FREEDOM-KL26Z Sample Code Guide for CodeWarrior

Board configuration, software, and development tools

Rev. 0

Contents

1   Purpose

This Sample Code Guide will familiarize you with Freedom-KL26Z board and development tools. You will learn the features of the Freedom-KL26Z board, the features of the OpenSDA standard, and how to access the source code examples using CodeWarrior 10.4(or later) and the integrated Processor Expert 10.0 (or later). In addition, instructions are provided to download a precompiled binary file to your board.

2   Getting to know the board

The Freedom board (FREEDOM-KL26Z) features the Kinetis MKL26Z128VLH4 microcontroller and comes with the following features (which are highlighted in the figure below):

- Tri-color LED
- 8 MHz crystal
- FXOS8700CQ Inertial Sensor
- OpenSDA connection
- Mini-B USB connector
- Touch Pad (Slider)
- SW1 Push Button
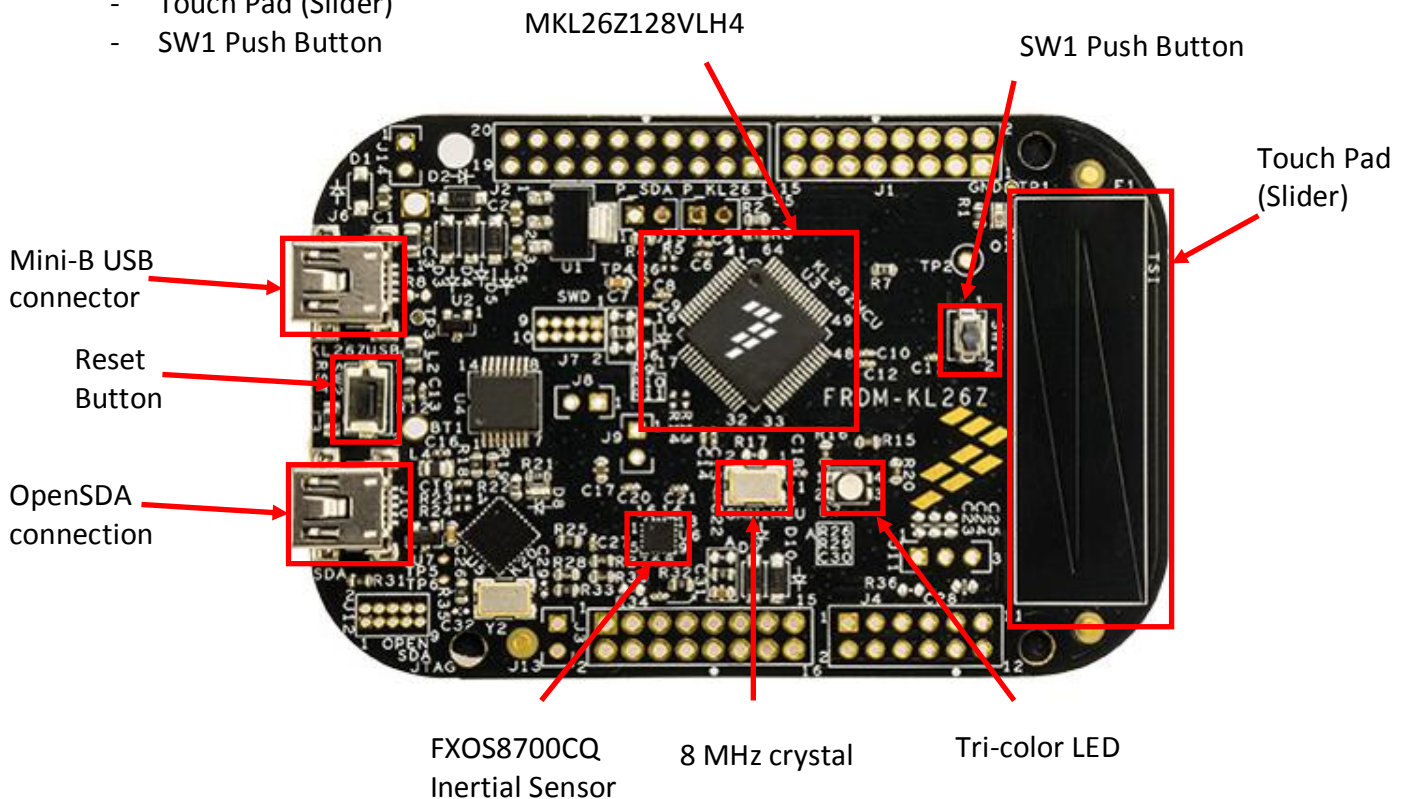
3   OpenSDA Overview

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 features a mass storage device bootloader that offers a quick and easy mechanism for loading applications such as flash programmers,

run-control debug interfaces, serial-to-USB converters, and more, onto your Freedom board. Currently, P&E Micro offers two different applications: an MSD application and a debug application.

3.1 MSD Application

This OpenSDA application was developed by P&E Micro and allows the Freedom board to instantiate as a mass storage device on your computer. Once this application properly enumerates, you may program the KL26Z128 on your Freedom board with a binary or srec file by simply "dragging and dropping" one of these files into Freedm-KL26 drive that is installed when your Freedom board enumerated. In addition, you will also have serial communication with the KL26Z128.

3.2 Debug Application

This OpenSDA application was also developed by P&E Micro and allows you to program and debug your KL26Z128 on your Freedom board just as any other debugger module would allow. With this application loaded onto your Freedom board, you will also have serial communication with the KL26Z128 available.

# 4   Download and Install Software and Tools

4.1 Downloading and Installing OpenSDA Drivers

Before you begin, you will need the latest OpenSDA serial drivers installed on your development computer and on your FREEDOM-KL26Z. The latest OpenSDA drivers should already be installed on either of these, and your system should be able to automatically find the latest Windows CDC drivers (as they should be pre-installed on the Freedom board). If they are not, please navigate to www.pemicro.com/opensda/index.cfm and follow the directions on this page to download the correct OpenSDA files. You may also refer to the OpenSDA user's guide which can be found in your Quick Start Package.

4.2 Downloading and Installing CodeWarrior 10.4(or later)

To download CodeWarrior 10.4 (or later), follow these instructions:
1. Open an internet browser and navigate to the CodeWarrior Downloads webpage by typing http://www.freescale.com/codewarrior/downloads into your web browser's address bar.
2. Next, navigate to the Downloads page.
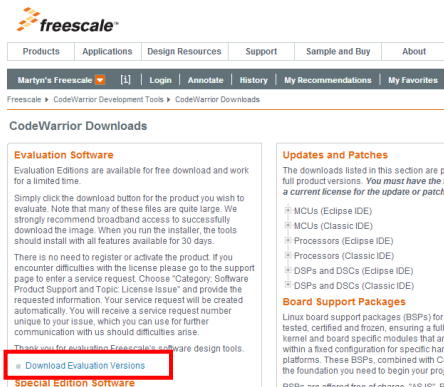
3. Under Software Development Tools, select CodeWarrior for Microcontrollers 10.4 (or later) (you may select either the offline or online version).

4. Follow Freescale's downloading and licensing instructions to download your CodeWarrior software.
5. To install software tools, follow the installer package instructions.
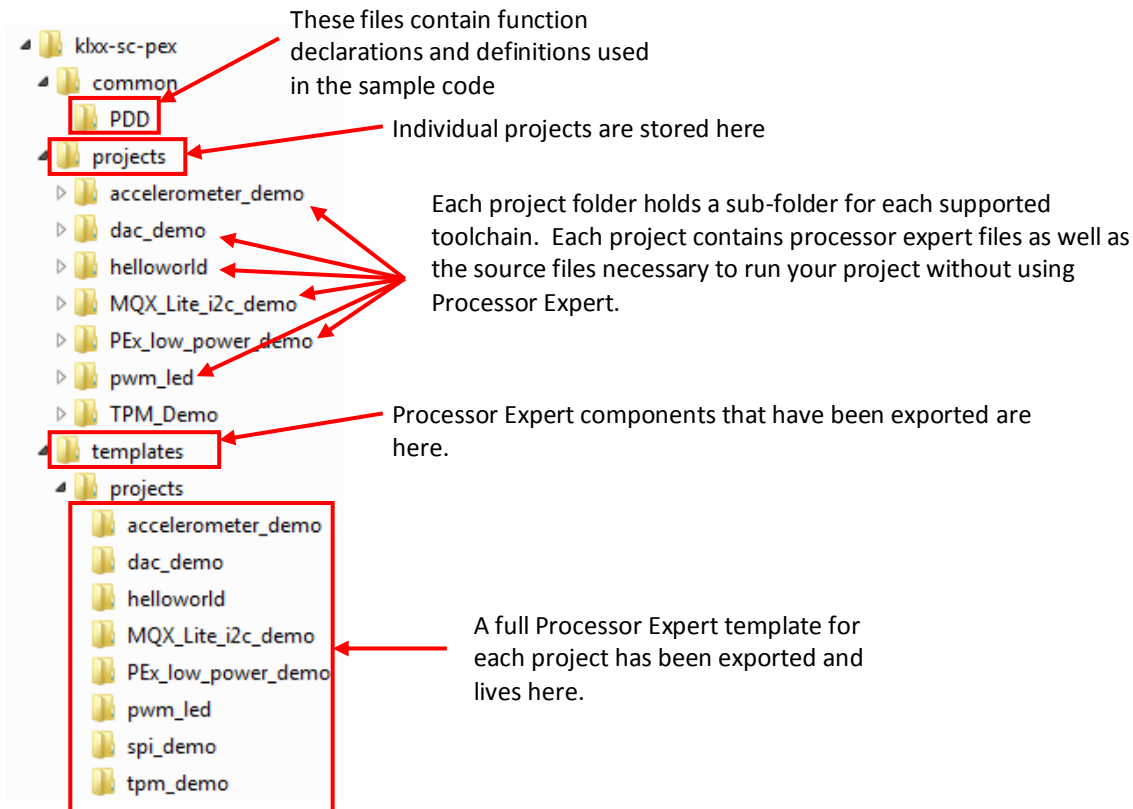
5 Freescale Sample Code

The Freescale sample code base contains two sample code folders: one for a Processor Expert based sample code, and one for a bare project implementation. Freescale recommends using Processor Expert for its scalability and ease of use features. The bare project implementations are provided for those who have applications where Processor Expert does not fit their application or who are not interested in Processor Expert.
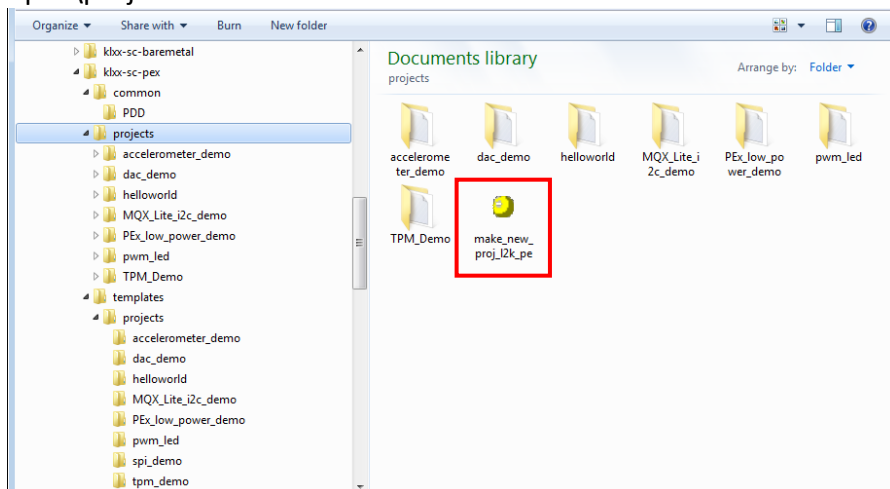
5.1 PEx Sample code (klxx-sc-pex)

5.1.1 PEx Sample Code Folder Structure

The file tree for your klxx-sc-pex example code is shown below and explanations are provided to the right.

These files contain function declarations and definitions used in the sample code

Individual projects are stored here

Each project folder holds a sub-folder for each supported toolchain. Each project contains processor expert files as well as the source files necessary to run your project without using Processor Expert.

Processor Expert components that have been exported are here.

A full Processor Expert template for each project has been exported and lives here.

5.1.2 Using the Freescale PEx Sample Code to Jumpstart your Design

The Kinetis L Family sample code is provides as a jump start for your design, as well as providing you with code examples. To facilitate this, we have provided a script that will copy our helloworld project and rename it to your desired project name. This script is a single executable that resides in the klxx-sc-pex\projects folder.
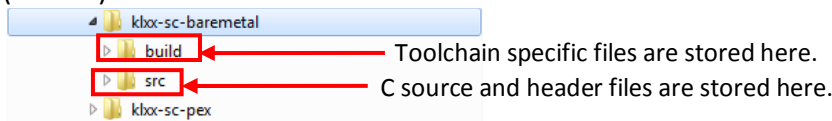

Simply double-click this icon and a command prompt pop-up window will prompt you for a project name, copy the helloworld project and rename all of the necessary files for your new project to work correctly.
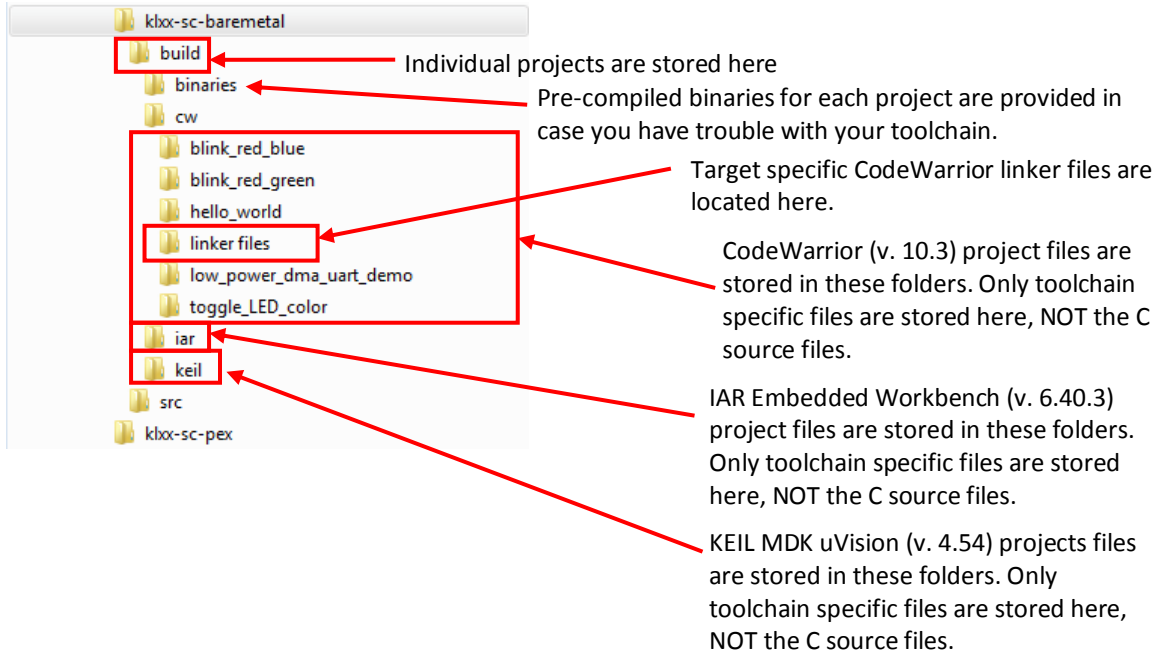
5.2 Baremetal Sample Code (klxx-sc-baremetal)

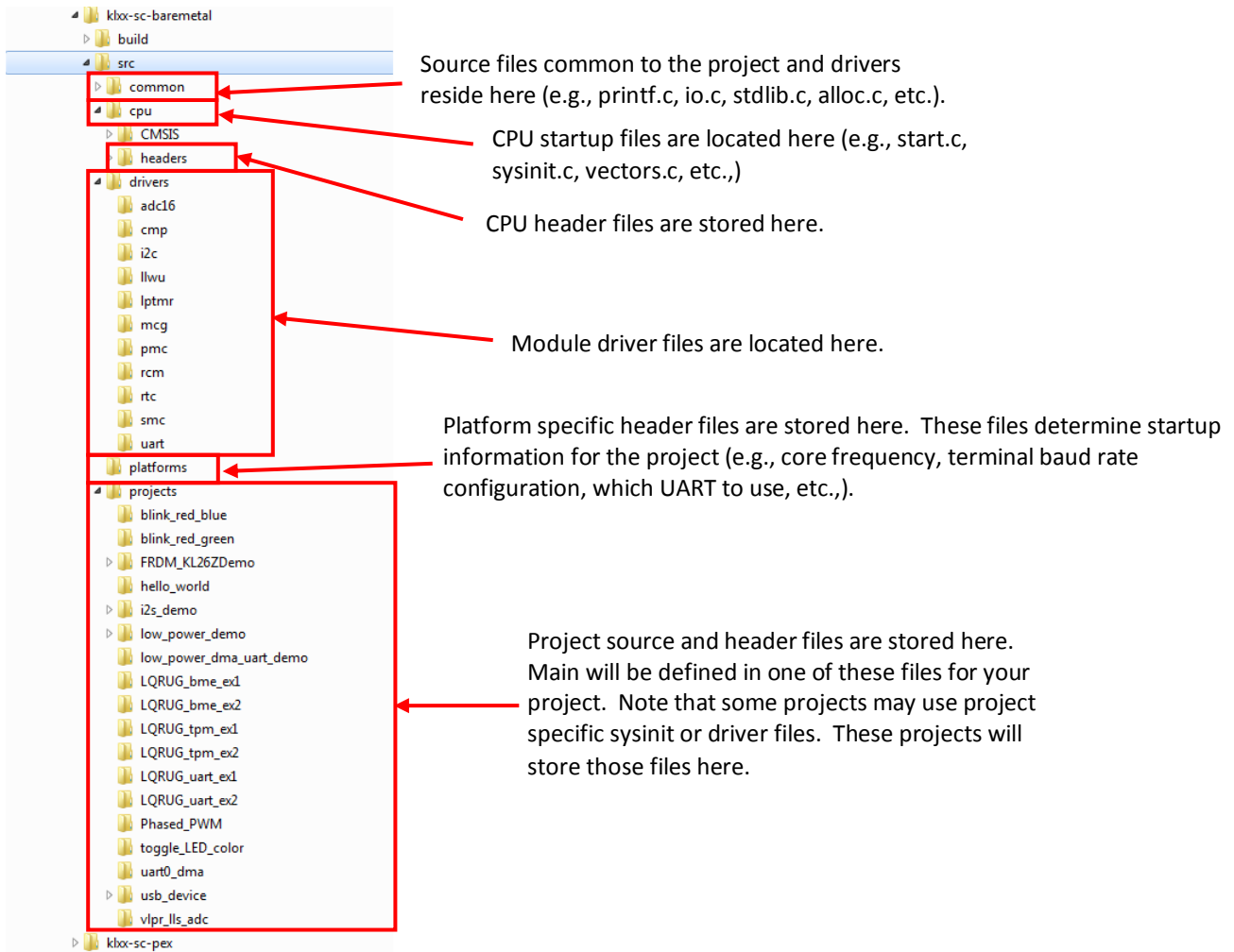### 5.2.1 Baremetal Sample Code Folder Structure

The Baremetal sample code folder contains two folders at the top level: a build folder and an src (source) folder.

First, the build folder will be discussed.

The source folder structure is as follows:

Source files common to the project and drivers reside here (e.g., printf.c, io.c, stdlib.c, alloc.c, etc.).

CPU startup files are located here (e.g., start.c, sysinit.c, vectors.c, etc.,)

CPU header files are stored here.

Module driver files are located here.

Platform specific header files are stored here. These files determine startup information for the project (e.g., core frequency, terminal baud rate configuration, which UART to use, etc.,).

Project source and header files are stored here. Main will be defined in one of these files for your project. Note that some projects may use project specific sysinit or driver files. These projects will store those files here.

5.2.2 Using the Freescale Baremetal Sample Code to Jumpstart your Design

The Kinetis L Family sample code is provides as a jump start for your design, as well as providing you with code examples. To facilitate this, we have provided a script that will copy our platinum project and rename it to your desired project name. This script is a single executable that resides in the klxx-sc-baremetal\build\cw folder.
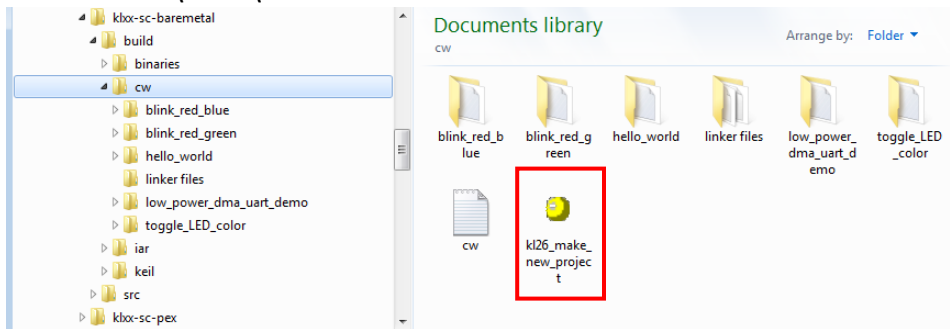
Simply double-click this icon and a command prompt pop-up window will prompt you for a project name, copy the platinum project and rename all of the necessary files for your new project to work correctly.

6   Configure Hardware

1) Using a Mini-B to A USB cable, connect your Freedom-KL26Z board to your development computer. Be sure to plug the Mini-B connection into the OpenSDA port of the Freedom-KL26Z board.
2) No special hardware configuration is necessary to run the demo applications in the code examples unless otherwise specified by the "readme.txt" file located in the project folder.

7   Terminal Program Configuration

The OpenSDA serial port is designed to enumerate just as any other USB to serial converter. Therefore, you will need to open a serial terminal utility (Tera Term, Hyperterm, etc.,) and configure your terminal as follows:

- 19,200 baud (or 115,200 baud for select projects)
- 8 data bits
- 1 stop bit
- no parity
- no flow control.

8   Loading and Running the Demos into CodeWarrior 10.4

The following instructions describe how to build and flash the helloworld demo using CodeWarrior 10.4. This document is targeted for users who choose to use the OpenSDA programming and debugging capabilities and it is assumed that you have loaded the P&E Micro Debug application onto your Freedom-KL26Z. If you need assistance in loading this application onto your Freedom-KL26Z, please refer to the OpenSDA user's guide provided in your Quick Start Package.

1) Open CodeWarrior 10.4 (Start->All Programs->Freescale CodeWarrior->CW for MCU v10.4->CodeWarrior).
2) Import the workspace at **..\klxx-sc-pex\projects\helloworld\cw.**
   a. Open up the import wizard by selecting File->Import…
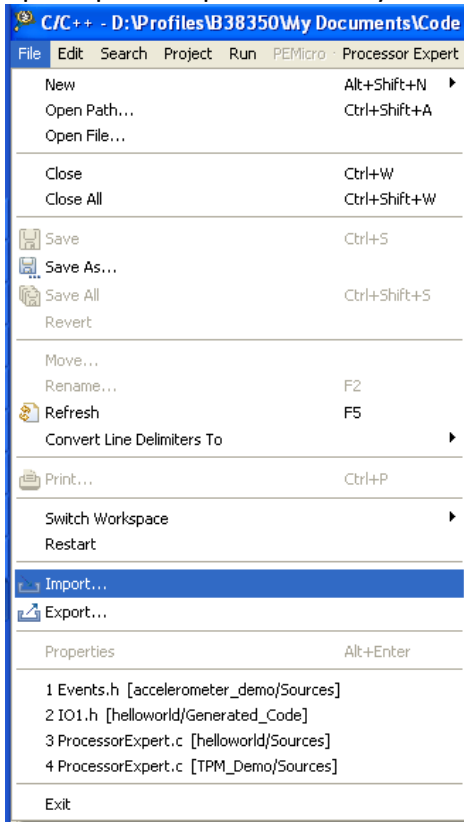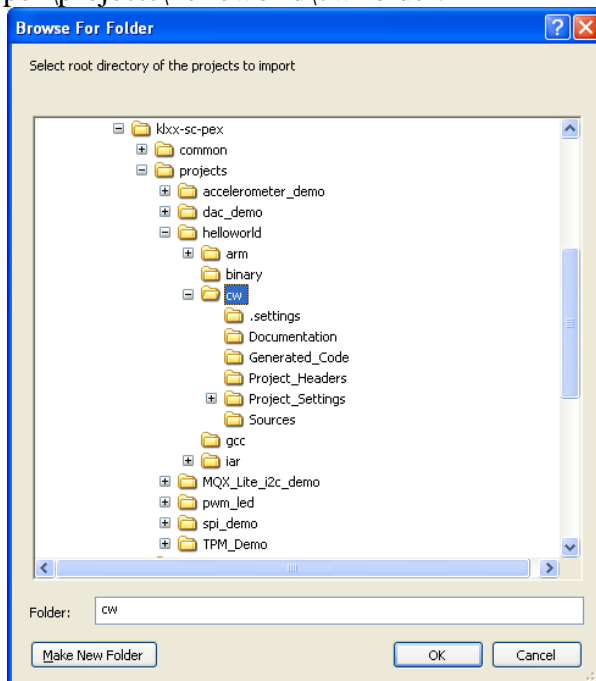

   b. In the Import dialog box, choose General->Existing Projects into Workspace and click Next >.
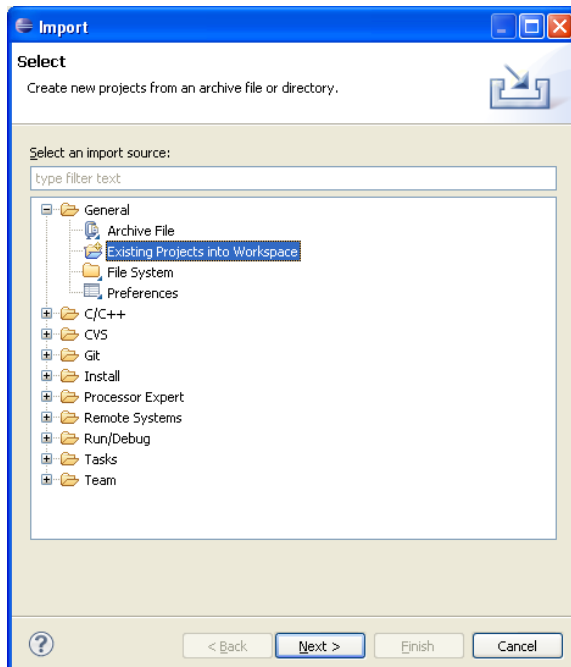
c. At the next screen, choose the "Select root directory:" option, ensure that the "Copy projects into workspace" option is not selected and then click "Browse…".
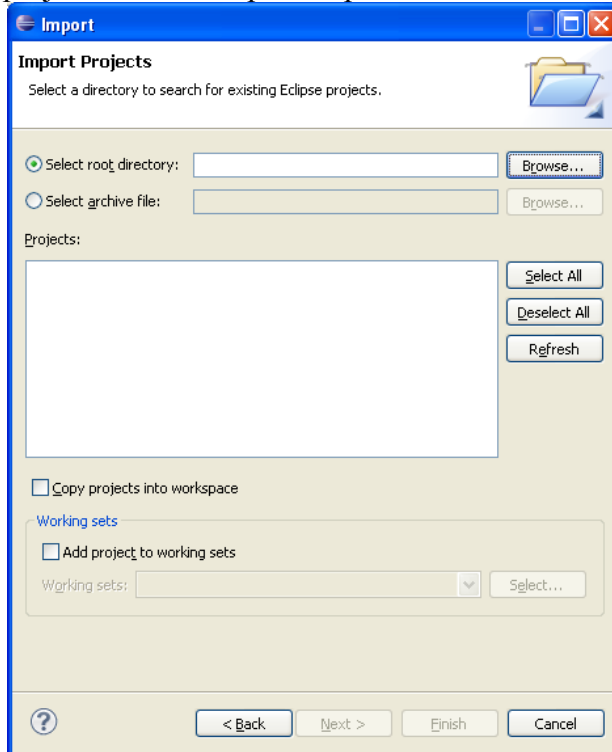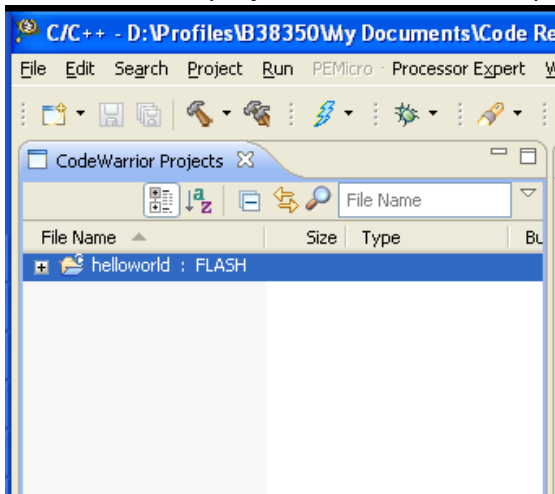

d. In the "Browse For Folder" dialog box, point CodeWarrior to the klxx-sc-pex\projects\helloworld\cw folder.

e. CodeWarrior will find the helloworld Project and automatically select it in the projects box. You may now click "Finish" to import the project into your workspace.
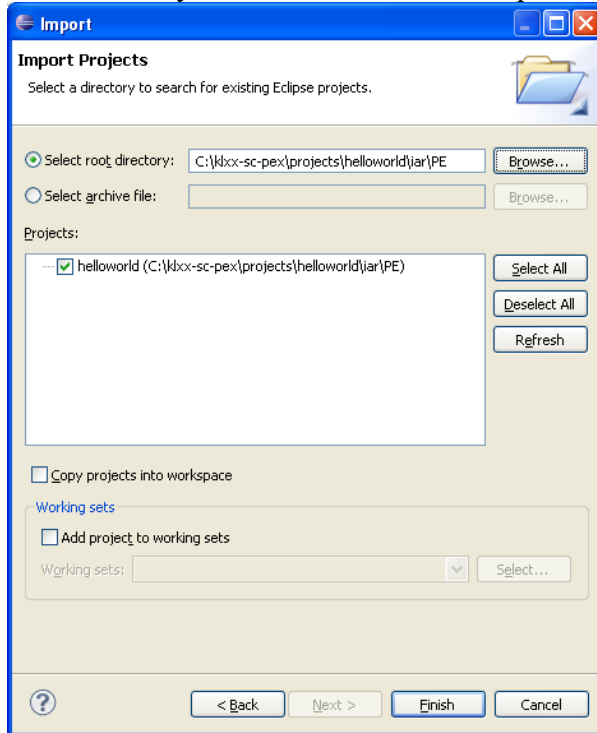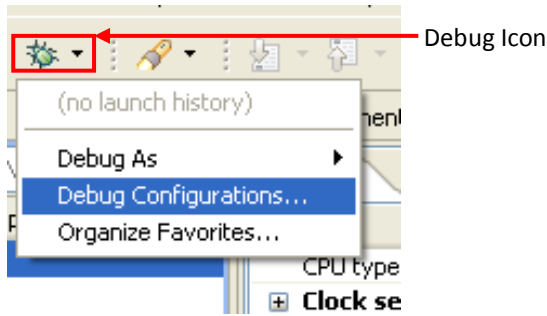

3) Ensure that the project is selected in the projects tab.

4) Compile the project by clicking the Build icon (or right click on the project and select "Make").

5) After compilation completes, launch the OpenSDA debugger configuration by following these instructions:

a. Left click on the down arrow next to the debug icon and select "Debug Configurations".

Debug Icon

b. In the pop-up dialog box, select "helloworld_FLASH_OpenSDA" from the CodeWarrior Download group from the left side of the dialog box.
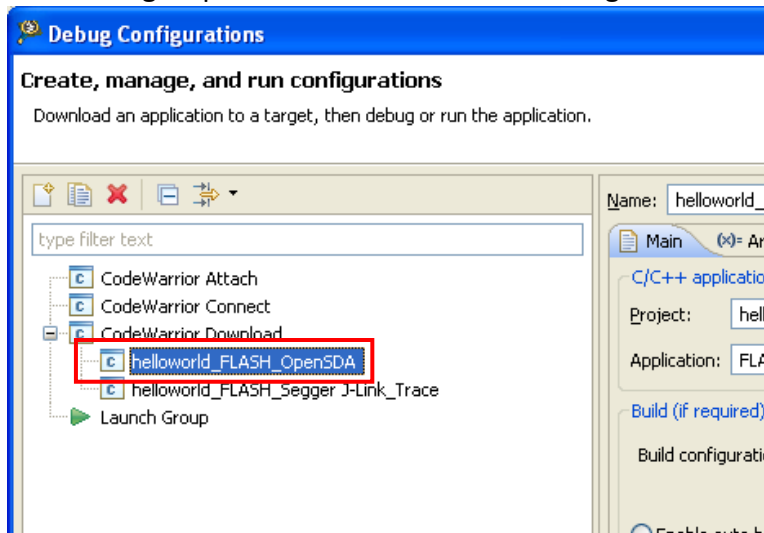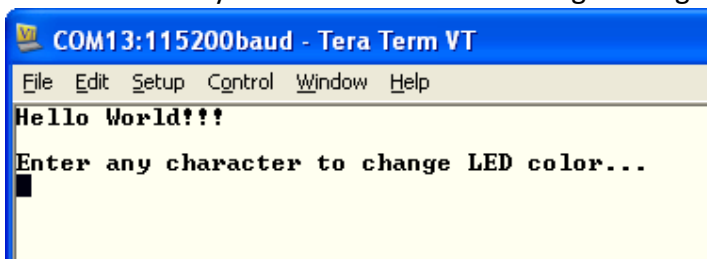
c. Click the "Debug" button.

6) CodeWarrior will automatically change the perspective to the Debug perspective and pause at the first instruction. Hit the "Resume" button to start running.

7) On the terminal you should see the following message:

8) Entering characters will cycle through the possible LED colors as well as echo the characters to the terminal.

9   Flashing the Pre-compiled Binary onto your Board

Your FREEDOM-KL26Z board should come with the OpenSDA MSD application preprogrammed onto the K20 device. If this is the case, you should see the Freedom board enumérate as a USB mass storage device and the following icon should be present in your "My Computer" window as shown.
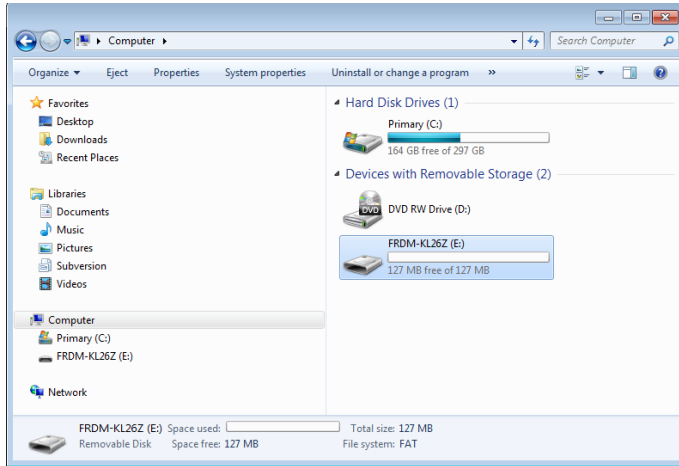
If the FRDM-KL26Z icon is not available, please refer to the OpenSDA User's Guide to program the MSD application onto your Freedom board. Otherwise, follow these steps to load a pre-compiled binary onto your KL26Z128:

1. Navigate to the FRDM-KL26Z folder in your file system (C:\FRDM-KL26Z, or you may double click the FRDM-KL26Z icon in the screen displayed above).

2. You should see the following files:
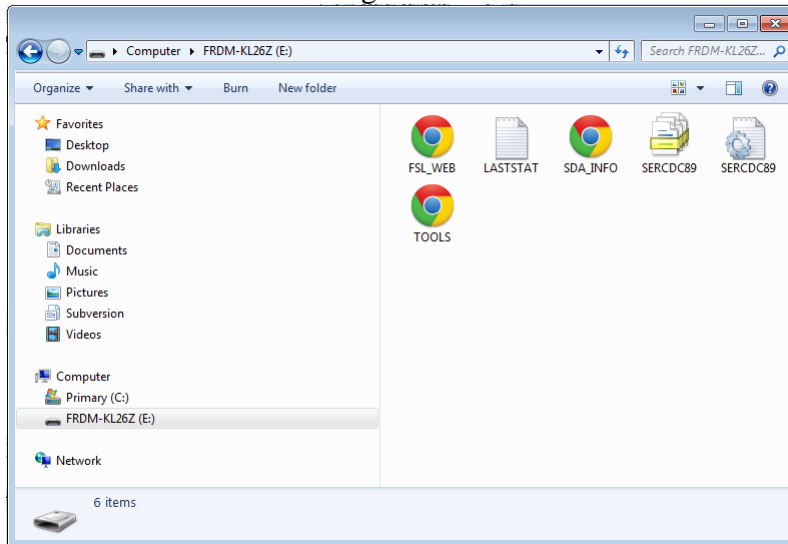
   If you do not, reprogram your board with the MSD application. Otherwise, open a second explorer window and navigate to the location where your pre-compiled binary application is stored (<root>\klxx-sc-pex\projects\helloworld\binary).

3. Simply "drag and drop" the hello_world.srec file into the FreedmKL26Z drive and the KL26Z128 will be automatically programmed with the pre-compiled binary.