Kexx_drv_lib KE06 Sample Code Guide for KEIL

Board configuration, software, and development tools
Rev.0.1

Contents

1   Purpose

This Sample Code Guide will familiarize you with kexx_drv_lib, the FRDM-KE06Z board, and development tools. You will learn the features of the FRDM-KE06Z board, the features of the OpenSDA standard, and how to access the source code examples using KEIL 5.10. In addition, instructions are provided to download a precompiled binary file to your board.

2   Getting to know the board

The Freedom board (FRDM-KE06Z) features the Kinetis KE06Z128VLK4 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
- IrDA(infrared)
- Thermistor
- CAN communication
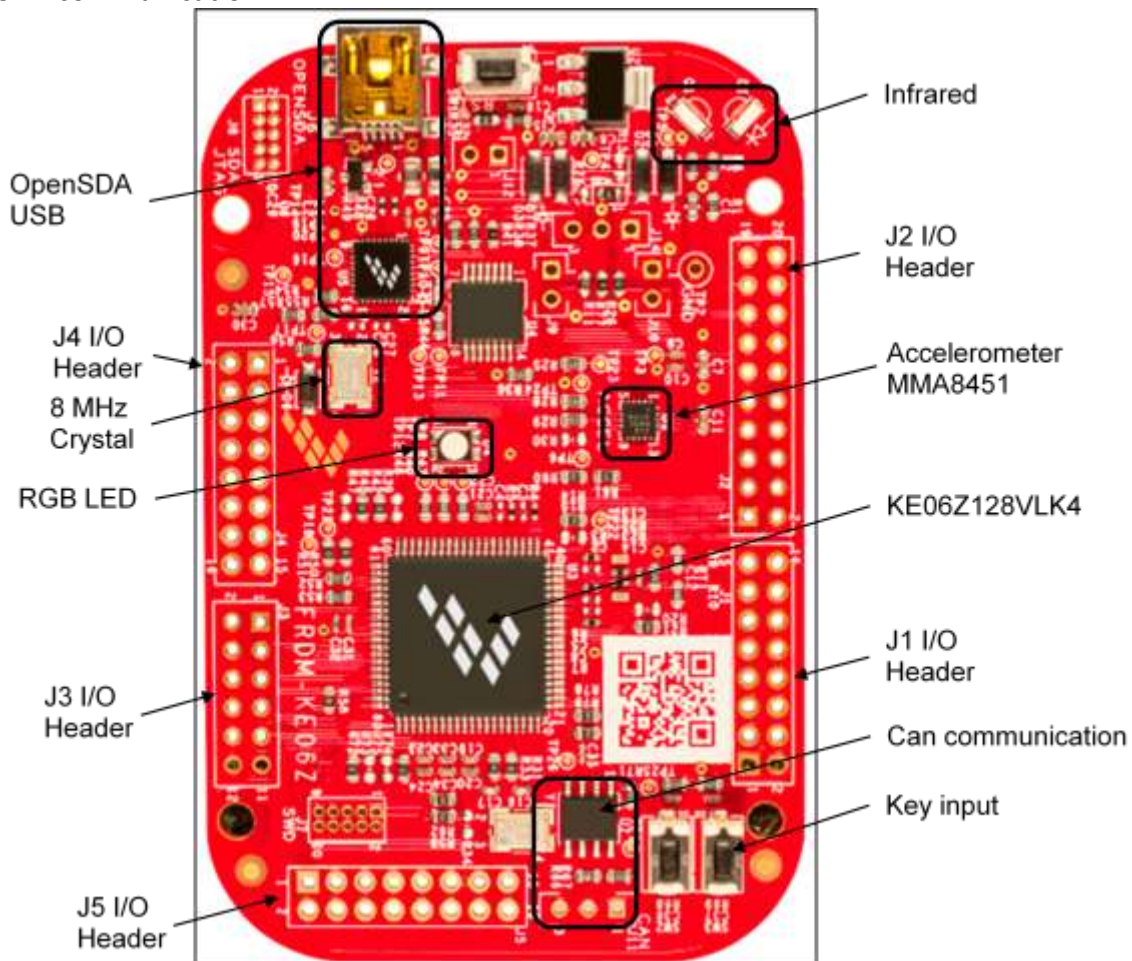
3   OpenSDA Overview

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 Tower or 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 KE06Z128 on your Freedom board with a binary or SREC file by dragging and dropping one of these files into FRDM-KE06Z drive. In addition, you will also have serial communication with the KE06Z128.

3.2 Debug Application

This OpenSDA application (also developed by P&E Micro) allows you to program and debug the KE06Z128 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 KE06Z128 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 the FRDM-KE06Z. The latest OpenSDA drivers should already be installed, and your system should be able to automatically locate the latest Windows CDC drivers (as they should be pre-installed on the Freedom board). If they are not, 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 in your Quick Start Package.

4.2 Downloading and Installing KEIL 5.10

To download the KEIL 5.10 (or newest), and follow these instructions:
1. Navigate to KEIL's website at http://www2.keil.com/mdk5/ .
2. Next, select KEIL Microcontroller Development Kit Version 5.

3. Click on the "Install MDK" button.
4. Follow KEIL's downloading and licensing instructions
5. To install software tools, follow the installer package instructions.
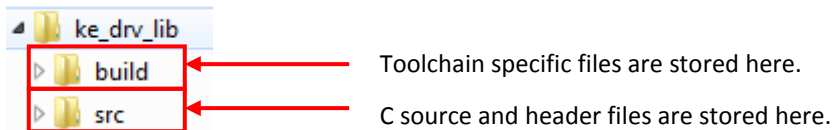
5 Freescale Sample Code

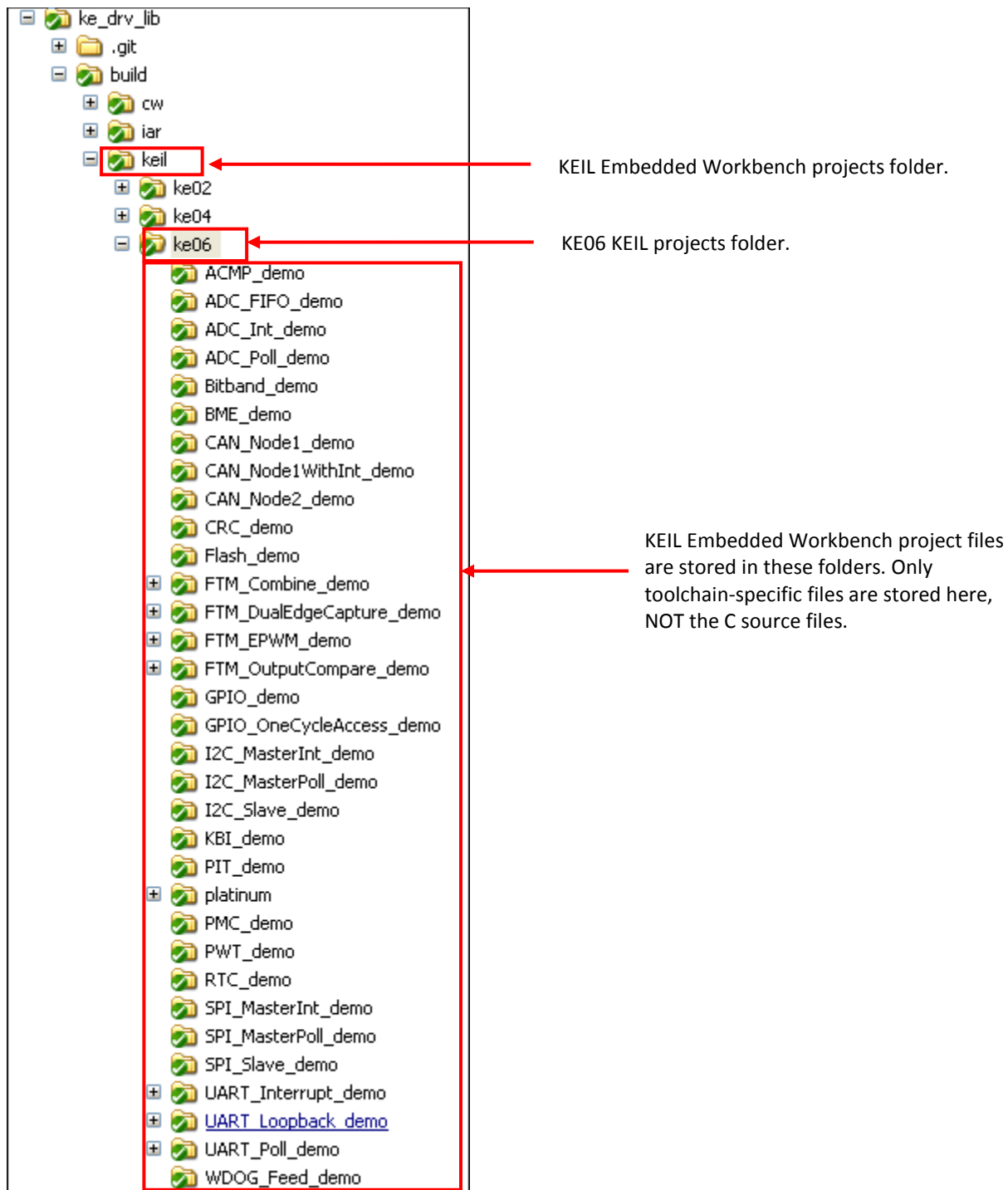The Freescale kexx_drv_lib sample code provided for KE06Z128 is a baremetal code.

5.1 Baremetal Sample Code (kexx_drv_lib)

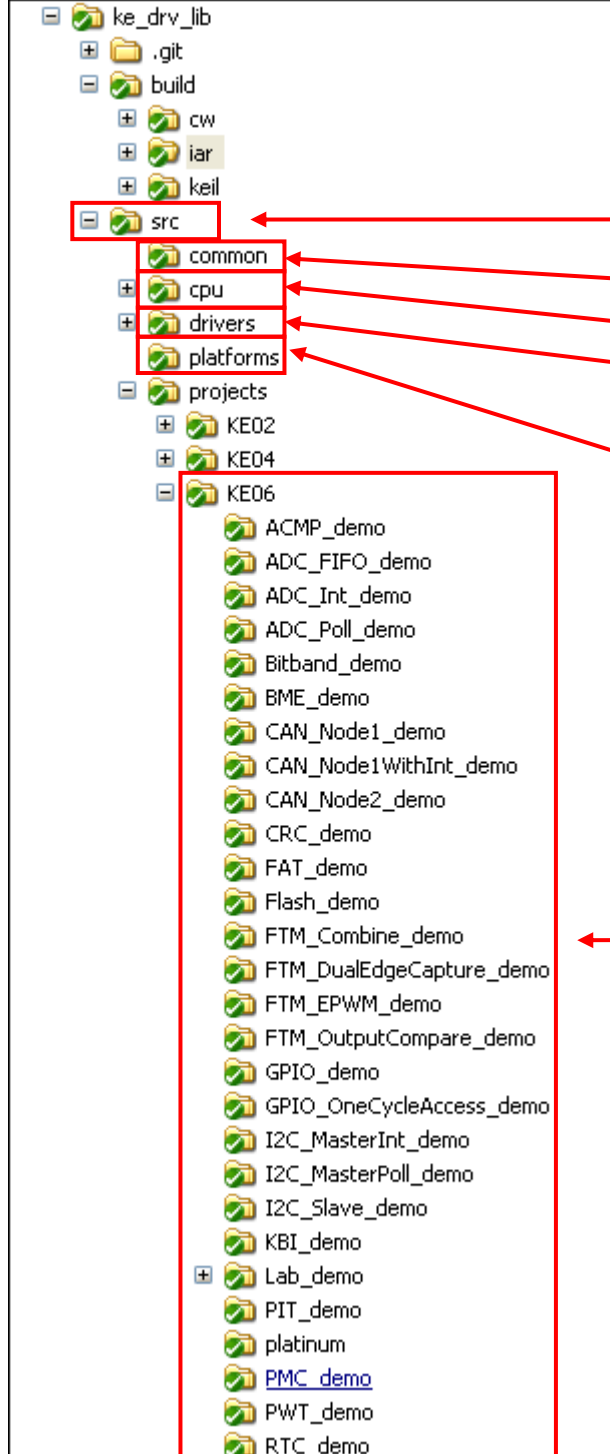### 5.1.1 Baremetal Sample Code Folder Structure

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

The build folder is structured as follows.

ke_drv_lib
  .git
  build
    cw
    iar
    keil ← KEIL Embedded Workbench projects folder.
      ke02
      ke04
      ke06 ← KE06 KEIL projects folder.
        ACMP_demo
        ADC_FIFO_demo
        ADC_Int_demo
        ADC_Poll_demo
        Bitband_demo
        BME_demo
        CAN_Node1_demo
        CAN_Node1WithInt_demo
        CAN_Node2_demo
        CRC_demo
        Flash_demo
        FTM_Combine_demo
        FTM_DualEdgeCapture_demo
        FTM_EPWM_demo
        FTM_OutputCompare_demo
        GPIO_demo
        GPIO_OneCycleAccess_demo
        I2C_MasterInt_demo
        I2C_MasterPoll_demo
        I2C_Slave_demo
        KBI_demo
        PIT_demo
        platinum
        PMC_demo
        PWT_demo
        RTC_demo
        SPI_MasterInt_demo
        SPI_MasterPoll_demo
        SPI_Slave_demo
        UART_Interrupt_demo
        UART_Loopback_demo
        UART_Poll_demo
        WDOG_Feed_demo

KEIL Embedded Workbench project files are stored in these folders. Only toolchain-specific files are stored here, NOT the C source files.

The source folder structure is as follows:

All source files are located here.
Source files common to the project and drivers reside here (e.g. printf.c, io.c, stdlib.c, alloc.c, etc.).
CPU header files are stored here.
Peripheral driver source files are located here (e.g. gpio.c, gpio.h, etc.)

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.

5.1.2 Using the Freescale Baremetal Sample Code to Jumpstart your Design

The kexx_drv_lib library is provided to jump start for your design, and is accompanied by code examples. 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 \build\keil\ke06 folder.

Double-click make_new_project_ke06.exe file 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 FRDM-KE06Z board to your development computer. Be sure to plug the Mini-B connection into the OpenSDA port of the FRDM-KE06Z 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:

- 115200 baud
- 8 data bits
- 1 stop bit
- no parity
- no flow control

8 Loading and Running the Demos into KEIL 5.10

The following instructions describe how to build and debug the platinum demo using KEIL 5.10. 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 FRDM-KE06Z. If you need assistance in loading this application onto your tower board, see the OpenSDA user's guide provided in your Quick Start Package.
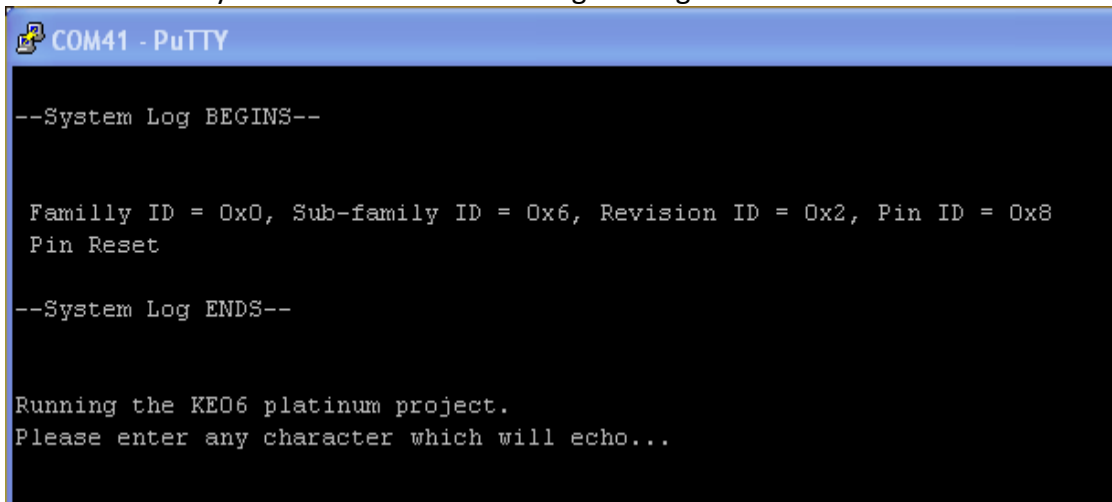
1) Open KEIL MDK5.10 (Start->Keil uVision5).
2) Open the workspace at ...\build\keil\ke06\platinum\platinum.eww. You can either double click the *.uvproj icon into the KEIL Workspace or by selecting Project->Open Project.

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

4) After compilation completes, please ensure that you have the OpenSDA debugger selected. You may check this by following these instructions:
   a. Right click on the platinum project in the Workspace window pane and select "Options for Target KE06Z-Flash".
   b. In the pop-up dialog box, select "Debug" tab.
   c. In the "Debug" tab, select "PEMicro Debugger". Then click "Setting".
   d. In "Setting", select "OpenSDA Embedded Tower Debug – USB Port".
   e. In "Setting", select Target CPU information: "KE06Z128M4".
   f. Click "OK".

5) After compilation completes, download the code to the board and start the debugger by pressing the "Download and Debug" button. ▣

6) The code will download, and the debugger screen will come up and pause at the first instruction. Hit the "Go" button to start running.

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

8) The tri-color LED will start blinking. Enter any character which will be echoed to the terminal.

9 Explore Further

Additional software and lab guides are available at http://www.freescale.com/FRDM-KE06 .

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