

Getting started with TRAVEO™ T2G entry family starter kit

About this document

Scope and purpose

This document explains how to set up and use TRAVEO™ T2G body entry family starter kit. The document also explains how to debug with a single core and dual core environment in IAR embedded workbench for Arm® (EWARM). The document uses the TRAVEO™ T2G body entry starter kit board with the sample driver library (SDL).

Intended audience

This document is intended for software and hardware engineers integrating TRAVEO™ T2G body entry device into their application.

Abbreviations and definitions

Table 1 **Abbreviations**

Abbreviations	Description
CM0+	Arm® Cortex®-M0 plus
CM4	Arm® Cortex®-M4
SDL	sample driver library
SK	starter kit
USB	universal serial bus
EWARM	embedded workbench for Arm®
C-SPY	high level debugger language for embedded system

Reference documents

- [1] [KitProg3 user guide](#)
- [2] [TRAVEO™ T2G starter kit user guide](#)

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Getting started

1 Getting started

This section explains the hardware setup. [Table 2](#) lists the prerequisites for the setup.

Table 2 Prerequisites

Quantity	Description	Remarks
1	CYTVII-B-E-1M-SK	TRAVEO™ T2G body entry series starter kit
1	Micro USB cable	For power and communication
1	PC	With USB port
1	IAR EWARM 8.42.1	Downloaded from the web
1	Sample driver library v7.0.0	Downloaded from the web
-	Firmware	Pre-installed

1.1 Connection setup

Connect the USB cable from the PC to the starter kit. The starter kit is powered by the PC via the USB cable (5 V). Check if the mode LED (LED3) and the power LED (LED2) are turned ON.

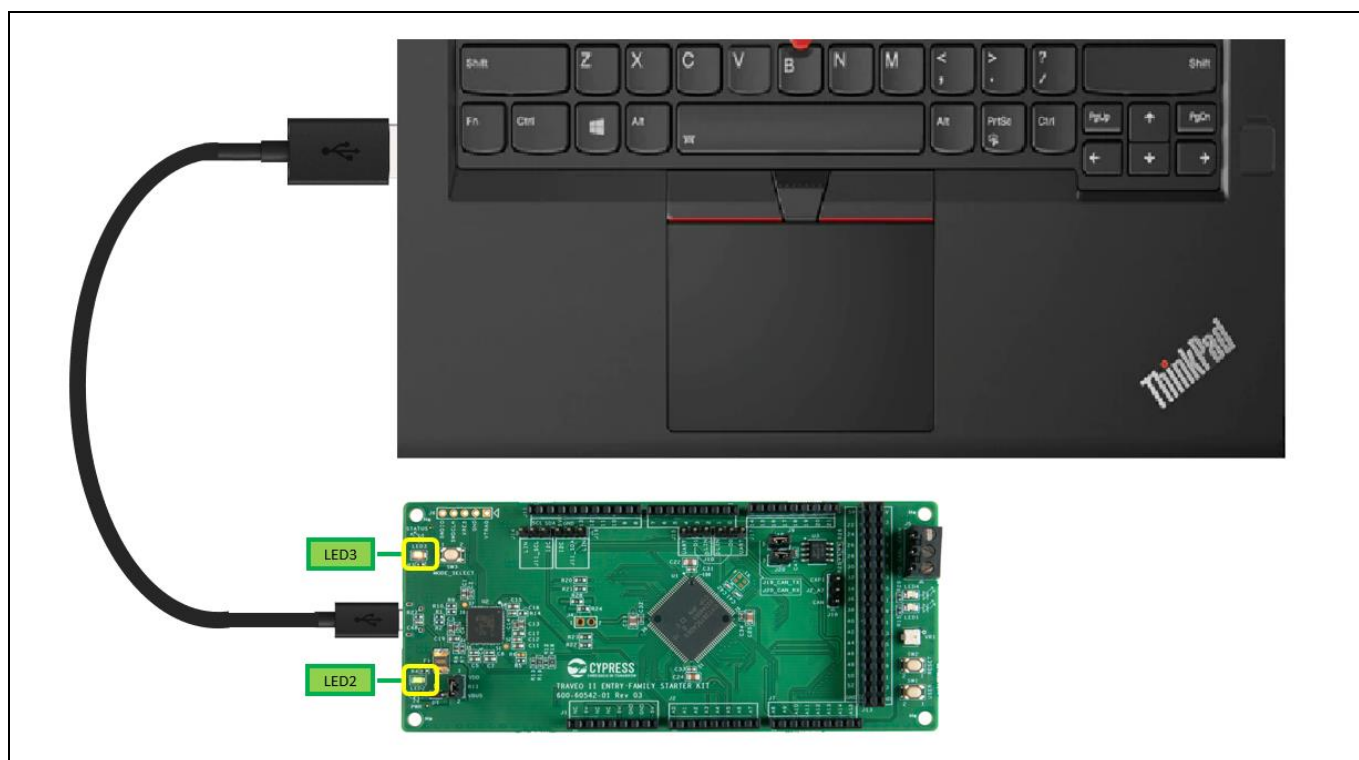


Figure 1 Connection between PC and starter kit

1.2 Power up

When powered ON, the device will start executing the pre-installed firmware, which is indicated by the blinking user LEDs (LED1 is controlled by core Arm® Cortex®-M0+ (CM0+) and LED4 is controlled by core Cortex®-M4 (CM4)).

Getting started

Note: To indicate that the starter kit is powered ON and the USB controller is starting in the correct mode, the amber-colored status LED3 must be permanently ON. But, LED3 does not indicate a successful USB driver installation.

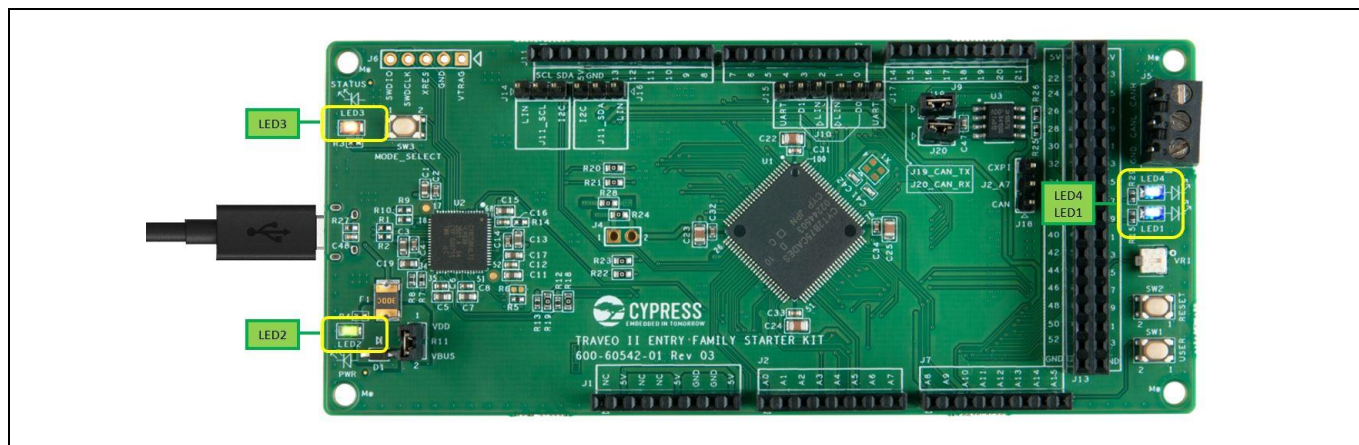


Figure 2 LED indicating power ON

1.3 Installing kit driver

To work with the starter kit, the KitProg3 USB-UART driver must be installed on the system. This driver is part of a firmware package and must be installed manually. Optionally further information about KitProg3 see [1].

To install the KitProg3 USB-UART driver, do the following steps:

1. Download [firmware-loader](#) package
2. Extract the package.
3. Depending on your operating system, browse `fw-loader\bin\drivers\KitProg3\KitProg3UART`.
4. Right-click the file “KitProg3UART.inf” and execute “Install”. Then the driver is being installed.

Confirm that the starter kit is recognized as a KitProg3 device on Windows (open Device Manager, follow the menu path **View > Devices by container**) as shown in [Figure 3](#). This completes the hardware setup.

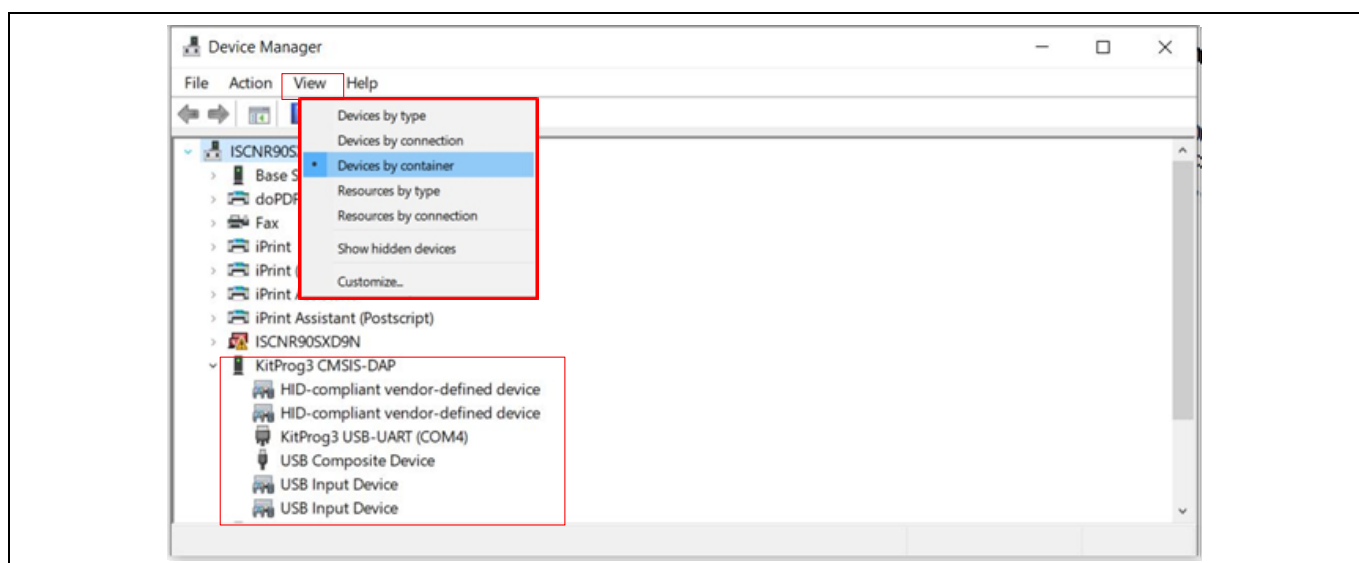


Figure 3 Viewing KitProg3 driver in Device Manager

Getting started

Note: Do not press SW3. Pressing SW3 changes the mode of the USB controller. This is necessary only for upgrading the USB driver firmware and other activities. For more details, see the KitProg3 user guide [\[1\]](#).

For more information related to the starter kit, see the TRAVEO™ T2G starter kit user guide [\[2\]](#).

SDL and IAR EWARM setup

2 SDL and IAR EWARM setup

This section explains how to run an example from the SDL on the TRAVEO™ T2G starter kit using the IAR C-SPY debugger.

2.1 SDL environment setup

Download the latest SDL for the TRAVEO™ T2G starter kit on the target system. Install the SDL outside the default program files to allow the IDE to access and create temporary files. [Figure 4](#) shows the sample path.

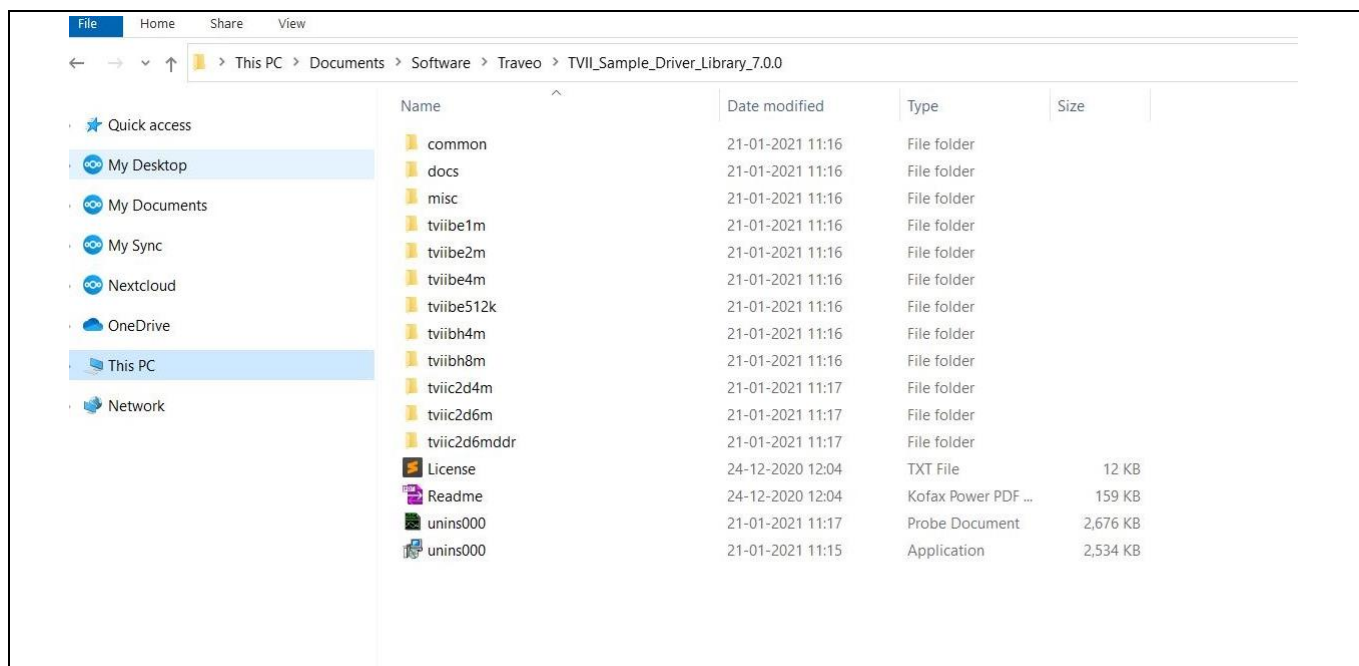


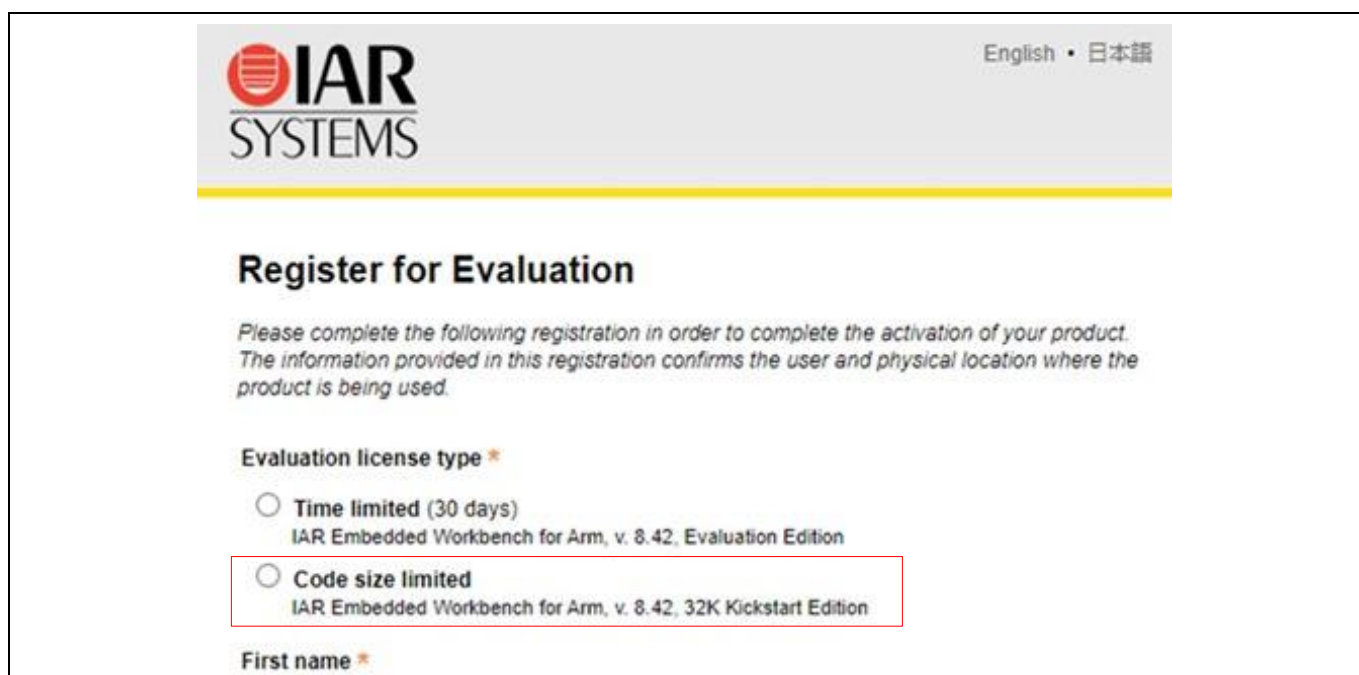
Figure 4 SDL 7.0.0 top-level directory

2.2 IAR EWARM setup

Open the *Readme.pdf* from the root folder of the SDL and use the same link to download the version of IAR EWARM supported by the SDL.

Download the software and run the installation (note that the installation might take some time). When you open the IAR EWARM for the first time, select the license in the License wizard. If you do not have the license, it is strongly recommended to register for a **Code size limited** license type. See [Figure 5](#).

Note: IAR EWARM v8.42.1 is only for reference; always use the IAR EWARM version supported by the specific SDL release.



English • 日本語

Register for Evaluation

Please complete the following registration in order to complete the activation of your product. The information provided in this registration confirms the user and physical location where the product is being used.

Evaluation license type *

☐ Time limited (30 days)
IAR Embedded Workbench for Arm, v. 8.42, Evaluation Edition

☒ Code size limited
IAR Embedded Workbench for Arm, v. 8.42, 32K Kickstart Edition

First name *

Figure 5 Registering IAR for evaluation (based on v. 8.42)

2.3 Verify installation by quick hands-on

The starter kit is now ready to use after a successful environment setup (USB driver installation, SDL installation, and IAR installation). To verify the installation and setup is complete, quickly walkthrough the following steps:

1. Connect the USB cable from the PC to the starter kit, LED2 and LED3 should be ON.
2. After power-up, LED1 and LED4 will start blinking from the pre-installed firmware on the kit.
3. Start IAR EWARM and open the SDL template workspace file:
`tviibe1m\tools\iar\flash\tviibe1m_flash_cm0plus_template`
4. Select the workspace revision **starter_kit** from drop-down list under **Workspace**.
5. Click **Project** from top menu and select **Rebuild All**.
6. Check for the successful build from the **Build** tab at the bottom left corner in IAR window.
7. The kit is already running a pre-installed firmware on it so we can connect to target CPU (TRAVEO™ T2G) by selecting **Attach to Running target** option from the **Project** menu.
8. The debug log shows the interface and device information in the **Debug** tab at the bottom left corner.
9. Click pause to check the CPU execution, LED1 will stop blinking due to the pause action.
10. Now click the stop debugging button to detach the target.
11. Close the IAR window and reset the starter kit using switch SW2.

Note: In case of problems, see [Troubleshooting](#).

SDL and IAR EWARM setup

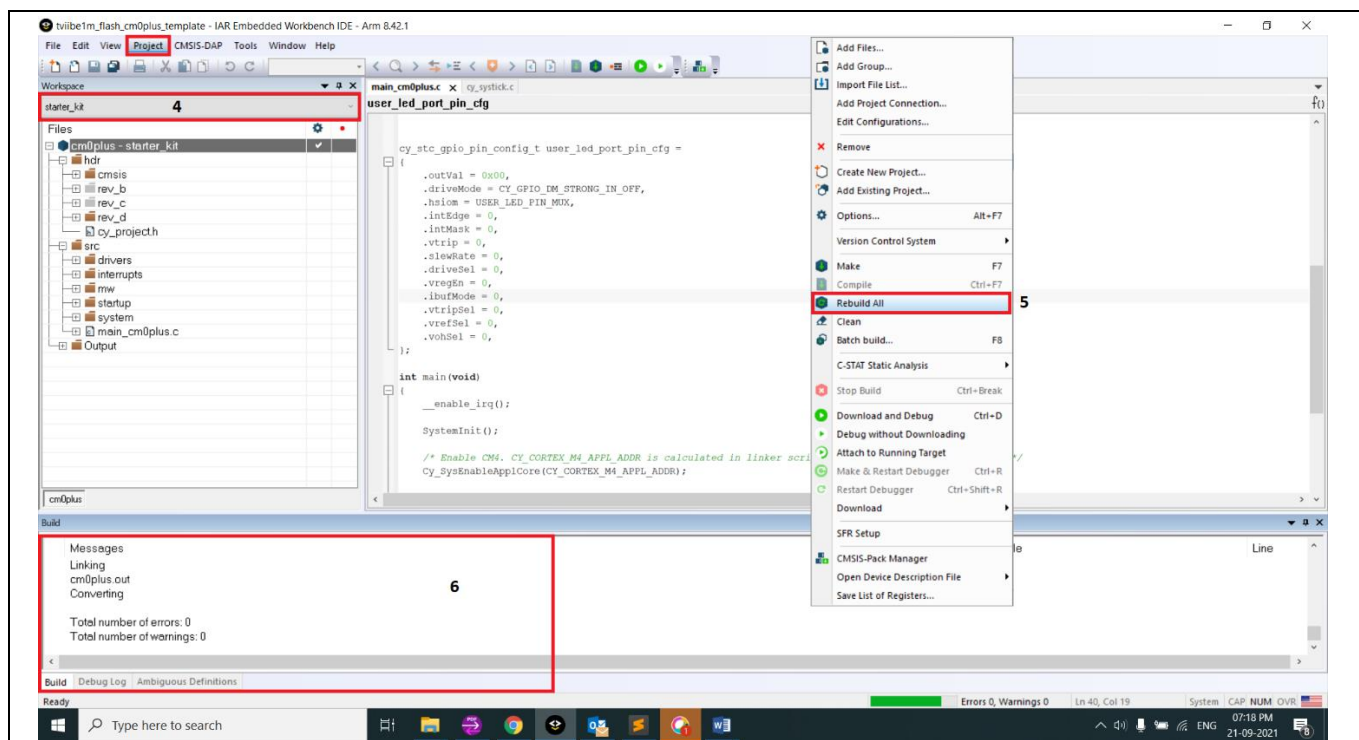


Figure 6 Build a workspace in IAR

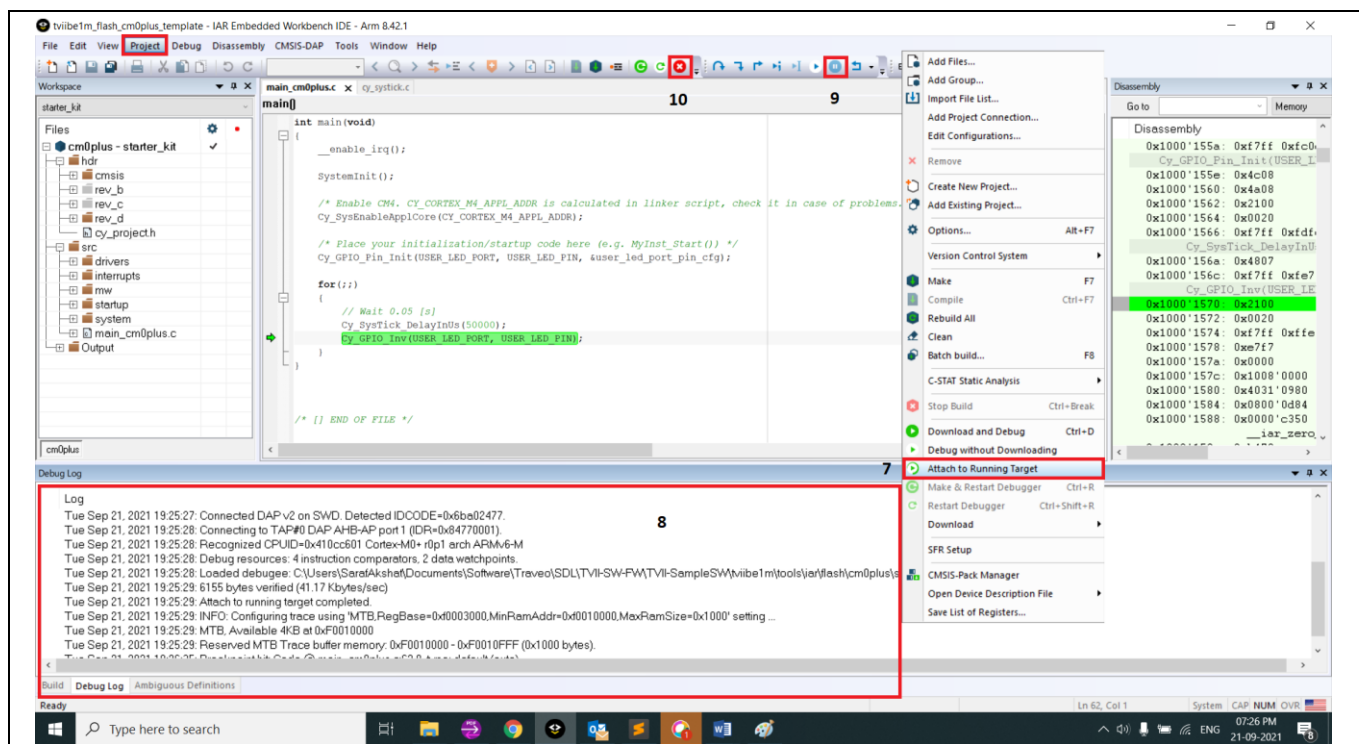


Figure 7 Check debugger and kit connection in IAR

Download and debug with starter kit

3 Download and debug with starter kit

There are two debugging methods with IAR EWARM:

- Debugging with code downloaded on to RAM
- Debugging with code downloaded on to the flash memory (described in this document)

SDL supports three types of workspaces under flash memory debugging as listed in [Table 3](#).

Table 3 IAR Flash workspaces and functions

Workspace	Application core	Number of cores supported	Details
Single core CM0+ workspace “tviibe1m_flash_cm0plus_template”	No	Single	Single core download and debug for CM0+ core.
Single core CM4 workspace “tviibe1m_flash_cm4_mc_template”	Yes	Single	Single core download and debug for CM4 core; works as client/slave workspace in multicore configuration. <i>Note: It is possible to debug only with CM4, when CM0+ executes some code, thus enabling CM4.</i>
Dual core CM0+ and CM4 workspace “tviibe1m_flash_cm0plus_cm4_template”	Yes	Dual	Dual core download and debug for CM0+ and CM4 cores; works as master workspace in multicore configuration.

Note: Both CM0+ and CM4 can do normal code execution, but from an architectural point only CM4 is considered as the application core. After a reset, the default core is always the CM0+ core. To enable the CM4 core, CM0+ must call `Cy_SysEnableApplCore()`. In the SDL, this is usually done within `main_cm0plus.c`.

Before downloading and debugging with the multicore master project, you must build the multicore slave project for the application core (which is CM4 here).

Open the master workspace (dual core CM0+ and CM4 workspaces) for multicore debugging. The slave workspace (single core CM4 workspace) will automatically open from the master workspace when you click **Download and Debug**.

Download and debug with starter kit

3.1 Debugging with single core CM0+ workspace

1. Start IAR EWARM and open the SDL template workspace file:
`tvibee1m\tools\iar\flash\tvibee1m_flash_cm0plus_template`

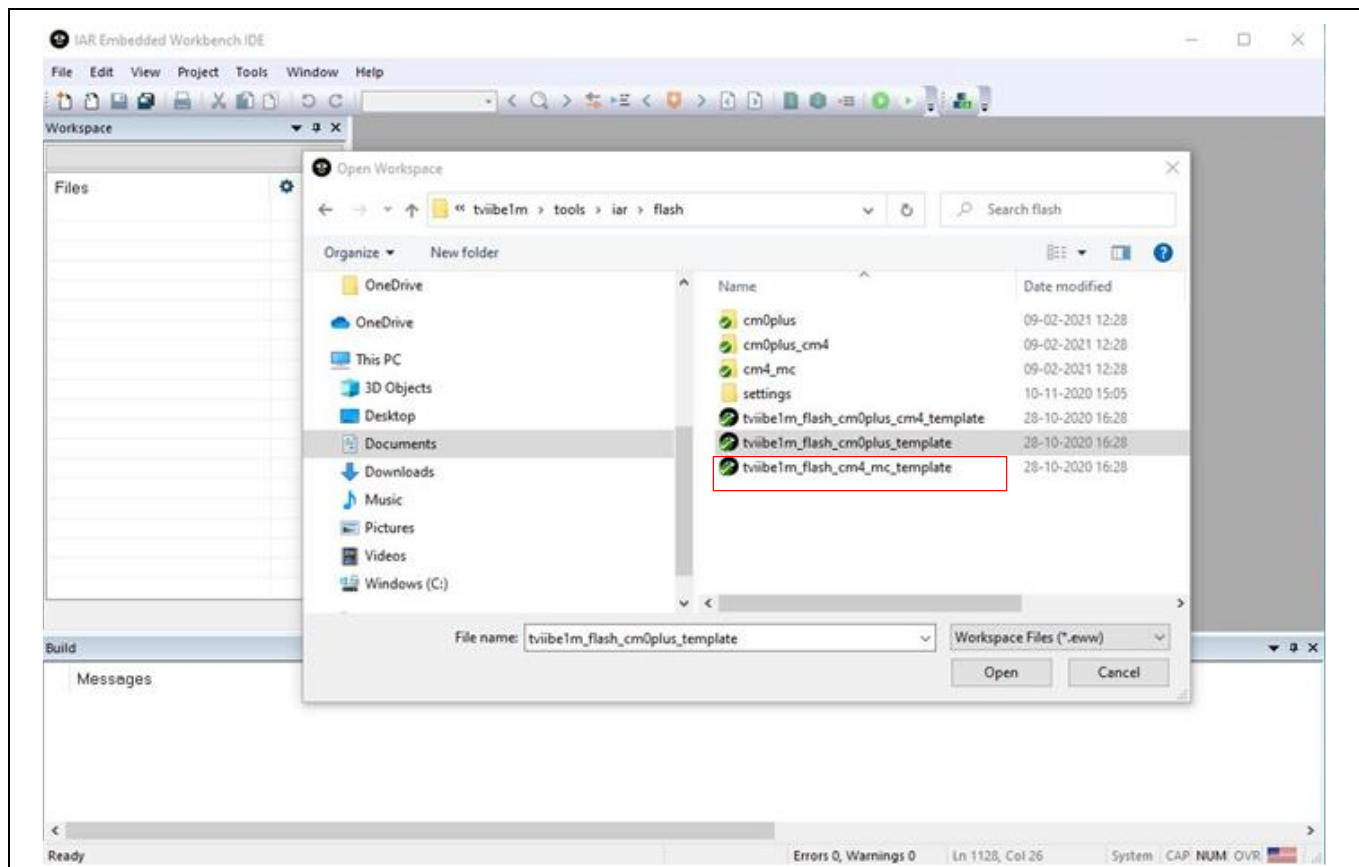


Figure 8 Selecting CM0+ single core template

2. Select the workspace revision **starter_kit** from the drop-down list under **Workspace**, as shown in [Figure 9](#).

Note: Ignore other workspace revisions for this starter kit. The other revisions constitute the MCU assembled on other evaluation boards (CPU board).

Download and debug with starter kit

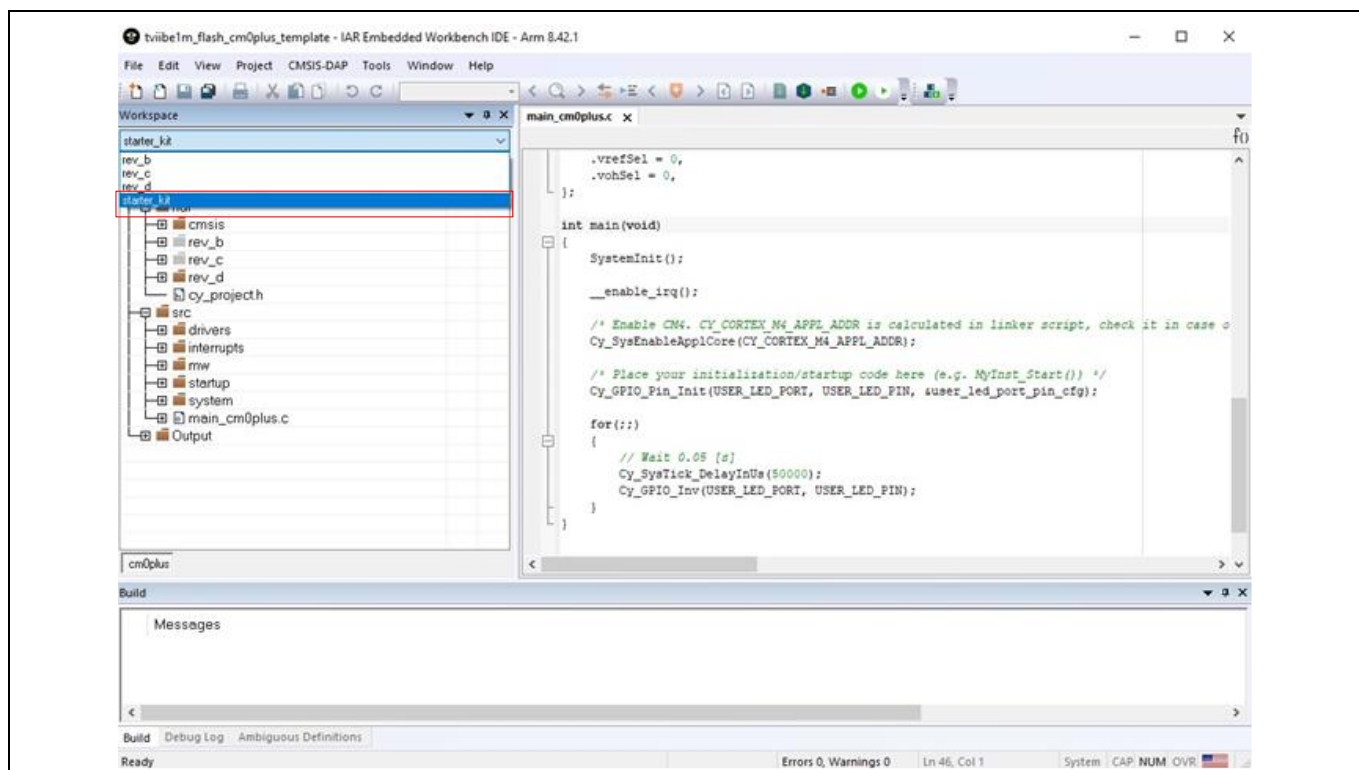


Figure 9 Selecting workspace revision

3. For the build, right-click **cm0plus – starter_kit** and select **Rebuild All**.

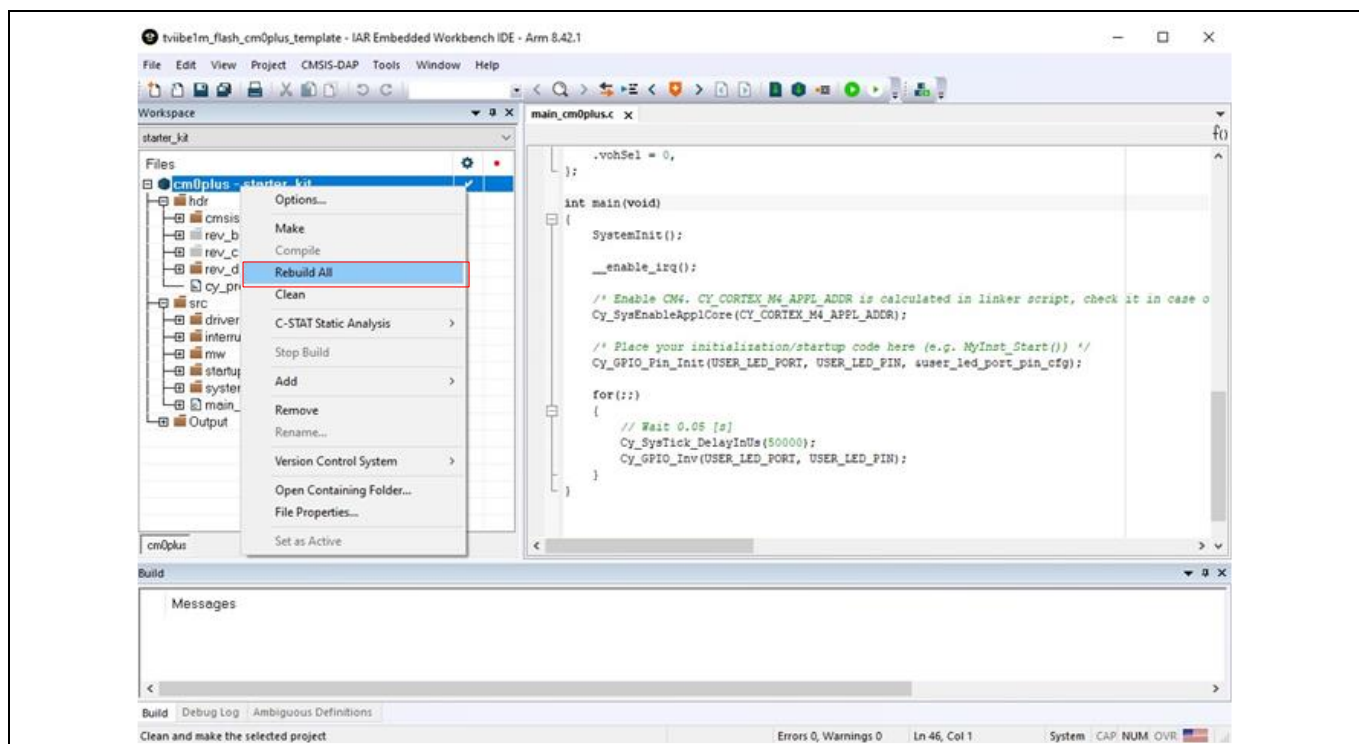


Figure 10 Rebuilding workspace revision

Download and debug with starter kit

- The rebuild process starts. Check for errors and warnings in the **Build** log.

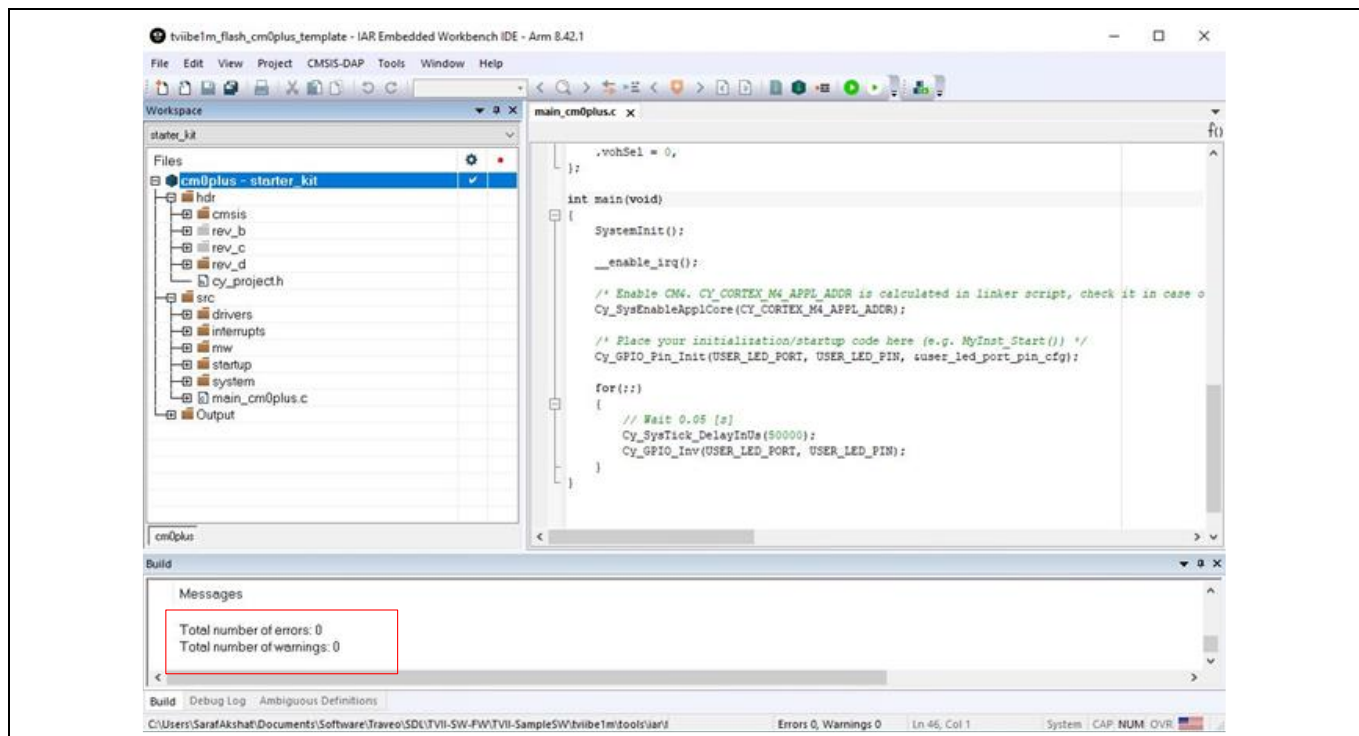


Figure 11 Checking build status in build log

- To load the program to the flash region of CM0+ core, click the green **Download and Debug** icon.

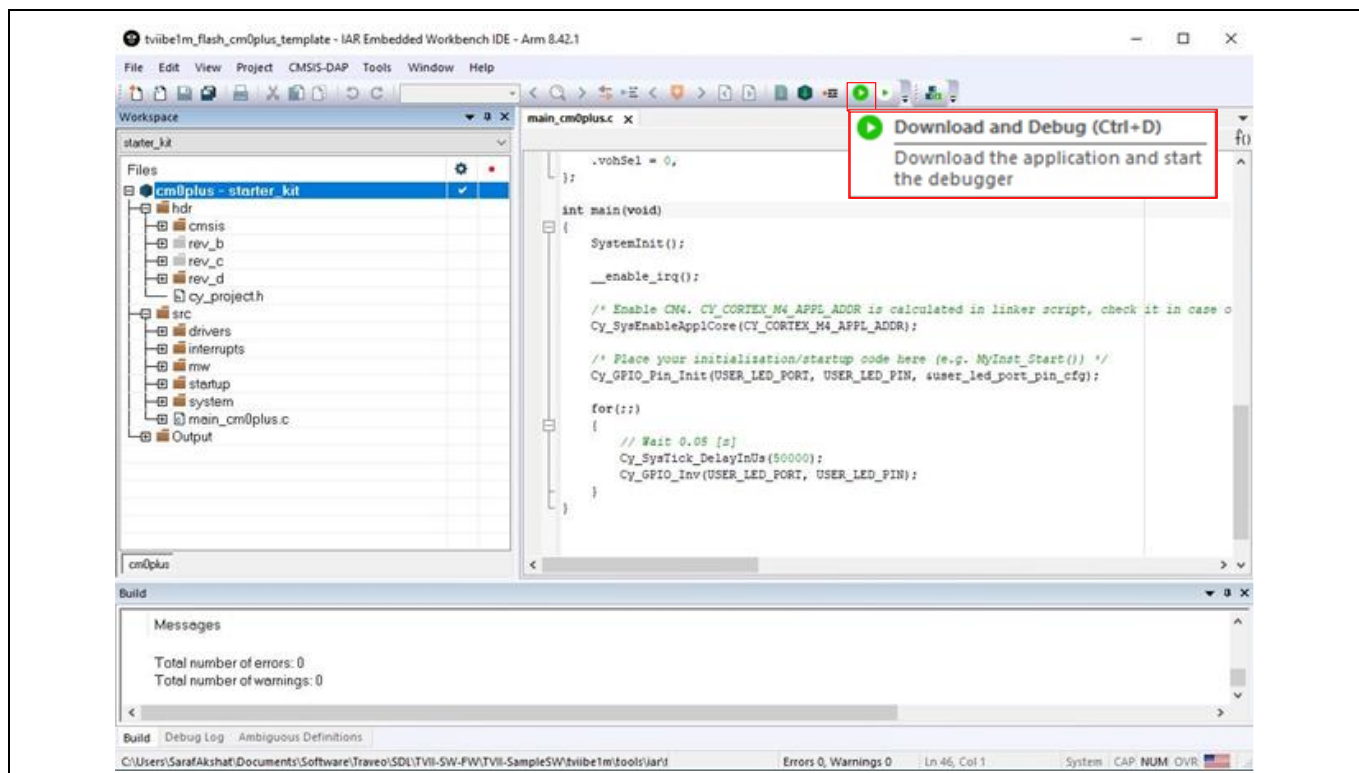


Figure 12 Downloading and debugging

Download and debug with starter kit

6. Now, click the **Go** icon to start execution.

Note: You can also use the function keys in the Debug window: Go (F5), F10 (Step Over), F11 (Step into), Ctrl+D (Download and Debug).

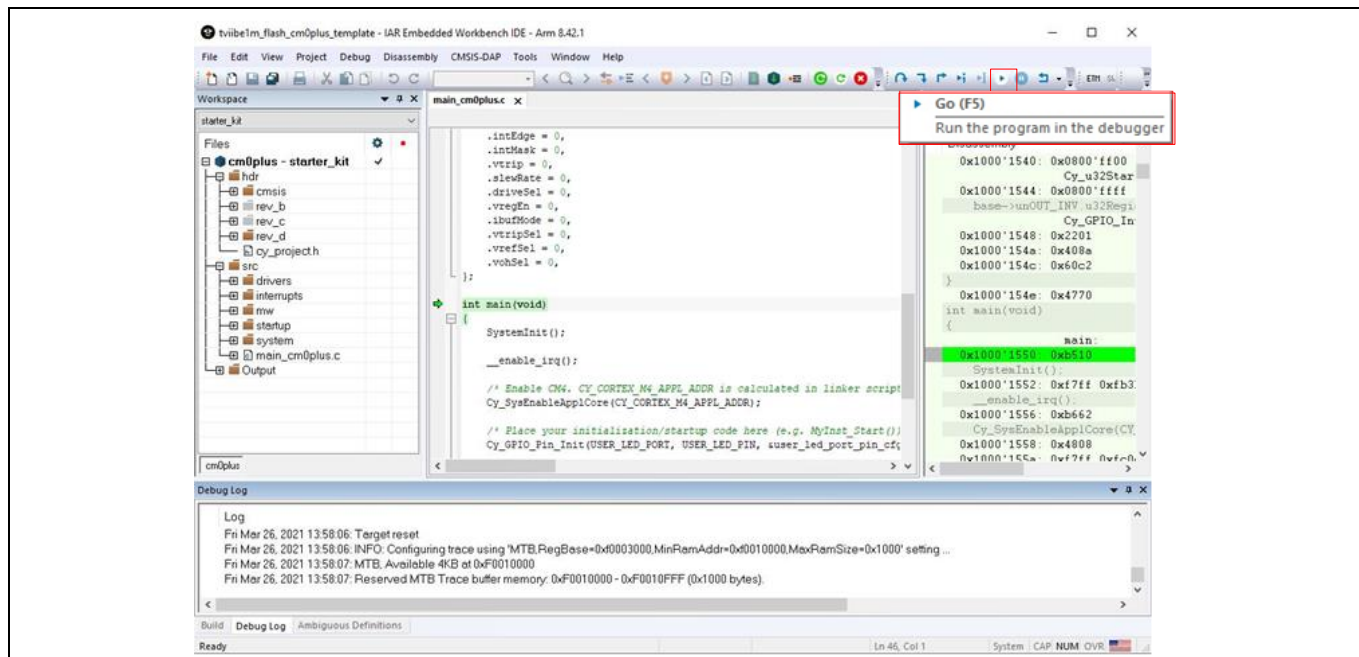


Figure 13 Debugging with CM0+ core

LED1 should start blinking.

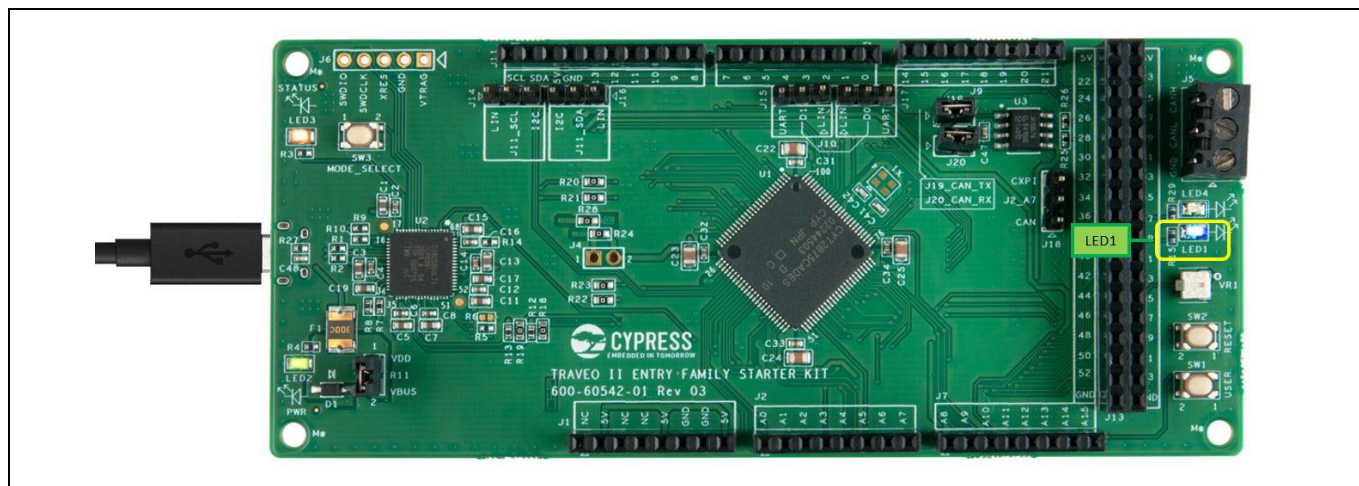


Figure 14 Blinking LED1

Download and debug with starter kit

3.2 Debugging with single core CM4 workspace

1. Start IAR EWARM and open the SDL template workspace file:
`tviibe1m\tools\iar\flash\tviibe1m_flash_cm4_mc_template`

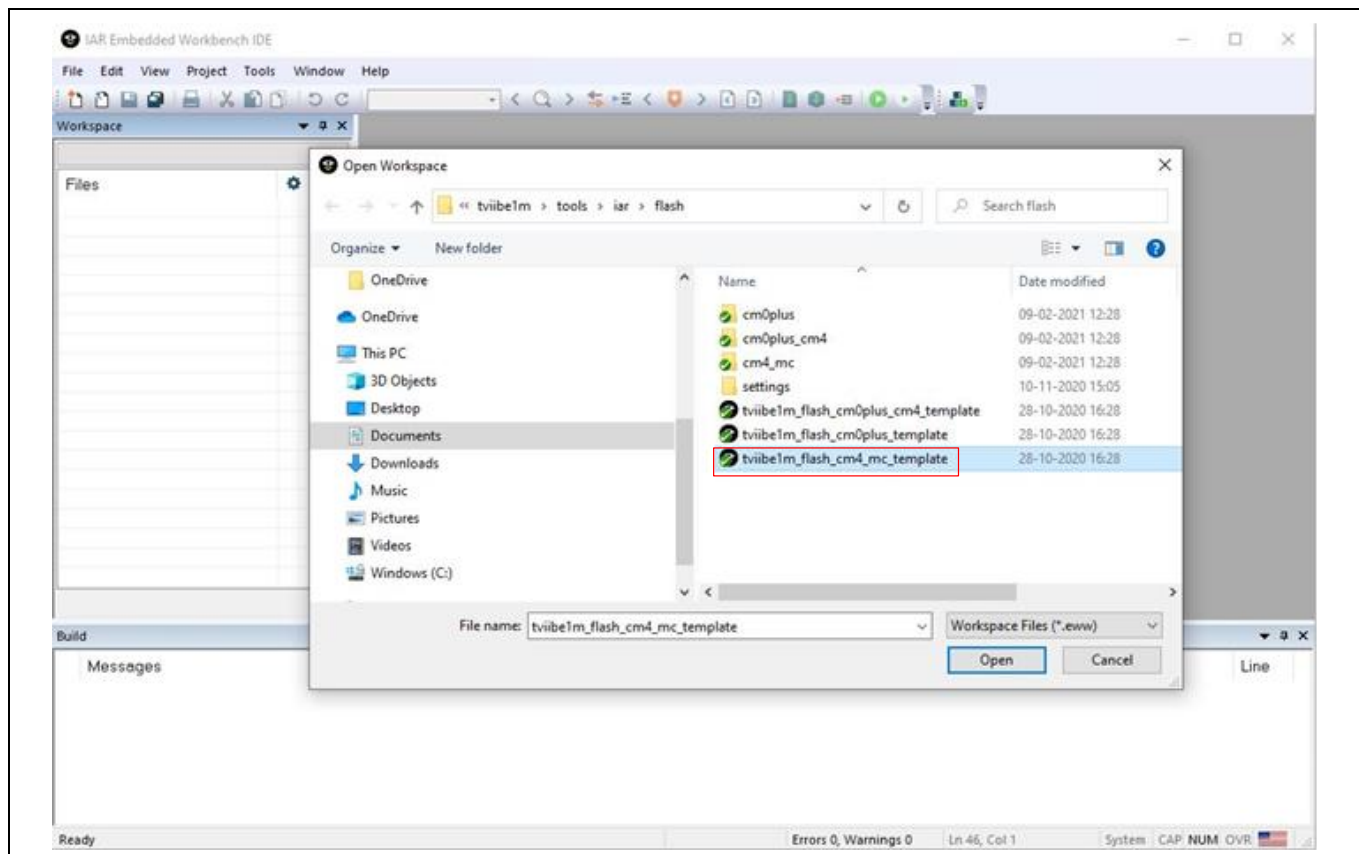


Figure 15 Selecting CM4 single core template

2. Select the workspace revision **starter_kit** from the drop-down list under **Workspace**, as shown in [Figure 16](#).

Download and debug with starter kit

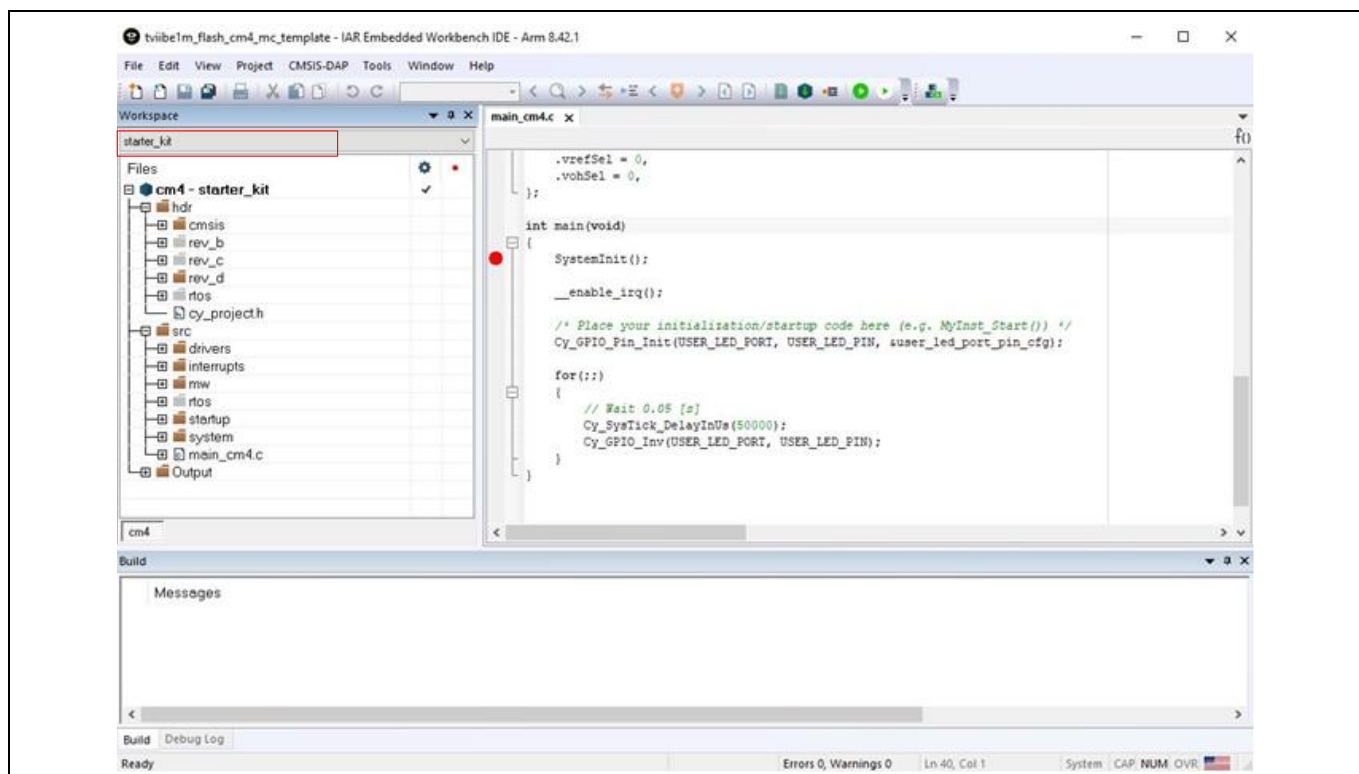


Figure 16 Selecting workspace revision

- For the build, right-click **cm4 - starter_kit** and select **Rebuild All**.

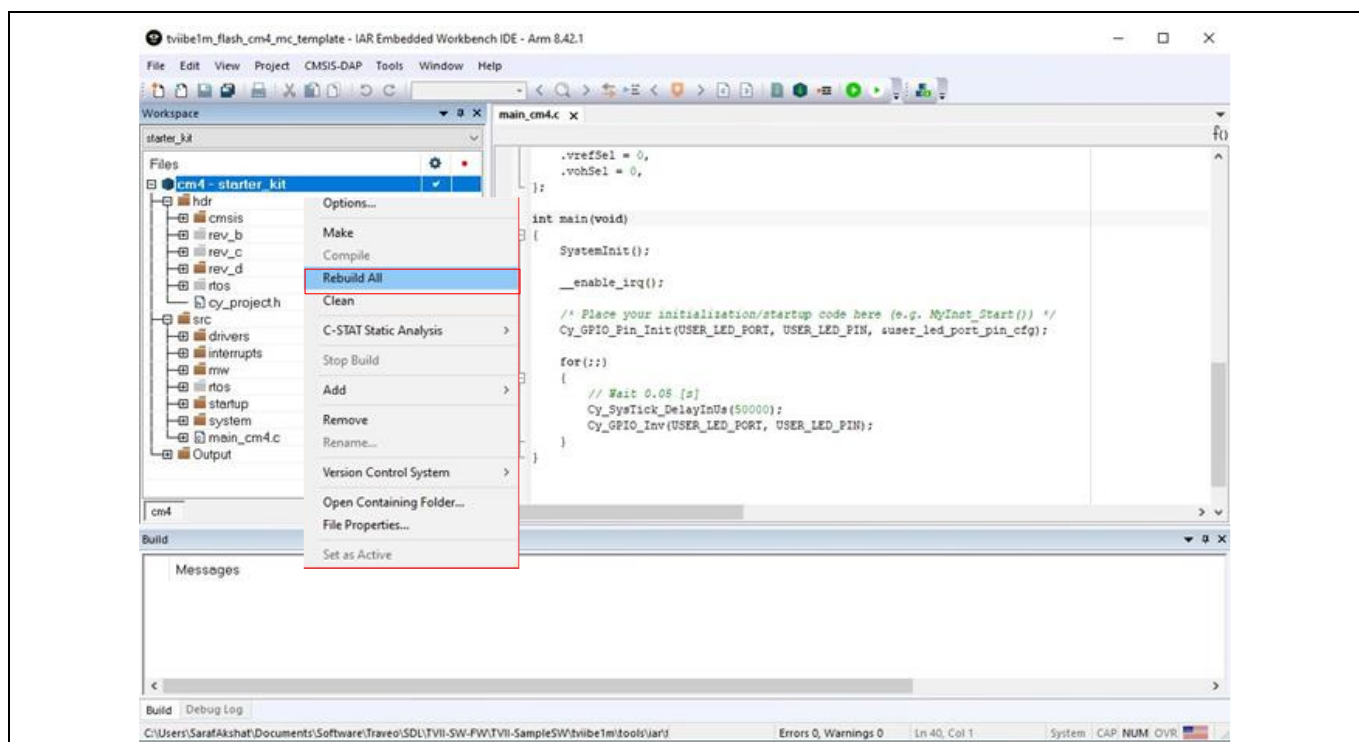


Figure 17 Rebuilding workspace revision

Download and debug with starter kit

- The rebuild process starts. Check for errors and warnings in the **Build** log.

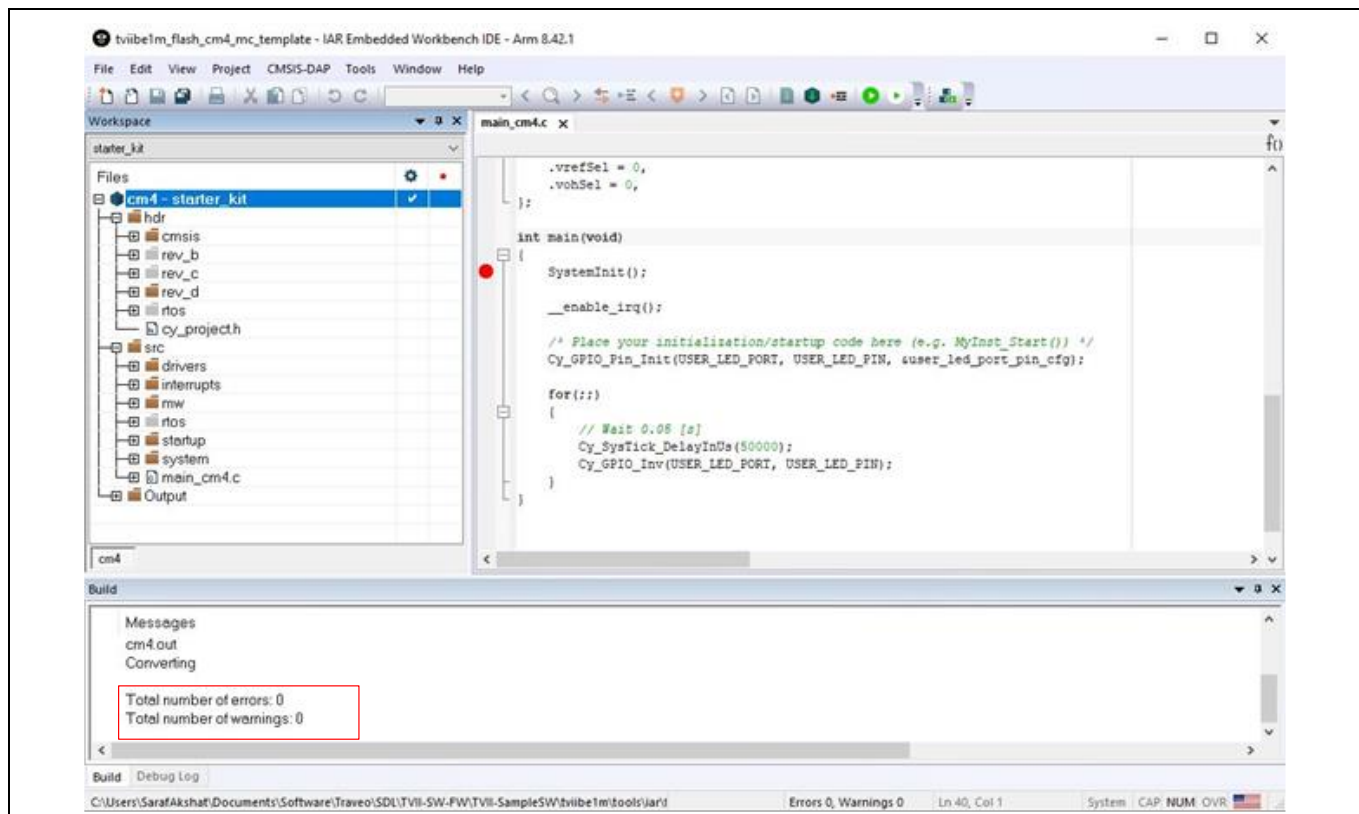


Figure 18 Checking build status in build log

- To load the program to the flash region of CM0+ core, click the green **Download and Debug** icon.

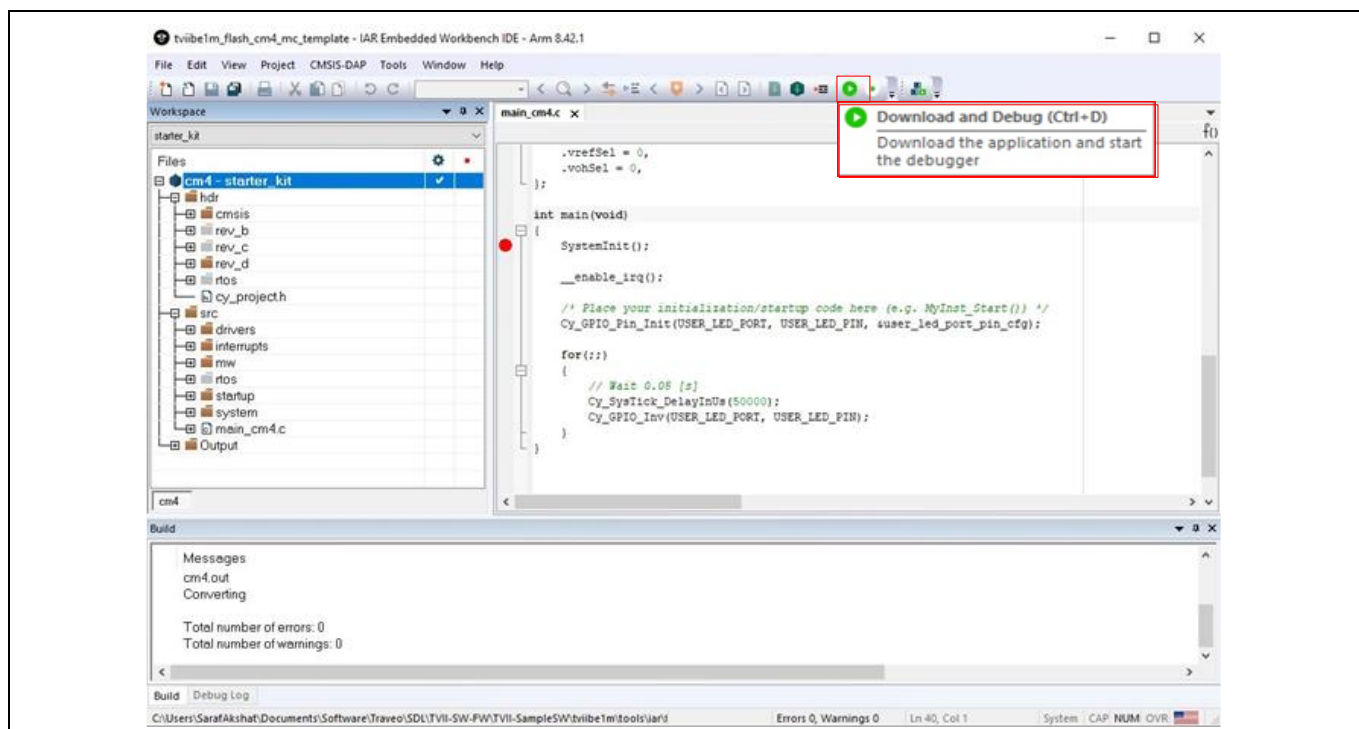


Figure 19 Downloading and debugging

Download and debug with starter kit

6. Now, click the **Go** icon to start execution.

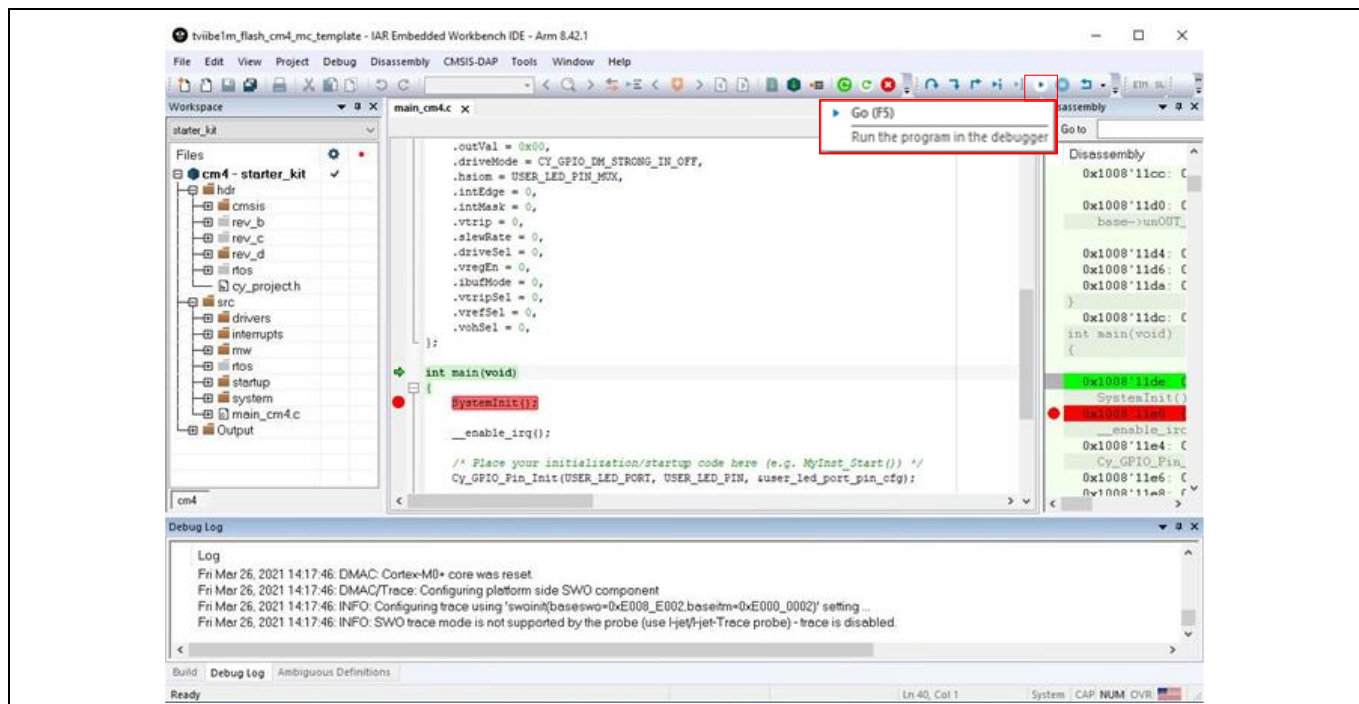


Figure 20 Debugging with CM4 core

LED4 should start blinking.

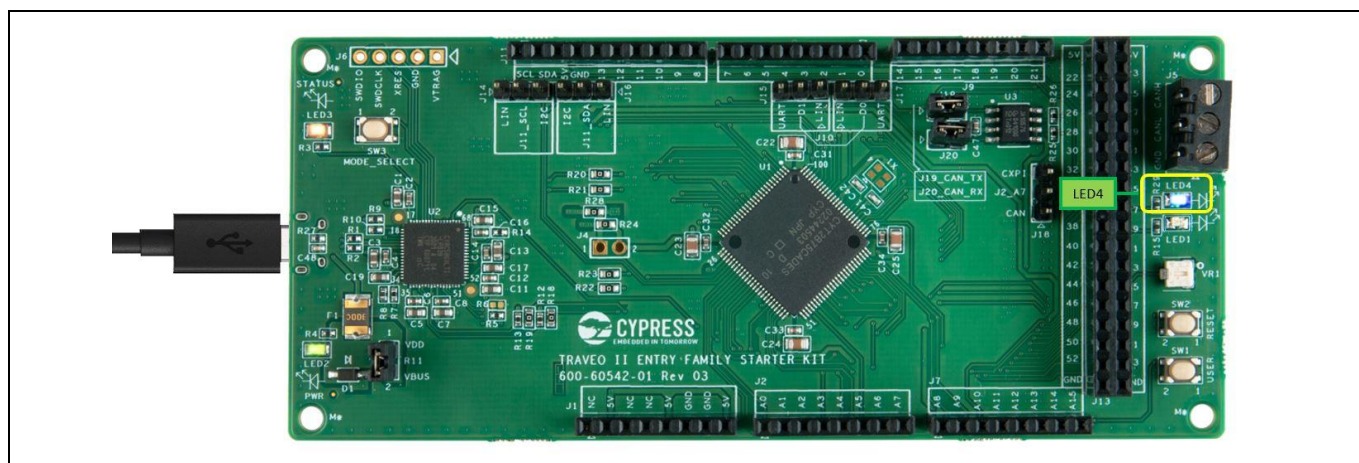


Figure 21 Blinking LED4

Download and debug with starter kit

3.3 Debugging with dual core CM0+ and CM4 workspaces

1. Start IAR EWARM and open the SDL template workspace file:
`tviiibe1m\tools\iar\flash\tviiibe1m_flash_cm0plus_cm4_template`

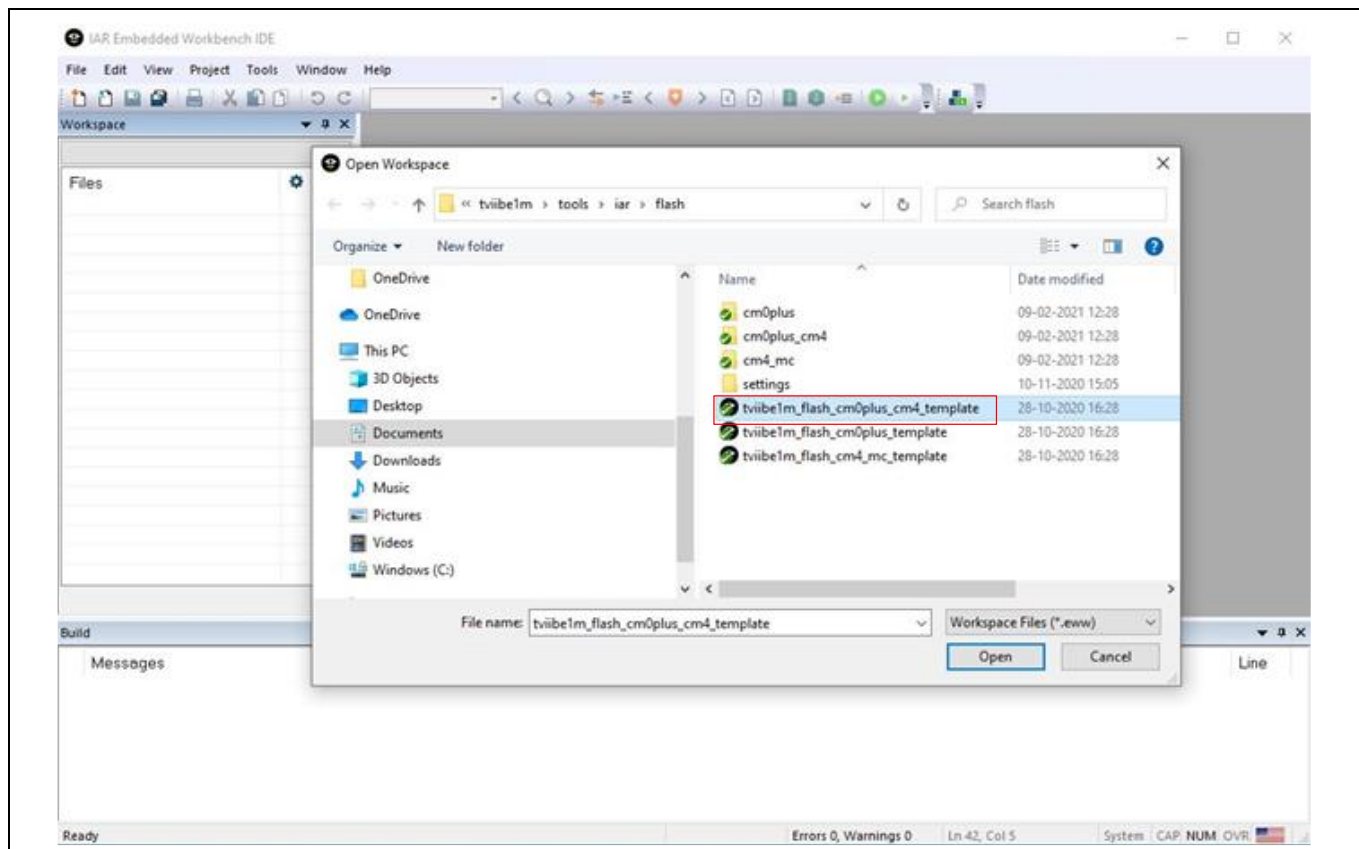


Figure 22 Selecting CM0+ and CM4 dual core template

Download and debug with starter kit

2. Select the workspace revision **starter_kit** from the drop-down list under **Workspace**, as shown in [Figure 9](#).

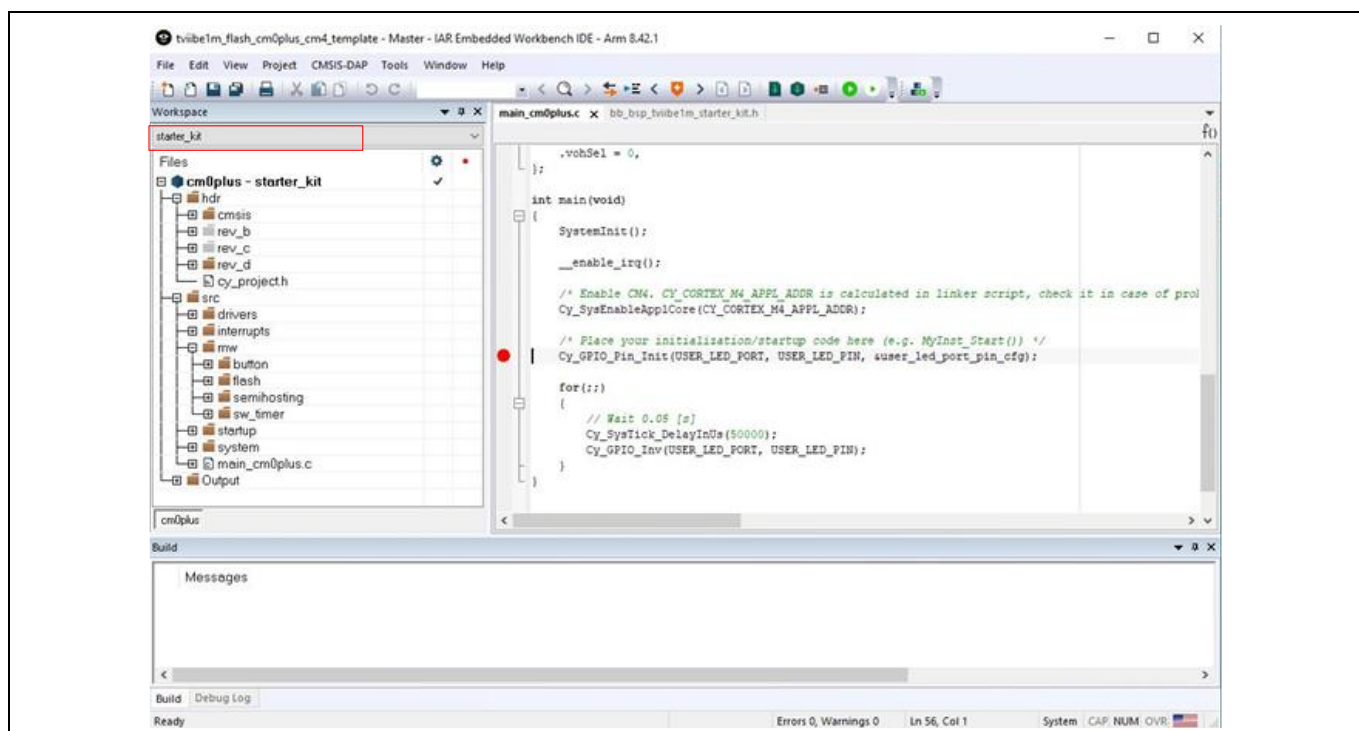


Figure 23 Selecting workspace revision

3. For the build, right-click **cm0plus - starter_kit** and select **Rebuild All**.

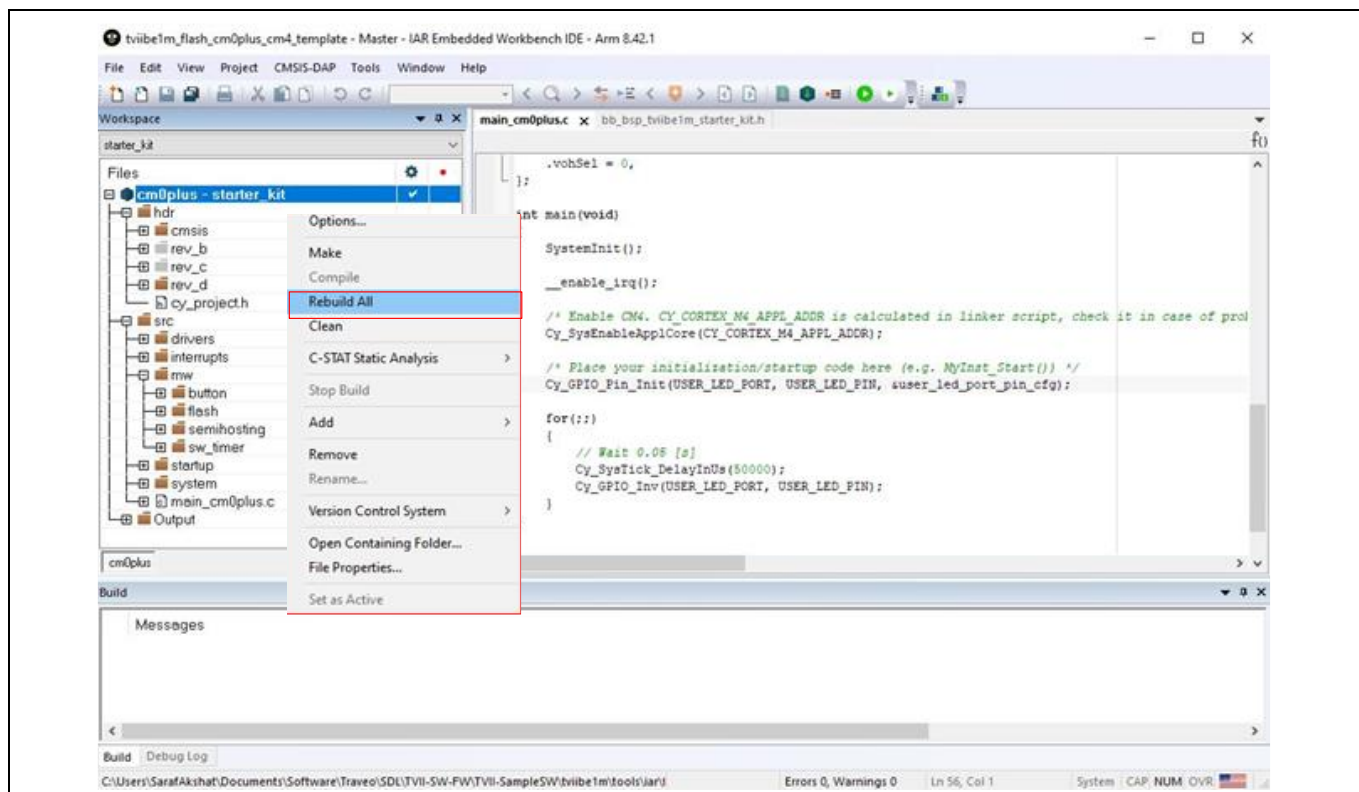


Figure 24 Rebuilding workspace revision

Download and debug with starter kit

- The rebuild process starts. Check for errors and warnings in the **Build** log.

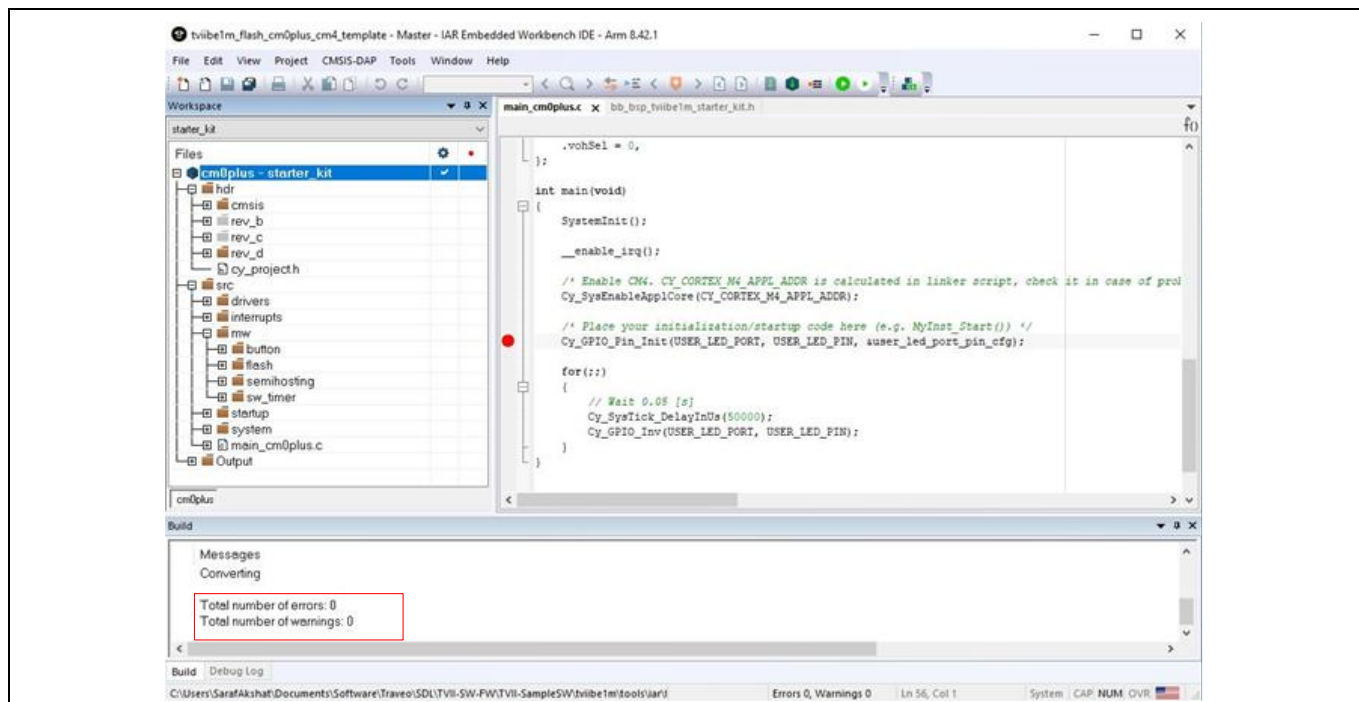


Figure 25 Checking build status in build log

- To load the program to the flash region of CM0+ and CM4 cores, click the green **Download and Debug** icon. This will automatically open the CM4 multicore client workspace, and the corresponding code will be downloaded into the flash region of respective cores.

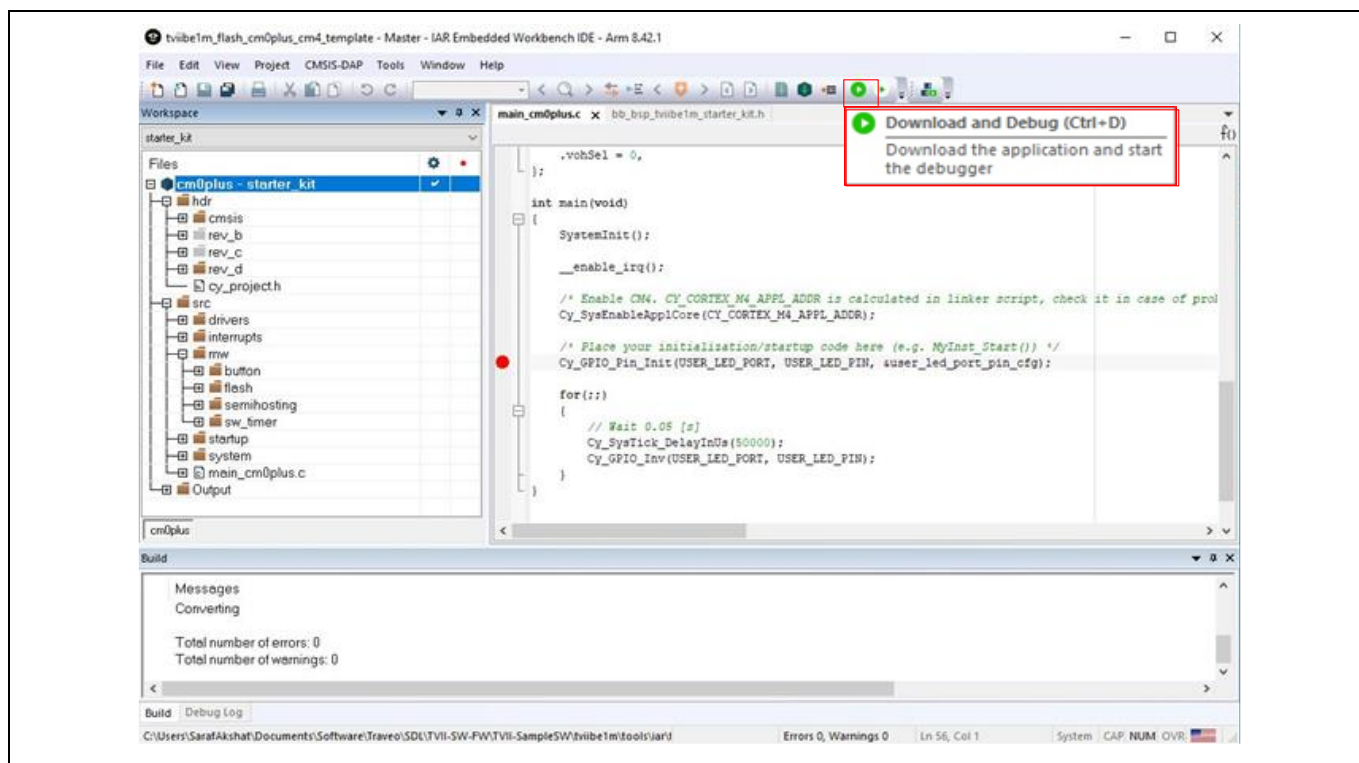


Figure 26 Downloading and debugging

Download and debug with starter kit

- Place a break point in the `SystemInit()` API in the CM4 core workspace. CM4 core will start executing after being enabled by CM0+ core. You can debug both cores simultaneously.

Note: To place a breakpoint at the target instruction, click the white space between the editor window (left pane) and the workspace window (center pane).

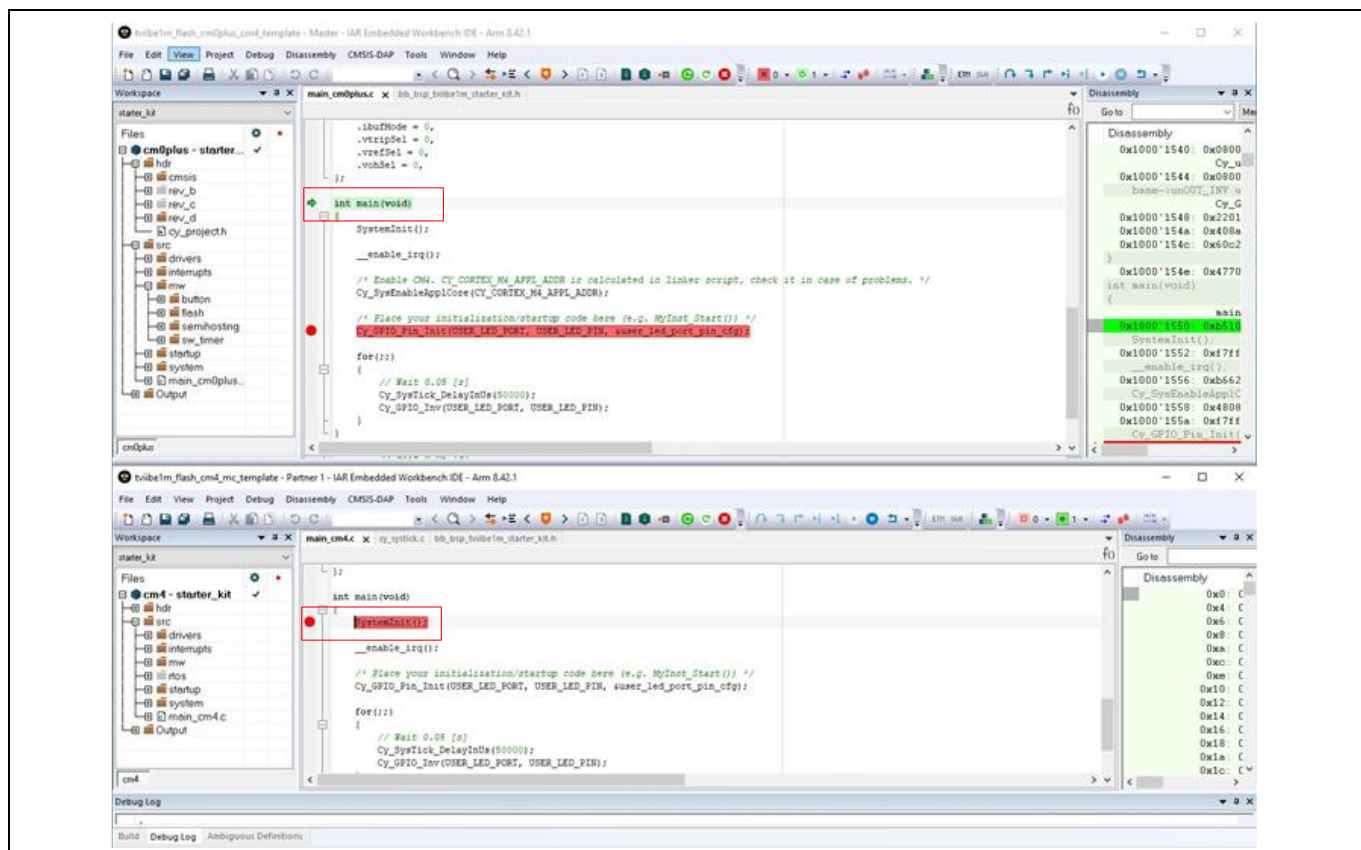


Figure 27 Dual core Debug windows

- Now, click the **Go** icon in the CM0+ workspace to start execution. After executing `Cy_SysEnableApplCore()`, CM4 core will be enabled and the execution will reach the breakpoint in the CM4 workspace. You can now continue to debug the code from CM4 core.

Download and debug with starter kit

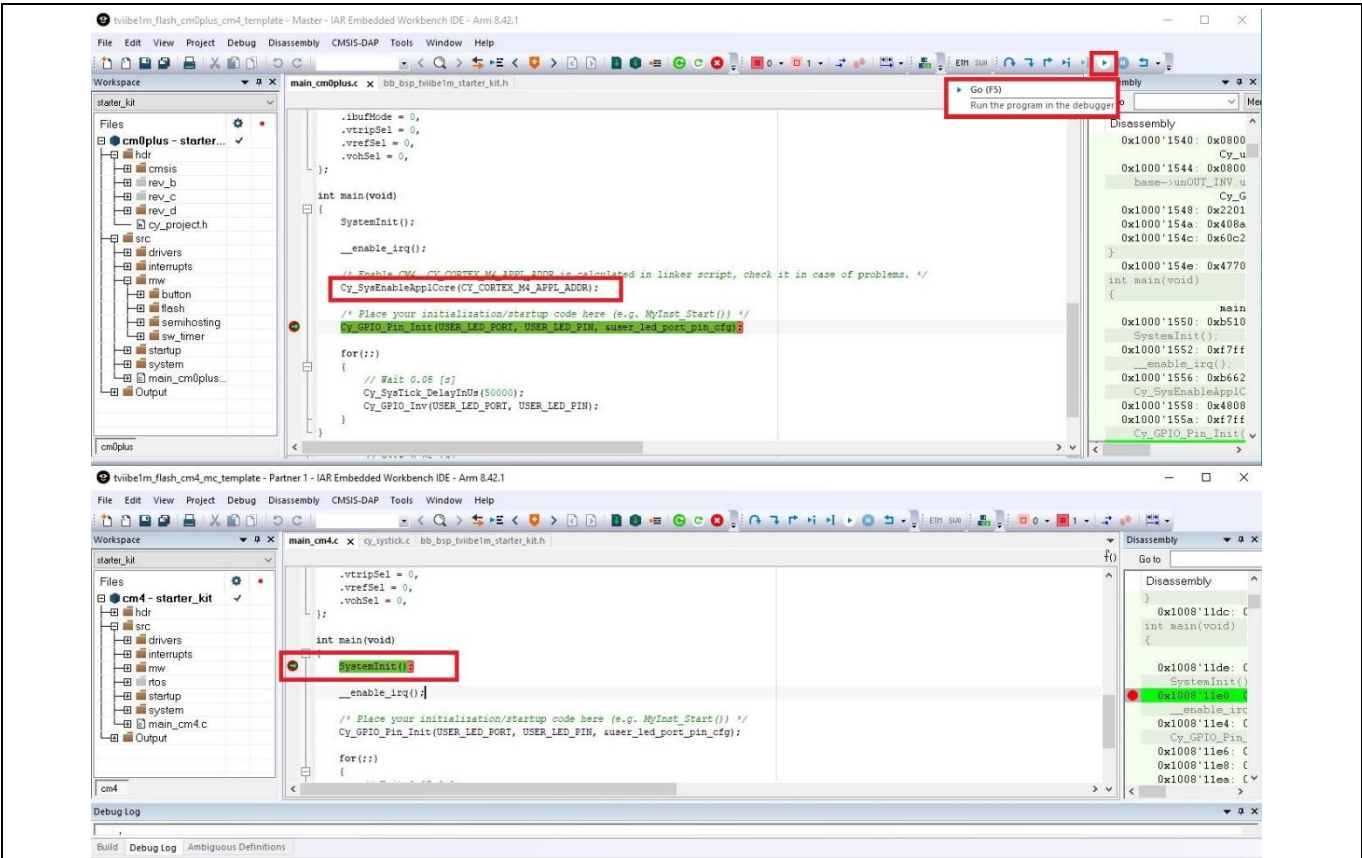


Figure 28 Debugging with CM0+ and CM4 cores

LED1 and LED4 should start blinking once both the cores are running.

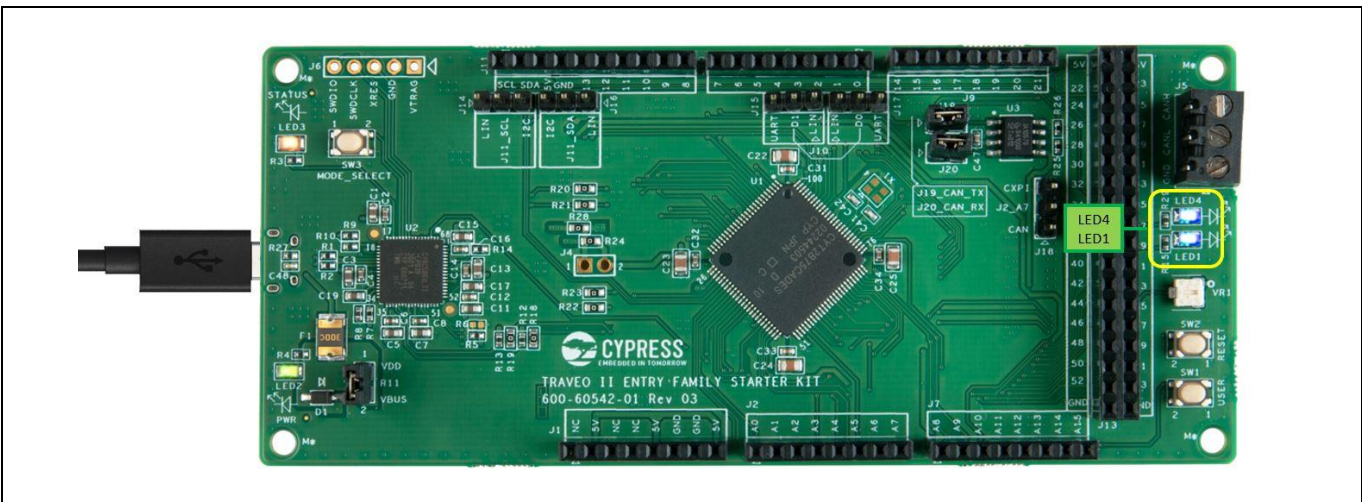


Figure 29 Blinking LED1 and LED4

Troubleshooting

4 Troubleshooting

This section explains possible issues and the workarounds.

4.1 Connection troubleshooting

Error: Starter kit is not detected on the target system.

- Connect the USB cable that comes with the starter kit. Other USB cables may not connect data lines
- Make sure LED3 is ON (CMSIS-DAP mode). If not, press SW3 to change the KitProg3 device mode
- If LED3 is ON (CMSIS-DAP mode), change the KitProg3 device mode by pressing SW3. Now LED3 is smoothly blinking. Then try to reconnect the debug session. Then independently if this works or not, stop the debug session again and switch the KitProg3 device mode to LED3 is always ON (CMSIS-DAP mode)
- Make sure jumper R11 is closed

4.2 Driver troubleshooting

Error: Driver is not detected on the target system or “KitProg3” is not visible

For more information on the supported driver, see the KitProg3 user guide [\[1\]](#).

4.3 Debugger troubleshooting

Error: While programming TRAVEO™ T2G device, CMSIS-DAP device is not found.

Check the USB cable connection and the state of LED3 (LED should be ON for CMSIS-DAP mode).

4.4 Key points

- CM0+ core should be running while debugging with CM4 in single core mode. CM0+ core enables the CM4 core by calling the `Cy_SysEnableApplCore()` API
- CM4 core workspace (tvii1m_flash_cm4_mc_template) should be built before building the dual core workspace (tvii1m_flash_cm0plus_cm4_template)

Revision history

Revision history

Document version	Date of release	Description of changes
**	2021-04-08	Initial release
*A	2021-09-29	Added instruction to install KitPro3 USB-UART driver manually in section 1.3 Moved “Download and Debug with Starter Kit” to section 3. Added “Verify installation by quick hands-on” at section 2.3.

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