Install Keil Microcontroller Development Kit Version 5 for Freescale FRDM-KL25Z

This tutorial is intended for the preparation to develop software with Freescale FRDM-KL25Z board using Keil Microcontroller Development Kit (MDK) version 5.11a.
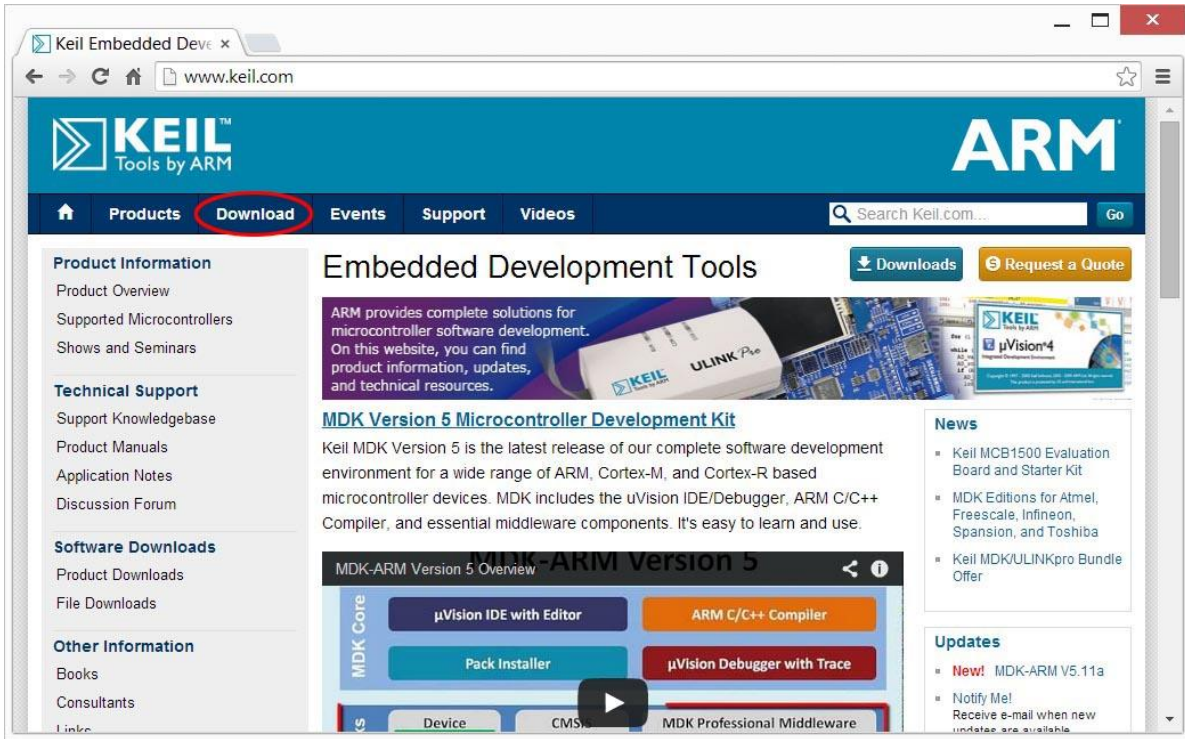
This document covers

- download/installation of Keil MDK v5.11a

- installation of Device Family Pack for Freescale Kinetis KL25Z family

- the PEMicro device driver update

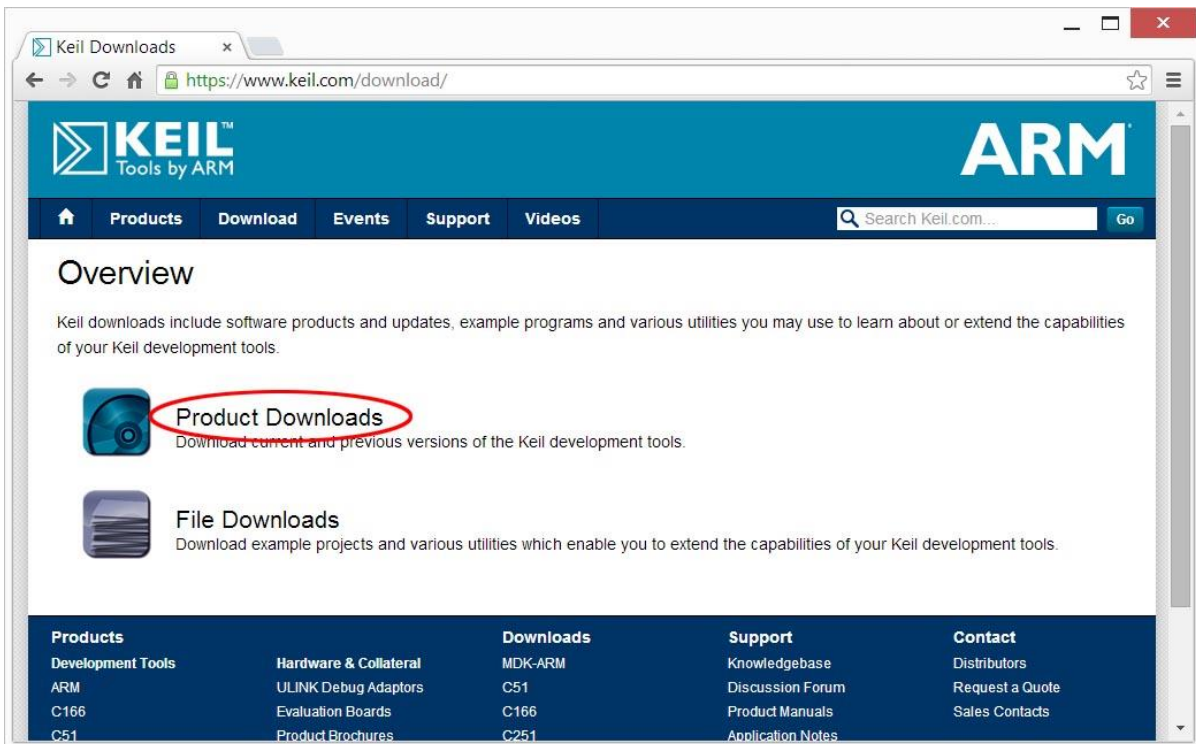- installation of bootloader and MSD-debugger firmware for FRDM-KL25Z board

Starting version 5 the device support software components are separated from the MDK software and called Device Family Packs. As release v5.11a, many ARM microcontroller Device Family Packs are available. Software development with Device Family Packs is slightly different from software development in MDK v4.
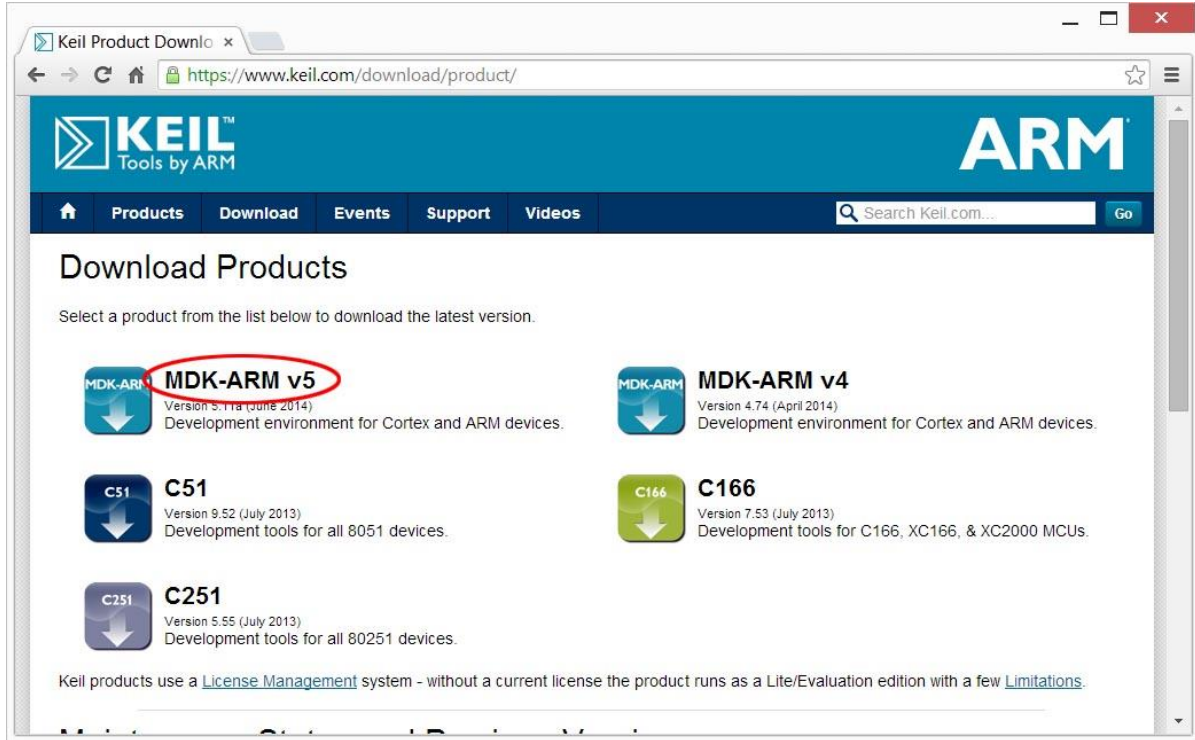
Download MDK v5

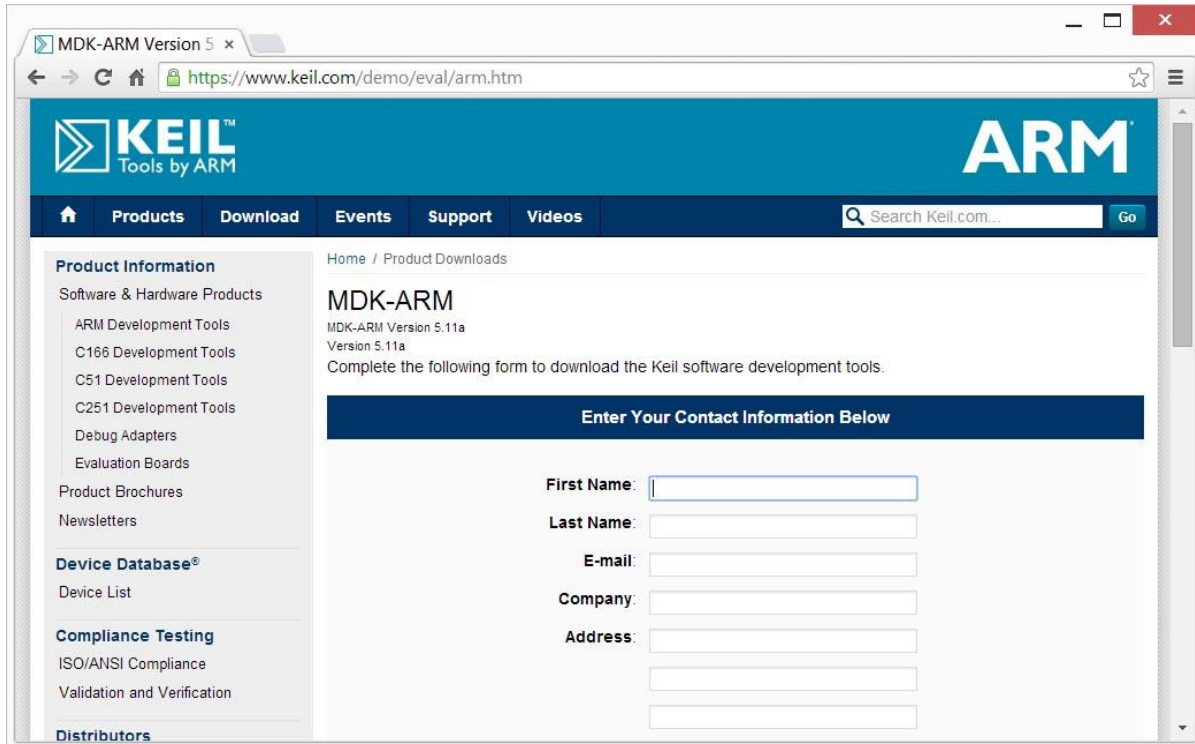1. Browse to www.keil.com. And click on Download.

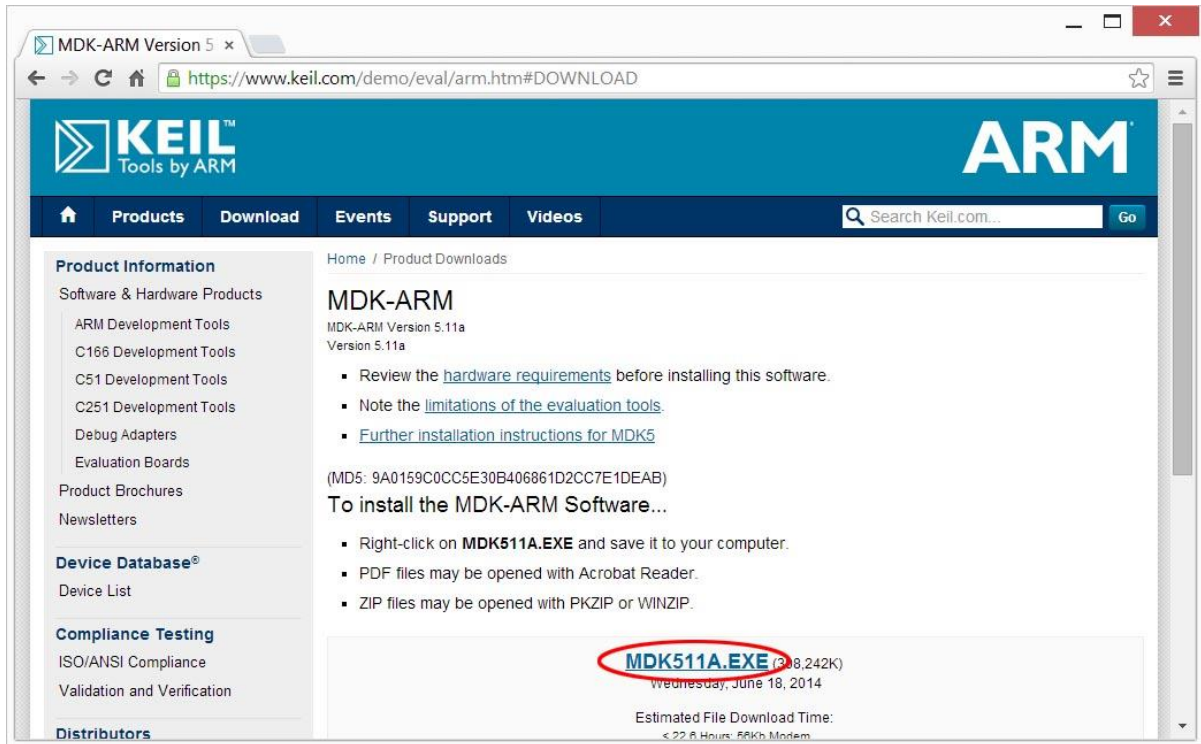2. In the next page, click on "Product Downloads."

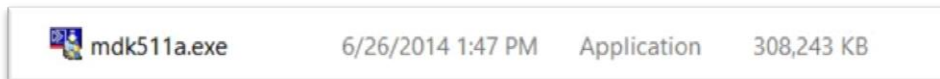3. In the next page, click on "MDK-ARM v5"

4. Fill up the form in the page and click "Submit."

5. In the next page, click "MDK511A.EXE" to download the development software kit. The file is over 300 MB and will take a while to download.
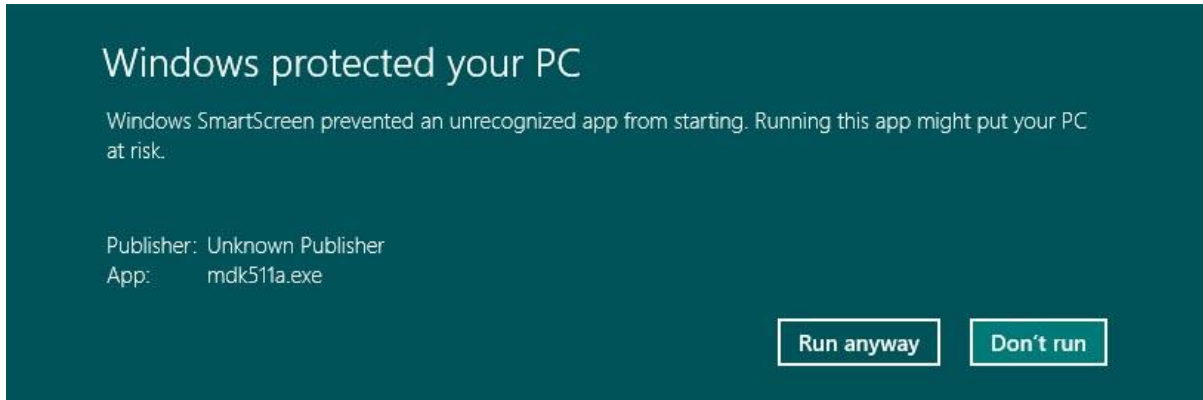

6. After downloads are complete, you should see the file in your download folder.
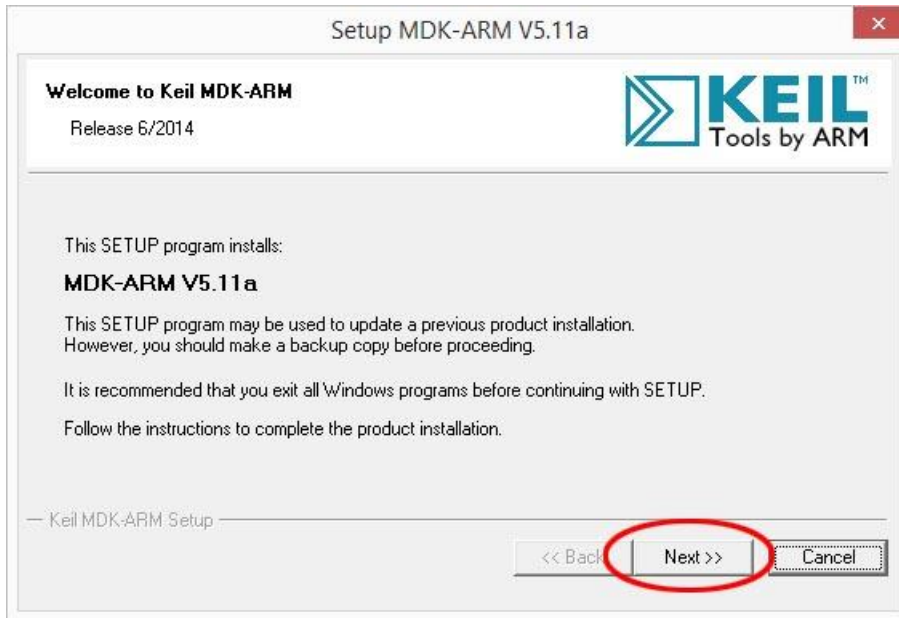
Installation of MDK v5

7. Double click on the icon of **mdk511a.exe** in the download folder. Windows may block the execution and display a warning screen. Click "Run anyway" button.
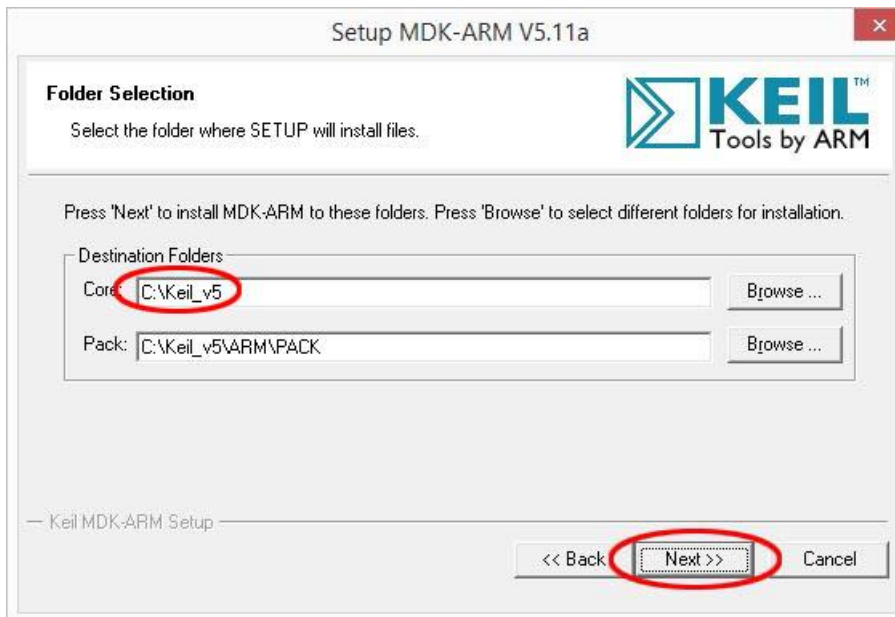

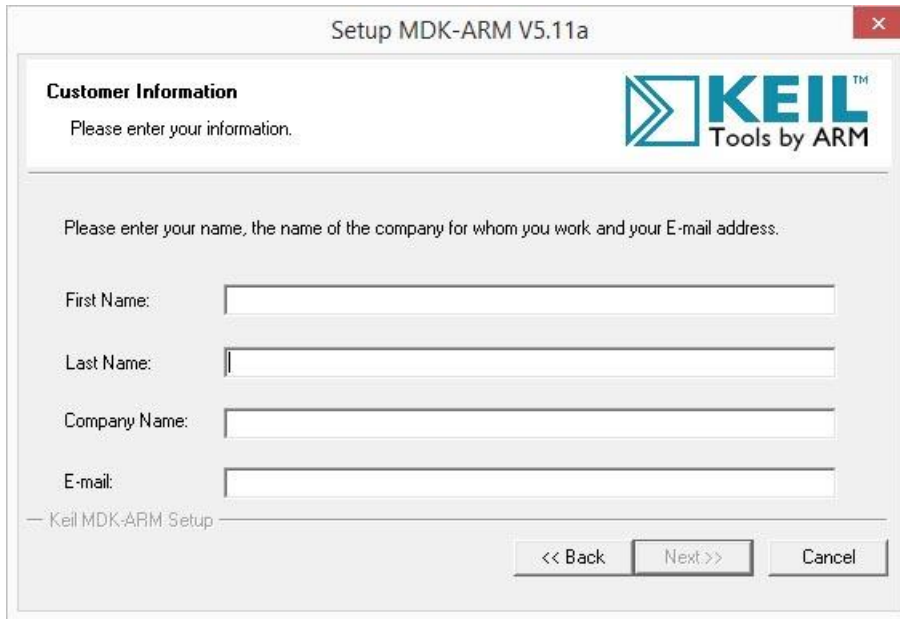8. When the Welcome dialog box pops up, click "Next" button.

9. In the next License Agreement dialog box, check "I agree …" and click "Next" button.
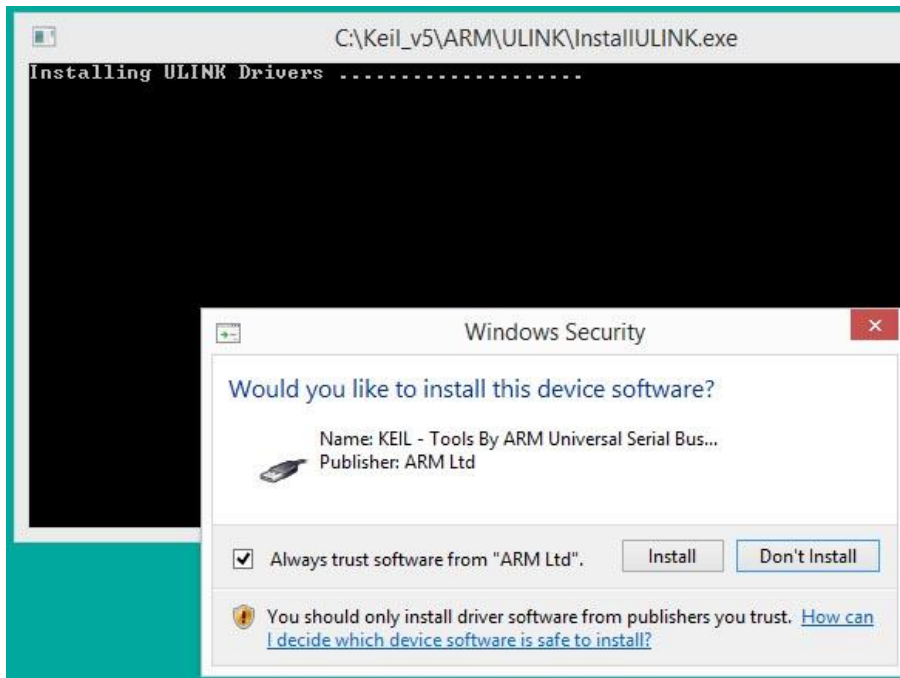

10. In the next Folder Selection dialog box, accept the defaults and click "Next" button.
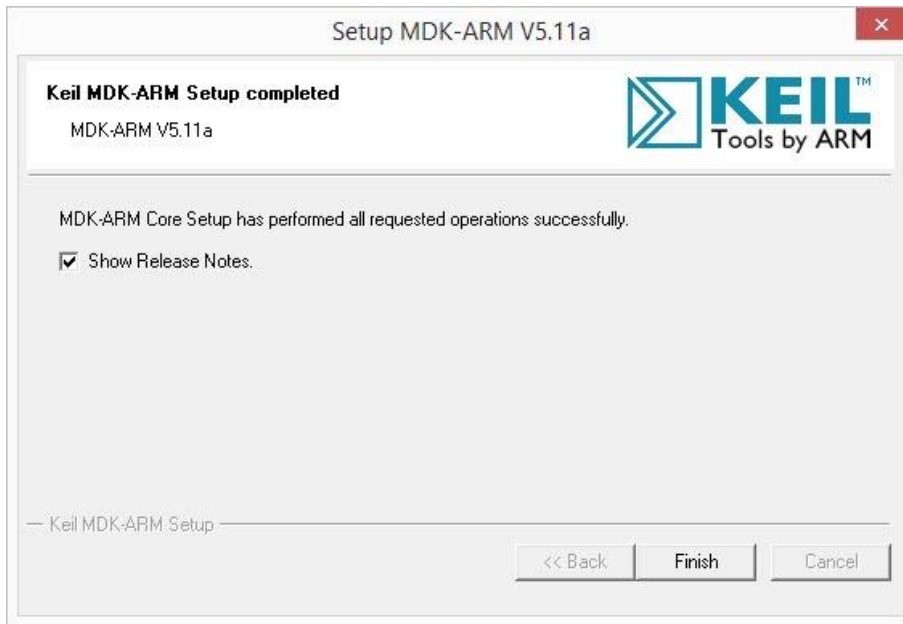
11. In the next Customer Information dialog box, fill the information and click "Next" button. The installation of MDK and several software packs will start.

12. Before installing ULINK device drivers, Windows will halt it and asks for confirmation. If you do not use a ULINK debugging device you do not need it. On the other hand, you may install it for future use.
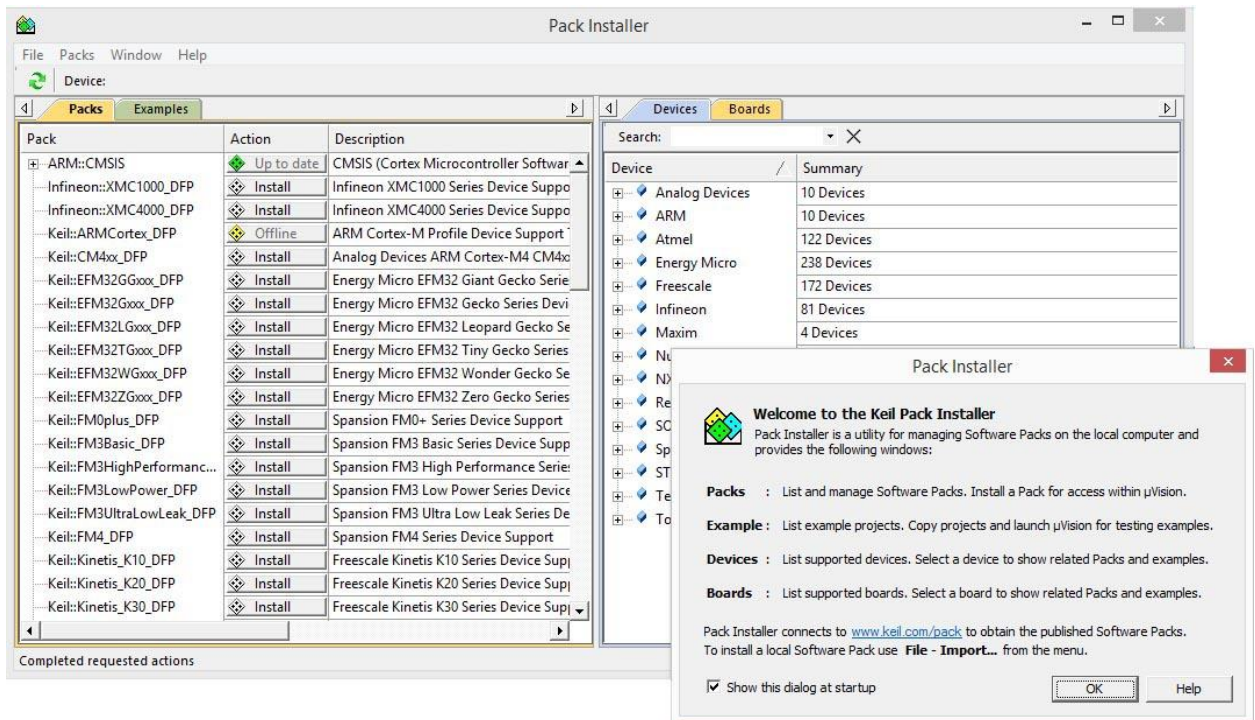
13. When the installation is complete, this dialog box will appear. Click "Finish" button.
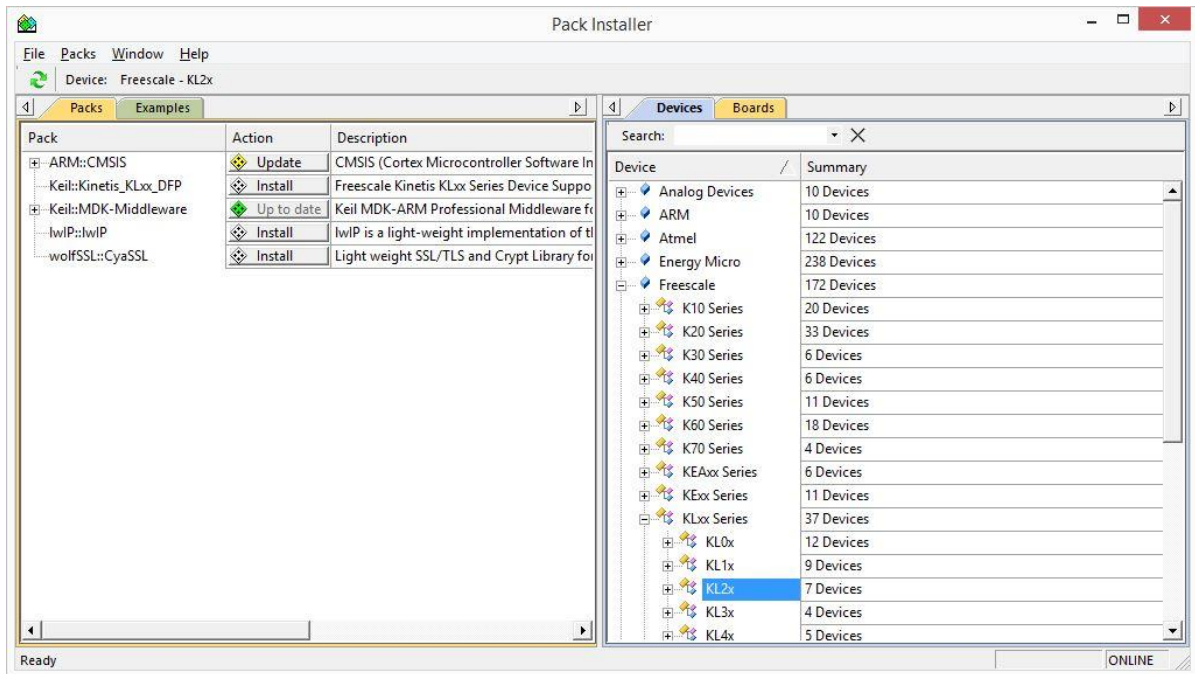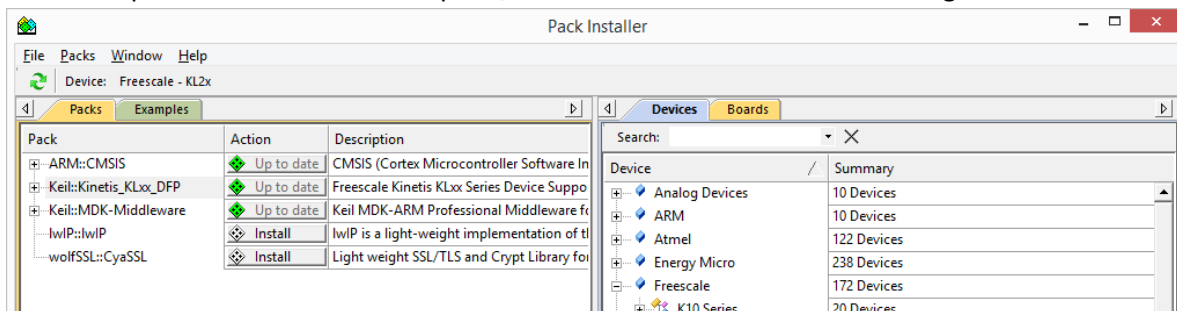

Installation of KL25Z Device Family Pack

14. After MDK v5 is installed, it will automatically prompt the user to install the Device Family Packs.

15. After reading the descriptions, click "OK" button in the smaller dialog box to close it. It will take few minutes to download and populate the most current packs information and verify whether there are any updates available.

16. To install a Device Family Pack, you need to select one of the devices or boards on the right panel of the Pack Installer. The required pack(s) to support your device/board selection will appear on the left panel. For example, if you plan to use Freescale FRDM-KL25Z board, drill down the Device list to Freescale->KLxx Series->KL2x. The required and optional packs appear on the left panel Packs tab.

17. A yellow diamond in Action column (such as ARM::CMSIS) indicates the pack is installed but an update is available. A green diamond (Keil::MDK::Middleware) indicates the pack is current. A grey diamond (Keil::kinetis_KLxx_DFP) shows that the device pack is available for download. The light-weight IP and light-weight SSL are optional. Click on the Update button for CMSIS and Install button for KLxx_DFP to download and install these packs. The packs are downloaded from Keil website and built locally. It takes several minutes depending on the computer and Internet speed. When the pack installations are complete, the diamond in the button will turn green.
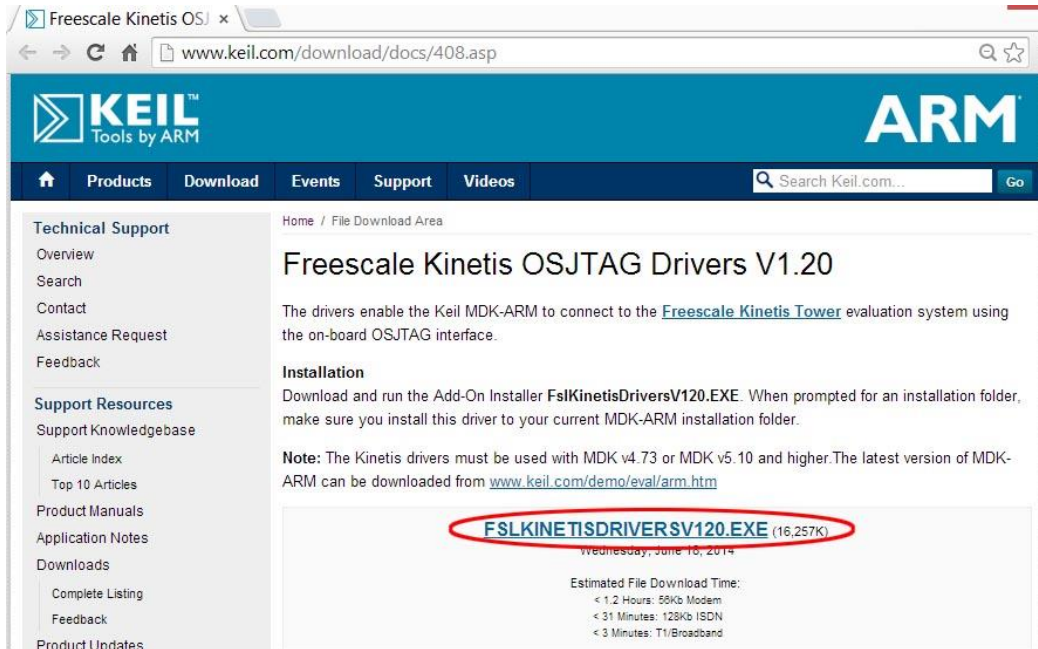

18. Now you have the Device Support Pack installed, you are ready to start a new software project.

Install PEMicro Kinetis Driver Update

For MDK v5.10 or higher, it is necessary to install the driver updates for PEMicro OpenSDA on the FRDM board. The driver updates are available at http://www.keil.com/download/docs/408.asp as Freescale Kinetis OSJTAG Drivers V1.20.

19. Open the webpage with the URL above and click on "FSLKINETISDRIVERSV120.EXE".
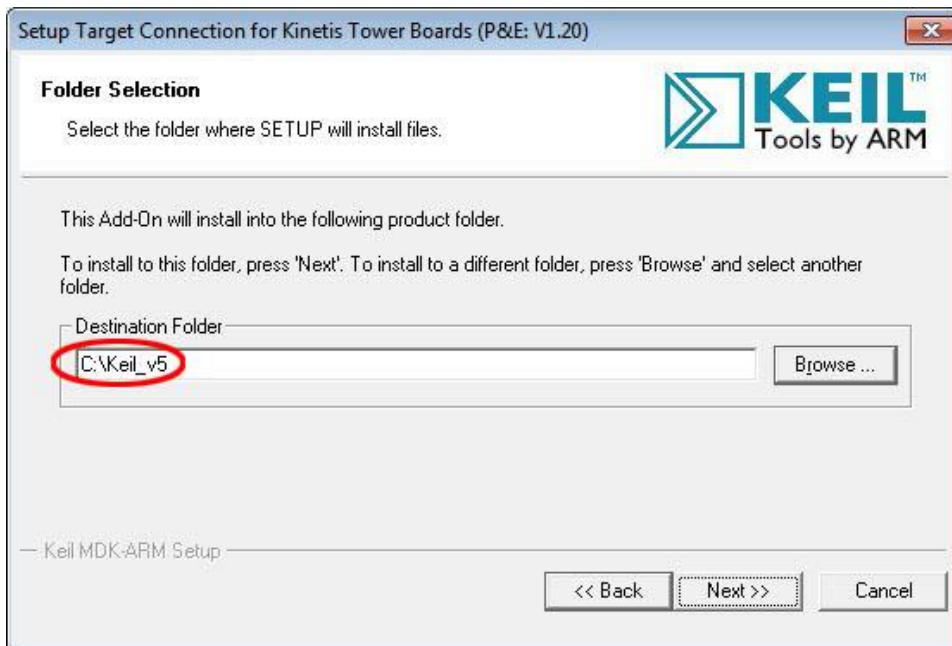

20. Double click the icon of the file downloaded and the Welcome dialog box will open.

21. Check the license agreement and click Next button.

22. In the next dialog box, choose the same destination folder as you did in step 10.

23. Fill the Customer Information and click Next button. The "Target Connection for Kinetis Tower Boards" will be installed.

24. After the Target Connection for Kinetis Tower Boards installation is complete, click Finish button to proceed with the installation of the P&E OSJTAG driver.
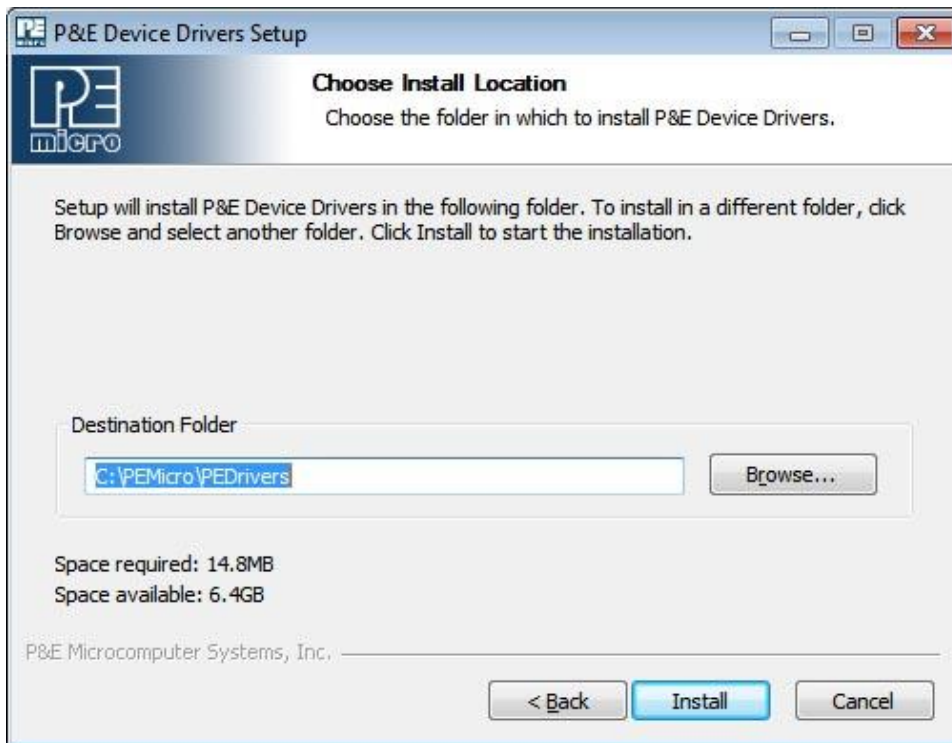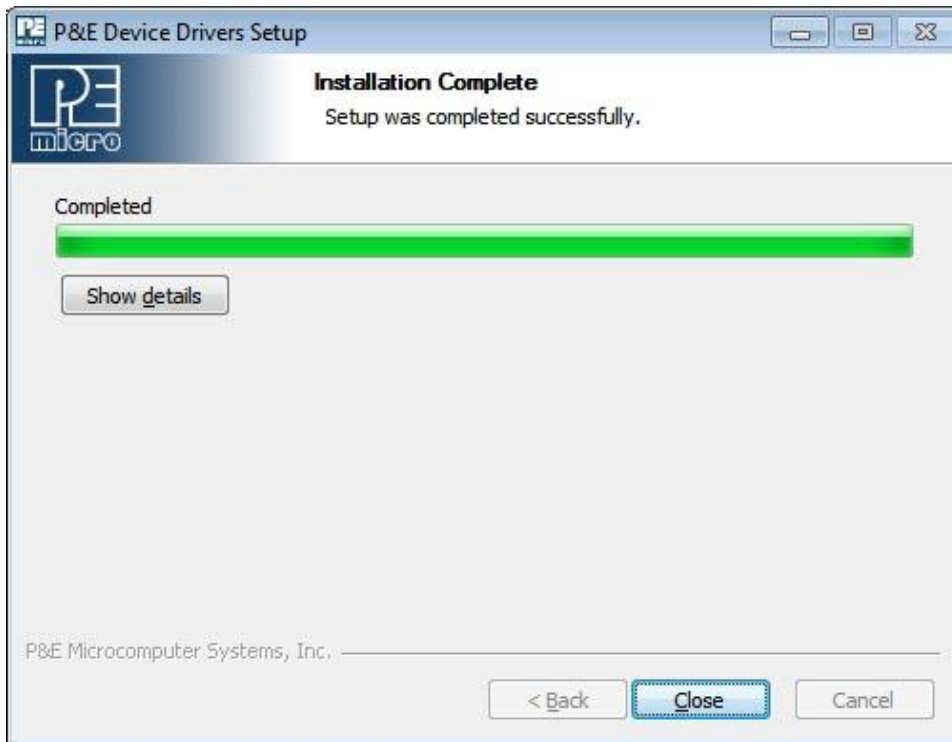
25. Click "I Agree" button to proceed.

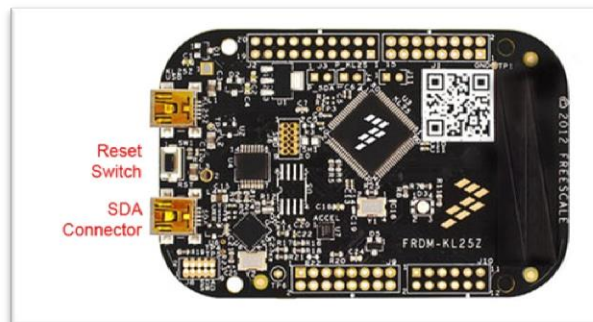26. Accept the default Destination Folder and click Install button.

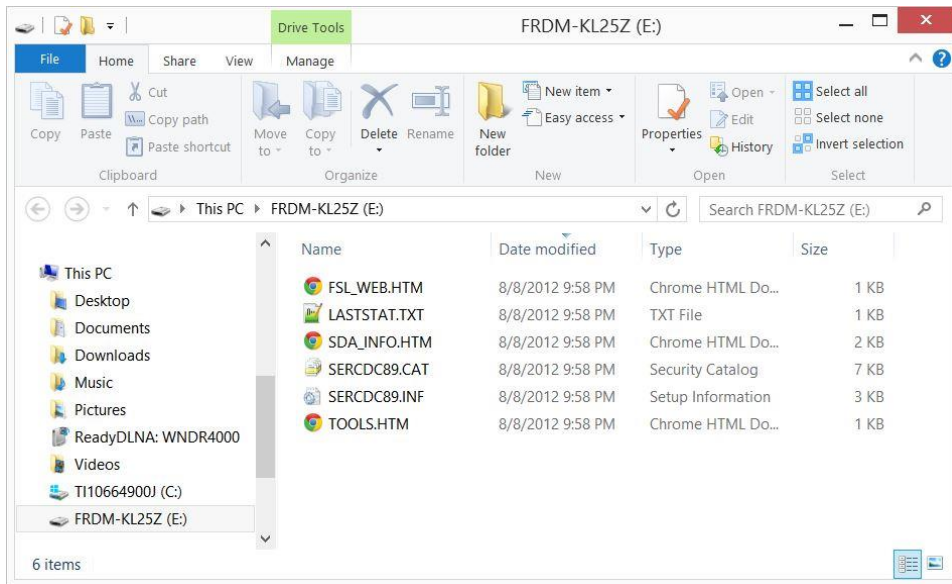27. When installation is complete, click Close button.

Install Bootloader and OpenSDA Firmware

The FRDM-KL25Z board should be preloaded with the firmware of MSD (mass storage device), bootloader, and OpenSDA (Open-standard Serial and Debug Adapter). You may skip this section unless the OpenSDA is not loaded or you need to upgrade the firmware for Windows 8.1.
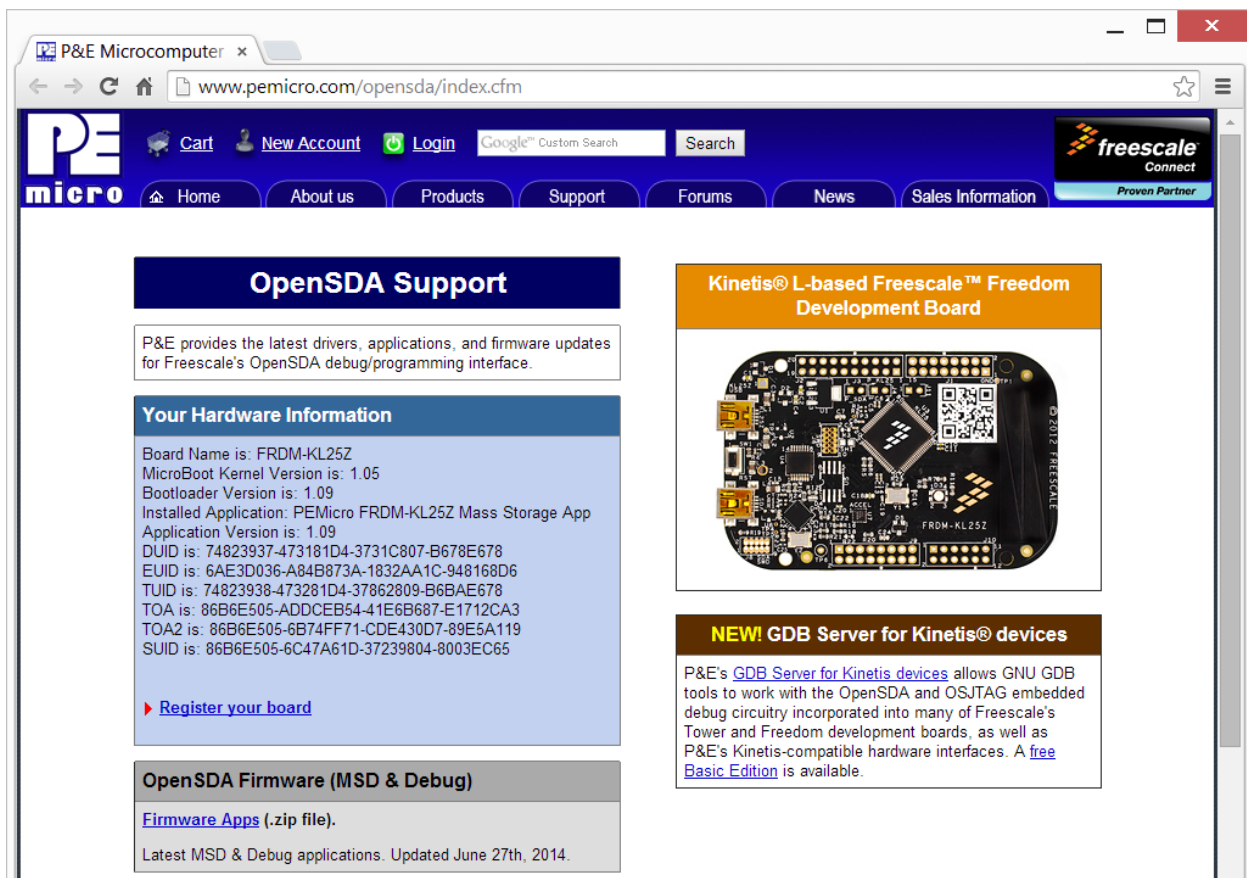
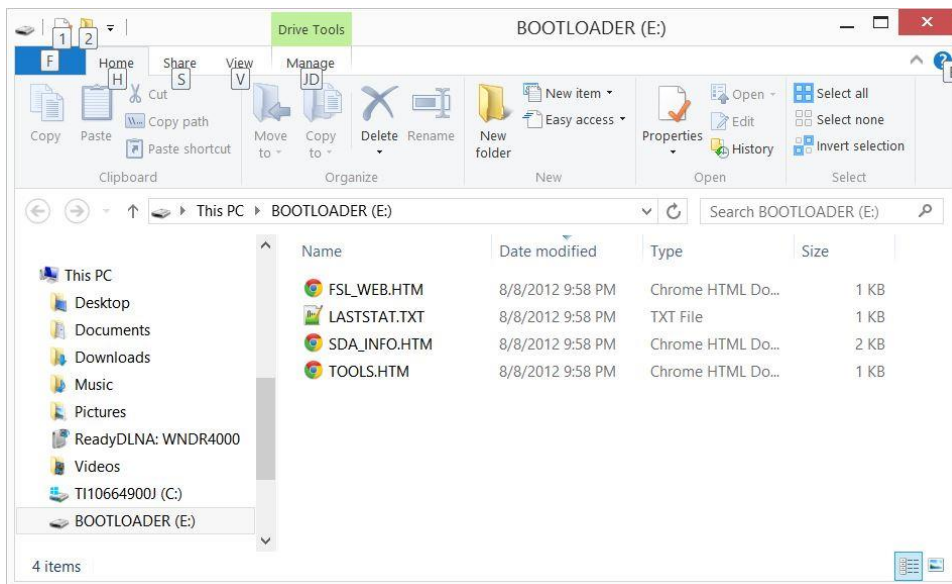Connect a USB cable from the SDA connector to the PC.

With the MSD firmware, the board should show up as a USB disk drive. If OpenSDA firmware is installed, the label of the drive will appear as "FRDM-KL25Z" as shown in the figure below. If OpenSDA firmware is not installed, the label of the drive will appear as "BOOTLOADER".
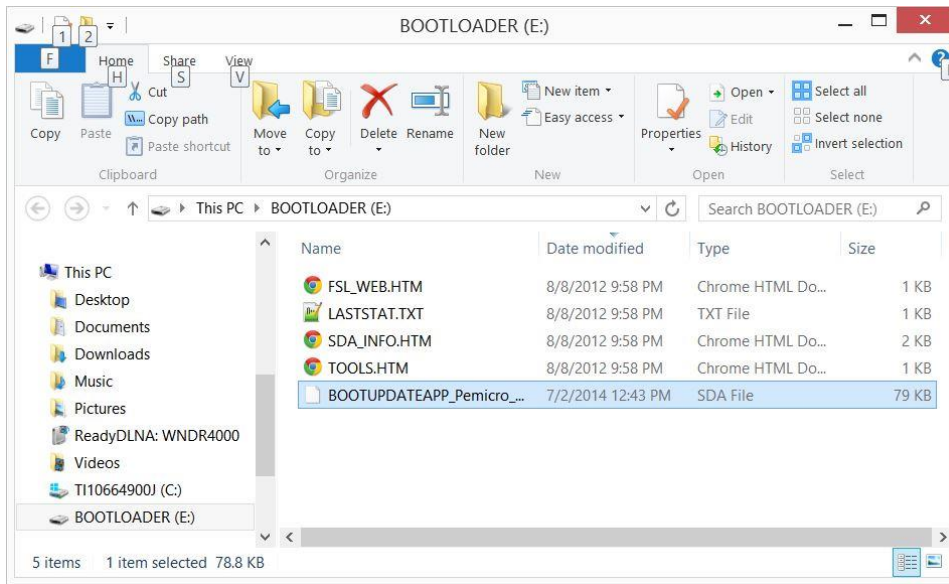
In either case, with the PC connected to Internet, double click on the file SDA_INFO.HTM. It will connect to P&E Micro OpenSDA Support webpage. The webpage displays the current versions of the firmware on the board. You need bootloader version 1.11 or higher to work with Windows 8.1.
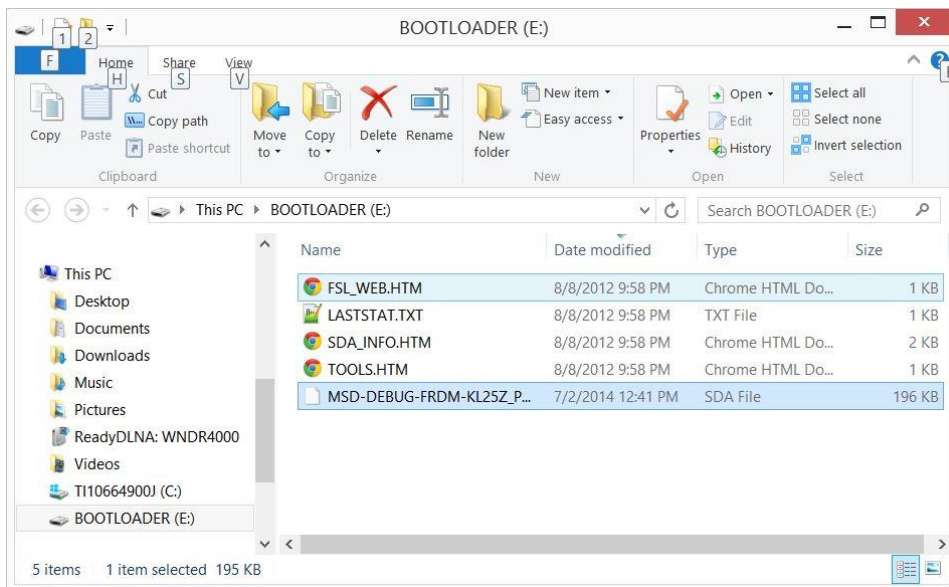
28. If your FRDM-KL25Z board already has the version of Bootloader and OpenSDA firmware for your PC, you may the rest of this section.

29. To do the upgrades for bootloader and OpenSDA firmware, click on Firmware Apps link under "OpenSDA Firmware (MSD & Debug)" to download the files.

30. The Bootloader version 1.09 does not work with Windows 8.1. In order to upgrade the Bootloader firmware, you need to use a Windows 8 or Windows 7 PC to perform the rest of the procedure in this section.

31. Unzip the downloaded file then extract "MSD-DEBUG-FRDM-KL25Z_Pemicro_v114.SDA" and "BOOTUPDATEAPP_Pemicro_v111.SDA". Depends on the updates, you may receive newer versions of the files. The latter is inside the "OpenSDA_Bootloader_Update_App_v111_2013_12_11.zip" file. Again, the version number and the date may be newer.

32. To upgrade the bootloader, unplug the USB cable from the board. Hold the Reset switch while plugging the USB cable back to the board. Wait until Windows recognizes the board and sounds the three tone chime, release the Reset switch. You should see a drive named "BOOTLOADER".
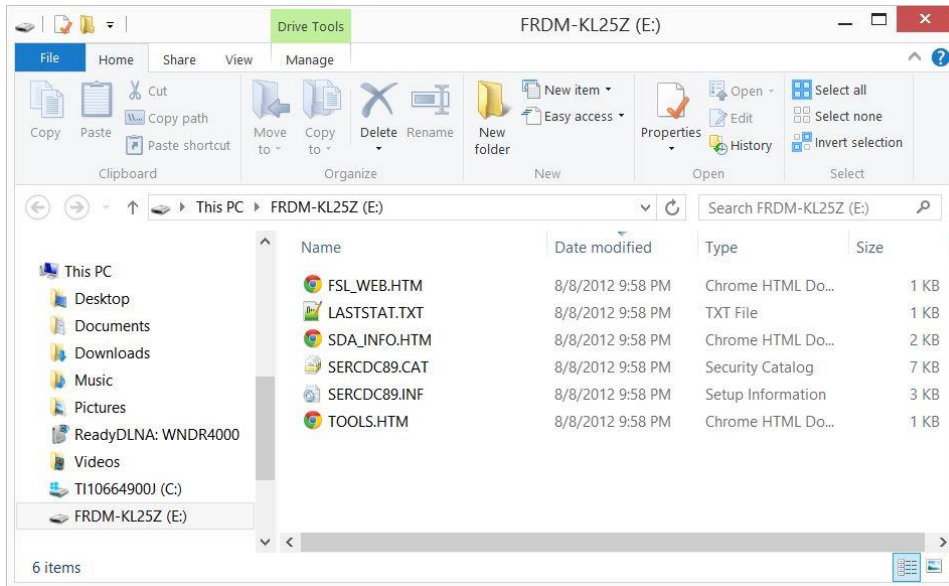
33. Drag and drop the file "BOOTUPDATEAPP_Pemicro_v111.SDA" into the BOOTLOADER drive.
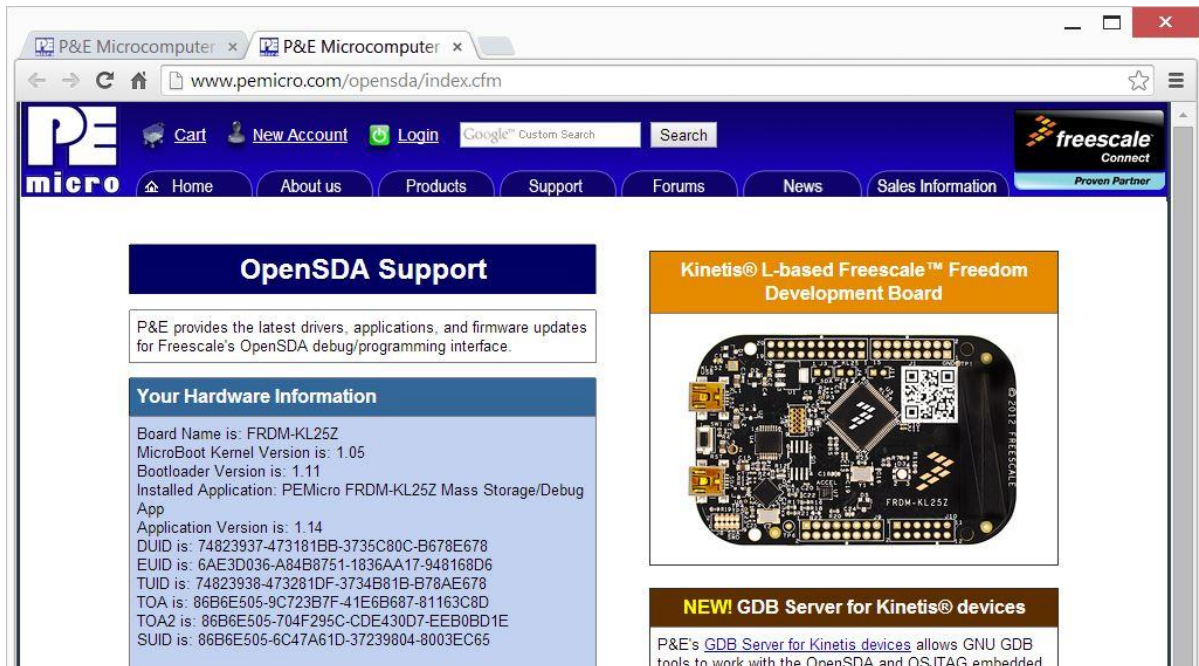

34. Unplug the USB cable from the FRDM board and plug the cable back without holding the Reset switch. Windows should recognize the board and open it as a disk drive again as BOOTLOADER. This time drag and drop the file "MSD-DEBUG-FRDM-KL25Z_Pemicro_v114.SDA" into the BOOTLOADER drive.

35. Unplug the USB cable from the FRDM board and plug the cable back without holding the Reset switch again. This time the board should appear as a drive with label "FRDM-KL25Z".

36. Double click the "SDA_INFO.HTM" file to open the OpenSDA Support webpage at P&E Micro. You should see both the Bootloader and the Application versions are updated.

37. You have completed the firmware upgrades.