Keil MDK Configuration Guide for Atmosic SDK

Revision History

Date	Version	Description
October 29, 2019	0.50	For SDK 20191029 Release.
February 14, 2020	0.51	For SDK 20200214 Release.
March 13, 2020	0.52	For SDK 20200313 Release.
November 23, 2020	0.53	For SDK 3.0.0 Release.
March 31, 2021	0.54	For SDK 4.0.0 Release.
April 14, 2021	0.55	Updated format, no content change.

Table of Contents

List of Figures

List of Tables

Overview

This document provides the installation and configuration required to use Keil MDK for Atmosic SDK on Windows platform.

Prerequisite

1. Atmosic SDK
2. Atmosic Evaluation Board and Interface Board
3. JLink device (SWD Interface)
4. Keil MDK-Lite (free version)
5. GNU Tools ARM Embedded

Limitation

1. All examples have a Keil project for the GNU gcc compiler. Its folder is named keilauto.
2. Keil MDK IDE can build and download application code into flash. If you want a full tool chain of SDK on J-Link Debug Probes.(like programming Flash NVDS data, OTP and pull flash/OTP data...etc). Refer to Using J-Link Debug Probes with Openocd.

Toolchain

1. JLink Tool Kit (https://www.segger.com/downloads/jlink/JLink_Windows_beta.exe)
2. MDK (https://www.keil.com/demo/eval/arm.htm) (v5.28.0.0)
3. GNU Tools ARM Embedded (https://developer.arm.com/tools-and-software/open-source-software/developer-tools/gnu-toolchain/gnu-rm/downloads) (8-2019-q3-update)

Installation

1. Download the Atmosic SDK and follow the REAMDE to setup Universal Serial Bus device (can ignore this if using Atmosic SDK Windows Installer)
    a. Libusb-1.0.dll
    b. WinUSB
    c. Viewer for Console Output
    d. Connect mini-USB cable to [USB1] of Interface Board. Confirm "Atmosic RDI USB1" is showing in Windows device manager under USB devices
    e. Connect mini-USB cable to [USB0] of Interface Board. Confirm "Atmosic RDI USB0" is showing in Windows device manager under USB devices
2. J-Link Debug Probes
    a. Insert the JLink device and Install the JLink Tool Kit
    b. Device manager: After successful installation, “J-Link driver” should show up under Universal Serial Bus controllers.

Figure 1 - J-Link Driver Installation Successful

    c. Pin Connection:
        - Atmosic Interface Board V2.x:
          Remove JP18, JP19 and JP22 jumpers on the interface board.

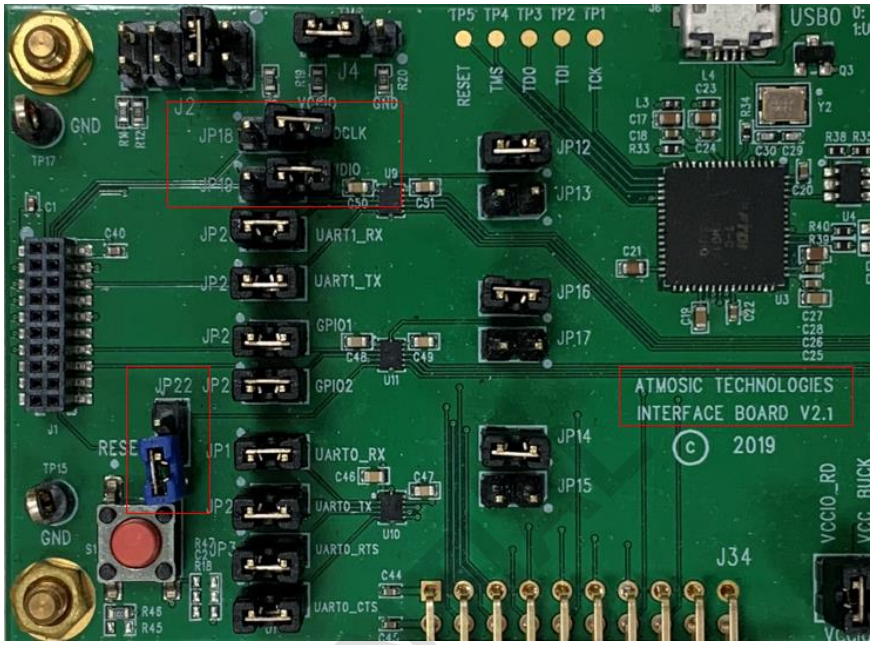

Figure 2 - Interface Board V2.x

Following Table 1 for fly-wired connection.

J-Link Pin	Interface Board	EVB
SWDCLK	JP18	N/A
SWDIO	JP19	N/A
GND	N/A	J4 Pin1
VREF	N/A	J4 Pin2
TDI	N/A	J4 Pin47
RTCK	N/A	J4 Pin49

Table 1 - Fly-wired Connection

- Atmosic Interface Board V3.x:
  Remove JP18, JP19 and JP22 jumpers on the interface board.
  Connect J-Link Adapter to J-Link socket of interface board.

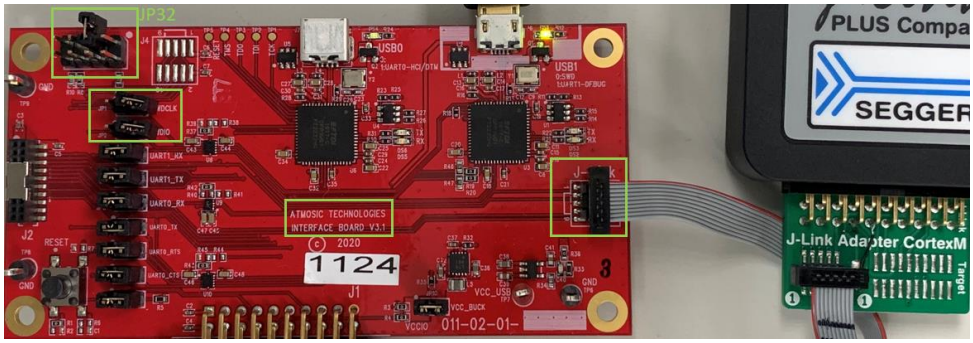

Figure 3 - Interface Board V3.x

3. Install ARM Keil MDK-Lite
4. Install GNU Tools ARM Embedded (can ignore this if using Atmosic SDK Windows Installer)
   Add the toolchain path to the user or system path
5. Flash Loader(can ignore this if using Atmosic SDK Windows Installer)
   a. Copy JLinkDevices.xml from [atmosic SDK\tools\keil] to [C:\Program Files (x86)\SEGGER\JLink]
   b. Copy atmx_flash.flm and atmx_nvds.flm from [atmosic SDK\tools\keil] to [C:\Program Files (x86)\SEGGER\JLink\Devices\Atmosic\atmx]
   c. Copy atmx_flash.FLM and atmx_nvds.FLM from [atmosic SDK\tools\keil] to [C:\Keil_v5\ARM\Flash]
6. Open Keil project file with GNU toolchain
   a. GNU toolchain
      i. Open example.uvprojx of [atmosic SDK\platform\atm[2,3]\ATM2xxx-xxx\examples\xxx\keilauto

Build Example and Program

1. Program Flash NVDS data for each example(refer to Flash NVDS Writer)
2. Example project (under keilauto folder)

3. Edit/Compile/Program/Debug Code at Keil IDE

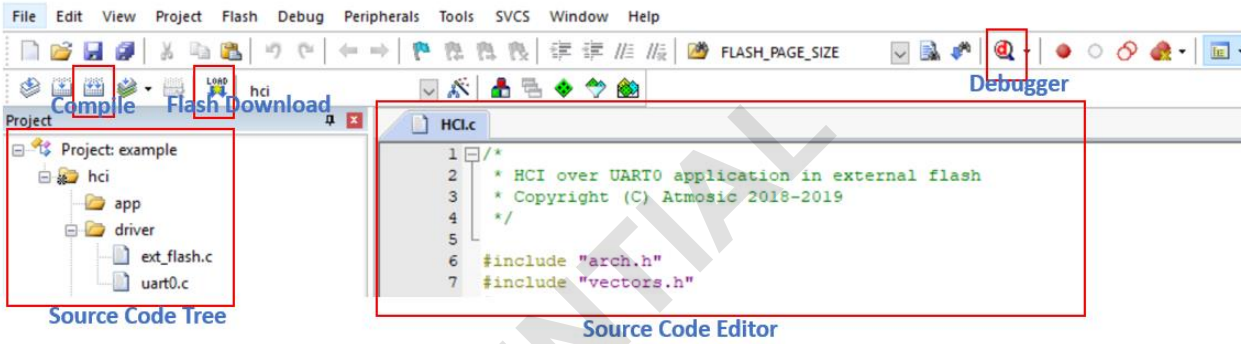

Figure 4 - Keil MDK IDE GUI

4. Run time debugger

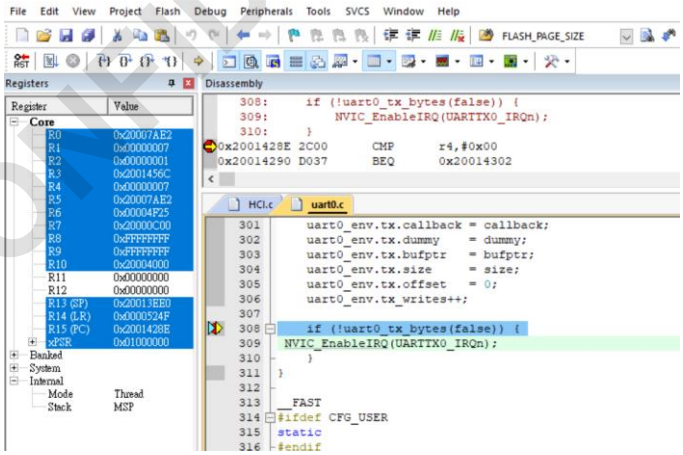

Figure 5 - Debug Session

Use GCC Compiler in Keil uVersion: (Only for GCC)

When creating a new keil project, follow the steps below to select GNU GCC compiler:

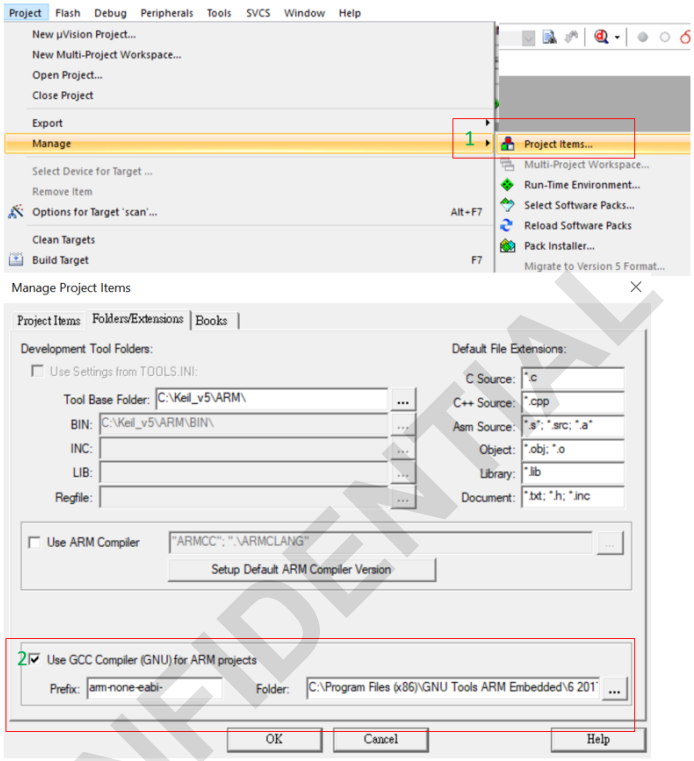

Figure 6 - Select Compiler

Add Flash Programming Algorithm in Keil uVersion

When creating a new keil project, follow the steps below to select a flash programming algorithm.

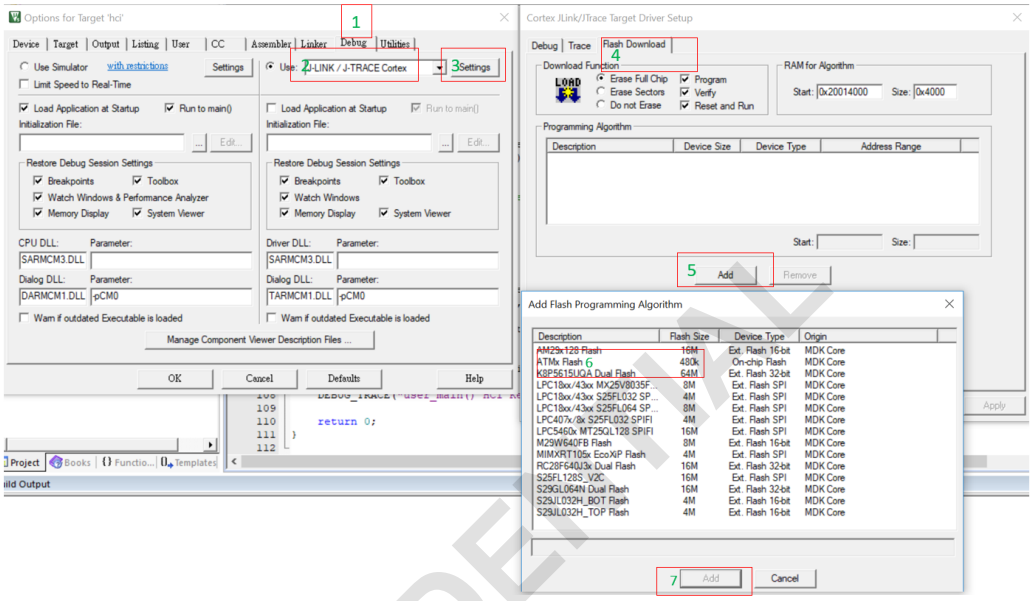

Figure 7 - Add Flash Loader

Release Build

1. Open the “Option of Target” dialog of Keil IDE and select CC tab page.
    - Remove “CFB_DBG” of “Preprocessor Symbols Define”
    - Modify compile option (Misc Controls): remove “-g3” and use “-flto”
2. Open the “Option for Target” dialog of Keil IDE and select Linker tag page. Add compile option (Misc Controls): “-flto”

Flash NVDS Writer

Each keilauto folder of example will have the **atmosic_nvds.bat** batch file. It will use the flash_nvds.bin as input. Use the SDK toolchain to generate the flash_nvds.bin (`make build_flash_nvds; dd if=/dev/zero ibs=1 count=4096 | tr '\000' '\377' >> flash_nvds.bin ; truncate flash_nvds.bin -s 4096`) then run this batch file.
Note: The step of generating the .bin is not needed when using SDK Release 4.0.0 or newer as it is part of the updated atmosic_nvds.bat.

This batch file can be added into keil’s customize tools menu as in Figure 8.

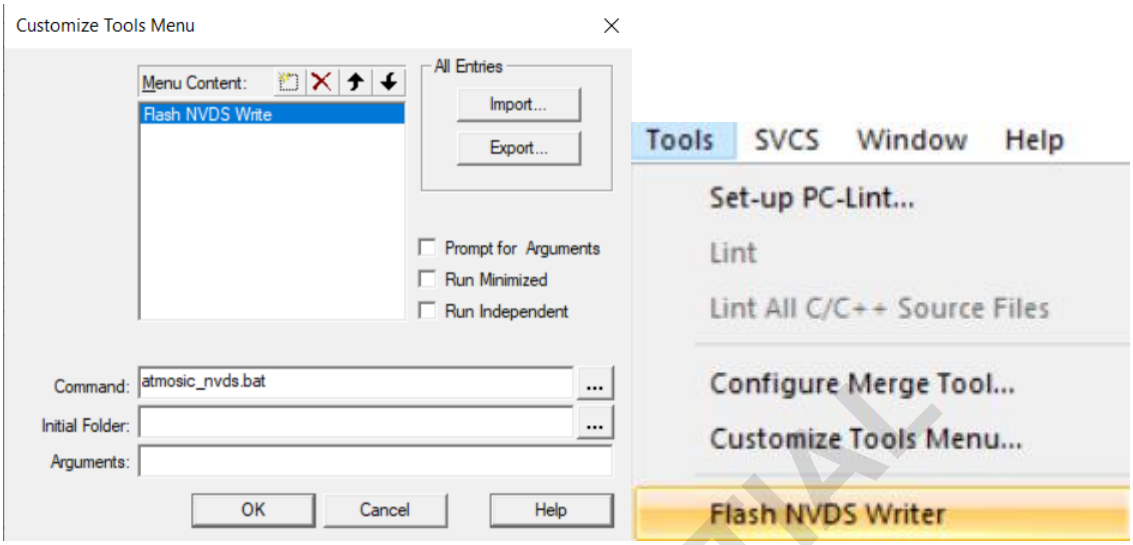

Figure 8 - Customize Tools Menu

Using J-Link Debug Probes with Openocd

Atmosic SDK tool chain consists of many makefile targets. It can be used on J-Link Debug Probes just as the Atmosic Interface Board's SWD interface. "Zadig" can be used to replace the J-Link driver for the WinUSB driver.

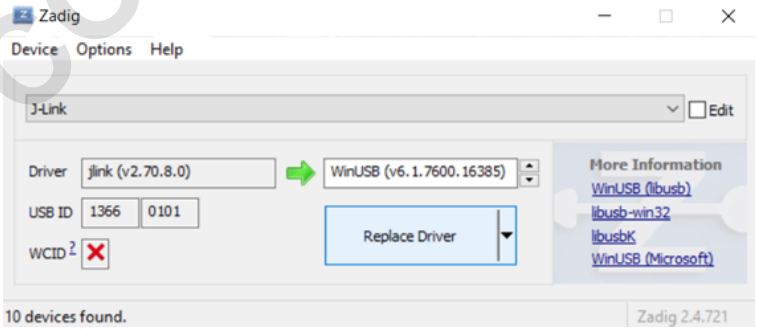

Figure 9 - Zadig Driver Replacement

After successful installation, J-Link device configuration will move to "Universal Serial Bus devices"

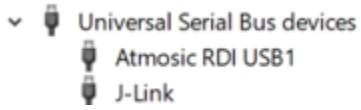

Figure 10 - Zadig Driver Installation Successfully

The usage of Makefile helper targets are the same, just appends “SWDIF=JLINK” for each command. (for example: make run_all **SWDIF=JLINK**)

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