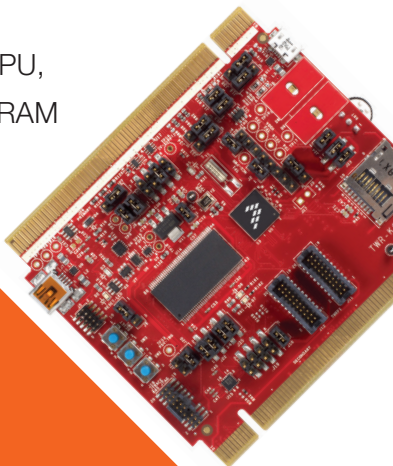# TWR-K65F180M
Quick Start Guide

Power-Efficient, 180 MHz ARM®
Cortex®-M4-based MCUs with FPU,
up to 2 MB Flash and 256 KB SRAM

Tower System
Development
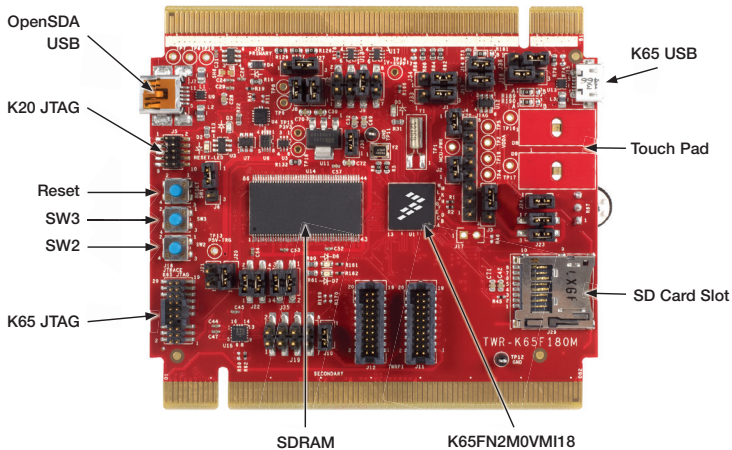Platform

Get to Know the TWR-K65F180M

OpenSDA
USB

K20 JTAG

Reset

SW3

SW2

K65 JTAG

K65 USB

Touch Pad

SD Card Slot

SDRAM

K65FN2M0VMI18

Figure 1: Front side of TWR-K65F180M
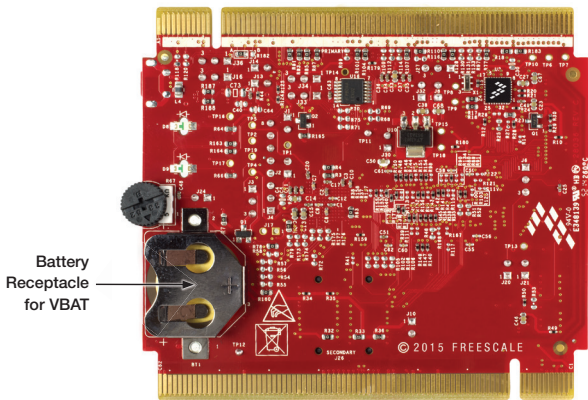
Battery Receptacle for VBAT

Figure 2: Back side of TWR-K65F180M

TWR-K65F180M
Freescale Tower System Development Platform

The TWR-K65F180M board is designed to work either in standalone mode or as part of the Freescale 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 **freescale.com/Tower** for additional Tower System boards and compatible peripherals.

TWR-K65F180M
Features

- K65FN2M0VMI18 MCU
  - 180 MHz Cortex-M4 core, 2MB Flash, 256 KB SRAM, 169 MAPBGA, with SDRAM controller and Dual USB
- Tower compatible processor board
- Socket for tower plug-in (TWRPI, e.g. sensor board)
- Onboard debug circuit: K20DX128VFM5 OpenSDA with virtual serial port
- Four (4) user-controlled status LEDs
- Two (2) capacitive touch pads
- Two (2) mechanical push buttons
- Standalone high-speed USB host and device function
- Potentiometer
- SDRAM connection
- MMA8451Q three-axis accelerometer
- Board power select with 3.3V or 1.8V MCU operation
- Independent, battery-operated power supply for real-time clock (RTC) module
- Battery holder for 20mm lithium battery (e.g. 2032, 2025)

Step-by-Step Installation Instructions

In this Quick Start Guide, you will learn how to set up the TWR-K65F180M board and run the included demonstrated software. For more detailed information, review the user manual at **freescale.com/TWR-K65F180M**.

1 Configure the Hardware

Install the included battery into the VBAT (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-K65F180M module. Allow the PC to automatically configure the USB drivers if needed.

2 Run the Quick Start Demo

The LEDs on the board, D6 and D7, will gradually illuminate as the board is tilted. When rotated around the accelerometer's x-axis the orange LED (D7) will illuminate. Similarly, the yellow LED (D6) will gradually illuminate as rotated around the y-axis. The actual accelerometer data is printed to a terminal window via the UART module.

3 Download Software and Tools

Download installation software and documentation under **"Jump Start Your Design"** at **freescale.com/TWR-K65F180M**.

Expanded Software and Tools Now Available for Kinetis MCUs

Additional details regarding the Quick Start Demo are included as part of the Kinetis software development kit (SDK).

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 software development kit at **freescale.com/ksdk**

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

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

TWR-K65F180M 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
J1	MCU power connection	ON	Connect V_SUPPLY and V_BRD with MCU_PWR
		OFF	Disconnect V_SUPPLY and V_BRD with MCU_PWR
J2	VDD and VDDA connection	ON	Connect VDD and VDDA
		OFF	Disconnect VDD and VDDA
J3	VBAT power selection	1-2	Connect VBAT to on board 3.3V supply from V_SUPPLY
		2-3	Connect VBAT to the higher voltage between on board 3.3V supply or coin cell supply
J4	Tamper signal header	2-3	Tamper signal header
J6	RESET button connection	1-2	When powering the OPENSDA MCU, bootloader mode can be selected
		2-3	When OPENSDA MCU is not powered, RESET button can be used
J8	5V power connection	ON	Connect P5V_TRG_USB to input of on board 3.3V regulator
		OFF	Disconnect P5V_TRG_USB to on board 3.3V regulator

TWR-K65F180M Jumper Options (cont.)

Jumper	Option	Setting	Description
J9	Board power selection	1-2	V_SUPPLY comes from OPENSDA MCU (K20) USB regulator
		3-4	V_SUPPLY comes from on board 1.8V regulator
		5-6	V_SUPPLY comes from on board 3.3V regulator
		7-8	V_SUPPLY comes from K65 USB regulator
J10	TWRPI power selection	**ON**	Connect V_BRD to TWRPI connector power
		OFF	Disconnect V_BRD to TWRPI connector power
J13	USB power enable connection	**ON**	Connect PTD8 to USB power enable for MIC2005
		OFF	Disconnect PTD8 to USB power enable for MIC2005
J14	USB over-current flag connection	**ON**	Connect PTD9 to USB over-current flag for MIC2005
		OFF	Disconnect PTD9 to USB over-current flag for MIC2005

TWR-K65F180M Jumper Options (cont.)

Jumper	Option	Setting	Description
J16	USB ID connection	**1-2**	Connect PTD15 to USB ID pin on MicroUSB connector J15
		2-3	Connect PTE10 to USB ID pin on MicroUSB connector J15
J17	Pulldown connection on CD/DAT3 for MicroSD slot	ON	Disconnect pull down resistor on CD/DAT3 pin on MicroSD slot
		OFF	Connect pull down resistor on CD/DAT3 pin on MicroSD slot
J20	MCU reset connection on JTAG connector	**ON**	Connect MCU reset on pin10 of JTAG connector J18
		OFF	Disconnect MCU reset on pin10 of JTAG connector J18
J21	JTAG Power Connection	ON	Connect on-board 5V supply to JTAG port (supports powering board from external JTAG probe)
		OFF	Disconnect on-board 5V supply from JTAG port
J22	Accelerometer INT connection	**1-2**	Connects INT1 from MMA8451 to PTE27
		3-4	Connects INT2 from MMA8451 to PTE28

TWR-K65F180M Jumper Options (cont.)

Jumper	Option	Setting	Description
J23	K65 VREGIN selection	1-2	VREG_IN0 connected with ONBOARD_USB_VBUS
		1-3	VREG_IN1 connected with ONBOARD_USB_VBUS
		2-4	VREG_IN0 connected with ELEV_USB_VBUS
		3-4	VREG_IN1 connected with ELEV_USB_VBUS
J24	Potentiometer connection	ON	Connect potentiometer to ADC1_SE16
		OFF	Disconnect potentiometer to ADC1_SE16
J27	/RSTOUT connection	1-2	MCU reset signal connected to /RSTOUT (A63) on primary elevator
		2-3	PTD10 connected to /RSTOUT (A63) on primary elevator
J30	SDRAM power connection	ON	Connect V_BRD to SDRAM chip
		OFF	Disconnect V_BRD to SDRAM chip

TWR-K65F180M Jumper Options (cont.)

Jumper	Option	Setting	Description
J32	SWD clock disconnection	ON	Connect SWD_CLK from OPENSDA circuit to K65 MCU to allow debugging using OPENSDA
		OFF	Disconnect SWD_CLK from OPENSDA circuit to K65 MCU to allow J-Link or U-Link debug
J33	UART2 RX connection	1-2	Connect UART2_RX to elevator
		2-3	Connect UART2_RX to OPENSDA UART RX
J34	UART2 TX connection	1-2	Connect UART2_TX to elevator
		2-3	Connect UART2_TX to OPENSDA UART TX
J35	I2C connection with accelerometer	1-2	Connect I2C0_SCL with accelerometer SCL
		3-4	Connect I2C0_SDA with accelerometer SDA
J36	USB 5V power connection	1-2	Connect MiniUSB connector (J7) VBUS with U12 pin 1
		2-3	Connect P5V_ELEV with U12 pin 1

et Started

Download installation software and documentation under
"Jump Start Your Design" at **freescale.com/TWR-K65F180M**.

Visit **freescale.com/TWR-K65F180M** or
freescale.com/Kinetis for more information
on the TWR-K65F180M board.

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-K65F180M,
freescale.com/Kinetis or freescale.com/Tower