IAR Workbench

User Guide

SUMMARY: This document provides the installation and configuration required to use IAR Workbench IDE for the Atmosic Wireless SoC Series Software Development Kit (SDK) on the Windows platform.

Atmosic™

IAR Workbench User Guide
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Table of Contents

List of Figures

Acronyms and Abbreviations

Acronyms	Definition
ATMx2xx	ATM2201 ATM2202 ATM2221 ATM2231 ATM2251 ATM3201 ATM3202 ATM3221 ATM3231
ATM33	ATM3330 ATM3325
ATM33e	ATM3330e
ATM33/e	ATM33/ATM33e
ATM34	ATM3405 ATM3425
ATM34e	ATM3430e
ATM34/e	ATM34/ATM34e

EVB	Evaluation Board
EVK	Evaluation Kit
SDK	Software Development Kit
SoC	System-on-Chip

1. Purpose

This document provides the installation and configuration required to use the IAR Embedded Workbench for the Atmosic SDK on the Windows platform.

1.1 Prerequisites

1) Atmosic SDK v5.5 or later
2) Atmosic Evaluation Board for ATM3330e/ATM3330/ATM3325 devices or
3) Atmosic Evaluation Board for ATM3430e/ATM3425/ATM3405 devices or
4) Atmosic Evaluation Board for ATMx2xx devices and Interface Board v3.x
5) IAR Embedded Workbench v9.32.2.57414
    a) Download IAR Workbench
6) I-jet Probe/debugger (for ATM2/ATM3 platform only)

2. ATM2/ATM3 Platform

2.1 Installation

1) I-jet Probe/debugger
    a) Install IAR Embedded Workbench
    b) Insert the I-jet device
    c) After successful installation, IAR Systems USB Probes should display under Device Manager as shown in Figure 1

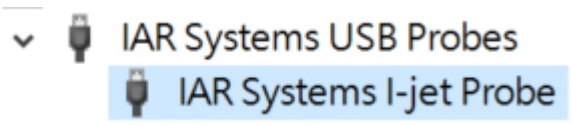

Figure 1 - I-jet Installation Successful

    d) Pin Connection

i) Atmosic Interface Board V3.x, V4.x or V5.x, see Figure 2

ii) Remove JP1, JP2 and J3 jumpers on the interface board

iii) Use the attached MIPI-10 JTAG cable to connect to the J-Link socket of the interface board

e) Connect the interface board to the ATM2/ATM3 EVB (refer to the ATM2/ATM3 Evaluation Kit User Guide and Interface Board User Guide for more information)

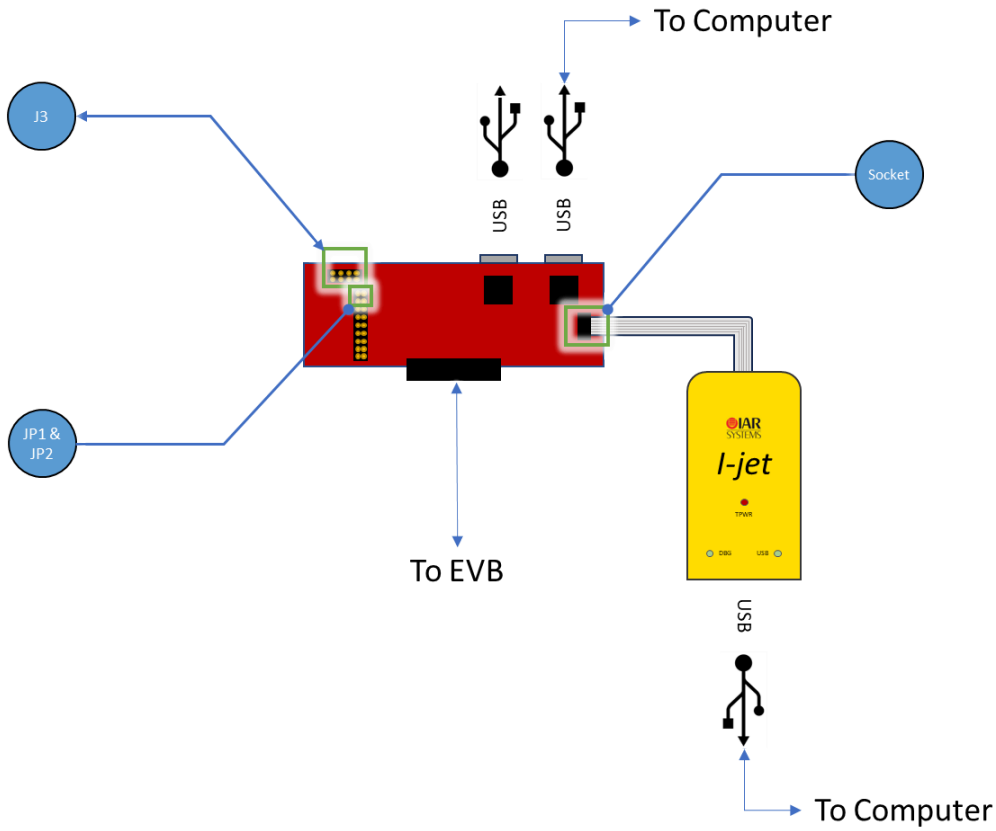

Figure 2 - Interface Board V3.x/V4.x/V5.x and I-jet Connections

2) Flash Loader

Copy all files from <SDK installation folder>\tools\iar to <IAR installation folder>\arm\config\flashloader\Atmosic

See the Generate IAR Workspace section to generate the IAR Workspace.

2.2 Generate IAR Workspace

Please refer to the section on **How to Generate IDE Project** from the **IDE Auxiliary Flash Programming Tool User Guide** to generate IAR Workspace.

After generating the workspace successfully, it can be found in the following folder:

<Atmosic SDK>\platform\atm2\ATM2xxx-xxx\example\xxx\iar
<Atmosic SDK>\platform\atm3\ATM3xxx-xxx\example\xxx\iar

Open workspace file in IAR folder, i.e., example\xxx\iar\<xxx>.eww

***Note**: IAR for ATM_mcuboot example is not supported. (Only GCC is supported for this example). For more details please refer to the makefile of ATM_mcuboot.*

2.3 Build and Program

1) Program Flash
    a) Without NVDS for each example is the default configuration
    b) With NVDS data for each example (refer to Program Flash with NVDS section)
2) Edit/Compile/Program/Debug Code at IAR IDE

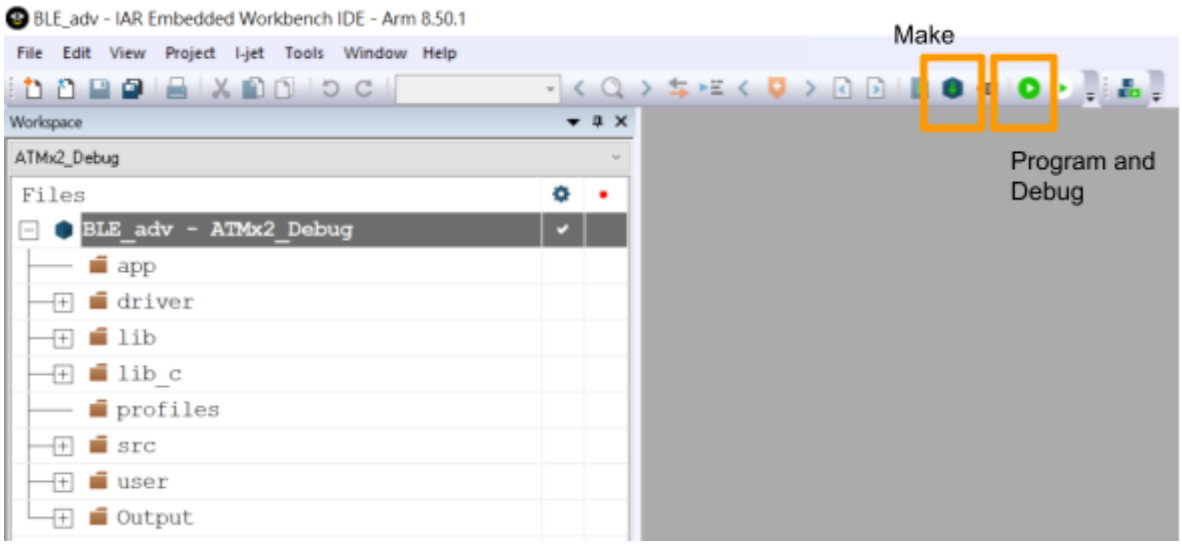

Figure 3 - IAR Workbench GUI

3) Run time debugger, Figure 4 shows the layout of the debugger session as an example

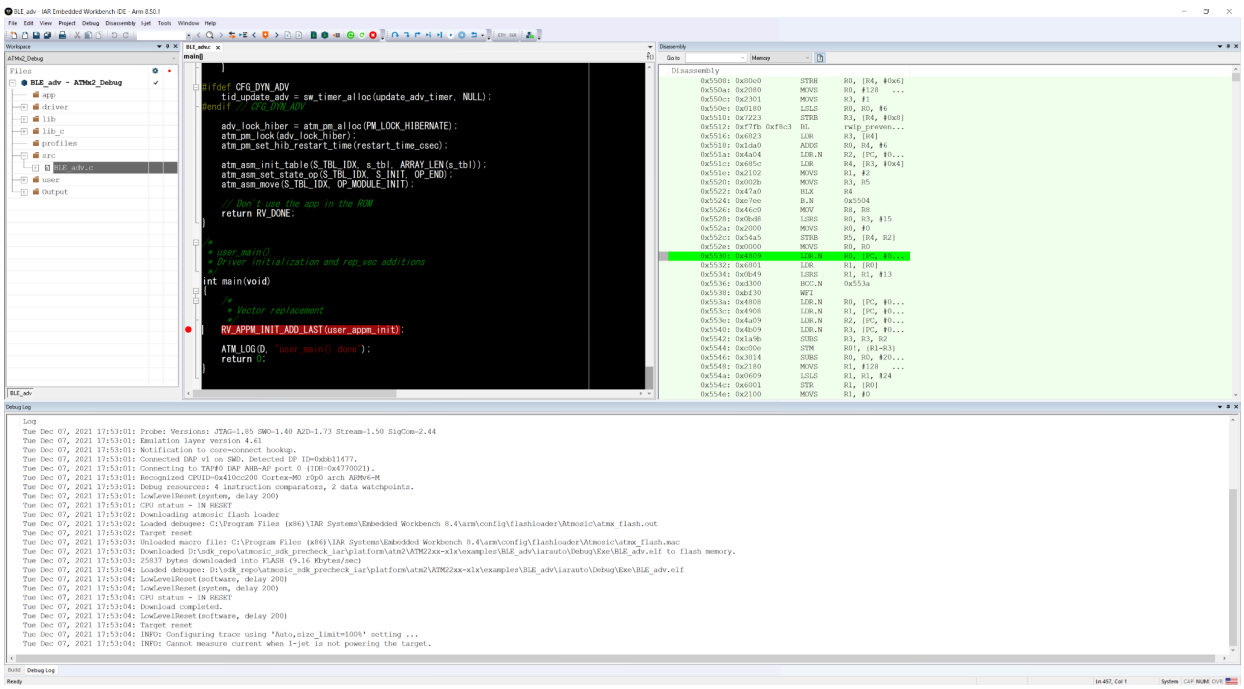

Figure 4 - Debug Session

2.4 Set Flash Loader

When creating a new IAR project, it needs to override the default .board file.
The PATH is $TOOLKIT_DIR$\config\flashloader\Atmosic\atmx_flash.board. See Figure 5.

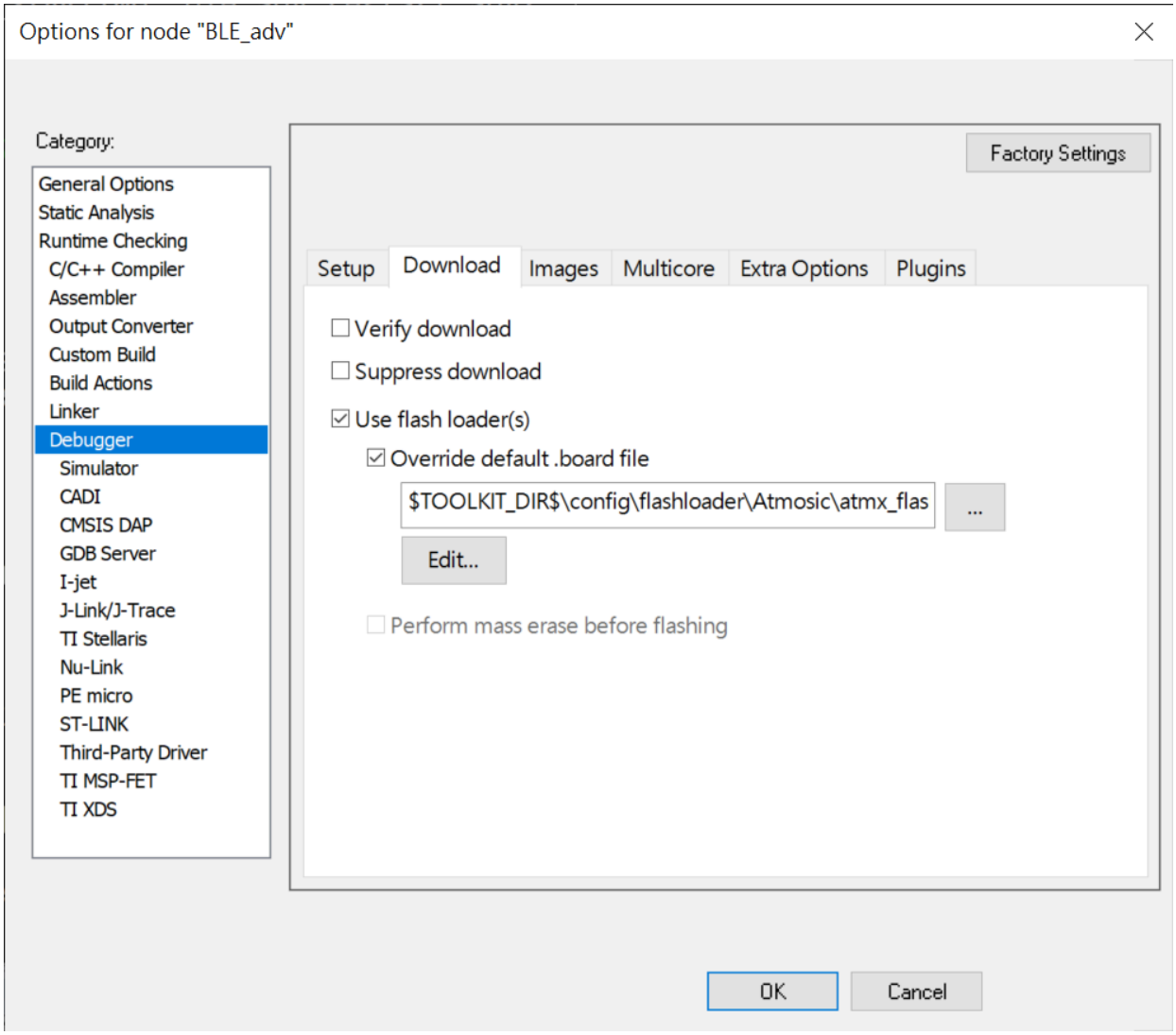

Figure 5 - Set Flash Loader

2.5 Program Flash with NVDS

Each IAR Workspace folder will include the flash_nvds.bin file.

To program NVDS, set flash_nvds.bin as an input and program the whole image. See Figure 6.

1) Go to the linker setting page: Project Options →Linker →Input
    a) Keep symbols: NVDS
    b) Raw binary file: $PROJ_DIR$\flash_nvds.bin
    c) Symbol: NVDS, Section:.NVDS, Align:8
2) Rebuild the whole project
3) Program image

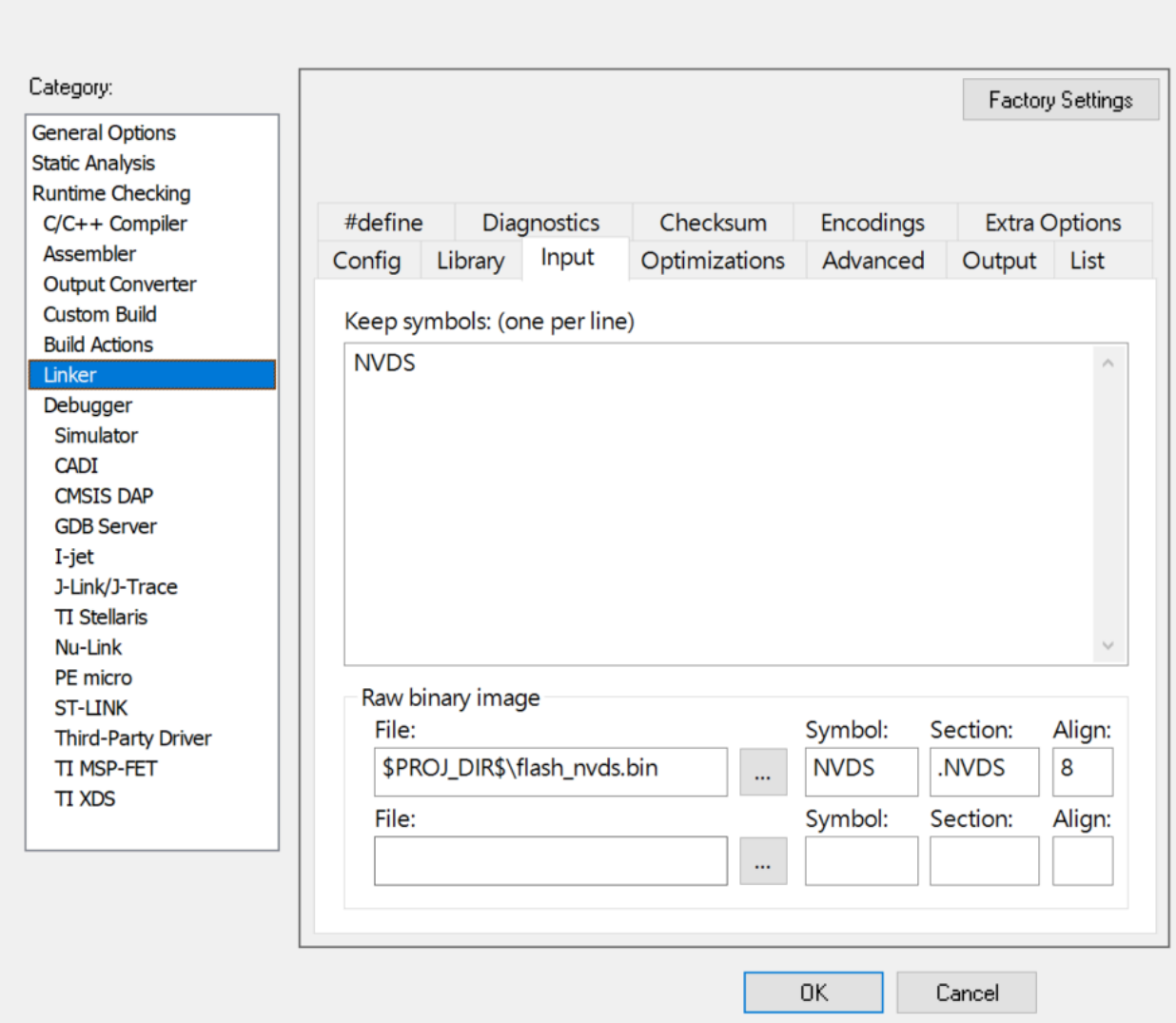

Figure 6 - Add flash_nvds.bin

3. ATM33/e and ATM34/e Platform

3.1 Installation

1) Connect the USB cable to the USB Connector on the ATM3330e/ATM3330/ATM3325/ATM3430e/ATM3425/ATM3405 Evaluation Board, see Figure 7 as an example for ATM33/e. Confirm JLink CDC UART Port and J-Link driver are showing in the Windows device manager.

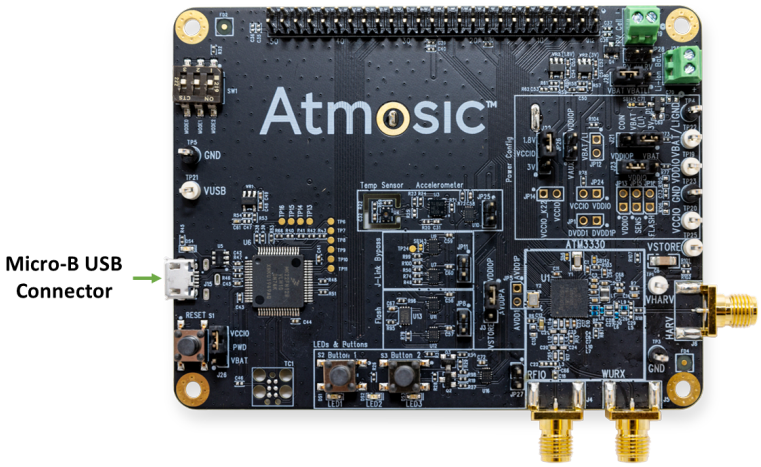

Figure 7 - ATM33/e Evaluation Board

2) Flash Loader

   Copy all files from <SDK installation folder>\tools\iar to <IAR installation folder\arm\config\flashloader\Atmosic>

3) Refer to Generate IAR Workspace to generate IAR Workspace.

4) Two options to build and program firmware

   Option 1: Generate IAR Workspace without USE_MCUBOOT

   - Refer to Build Example and Program (without US_MCUBOOT) to build and program bootloader
   - Refer to Program Image without NVDS and Program Image with NVDS to build and program application

   Option 2: Generate IAR Workspace with USE_MCUBOOT

- Edit and build the project to generate application image
    - ***Note**: if the bootloader was updated, then it needs to follow section 3.3 to link right Secure_Functions.o.*
- Refer to IDE Auxiliary Flash Programming Tool User Guide to program generated image.

3.2 Generate IAR Workspace

Please refer to the section on **How to Generate IDE Project** from the **IDE Auxiliary Flash Programming Tool User Guide** to generate IAR Workspace.

After generating successfully, the workspace can be found in the following folder:
<Atmosic SDK>\platform\atm33\ATM33xx-5\example\xxx\iar OR
<Atmosic SDK>\platform\atm34\ATM34xx-2\example\xxx\iar

Open workspace file in IAR folder, i.e., example\xxx\iar\<xxx>.eww

3.3 Build and Program Bootloader

Bootloader is an example to boot the system and it will generate an object file called Secure_Functions.o for applications to link and to use the secure entry functions. So it's important to know what Secure_Functions.o was programmed into the device. The application must link with proper Secure_Functions.o.

By default, the project will automatically use a script called prebuild.bat (located in the workspace folder) to generate a bootloader image in <Atmosic SDK>\platform\atm33\ATM33xx-5\example\bootloader\ and link it with the application.

Or for ATM34/e, <Atmosic SDK>\platform\atm34\ATM34xx-2\example\bootloader\.

If the bootloader is needed to build using IAR, please refer to the following steps to build and link the Secure_Functions.o.

IAR Workspace to Generate Bootloader

1) Run Setup `IDE Environment` and ensure the J-Link driver is showing in the Windows device manager under USB devices. Setup IDE Environment can be found at Start Menu -> AtmosicSDK.
2) Generate IAR Workspace, (please refer to Generate IAR Workspace) and Open IAR Workspace at SDK\platform\atm33\ATM33xx-5\example\bootloader\iar\bootloader.eww or

   SDK\platform\atm34\ATM34xx-2\example\bootloader\iar\bootloader.eww
3) Build and Program bootloader.
4) Modify the link option in the application workspace.
   a) Project -> Options -> Linker -> Extra Options
   b) Replace $PROJ_DIR$\..\..\bootloader\Secure_Functions.o with --> $PROJ_DIR$\..\..\bootloader\iar\Debug\Exe\Secure_Functions.o

3.4 Build Example and Program (without USE_MCUBOOT)

1) Run Setup IDE Environment and ensure the J-Link driver is showing in the Windows device manager under USB Serial Bus controllers. Setup IDE Environment can be found at Start Menu -> AtmosicSDK.
2) Edit/Compile/Program Code in IAR IDE, see Figure 8.

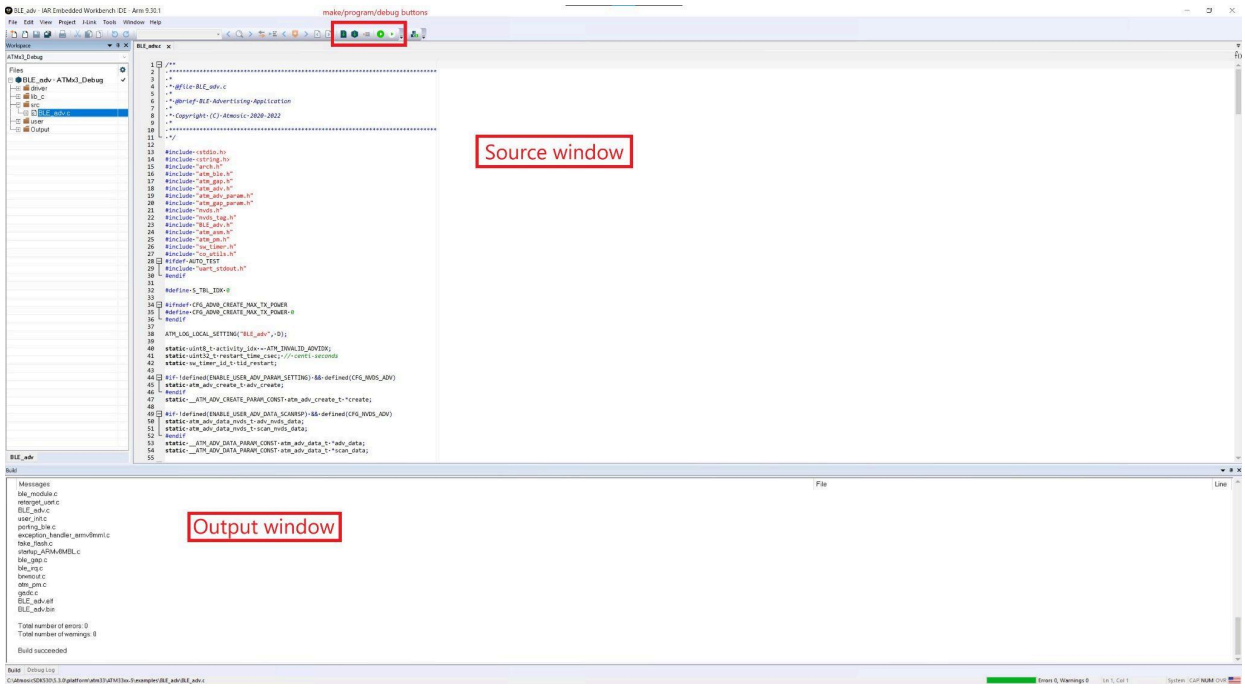

Figure 8 - IAR Workbench GUI

3) For the Program and Debug image, please refer to Figure 12 for the programming image with NVDS

   a) Press the Download and Debug button on the toolbar or (Project → Download → Download and Debug), see Figure 9.

   b) Runtime debug, see Figure 10.

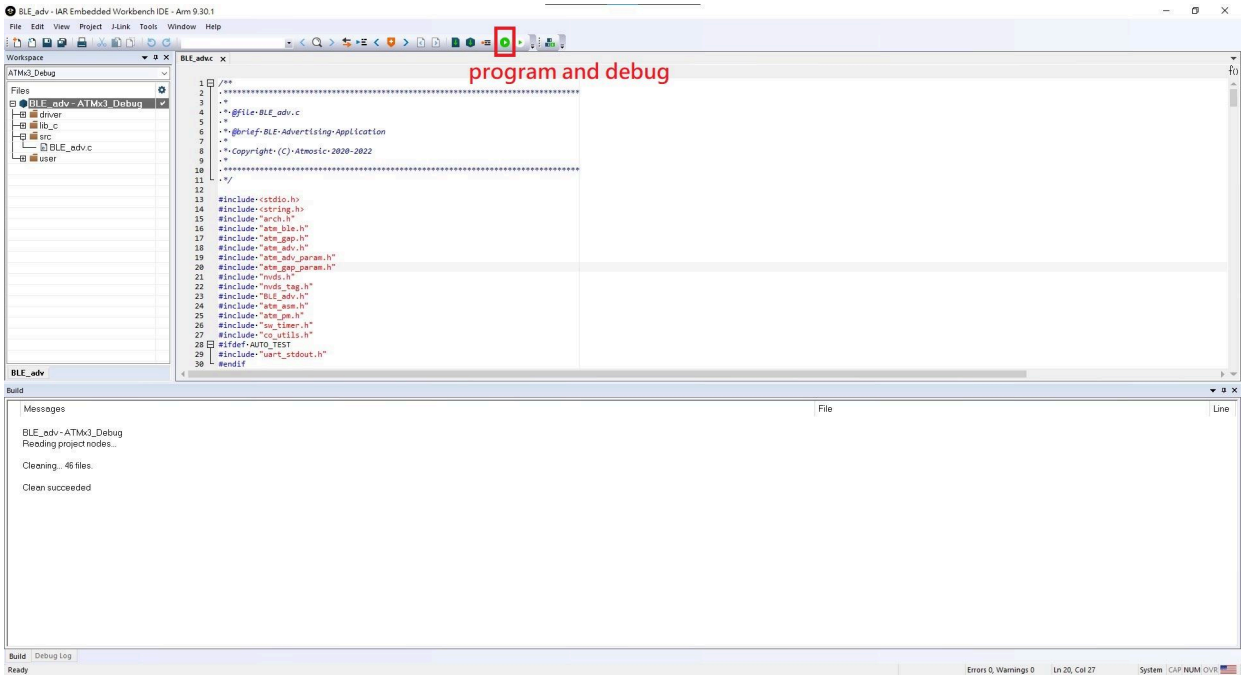

Figure 9 - Download and Debug

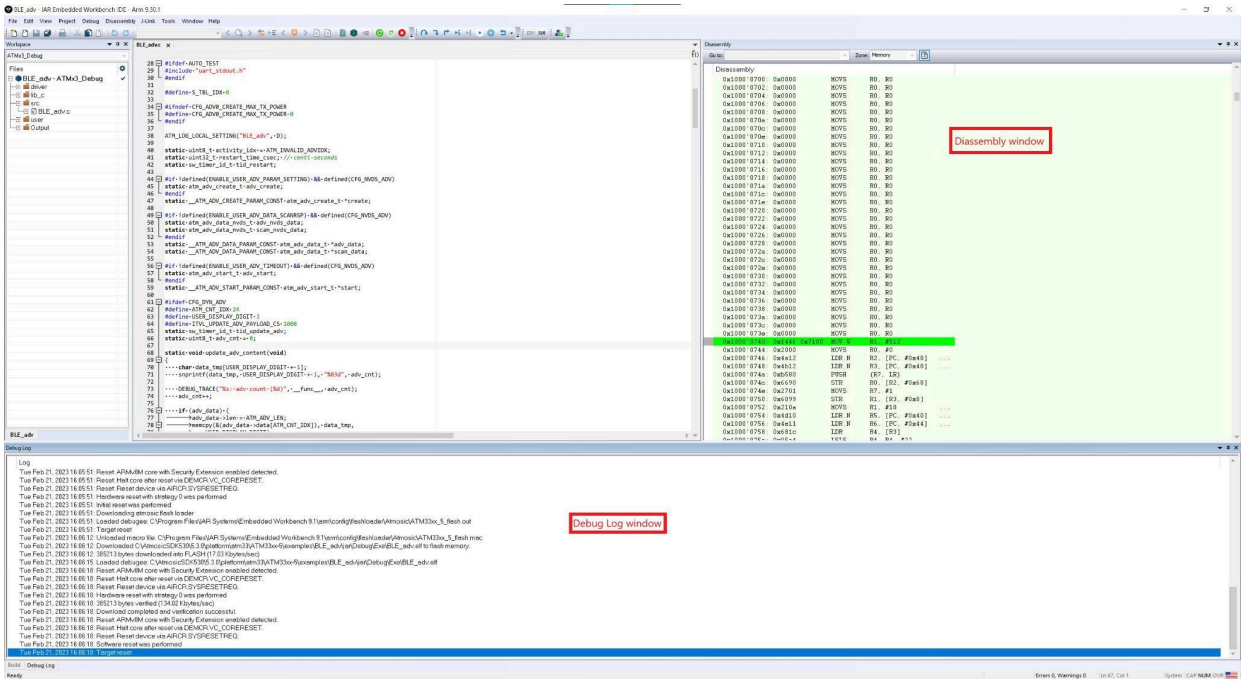

Figure 10 - Runtime Debug

4) See the log of the debug port as shown in Figure 11.

```
@000000b4 PSEQ STATUS=0x1
@000000ff RESET_SYNDROME=0x1
@00000156 PMU WKUP_DET = 0
@000001a5 boot_status = 1000000
@00000203 Cold boot
@0000023f  Power on Reset
@000002ba pmu_init
@000002ec bp_freq is 16000000
@00000340 pmu_nonharv
@00000381 SDK Version: 5.3.0
@000003cd APP Version: 0.0.0.9
WARNING: OTA update not supported with this image
NVDS_RRAM: 4e 56 44 53 06 06 27 00 00 00 00 01 02 00 00 00 ...
@0000054d [   BLE_adv][D]: user_main() done
@0000060a rw ISRs configured
@0000066d [   BLE_adv][D]: ble_adv_init: NVDS tag for adv timeout param not
found. Using default
@00000781 rwip_init() done
@000007ca Entering main loop
@00000899 [   atm_adv][D]: Adv dur 0(unit:10ms) max_adv_evt 0 (timeout 0ms)
@00000992 [   BLE_adv][D]: adv_state = 2
@00000a33 [   BLE_adv][D]: adv_state = 4
@00000ac6 [   BLE_adv][D]: adv_state = 6
@00000b68 [   atm_adv][D]: Adv0: ON
@00000be1 [   BLE_adv][D]: adv_state = 9
```

Figure 11 - BLE_adv Example Log

3.5 Program Image with NVDS (without USE_MCUBOOT)

1) To program with NVDS, it needs to add the settings below. See Figure 12.
2) Steps for adding settings to program NVDS:
3) Go to the linker setting page: Project Options →Linker →Input
    a) Keep symbols: NVDS
    b) Raw binary file: $PROJ_DIR$\flash_nvds.bin
    c) Symbol: NVDS, Section:.NVDS, Align:8
4) Rebuild the whole project and the flash_nvds.bin will be linked into the final ELF file.

5) Program image

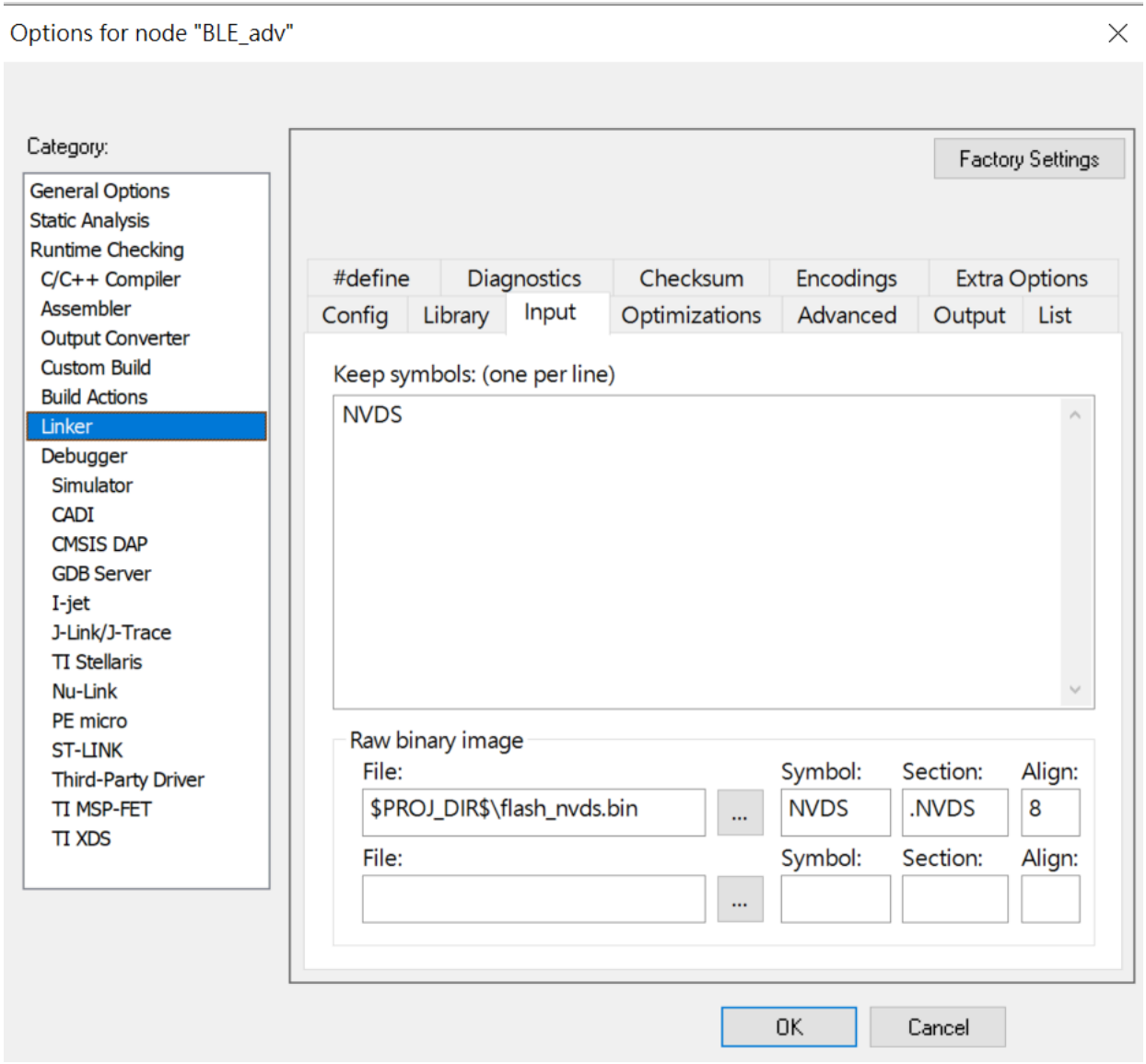

Figure 12 - Program without NVDS (without USE_MCUBOOT)

Reference Documents

Title	Document Number
ATM2/ATM3 Evaluation Kit User Guide	ATM2_ATM3-UGEVK
ATM33/e Series Evaluation Kit User Guide	ATM33_e-UGEVK
ATM34/e Series Evaluation Kit User Guide	6441-xxxx-xxxx
IDE Auxiliary Flash Programming Tool User Guide	4381-xxxx-xxxx
Interface Board User Guide	ATMx221-UGIB

Revision History

Date	Version	Description
July 3, 2024	0.63	Updated for SDK 6.0.0.
August 30, 2023	0.62	Updated IAR Workbench version under Prerequisites; ATM2/ATM3 Platform: Installation, Generate IAR Workspace, ATM33/e Platform: Installation, Generate IAR Workspace,
March 17, 2023	0.61	Updated Generate IAR workspace, Program Flash with NVDS, Installation, Build, and Program Bootloader, Figure 7 - ATM33/e Evaluation Board, Program Image with NVDS
May 13, 2022	0.60	The initial version was created for SDK 5.1 which supports ATM2/ATM3 and ATM33 platforms.

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