BSP Project Quick Start

For NuMicro 8051 Series

Dec, 2023

Copyright © Nuvoton Technology Corporation

Agenda

- The Structure Of BSP
- Build Your Project Utilizing BSP - KEIL
- Build Your Project Utilizing BSP - IAR
- Build Your Project Utilizing BSP - NuEclipse

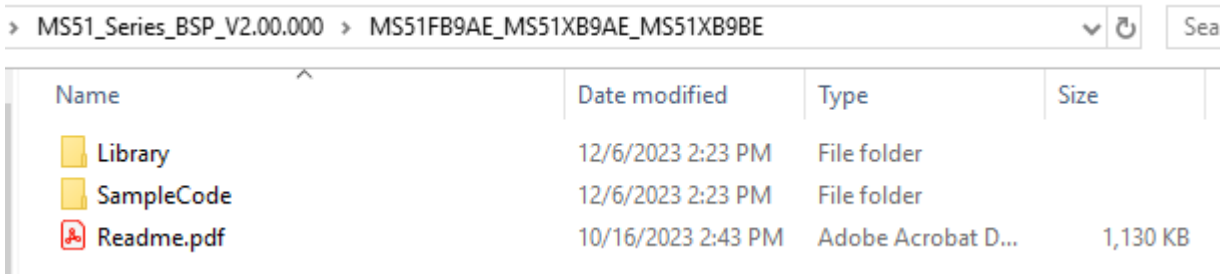
Copyright © Nuvoton Technology Corporation

The BSP Structure

KEIL / IAR / SDCC NuEclipse

Folder structure

- MS51_BSP_C51_V2.00.000
  - **Library**
  - SampleCode
    - RegBased
      - ADC_Bandgap_VDD
    - Template
      - Project_temp
        - Keil
        - IAR
        - SDCC



- It is recommended to create a new project folder at the same level as the subfolder within either the "Template" or "RegBased" directory.
- The “Library” folder and all subfolders should always be remained.

Copyright © Nuvoton Technology Corporation

The .c File Define For Different Compiler

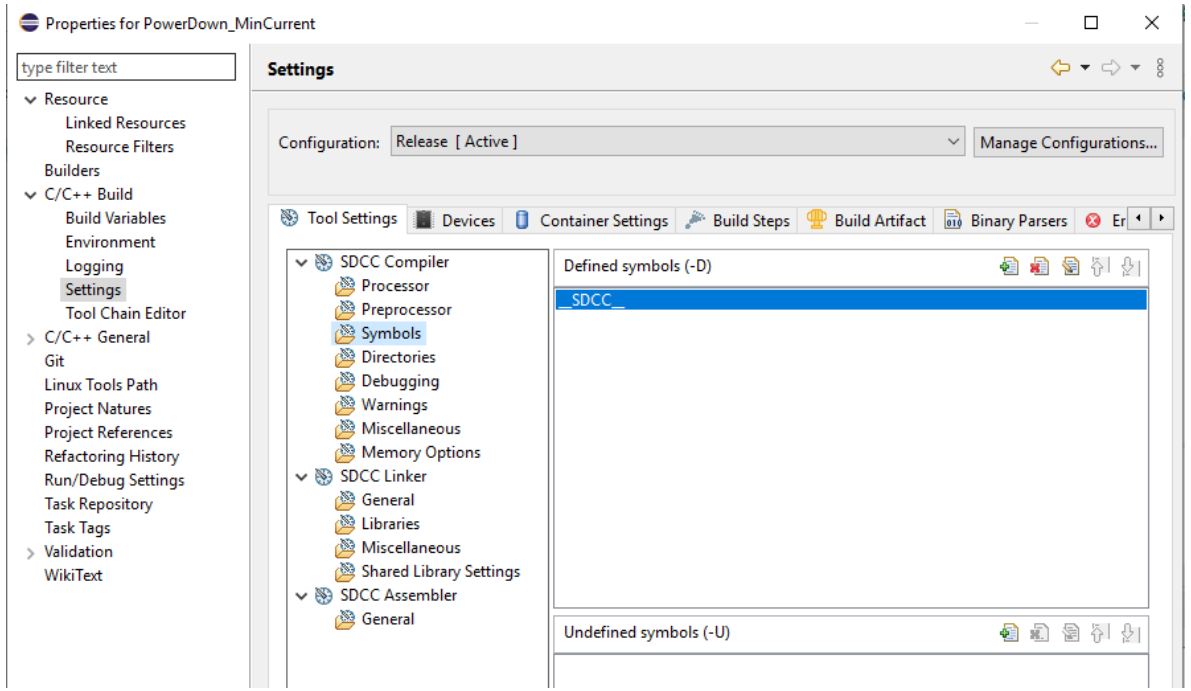
- Different Coding Rule

  __C51__ is for KEIL PK51

  __ICC8051__ is for IAR 8051 workbench

  __SDCC__ is for NuEclipse

```
11  #if defined __C51__
12  uint8_t data  TA_REG_TMP,BYTE_TMP,SFRS_TMP;
13
14  #elif defined __ICC8051__
15  uint8_t __data  TA_REG_TMP,BYTE_TMP,SFRS_TMP;
16
17  #elif defined __SDCC__
18  __data uint8_t TA_REG_TMP,BYTE_TMP,SFRS_TMP;
19  #endif
```



NuEclipse defined symbols window

- Simplify code

  When you decide to use a certain compiler, you can remove the definitions of other compilers whole group.

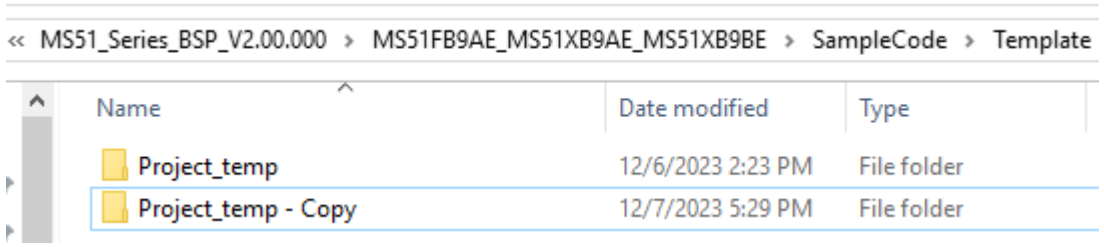
Copyright © Nuvoton Technology Corporation

Build Your Project Utilizing BSP - KEIL

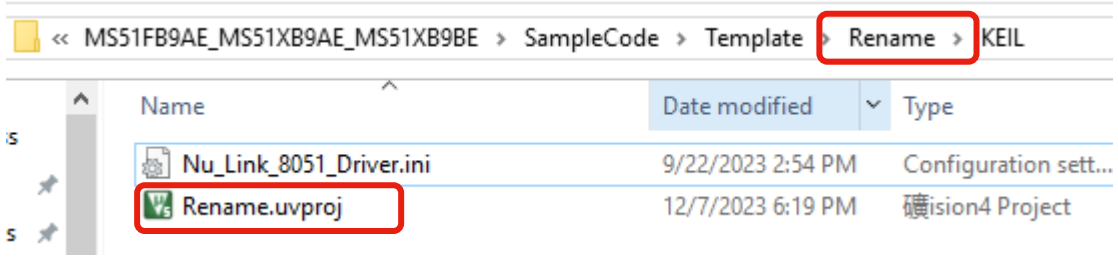
Copying from the existing project is often more advantageous than creating a new one

For KEIL

- Copy A Folder From Template “ Project_temp”



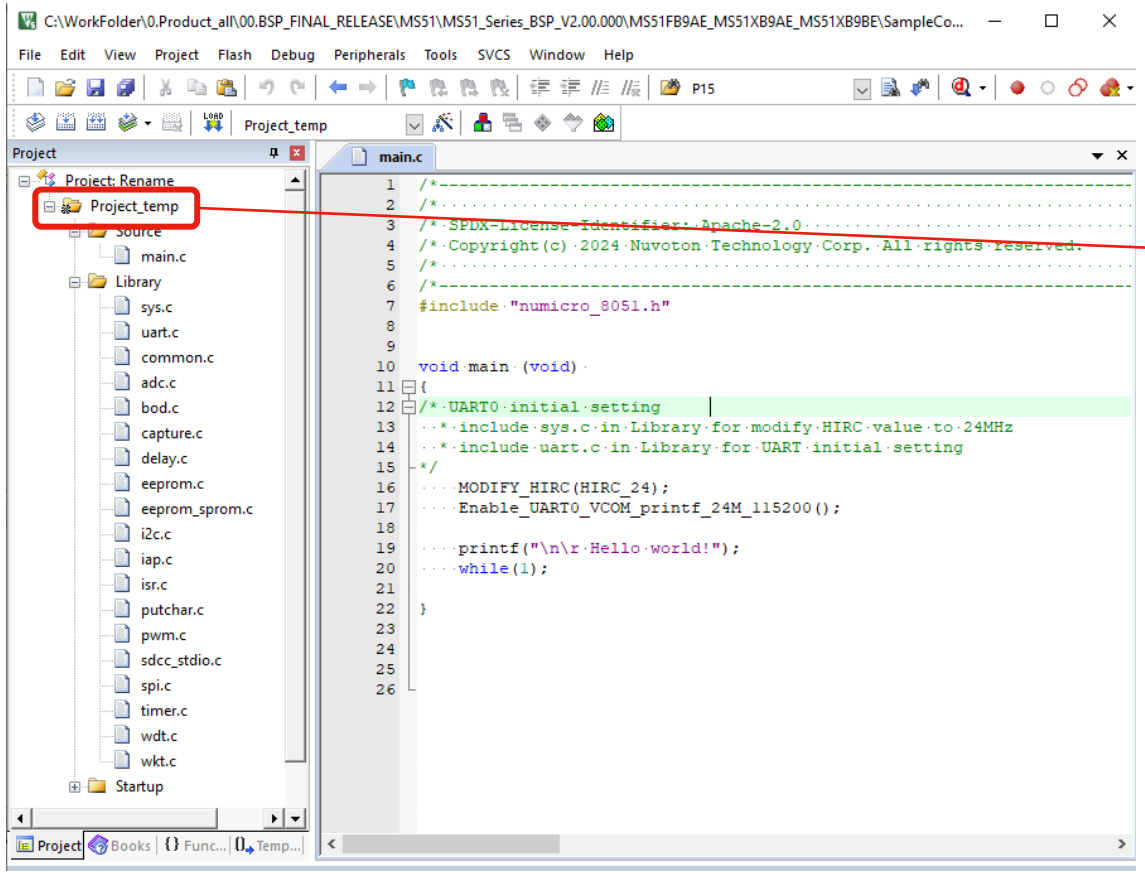
- Rename the “project_temp.uvproj” to “Rename.uvproj”

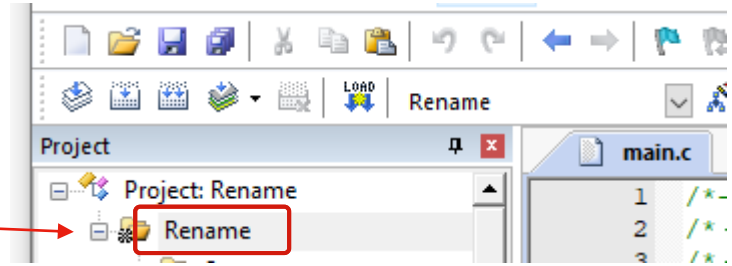


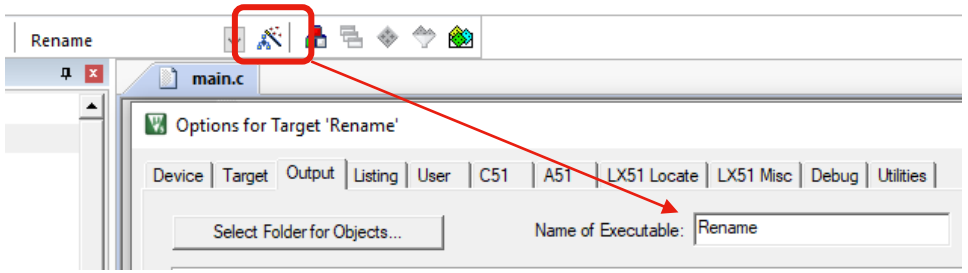
Joy of innovation
nuvoTon
Copyright © Nuvoton Technology Corporation

For KEIL

- Modify the Project name in KEIL.



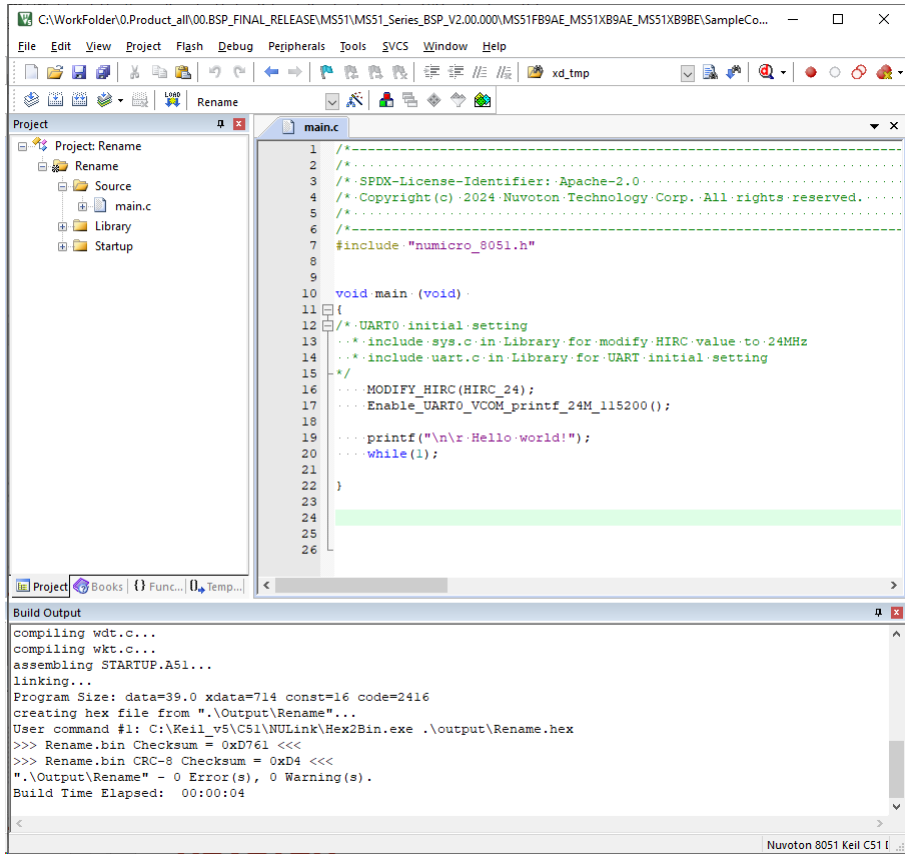


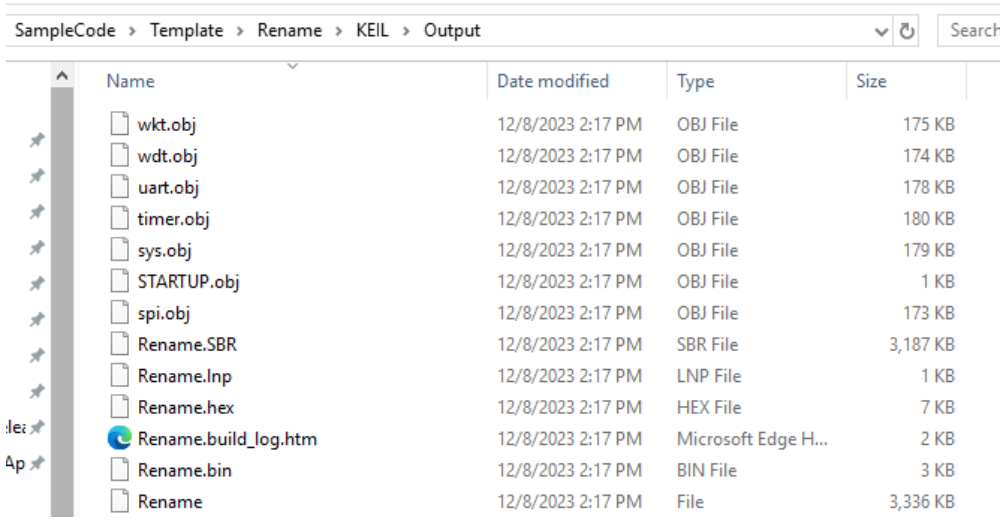


Copyright © Nuvoton Technology Corporation

For KEIL

- Compile with the new application .c file. Find the output hex and bin file.



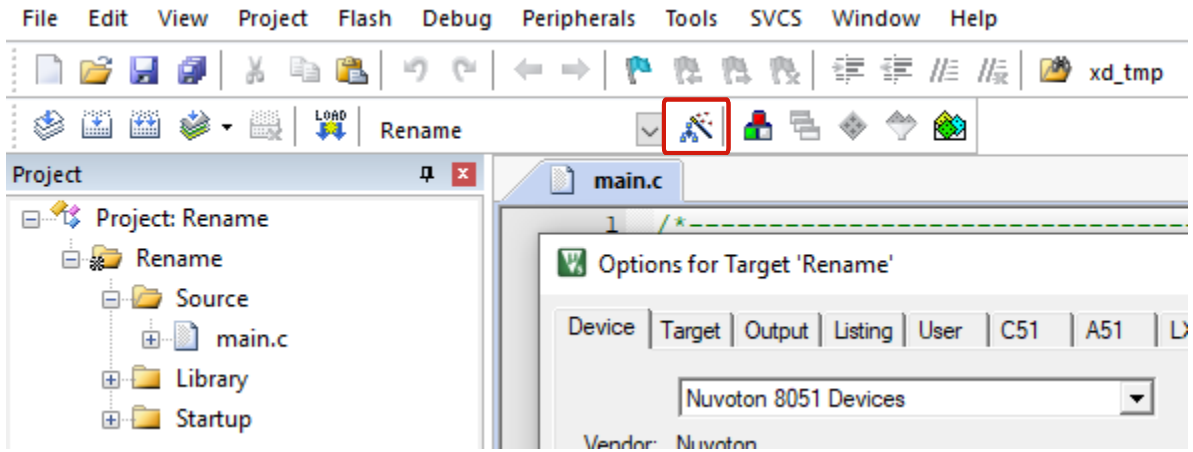


Copyright © Nuvoton Technology Corporation

Options of KEIL PK51

- The following introduction focuses on the special definition of Nuvoton 8051 series.
- For a comprehensive description of all options, please consult the official Keil documentation.

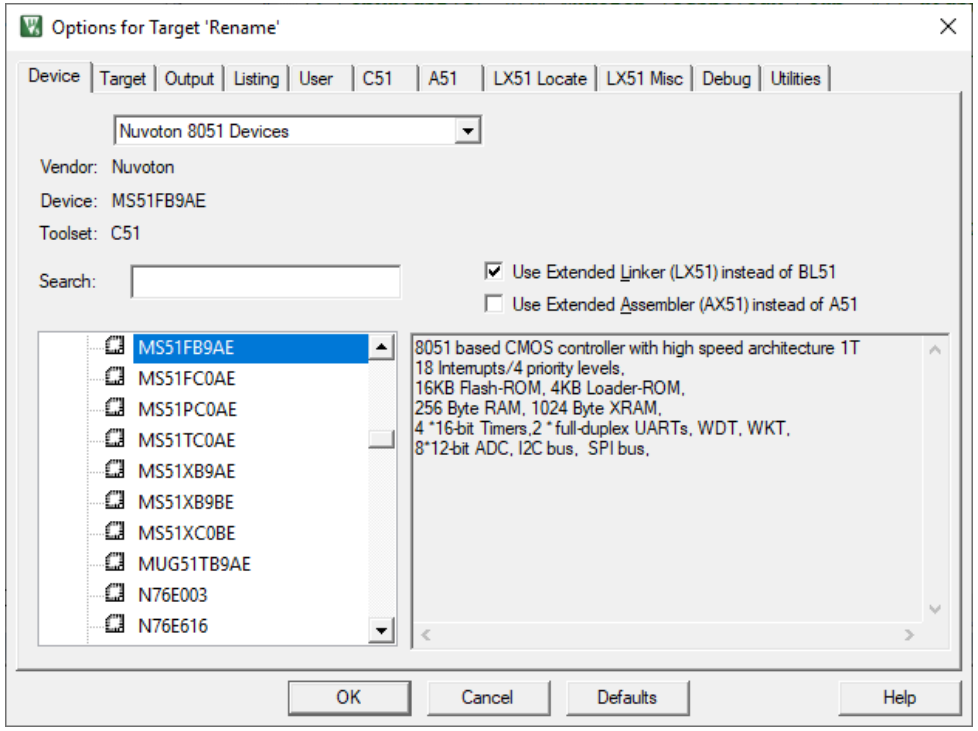
  https://www.keil.com/support/man/docs/uv4cl/uv4cl_dg_options.htm



Copyright © Nuvoton Technology Corporation

For KEIL - Device

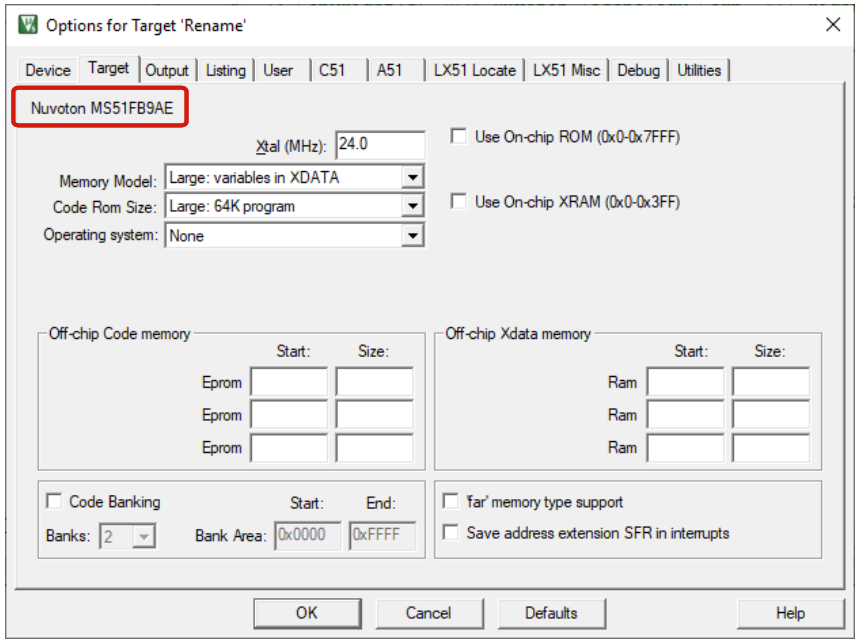
- Confirm "Nuvoton 8051 Device" is selectable.
- If this option is unavailable, please install the Nuvoton Keil driver package.



Joy of innovation
nuvoTon
Copyright © Nuvoton Technology Corporation

For KEIL - Target

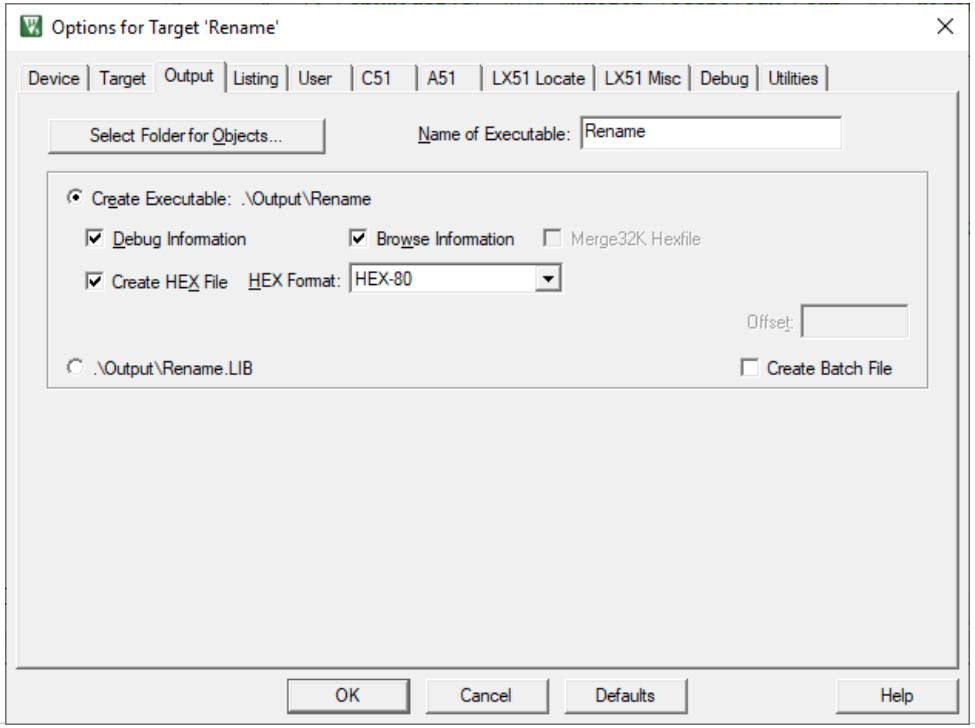
- Check with the device. If not match, select the correct device in “Device” page.
- Memory Model: Large for variable default using XDATA



Copyright © Nuvoton Technology Corporation

For KEIL - Output

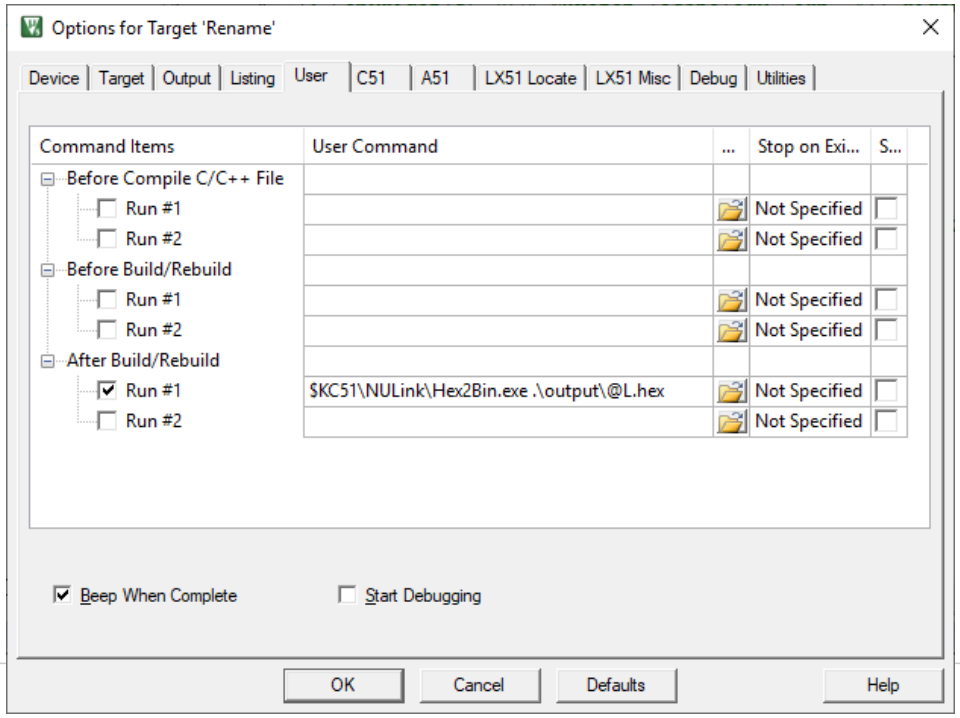
- “Name of Executable” define the output .hex file name
- Keil exclusively generates HEX format files, while BIN files are produced using the Nuvoton command line. The command line we introduce in next page.



Joy of innovation
nuvoTon
Copyright © Nuvoton Technology Corporation

For KEIL - User

- This file is located within the Keil setup folder. For example: C:\Keil_v5\C51\NULink
  - By default, unused locations will be filled with 0xFF.
  - Users can also include the parameter –P 0x00 means unused locations are filled with zeros.
  - Parameter <start address> <data length>




```
C:\Keil_v5\C51\NULink>hex2bin

================================================
==    Nuvoton HexToBin for 8051 Series v1.06    ==
================================================

Command Format:
Hex2Bin [File] [Arg0] [Arg1] [Arg2] [Arg3] [Arg4] [Arg5]

C:\>Hex2Bin C:\File.hex
C:\>Hex2Bin C:\File.hex -P 0xFF
C:\>Hex2Bin C:\File.hex -P 0xFF 0x00 0x1000
C:\>Hex2Bin C:\File.hex 0x00 0x1000
C:\>Hex2Bin C:\File.hex -P 0xFF 0x00 0x1000 0x2000 0x800
C:\>Hex2Bin C:\File.hex 0x00 0x1000 0x2000 0x800
C:\>Hex2Bin C:\File.hex -S 0xFF 0x1000 0x800
```


Copyright © Nuvoton Technology Corporation

For KEIL – C51

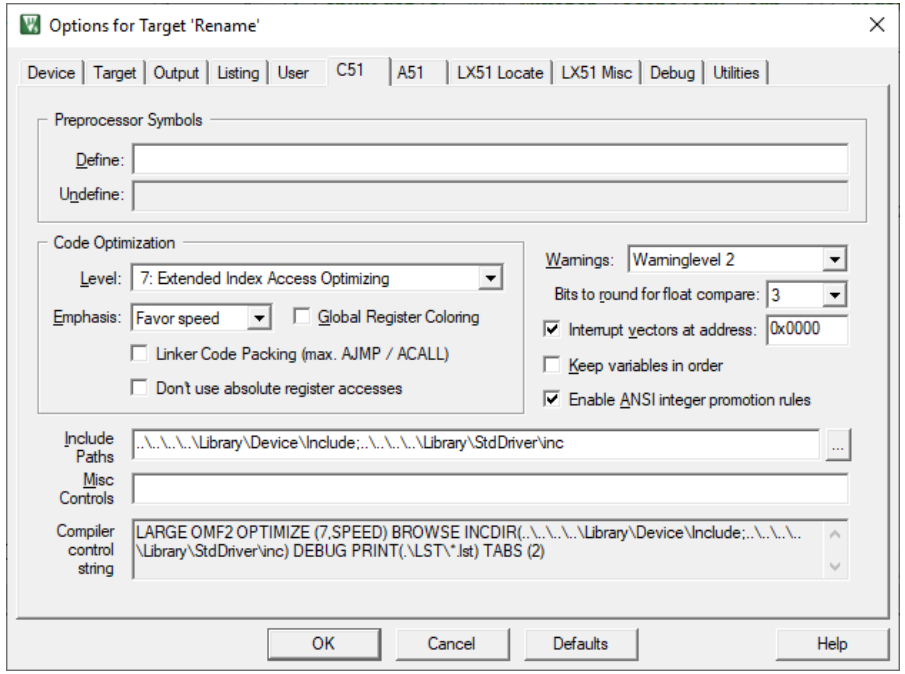
- Code Optimization

Levels 7 and 4 are recommended especially when considering code size.

- Include Paths

Defined the header file path of device and library.

- Following shows the most popular define

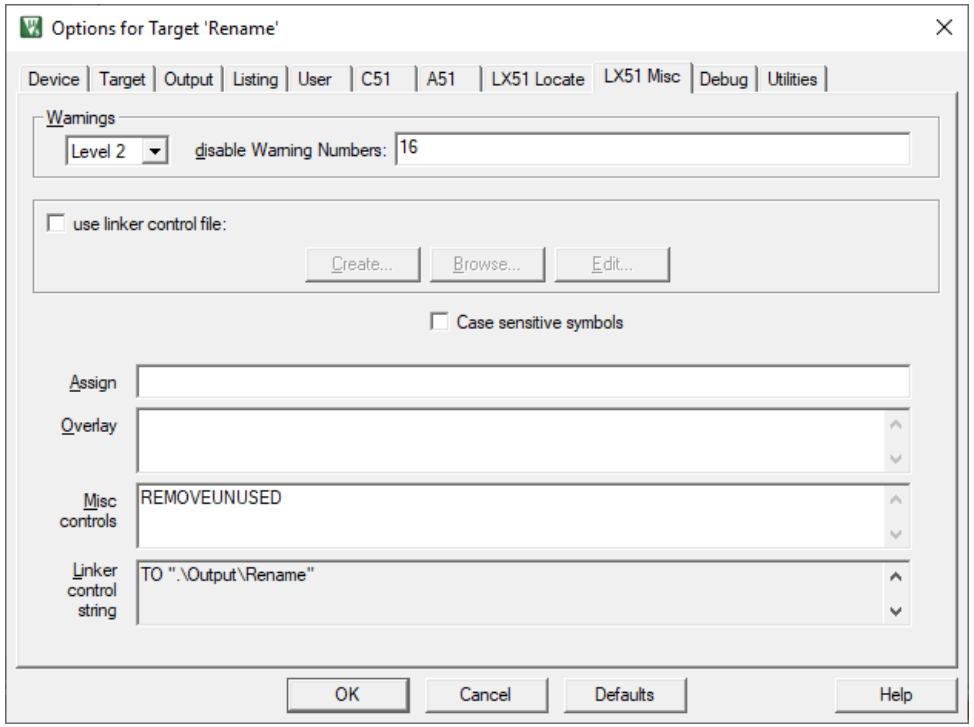


Copyright © Nuvoton Technology Corporation

For KEIL – LX51 Misc

- The Parameter for code size.

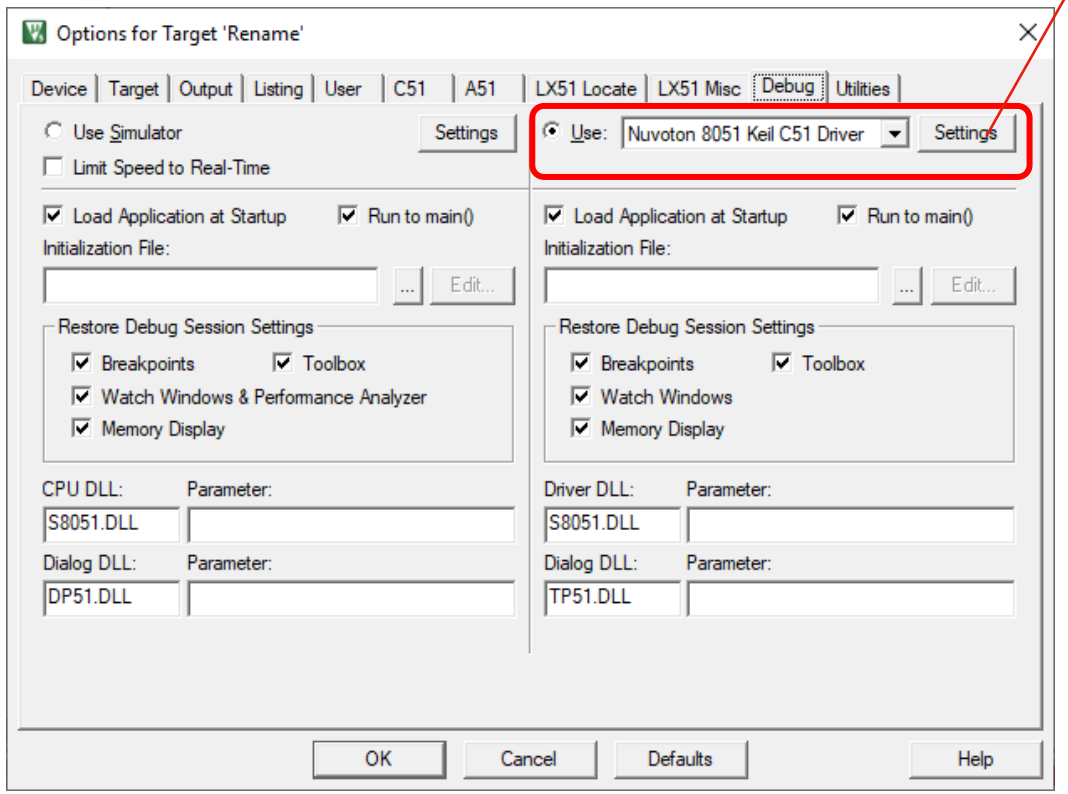
"REMOVEUNUSED" to uncalled subroutine not linked into the project to compile. This can reduce the bin file code size.

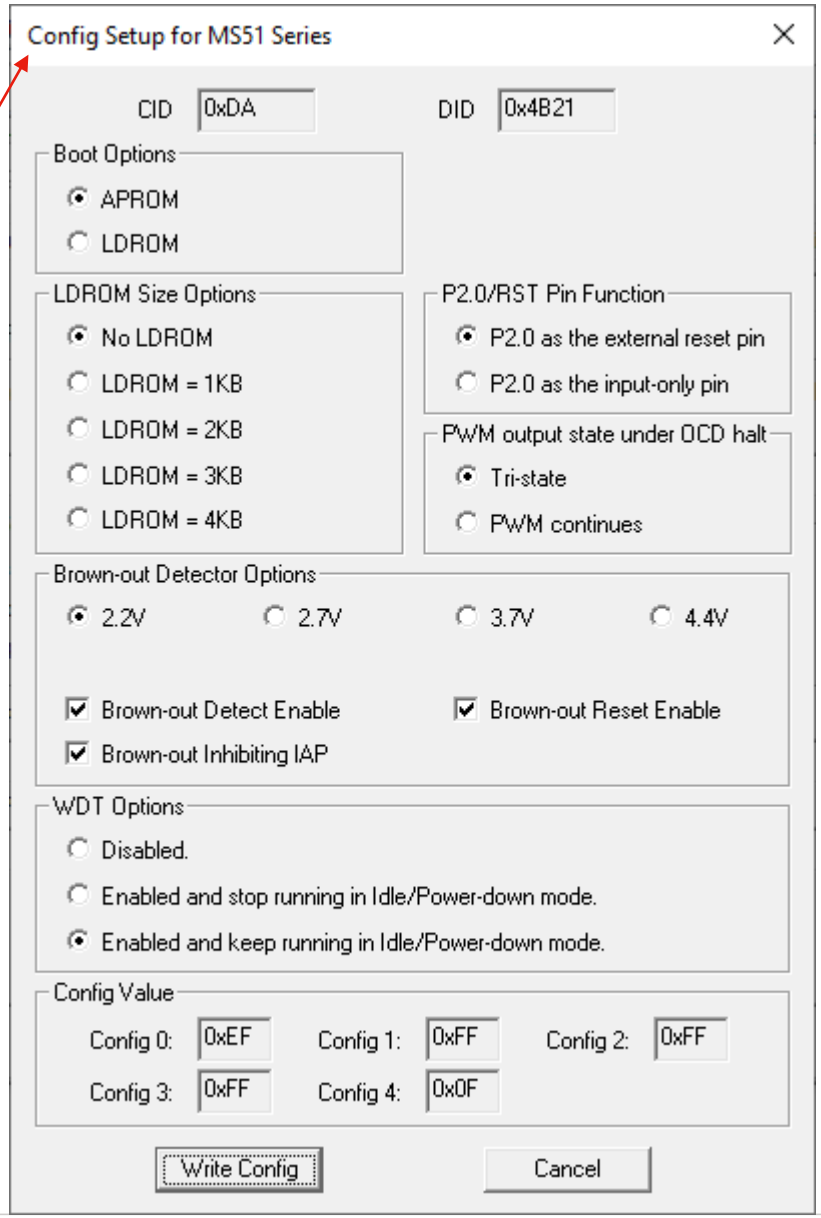


Copyright © Nuvoton Technology Corporation

For KEIL – Debug

CONFIG setup page



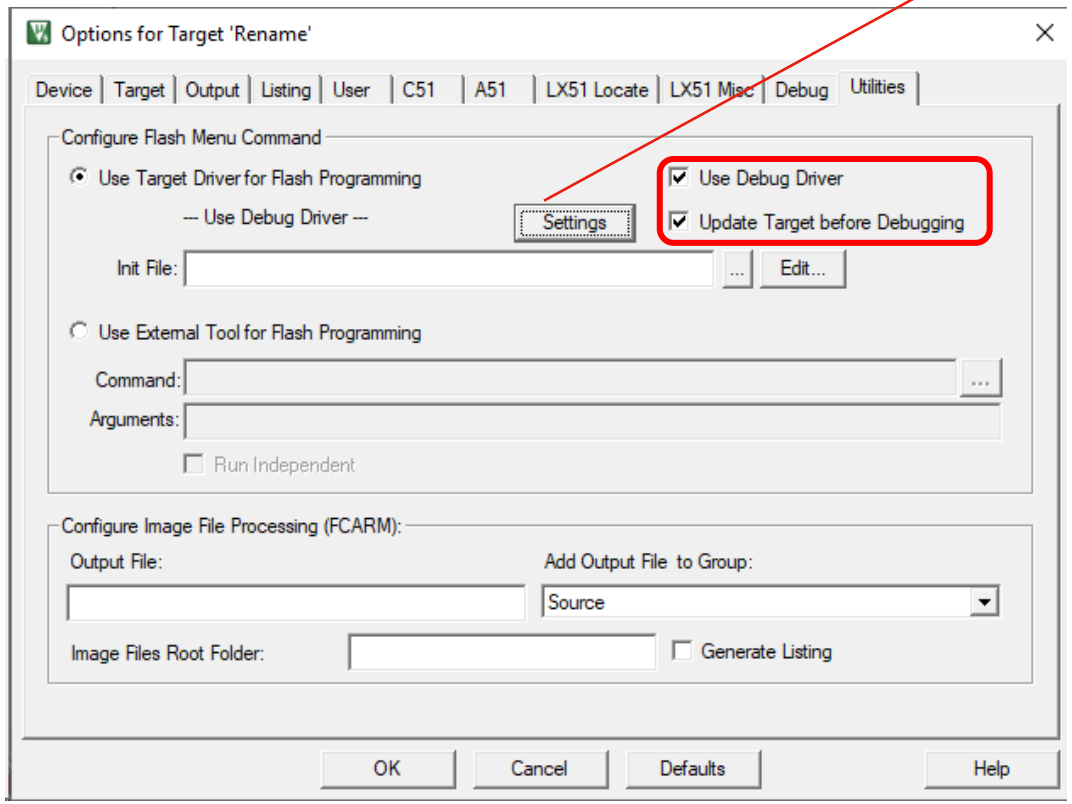


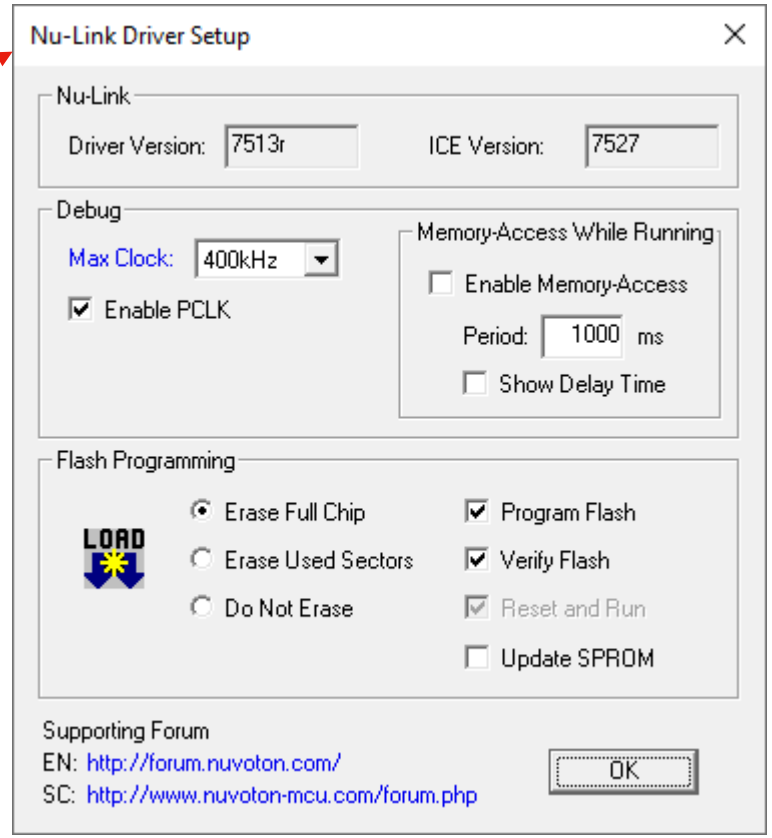
Joy of innovation
nuvoTon

Copyright © Nuvoton Technology Corporation

For KEIL – Utilities

Nu-Link setup





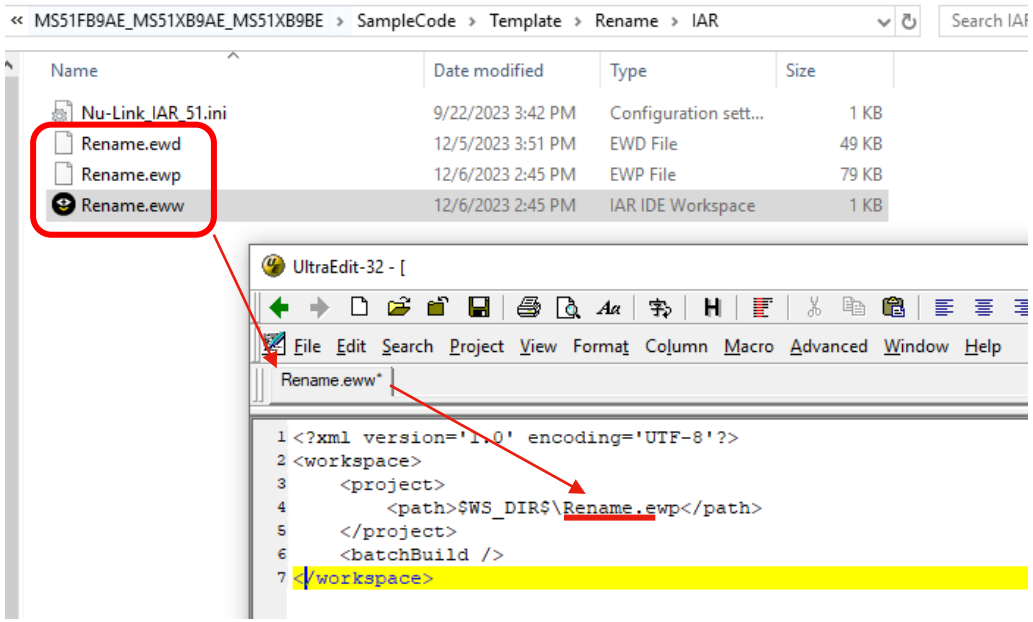
Copyright © Nuvoton Technology Corporation

Build Your Project Utilizing BSP - IAR

Copying from the existing project is often more advantageous than creating a new one

For IAR

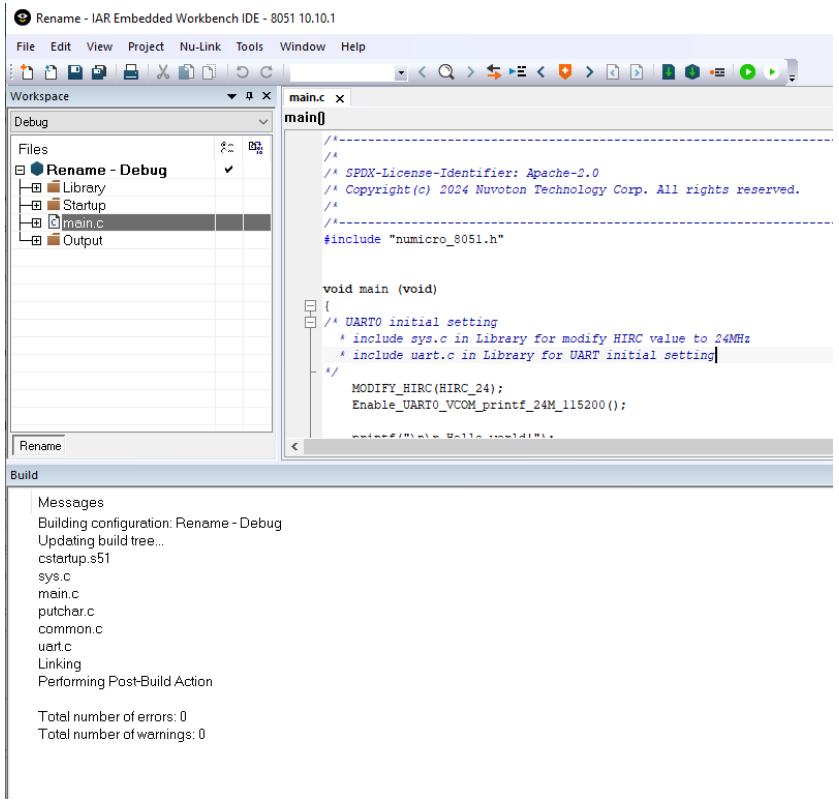
- Duplicate a folder from the template "Project_temp"
- then rename the ".ewd," ".ewp," and ".eww" file names accordingly.
- Open the ".eww" file and modify the project <path>to reflect the new name, "Rename.ewp."

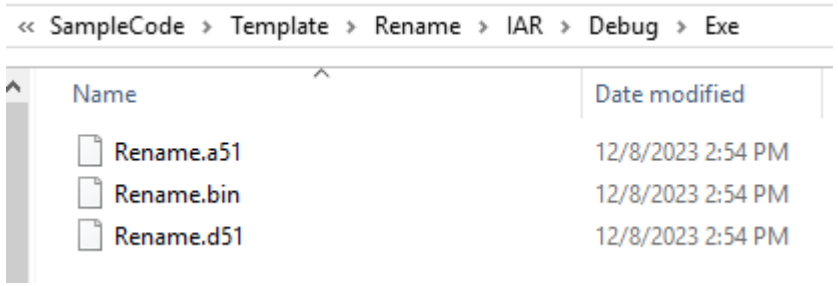


Copyright © Nuvoton Technology Corporation

For IAR

- Compile with the new application .c file. Find the output hex and bin file.



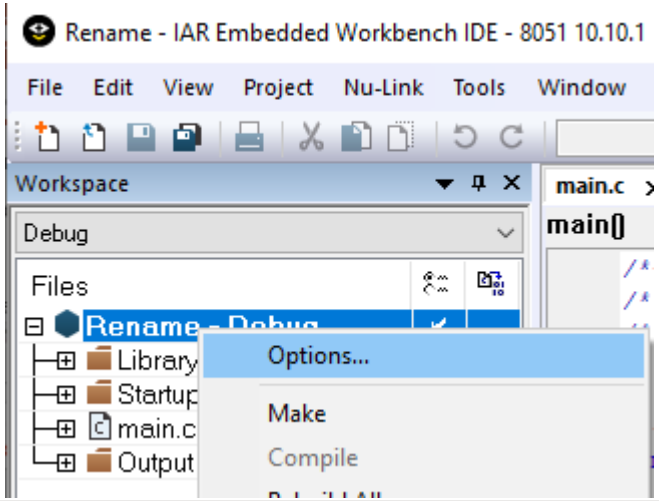


Copyright © Nuvoton Technology Corporation

Options of IAR workbench

- The following introduction focuses on the special definition of nuvoton 8051 series.
- For a comprehensive description of all options, please consult the official IAR documentation.

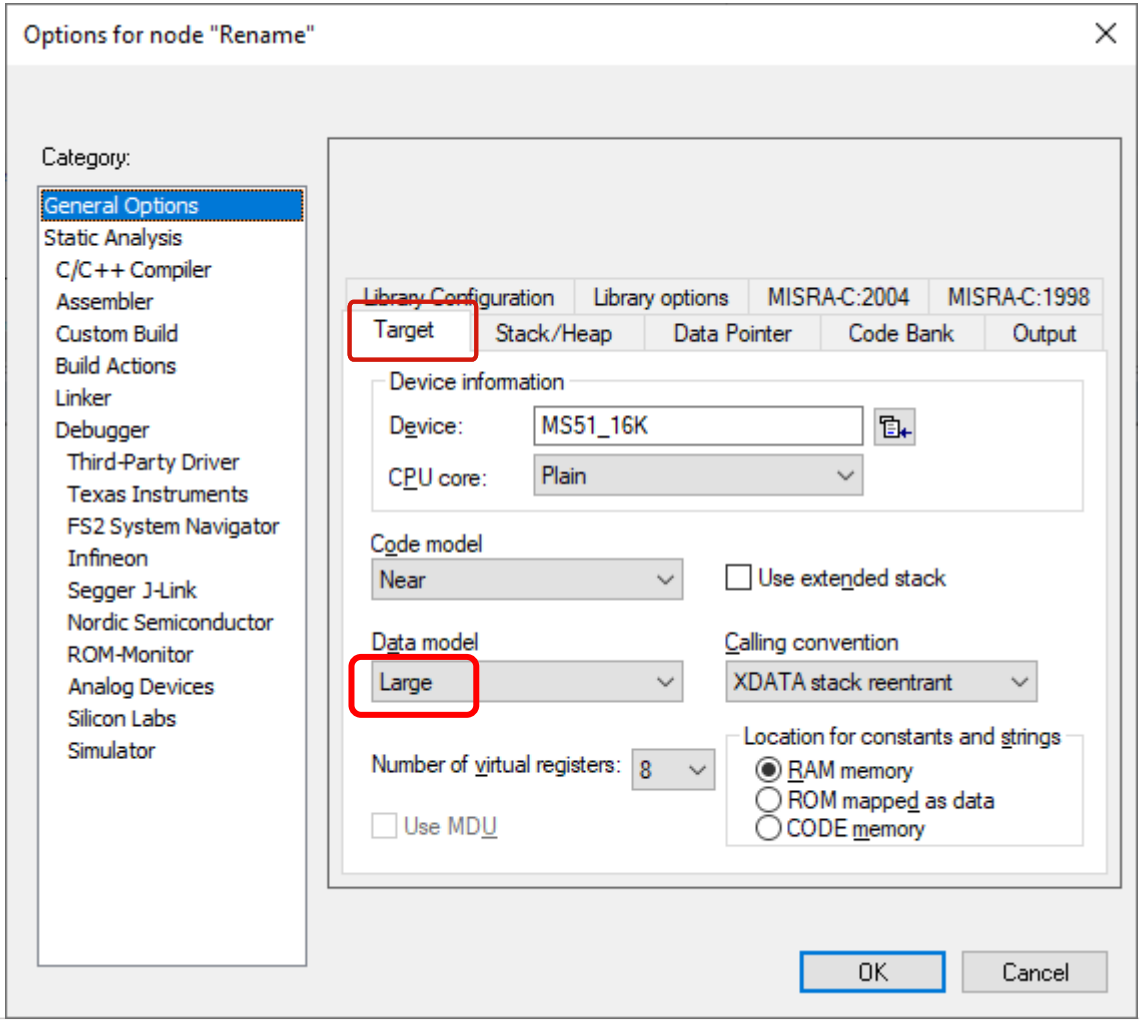
  https://wwwfiles.iar.com/8051/webic/doc/EW8051_MigrationGuide_v7.pdf



Copyright © Nuvoton Technology Corporation

For IAR – General Options

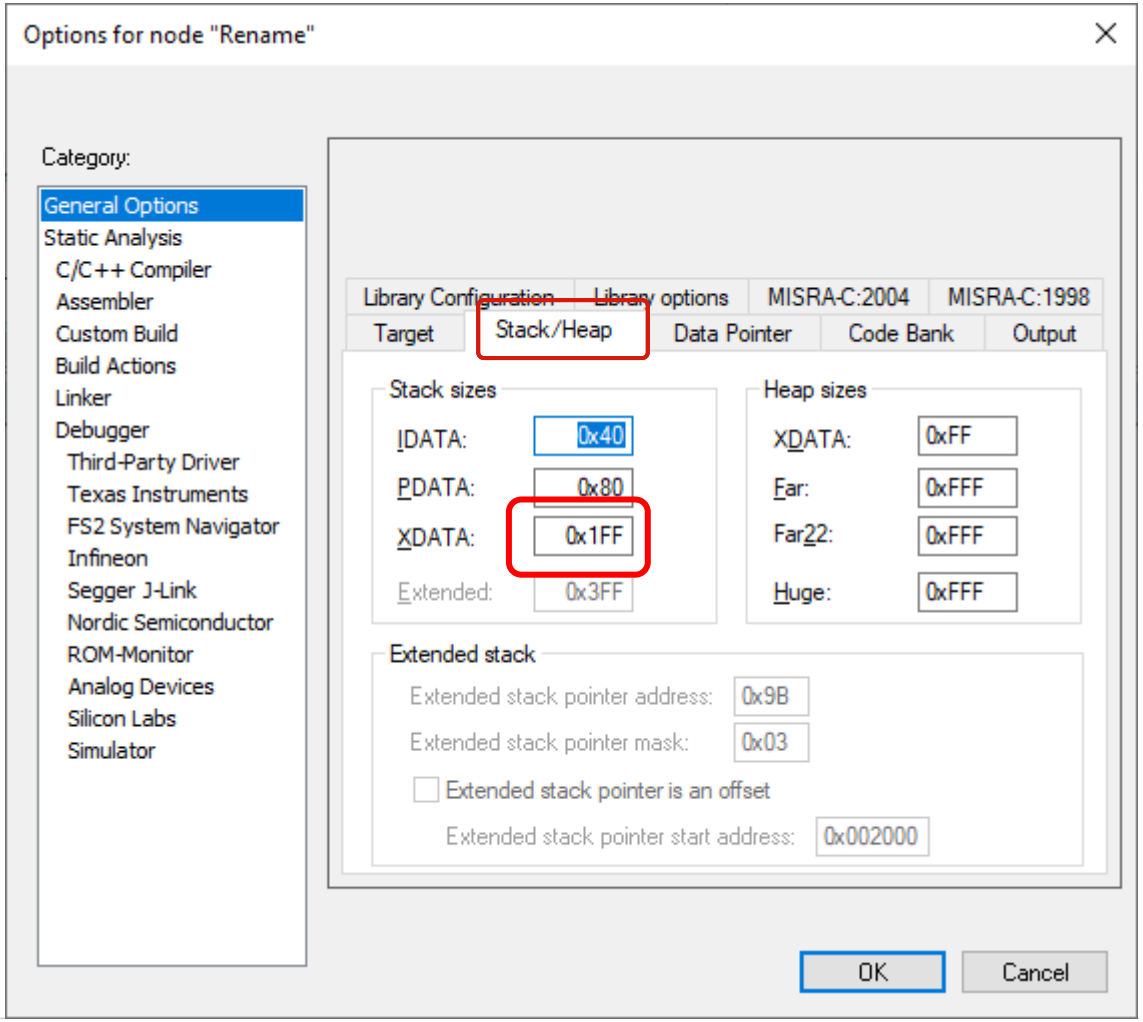
- Check with the device.
- Data Model: Large for variable default using XDATA



Copyright © Nuvoton Technology Corporation

For IAR – General Options

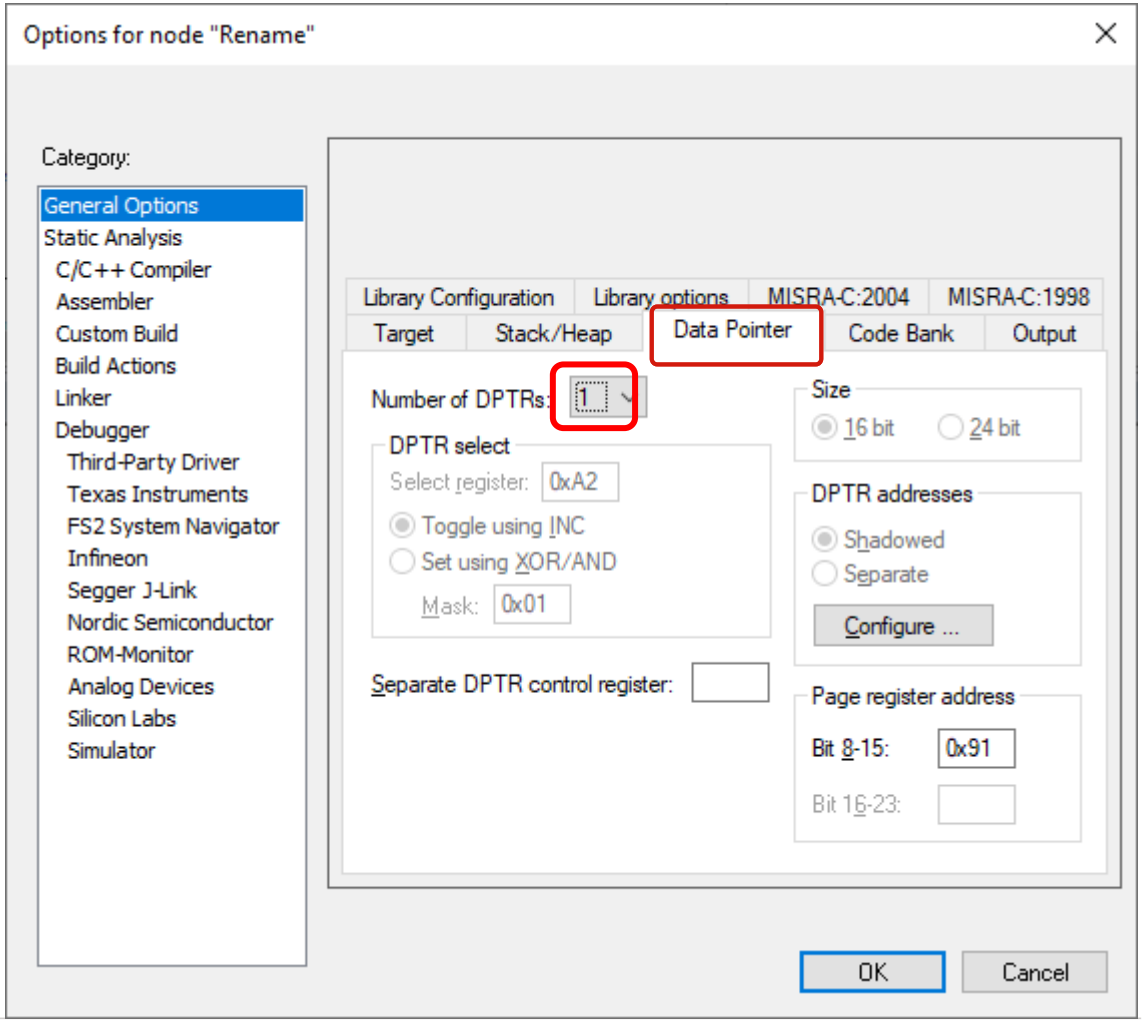
- Stack / Heap
  - XDATA value is important to printf



Copyright © Nuvoton Technology Corporation

For IAR – General Options

- DPTRs
  - Always use 1 DPTR.

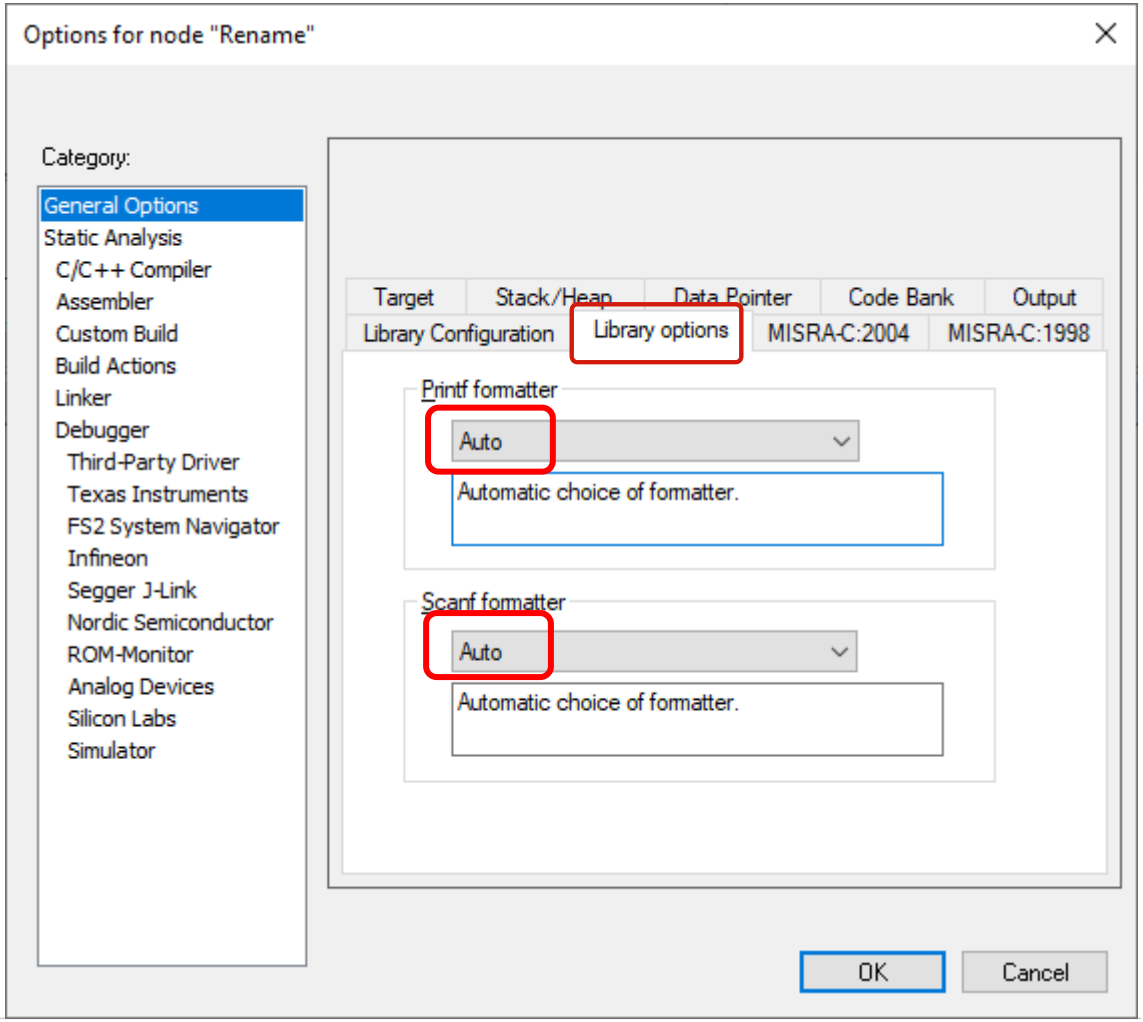


Joy of innovation
nuvoTon

Copyright © Nuvoton Technology Corporation

For IAR – General Options

- Auto for Printf formatter

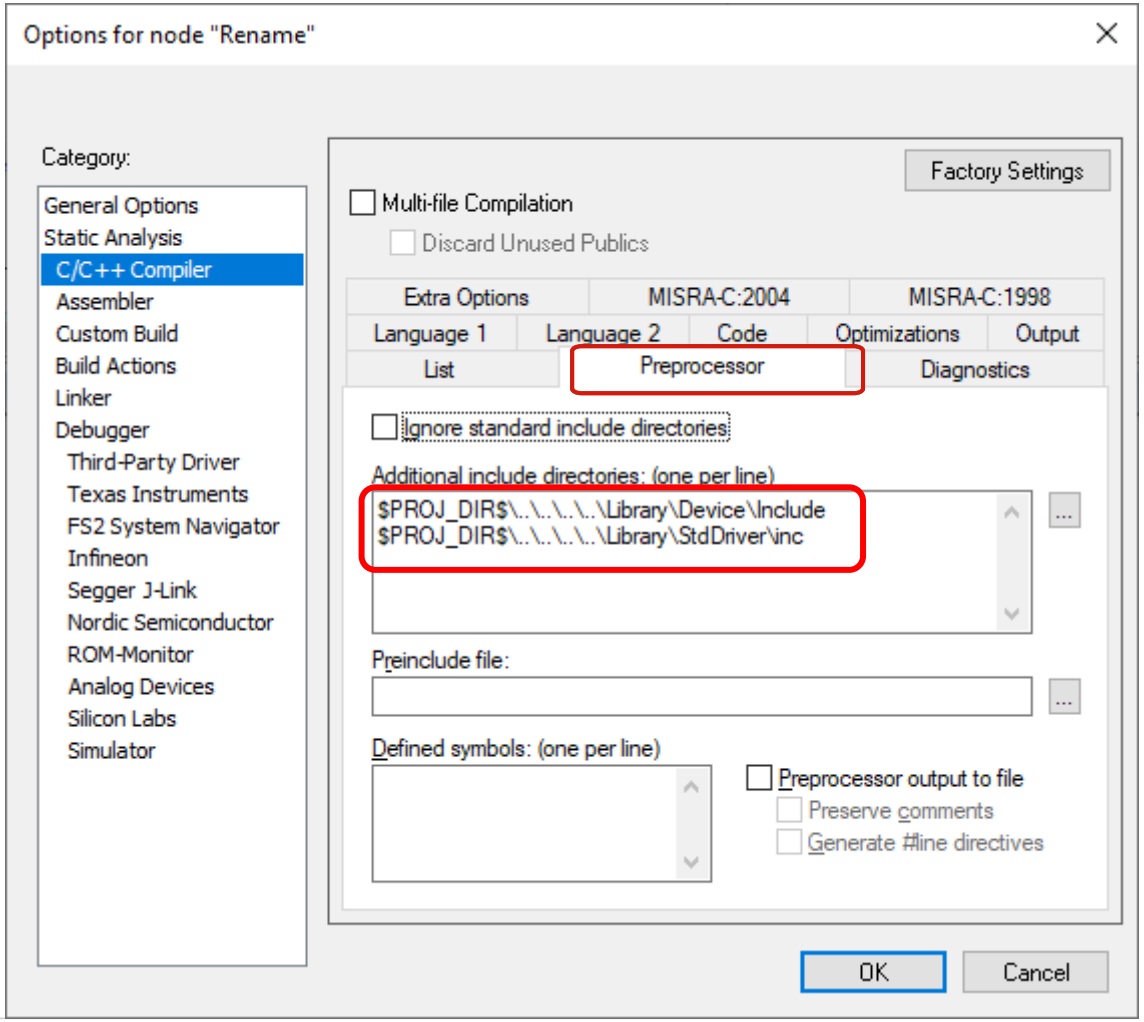


Copyright © Nuvoton Technology Corporation

For IAR – C/C++ Compiler

- Include Paths

Defined the header file path of device and library.

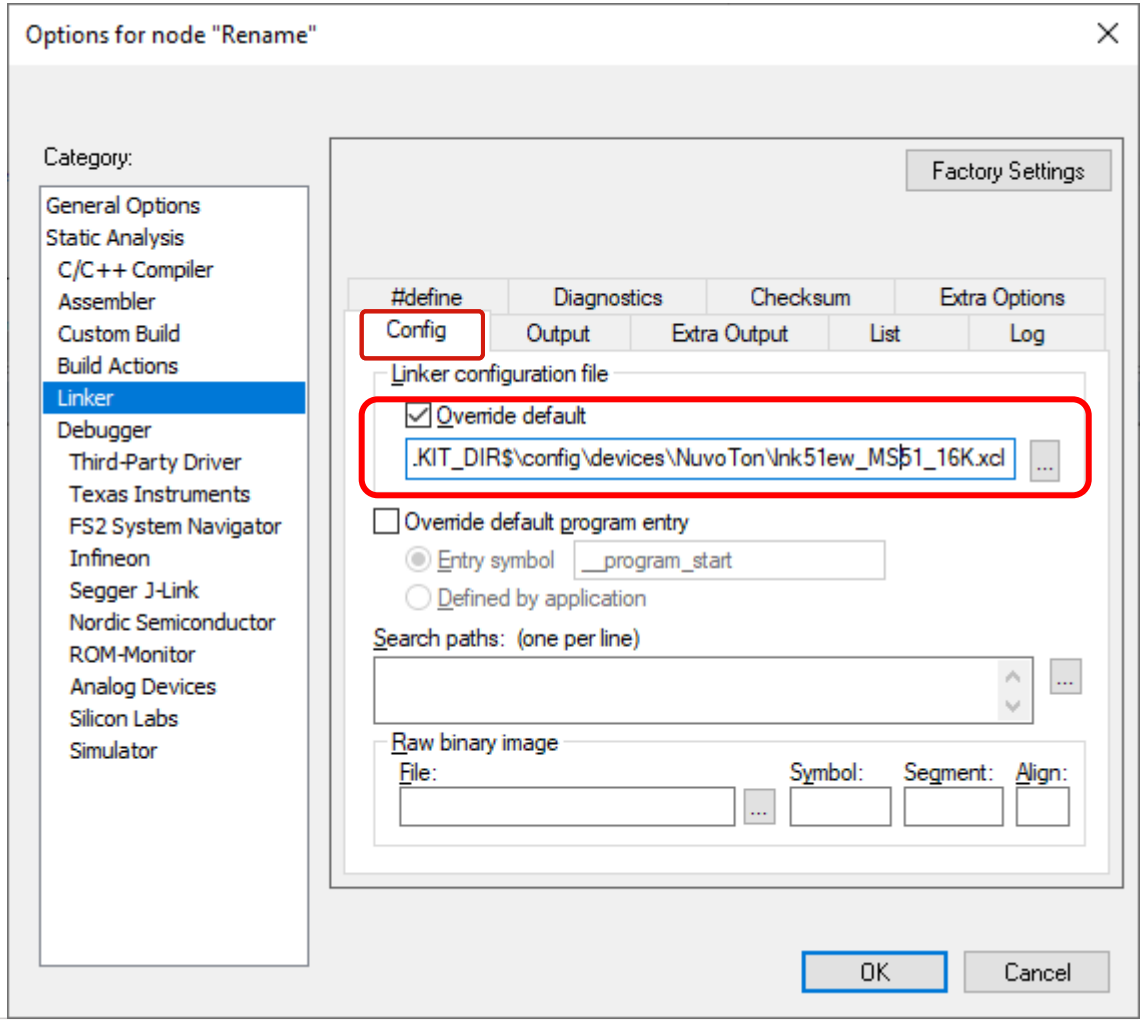


Joy of innovation
nuvoTon

Copyright © Nuvoton Technology Corporation

For IAR – Build Actions

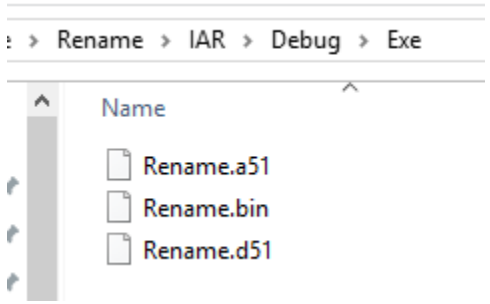
- Linker configuration file
  - Derived from the device definition manually adjusted by Nuvoton (rather than automatically selected by the IAR tool).
  - **Do not modify the value in this area under any circumstances.**

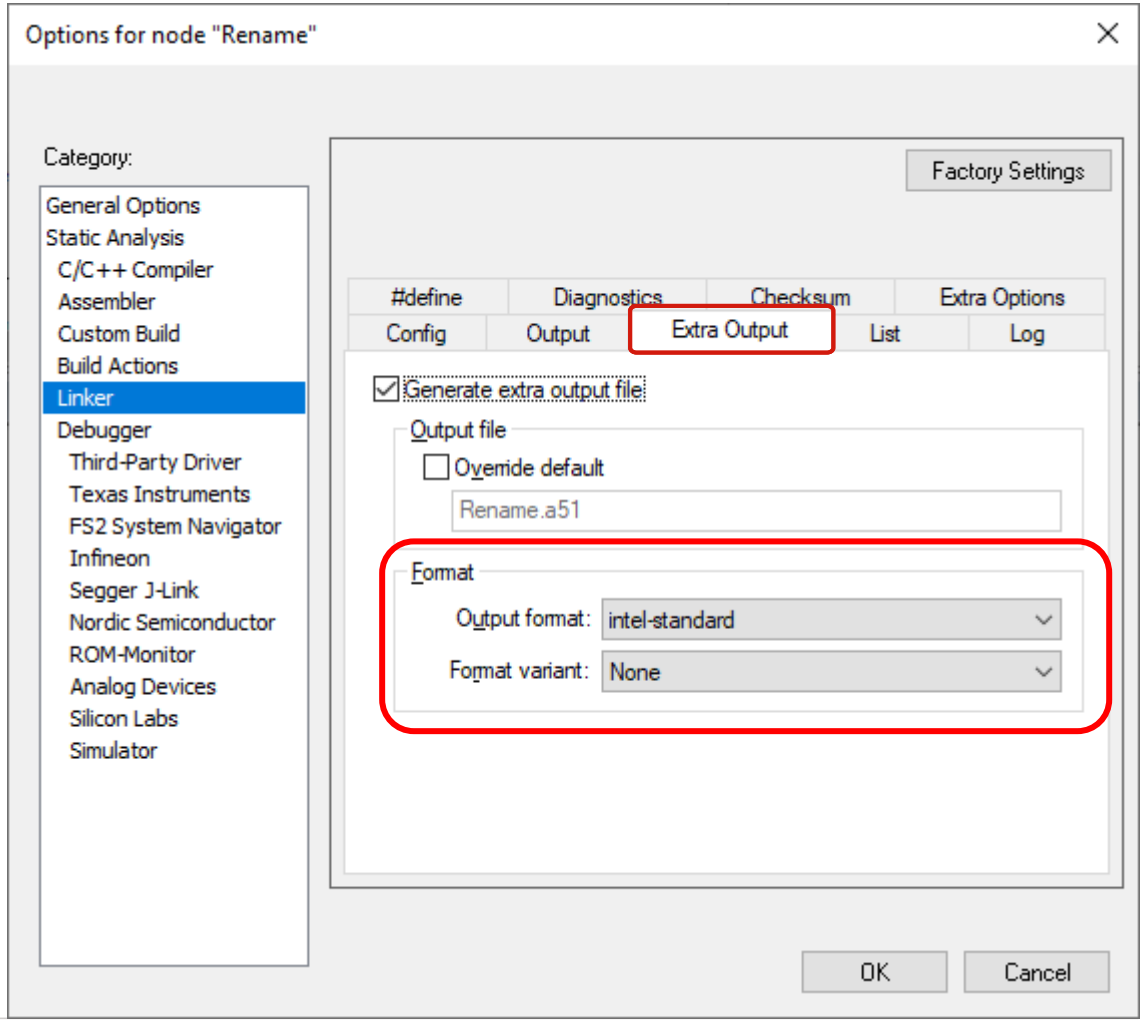


Joy of innovation
nuvoTon
Copyright © Nuvoton Technology Corporation

For IAR – Build Actions

- Build with hex format output
- Bin format use nuvoton command line. Introduce in next page.
- After compiler with following
  - .a51 hex format
  - .bin bin format
  - .d51 debug file for IAR





Copyright © Nuvoton Technology Corporation

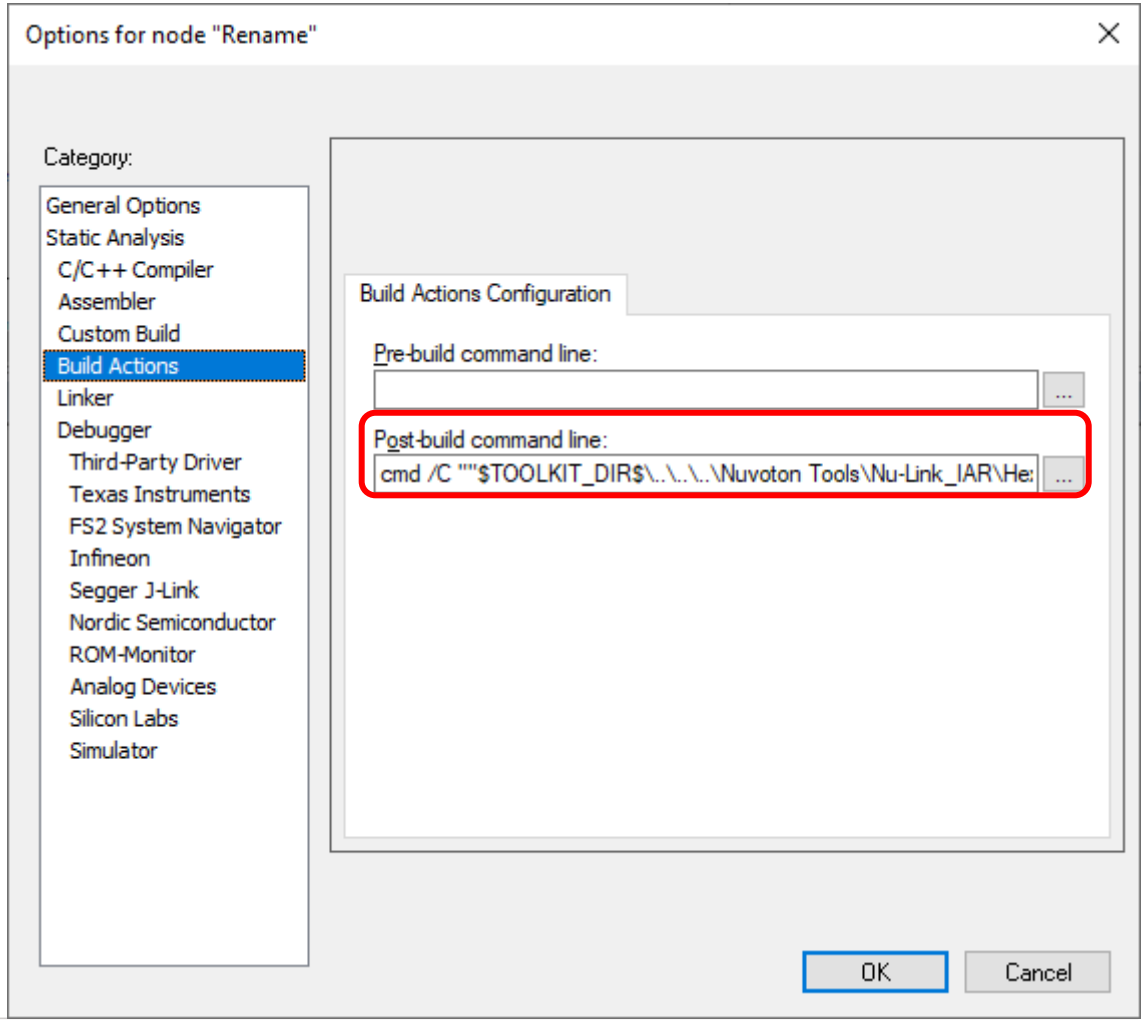
For IAR – C/C++ Compiler

- Hex2bin

This file is located within the Nuvoton IAR driver folder.

. \Nuvoton Tools\Nu-Link_IAR\Hex2Bin.exe

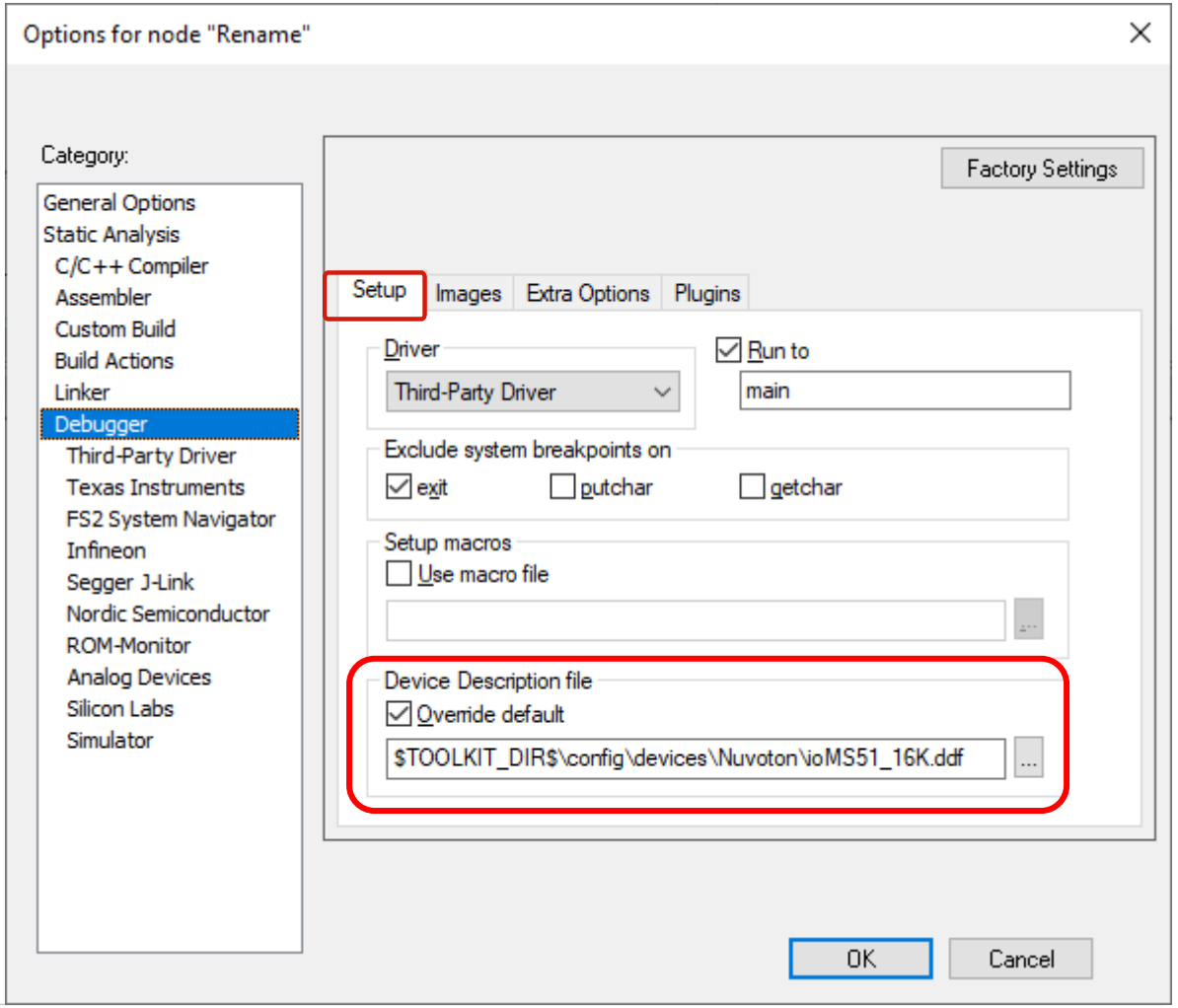
  - By default, unused locations will be filled with 0xFF.
  - Users can also include the parameter –P 0x00 means unused locations are filled with zeros.
  - Parameter <start address> <data length>



Joy of innovation
nuvoTon
Copyright © Nuvoton Technology Corporation

For IAR – Debugger

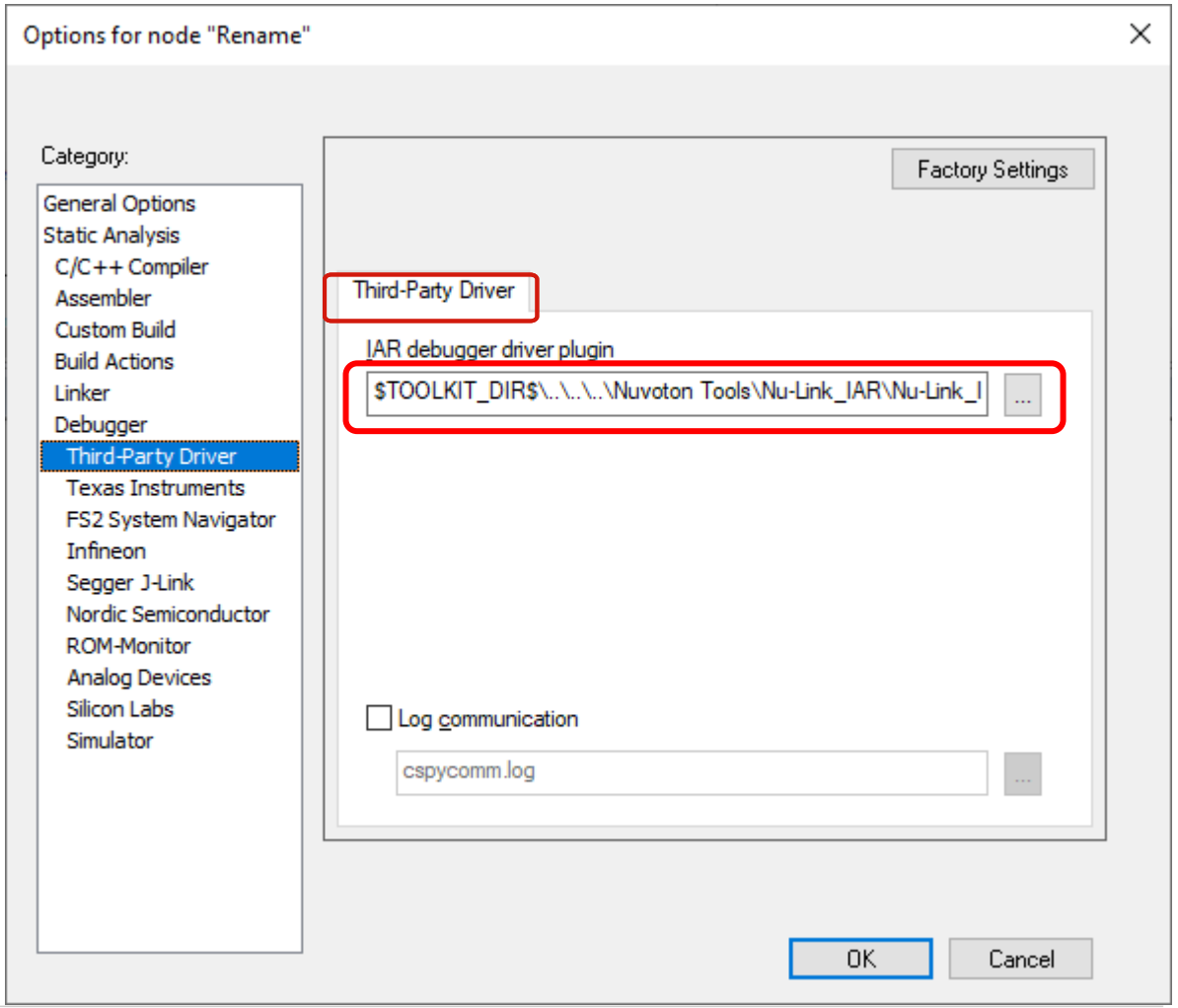
- Third-Party Driver
  - Manually adjusted by Nuvoton (rather than automatically selected by the IAR tool).
  - **Do not modify the value in this area under any circumstances.**



Joy of innovation
nuvoTon
Copyright © Nuvoton Technology Corporation

For IAR – Third Party Driver

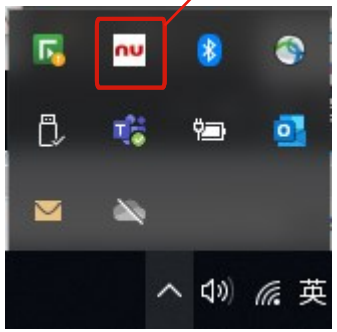
- Third-Party Driver
  - Manually adjusted by Nuvoton (rather than automatically selected by the IAR tool).
  - **Do not modify the value in this area under any circumstances.**

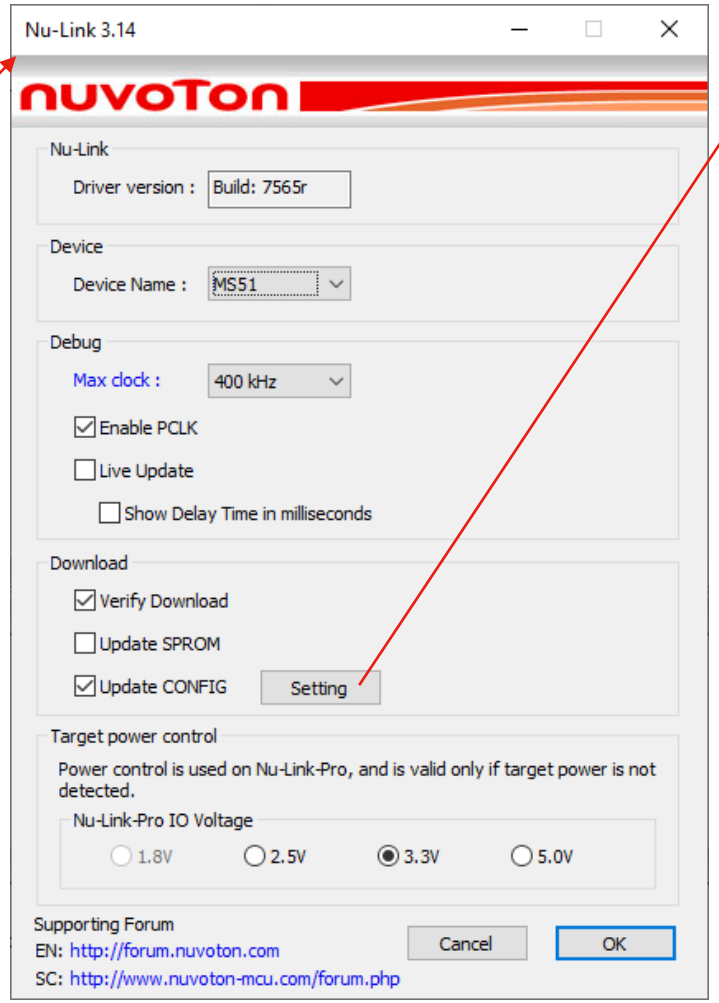


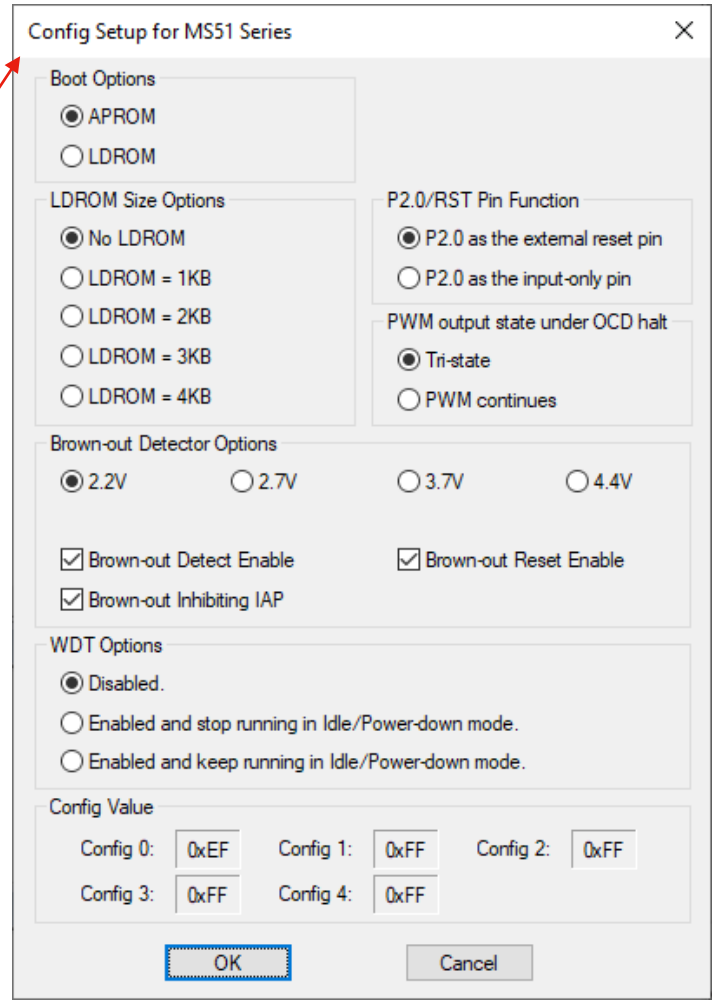
Copyright © Nuvoton Technology Corporation

For IAR – Nu-Link Setup & CONFIG define

- Third-Party Driver







Copyright © Nuvoton Technology Corporation

Build Your Project Utilizing BSP - KEIL

Copying from the existing project is often more advantageous than creating a new one

For NuEclispe SDCC

- Refer to the "Nu Eclipse SDCC Quick Start_EN.pdf" for guidance.

Copyright © Nuvoton Technology Corporation

Joy of innovation

NUVOTON

Thank You

Danke

Merci

ありがとう

Gracias

Kiitos

감사합니다

धन्यबाद

شكرا لك

הדות