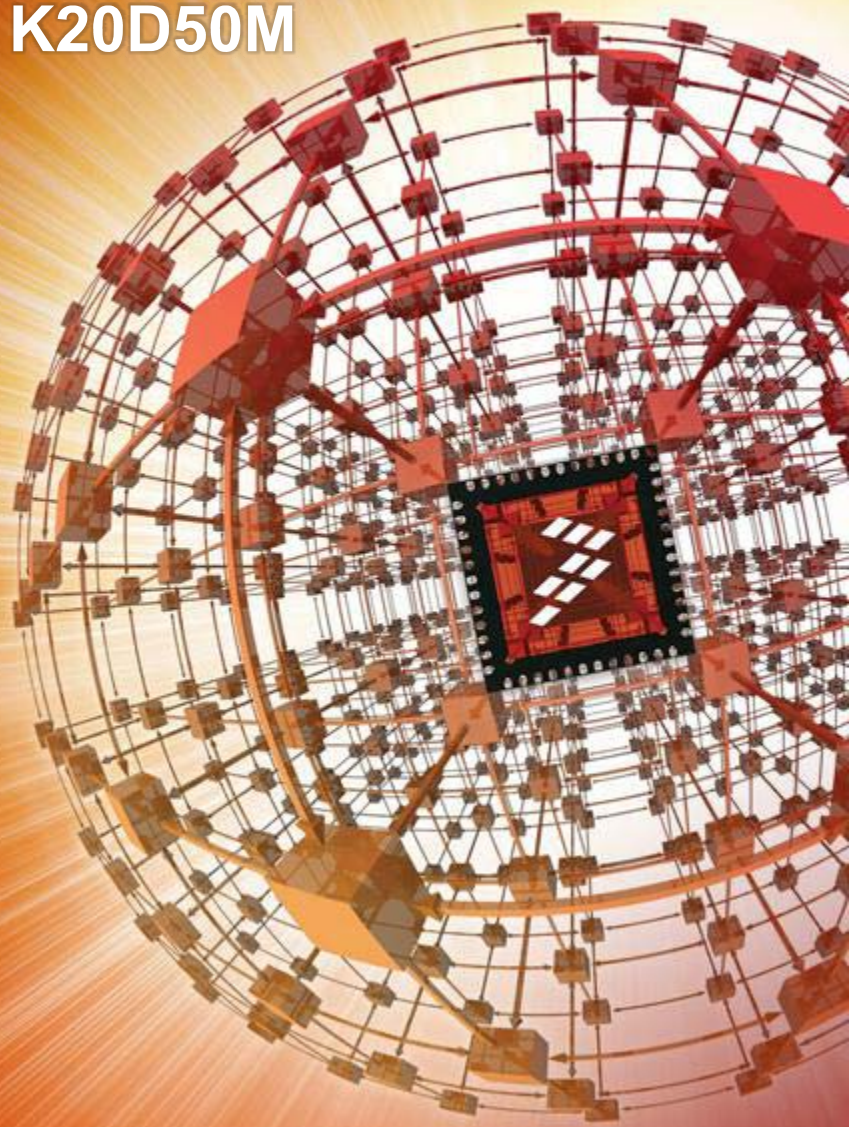
Quick Start Guide for Freedom K20D50M



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- Getting Started Out of the Box
- Introduction to OpenSDA
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www.freescale.com/FRDM-K20D50M

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Quick Start Package Overview

These documents are available as part of the Quick Start Package:

Name	Type	Description
Quick Start Guide	PDF	This document
OpenSDA Applications	Folder	OpenSDA Applications for the FRDM-K20D50M
Precompiled Examples	Folder	S-record images of example projects for use with the MSD Flash Programmer

Additional reference documents are available on freescale.com/FRDM-K20D50M:

Name	Description
FRDM-K20D50M Quick Start Package	Quick Start Guide and supporting files for getting started with the FRDM-K20D50M.
FRDM-K20D50M User's Manual	This document—overview and detailed information for the FRDM-K20D50M hardware.
FRDM-K20D50M Pinout	Spreadsheet of pin connections for all MCU pins. Includes pinout for the I/O headers, Arduino R3 compatibility chart, and OpenSDA MCU pinout
FRDM-K20D50M Schematics	PDF schematics for the FRDM-K20D50M hardware
FRDM-K20D50M Design Package	Zip file containing all design source files for the FRDM-K20D50M hardware
OpenSDA User's Guide	Overview and instructions for use of the OpenSDA embedded debug circuit.

Get to Know the FRDM-K20D50M

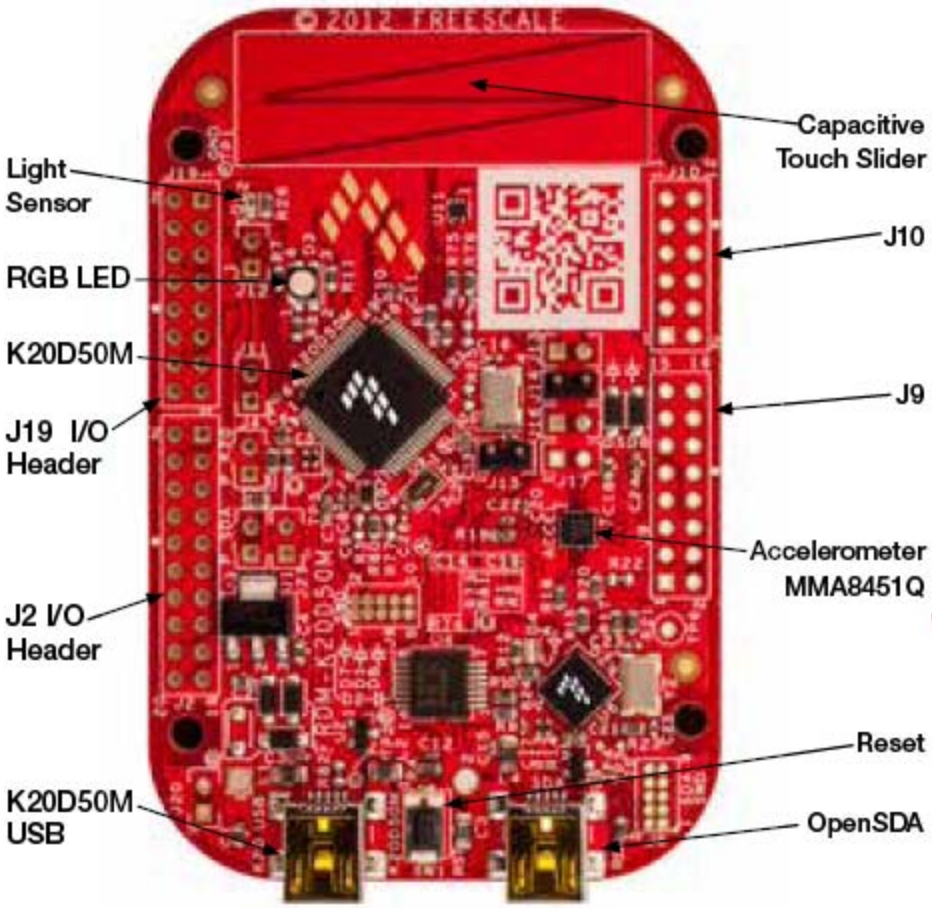


Figure 1: FRDM-K20D50M Callouts

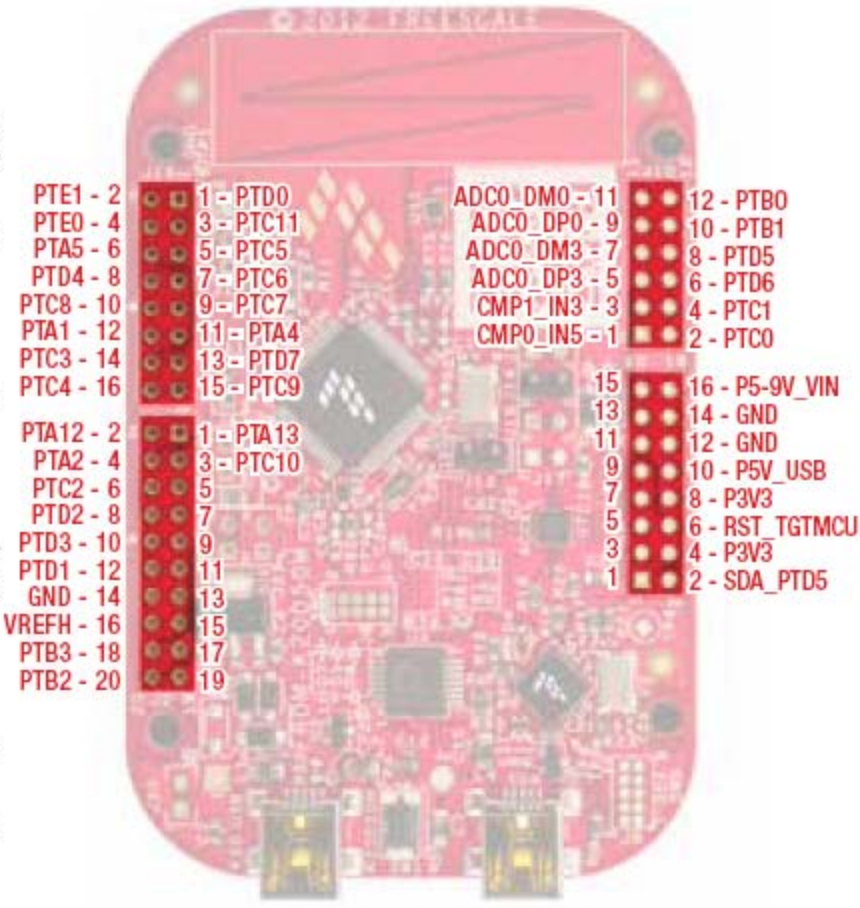


Figure 2: FRDM-K20D50M Pin-Out

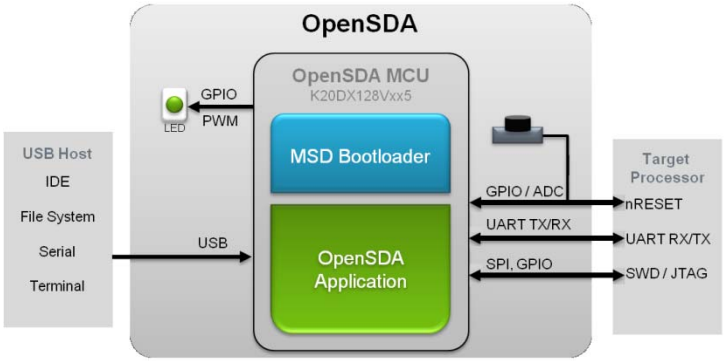
Get to Know the FRDM-K20D50M

The Freescale Freedom development platform is a set of software and hardware tools for evaluation and development. It is ideal for rapid prototyping of microcontroller-based applications. The Freescale Freedom K20D50M hardware, FRDM-K20D50M, is a simple, yet sophisticated design featuring a Kinetis K Series microcontroller, the industry's first microcontroller built on the ARM® Cortex™-M4 core.

Features:

- MK20DX128VLH5 MCU – 50MHz, 128KB Flash, 16KB SRAM, 32KB FlexMem, USB OTG (FS), 64LQFP
- Capacitive touch slider, MMA8451Q accelerometer, Tri-color LED
- Flexible power supply options – USB, coin cell battery, external source
- Easy access to MCU I/O
- Battery-ready, power-measurement access points
- Form factor compatible with Arduino ™ R3 pin layout
- OpenSDA debug interface
- Mass storage device flash programming interface (default) – no tool installation required to evaluate demo apps
- P&E Debug interface provides run-control debugging and compatibility with IDE tools
- CMSIS-DAP interface: new ARM standard for embedded debug interface Refer to the *FRDM-K20D50M User's Manual and OpenSDA User's Guide for more information .*





Getting Started Out of the Box

Installing Drivers and Running the Out of Box Demo

0 **Optional: Download and Install the P&E OpenSDA USB Drivers found at www.pemicro.com/opensda.**

1 Plug in a USB cable (not included) from a USB host to the OpenSDA mini-B USB connector. The FRDM-K20D50M will be powered by this USB connection.

FRDM-K20D50M comes with the mass-storage device (MSD) Flash Programmer OpenSDA Application preinstalled. It will appear as a removable storage drive with a volume label of FRDM-K20D50M

The MSD Flash Programmer also includes a USB virtual serial port which requires an .INF file for proper installation in Windows. The necessary .INF file is available in the P&E OpenSDA USB Drivers (Step 0) and also on the FRDM-K20D50 removable drive.

If the USB CDC Serial Port fails to automatically install in Windows, follow the instructions in Step 2. Otherwise, skip to Step 3.

2 a. Open Device Manager

b. Locate and right-click on "OpenSDA – CDC Serial Port"

c. Select "Update Driver Software"

d. "Browse" and select the FRDM-K20D50 drive

e. Click "Next" to complete the installation

3 The pre-installed demo running on the K20 MCU will cycle through several colors on the RGB LED. After this completes, tilt the board. The color mix of the RGB LED will change based on the accelerometer data. *

4 Touch the capacitive slider. The touch position along the slider will determine the brightness of the LED.

* Follow the "**Using the MSD Flash Programmer** " instructions to update frdm-k20d50m-demo code on your FRDM-K20D50M to the latest version. It is likely that the version provided in this package is newer than what was preprogrammed on your FRDM-K20D50M.

Introduction to OpenSDA

OpenSDA is an open-standard serial and debug adapter. It bridges serial and debug communications between a USB host and an embedded target processor. OpenSDA software includes a flash-resident USB mass-storage device (MSD) bootloader and a collection of OpenSDA Applications. FRDM-K20D50M comes with the MSD Flash Programmer OpenSDA Application preinstalled. Follow these instructions to run the OpenSDA Bootloader and update or change the installed OpenSDA Application.

Enter OpenSDA Bootloader Mode

1. Unplug the USB cable if attached.
2. Press and hold the Reset button (SW1).
3. Plug in a USB cable (not included) between a USB host and the OpenSDA USB connector (labeled "SDA").
4. Release the Reset button

A removable drive should now be visible in the host file system with a volume label of BOOTLOADER. You are now in OpenSDA Bootloader mode.

Load an OpenSDA Application

1. While in OpenSDA Bootloader mode, double-click SDA_INFO.HTML in the BOOTLOADER drive. A web browser will open the OpenSDA homepage containing the name and version of the installed Application. This information can also be read as text directly from SDA_INFO.HTML.
2. Locate the OpenSDA Applications folder in the FRDM-K20D50M Quick Start Package.
3. Copy & paste or drag & drop the MSD Flash Programmer Application (MSD-FRDM-K20D_v*XYZ_Pemicro.SDA)to the BOOTLOADER drive.*
4. Unplug the USB cable and plug it in again. The new OpenSDA Application should now be running and a FRDM-K20D50M drive should be visible in the host file system.

You are now running the latest version of the MSD Flash Programmer. Use this same procedure to load other OpenSDA Applications

Introduction to OpenSDA

The MSD Flash Programmer is a composite USB application that provides a virtual serial port and an easy and convenient way to program applications into the K20D50M MCU. It emulates a FAT16 file system, appearing as a removable drive in the host file system with a volume label of FRDM-K20D50. Raw binary and Motorola S-record files that are copied to the drive are programmed directly into the flash of the MK20DX128 and executed automatically. The virtual serial port enumerates as a standard serial port device that can be opened with standard serial terminal applications.

Using the MSD Flash Programmer

1. Locate the Precompiled Examples folder in the FRDM-K20D50M Quick Start Package.
2. Copy & paste or drag & drop one of the .srec files to the FRDM-K20D50M drive.

The new application should now be running on the FRDM-K20D50M drive.

Program frdm-k20d50m-demo_freedom.srec example to replace the out-of-box demo on your FRDM-K20D50 drive.

Using the Virtual Serial Port

1. Determine the symbolic name assigned to the FRDM-K20D50M virtual serial port. In Windows open Device Manager and look for the COM port named "PEMicro/Freescale – CDC Serial Port".
2. Open the serial terminal emulation program of your choice. Examples for Windows include Tera Term, PuTTY, and HyperTerminal.
3. Program one of the "serial test" applications from the Precompiled Examples folder using the MSD Flash Programmer.
4. Configure the terminal program. Most embedded examples use 8 data bits, no parity bits, and one stop bit (8-N-1). Match the baud rate to the selected serial test application and open the port.
5. Press and release the Reset button (SW1) at anytime to restart the example application. Resetting the embedded application will not affect the connection of the virtual serial port to the terminal program.

NOTE: Refer to the *OpenSDA User's Guide for a description of a known Windows issue when disconnecting a virtual serial port while the COM port is in use.*

Explore Further



Now that you are familiar with the FRDM-K20D50M and OpenSDA, it's time to explore the additional software and lab guides available on www.freescale.com/FRDM-K20D50M. Select your next path from the links in the **Jump Start Your Design section.**

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