Freescale Semiconductor

User's Guide

Document Number: USBKSDKUG

Rev. 1.0.0-beta, 03/2014

Integration of the USB Stack and Kinetis SDK

1 Read Me First

This document describes how to compile the USB stack and examples, download a binary image and run the examples. This document also provides the board-specific information for the TWR-K64F120M Tower System module and the FRDM-K64F board.

Contents

2 Release Scope

2.1 Hardware

- Supports TWR-K64F120M and FRDM-K64F.

2.2 Software

- TWR-K64F120M/ FRDM-K64F have HID mouse host/device and CDC device examples.
- Supports Bare-Metal.
- Other RTOS are supported on the TWR-K64F.

3 Requirements for Building USB Examples

3.1 Hardware

- TWR-K64F120M/FRDM-K64F
- (Optional) TWR-SER and Elevator
- J-Link debugger
- USB cables

3.2 Software

- Freescale Kinetis SDK release package
- IAR Embedded Workbench for ARM Version 6.70.3, available for Kinetis devices

3.3 Board Jumper Settings

This document focuses on the USB-related jumper settings on the board. For the other jumper settings, refer to the board-related user guide.

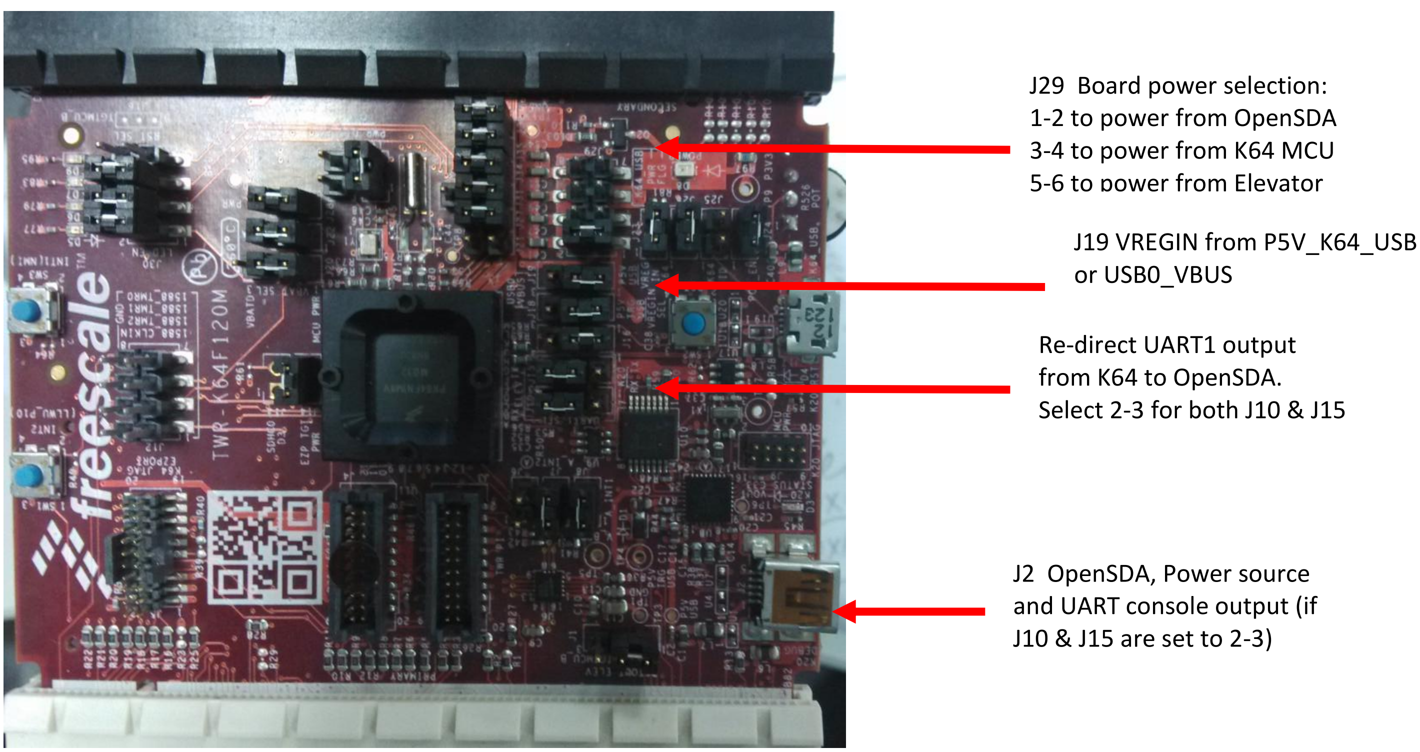
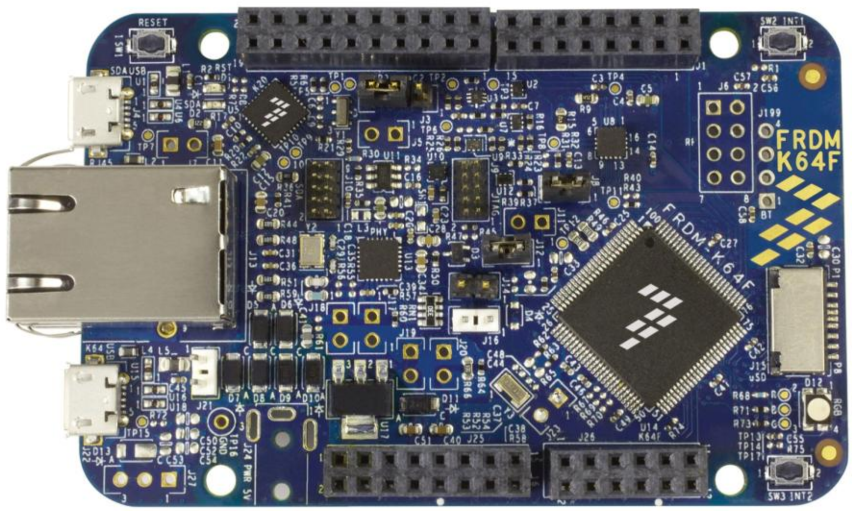


Figure-1 TWR-K64



- Connect J21
- Install a 2.2uF capacitor in the position C33 as shown.

Figure-2 FRDM-K64F

4 USB Code Structure

The USB code is located in usb folder in the root level of the Kinetis_SDK folder.

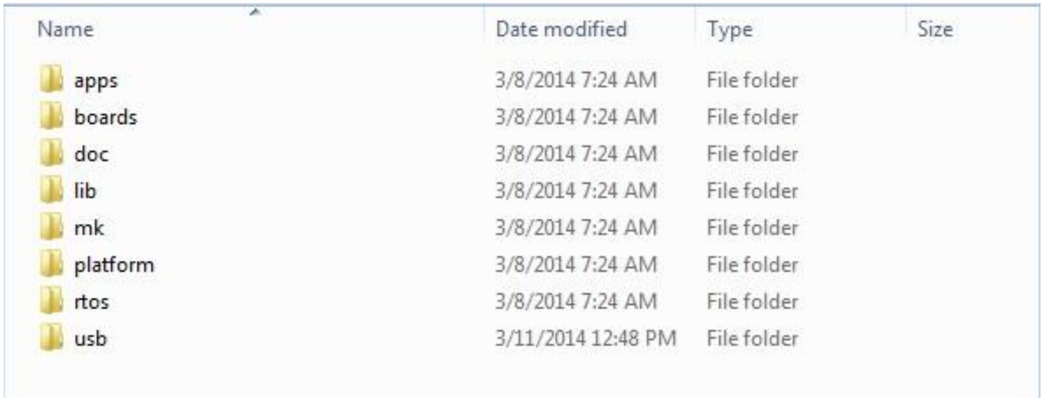


Figure-3 Kinetis SDK Folder Structure

The usb folder includes the source code, projects, and tools. There are three subfolders:

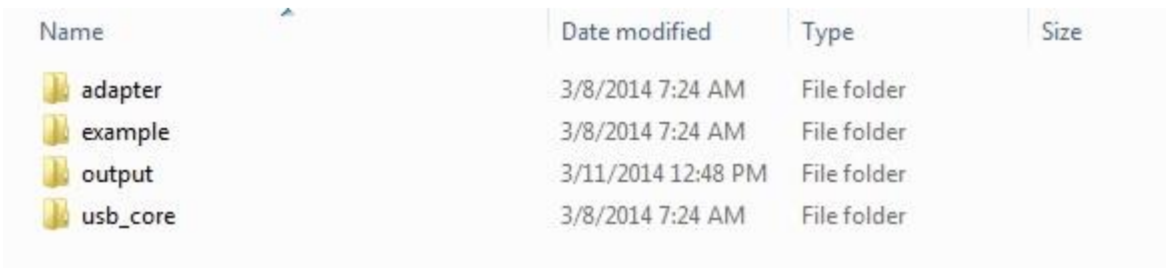


Figure-4 USB Folder Structure

- adapter

  It includes the adapter files which can make the USB stack run on a different RTOS with the same USB core code.

- example

  It includes all the source code and project files for the USB examples.

- usb_core

  It includes the USB source files, such as HAL, controller driver, and class drivers. It also includes the USB library projects.

5 Compiling or Running the USB Stack and Examples

5.1 Step-by-Step Guide for IAR

This section shows how to use IAR. Open IAR is shown here:

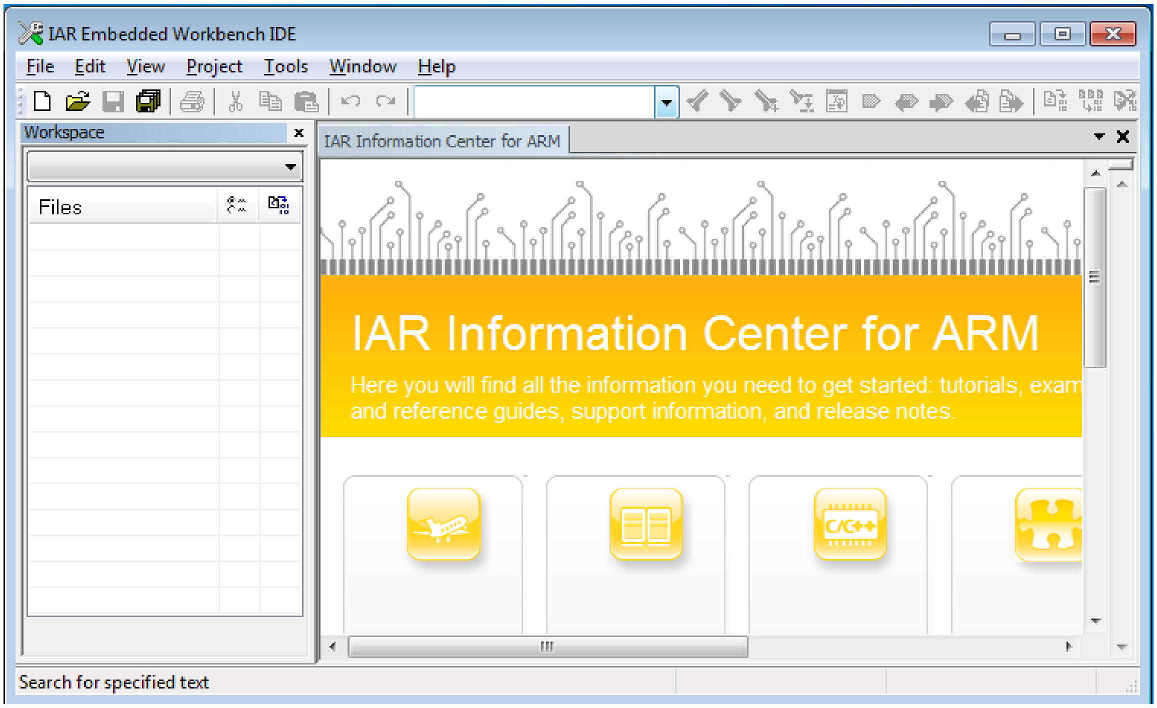


Figure-5 IAR

1. Open the workspace corresponding to different chips.
   You can find the corresponding IAR workspace files supported in this release in these paths:
   usb\example\host\hid\mouse\sdk\iar\ host_hid_mouse_twrk64f120m_bm\
   hid_mouse_host_twrk64f120m.eww
   usb\example\host\hid\mouse\sdk\iar\ host_hid_mouse_frdmk64f120m_bm \
   host_hid_mouse_frdmk64f120m_bm.eww
   usb\example\device\hid\hid_mouse\sdk\iar\dev_hid_mouse_twrk64f120m_bm\
   dev_hid_mouse_twrk64f120m.eww
   usb\example\device\hid\hid_mouse\sdk\iar\dev_hid_mouse_frdm64f120m_bm\
   dev_hid_mouse_frdm64f120m.eww
   usb\example\device\cdc\virtual_com\sdk\iar\dev_cdc_virtual_com_frdmk64f120m_bm\
   dev_cdc _virtual_com_frdmk64f120m.eww
   usb\example\device\cdc\virtual_com\sdk\iar\dev_cdc_virtual_com_twrk64f120m_bm\
   dev_cdc_virtual_com_twrk64f120m_bm.eww

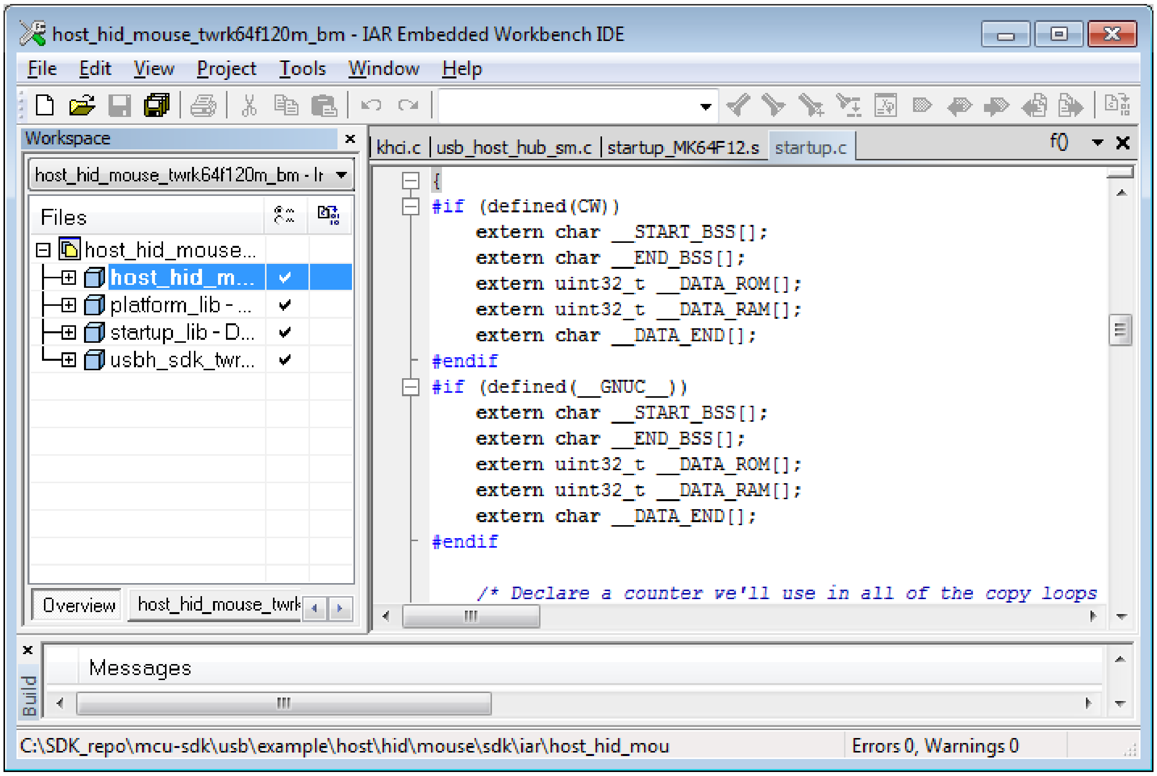


Figure-**6** Workspace

This is a step that must be completed to integrate the USB stack into the SDK. Otherwise, the USB example does not run.

2. Change the HEAP size in the corresponding linker files:

   K64: platform\linker\iar\K64F12\K64FN1Mxxx12_flash.icf

   From

   define symbol __ICFEDIT_size_heap__ = 0x2000;

   To

   define symbol __ICFEDIT_size_heap__ = 0x4000;

3. Build the platform_lib library.

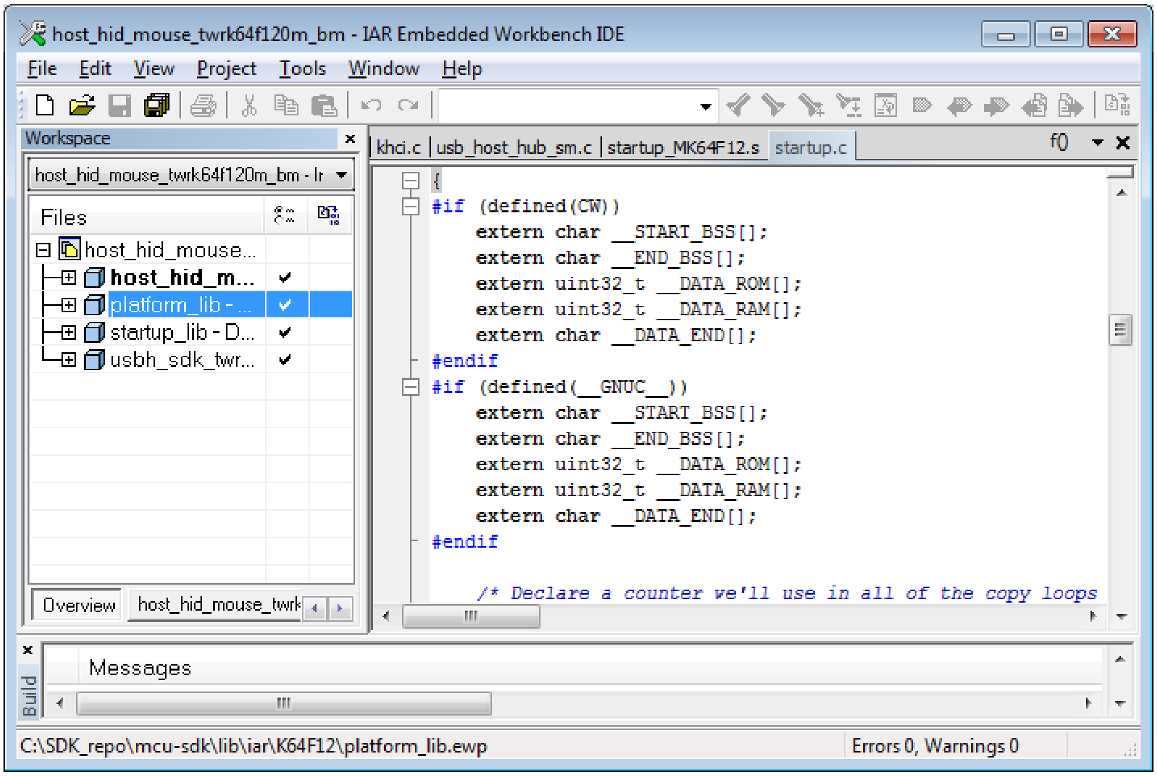


Figure-7 Build the platform library project

4. Build the startup_lib library.

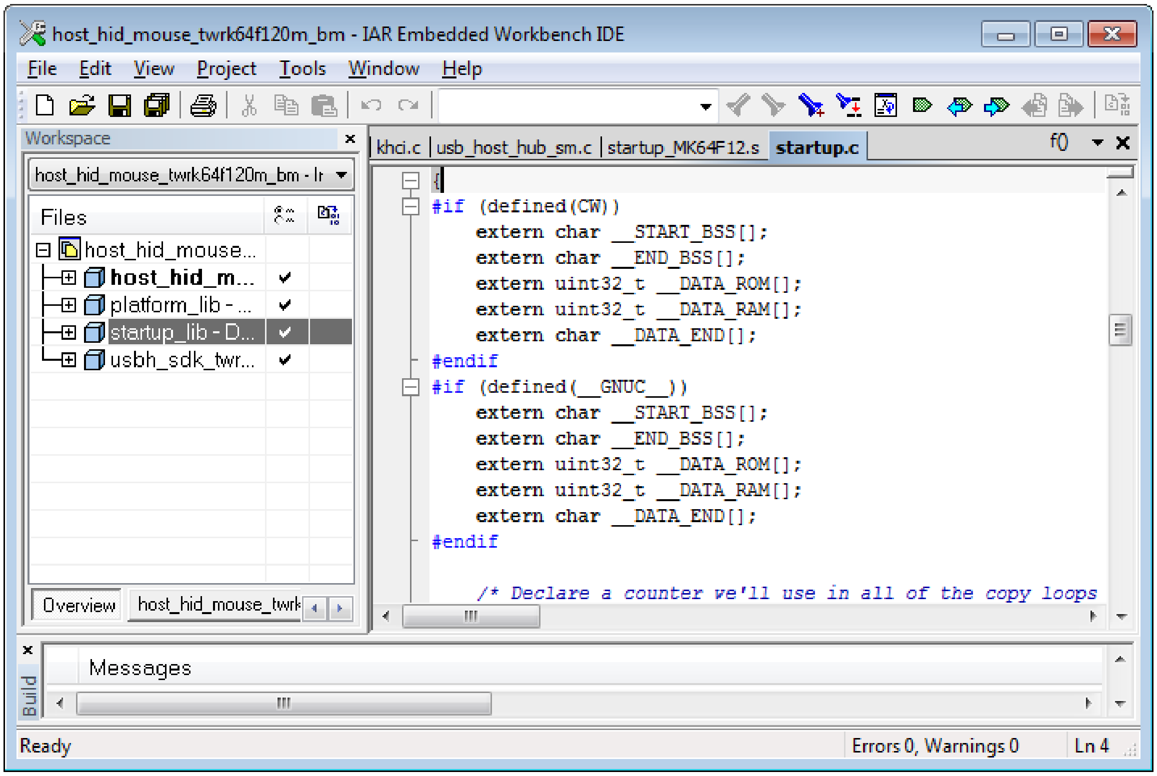


Figure-8 Build the startup library project

5. Build the USB stack.

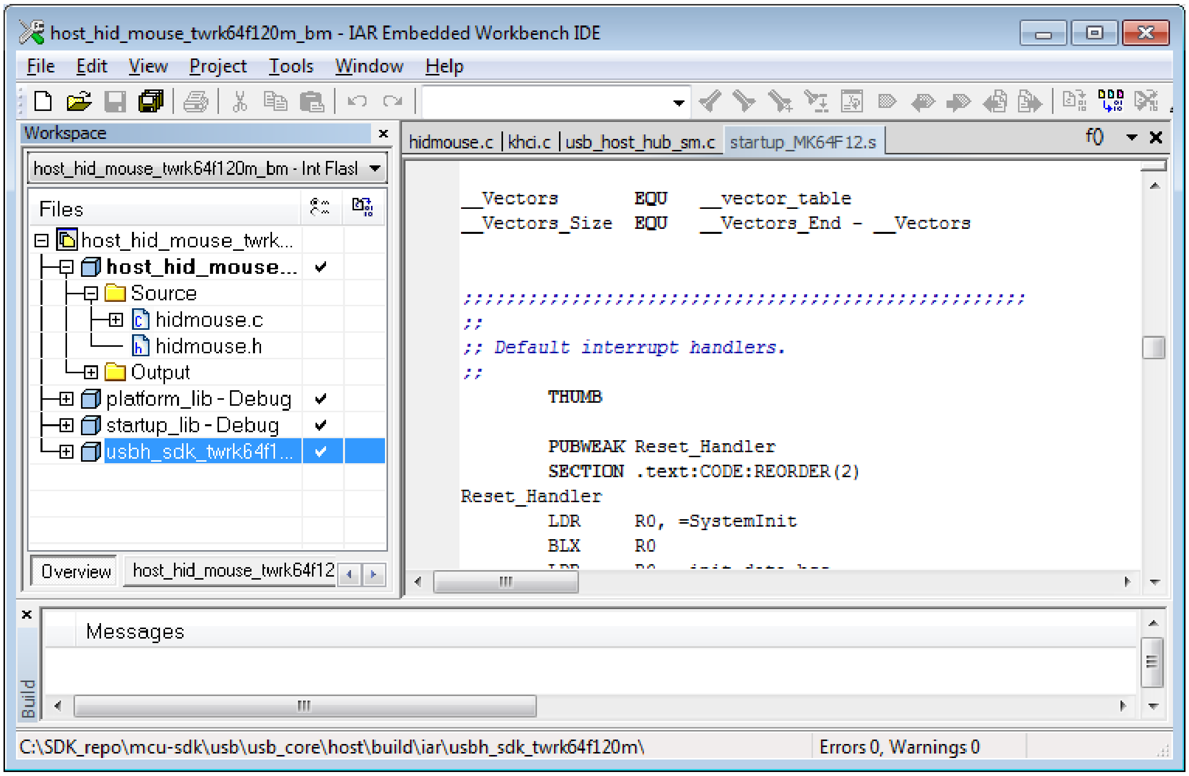


Figure-9 Build the USB stack project

6. Check the results of building the USB library.

After the USB library is built, you can find the generated library binary file (usbh.a) under output\twrk64f120m.iar\debug\usbh\sdk\.

In addition, all the USB-related public header files that may be used by the user are copied to this folder.

7. Build the HID mouse example.

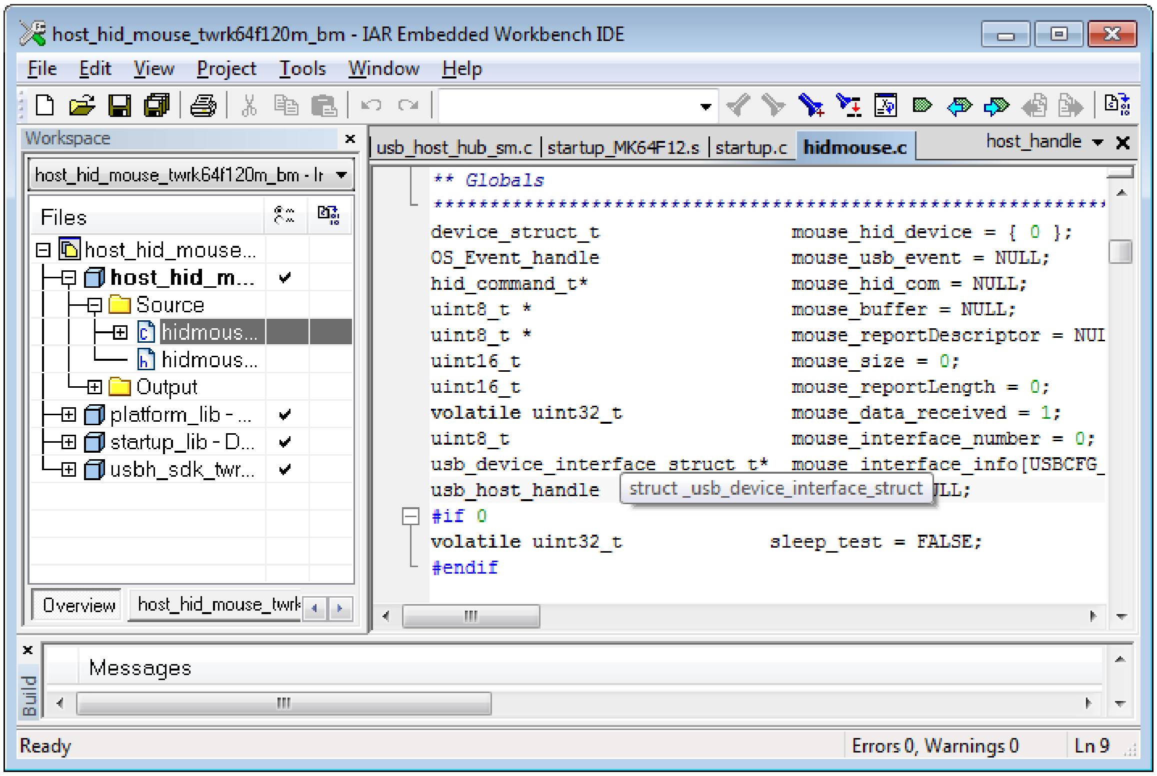


Figure-10 Build the HID mouse project

8. After all building steps are finished, run the examples.
   - Connect the J-Link to the JTAG port J5 on the TWR-K64F120M.
   - Connect the micro USB cable from the PC to J2 on the TWR-K64F120M to power the board.
   - Click Download and Debug. Wait for the downloading to be finished.
   - Click Go to run the example.
   - Connect the micro USB cable from the mouse to J17 on the TWR-K64F120M to verify that the mouse is working on the platform.
   - If it is a CDC virtual_com project, please see usb\example\device\cdc\virtual_com\readme.pdf for more details.

Note

If, on the K64 Tower System module, the USB mini port (J14) on the serial board needs to be used as a device connector, J19 must be set to 2-3.

9. After the mouse is attached, the movement of the mouse is displayed on the COM port.

   For the TWR-K64F120M, the default UART output is from J2 on the TWR-K64F120M board.

6 Integrate USB stack with other RTOS

The USB workspaces for FreeRTOS, Freescale MQX™ RTOS, µC/OS II, and µC/OS III are in these locations:

- usb\example\host\hid\mouse\sdk\iar\ host_hid_mouse_twrk64f120m_freertos\ host_hid_mouse_twrk64f120m_freertos.eww
- usb\example\host\hid\mouse\sdk\iar\ host_hid_mouse_twrk64f120m_mqx\ host_hid_mouse_twrk64f120m_mqx.eww
- usb\example\host\hid\mouse\sdk\iar\ host_hid_mouse_twrk64f120m_ucosii\ host_hid_mouse_twrk64f120m_ucosii.eww
- usb\example\host\hid\mouse\sdk\iar\ host_hid_mouse_twrk64f120m_ucosiii\ host_hid_mouse_twrk64f120m_ucosiii.eww

7 USB Stack Configuration

7.1 USB Device Configuration

All USB device configurations are listed in this file:

usb_core\device\include\MK64F120M\usb_device_config.h

The USB class driver can be enabled or disabled by using this file. Additionally, the object number can be configured either to decrease the memory usage or to increase the object number to meet specific requirements.

If you change the configuration of the USB device stack, both the USB library project and the example project need to be rebuilt.

7.2 USB Host Configuration

All USB host configurations are listed in this file:

usb_core\host\include\MK64F120M\usb_host_config.h

The USB class driver can be enabled or disable by using this file. Additionally, the object number can be configured either to decrease the memory usage or to increase the object number to meet specific requirements.

If you change the configuration of the USB host stack, both the USB library project and the example project need to be rebuilt.

Note

Because the K64_USB_DP and K64_USB_DN are not connected to the elevator micro USB port on the TWR-K64F120M Tower System module, R522 and R523 are not placed and only the micro USB port can be used.

If the TWRK-K64 is a USB device when no OpenSDA power is supplied, the jumpers need to be set up like this:

J29, 5-6
J19, 2-3
J18, 2-3.

If the FRDM-K64F is a device when no OpenSDA power is supplied, add a 0-ohm resistor on R61 to power on the P3V3_SDA.

8 Revision History

Revision/Date	Description
1.0.0-beta 2014	Initial release

How to Reach Us:

Home Page:
www.freescale.com

Web Support:
www.freescale.com/support

Document Number: USBKSDKUG
Rev. 1.0.0-beta
03/2014