20 OpenSDA Debug

K24F JTAG

K24FN256VDC12 MCU

Audio In

Audio Out/Mic

Power Selection

Figure 1: Front side of TWR-K24F120M
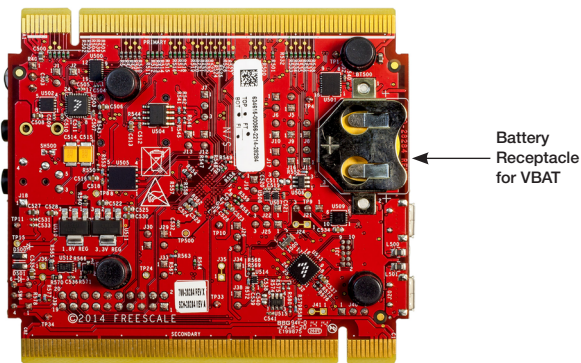
2

Battery
Receptacle
for VBAT

Figure 2: Back side of TWR-K24F120M

TWR-K24F120M
Freescale Tower System

The TWR-K24F120M 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.

3

TWR-K24F120M Features

- K24FN256VDC12 MCU (120 MHz, 256 KB Flash, 256 KB RAM, low power, 121 MAPBGA thin-profile package)
- Dual-role USB interface with micro-AB USB connector
- General-purpose Tower plug-in (TWRPI) socket
- On-board debug circuit: K20DX128VFM5 OpenSDAv2 with virtual serial port
- Three-axis combination accelerometer and magnetometer (FXOS8700CQ)
- Four (4) user-controllable LEDs plus RGB LED
- Two (2) user pushbutton switches for GPIO interrupts
- On-board Freescale SGTL5000 audio codec
- 16 Mbit SPI serial flash memory
- Li-Ion battery charging circuit (battery not included)
- One (1) user pushbutton switch for MCU reset
- Potentiometer
- Independent, battery-operated power supply for real-time clock (RTC) module

Step-by-Step Installation Instructions

In this quick start guide, you will learn how to set up the TWR-K24F120M module and run the included demonstrated software. For more detailed information, review the user manual at **freescale.com/TWR-K24F120M**.

1 Configure the Hardware

Install the included battery into the VBAT (RTC) battery holder. Connect one end of the USB cable to the PC and the other end to the Power/OpenSDAv2 micro-AB connector on the TWR-K24F120M module. Allow the PC to automatically configure the USB drivers if needed.

2 Download and Install the Serial Driver

The directions and link to the latest ARM® mbed™ serial port driver can be found at: **mbed.org/handbook/Windows-serial-configuration**

Step-by-Step Installation Instructions *(continued)*

3 Run the Quick Start Demo

Set up the serial port connection on your terminal program for 115200 baud rate, 8-bit data, no parity, 1 stop bit.

Press the reset button on the board to display the following message:

Select from the following menu:

1: Audio demo

2: Bubble level

3: eCompass demo

4: Metal Detector demo

5: Stopwatch demo

Enter a number key (1–5) on the keyboard to run each option from the Quick Start Demo. Further information will be displayed on the terminal as the demo runs.

TWR-K24F120M Jumper Options

The following is a list of all jumper options available on the TWR-K24F120M. The default installed jumper settings are indicated by white text within the red boxes.

Jumper	Option	Setting	Description
J33	Debug target power	ON	Connect P5V_TRG_SDA to target power
		OFF	Disconnect P5V_TRG_SDA from target power
J15	Enable USB power	ON	Connect PTB23 to USB power enable on power switch MIC2005
		OFF	Disconnect PTB23 from USB power enable on power switch MIC2005
J19	USB ID connection	ON	Connect PTD7 to USB ID pin
		OFF	Disconnect PTD7 from USB ID pin
J16	USB over-current flag	ON	Connect PTB22 to over-current flag on power switch MIC2005
		OFF	Disconnect PTB22 from over-current flag on power switch MIC2005
J21	USB switch	1-2	Connect MCU USB0_DP and USB0_DM pins to micro-USB connector (J23)
		2-3	Connect MCU USB0_DP and USB0_DM pins to Tower Elevator
J26	VREGIN input to processor	1-2	Connect P5V0_VREGIN_K24 to MCU VREGIN pin
		2-3	Connect on-board regulator output P3V3_REG to MCU VREGIN pin
J28	P5V0_VREGIN_K24 selection	5-6	5V MCU input from on-board USB connector (J23)
		6-8	5V MCU input from tower USB VBUS
		4-6 & 1-3	5V from OpenSDA USB/TWR 5V (P5V_TRG_SDA)

TWR-K24F120M Jumper Options *(continued)*

Jumper	Option	Setting	Description
J28	3.3V regulator input selection	1-2	5V from OpenSDA USB/TWR 5V (P5V_TRG_SDA)
		3-5 & 2-4	5V power from on-board USB connector (J23)
J27	MCU power selection	3-4	3.3V from regulator
		1-3	VOUT_3V3 (from MCU)
		3-5	1.8V from regulator
J27	Rechargeable battery selection	6-8	Rechargeable battery powers input to 3.3V regulator
		4-6	Rechargeable battery powers input to 1.8V regulator
J30	MCU VDD current measurement	ON	Connect V_BRD to MCU_PWR
		OFF	Allow current measurement on MCU VDD
J29	VDDA and VREFH power	ON	Connect V_BRD to VDDA and VREFH
		OFF	Disconnect V_BRD from VDDA and VREF
J17	VBAT power	1-2	Connect VBAT to MCU_PWR
		2-3	Connect VBAT to the higher voltage between MCU_PWR and coin-cell battery (P3V0_COINCELL)
J3	LED connections	1-2	Connect PTD4 to Yellow LED (D7)
		3-4	Connect PTD5 to Red LED (D4)
		5-6	Connect PTD6 to Orange LED (D3)
		7-8	Connect PTD7 to Yellow/Green LED (D2)

TWR-K24F120M Jumper Options *(continued)*

Jumper	Option	Setting	Description
J2	Audio codec power	**ON**	Supply 3.3V power to audio codec
		OFF	Remove power from audio codec. Audio codec cannot be used when operating the board at 1.8V. So J2 should be OFF for 1.8V board operation.
J13	TWRPI current measurement	**ON**	Connect V_BRD to TWRPI 3-V power (GPT_VBRD)
		OFF	Disconnect V_BRD from TWRPI 3-V power (GPT_VBRD) to measure TWRPI current
J5	Accelerometer/magnetometer* I^{2}C SCL connection	**ON**	Connect PTE24 to I^{2}C_SCL_SNSR
		OFF	Disconnect PTE24 from I^{2}C_SCL_SNSR
J6	Accelerometer/magnetometer I^{2}C SDA connection	**ON**	Connect PTE25 to I^{2}C_SDA_SNSR
		OFF	Disconnect PTE25 from I^{2}C_SDA_SNSR
J9	Accelerometer/magnetometer I^{2}C slave address SA0	**ON**	Pull accelerometer/magnetometer SA0 low
		OFF	Pull accelerometer/magnetometer SA0 high
J8	Magnetometer slave address SA1	**ON**	Pull magnetometer SA1 high
		OFF	Pull magnetometer SA1 low (also used for accelerometer GND)
J12	Accelerometer/Magnetometer I^{2}C interrupt 1	ON	Connect PTB0 to INT1
		OFF	Disconnect PTB0 from INT1
J10	Accelerometer/Magnetometer I^{2}C interrupt 2	ON	Connect PTB1 to INT2
		OFF	Disconnect PTB1 from INT2

TWR-K24F120M Jumper Options *(continued)*

Jumper	Option	Setting	Description
J1	Potentiometer enable	ON	Connect PTB2 to POT_5K
		OFF	Disconnect PTB2 from POT_5K
J40	Reset push button	1-2	Connect SW3 to SDA_RST_TGTMCU_J_B
		2-3	Connect SW3 to RST_TGTMCU_B
J38	SWD_DIO isolation	ON	Connect SWD_DIO_TGTMCU_BUF to SWD_DIO_TGTMCU
		OFF	Disconnect SWD_DIO_TGTMCU_BUF from SWD_DIO_TGTMCU
J34	SWD_CLK isolation	ON	Connect SWD_CLK_TGTMCU_BUF to SWD_CLK_TGTMCU
		OFF	Disconnect SWD_CLK_TGTMCU_BUF from SWD_CLK_TGTMCU
J25	UART RX selection	1-2	Connect UART1_RX_TGTMCU to UART1_RX_ELEV_BUF (Tower Elevator)
		2-3	Connect UART1_RX_TGTMCU to UART1_RX_TGTMCU_BUF (OpenSDA)
J22	UART TX selection	1-2	Connect UART1_TX_TGTMCU to UART1_TX_ELEV_BUF (Tower Elevator)
		2-3	Connect UART1_TX_TGTMCU to UART1_TX_TGTMCU_BUF (OpenSDA)
J7	RESET-OUT_B selection	1-2	Connect Tower Elevator RESET_OUT_B to PTA14
		2-3	Connect Tower Elevator RESET_OUT_B to PTA17

Get Started

Download installation software and documentation for the Quick Start Demo under **"Jump Start Your Design"** at **freescale.com/TWR-K24F120M**.

Expanded Software and Tools Now Available for Kinetis MCUs

To take your design to the next level, leverage the Kinetis SDK and other online enablement software and tools for Kinetis MCUs, available for download at the relevant links listed here.

- Kinetis SDK at **freescale.com/KSDK**

- MQX™ RTOS at **freescale.com/MQX**

- Kinetis Design Studio IDE at **freescale.com/KDS**

- Bootloader for Kinetis MCUs at **freescale.com/Kboot**

freescale™
Kinetis
Design Studio

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/TWR-K24F120M, freescale.com/Kinetis or freescale.com/Tower**

Join the online Tower community at towergeeks.org

freescale™