IMC301/302A MCU Getting Started Guide

About this document

Scope and purpose

The IMC300A motor controller series, namely IMC301A and IMC302A product line, contains two distinct cores, the Motion Control Engine (MCE) for control of a motor and/or power factor correction (PFC) and an additional microcontroller (MCU) based on an Arm® Cortex® -M0 processor.

This application note is a getting started guide to quickly get up and running with the IMC300A MCU. Detailed information on the functionality and configuration of the MCE, is beyond the scope of this document and can be found in the iMOTION™Motion Control Engine Software Reference Manual. For example code and explanation of example code please refer to document [3].

Intended audience

This document is intended for customers who would like to get started with the IMC300A MCU core.

Table of contents

1 Brief Overview of MCU

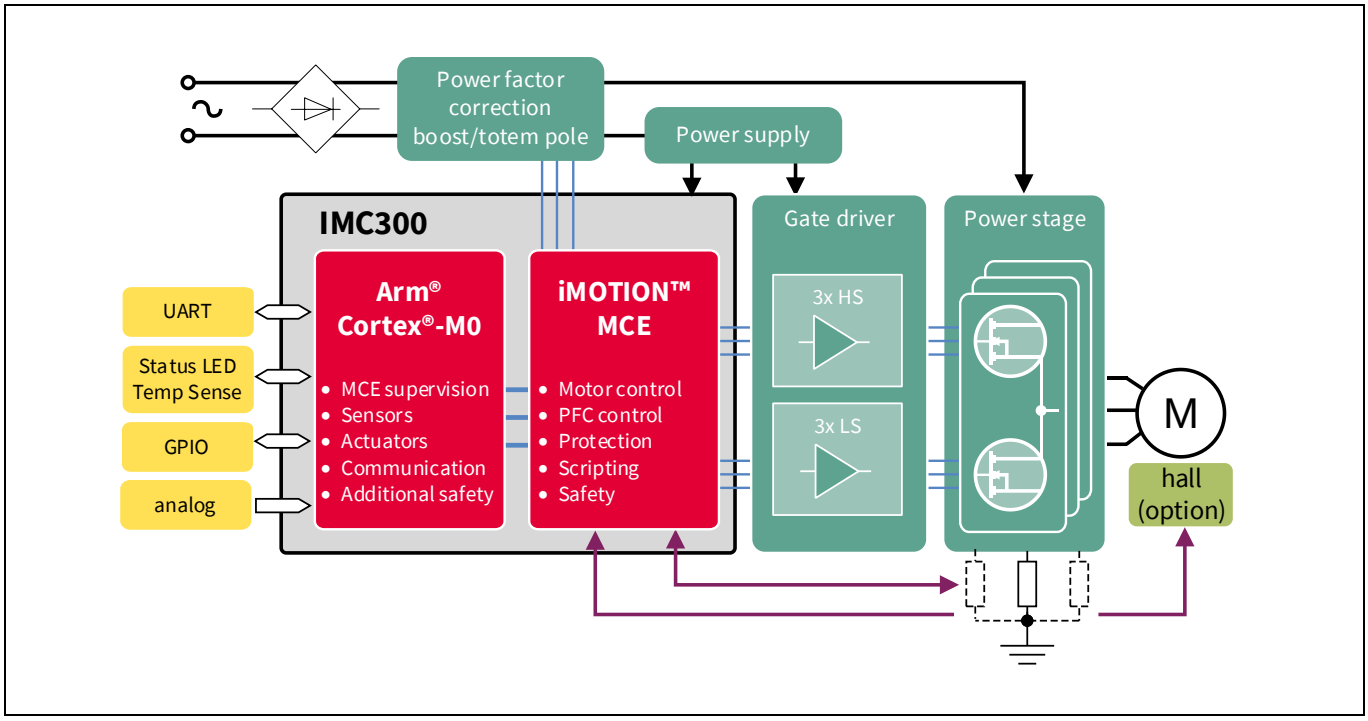

Figure 1 **IMC300A application block diagram**

iMOTION™ IMC300A is a family of highly integrated ICs for the control of variable speed drives. It integrates the Motion Control Engine (MCE) for control of a motor and/or power factor correction (PFC) with an additional microcontroller (MCU) based on an Arm® Cortex® -M0 core.

The embedded microcontroller is using an Arm® Cortex® -M0 core along with Flash, SRAM and a comprehensive set of peripheral modules allows for the implementation of complex system functionality. For further details about this device please refer to the iMOTION™ IMC300A Hardware Reference Manual along with the document IMC300A Peripheral Use Case Examples.

2 Getting Started

2.1 Requirements

2.1.1 Hardware Requirements

For evaluation of the IMC300A product line it is recommended to use the following hardware:

- (Optional) iMOTION™ Link
  - Isolated debug probe for the new generation iMOTION™ motor control ICs.
- EVAL-M1-301F/EVAL-M3-302F (MADK Control Board)
  - EVAL-M1-301F/EVAL-M3-302F evaluation board is a part of the iMOTION™ Modular Application Design Kit for drives (iMOTION™ MADK).
- MADK Power Board
  - Select one of the MADK Power Boards that is compatible with one of the MADK Control Boards.

Any of the hardware mentioned here can be found at https://www.infineon.com/cms/en/product/power/motor-control-ics/digital-motor-controller-imotion/ .

2.1.2 Software Requirements

2.1.2.1 Arm Keil MDK

Keil® MDK is a comprehensive software development solution for Arm®-based microcontrollers and includes all components that you need to create, build, and debug embedded applications. It includes MDK-Core based on µVision (Windows only) with support for Cortex-M devices. MDK also includes Arm C/C++ Compiler with assembler, linker, and run-time libraries optimized for code size and performance.

Arm Keil® MDK can be downloaded at https://www2.keil.com/mdk5/ .

2.1.2.2 µVision® IDE

µVision® IDE is an Integrated Development Environment and subset of the Arm Keil® MDK tools for Cortex M based microcontrollers. It combines project management, run-time environment, build facilities, source code editing, and program debugging in a single environment. It is also what is going to be used throughout this document for building and downloading source code to IMC300A MCU core.

µVision® IDE can be downloaded at https://www2.keil.com/mdk5/uvision/ .

2.1.2.3 Infineon IMC300A DFP

Infineon IMC300A DFP is a Device Firmware Pack for the IMC300A product line. It contains low-level API library code for the IMC300A's comprehensive set of peripheral modules.

Infineon IMC300A DFP can be installed from within Keil using Pack Installer. The IMC300A DFP can be downloaded from the Keil website at https://www.keil.com/dd2/pack/ under the Infineon heading in the "Infineon IMC300A Series" drop down menu.

2.2 Installing IMC300A DFP onto Keil µVision® IDE

1) Download Keil µVision® IDE, and the Infineon IMC300A DFP.

2) Open Keil µVision® IDE and select the “Pack Installer” as shown in Figure 2.

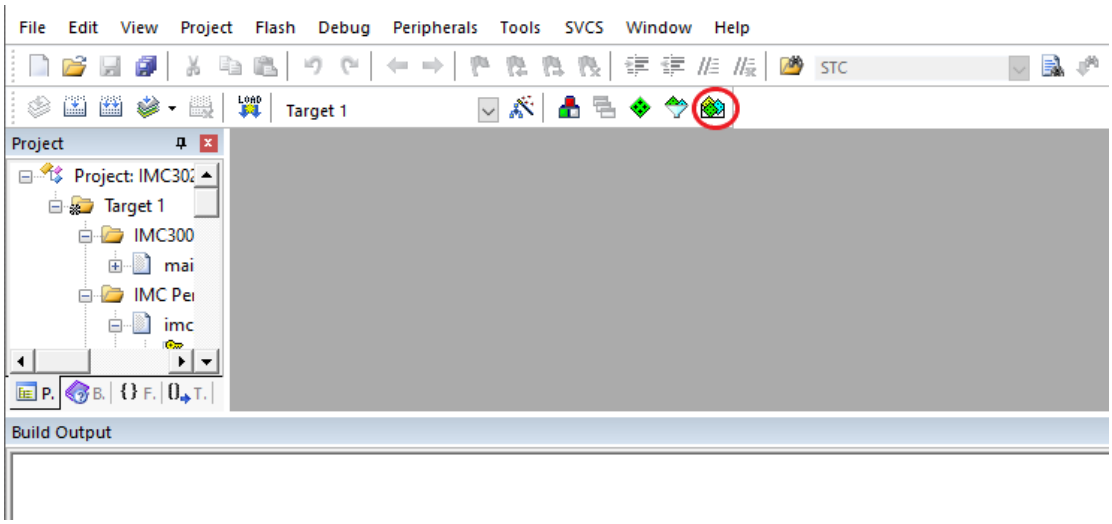

Figure 2 Keil µVision® IDE Pack Installer

3) The standalone pack installer should open in a separate window. Go to “File” →” Import…” and locate the Infineon IMC300A DFP on your local file system as shown in Figure 3.

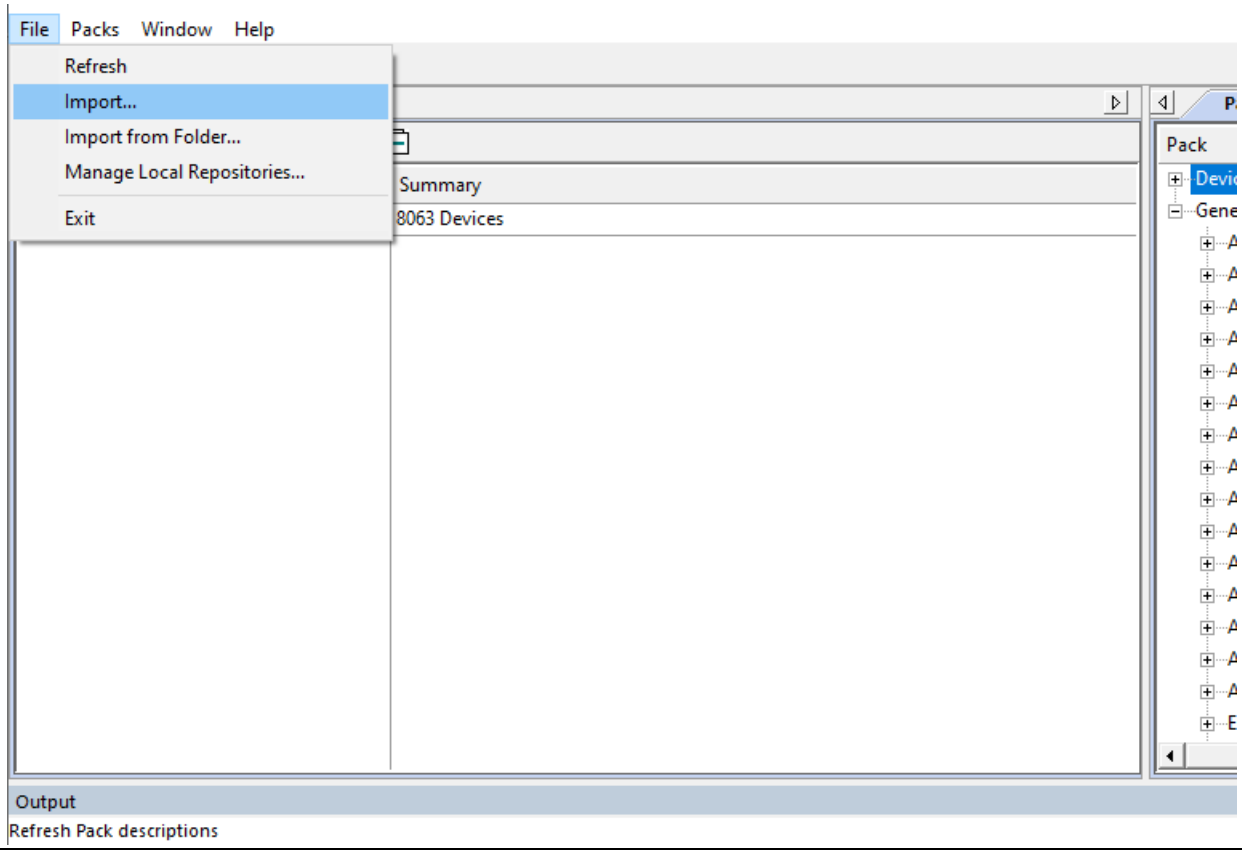

Figure 3 Keil µVision® IDE Pack Installer “Import”

4) Agree to the “Terms of Service” and click “Next” as shown in Figure 4.

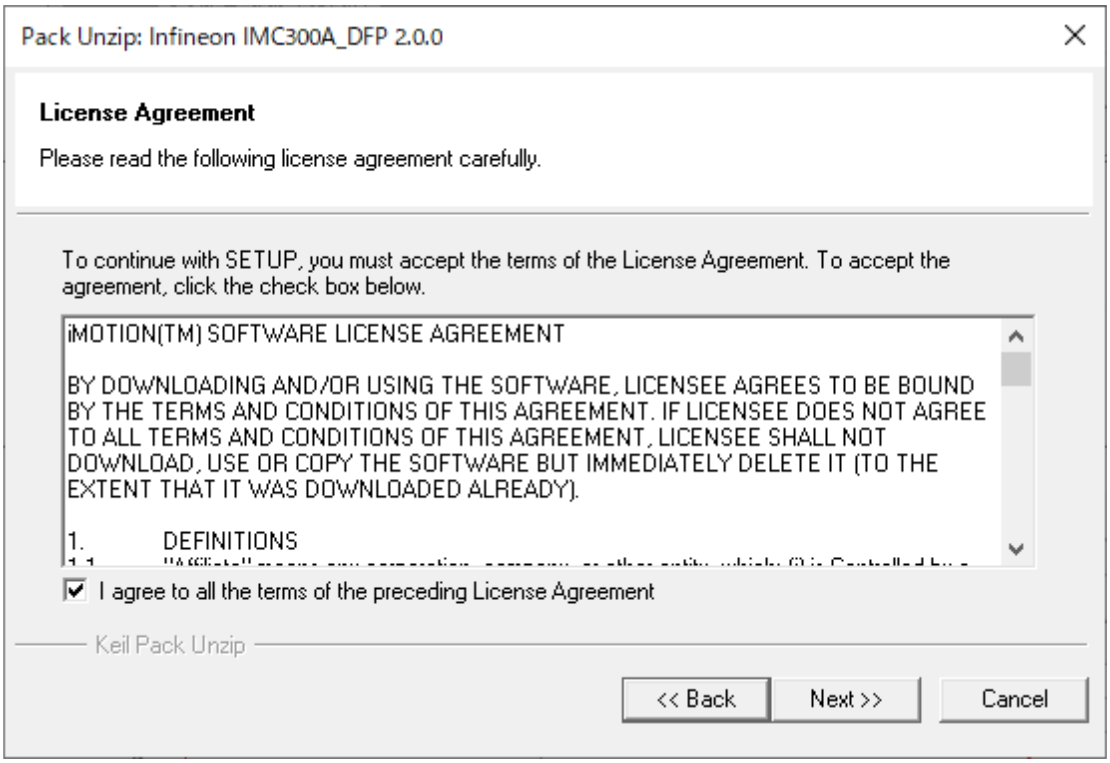

Figure 4 iMOTION™ Software License Agreement

5) To confirm IMC300A DFP has been installed look under “All Devices” → “Infineon” → “iMOTION” and one should see the IMC300 Series as shown in Figure 5.

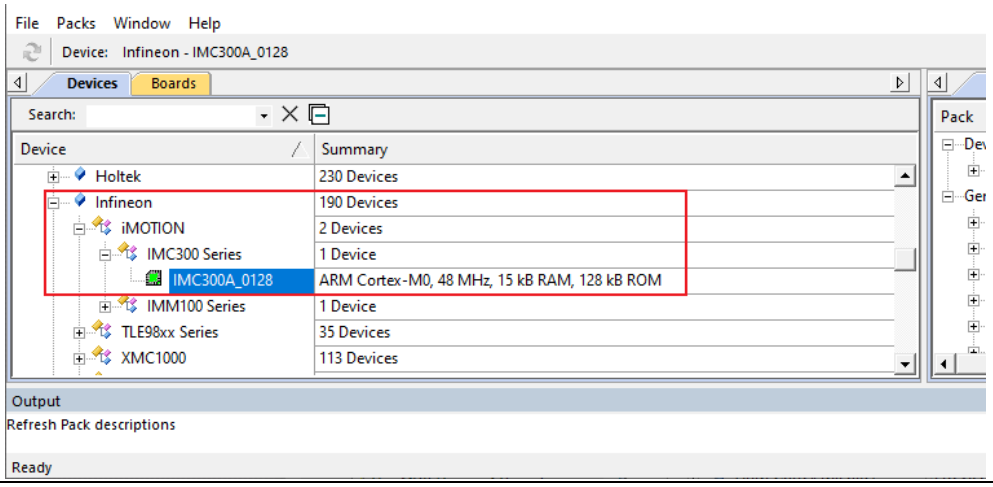

Figure 5 Keil µVision® IDE Pack Installer Window

2.3 Setting up Run-Time Environment according to the iMOTION FW version

Here, the FW 1.03.07 and the FW 5.X have different MCE software configurations. And even in the FW 5.X, there may have different definition in each version. Therefore, users must set the “iMOTION specific configuration” version according to the FW version in the “Manage Run-Time Environment”. Please follow the procedure below to set up the Run-Time Environment.

1) Select the “Manage Run-Time Environment” as shown in Figure 6.

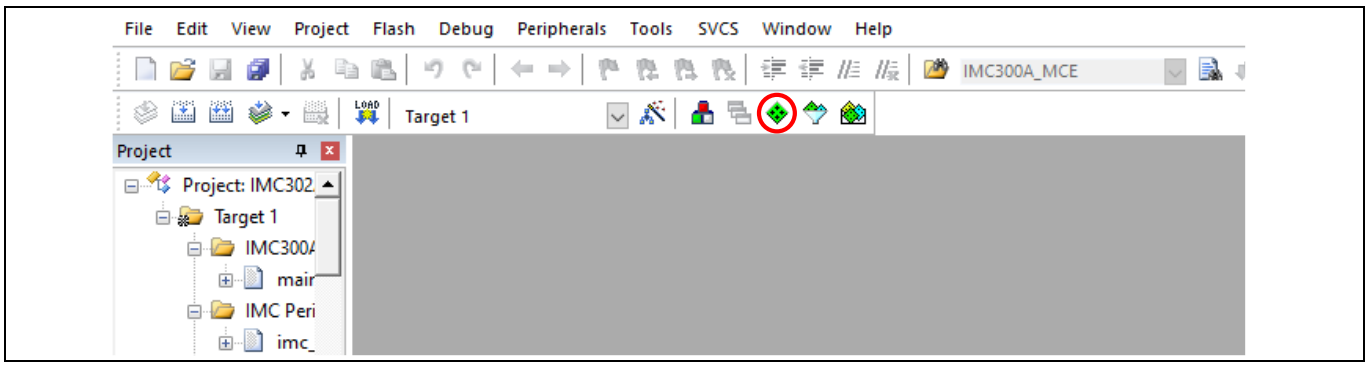

Figure 6 Keil µVision® IDE Manage Run-Time Environment

2) The standalone “Manage Run-Time Environment” should open in a separate window as shown in Figure 7.
3) Extract the “Device” in the “Software Component” index, and to confirm the “IMC300A PLIB” and “Startup” has been checked. If they are unchecked, please check them.
4) And also extract the “iMOTION” index, and select a appropriate Software Component according to the MCE FW version which user is going to use.
   a. If you are using FW 1.03.07, then check the “MCE V1.x.y” and uncheck the “MCE V5.x.y”.
   b. If you are using the FW 5.X, then uncheck the “MCE V1.x.y” and check the “MCE V5.x.y”, then choose the appropriate variant type of the configuration according to the sdpack version you are using. In the Figure 7, it is assumed that the FW 5.03.00.6.1395 is used as part of the SDpack V5.3.x, so, the “MCE V5.x.y” is checked with selecting the “V5.03.00.6.1395”.

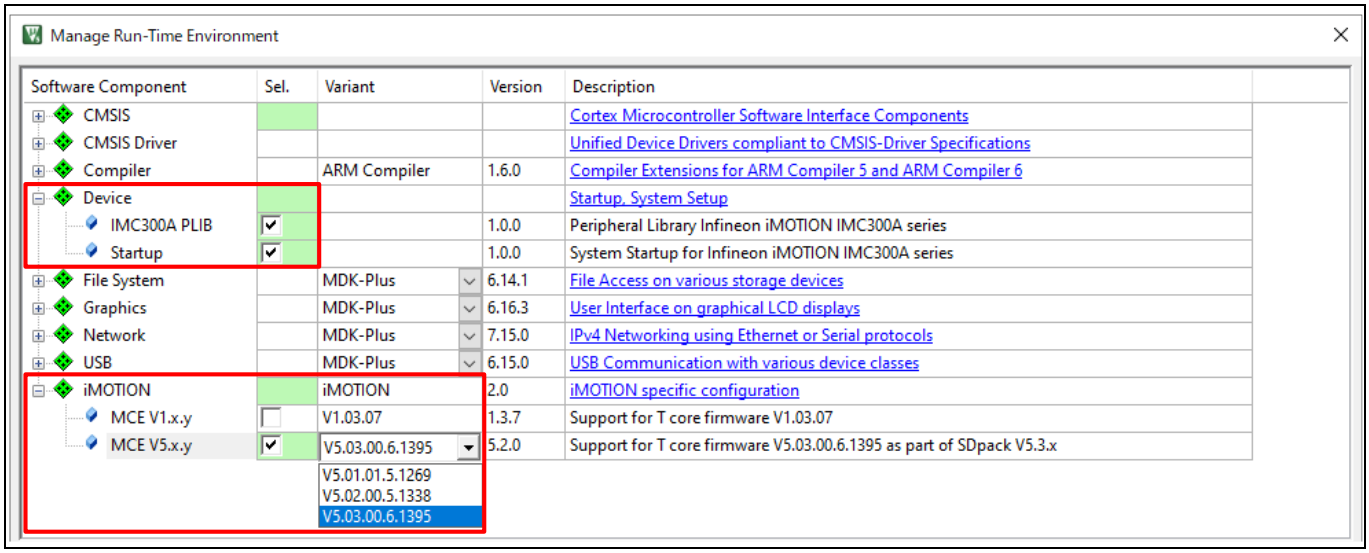

Figure 7 Keil µVision® IDE Manage Run-Time Environment Window

2.4 Setting up J-LINK/J-TRACE Cortex as debugger

1) Connect iMOTION™ Link to EVAL-M1-301F/EVAL-M3-302F or use the on-board debugger using USB connection.

   a. Please refer to the User Manual of the correlated board to connect iMOTION™ Link to MCU.

2) In µVision® IDE open a use case code example from https://www.infineon.com/cms/en/product/power/motor-control-ics/digital-motor-controller-imotion/ or start a new blank project.

3) Select "options for target" next to the "Select Target" dropdown menu as shown in Figure 8.

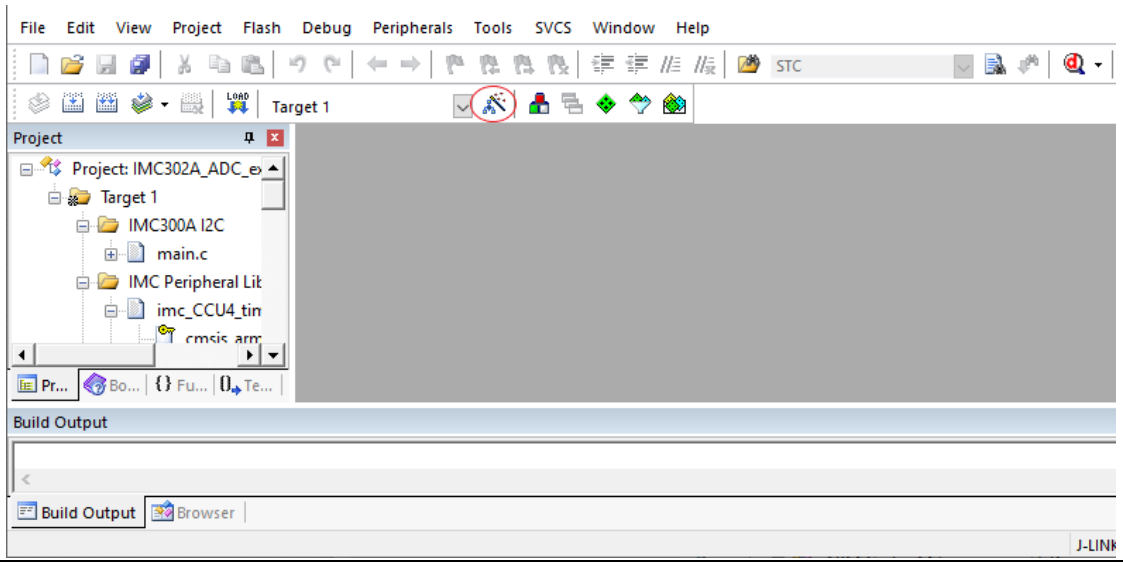

Figure 8 Keil µVision® IDE Options for Target

4) Go to the "Debug" tab and select "J-LINK/J-TRACE Cortex" from the drop-down menu on the right side of the page as shown in Figure 9.

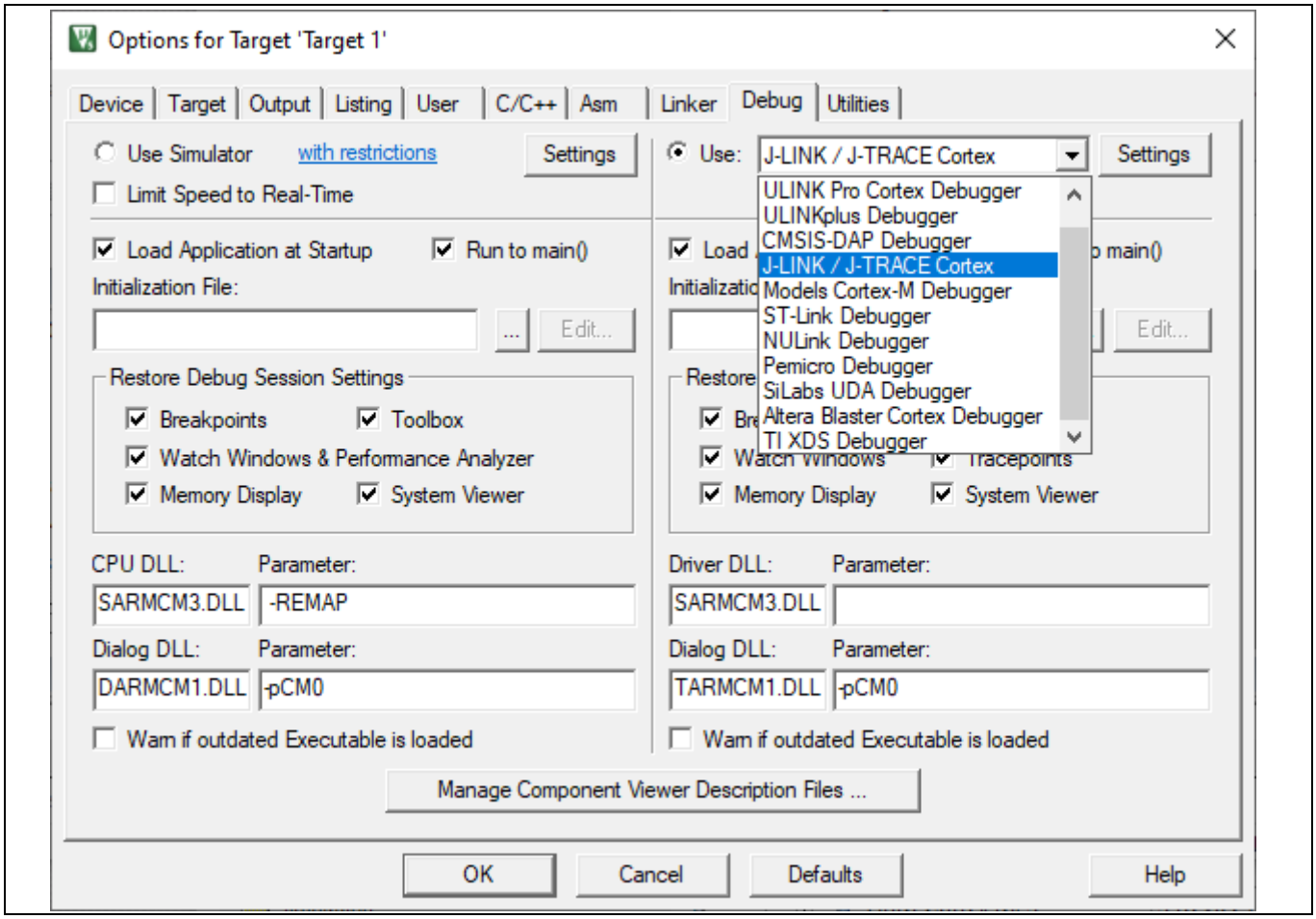

Figure 9 **Keil µVision® IDE Options for Target Window**

5) Then click the “Settings” button and under the “Debug” tab click “Scan” in the interface section for USB. A software device should be seen if the iMOTION™ Link is connected properly as shown in Figure 10. Make sure the port used for the device is a “SW” port.

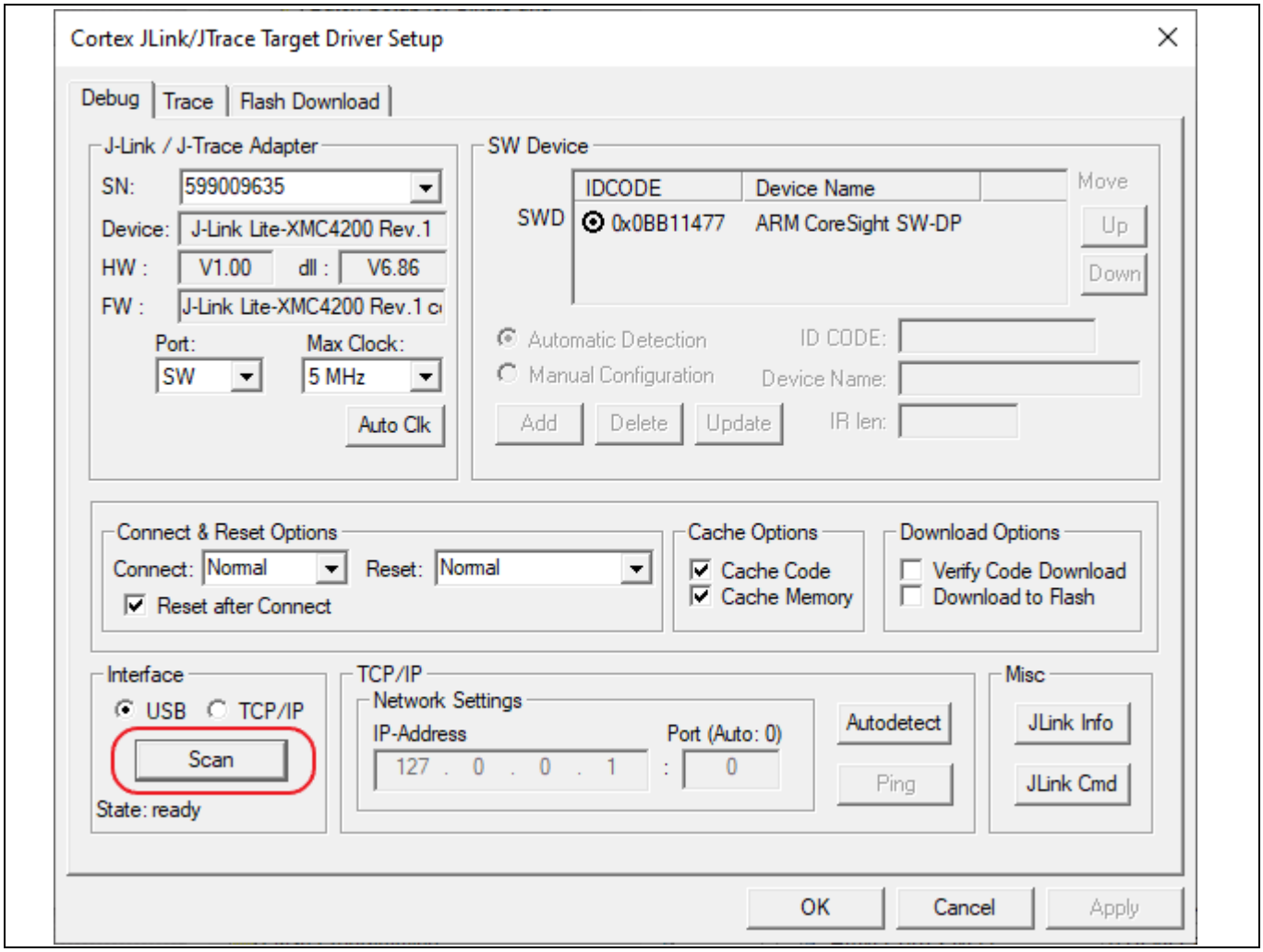

Figure 10 **Keil µVision® IDE JLink/JTrace Setup Window**

6) Go to the “Flash Download” tab and select settings that are appropriate for your application as shown in Figure 11.

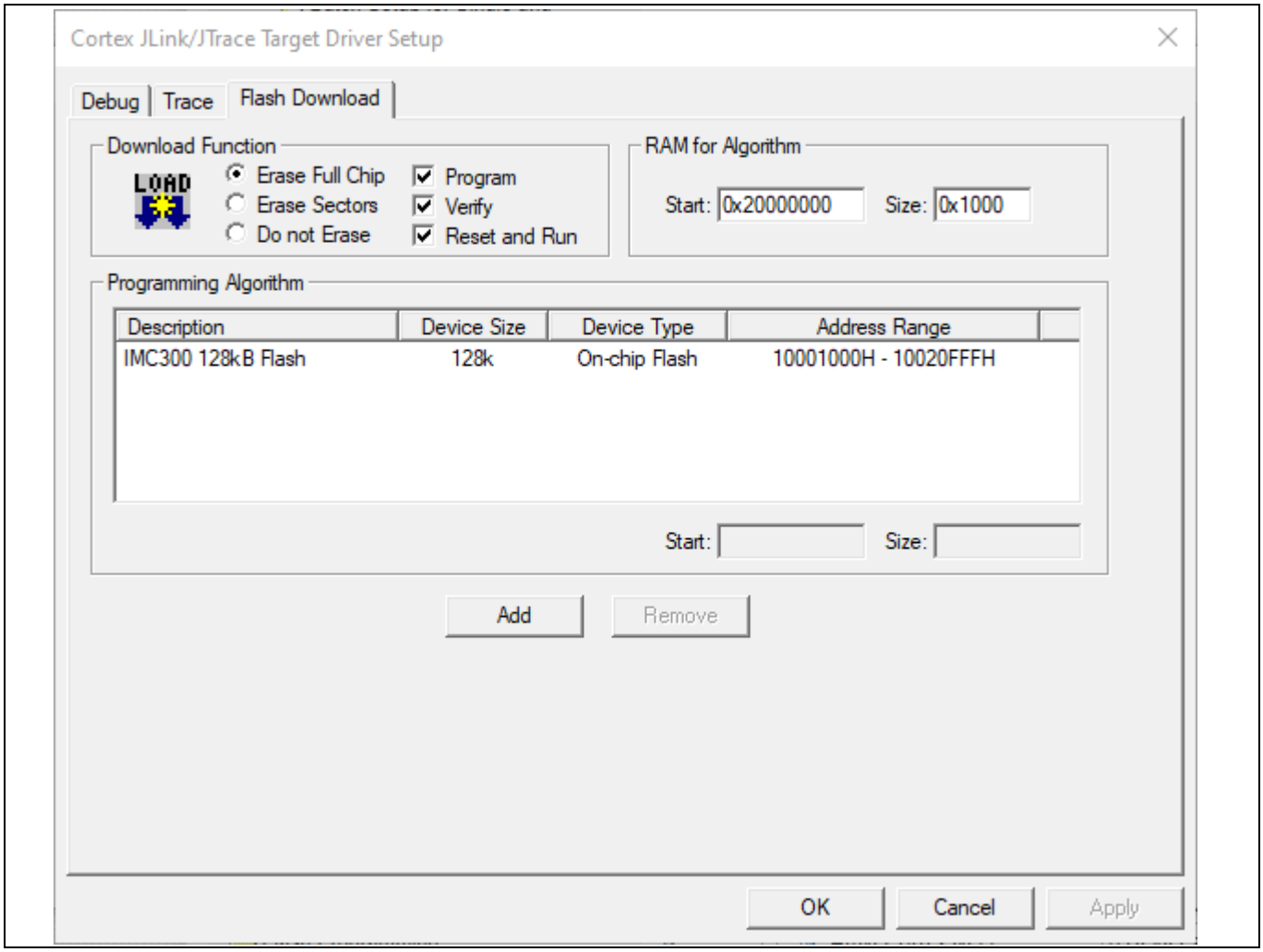

Figure 11 Keil µVision® IDE JLink/JTrace Flash Download Tab

7) Finally, press “OK” twice to exit out of “options for target”.

2.5 Building A Project and Downloading to Flash Memory

8) Connect iMOTION™ Link to EVAL-M1-301F/EVAL-M3-302F or use the on-board debugger using USB connection.

   a. Please refer to the User Manual of the correlated board to connect iMOTION™ Link to MCU.

2) Open one of our use case example codes in µVision® IDE as shown in Figure 12.

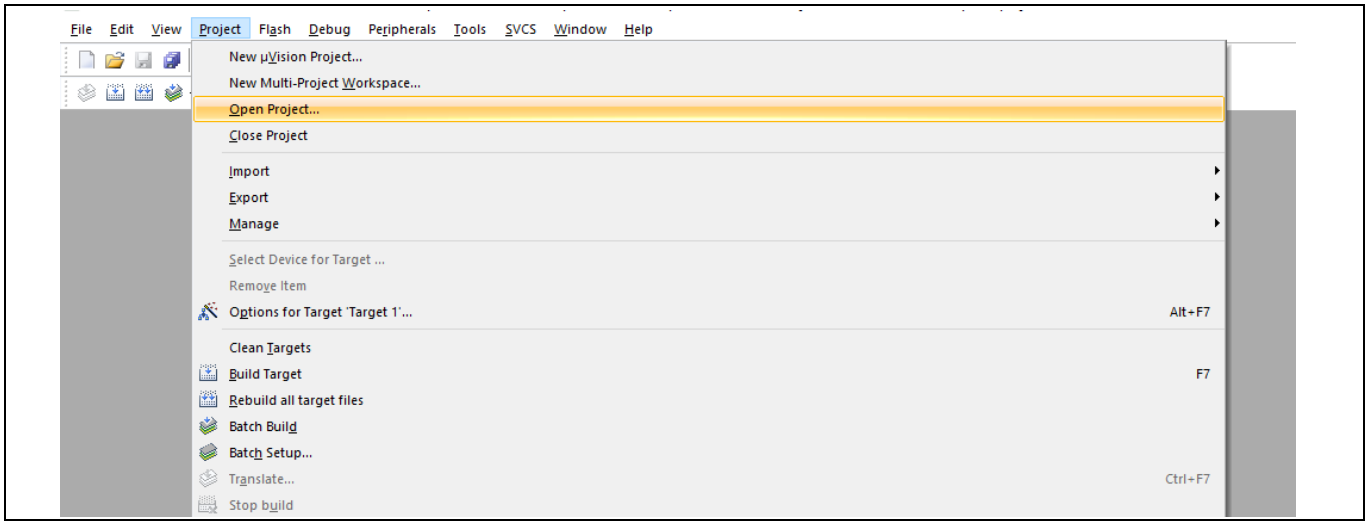

Figure 12 Keil µVision® IDE Open Project

3) Press F7 or click the "Build" button in the top left corner as shown in Figure 13. This should build the source code and compile into an object file.

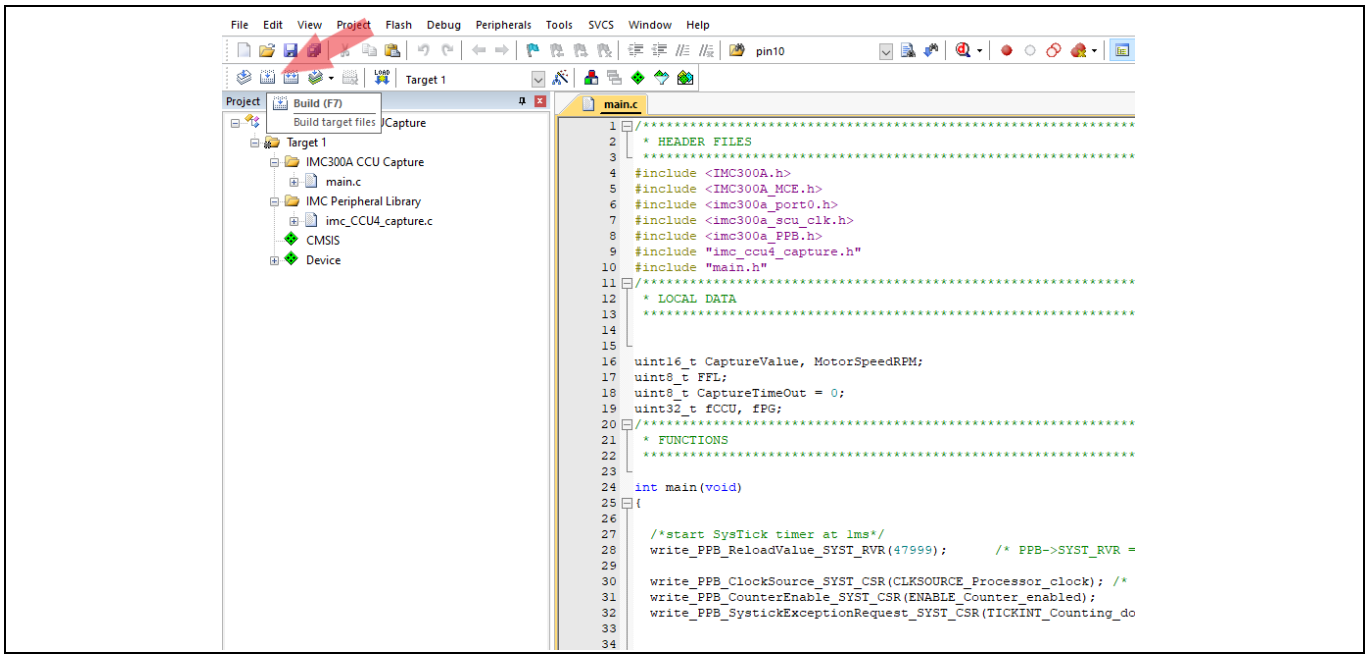

Figure 13 Keil µVision® IDE Build Project

4) Press F8 or click the "Load" button in the top left corner to download the object file into the MCU's flash memory as shown in Figure 14.

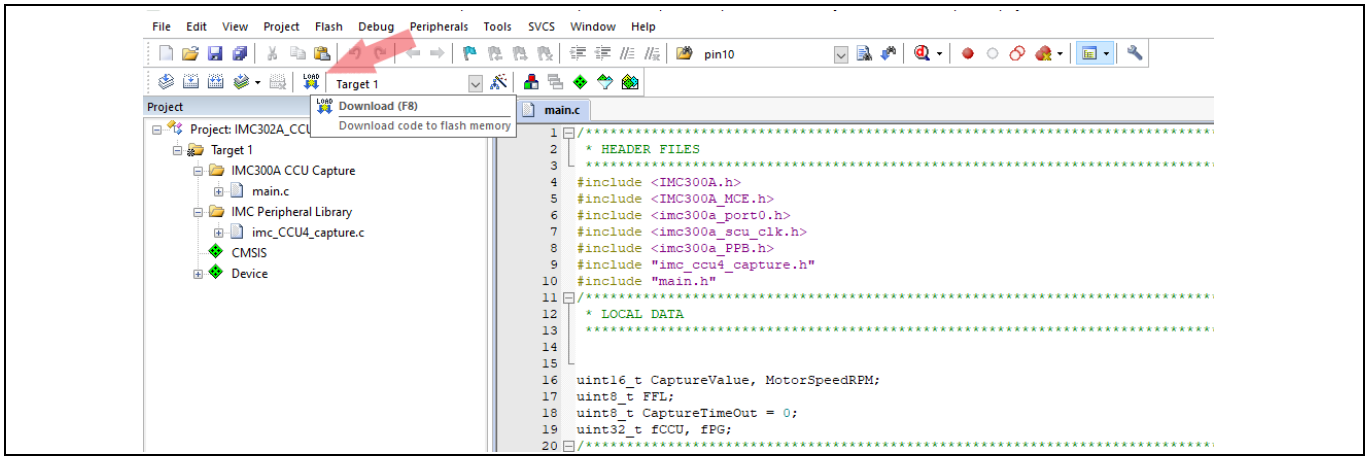

Figure 14 **Keil µVision® IDE Load to Flash Memory**

3 Troubleshooting FAQ

Q **Why can't I find the iMOTION Link when I scan?**

A In order to scan for the iMOTION Link port must be set to "SW" (Serial Wire) interface.

Q **Why do I get "No J-Link found" pop up when I try to "Load" firmware?**

A Debugger settings may be incorrect for the target. Please refer to section 2.3 on how to setup the debugger.

4 Reference

[1] See the code examples at www.infineon.com/iMOTION

[2] iMOTION™Motion Control Engine Software Reference Manual

[3] AN2020-10 IMC300A Peripheral Use Case Examples

[4] iMOTION™ IMC300A Hardware Reference Manual

Revision history

Document version	Date of release	Description of changes
1.0	2021-04-13	Initial Release
1.1	2021-07-14	Updated link for IMC300A DFP
1.2	2021-07-22	Revised section 2.1.2.3
1.3	2023-11-22	Added section 2.3 for setting up the Run Time Environment with support the IMC300A DFP pack version 2.0.0

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