IS2083

IS2083 SDK Debugger User's Guide

Introduction

This document describes how to use the SEGGER JLINK debugger to enable software debugging of 8051 MCU core that is part of the IS2083BM. The SEGGER debugger makes use of IS2083BM 2-wire JTAG interface to download 8051 firmware images into IS2083BM SQI flash. It then controls the IS2083BM SQI CPU register to provide debugging features. The following chapters describe the software and hardware prerequisites, setup and procedure to enter the Debugging mode.

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1. Quick References

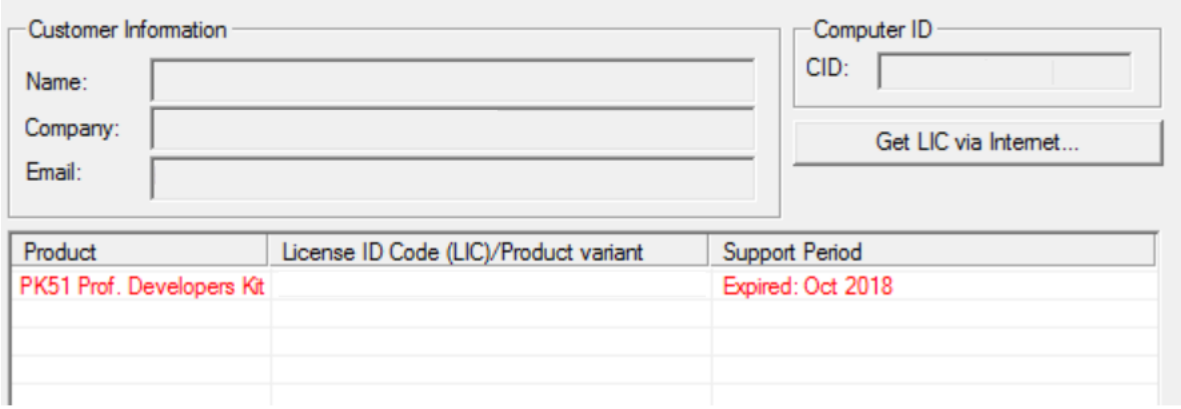
1.1 Reference Documentation

Please go to http://www.microchip.com/IS2083 or http://www.microchip.com/BM83 to get the following documents.

- *IS2083 Bluetooth® Stereo Audio SoC Data Sheet*
- *BM83 Bluetooth® Stereo Audio Module Data Sheet*
- *BM83 Bluetooth® Audio Development Board User's Guide*
- *IS2083 SDK User's Guide*

1.2 Software Prerequisites

- IS2083 Software Development Kit
- isUpdate tool
- Please refer to the *IS2083 SDK User's Guide* Section 1.2 to know what Keil® µVision® version should be used. Furthermore, please be sure your PK51 license is valid in the support period. If your license expires on or before the support period, Keil C51 may not allow you to use the debugger support. It depends on if your license expiration date is on or before the C51 release date. For example, C51 9.59 released in May 2018. If your license expired before that, you cannot use the debugger with C51 9.59. On the other hand, if your license expired after May 2018, you can still use the debugger support. For example, the figure below shows that this license has expired, but it can still work with C51 9.59 because it is after May 2018.



  - The following DLL files enable debugging in the IS2083BM using Keil µVision:
    - JLinkARM.dll
    - JLinkIS2083.dll
  - Initsession.ini – this file stops the Keil µVision at the first execution of SDK.

  Note: The DLL files and Initsession.ini file are available in the following folder: release-package at http://www.microchip.com/IS2083 or http://www.microchip.com/BM83.
- J-Link Commander (folder path: \Software\Debugger Support\Commander)
  - An executable command prompt to check if J-Link probes can communicate with the IS2083BM.

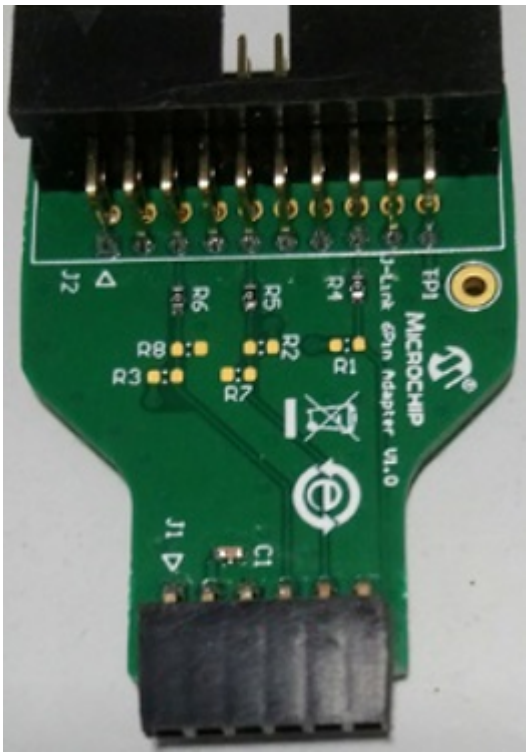
1.3 Hardware Prerequisites

- SEGGER J-Link Debug Probe

Figure 1-1. J-Link Debug Probe

  - J-Link PRO, J-Link ULTRA+, J-Link PLUS and J-Link BASE.
- BM83 EVB
  - BM83 EVB provides a two-wire JTAG interface to communicate with the IS2083BM.
- J-Link 6-pin adapter from Microchip

Figure 1-2. J-Link 6-pin Adapter



2. Software Setup

This section describes the setup procedure of Keil uVision and IS2083 SDK to work with the debug probes.

2.1 Keil µVision Setup

This section describes the step-by-step procedure for Keil µVision setup. The user needs to first set up µVision and connect to J-Link debug probes and later to the BM83 EVB. See 3.1 J-Link Probes Connection.

2.1.1 File Settings

Visit the Keil website to download and install the required Keil C51 (See *IS2083 SDK User Guide, Section 1.2, Software Prerequisites* for the latest SDK Keil supported version.).

IS2083 SDK requires a specific Keil µVision tool to compile and operate with J-Link probes. The `.dll` files customized for SEGGER J-Link debugger allows Keil µVision to communicate with the IS2083BM through J-Link probe.

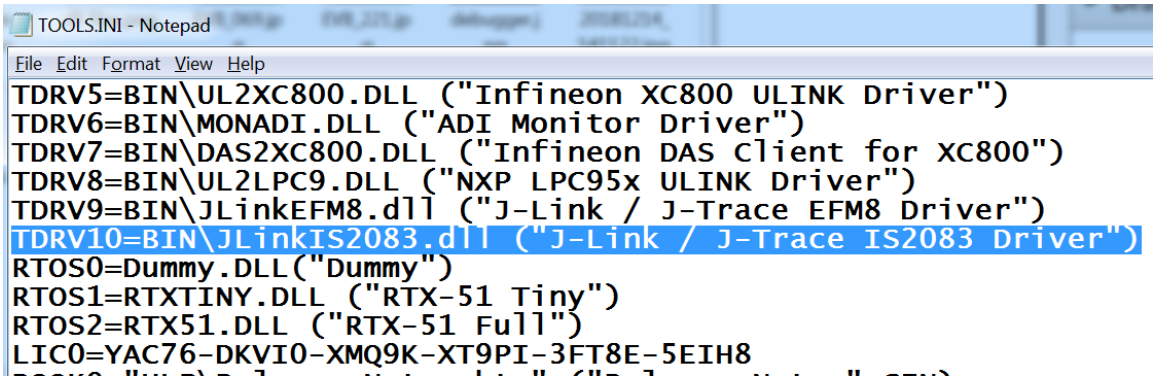
Note: After Keil µVision installation, ensure that it is not running.

Keil C51 v9.59 requires the following steps, 1 to 3 for file settings. The version v9.60 and above contains the DLL files. Perform only step 3 for Keil C51 v9.60 and above.

Perform the following steps for the setup:

1. Go to `C:\Keil_v5\` and use the text editor to open the `TOOLS.INI` file.
2. Insert the text `TDRV10=BIN\JLinkIS2083.dll` (`J-Link / J-Trace IS2083 Driver`) into the file as shown below:

Figure 2-1. TOOLS.INI



3. Go to `C:\Keil_v5\C51\BIN` and copy the following files from the debug package to the directory:
   - JLinkIS2083.dll
   - JLinkARM.dll

2.1.2 Debug Settings

After verifying the J-link connection and Keil file settings, unplug and plug in the power cord to reset the IS2083BM. This turns the J-Link LED to steady green.

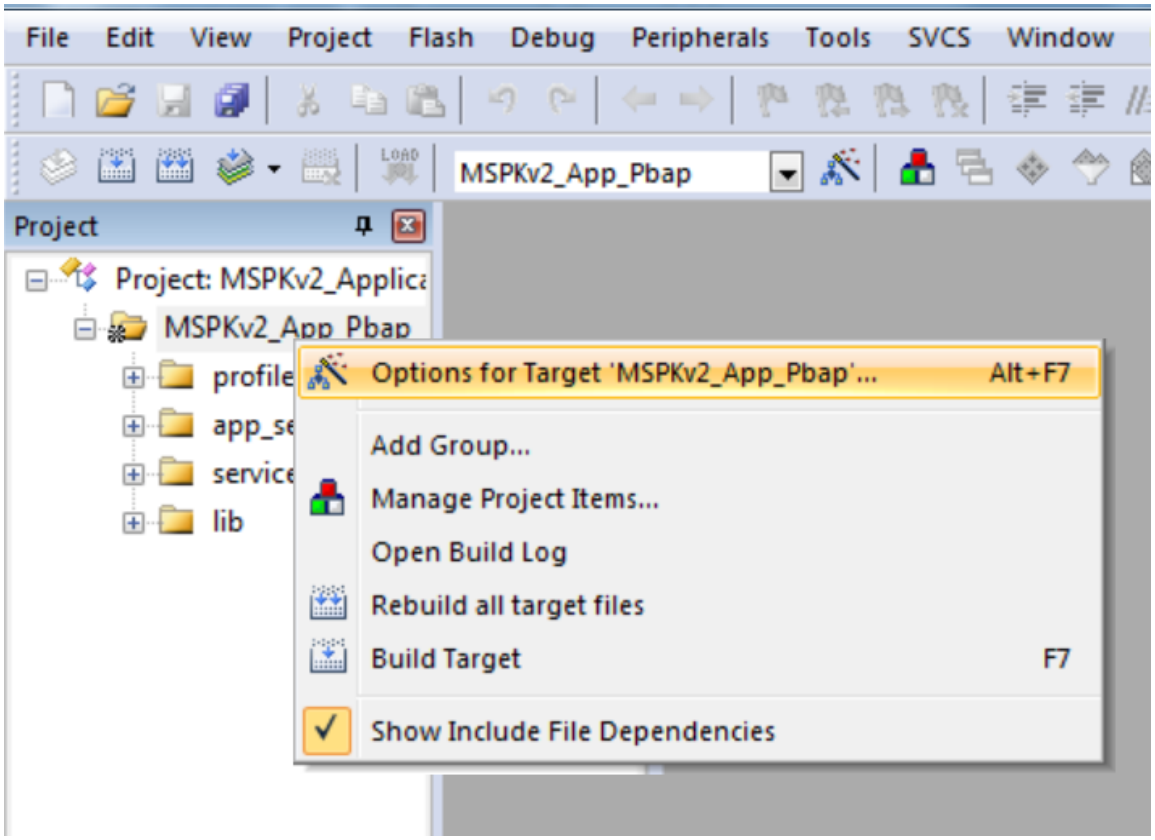
Perform the following steps for debug settings:

1. Launch Keil µVision and double click **MSPKv2_Application_IS2083B.uvproj** and Keil uVision automatically loads these SDK project files:
   - MSPKv2_App_Pbap
   - MSPKv2_App_MSPK
   - MSPKv2_App_Basic

– MSPKv2_App_MSPK_Debug

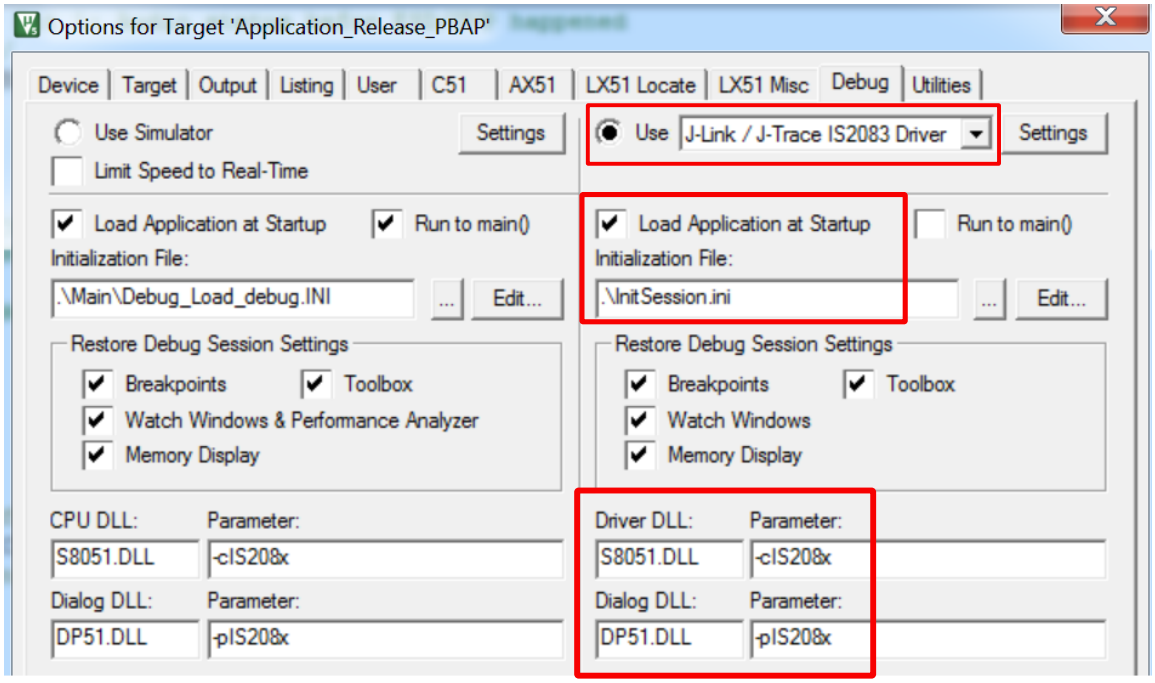
2. For each of the projects, right-click the "Options for Target."

Figure 2-2. Build Target



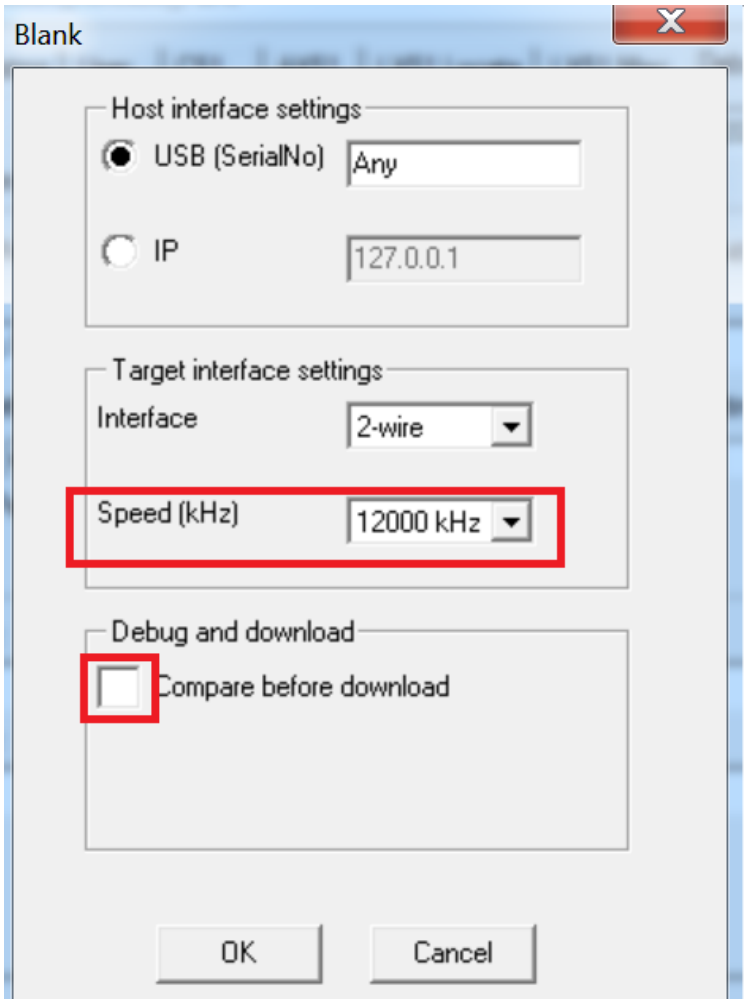
3. In the **Debug** tab, select the highlighted parameters for setup. Replace `S8051.DLL` with `-cIS208x` and `DP51.DLL` with `-pIS208x`. Load the `InitSession.ini` file in “Initialization File” and select the “Load Application Setup” checkbox.

Figure 2-3. Options for Target



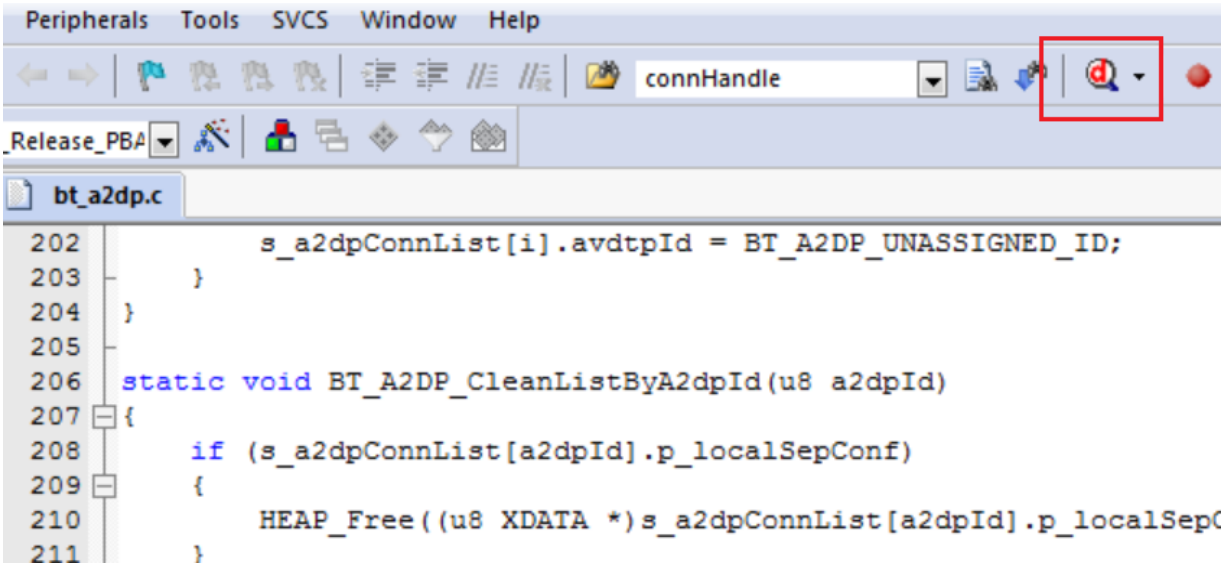
4. Click the **Settings** button.
5. Select “Speed” as *12000 kHz* and deselect the checkbox "Compare before download". Click **OK**.

Figure 2-4. Debug Settings



6. To build the application and start a debug session, click  . Keil µVision is now ready to debug the IS2083BM device.

Figure 2-5. Debugging Session



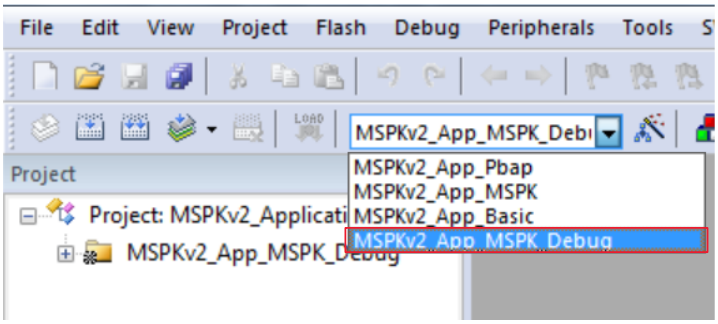
2.2 SDK Settings

The 2-wire JTAG debug port (i.e. P1_2 and P1_3) on IS2083BM is multiplexed with I2C function. Before debugging, the user must enable the buildoption ENABLE_JTAG_DEBUG. This enables SW I2C and disables Low Power mode for the debugger to run properly. The user can select **MSPKv2_App_MSPK_Debug** project target, which includes ENABLE_JTAG_DEBUG buildoption.

ENABLE_JTAG_DEBUG uses SW I2C port (P2_3 and P2_6 by default) instead of HW I2C. SDK enables Low Power mode, which turns off the debugger clock and then disconnects the debugger. ENABLE_JTAG_DEBUG is used to disable the Low Power mode to avoid this. Refer to the *IS2083 Bluetooth® Stereo Audio SoC Data Sheet* for more details on JTAG program and debug feature.

For information on which SDK features are included in MSPKv2_App_MSPK_Debug project, see the *IS2083 SDK User's Guide,* Section 2.2, and Table 2-1.

Figure 2-6. Target Build



3. Hardware Connection

The section describes the procedure to connect the BM83 EVB with the J-Link debug probes.

3.1 J-Link Probes Connection

SEGGER J-Link debug probes can work with Keil µVision to provide software debugging and downloading on the IS2083BM.

Perform the following steps:

Case 1 – Connecting J-Link Probes to BM83 EVB

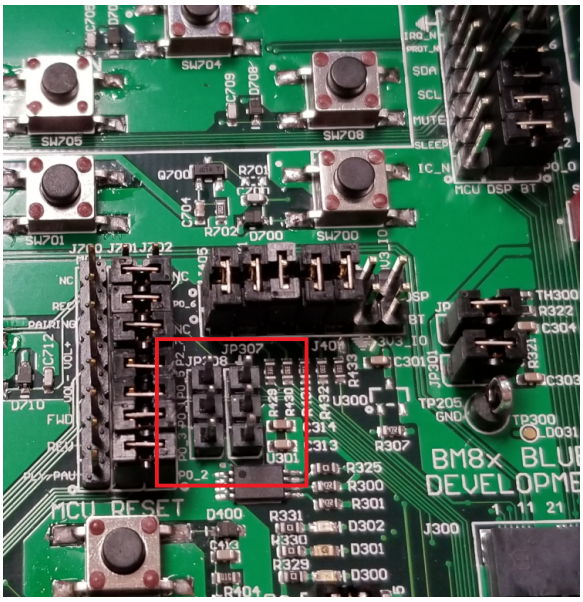
Connect the J-Link, BM83 EVB, and 6-pin adapter as shown in the following figures.

Figure 3-1. J-Link Probes to BM83 EVB Connection

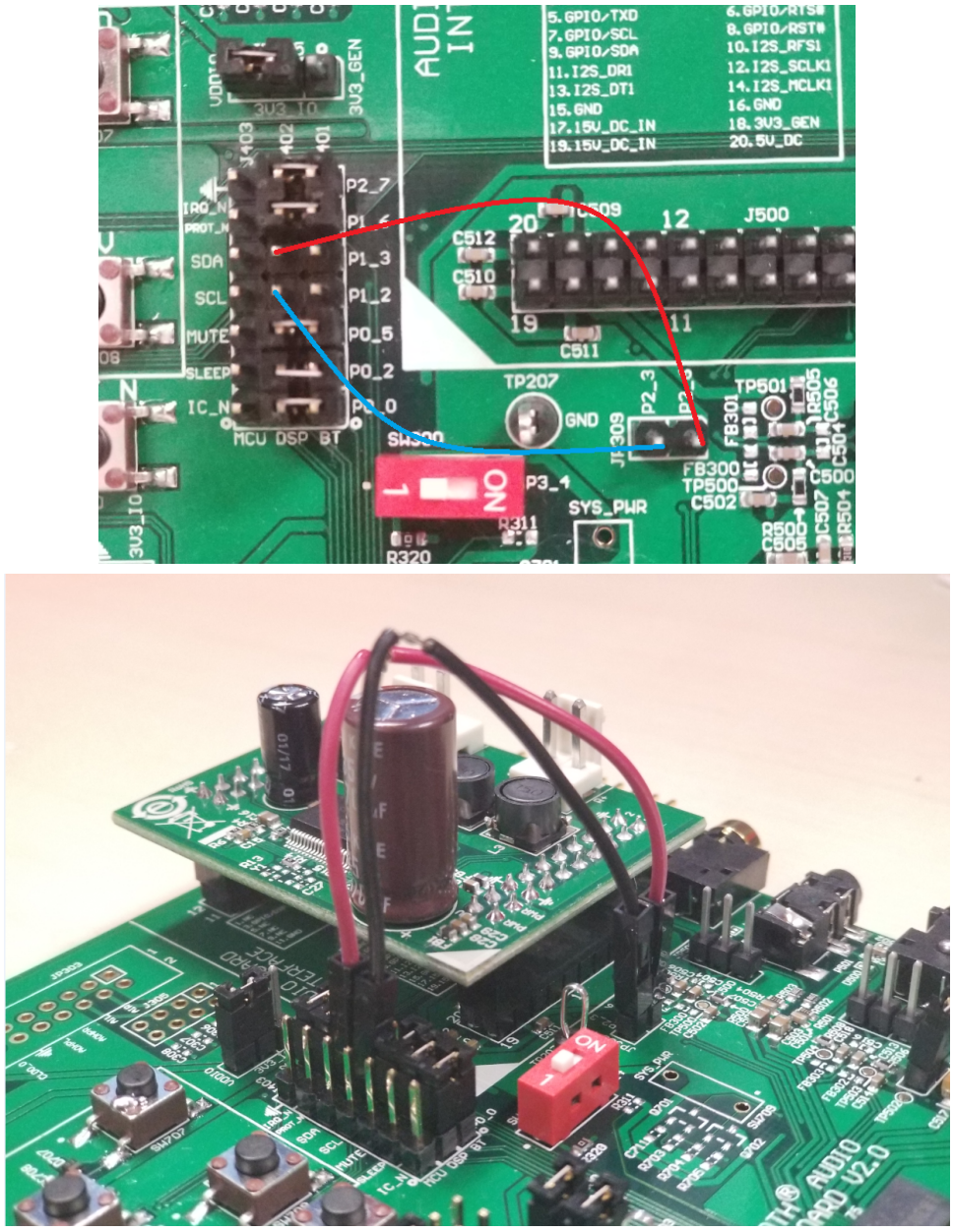
Be sure to have the correct orientation while inserting the 6-pin adapter to a BM83 EVB.

Figure 3-2. 6-pin Adapter Connection

Be sure to unplug jumpers in-between JP307 and JP308 so the HW-I2C interface will not be used:

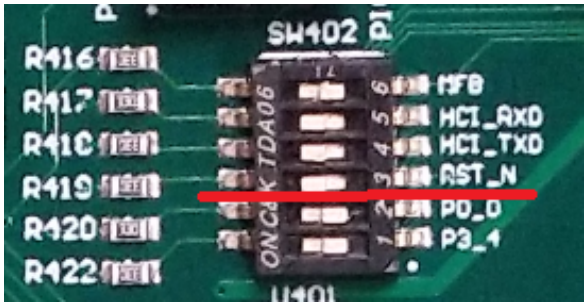


In order to use Embedded mode, please connect P2_6 of JP309 to P1_3 of JP402, P2_3 of JP309 to P1_2 of JP402. Then IS2083BM can communicate with ST codec over SW I2C.



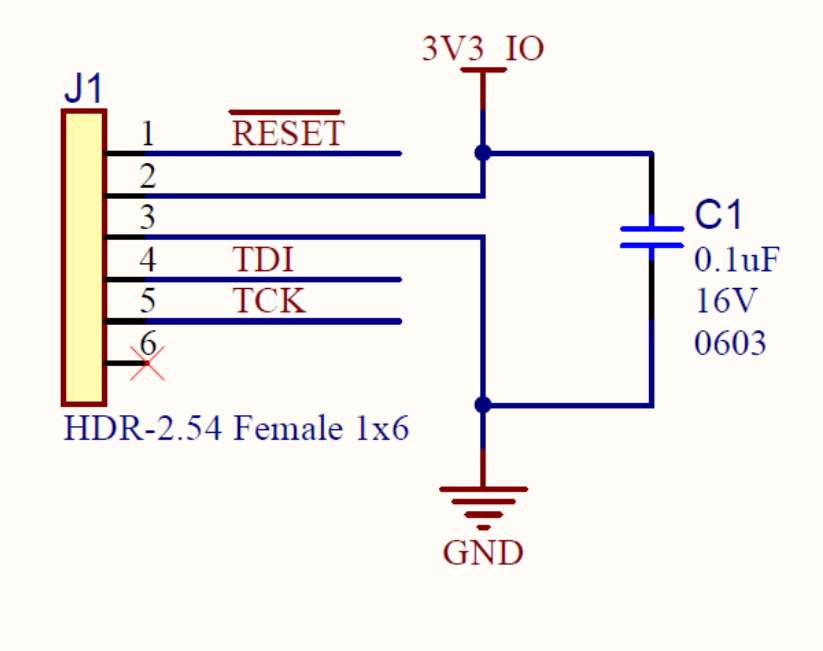
Ensure that RST_N of SW402 on BM83 EVB is connected to the BM83 module. J-Link uses this pin to reset the debugger.

Figure 3-3. RST_N Connection to BM83 Module



Case 2 – Connecting J-Link Probes to application board with IS2083BM

Figure 3-4. J-Link 6-pins connector schematic



Connect the following pins from your board to the 6pins connector:

Table 3-1. Pin details for the IS2083BM/BM83 board

J-Link 6pin Connector	BM83	IS2083BM	Description
Pin1	Pin43, RST_N	RST_N	Reset IS2083BM
Pin2	3V3	3V3_IO	3V3 power
Pin3	Ground	Ground	Ground
Pin4	Pin46, TDI_CPU	TDI_CPU	Data
Pin5	Pin47, TCK_CPU	TCK_CPU	Clock
Pin6	NC	NC	Not used

4. Start Debugging

The section describes the procedure for IS2083BM file configuration and starting of the debugging on Keil uVision.

4.1 Enabling Debug Mode

SEGGER J-Link debugger downloads the 8051 image and automatically updates the Flash header in the IS2083BM. Pre-program the IS2083BM device with voice prompt, UI Config and DSP images before using the debugger. It is recommended to pre-program with the demo package, which contains the following files:

- Embedded mode – `Demo_Package_Embedded_Mode_RTP.hex`
- Host mode – `Demo_Package_MCU_Mode_RTP.hex`

Choose one of them according to your desired application mode. Please refer to the *BM83 Bluetooth® Audio Development Board User's Guide* for how to download the image with tools.

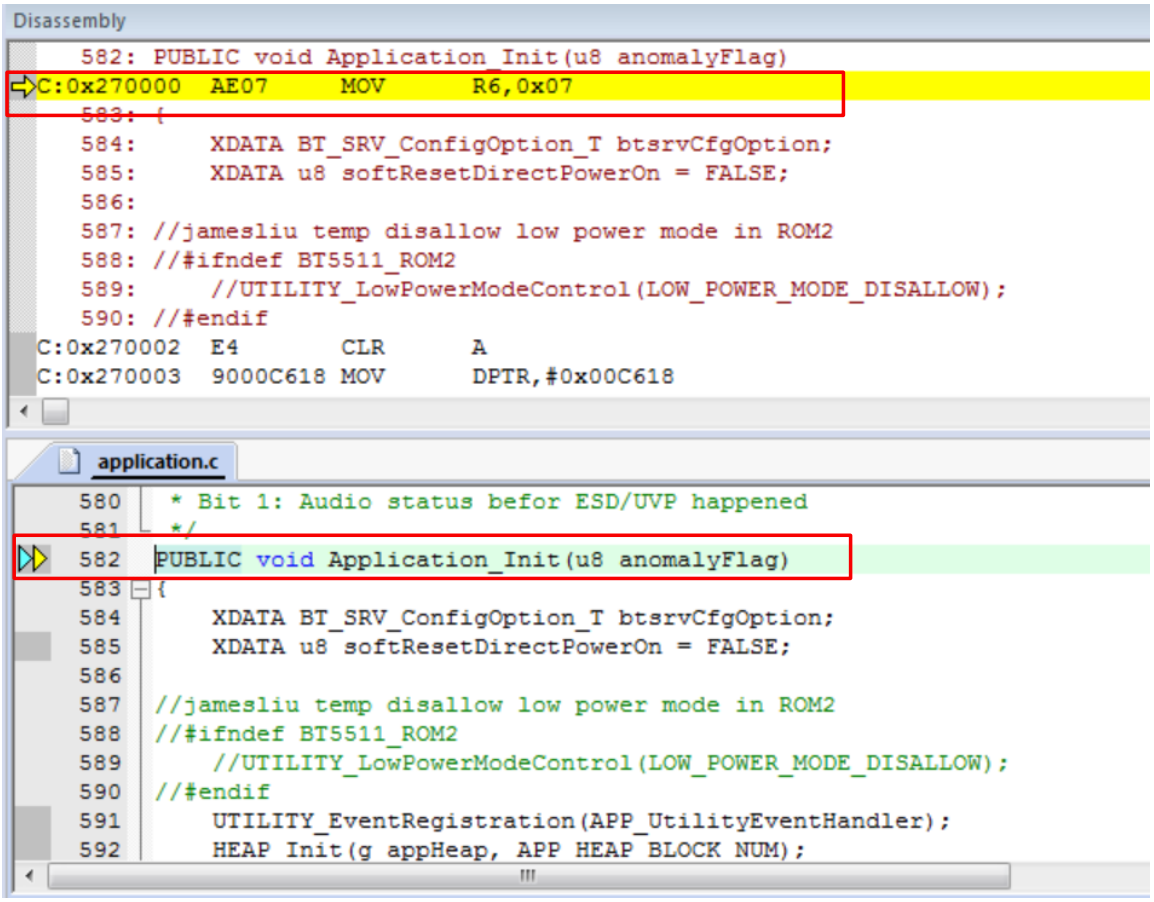
Perform the following steps to enable Debugging mode:

1. In the Keil uVision tool, select and build "MSPKv2_App_MSPK_debug".
2. Click the

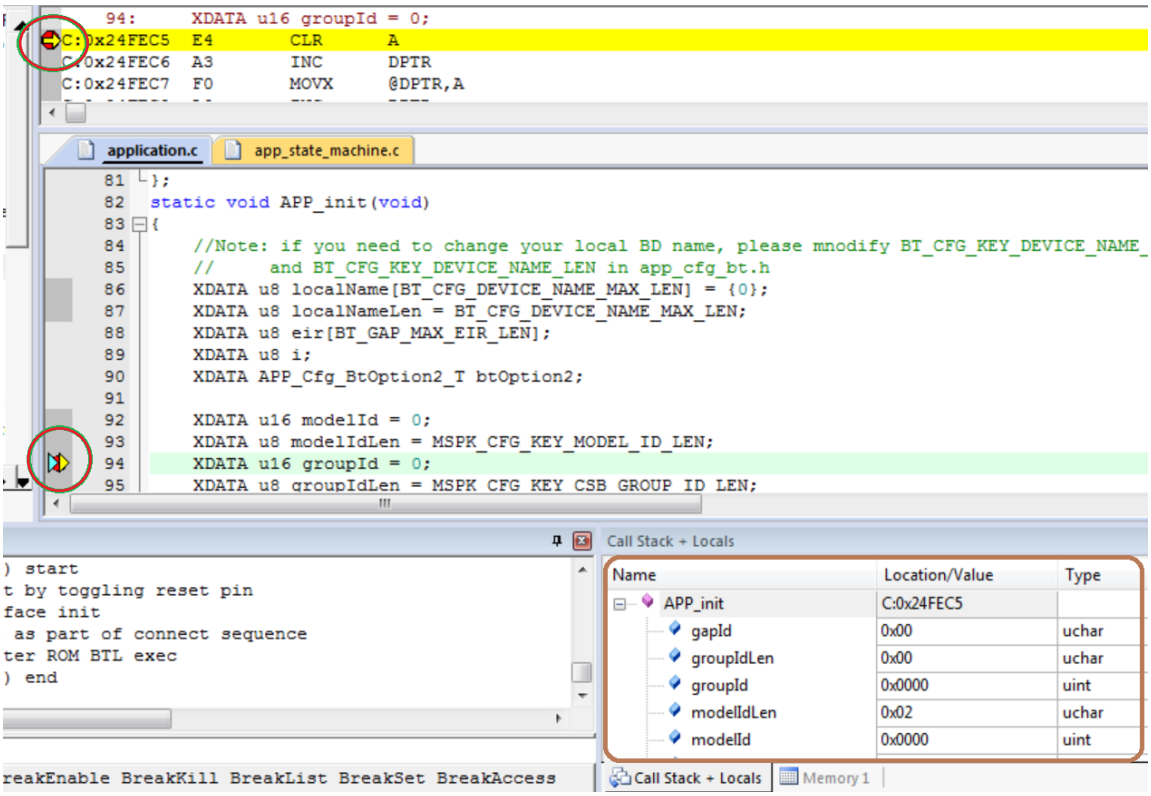
   icon or go to *Debug* > *Start/Stop Debug Session* for debugging. Keil µVision uses the DLL files to communicate to the IS2083BM and then access Flash. J-Link checks for the Flash header and downloads the complied 8051 images at the correct bank.
3. After Flash, the program counter stops at `0x27_0000`, which is the `Application_Init`. This is the first function that the application code can execute.
   During debugging, 8051 MCU will be halted, once the program counter hits the breakpoint. Program ROM is suspended and the Bluetooth connection is dropped simultaneously.

Figure 4-1. Application_Init



4. The following example shows how to add a breakpoint in the function App_init. When the user runs the debugger, it stops at line94 and Keil µVision provides the local variable of `APP_init` at the right-hand side. The user can investigate the global variable by using the Watch window.

Figure 4-2. Watch Window



5. Document Revision History

Revision	Date	Section	Description
A	07/2019	Document	Initial Revision

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