Freescale MKW01 SMAC Software
Quick Start Guide

This document is a brief presentation of the Freescale SMAC Software for the MRB-KW01 wireless microcontroller platform, version 3.0.2. This software package is an add-on for the Kinetis Software Development Kit (KSDK). This document covers installation of the software packages, hardware setup, build and usage of the provided demo applications.

Contents

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1 Installation

This section covers the steps for a successful installation of the required software packages: connectivity and Kinetis SDK.

1.1 Kinetis SDK Installation

The first step is to install the KSDK (Kinetis SDK) version 1.2.0 using the installation package from the Freescale website. The installer must match your architecture, operating system and required KSDK version number for the connectivity functionality (1.2.0).

KSDK installation example

This example is based on the following setup:

Architecture: 64-bit

Operating System: Windows

Revision Number: 1.2.0

Figure 1:   Freescale KSDK download page

Figure 2:   Freescale KSDK download page (continued)

Once downloaded please execute the installer and follow the steps indicated by the wizard
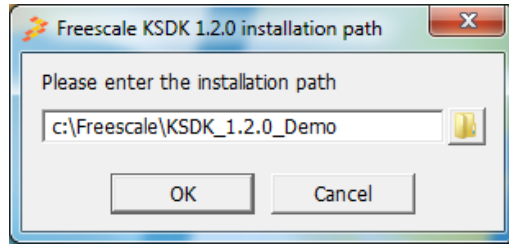
Figure 3:   KSDK install wizard first page

The installer will prompt you with the installation path for the KSDK. By default this path is "C:\Freescale\KSDK_1.2.0".
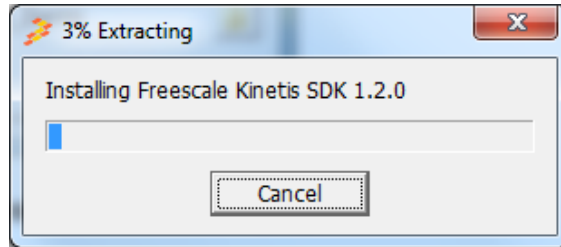

Figure 4:   KSDK install extract page

1.2 Freescale MKW01 SMAC Software Installation

After completing the KSDK installation procedure, the installation of the SMAC software package can begin. Please execute the installer and follow the steps presented in the example.

Freescale MKW01 SMAC Software Installation Example

The first page is just a preamble for the installation. Choose next to continue.
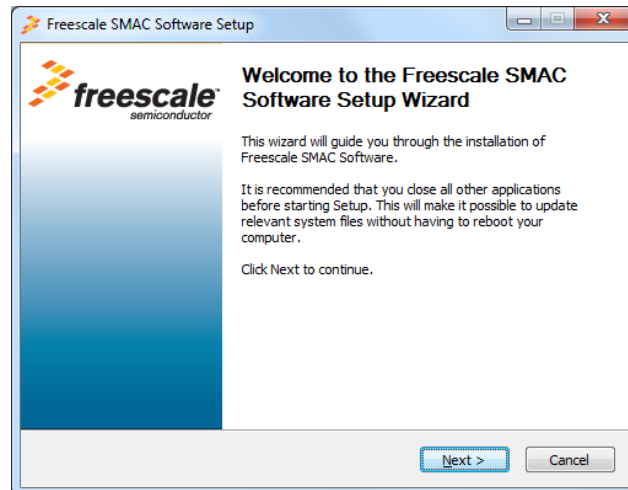

Figure 5:   SMAC software install wizard first screen

The next page is the license agreement. If you accept the terms and conditions please select "I Agree" to continue the installation.
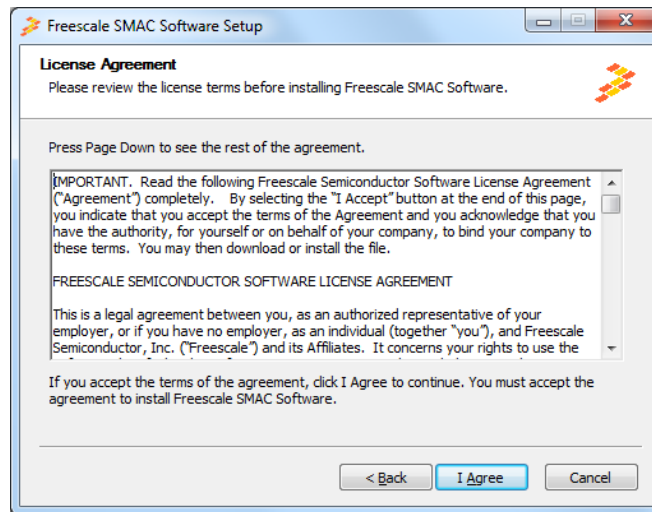

Figure 6:   SMAC software install wizard license screen

On the next page the wizard will detect the KSDK package location. If it does not match with the location of the package you want please change it accordingly. Also, it is advisable to leave the environment variable checkbox checked, so that the KSDK_PATH environment variable is properly updated. This variable is used by the SMAC IDE projects to refer KSDK sources and libraries.
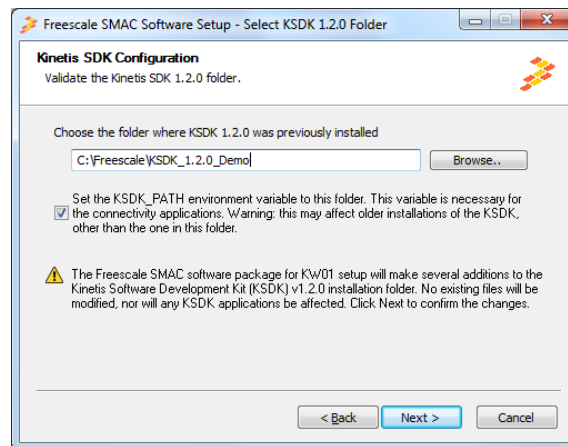

Figure 7:   SMAC software install wizard KSDK location

The next step is to select the install location for the Freescale SMAC software. By default the installer uses "C:\Freescale\KW01_SMAC_v3.0.2", but this may be changed depending on your needs.
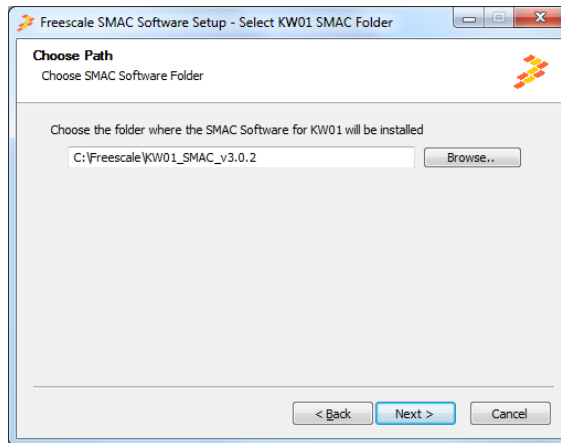
Figure 8:   SMAC software install wizard location selection

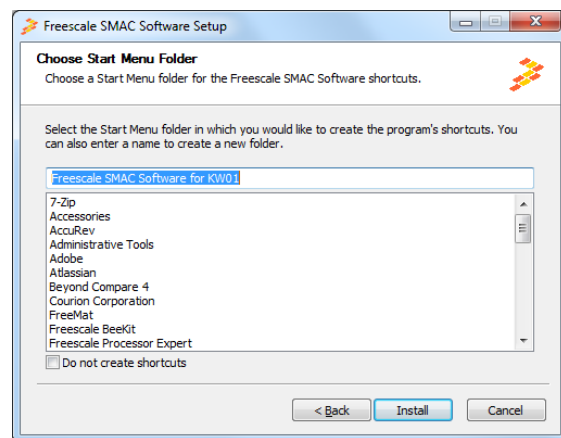The last step is to choose whether you wish to create shortcuts for the SMAC software installation.

Figure 9:   SMAC software install wizard create shortcuts

2   Building the Binaries

This section details the required steps for obtaining the binary files for usage with the boards.

NOTE

In order to be able to build any of this packages you will require a copy of the IAR Embedded Workbench for ARM® version 7.40.2 or higher. This connectivity software package does not include support for any other toolchains.

All of these packages should be built with the debug configuration in order to enable the end user with debugging information.

2.1 Building the KSDK Libraries

This release supports the modular reference board based on the MKW01 microcontroller. For the microcontroller evaluation boards, the SDK libraries must be built. Also, depending on the RTOS kernel support desired, the appropriate libraries must be built. This release supports the FreeRTOS and MQX kernels and also a non-preemptive bare-metal scheduler.

For brevity, in the remainder of this document we shall introduce the following placeholders for text:

- <ksdk_path> : represents the root path of the KSDK installation folder
- <device> : represents the wireless microcontroller on the board (KW01Z4)
- <board> : represents the board (mrbkw01)

For a given SMAC application, the following Kinetis SDK libraries need to be built with the IAR Embedded Workbench for ARM® in order to enable the complete board support and RTOS kernel support:

- FreeRTOS/MQX/Bare-Metal Platform drivers library
- MQX Kernel library

Using the placeholders, here are the required Kinetis SDK v1.2.0 packages location:

- <ksdk_path>\rtos\mqx\mqx\build\iar\mqx_<board>\mqx_<board>.eww
- <ksdk_path>\lib\ksdk_mqx_lib\iar\<device>\ksdk_mqx_lib.eww
- <ksdk_path>\lib\ksdk_freertos_lib\iar\<device>\ksdk_freertos_lib.eww
- <ksdk_path>\lib\ksdk_platform_lib\iar\<device>\ksdk_platform_lib.eww

NOTE

The IAR projects for KSDK libraries are included in the IAR workspaces corresponding to the SMAC demonstration applications and it is recommended to access them this way.

2.2 Building and Flashing the Freescale SMAC Software Demo Applications

The package contains various demo applications that can be used to get a first feel for the software.

In this section you will be guided through building the Connectivity Test Application, using the following placeholders for text.

- <connectivity_path> : represents the root path for the Freescale SMAC software package
- <board> : represents the target board for the demo application (mrbkw01_twrrf)
- <demo_app> : represents the demo application name

All of the apps can be reached using:
"<connectivity_path>\app\ieee_802_15_4\<demo_app>\<board>\build\iar"

Selected app: Connectivity_Test

Board: mrbkw01_twrrf

Resulting location:
    <connectivity_path>\app\ieee_802_15_4\Connectivity_Test\mrbkw01_twrrf\build\iar

Step 1:

Navigate to the resulting location
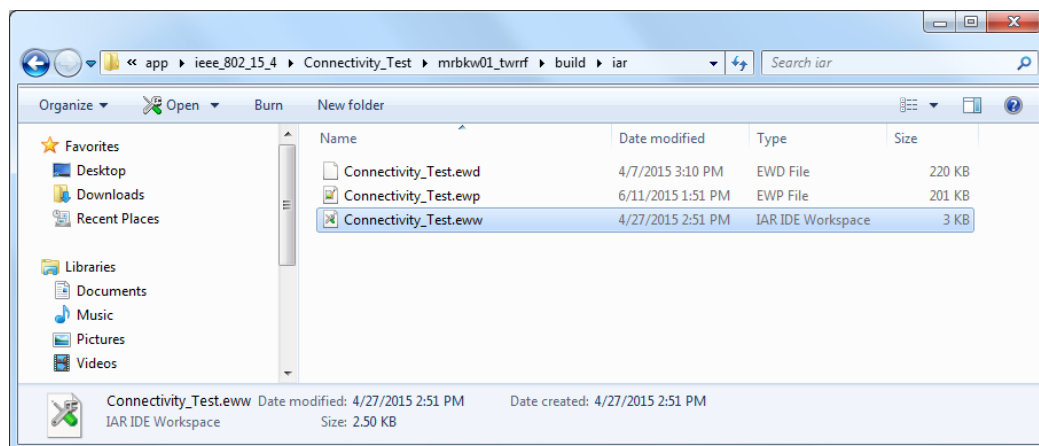
Step 2:

Open the project file (*.eww file format)

Figure 14: Demo app "Connectivity_Test" project location

Step 3:

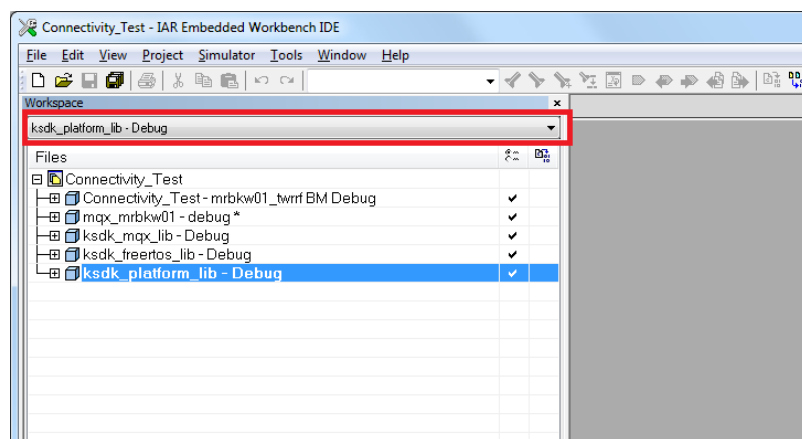From the workspace drop-down list, select the library project(s) depending on the scheduler used (for example the platform library project for bare-metal).

Figure 10: KSDK Platform (bare-metal) library project

Step 4:

Build the platform library project.
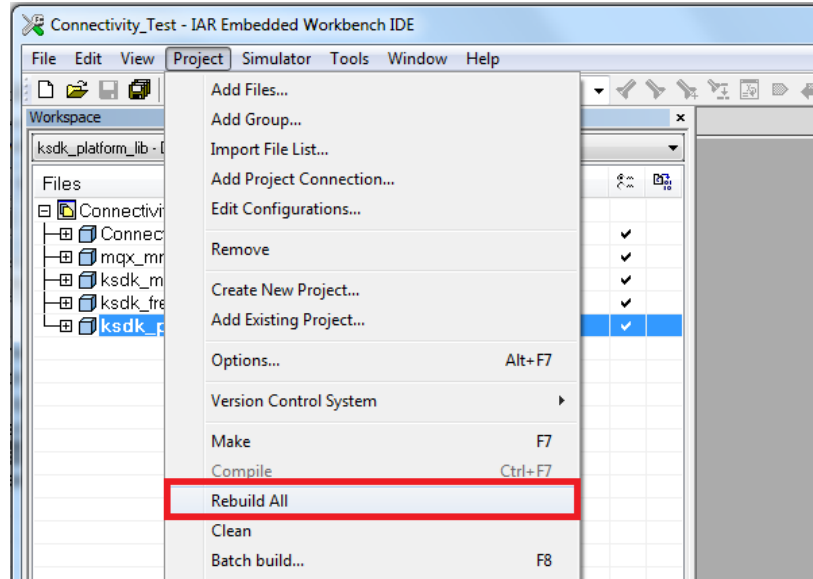
Figure 11: : KSDK Platform library build

Step 5:

Select the Connectivity Test Application project with the debug, bare-metal (BM) configuration.
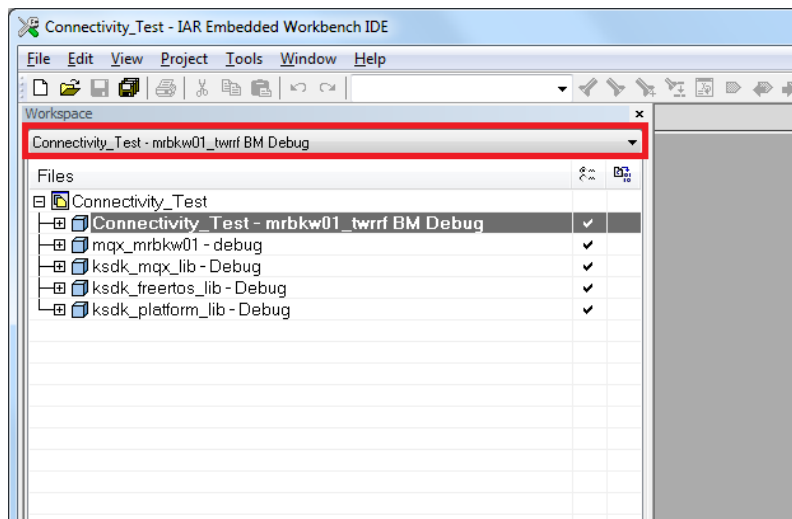
Figure 12: Connectivity Test project with bare-metal configuration and debug settings

Step 6:

Build the Connectivity Test project in the previously selected configuration.
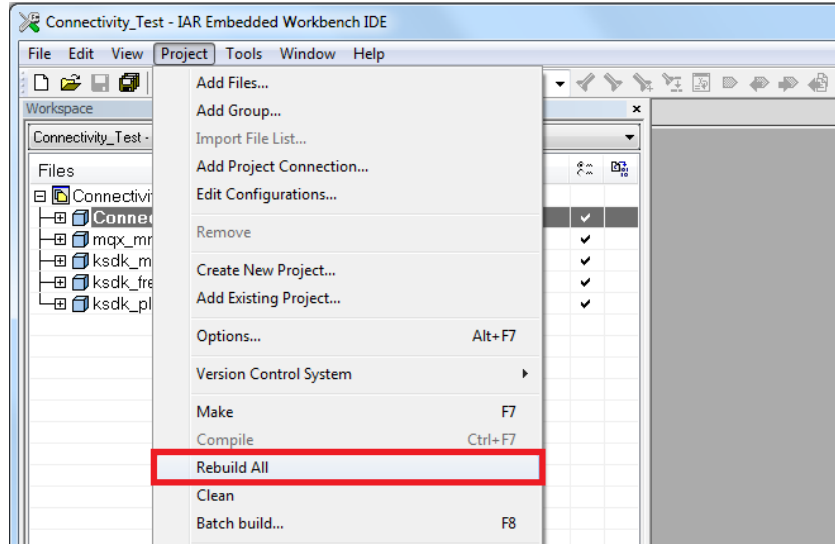
Figure 13: Connectivity Test project build with bare-metal configuration

Step 7:

Click the "Download and Debug" button to flash the executable to the board.
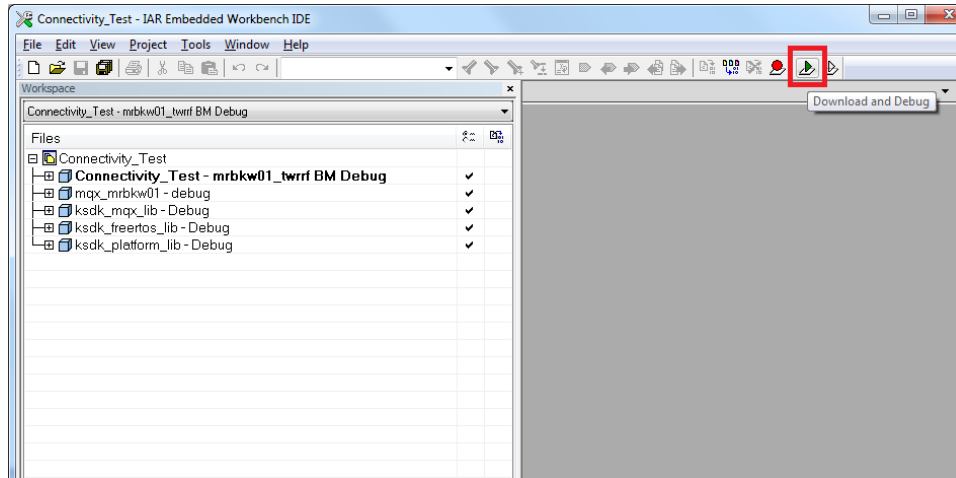
Figure 14: Connectivity Test App Download and Debug

3 Hardware Setup

The hardware setup in this example uses a MRB-KW01 development platform shown in the figure below:
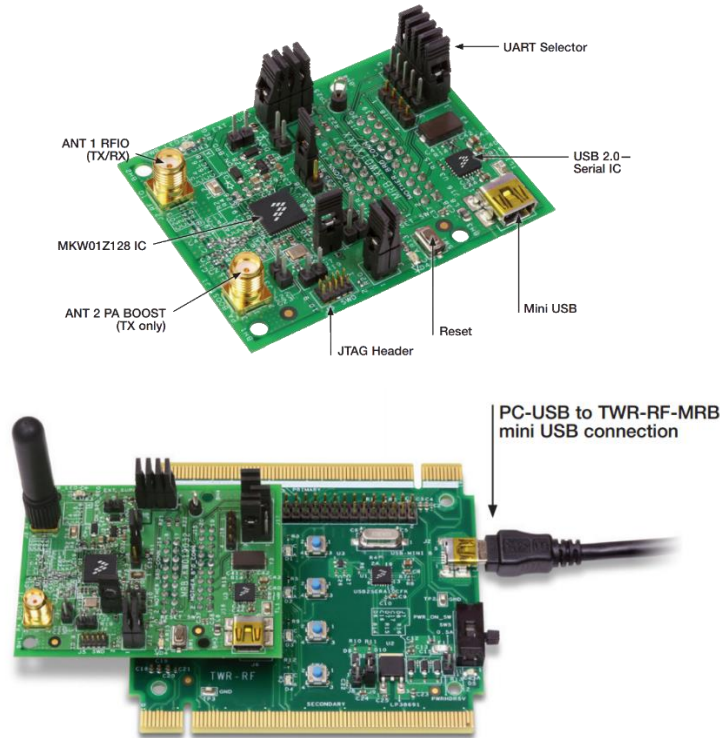
Figure 15: MRB-KW01 standalone and with TWR-RF

The jumper configuration necessary to switch between standalone and TWR-RF is available in the MKW01 SMAC Demonstration Applications User's Guide.

4 Example: Running the Connectivity Test Demo Application

For this demo, a serial terminal program is needed to connect to the board. Any serial port terminal program is suitable, but for this example, Tera Term was chosen.

The application shown below is the SMAC Demo "Connectivity Test".

Step 1:

The first step is to load the application onto the board using IAR Embedded Workbench for ARM® as shown in *Figure 14*. After pressing "Download and Debug" the binary will be flashed to the MKW01 microcontroller.
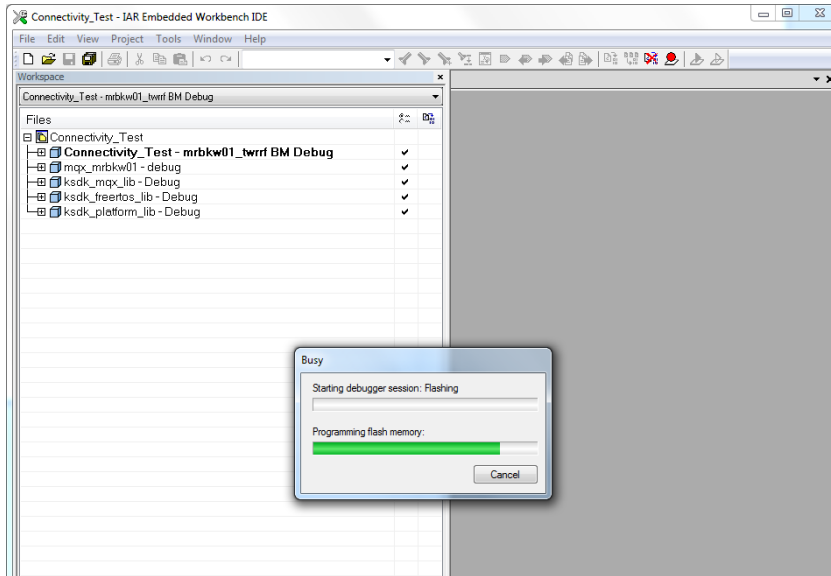
Figure 16: Connectivity Test loading stage example
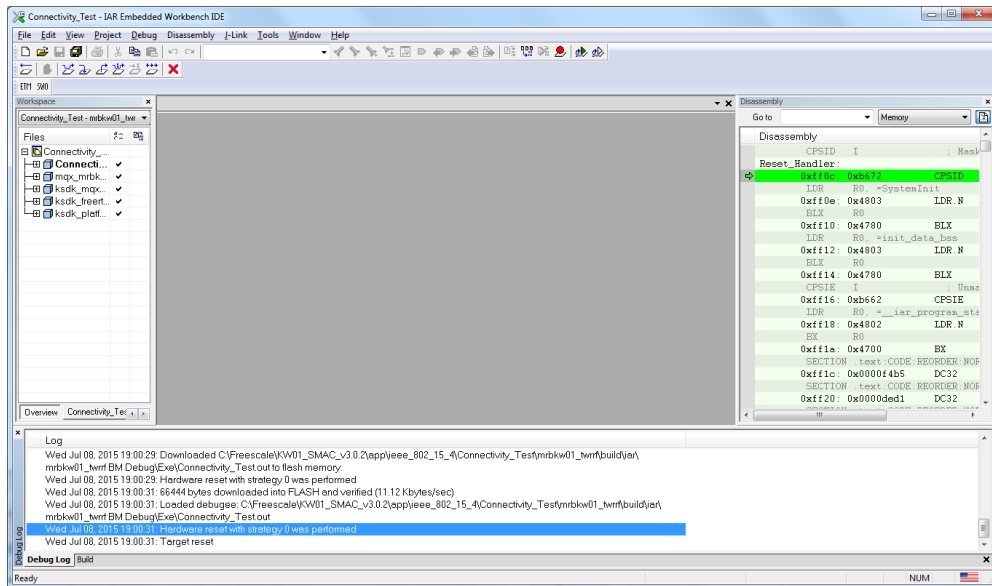
Figure 17: Connectivity Test loaded application example

Step 2:

After loading the application check "Device Manager" to get the serial port number. This should appear with the prefix "Freescale CDC Device".
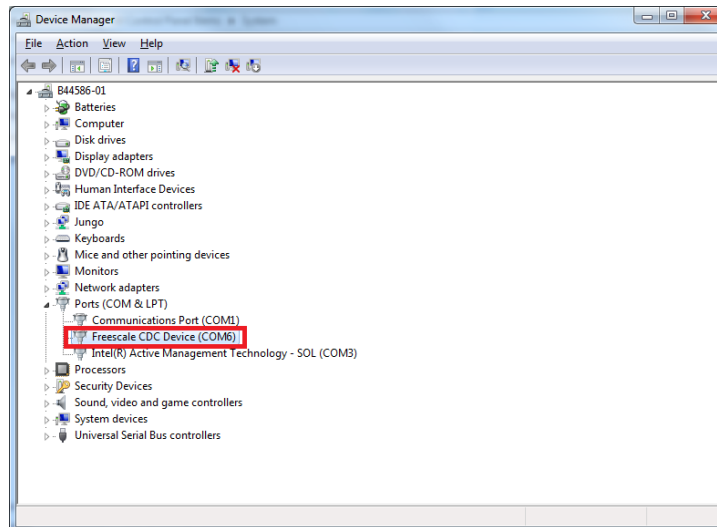
Figure 18: Device Manager serial port look up

Step 3:

Using the port number specified in Device Manager, open a Tera Term instance and connect to the device using the 115200 baud rate. To change the baud rate of the terminal go to "Setup-> Serial Port" menu.
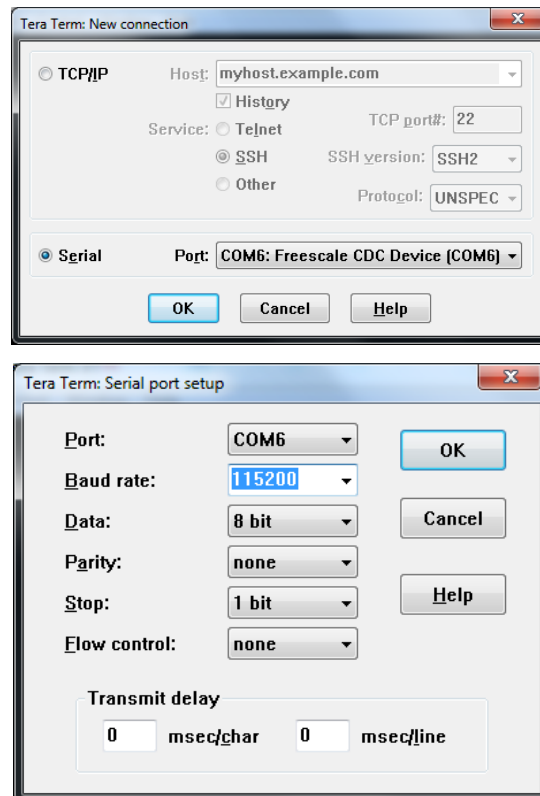
Figure 19: Setting the correct baud rate

Step 4:

Click "Go" to run the application.
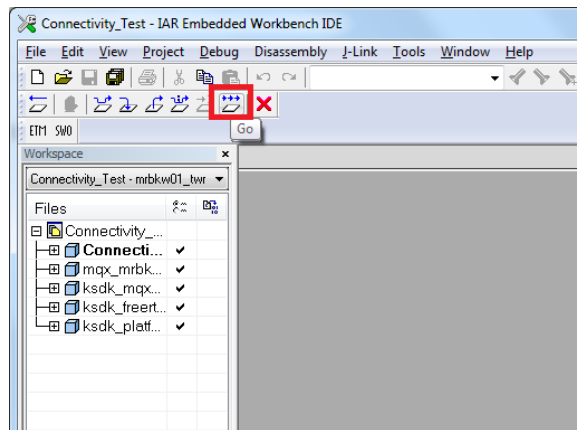
Figure 20: Connectivity Test Application resuming execution

Step 5:

The application displays a logo screen and waits for user intervention. When the [ENTER] key is pressed, the application will show the main menu. If any other key is pressed, the logo screen is redisplayed with on-screen instructions.
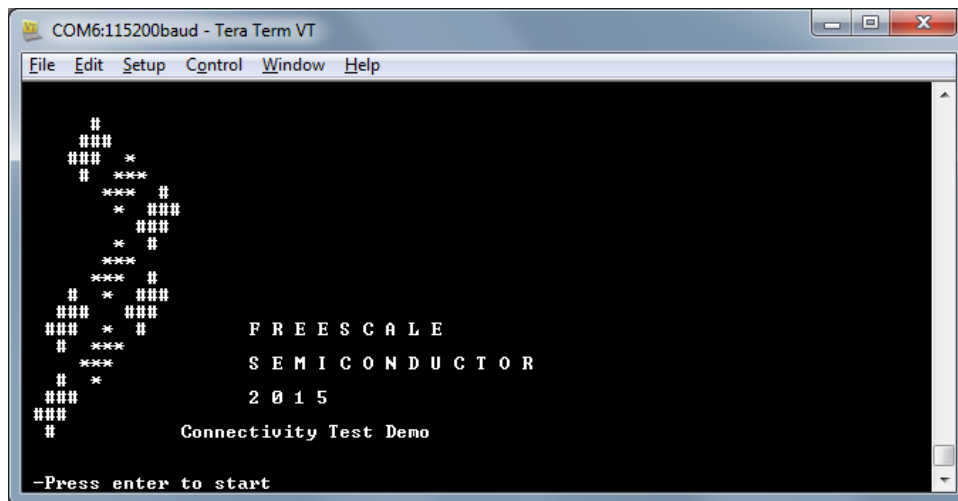
Figure 21: Connectivity Test after reset or after pressing any key except [ENTER] (return) key

Figure 22: : Connectivity Test after pressing the [ENTER] (return) key

To start any test, you can follow the on-screen instructions. In case a test needs a second MRB-KW01 platform, redo the previous steps to connect to the PC, flash and run the application on it.

The previous section demonstrates only the basic steps to run a demo application. For detailed information about the demo applications themselves, please refer the Demo Applications User's Guide included in the installer (*MKW01SMACDAUG.pdf*).

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