

Introduction

ABOV Starter Kit is an Arm Cortex-M core based 32-bit microcontroller development board that allows anyone to easily understand the functions of the ABOV 32-bit microcontroller and quickly develop prototypes using the ABOV 32-bit microcontroller.

The ABOV 32-bit Starter Kit Board comes with a software package that provides examples operating seamlessly in the IAR EWARM or Keil MDK-ARM IDE. The I/Os on the Starter Kit board enable you to extend the functionality and the A-Link board, which is connected to the Starter Kit, eliminates the need for an additional debugger interface.

This document describes how to use the ABOV 32-bit Cortex-Mx Starter Kit and how to operate the example code LED_Blinky on the Starter Kit.

Reference Document

The following documents are available on www.abovsemi.com.

- Datasheet for 32-bit Microcontroller
- User's Manual for 32-bit Microcontroller
- Starter Kit Manual, Schematic, and PCB file:
 - https://www.abov.co.kr/kr/tools_support/evaluation_tools.php?category=32bit_starter_kit
- Application Note:
 - STD10-AN_Keil Project Setting Guide for 32-bit Microcontroller in Table 1
 - STD10-AN_IAR Project Setting Guide for 32-bit Microcontroller in Table 1

Contents

Introduction.....	1
Reference Document	1
1. User Requirements	5
1.1 Hardware.....	5
1.2 Software	7
1.3 System Requirements.....	7
2. Example: How to Operate LED_Blinky	8
2.1 Preparing the Starter Kit.....	9
2.1.1 Hardware Part of the Starter Kit	9
2.2 Setting up the Starter Kit	10
2.2.1 Set Jumpers to Control the Starter Kit.....	10
2.3 Connecting the Starter Kit to Computer	11
2.3.1 Connect Host Computer via USB on the Starter Kit.....	11
2.3.2 Hardware Driver Installation	11
2.4 Opening the LED_Blinky Project.....	12
2.5 Compiling the LED_Blinky project.....	16
2.6 Downloading the LED_Blinky Firmware.....	17
2.6.1 Configuration of Debugger	17
2.6.2 Download Firmware.....	18
2.7 Debugging the LED_Blinky Firmware	19
2.8 Running the LED_Blinky on the Starter Kit	20
2.8.1 How to Check the LED Operation	20
Revision History	21

List of Tables

Table 1. Applicable Starter Kit List	6
--------------------------------------------	---

List of Figures

Figure 1. 32-bit Starter Kit Board Example	5
Figure 2. Compiler (Software)	7
Figure 3. Windows Computer and USB Micro-B or Type-C Cable	7
Figure 4. Starter Kit Board	9
Figure 5. Starter Kit Jumpers and Switch	10
Figure 6. Starter Kit and USB Cable Connection	11
Figure 7. Serial Bus Controller Lists at Device Manager	11
Figure 8. Execute Keil uVision5 and Pack Installer Icon	12
Figure 9. Target Device and Example Selection in Pack Installer	13
Figure 10. Create Example Project in Pack Installer	14
Figure 11. Example Project Created by the Pack Installer	15
Figure 12. Compilation Results on LED_Blinky Project	16
Figure 13. Debug Settings for Example Project Options	17
Figure 14. Firmware Download and Verification Result	18
Figure 15. Debugging with A-Link (CMSIS-DAP) Interface	19
Figure 16. Check LED Operation of Starter Kit	20

1. User Requirements

1.1 Hardware

Figure 1. 32-bit Starter Kit Board Example

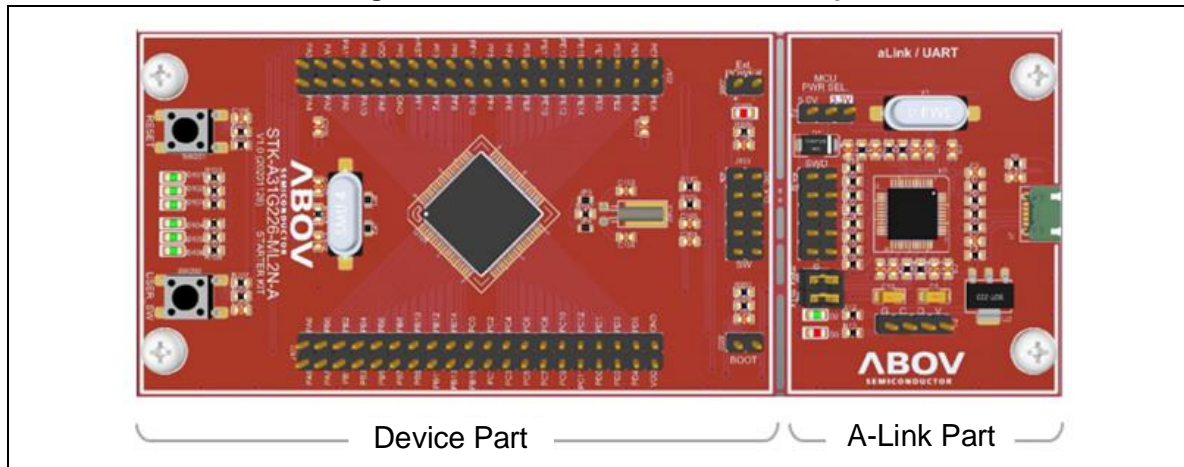


Table 1 shows the available ABOV 32-bit Starter Kit boards based on the Arm Cortex-M microcontroller.

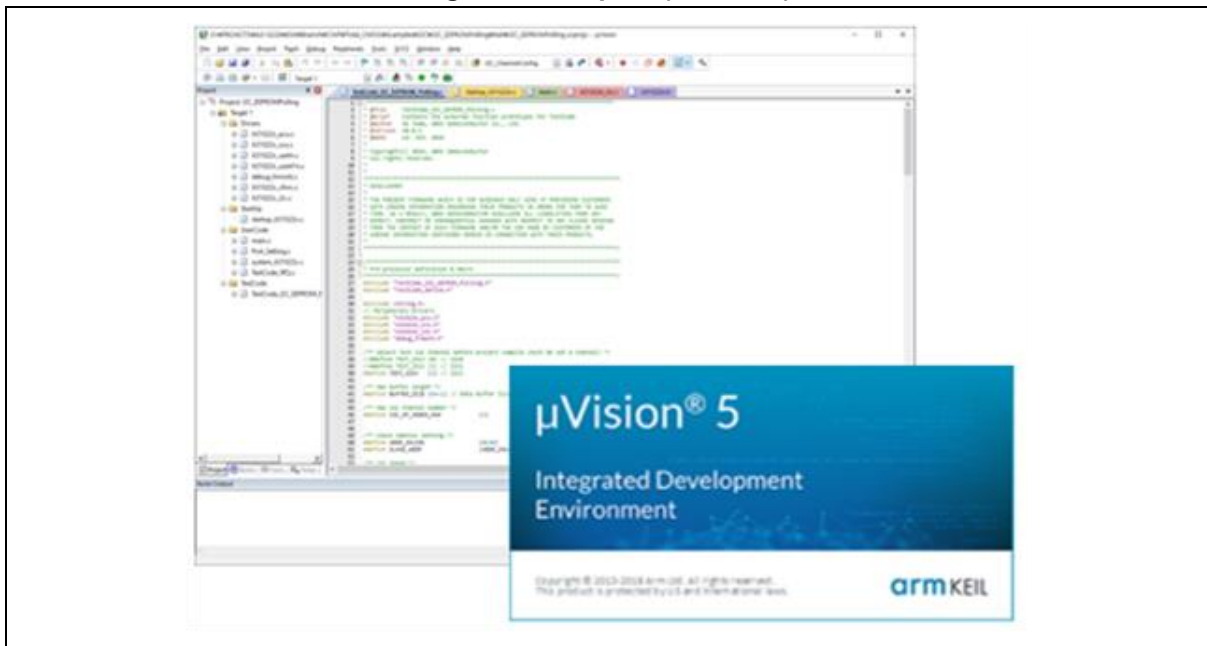
Table 1. Applicable Starter Kit List

Base Product	Order Information	Board Name	Microcontroller
A31G11x	StarterKit_A31G112CL	Starter Kit_A31G112CL	A31L112CLN
A31G12x	StarterKit_A31G123ML	Starter Kit_A31G123ML	A31G223MLN
A31G21x	StarterKit_A31G213CL2N	Starter Kit_A31G213CL2N	A31G213CL2N
A31G31x	StarterKit_A31G314MMN	Starter Kit_A31G314MMN	A31G314MMN
A33G52x	StarterKit_A33G527VQN	Starter Kit_A33G527VQN	A33G527VQN
	StarterKit_A33G526RLN	Starter Kit_A33G526RLN	A33G526RLN
AC30M1x64	StarterKit_AC30M1464	STK-AC30M1464-LBN-A	AC30M1464LBN
AC33Mx064	StarterKit_AC33M4064LBN	STK-AC33M4064-LBN-A	AC33M4064LBN
A34M41x	StarterKit_A34M418VLN	Starter Kit_A34M418VLN	A34M418VLN
	StarterKit_A34M418YLN	Starter Kit_A34M418YLN-A	A34M418YLN
A31G22x	StarterKit_A31G226ML2N	STK-A31G226-ML2N-A	A31G226ML2N
A31G32x	StarterKit_A31G324RLN	STK-A31G324-RLN-A	A31G324RLN
A31L12x	StarterKit_A31L123RLN	STK-A31L123-RLN-A	A31L123RLN
A31L21x	StarterKit_A31L214ML2N	STK-A31L214-ML2N-A	A31L214ML2N
A33M11x	StarterKit_A33M116RLN	STK-A33M116-RLN-A	A33M116RLN
A31R71x	StarterKit_A31R713MLN	STK-A31R713-MLN-A	A31R713MLN
A31T21x	StarterKit-A31T216RLN	STK-A31T216-RLN-A	A31T216RLN
A31L22x	StarterKit_A31L222FR2N	STK-A31L222-FRN-A	A31L222FR2N
A31M22x	StarterKit_A31M223CL2N	STK-A31M223-CL2N-A	A31M223CL2N
A33G53x	StarterKit_A33G539VLN	STK-A33G539-VLN-A	A33G539VLN
A34M420	StarterKit_A34M420YLN	STK-A34M420-YLN-A	A34M420YLN
A34L716	StarterKit_A34L716VLN	STK-A34L716-VLN-A	A34L716VLN

1.2 Software

- ARM-MDK Keil uVision5 IDE
- IAR Embedded Workbench IDE
- Example code
 - LED_Blinky example project for microcontrollers from www.abovsemi.com (for Keil, IAR)
 - LED_Blinky example project from Keil MDK5 software pack installer (for Keil only)

Figure 2. Compiler (Software)



1.3 System Requirements

- Windows Computer (7, 8, 10, 11)
- USB Micro-B or Type-C USB Cable

Figure 3. Windows Computer and USB Micro-B or Type-C Cable



2. Example: How to Operate LED_Blinky

This chapter describes how to operate the example code LED_Blinky in the Keil uVision 5 IDE.

Refer to the documents below for the Keil uVision 5 IDE settings:

- STD10-AN_Keil Project Setting Guide for 32-bit Microcontroller in Table 1
- STD10-AN_IAR Project Setting Guide for 32-bit Microcontroller in Table 1

While learning how to operate the application code (LED_Blinky), you can easily learn how to start the Starter Kit.

In the following sections, perform the steps below for the application code (LED_Blinky) and verify that the LEDs on the board are on and off:

1. Prepare the Starter Kit.
2. Set up the Starter Kit.
3. Connect the Starter Kit to your computer.
4. Open the LED_Blinky project.
5. Compile the LED_Blinky project.
6. Download the LED_Blinky firmware.
7. Debug the LED_Blinky firmware.
8. Run the LED_Blinky on the Starter Kit.

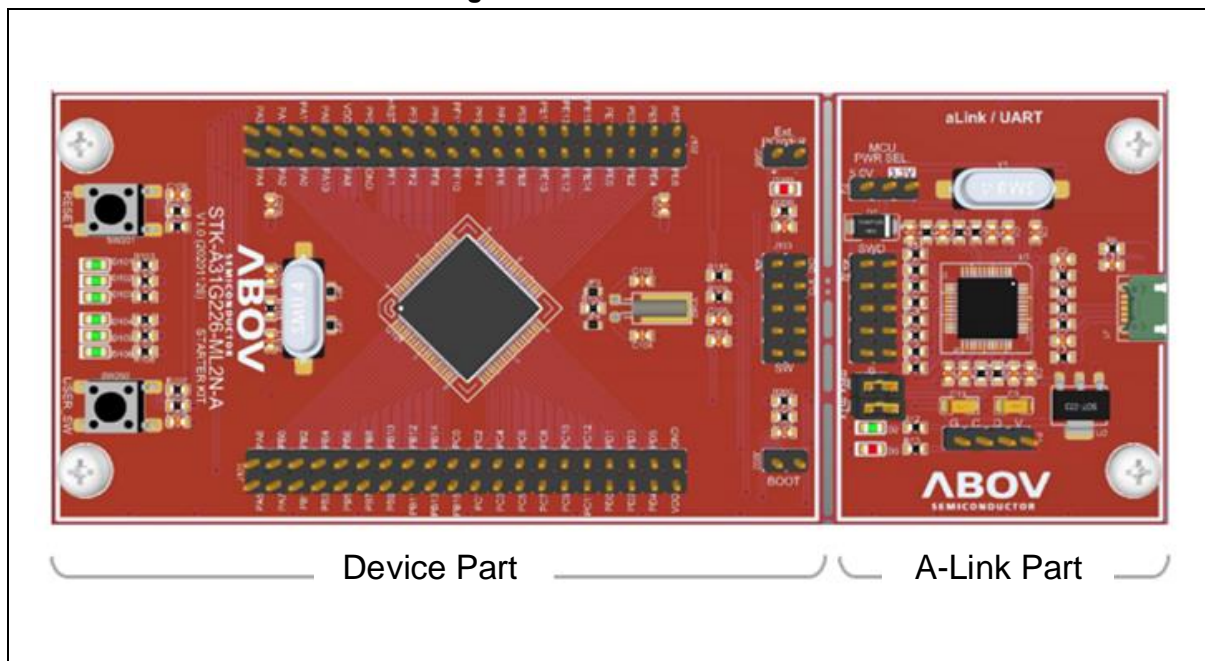
2.1 Preparing the Starter Kit

2.1.1 Hardware Part of the Starter Kit

The Starter Kit consists of a device part and an A-Link debugger part. It is possible to use the A-Link separately as needed.

- Device board configuration
 - ABOV 32-bit microcontroller, X-TAL (optional)
 - Pin headers connected to the microcontroller
 - LEDs and tact button to check input/output
 - Reset button, boot mode selection jumper, debugger connector
- A-Link board configuration
 - CMSIS-DAP compatible debug interface
 - A-Link connects a host computer with ABOV 32-bit microcontroller via USB.
 - USB-to-UART function is included.

Figure 4. Starter Kit Board

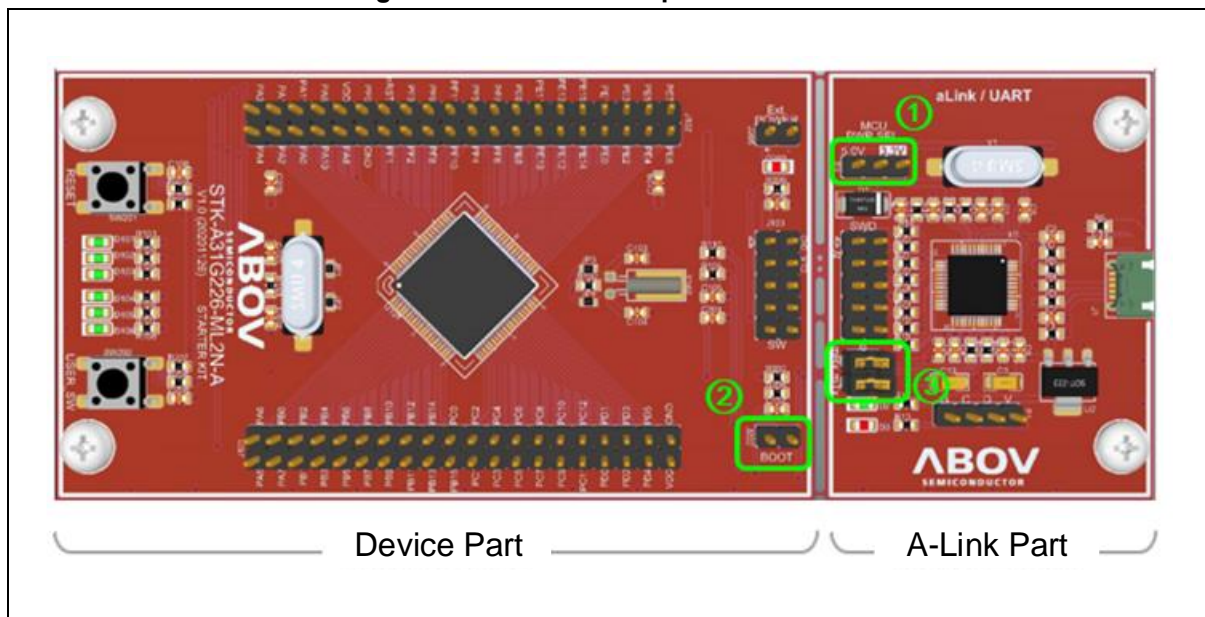


2.2 Setting up the Starter Kit

2.2.1 Set Jumpers to Control the Starter Kit

1. The Starter Kit uses USB power.
 - A. Select 3.3 V or 5.0 V. (Check the maximum operating voltage by referring to the specification sheet.)
2. Boot mode
 - A. Open: User program operating mode (default)
 - B. Short: Boot mode (debugger always enabled)
3. USB-to-UART connector
 - A. Jumpers for using UART via USB on the A-Link part
 - B. Used to connect UART Rx and Tx

Figure 5. Starter Kit Jumpers and Switch



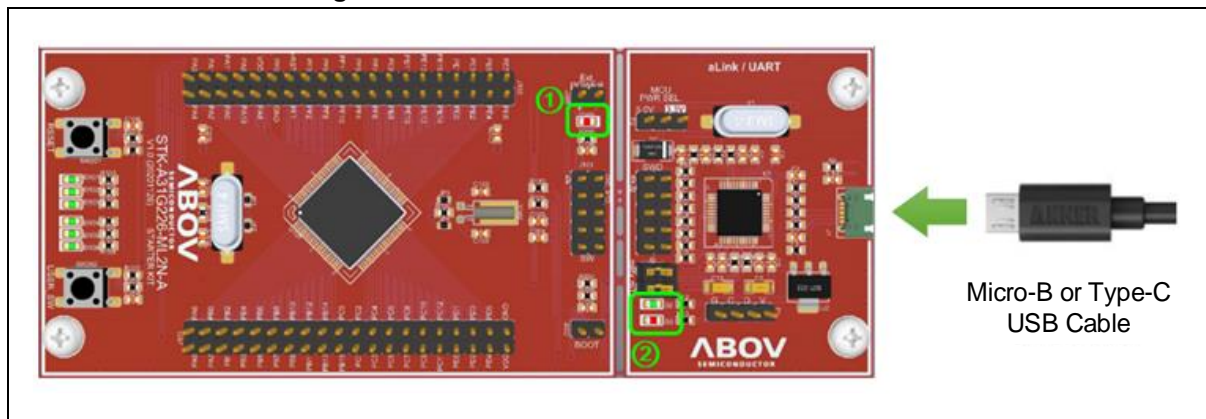
2.3 Connecting the Starter Kit to Computer

2.3.1 Connect Host Computer via USB on the Starter Kit

Connect the USB Micro-B or Type-C cable to the Starter Kit and host computer as shown in Figure 6.

1. If the host computer is properly connected, the power LED on the device board will be turned on.
2. If the host computer is properly connected, the status LED on the built-in A-Link debugger will be also turned on.

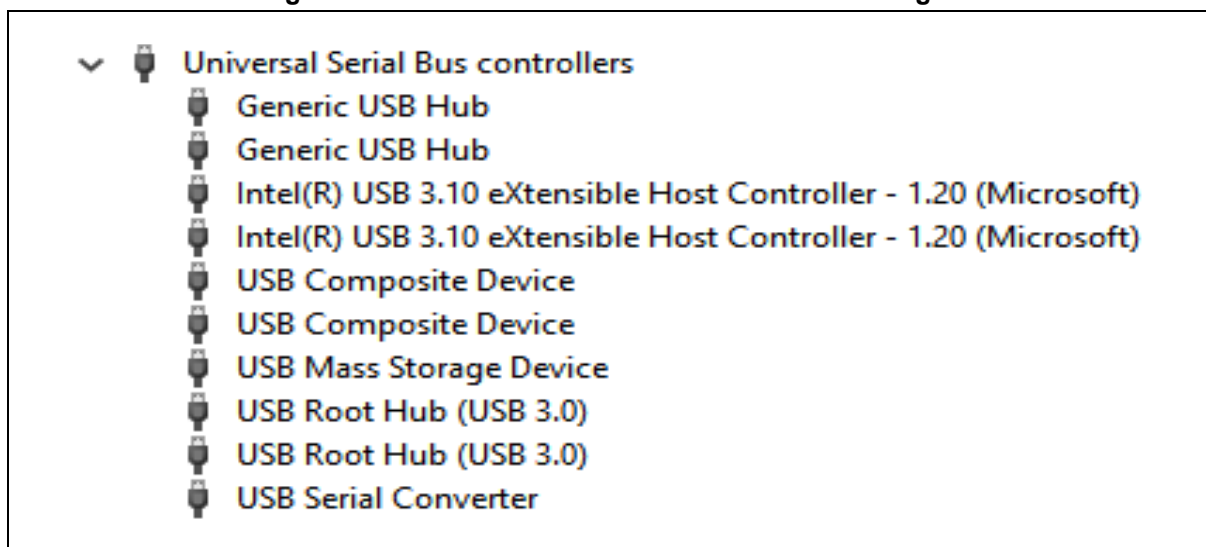
Figure 6. Starter Kit and USB Cable Connection



2.3.2 Hardware Driver Installation

The built-in A-Link debugger uses a USB interface. Once the A-Link debugger is properly connected to the host computer, “USB Composite Device” appears in the Serial Bus Controller list as shown in Figure 7. A-Link does not require driver installation in Windows OS.

Figure 7. Serial Bus Controller Lists at Device Manager

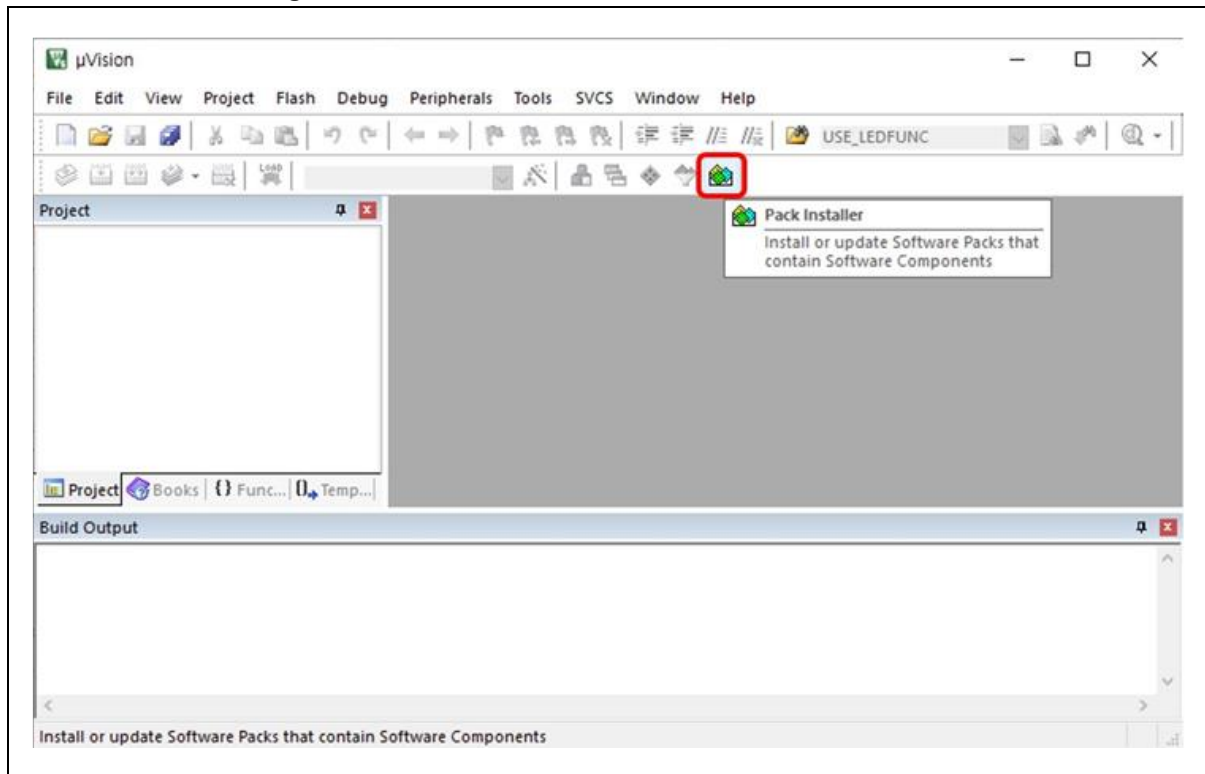


2.4 Opening the LED_Blinky Project

Before downloading the LED_Blinky example, Keil uVision5 software must be installed on the host computer.

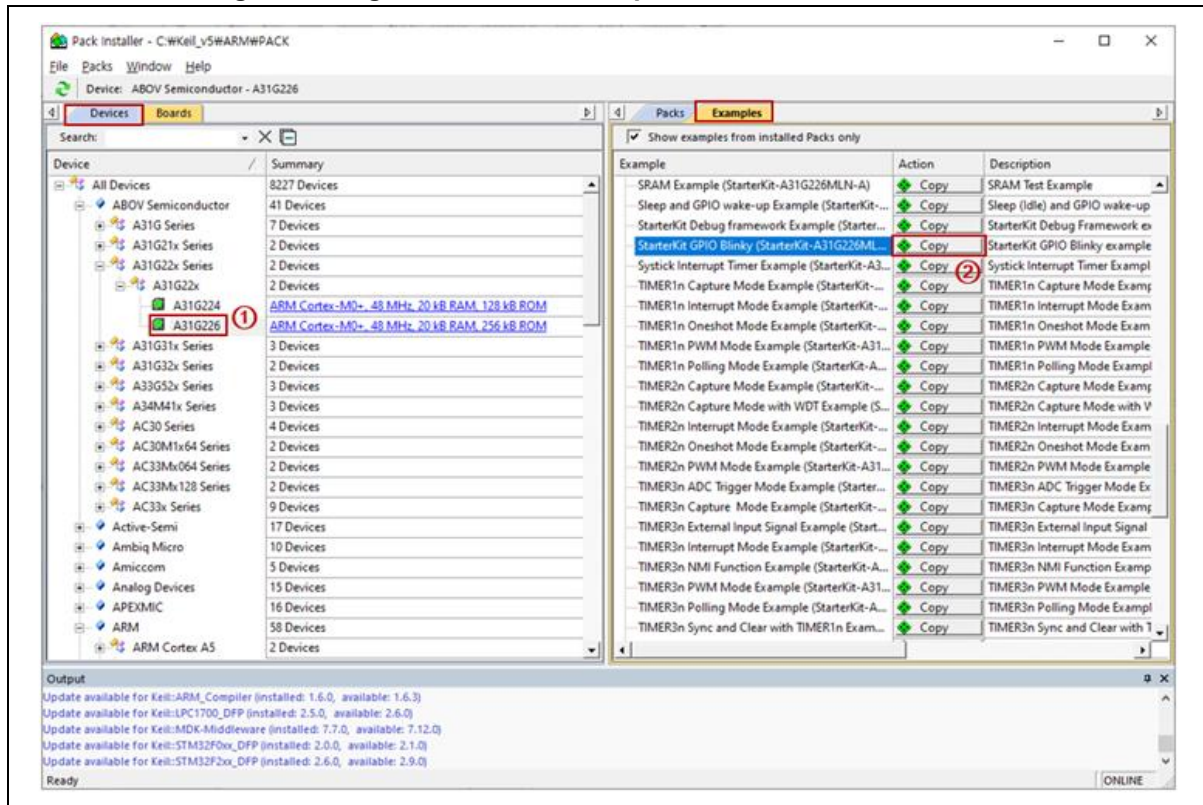
1. Execute “Keil uVision5”.
2. Click the Pack Installer icon to execute the installer. The Pack Installer is a utility to install or update software packs.

Figure 8. Execute Keil uVision5 and Pack Installer Icon



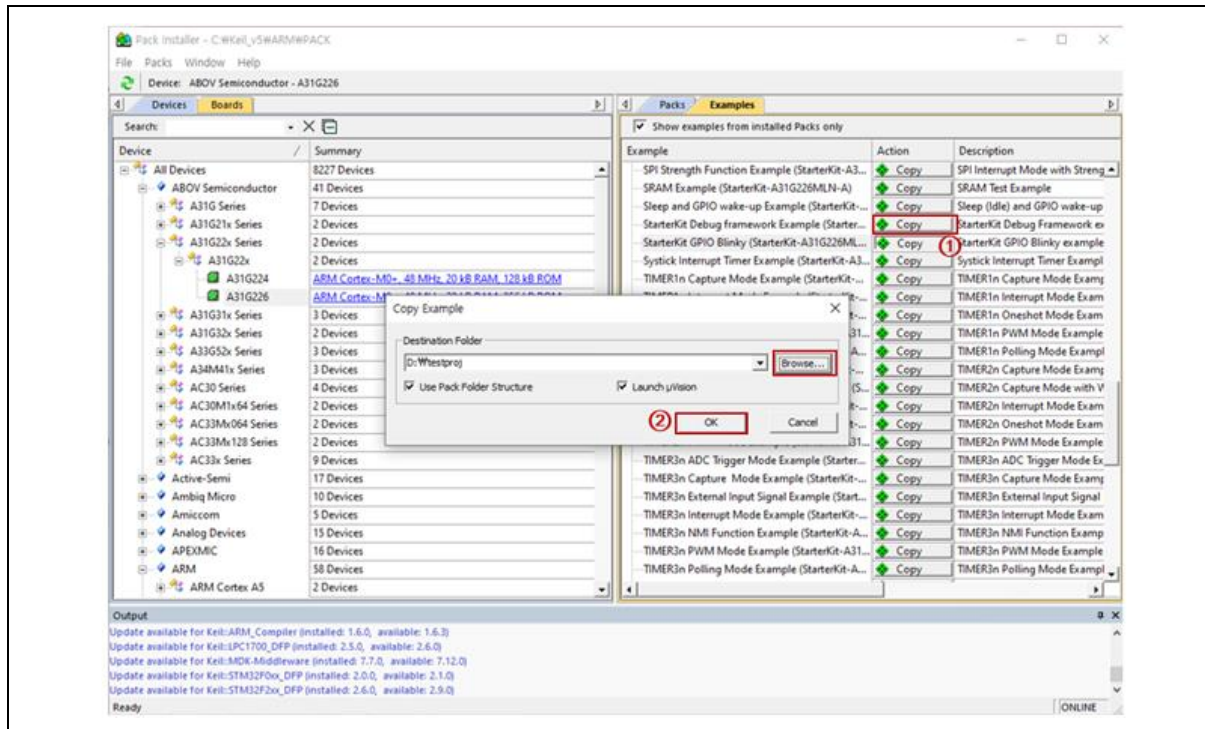
3. Select the Starter Kit device and example in the Pack Installer.
 - A. Select '**All Devices > ABOV Semiconductor**' on the Devices tab. Then, select the product series and target device. (Select the same microcontroller of the Starter Kit.)
 - B. Select an example to test the target device. (Select the Starter Kit GPIO Blinky as an example on the Examples tab.)

Figure 9. Target Device and Example Selection in Pack Installer



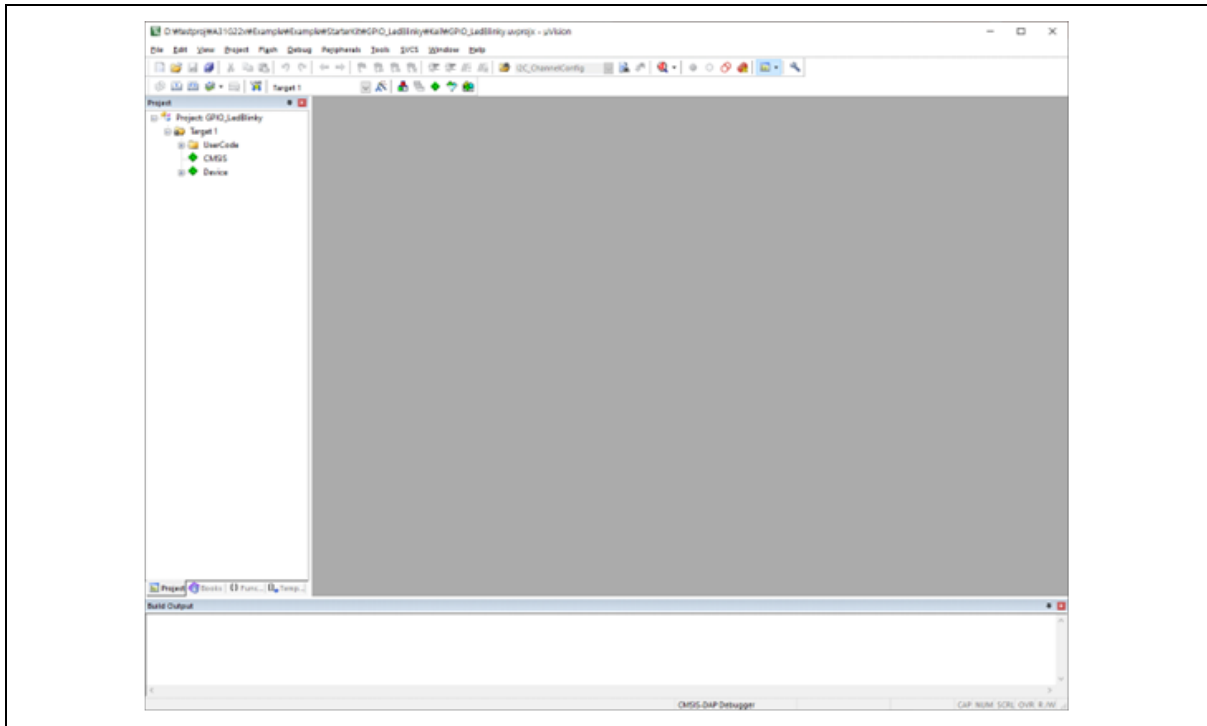
4. Copy a Starter Kit example found in the Pack Installer.
 - A. When you click the “Copy” button of the selected example, a dialog box pops up to prompt you to select a destination folder.
 - B. Then, select the destination folder and click **OK** to execute uVision5.

Figure 10. Create Example Project in Pack Installer



5. The Pack Installer installs the example to the destination directory and creates a Keil project for the example as shown in Figure 11.
 - A. The destination folder contains the Keil project and example files.

Figure 11. Example Project Created by the Pack Installer



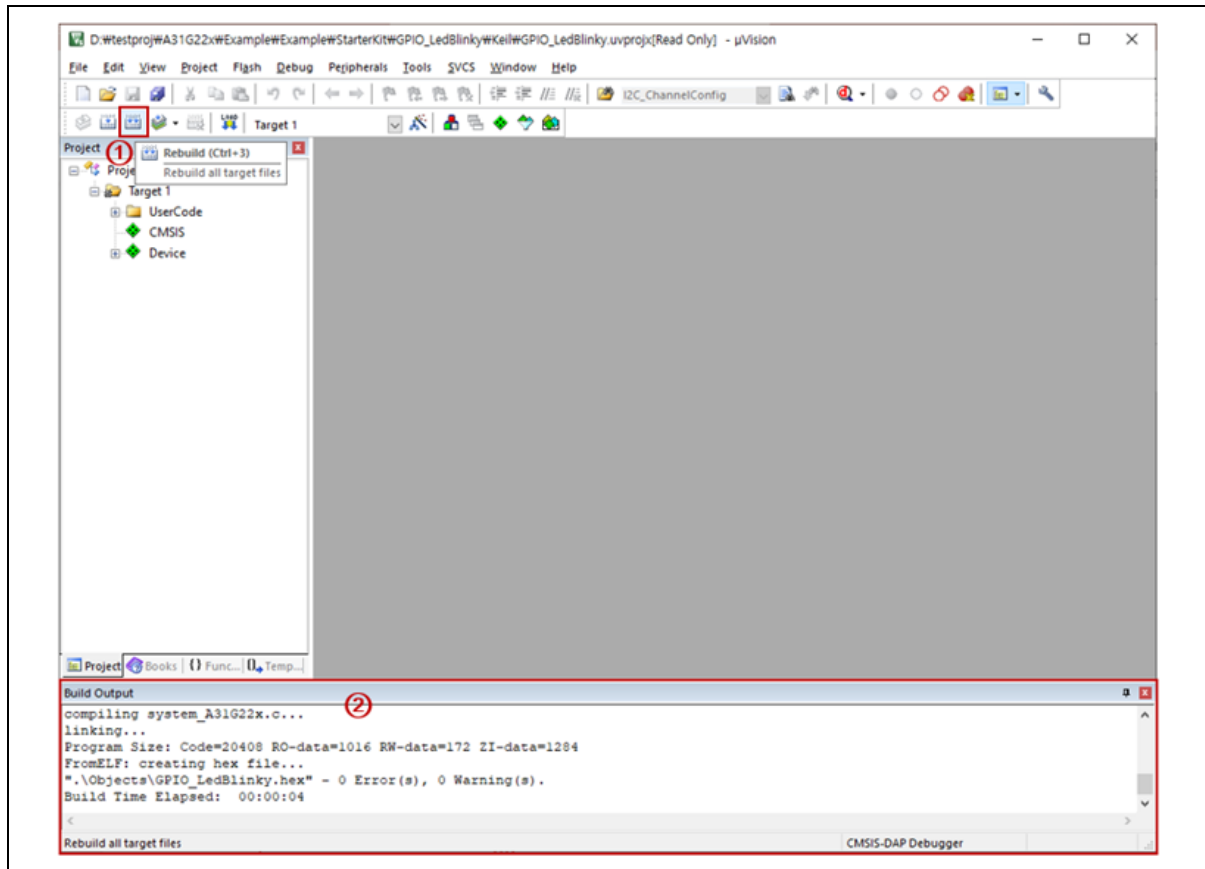
6. Using the example code, you can download the **Example_Code_[Device]** software for your device from the ABOV Semiconductor website.
 - A. Once the downloading is complete, unzip the file and execute the **LED_Blinky** uVision5 in the example directory. See the **Keil Setting Guide** for detailed instructions.

2.5 Compiling the LED_Blinky project

Compile the created uVision5 LED_Blinky project.

1. Select **Rebuild** to proceed with compilation.
2. The compilation results can be verified in the **Build Output** window. Make sure there are no errors in the project.

Figure 12. Compilation Results on LED_Blinky Project



2.6 Downloading the LED_Blinky Firmware

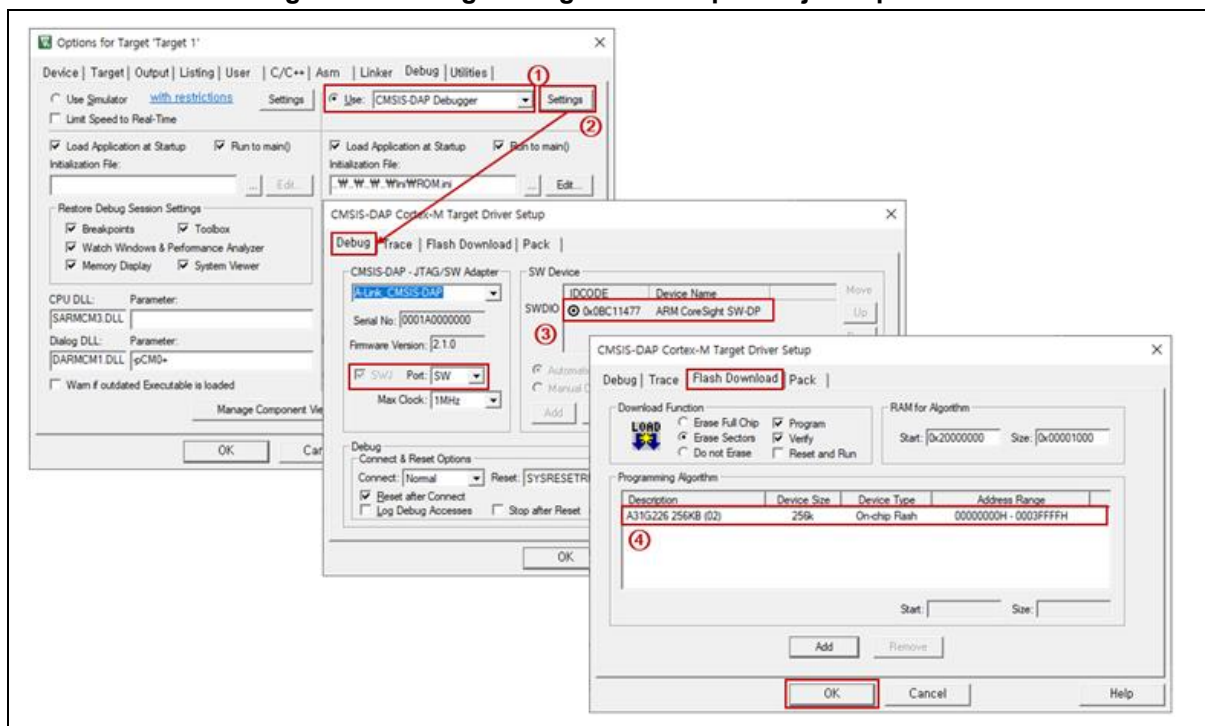
When the compilation is complete without errors, the Starter Kit is ready to be programmed. The Starter Kit is connected to the USB port on the host computer and enabled to be downloaded.

2.6.1 Configuration of Debugger

To download firmware to the target, the A-Link debugger must be configured in the Options panel of the project, as shown in Figure 13.

1. Verify that **CMSIS-DAP Debugger** is selected on the Debug tab. The A-Link debugger uses the CMSIS-DAP Debugger interface.
2. Click the Settings and verify that the A-Link CMSIS-DAP is selected on the Debug tab.
3. When the A-Link debugger is correctly connected to the target board, the target **IDCODE** and **Device Name** are displayed in the **SWDIO** field of the **SW Device** section.
4. Verify that the correct flash loaders of the device are displayed on the Flash Download tab.

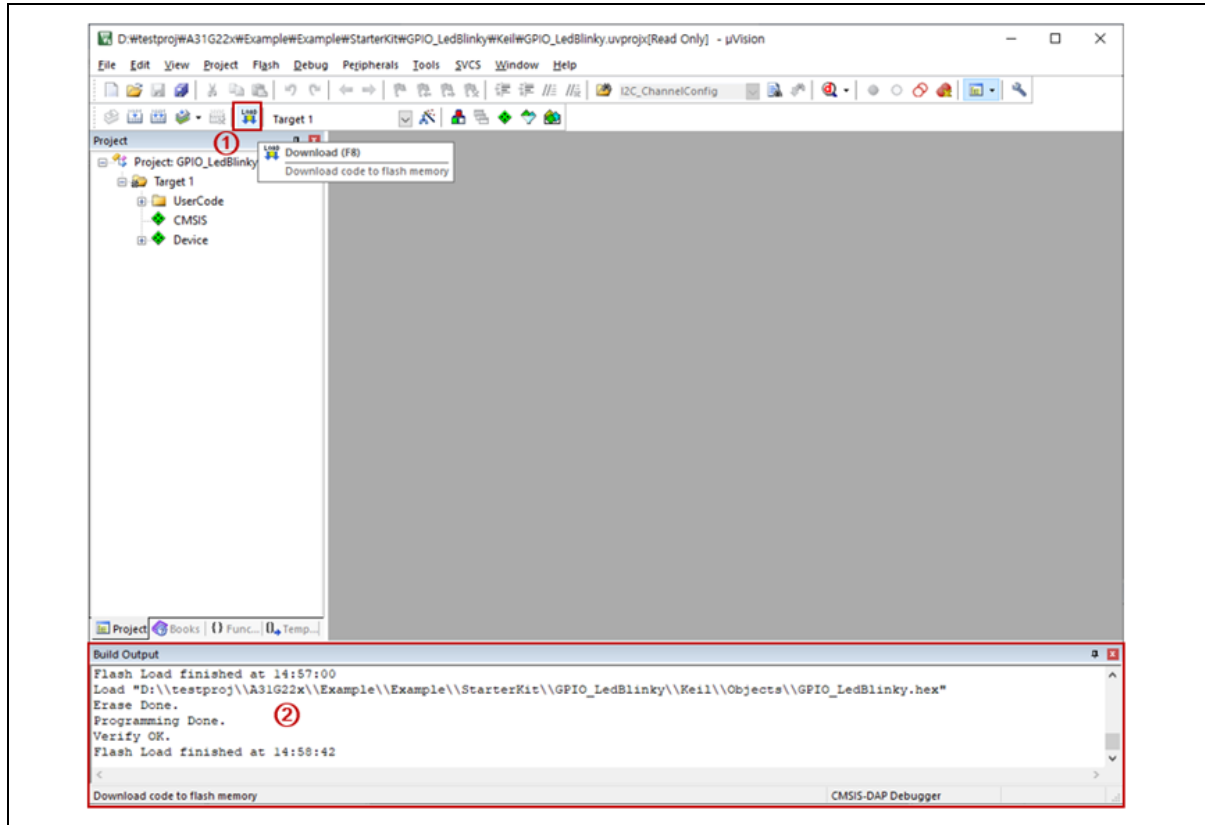
Figure 13. Debug Settings for Example Project Options



2.6.2 Download Firmware

1. Click the download icon to download the firmware to the target and verify that the download starts.
2. View the download results in the Build Output pane.

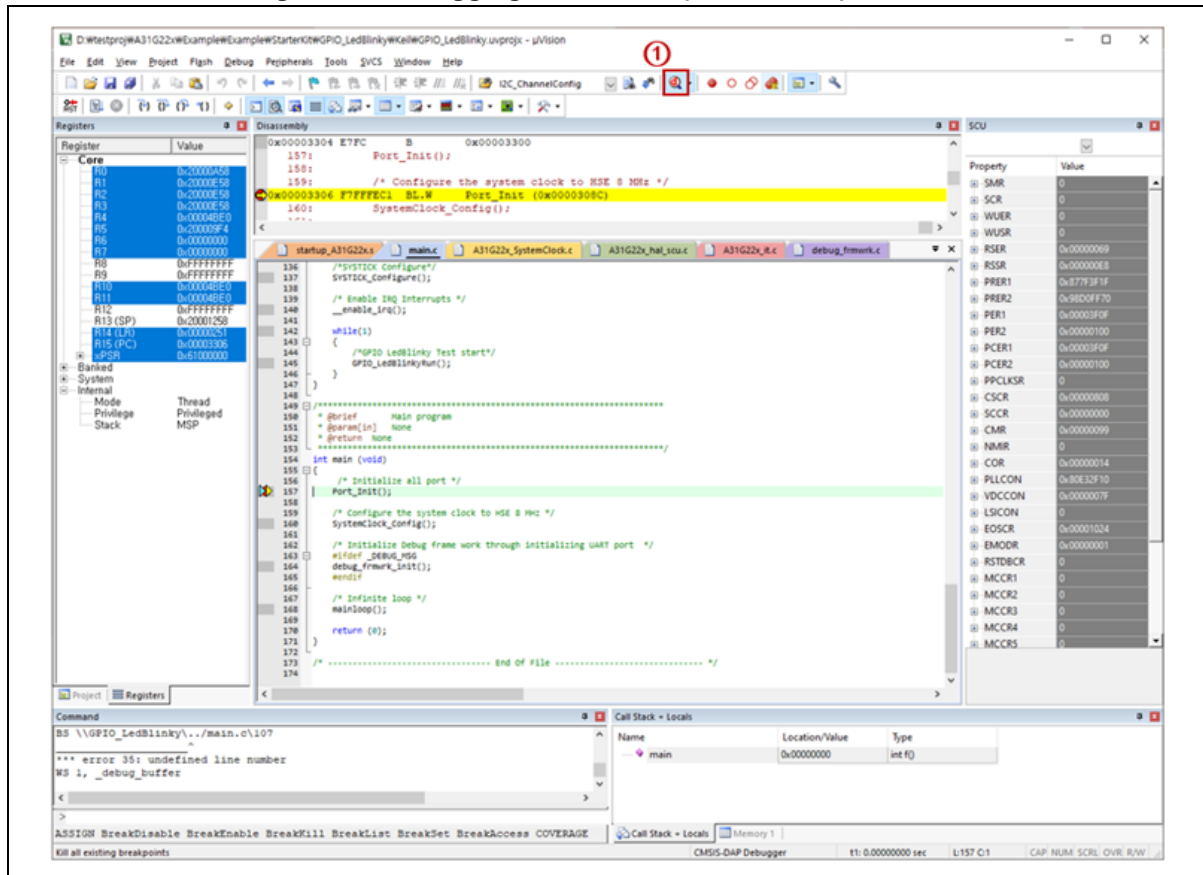
Figure 14. Firmware Download and Verification Result



2.7 Debugging the LED_Blinky Firmware

- Execute the 'Start/Stop Debugger Session' to enter Debugger mode.
 - The Starter Kit must be connected to the host computer for real-time, interactive debugging.
 - In Debugger mode, programs can be executed for each Run/Step/Stop Debugger Session.

Figure 15. Debugging with A-Link (CMSIS-DAP) Interface

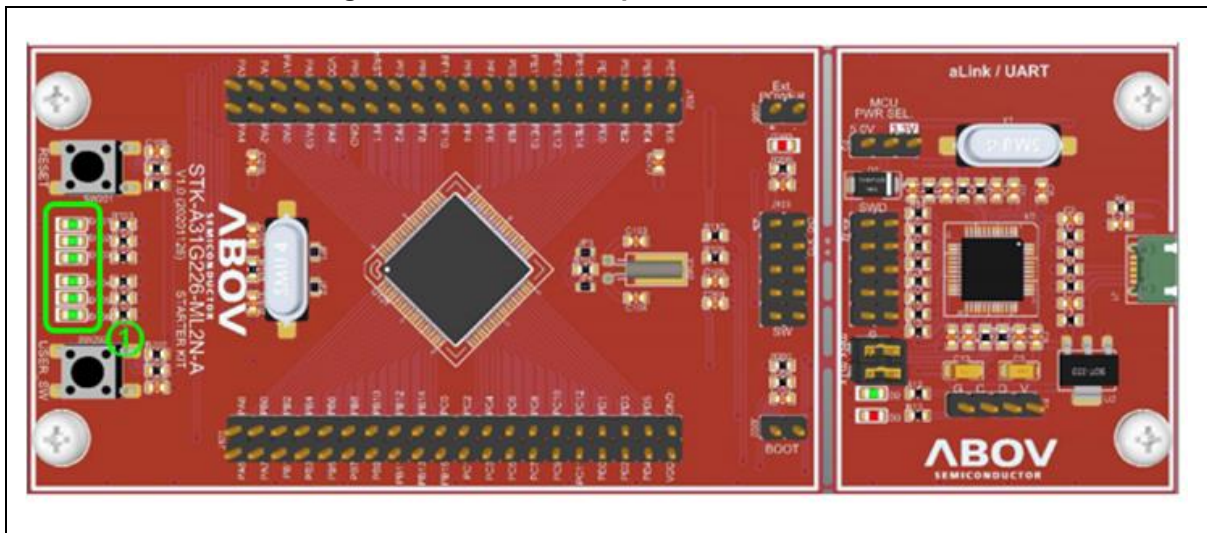


2.8 Running the LED_Blinky on the Starter Kit

2.8.1 How to Check the LED Operation

After successfully downloading the LED_Blinky program, re-apply the power (removing the USB cable) to check whether the LED is on or off.

Figure 16. Check LED Operation of Starter Kit



Revision History

Revision	Date	Notes
1.00	Jun. 1, 2023	Initial release.
1.01	Oct. 24, 2023	Added A33G53x device.
1.02	Dec.18, 2023	Added A34M420 device.
1.03	May. 27, 2024	Added A34L716 device.
1.04	Dec. 2, 2024	Updated the disclaimer.

Korea**Regional Office, Seoul**

R&D, Marketing & Sales
8th Fl., 330, Yeongdong-daero,
Gangnam-gu, Seoul,
06177, Korea

Tel: +82-2-2193-2200

Fax: +82-2-508-6903

www.abovsemi.com

Domestic Sales Manager

Tel: +82-2-2193-2206

Fax: +82-2-508-6903

Email: sales_kr@abov.co.kr

HQ, Ochang

R&D, QA, and Test Center
37, Gangni 1-gil, Ochang-eup,
Cheongwon-gun,
Chungcheongbuk-do, 28126, Korea

Tel: +82-43-219-5200

Fax: +82-43-217-3534

www.abovsemi.com

Global Sales Manager

Tel: +82-2-2193-2281

Fax: +82-2-508-6903

Email: sales_gl@abov.co.kr

China Sales Manager

Tel: +86-755-8287-2205

Fax: +86-755-8287-2204

Email: sales_cn@abov.co.kr

ABOV Disclaimer**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

ABOV Semiconductor (“ABOV”) reserves the right to make changes, corrections, enhancements, modifications, and improvements to ABOV products and/or to this document at any time without notice. **ABOV DOES NOT GIVE WARRANTIES AS TO THE ACCURACY OR COMPLETENESS OF THE INFORMATION INCLUDED HEREIN.** Purchasers should obtain the latest relevant information of ABOV products before placing orders. Purchasers are entirely responsible for the choice, selection, and use of ABOV products and ABOV assumes no liability for application assistance or the design of purchasers' products. **NO LICENSE, EXPRESS OR IMPLIED, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY ABOV HEREIN. ABOV DISCLAIMS ALL EXPRESS AND IMPLIED WARRANTIES AND SHALL NOT BE RESPONSIBLE OR LIABLE FOR ANY INJURIES OR DAMAGES RELATED TO USE OF ABOV PRODUCTS IN SUCH UNAUTHORIZED APPLICATIONS.** ABOV and the ABOV logo are trademarks of ABOV. For additional information about ABOV trademarks, please refer to https://www.abov.co.kr/en/about/corporate_identity.php. All other product or service names are the property of their respective owners. Information in this document supersedes and replaces the information previously supplied in any former versions of this document.

© 2023 ABOV Semiconductor – All rights reserved