

FREEDOM-KL25Z Sample Code Guide for CodeWarrior

Board configuration, software, and development tools

Rev. 0

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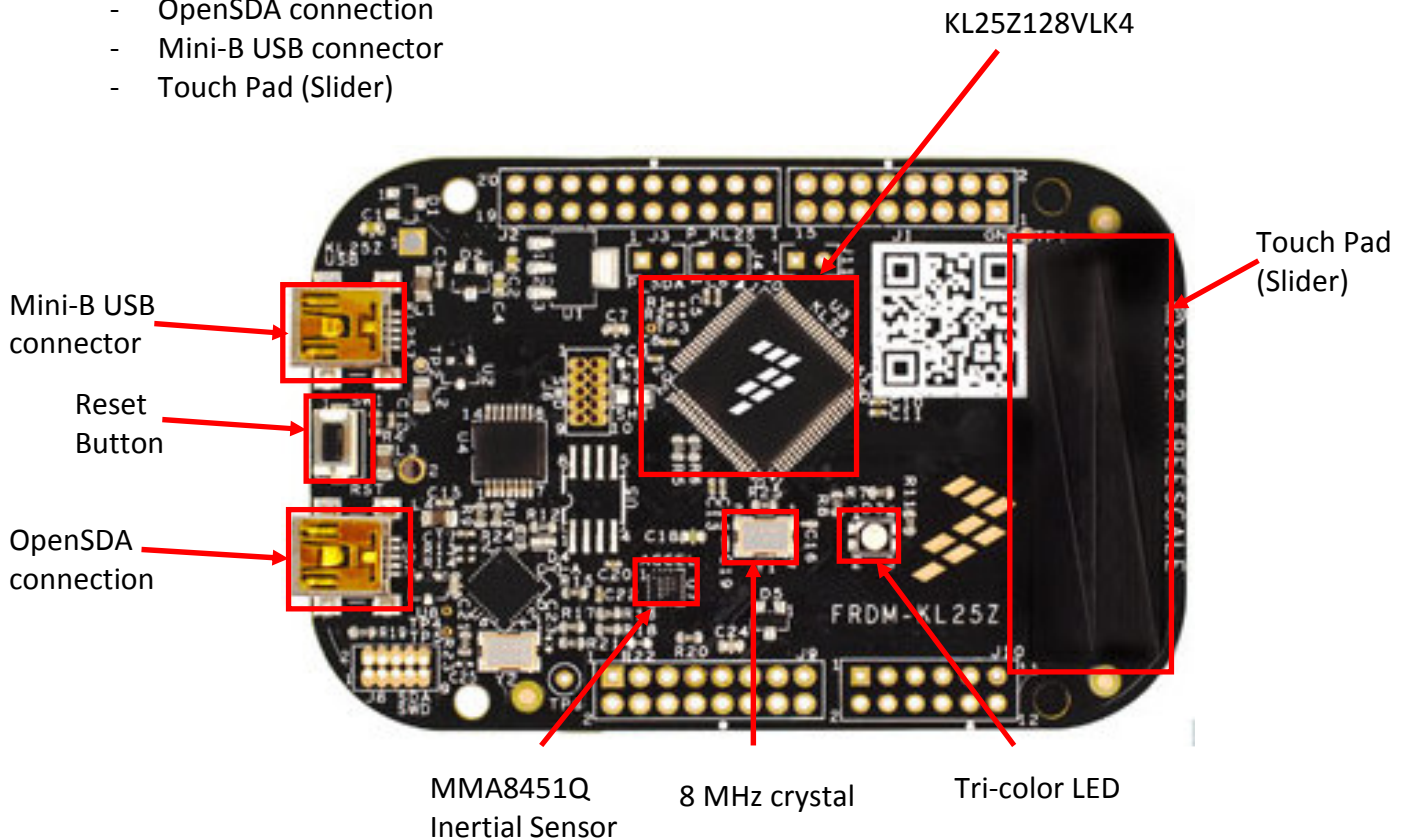
1 Purpose

This Sample Code Guide will familiarize you with Freedom-KL25Z board and development tools. You will learn the features of the Freedom-KL25Z board, the features of the OpenSDA standard, and how to access the source code examples using CodeWarrior 10.3 (Beta 2) and the integrated Processor Expert 10.0. In addition, instructions are provided to download a precompiled binary file to your board.

2 Getting to know the board

The Freedom board (FREEDOM-KL25Z) features the Kinetis KL25Z128VLK4 microcontroller and comes with the following features (which are highlighted in the figure below):

- Tri-color LED
- 8 MHz crystal
- MMA8451Q Inertial Sensor
- OpenSDA connection
- Mini-B USB connector
- Touch Pad (Slider)



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 KL25Z128 on your Freedom board with a binary or srec file by simply “dragging and dropping” one of these files into Freedom-KL25 drive that is installed when your Freedom board enumerated. In addition, you will also have serial communication with the KL25Z128.

3.2 Debug Application

This OpenSDA application was also developed by P&E Micro and allows you to program and debug your KL25Z128 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 KL25Z128 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-KL25Z. 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 10.3

To download CodeWarrior 10.3 (or later), follow these instructions:

1. Open an internet browser and navigate to the FRDM-KL25Z webpage by typing www.freescale.com/codewarrior into your web browser’s address bar.

- Next, expand the CodeWarrior Development Studio for Microcontrollers field and select the RS08/HCS08, ColdFire V1, Qorivva 56xx, PX Series, 56800/E DSC, Kinetis (Eclipse IDE) link.



- On the following web page, scroll to the Current Updates and Releases section and click on the CW-MCU-10-3-BETA link.

Featured Documentation

CODEWARRIORGS_IC: Codewarrior Information Center
 CW_MCU_10.2_RN: CodeWarrior Microcontrollers v10.2 Release Notes
 CWMCU10.2_BR: CodeWarrior Development Studio Version 10.2 - Brochures
 More ▼

Current Updates and Releases

CW-MCU-10-3-BETA: CodeWarrior for Microcontrollers 10.3 Beta
 CWX-MCU-PROED-EX: Evaluation: CodeWarrior for Microcontrollers 10.2 (Eclipse, Windows-hosted)
 CWX-MCU-LLPLT-EX: Evaluation: CodeWarrior for Microcontrollers 10.2 (Eclipse, Linux-hosted)
 More ▼

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

5 Freescale Sample Code

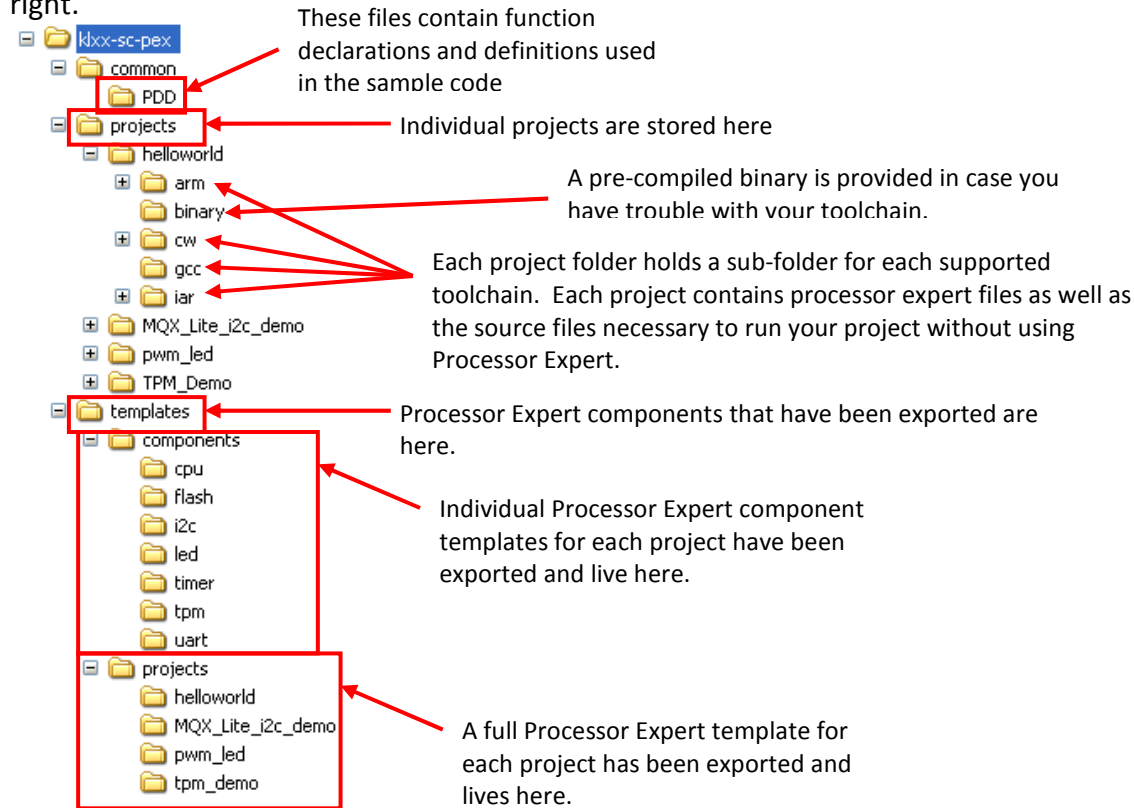
The Freescale sample code base contains two sample code folders: one for a Processor Expert based sample code, and one for a bare project implementation. Freescale recommends using Processor

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)

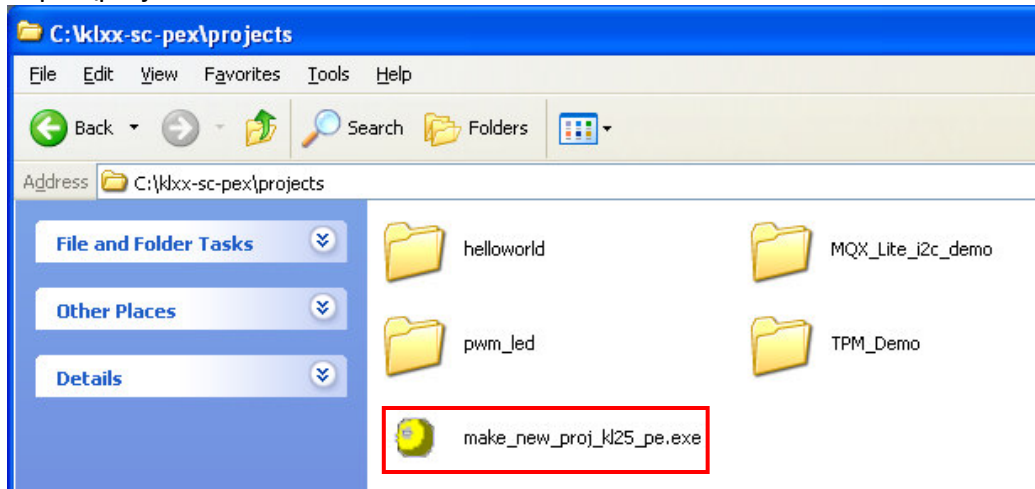
5.1.1 PEx Sample Code Folder Structure

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



5.1.2 Using the Freescale PEx Sample Code to Jumpstart your Design

The Kinetis L Family sample code is provided 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.

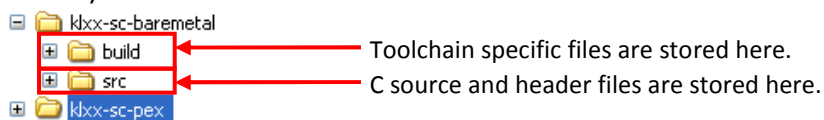


Simply double-click this icon and a command prompt pop-up window will prompt you for a project name, copy the helloworld project and rename all of the necessary files for your new project to work correctly.

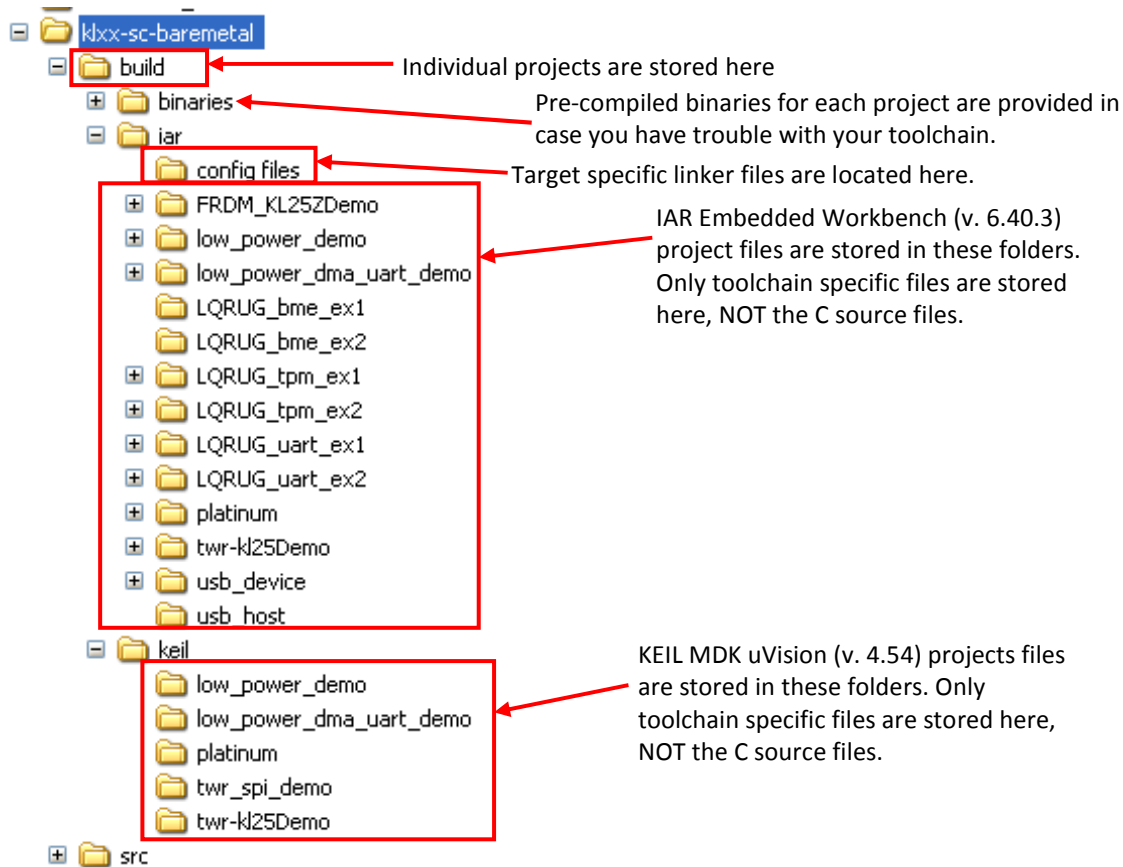
5.2 Baremetal Sample Code (klxx-sc-baremetal)

5.2.1 Baremetal Sample Code Folder Structure

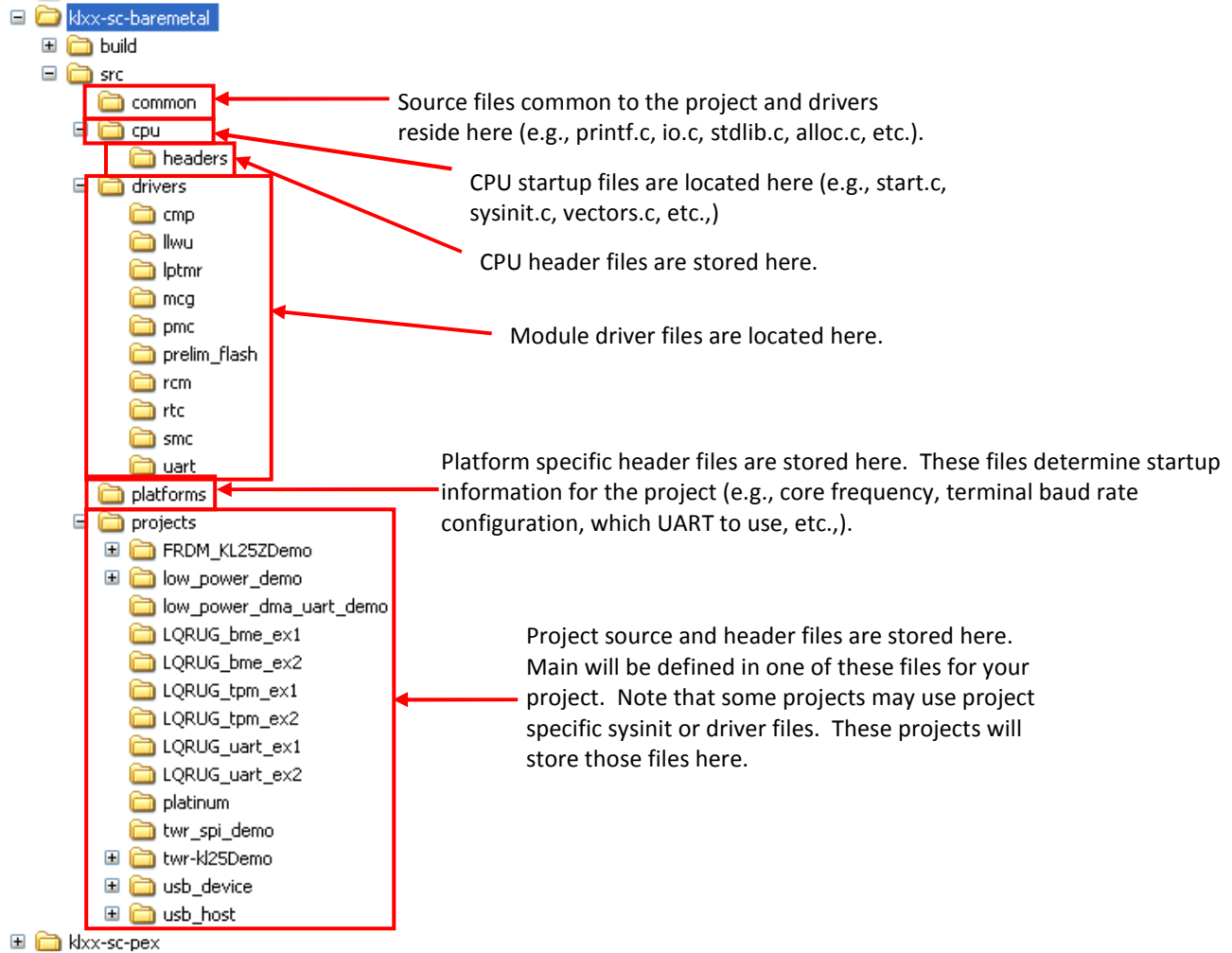
The Baremetal sample code folder contains two folders at the top level: a build folder and an src (source) folder.



First, the build folder will be discussed.

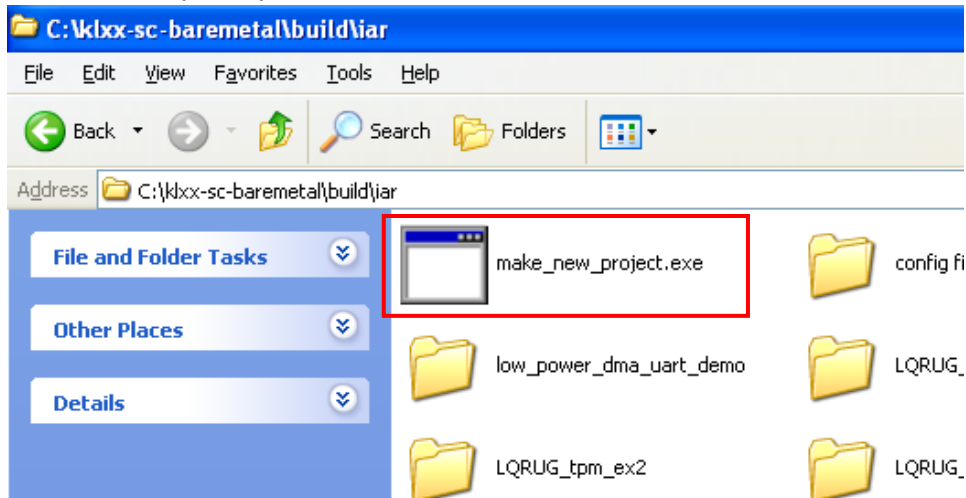


The source folder structure is as follows:



5.2.2 Using the Freescale Baremetal Sample Code to Jumpstart your Design

The Kinetis L Family sample code is provided 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\iar 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-KL25Z board to your development computer. Be sure to plug the Mini-B connection into the OpenSDA port of the Freedom-KL25Z 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

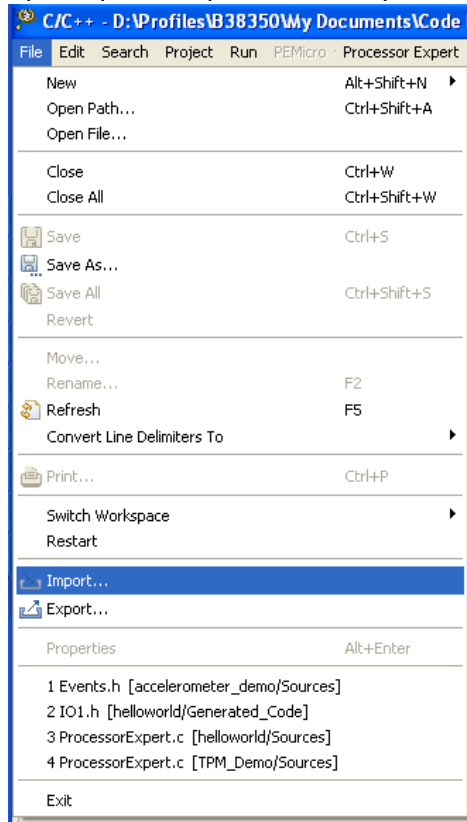
The OpenSDA serial port is designed to enumerate just as any other USB to serial converter. Therefore, you will need to open a serial terminal utility (Tera Term, Hyperterm, etc.,) and configure your terminal as follows:

- 115,200 baud
- 8 data bits
- 1 stop bit
- no parity
- no flow control.

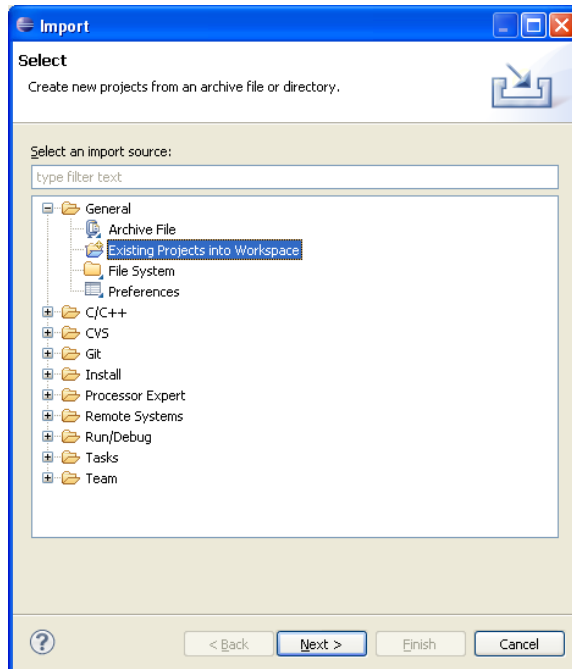
8 Loading and Running the Demos into CodeWarrior 10.3 BETA (2)

The following instructions describe how to build and flash the helloworld demo using CodeWarrior 10.3 BETA (2). 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-KL25Z. If you need assistance in loading this application onto your Freedom-KL25Z, please refer to the OpenSDA user's guide provided in your Quick Start Package.

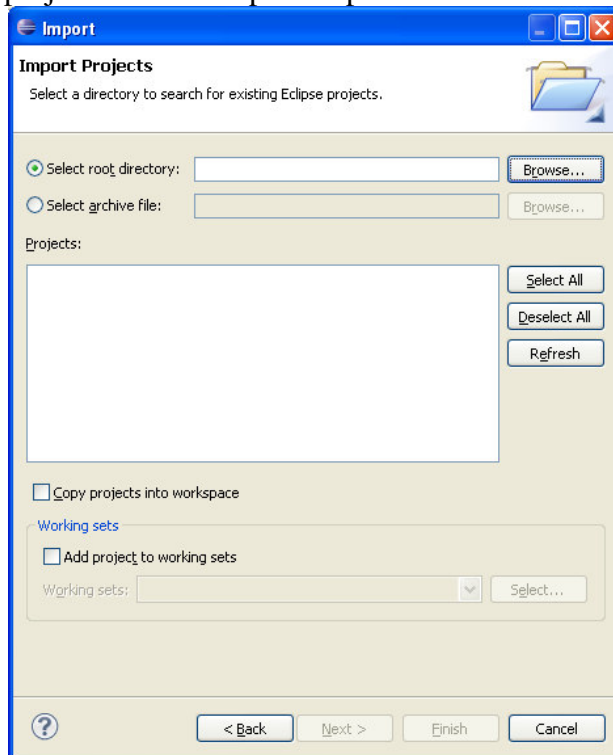
- 1) Open CodeWarrior 10.3 BETA (2) (Start->All Programs->Freescale CodeWarrior->CW for MCU v10.3->CodeWarrior).
- 2) Import the workspace at **..\klxx-sc-pex\projects\helloworld\cw\helloworld.eww**.
 - a. Open up the import wizard by selecting File->Import...



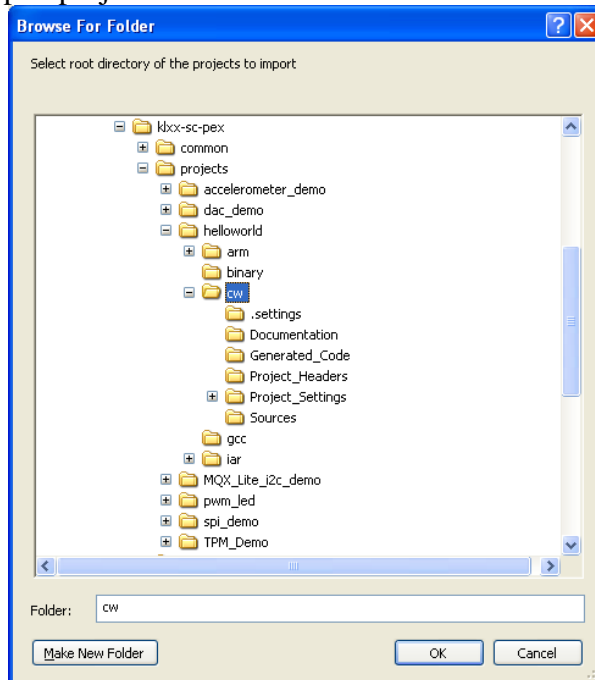
- b. In the Import dialog box, choose General->Existing Projects into Workspace and click Next >.



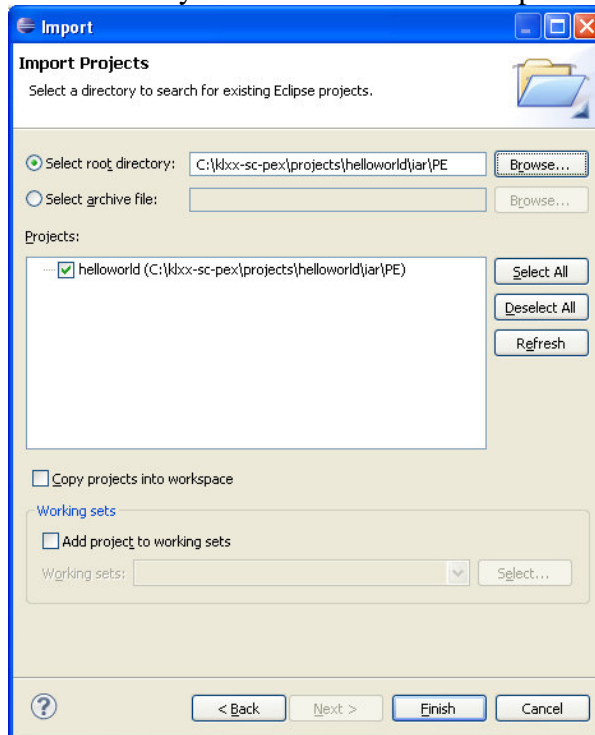
- c. At the next screen, choose the “Select root directory:” option, ensure that the “Copy projects into workspace” option is not selected and then click “Browse...”.



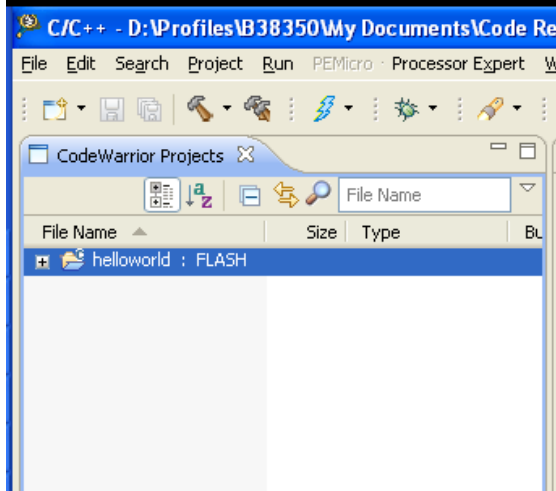
- d. In the “Browse For Folder” dialog box, point CodeWarrior to the klxx-sc-pex\projects\helloworld\cw folder.




- 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.



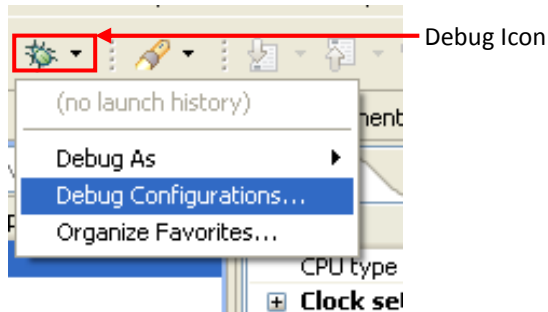
- 3) Ensure that the project is selected in the projects tab.



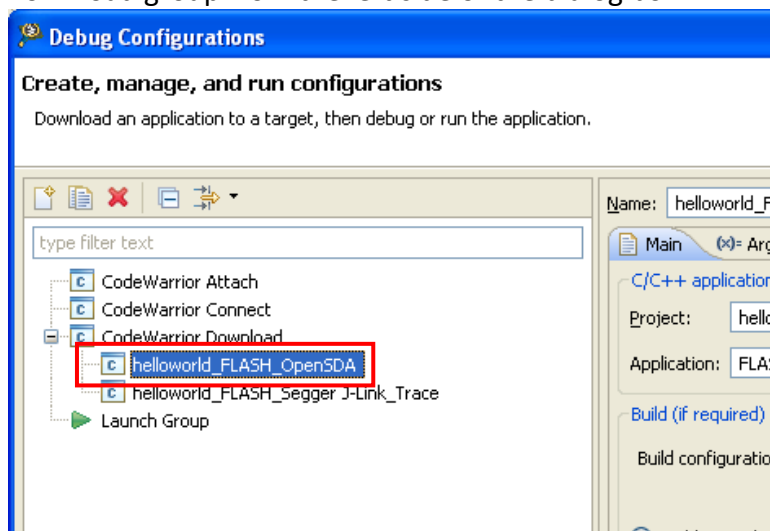
- 4) Compile the project by clicking the Build icon  (or right click on the project and select “Make”).

- 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”.



- b. In the pop-up dialog box, select “helloworld_FLASH_OpenSDA” from the CodeWarrior Download group from the left side of the dialog box.

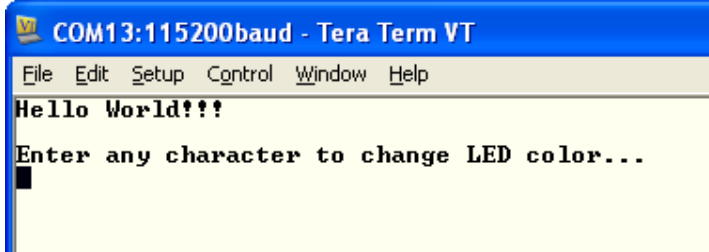


- c. Click the “Debug” button.

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



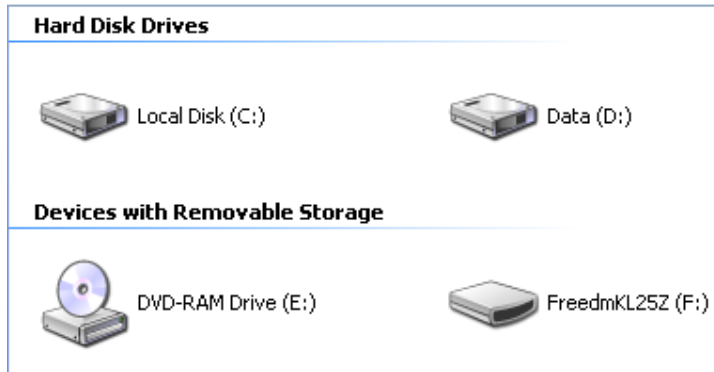
- 7) On the terminal you should see the following message:



- 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

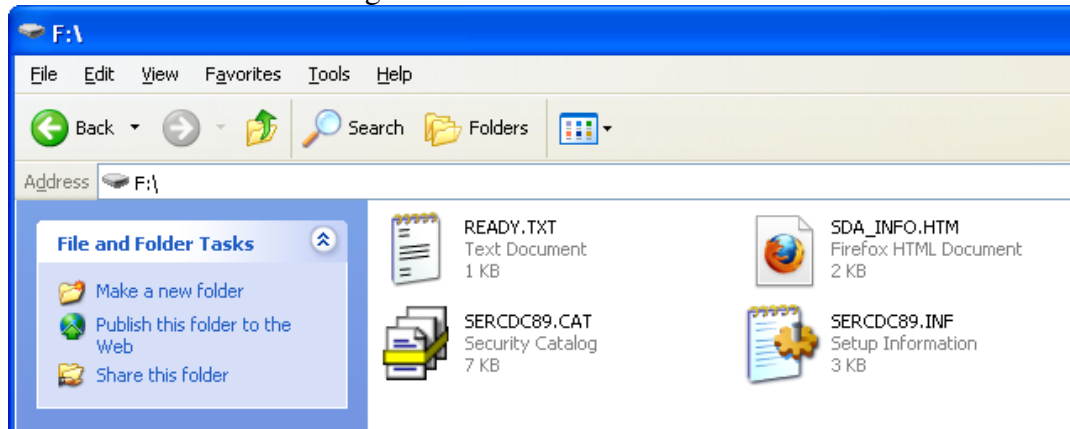
Your FREEDOM-KL25Z board should come with the OpenSDA MSD application preprogrammed onto the K20 device. If this is the case, you should see the Freedom board enumerate as a USB mass storage device and the following icon should be present in your “My Computer” window as shown.



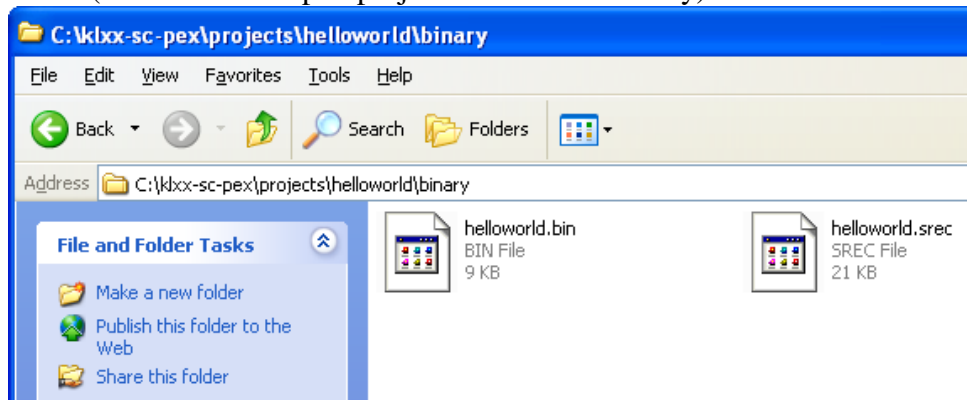
If the FreedmKL25Z icon is not available, please refer to the OpenSDA User’s Guide to program the MSD application onto your Freedom board. Otherwise, follow these steps to load a pre-compiled binary onto your KL25Z128:

1. Navigate to the FreedmKL25Z folder in your file system (C:\FreedmKL25Z, or you may double click the FreedmKL25Z 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 helloworld.bin or the helloworld.srec file into the FreedmKL25Z drive and the KL25Z128 will be automatically programmed with the pre-compiled binary.