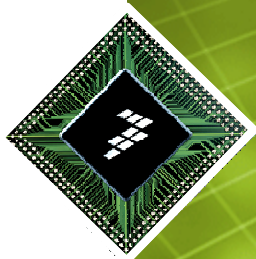
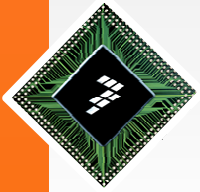




# OpenSDA

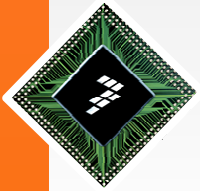


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# Agenda

1. What is FRDM-KL25
2. Overview OpenSDA
3. Hardware and software
4. Updating OpenSDA application
5. Loading a binary file to target MCU

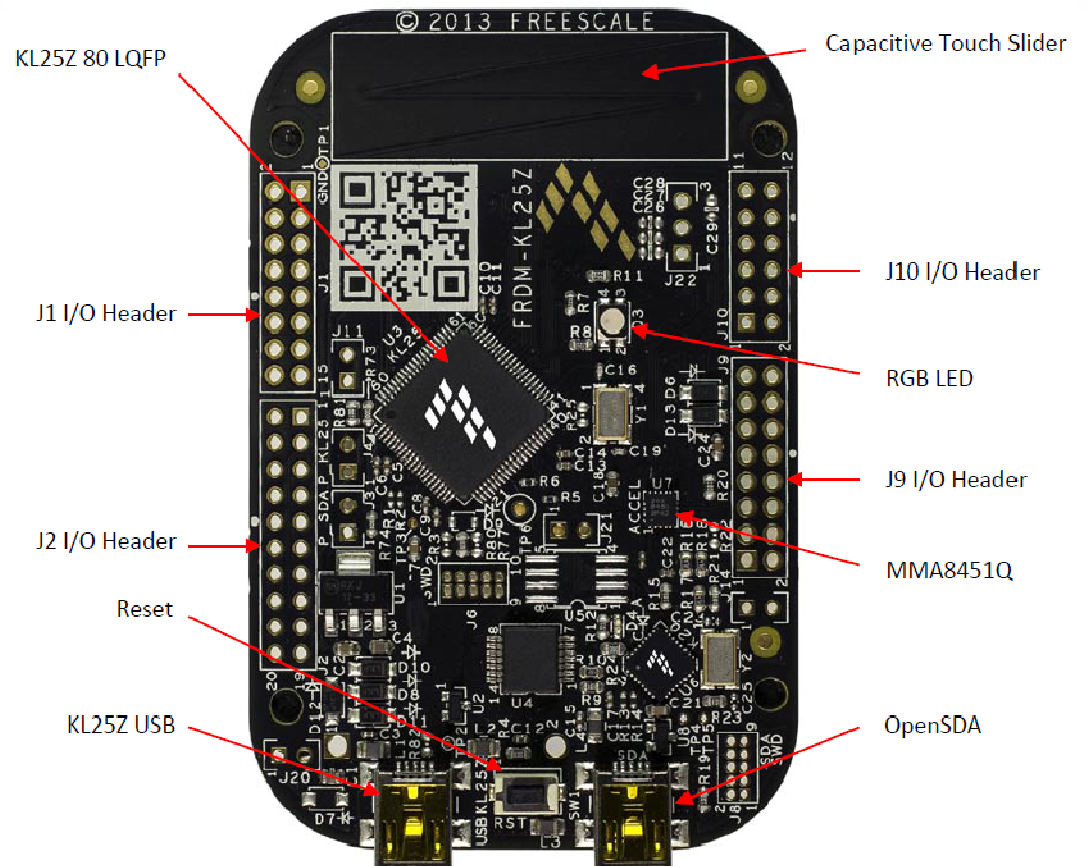


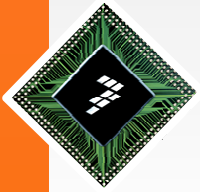
# What is FRDM-KL25?

- Ultra-low cost development platform enabled by L series KL1x and KL2x MCUs, built on ARM® Cortex™ M0+ processor.

Documents can be found at:

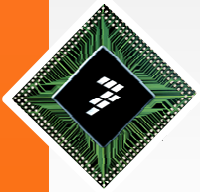
- [www.freescale.com/FRDM-KL25Z](http://www.freescale.com/FRDM-KL25Z)
- FRDMKL25UM: User Manual
- [www.freescale.com/freedom](http://www.freescale.com/freedom)





## Overview OpenSDA

- OpenSDA is a serial and debug adapter between a USB host and an embedded target processor.
- The hardware circuit is based on a Freescale Kinetis K20 microcontroller, with USB controller integrated.
- The OpenSDA features a mass storage device (MSD) bootloader, to load different OpenSDA Applications quick and easy.
- Example OpenSDA applications: Flash programmers, run-control debug interface, serial-to-USB, and more.



# OpenSDA block diagram

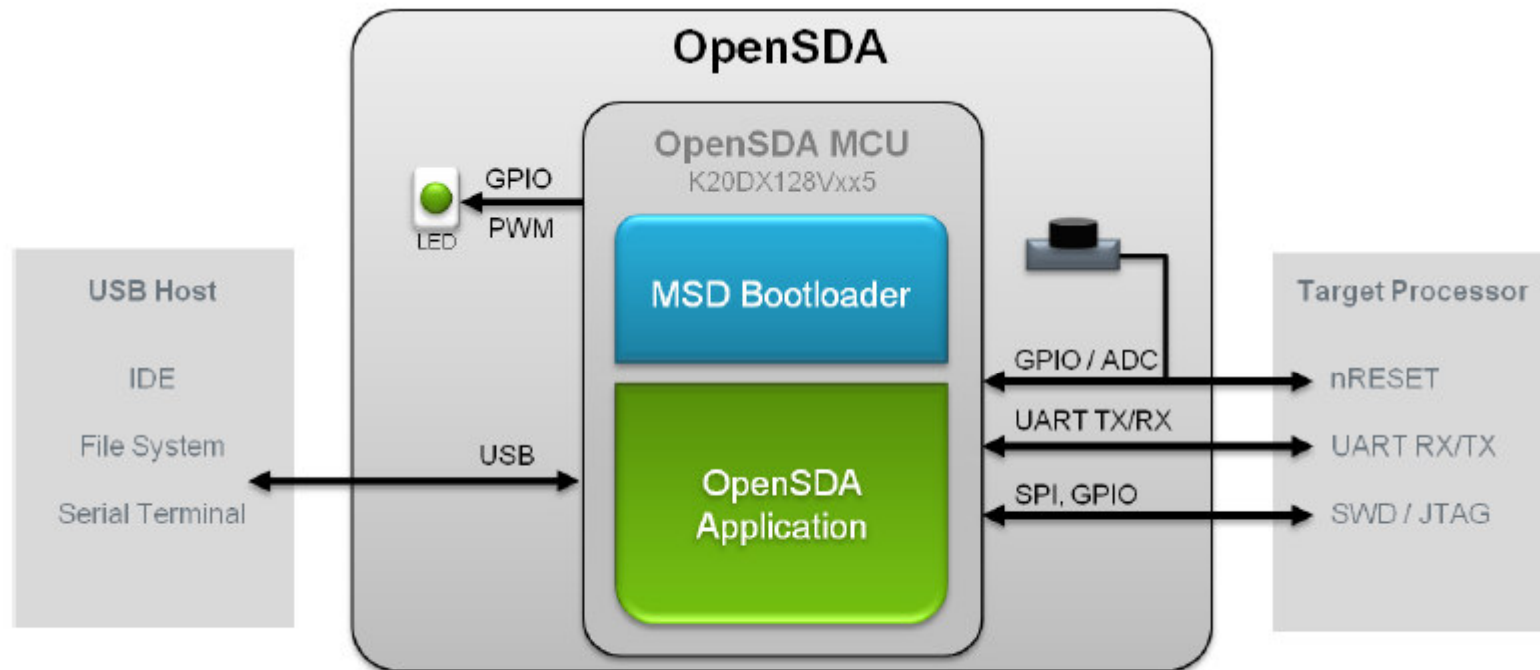
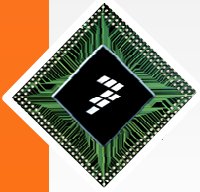


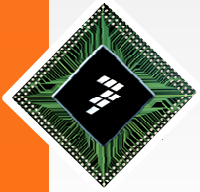
Figure 1. OpenSDA High-Level Block Diagram



## OpenSDA hardware

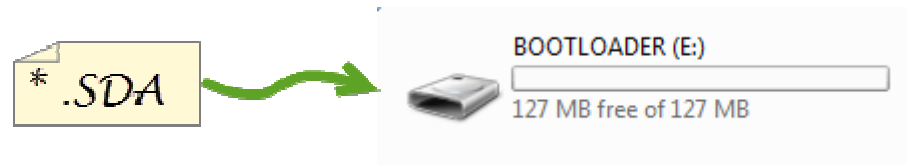
- OpenSDA is managed by a Kinetis K20 MCU with an ARM Cortex M4 core. K20 integrates a USB controller that can operate at clock rates up to 50 MHz.
- The OpenSDA circuit includes as minimum a status led and a pushbutton as target reset.
- Target can be a microcontroller, digital signal controller or microprocessor.
- SPI and GPIO signals provide an interface to either JTAG or SWD port on the target. UART serial channel also available.

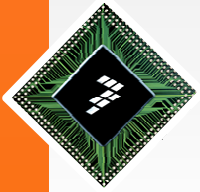




## OpenSDA software

- *MSD BOOTLOADER*
- Provides a simple interface for loading OpenSDA applications (.SDA files).
- Only one OpenSDA application may be resident at a time, and will be automatically run at startup unless bootloader is selected by holding down the reset button.
- Appears as a removable drive, and loading an application is as easy as drag-and-drop .SDA files to it.





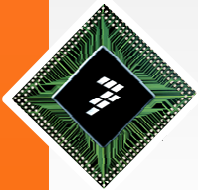
- *P&E DEBUG APPLICATION*

- Provides a debug interface and virtual serial port. Controls the JTAG or SWD interface of the target.
- Provides USB communications device class (CDC) interface between target and USB host.

- *MSD FLASH PROGRAMMER*

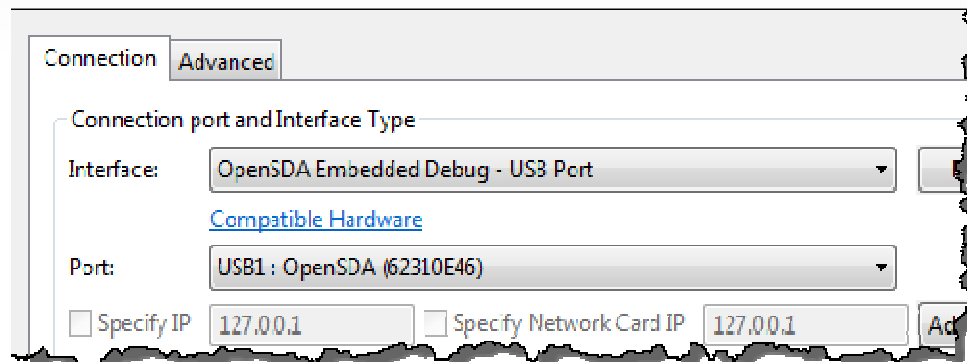
- Offers a way to program applications into the flash of the target processor.
- Enumerates as mass-storage device and appears as removable drive in the host.
- Also includes the CDC interface.



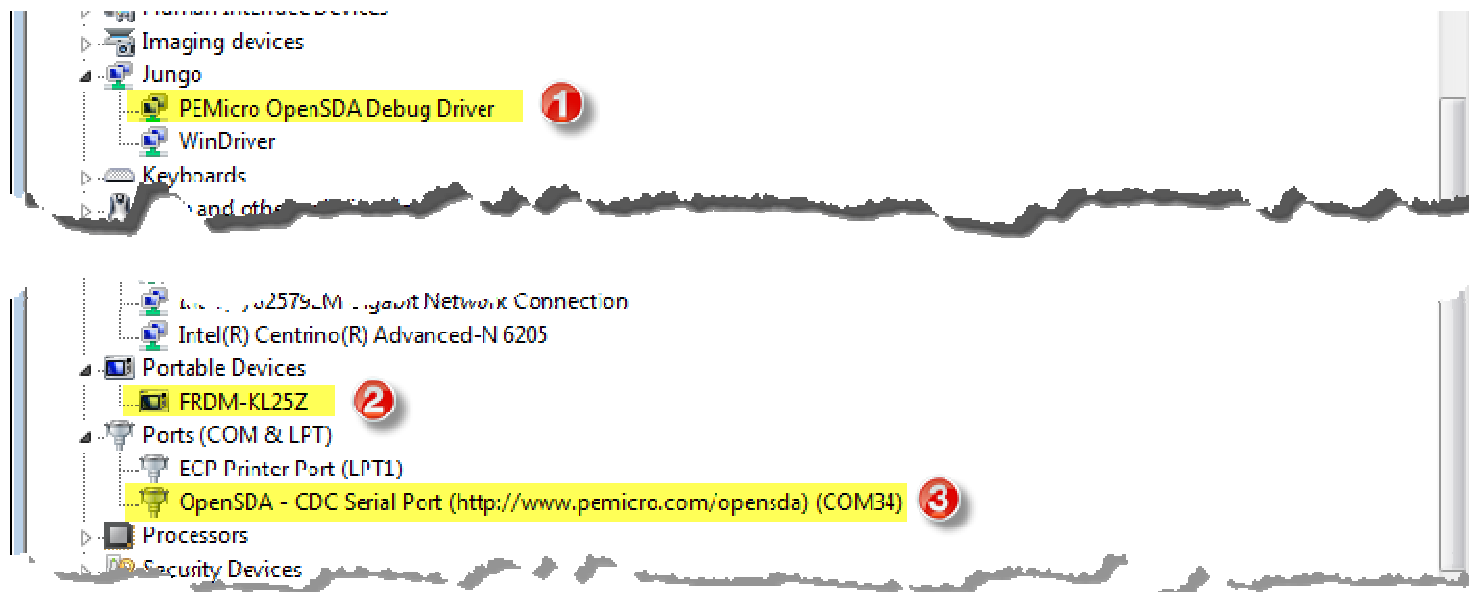
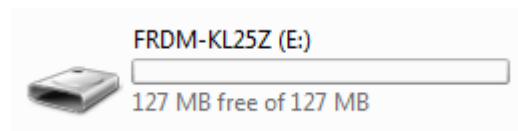


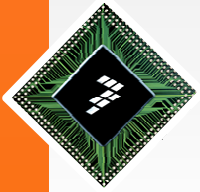
## OpenSDA Application:

- *P&E DEBUG + MSD FLASH PROGRAMMER*



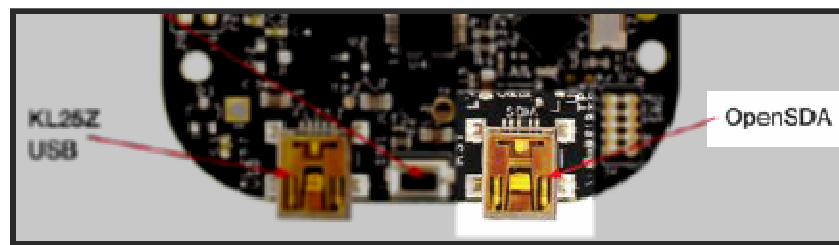
\*.SREC



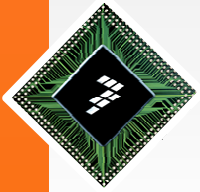


## Updating OpenSDA application

- 1- Unplug USB cable (if attached)
- 2- Press and hold reset button
- 3- Plug a USB cable from a USB host to the OpenSDA mini USB port.
- 4- Release the RESET button.
- 5- A removable drive will appear in host with label “BOOTLOADER”.  
Drag and drop “MSD-DEBUG-FRDM-KL25\_Pemicro\_v114.SDA”<sup>\*</sup> to the bootloader volume.
- 6- Unplug USB cable and plug it in again. OpenSDA application should now be running.



**\*NOTE:** Latest .SDA applications are downloaded from [www.pemicro.com/opensda](http://www.pemicro.com/opensda)



## Loading a binary file

- 1- Unplug USB cable (if attached)
- 2- Plug in a USB cable from a USB host to the OpenSDA USB port.
- 3- A removable drive will appear in host with label “FRDM-KL25Z”. Drag and drop “pwm\_led.srec” to the FRDM-KL25Z volume. Loaded application starts running.

