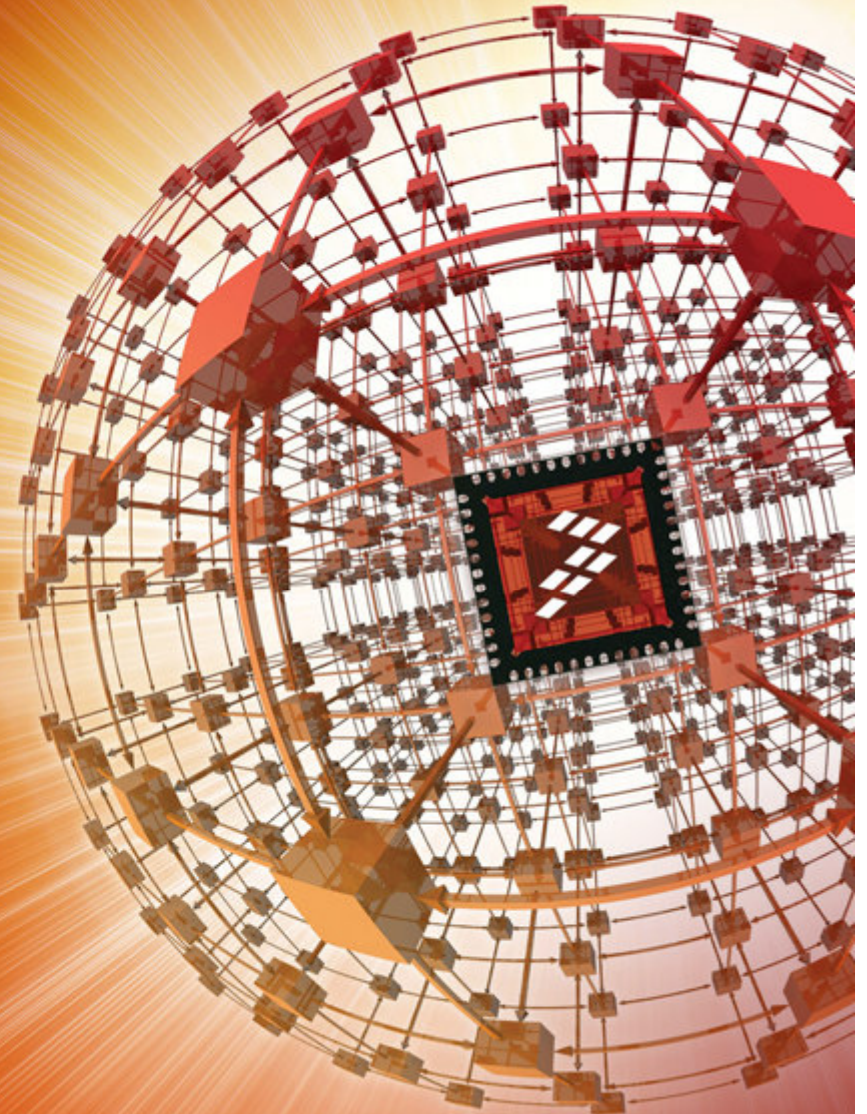


# Quick Start Guide for FRDM-KL05Z

## Contents:

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- Introduction to OpenSDA
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[www.freescale.com/FRDM-KL05Z](http://www.freescale.com/FRDM-KL05Z)



# Quick Start Package Overview

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

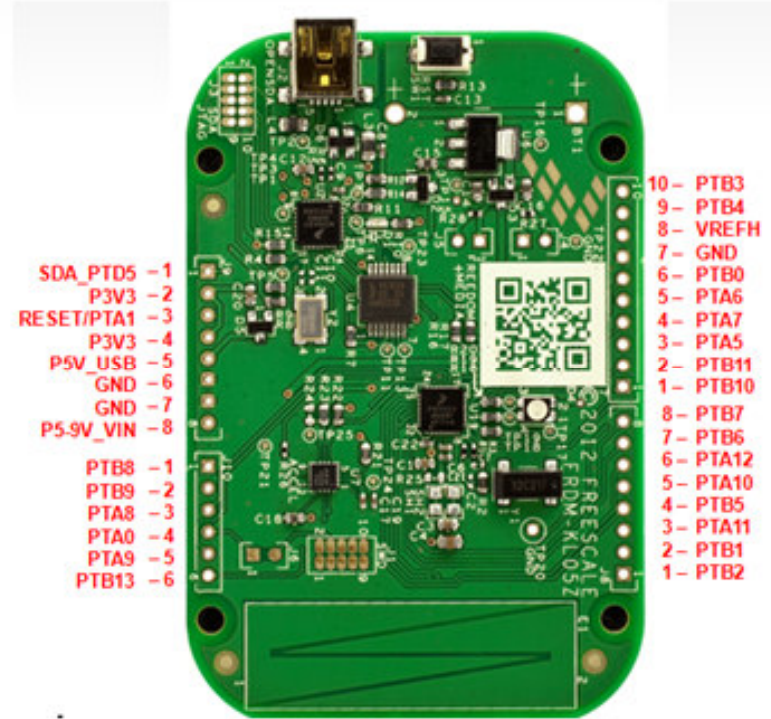
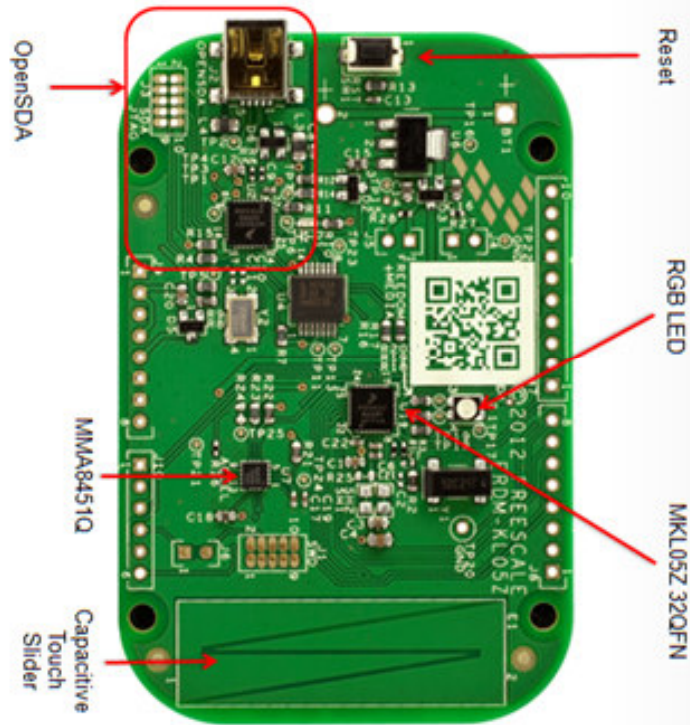
Name	Type	Description
Quick Start Guide	PPT	This document
OpenSDA Applications	Folder	OpenSDA Applications for the FRDM-KL05Z
Precompiled Examples	Folder	S-record images of example projects for use with the MSD Flash Programmer

Additional reference documents are available on [freescale.com/FRDM-KL05Z](http://freescale.com/FRDM-KL05Z):

Name	Description
FRDM-KL05Z User's Manual	Word document that provides an overview and detailed information for the FRDM-KL05Z hardware.
FRDM-KL05Z Pinouts	Spreadsheet of pin connections for all MCU pins. Includes pinout for the I/O headers, Arduino R3 compatibility chart, and OpenSDA MCU pinout.
FRDM-KL05Z Schematics	PDF schematics for the FRDM-KL05Z hardware
FRDM-KL05Z Design Package	Zip file containing all design source files for the FRDM-KL05Z hardware
OpenSDA User's Guide	Overview and instructions for use of the OpenSDA embedded debug circuit

# Get to Know the FRDM-KL05Z

1 of 2



# Get to Know the FRDM-KL05Z

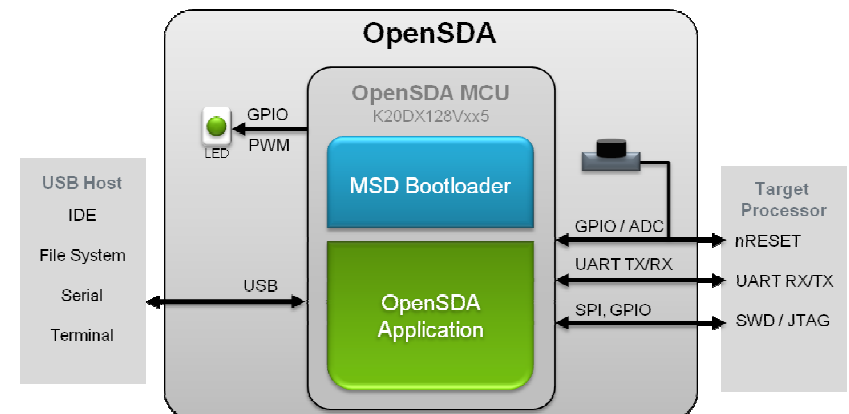
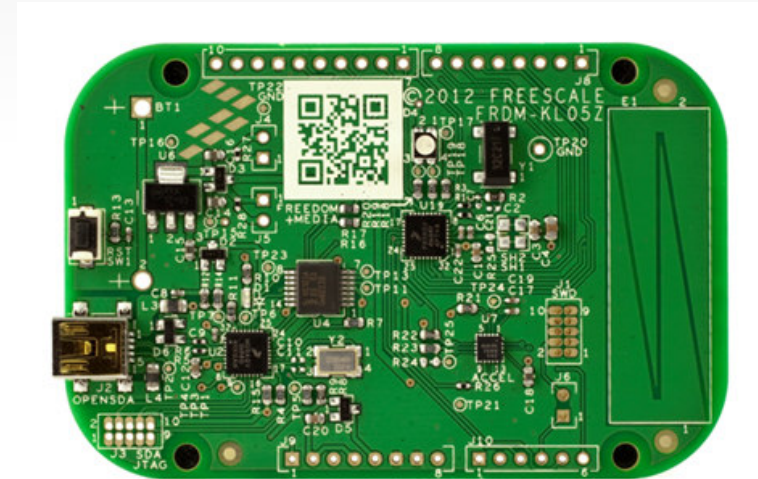
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The Freescale Freedom development platform is a set of software and hardware tools for evaluation and development. It is ideal for rapid prototyping of microcontroller-based applications. The Freescale Freedom KL05Z hardware, FRDM-KL05Z, is a simple, yet sophisticated design featuring a Kinetis L Series microcontroller, the industry's first microcontroller built on the ARM® Cortex™-M0+ core.

## Features:

- MKL05Z32VFM4 MCU – 48MHz, 32KB Flash, 4KB SRAM, 32 QFN
- 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
- New, 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-KL05Z 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](http://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-KL05Z will be powered by this USB connection.

FRDM-KL05Z 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-KL05Z.

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-KL05Z 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**
- [Open Device Manager](#)
  - Locate and right-click on “OpenSDA – CDC Serial Port”
  - Select “Update Driver Software”
  - “Browse” and select the FRDM-KL05Z drive
  - Click “Next” to complete the installation

**3** The pre-installed demo running on the KL05Z 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.

# Introduction to OpenSDA

1 of 2

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-KL05Z 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.

**IMPORTANT NOTE:** Follow the “Load an OpenSDA Application” instructions to update the MSD Flash Programmer on your FRDM-KL05Z to the latest version. It is likely that the version provided in this package is newer than what was preprogrammed on your FRDM-KL05Z.



## 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-KL05Z Quick Start Package.
- 3 Copy & paste or drag & drop the MSD Flash Programmer Application (`MSD-FRDM-KL05Z_vXYZ_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-KL05Z` 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

2 of 2

The MSD Flash Programmer is a composite USB application that provides a virtual serial port and an easy, convenient way to program applications into the KL05Z MCU. It emulates a FAT16 file system, appearing as a removable drive in the host file system with a volume label of `FRDM-KL05Z`. Raw binary and Motorola S-record files that are copied to the drive are programmed directly into the flash of the KL05Z and executed automatically. The virtual serial port enumerates as a standard serial port device that can be opened with any standard serial terminal application.

## Using the MSD Flash Programmer

- 1 Locate the `Precompiled Examples` folder in the FRDM-KL05Z Quick Start Package.
- 2 Copy & paste or drag & drop one of the `.srec` files to the `FRDM-KL05Z` drive.

The new application should now be running on the FRDM-KL05Z. Starting with v1.03 of the MSD Flash Programmer, you can program repeatedly without the need to unplug and reattach the USB cable before reprogramming.

Program `FRDM_KL05Z_OOBE_Demo.srec` example to replace the out-of-box demo on your FRDM-KL05Z.

## Using the Virtual Serial Port

- 1 Determine the symbolic name assigned to the FRDM-KL05Z virtual serial port. In Windows [open Device Manager](#) and look for the COM port named "PEMicro/Freescale – CDC Serial Port".

**NOTE:** Flash programming with the MSD Flash Programmer is currently only supported on Windows operating systems. However, the virtual serial port has been successfully tested on Windows, Linux and Mac operating systems.

- 2 Open the serial terminal emulation program of your choice. Examples for Windows include [Tera Term](#), [PuTTY](#), and [HyperTerminal](#).
- 3 Program one of the example 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-KL05Z and OpenSDA, it's time to explore the additional software and lab guides available on [www.freescale.com/FRDM-KL05Z](http://www.freescale.com/FRDM-KL05Z). Select your next path from the links in the **Jump Start Your Design** section.



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