Quick Start Guide

TWR-K22F120M Development Board for Kinetis® K02F and K22F MCU Families

Cost-Effective 32-bit ARM® Cortex®-M4
Microcontrollers with Floating Point Unit
and Crystal-Less Full-Speed USB

TOWER® SYSTEM DEVELOPMENT PLATFORM
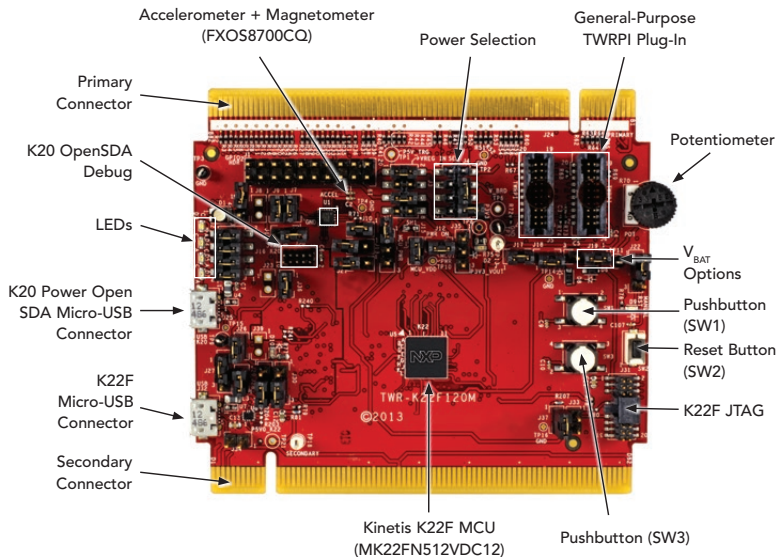
GET TO KNOW THE TWR-K22F120M BOARD

Accelerometer + Magnetometer
(FXOS8700CQ)

Power Selection

General-Purpose
TWRPI Plug-In

Primary
Connector

K20 OpenSDA
Debug

Potentiometer

LEDs

V_BAT
Options

K20 Power Open
SDA Micro-USB
Connector

Pushbutton
(SW1)

Reset Button
(SW2)

K22F
Micro-USB
Connector

K22F JTAG

Secondary
Connector

Kinetis K22F MCU
(MK22FN512VDC12)

Pushbutton (SW3)

Figure 1: Front Side of TWR-K22F120M

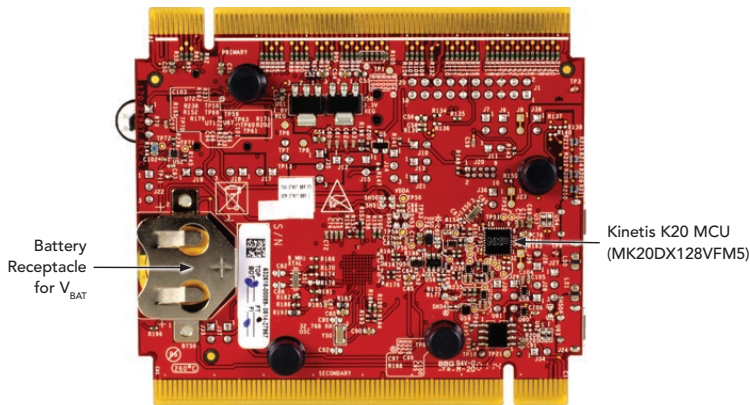Battery Receptacle for V$_{BAT}$

Kinetis K20 MCU (MK20DX128VFM5)

Figure 2: Back Side of TWR-K22F120M

TWR-K22F120M
NXP TOWER SYSTEM DEVELOPMENT
BOARD PLATFORM

The TWR-K22F120M board is designed to work either in standalone mode or as part of the NXP Tower System, a modular development board platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Begin constructing your Tower System evaluation board platform today by visiting **www.nxp.com/Tower** for additional Tower System boards and compatible peripherals.

FEATURES

- Kinetis K22F MCU (K22FN512VDC12): 120 MHz Cortex-M4F, 512 KB flash, 128 KB RAM, USB full-speed, 121 MAPBGA thin-profile package
- Dual-role USB interface with micro-AB USB connector
- General-purpose Tower plug-in (TWRPI) socket
- Onboard debug circuit: Kinetis K20 MCU (MK20DX128VFM5) OpenSDA 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
- One (1) user pushbutton switch for MCU reset
- Potentiometer
- Independent, battery-operated power supply for real-time clock (RTC) module

STEP-BY-STEP INSTRUCTIONS

In this Quick Start Guide, you will learn how to set up the TWR-K22F120M board and run the included demonstrated software. For more detailed information, review the user manual at
www.nxp.com/TWR-K22F120M

1 Download Software

Download installation software and documentation under **"Jump Start Your Design"** at **www.nxp.com/TWR-K22F120M**.

2 Configure the Hardware

Install the included battery into the V_{BAT} (RTC) battery holder. Then, connect one end of the USB cable to the PC and the other end to the Power/OpenSDA micro-AB connector on the TWR-K22F120M module. Allow the PC to automatically configure the USB drivers if needed.

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. Bubble level
2. eCompass demo
3. USB CDC demo
4. Metal detector demo
5. Stopwatch demo
6. Air mouse demo

Enter a number key (1–6) on the keyboard to run each option from the Quick Start Demo. Further information will be displayed on the terminal as the demo runs.

SOFTWARE AND TOOLS

- Kinetis Software Development Kit (SDK): **www.nxp.com/ksdk**
- FreeRTOS™: **www.nxp.com/freertos**
- Kinetis Design Studio IDE: **www.nxp.com/kds**
- Bootloader for Kinetis MCUs: **www.nxp.com/kboot**

TWR-K22F120M JUMPER OPTIONS

The following is a list of all the jumper options. The default installed jumper settings are indicated in the shaded boxes.

JUMPER	OPTION	SETTING	DESCRIPTION
J33	Debug target power	ON	Connect P5V_SDA to target power
		OFF	Disconnect P5V_SDA from target power
J26	Enable USB power	ON	Connect PTC9 to USB power enable on power switch MIC2026
		OFF	Disconnect PTC9 from USB power enable on power switch MIC2026
J34	USB ID connection	ON	Connect PTD7 to USB ID pin
		OFF	Disconnect PTD7 from USB ID pin
J28	USB over-current flag	ON	Connect PTC8 to overcurrent flag on power switch MIC2026
		OFF	Disconnect PTC8 from overcurrent flag on power switch MIC2026
J27	USB switch	1-2	Connect MCU USB0_DP and USB0_DM pins to micro-USB connector (J32)
		2-3	Connect MCU USB0_DP and USB0_DM pins to Tower System elevator
J35	V_{REGIN} input	1-2	Connect V_BRD to MCU_PWR
		2-3	Allow current measurement on MCU VDD
J15	MCU V_{DD} current measurement	ON	Connect P5V_SDA to target power
		OFF	Disconnect P5V_SDA from target power

TWR-K22F120M JUMPER OPTIONS CONT.

JUMPER	OPTION	SETTING	DESCRIPTION
J3	3.3 V V_{REGIN} selector	1-2	Connect output of USB power switch controlled by the VTRG_EN signal from the K20 MCU (P5V_TRG_SDA) to onboard 3.3 V regulator
		5-6	Connect V_{BUS} signal from micro-USB connector J32 to K22F VREGIN
		6-8	Connect V_{BUS} signal from Tower Elevator to K22F V_{REGIN}
J4	Board power selector	1-2	Connect PTD7 to USB ID pin
		3-5	Disconnect PTD7 from USB ID pin
		5-7	Connect 1.8 V regulator output to onboard supply (V_BRD)
J12	V_{REFH} and V_{DDA} power	ON	Connect V_BRD to V_{DDA} and V_{REFH}
		OFF	Disconnect V_BRD from V_{DDA} and V_{REF}
J19	V_{BAT} power	1-2	Connect V_{BAT} to MCU_PWR
		2-3	Connect V_{BAT} to the higher voltage between MCU_PWR and coin-cell battery (P3V0_COINCELL)
J38	LED operation	OFF	Connect LEDs to single resistor for 3.3 V operation
		ON	Connect LEDs to parallel resistors for 1.8 V operation
J16	LED connections	1-2	Connect PTD4 to green LED D7
		3-4	Connect PTD5 to yellow LED D5
		5-6	Connect PTD6 orange LED D4
		7-8	Connect PTD6 orange LED D4

TWR-K22F120M JUMPER OPTIONS CONT.

JUMPER	OPTION	SETTING	DESCRIPTION
J17	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)
J9	Accelerometer/ magnetometer I²C	ON	Connect PTC10 to I2C_SCL_SNSR
		OFF	Disconnect PTC10 from I2C_SCL_SNSR
J7	Accelerometer/ magnetometer I²C SDA connection	ON	Connect PTC11 to I2C_SDA_SNSR
		OFF	Disconnect PTC11 from I2C_SDA_SNSR
J11	Accelerometer/ magnetometer I²C slave address SA0	ON	Pull accelerometer/magnetometer SA0 low
		OFF	Pull accelerometer/magnetometer SA0 high
J10	Accelerometer/ magnetometer slave address SA1	ON	Pull magnetometer SA1 high
		OFF	Pull magnetometer SA1 low (also used for accelerometer GND)
J13	Accelerometer/ magnetometer I²C interrupt 1	ON	Connect PTB0 to INT1
		OFF	Disconnect PTB0 from INT1
J21	Accelerometer/ magnetometer I²C interrupt 2	ON	Connect PTB1 to INT2
		OFF	Disconnect PTB1 from INT2

TWR-K22F120M JUMPER OPTIONS CONT.

JUMPER	OPTION	SETTING	DESCRIPTION
J18	Potentiometer enable	ON	Connect PTB2 to POT_5K
		OFF	Disconnect PTB2 from POT_5K
J22	Reset push button	1-2	Connect SW2 to SDA_RST_TGTMCU_J_B
		2-3	Connect SW2 to RST_TGTMCU_B
J37	SWD_DIO isolation	ON	Connect SWD_DIO_TGTMCU_BUF to SWD_DIO_TGTMCU
		OFF	Disconnect SWD_DIO_TGTMCU_BUF from SWD_DIO_TGTMCU
J36	SWD_CLK isolation	ON	Connect SWD_CLK_TGTMCU_BUF to SWD_CLK_TGTMCU
		OFF	Disconnect SWD_CLK_TGTMCU_BUF from SWD_CLK_TGTMCU
J29	UART RX selection	1-2	Connect UART1_RX_TGTMCU to UART1_RX_ELEV_BUF (Tower System elevator)
		2-3	Connect UART1_RX_TGTMCU to UART1_RX_TGTMCU_BUF (OpenSDA)
J30	UART TX selection	1-2	Connect UART1_TX_TGTMCU to UART1_TX_ELEV_BUF (Tower System elevator)
		2-3	Connect UART1_TX_TGTMCU to UART1_TX_TGTMCU_BUF (OpenSDA)
J14	RESET-OUT_B selection	1-2	Connect Tower System elevator RESET_OUT_B to PTA14
		2-3	Connect Tower System elevator RESET_OUT_B to PTA17

Visit **www.nxp.com/TWR-K22F120M**
or **www.nxp.com/Kinetis** for more
information on the TWR-K22F120M board.

SUPPORT

Visit **www.nxp.com/support** for a list of
phone numbers within your region.

WARRANTY

Visit **www.nxp.com/warranty** for
complete warranty information.

Get Started

Download installation
software and documentation
under **"Jump Start Your Design"**
at **www.nxp.com/K22F120M**.

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or www.nxp.com/Tower**