

SN32F760B Series

QUICK START

SN32F768B
SN32F767B
SN32F766B
SN32F7661B
SN32F7651B
SN32F7652B

SONiX 32-Bit Cortex-M0 Micro-Controller

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AMENDENT HISTORY

Version	Date	Description
1.0	2017/07/07	First version released.

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1 OVERVIEW

The purpose of this document is to make the users be familiar with SONiX SN32F760B Quick Start Development Package and the settings of Keil MDK-ARM.

1.1 SN32F760B QUICK START DEVELOPMENT PACKAGE

SN32F760B Quick Start Development Package includes

H/W

1. SN32F760B Starter Kit Board
2. SN-LINK-V3

S/W

1. SN32F760B CMSIS Files
2. SN32F760B Flash Algorithm file
3. SN32F760B FW Library
4. SN32F760B Tool Installer

1.2 KEIL MDK-ARM

The MDK-ARM is a complete software development environment for Cortex™-M, Cortex-R4, ARM7™ and ARM9™ processor-based devices. MDK-ARM is specifically designed for microcontroller applications, it is easy to learn and use, yet powerful enough for the most demanding embedded applications.

- Complete support for Cortex-M, Cortex-R4, ARM7, and ARM9 devices
- Industry-leading ARM [C/C++ Compilation Toolchain](#)
- [µVision4](#) IDE, debugger, and simulation environment
- Keil [RTX](#) deterministic, small footprint real-time operating system (with source code)
- [TCP/IP Networking Suite](#) offers multiple protocols and various applications
- [USB Device](#) and [USB Host](#) stacks are provided with standard driver classes
- Complete [GUI Library](#) for embedded systems with graphical user interfaces
- [ULINKpro](#) enables on-the-fly analysis of running applications and records every executed Cortex-M instruction
- Complete [Code Coverage](#) information about your program's execution
- [Execution Profiler](#) and [Performance Analyzer](#) enable program optimization
- Numerous example projects help you quickly become familiar with MDK-ARM's powerful, built-in features
- [CMSIS](#) Cortex Microcontroller Software Interface Standard compliant

MDK-ARM is available in 4 editions: MDK-Lite, MDK-Basic, MDK-Standard, and MDK-Professional.

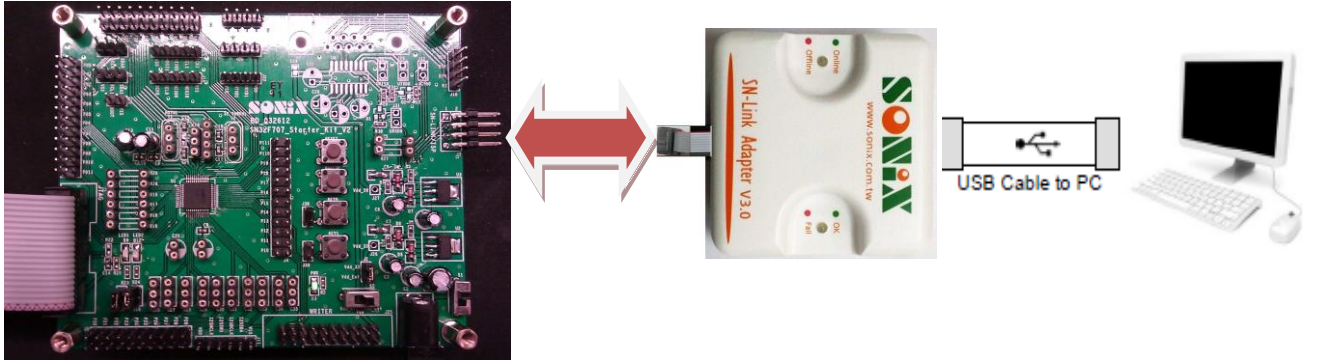
All editions provide a complete C/C++ development environment and MDK-Professional includes extensive middleware libraries. Refer to the [Product Selector](#) for more details.

For MDK Version 5 additional software components and support for microcontroller devices is provided by Software Packs. DFP (Device Family Pack) indicates that a Software Pack contains support for microcontroller devices.

*** Note:** 1. MDK-Lite (32KB) Edition is available for [download](#). It does not require a serial number or license key.
2. Please refer to [3.1 Build a New Project](#) step3 to download SONiX 32-bit M0 MCU DFP from Pack Installer of Keil MDK V5.X

Please link to <http://www.keil.com/arm/mdk.asp> to download and see more detail introduction.

2 SETUP



SONiX 32-bit Series Starter-kit

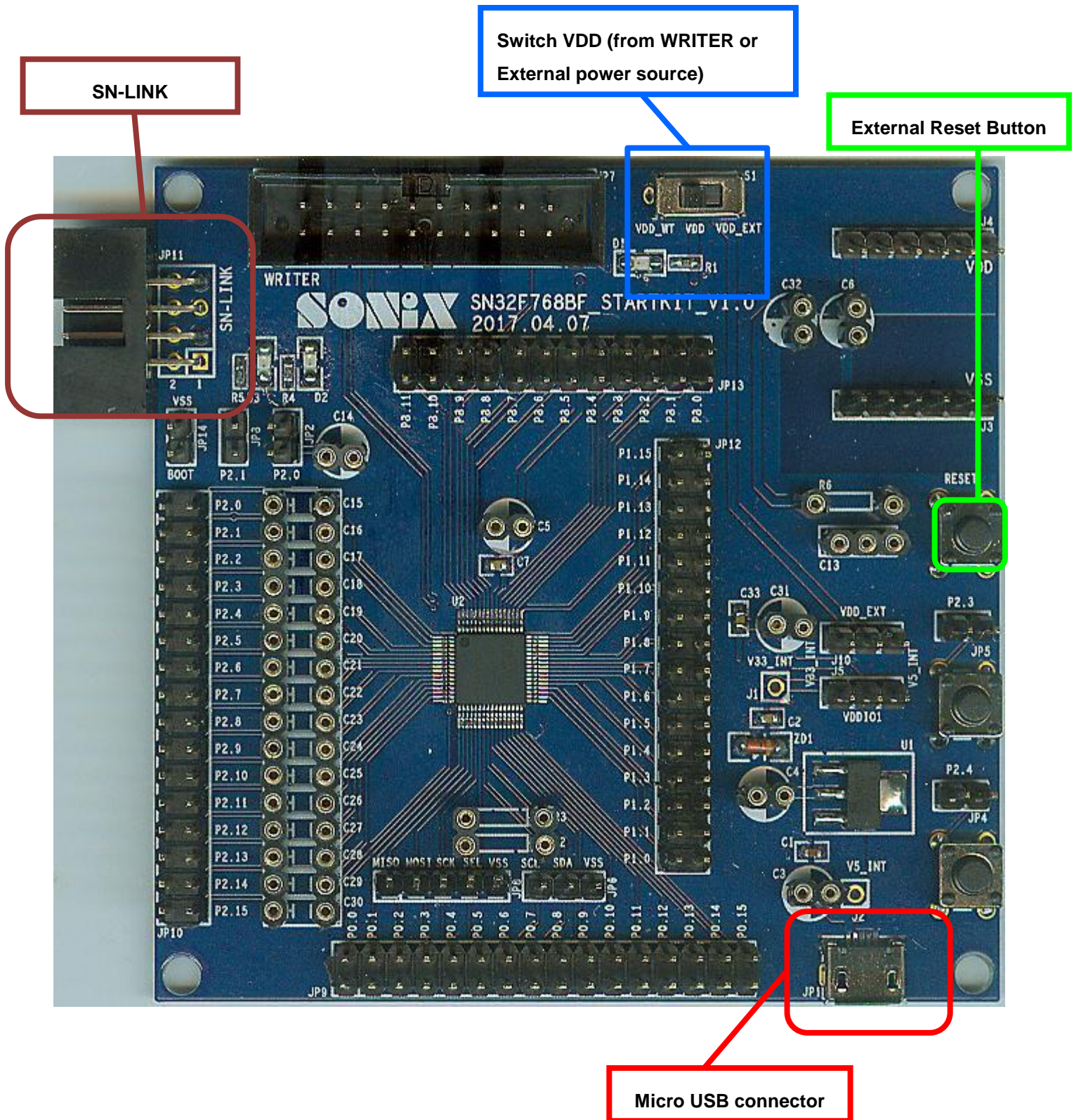
SN-LINK-V3.0

IDE/CMSIS

2.1 ICE

1. Please execute SN-LINK Package to install SN-LINK-V3.0 related files.
2. Connect SN-LINK-V3.0 debugger and PC via USB cable.

2.2 SN32F760B Starter-kit Board



JP1 → Micro USB connector.

S1 → Choose the source of VDD (5.0V/3.3V on board or WRITER). Please switch to VDD_WT if the WRITER is used.

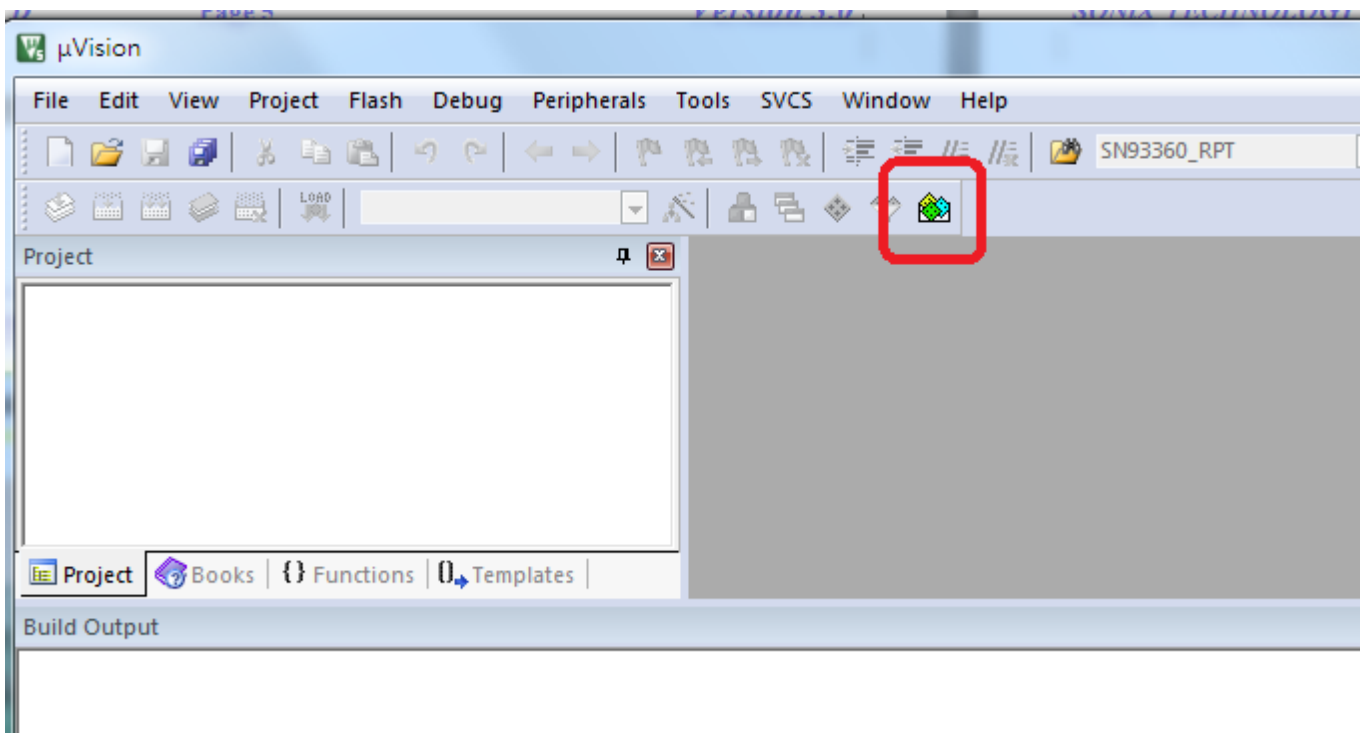
J10 → Connector for SN-LINK debugger

2.3 KEIL MDK-ARM

1. Please link to <http://www.keil.com/arm/mdk.asp> to download MDK V5.XX and install to default path (C:\Keil_v5)

* **Note: The new CMSIS architecture of can support Live update feature, so the user can use Pack Installer to check whether SONiX updates the latest CMSIS files on the server or not, and can update easily. We strongly recommend to update Keil MDk v5.XX, and translate the project to MDK v5 (we will introduce how to translate in [3.3 Transform Existed MDK v4 Project to v5](#)).**

2. Execute KEIL MDK, and then press “Pack Installer” button.

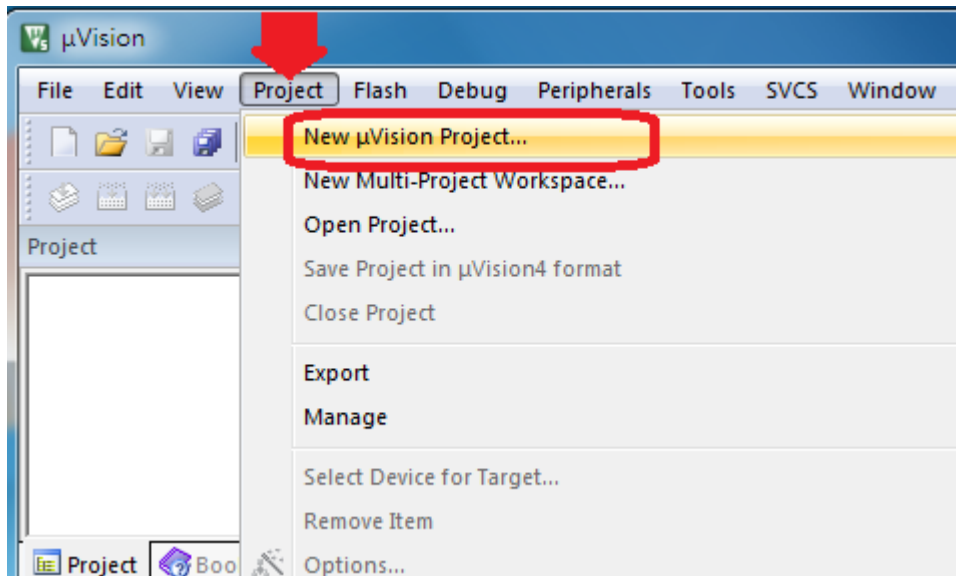


3. Please double click SONiX.SN32F7_DFP.x.y.z.pack inside SN32F760B _Startkit_Package_VX.X\Pack to install SN32F760B CMSIS related files.
4. Please double click Hex2Bin_Vxx.exe inside SN32F760B _Startkit_Package_VX.X\Tools\Hex2Bin to install HexConverter, it will be installed in the same path which Keil MDK is installed. In Chapter 3, we will show you how to set the project setting to use this tool, which can help to generate the bin file and calculate the checksum.

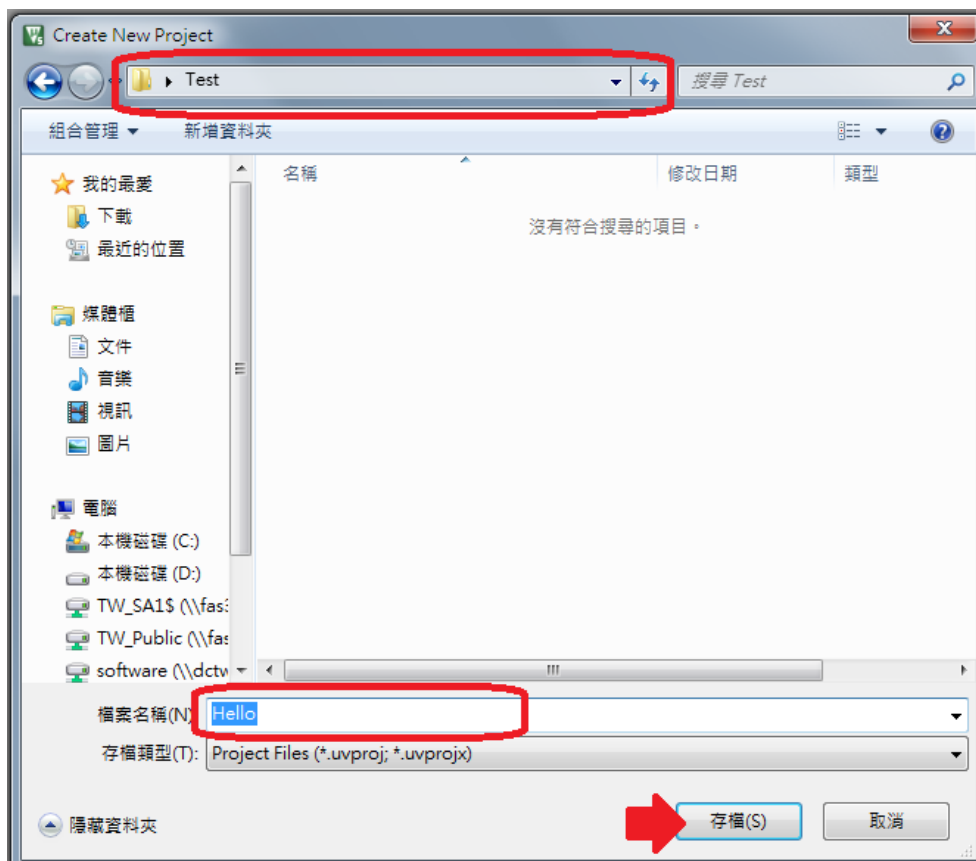
3 DEVELOP

3.1 Build a New Project

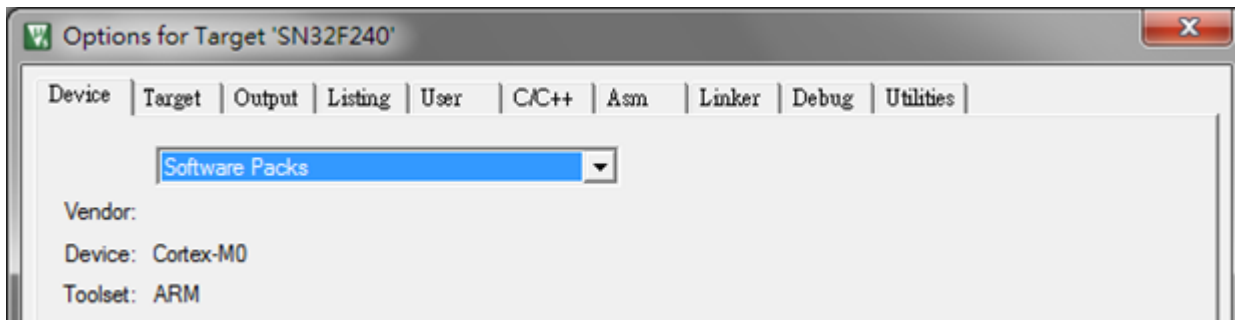
1. Press "Project", and then select "New uVision Project".



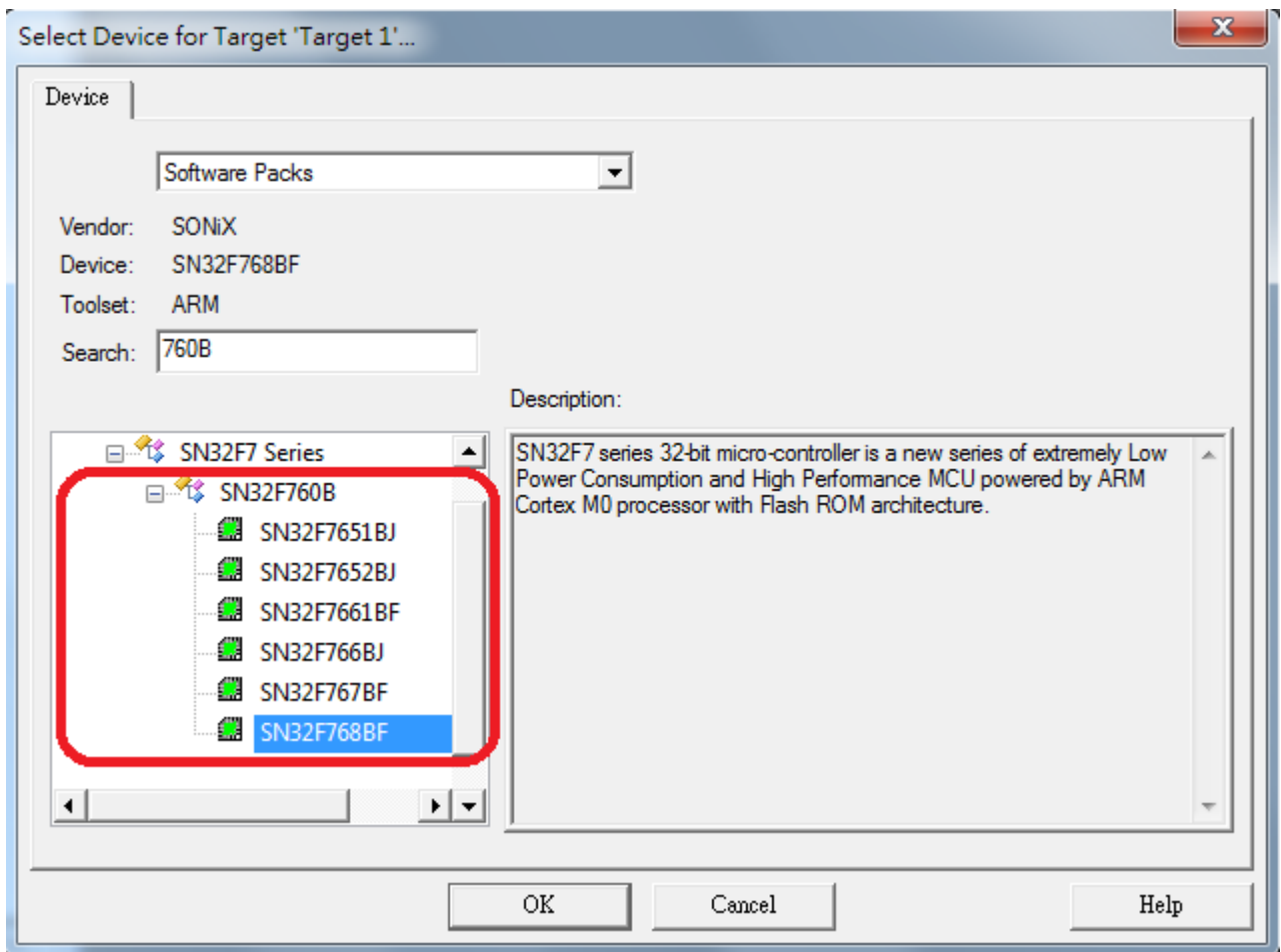
2. Choose the folder which is used to build the project, fill in the project name, and press "Save(S)".



- Please select "Software Packs".



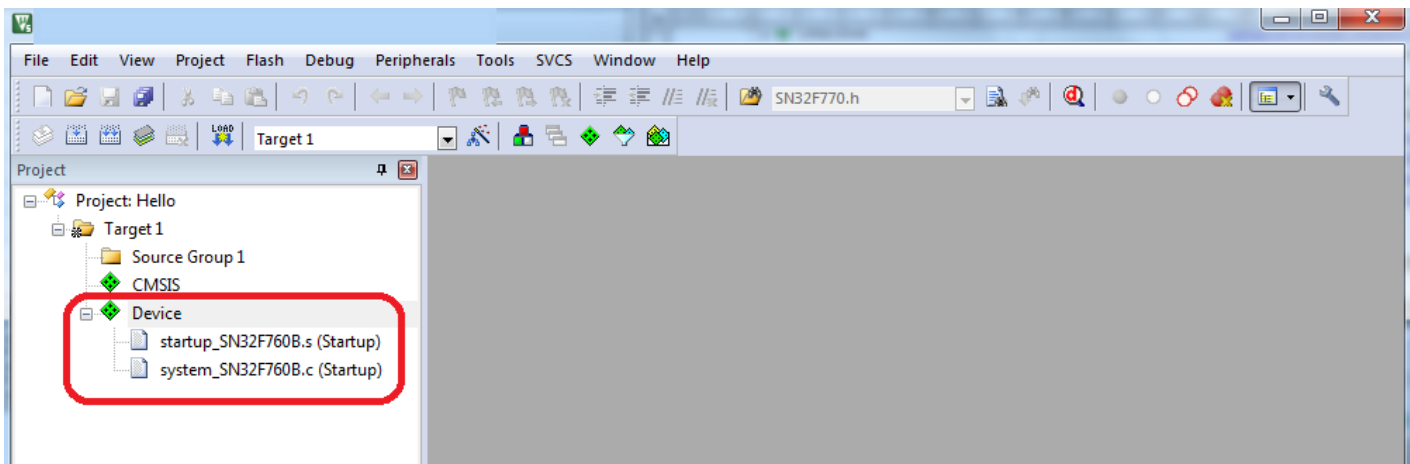
- Search "760B", take SN32F760B series MCU for example, select "SN32F7 Series" → "SN32F760B" → Either package ("SN32F768BF" for example), and then press "OK" button.



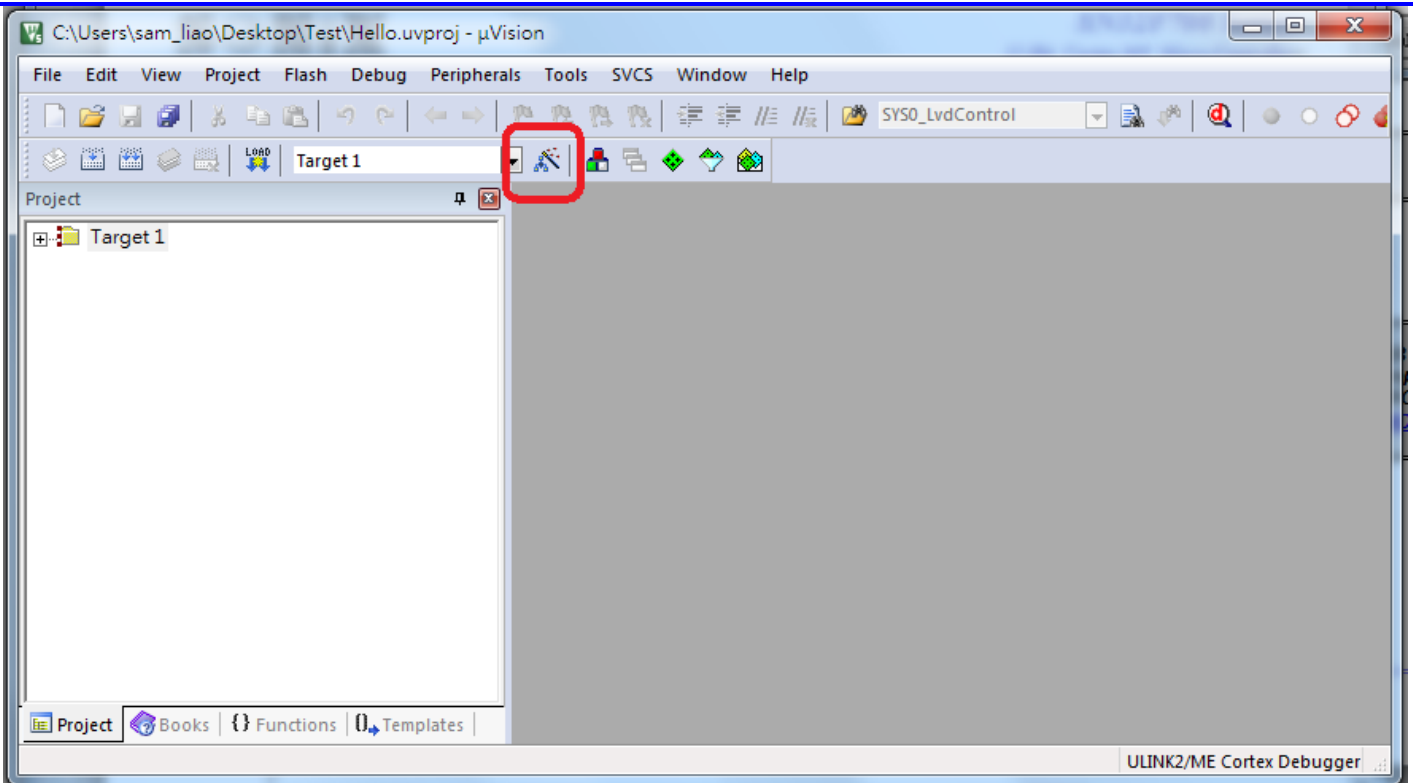
- Please check both "CMSIS" → "CORE" and "Device" → "Startup", and then press "OK" button.

Software Component	Sel.	Variant	Version	Description
<ul style="list-style-type: none"> [-] CMSIS <ul style="list-style-type: none"> [-] CORE [-] DSP [-] RTOS (API) [-] CMSIS Driver [-] Compiler [-] Device [-] Startup [-] Startup [-] File System [-] Graphics [-] Network [-] USB 	<input checked="" type="checkbox"/>			Cortex Microcontroller Software Interface Components
	<input checked="" type="checkbox"/>		4.3.0	CMSIS-CORE for Cortex-M, SC000, and SC300
	<input type="checkbox"/>		1.4.6	CMSIS-DSP Library for Cortex-M, SC000, and SC300
	<input type="checkbox"/>		1.0	CMSIS-RTOS API for Cortex-M, SC000, and SC300
	<input type="checkbox"/>			Unified Device Drivers compliant to CMSIS-Driver Specifications
	<input type="checkbox"/>			ARM Compiler Software Extensions
	<input type="checkbox"/>			Startup, System Setup
	<input checked="" type="checkbox"/>		1.0.0	System Startup for SONiX SN32F7 Series
	<input checked="" type="checkbox"/>		1.0.0	System Startup for SONiX SN32F760B Series
	<input type="checkbox"/>	MDK-Pro	6.8.0	File Access on various storage devices
	<input type="checkbox"/>	MDK-Pro	5.32.2	User Interface on graphical LCD displays
	<input type="checkbox"/>	MDK-Pro	7.2.0	IPv4/IPv6 Networking using Ethernet or Serial protocols
	<input type="checkbox"/>	MDK-Pro	6.8.0	USB Communication with various device classes

6. The figure below shows the MCU related CMSIS files are loaded.

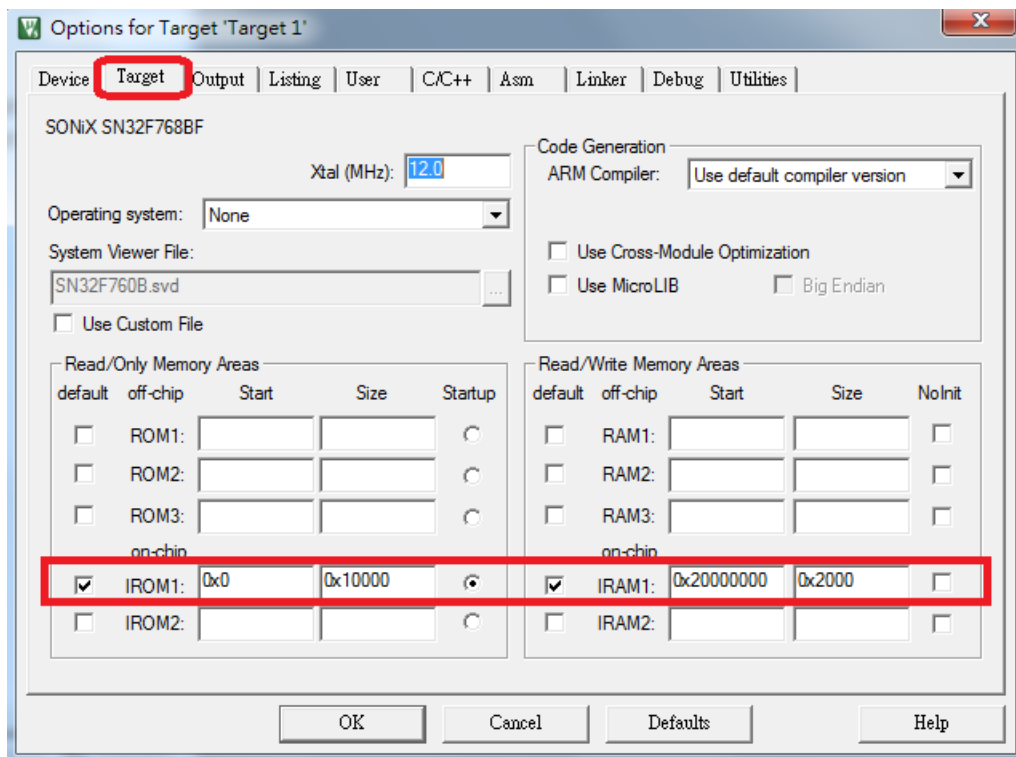


7. Press "Target Options".

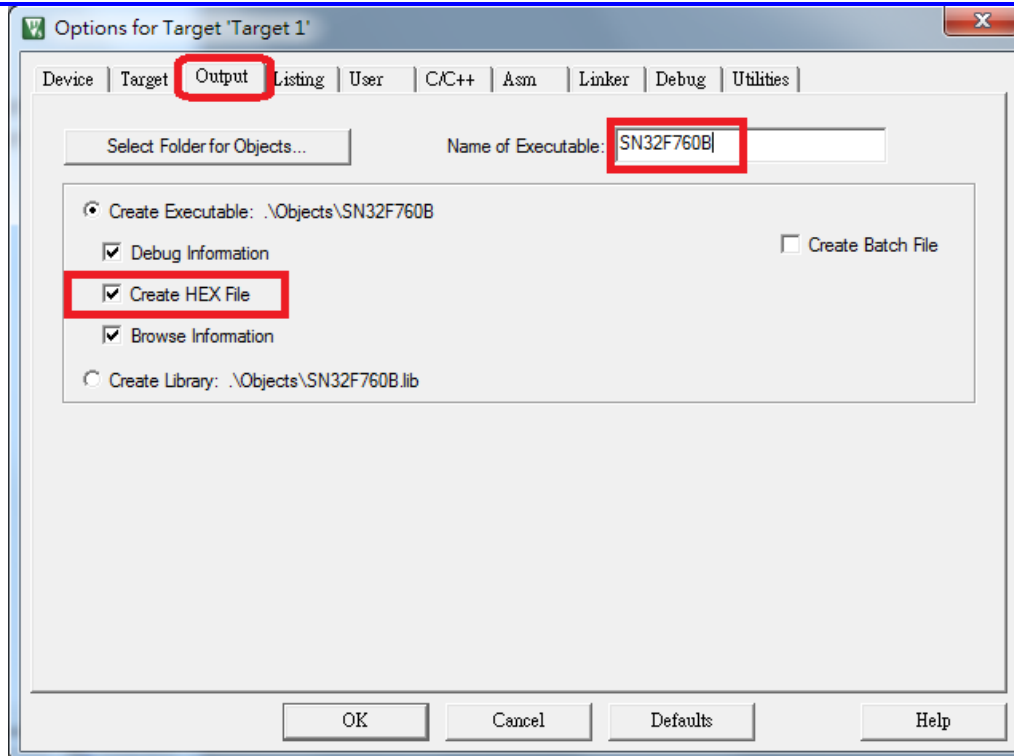


7.1 Press "Target", set the proper size of ROM and RAM correctly for each MCU type.

A. SN32F760B (ROM 64KB, RAM 8KB)

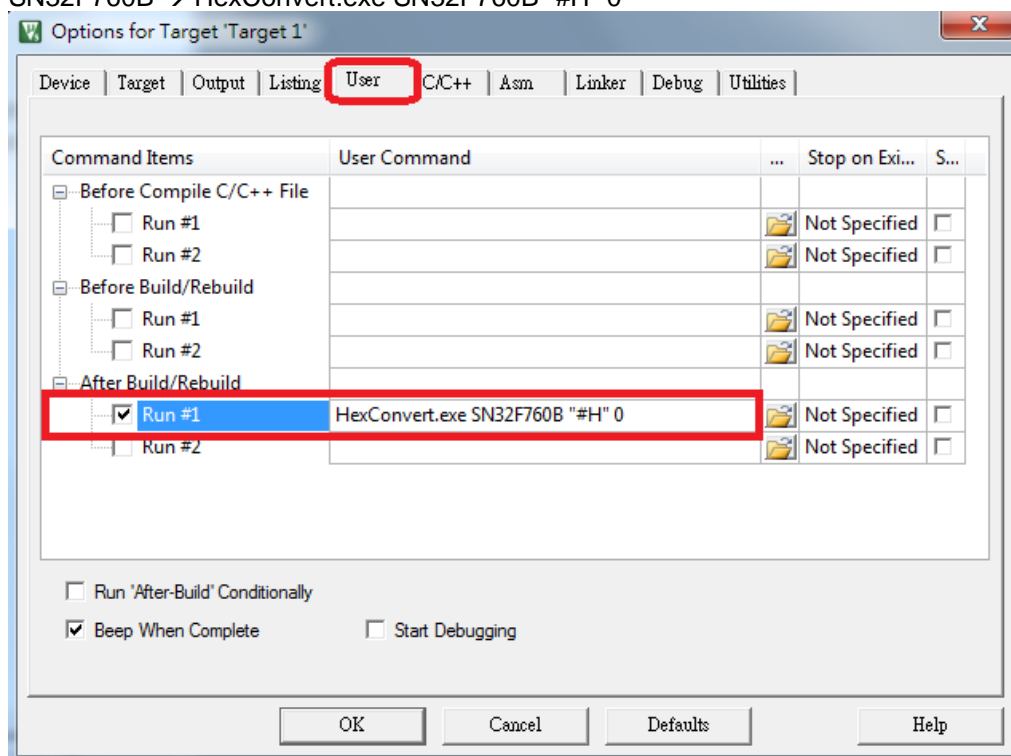


7.2 Press "Output", and check "Create HEX File".



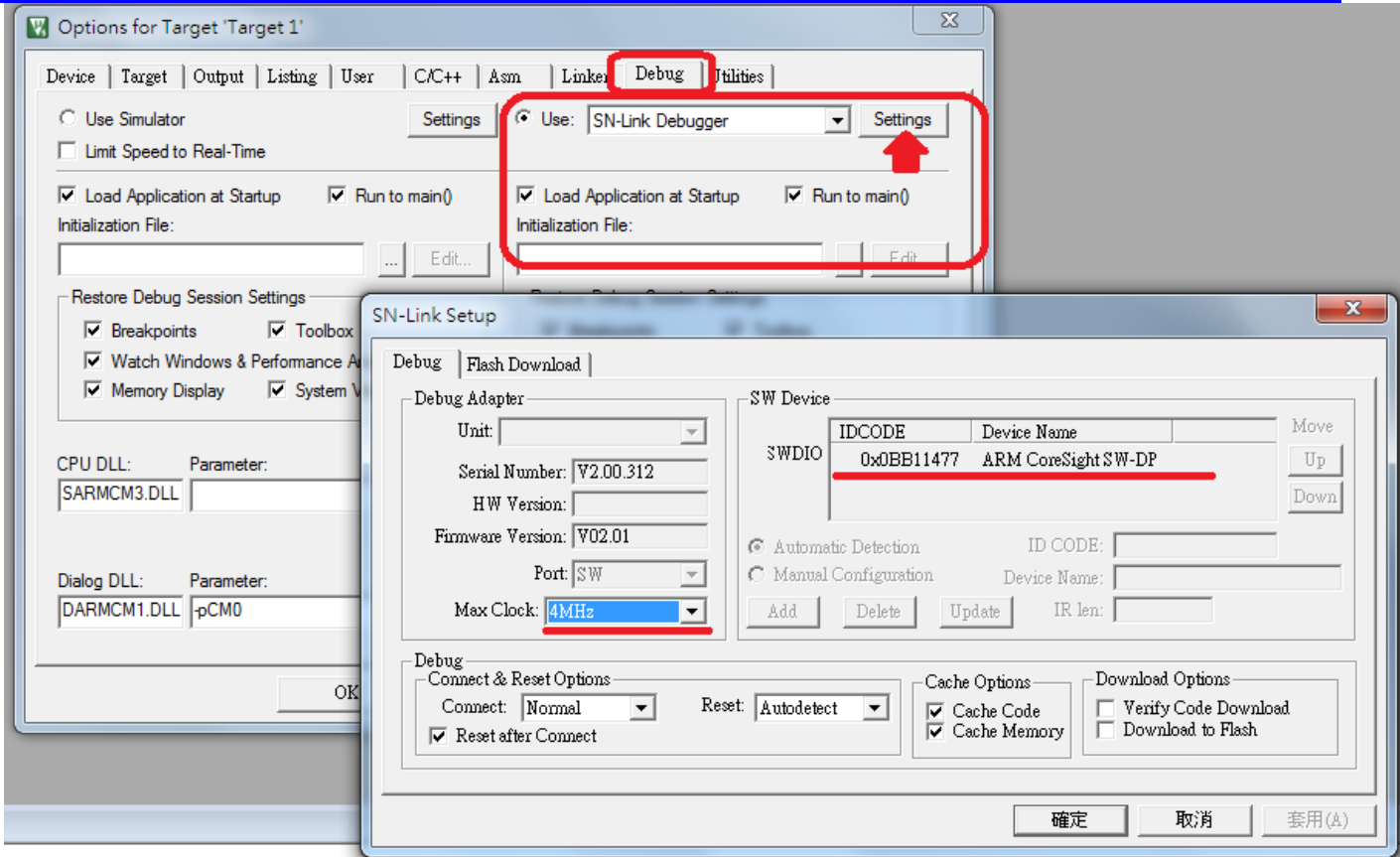
7.3 Press "User", check "Run #1:", and then fill in the command below for each MCU type.

SN32F760B → HexConvert.exe SN32F760B "#H" 0

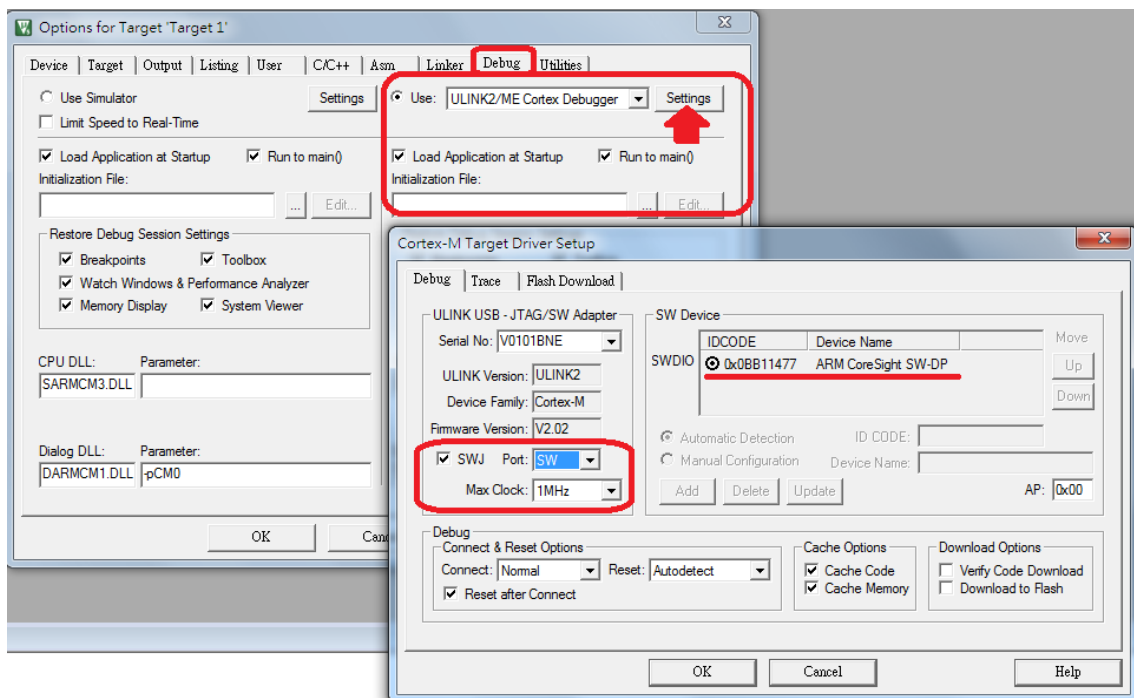


7.4 Press "Debug", and then press "Settings" to configure the ICE used. KEIL shall be able to get and the status of MCU if ICE is configured and connected correctly.

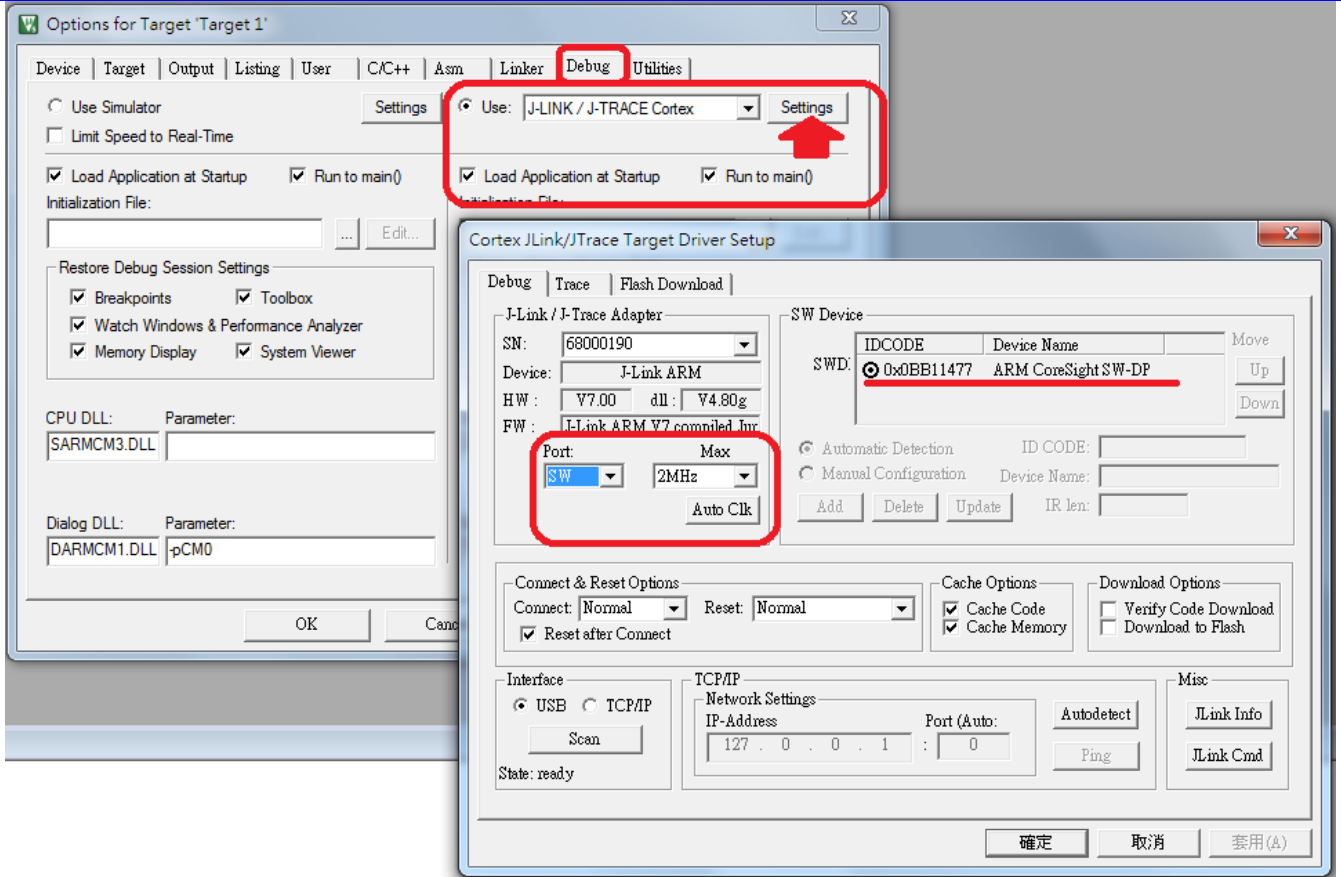
A. Use SN-LINK, setup the ICE speed (Max Clock)



B. Use ULINK2, check "SWJ" and set Port as "SW", and setup the ICE speed (Max Clock)

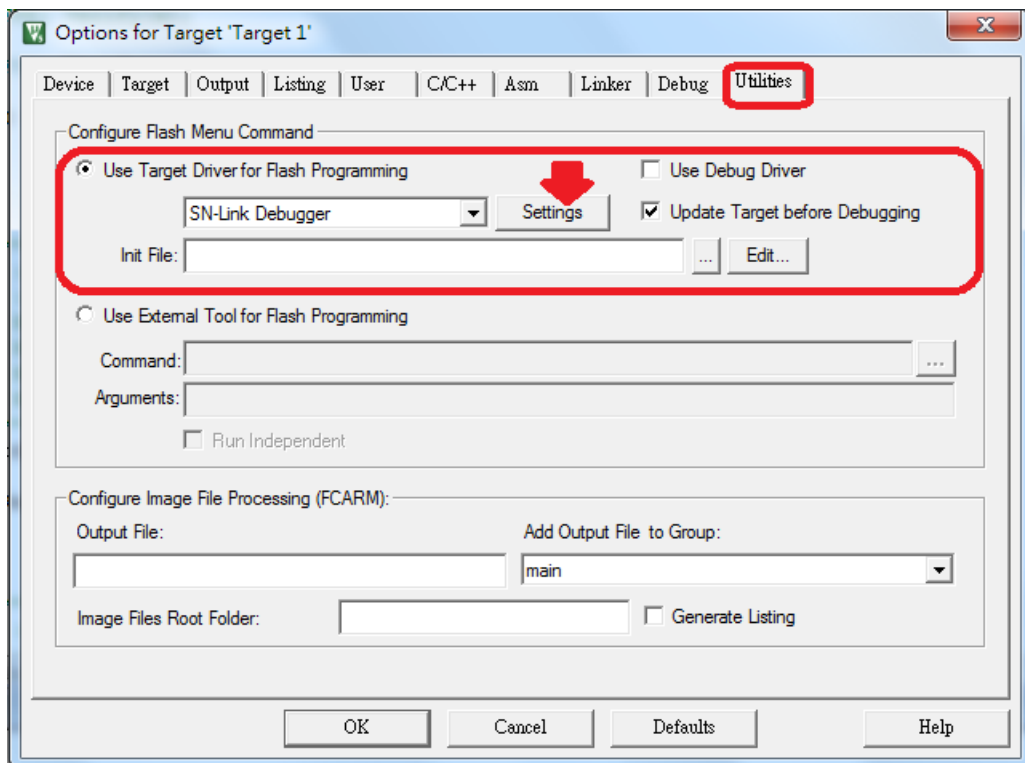


C. Use J-LINK, set Port as "SW", and setup the ICE speed (Maxk)



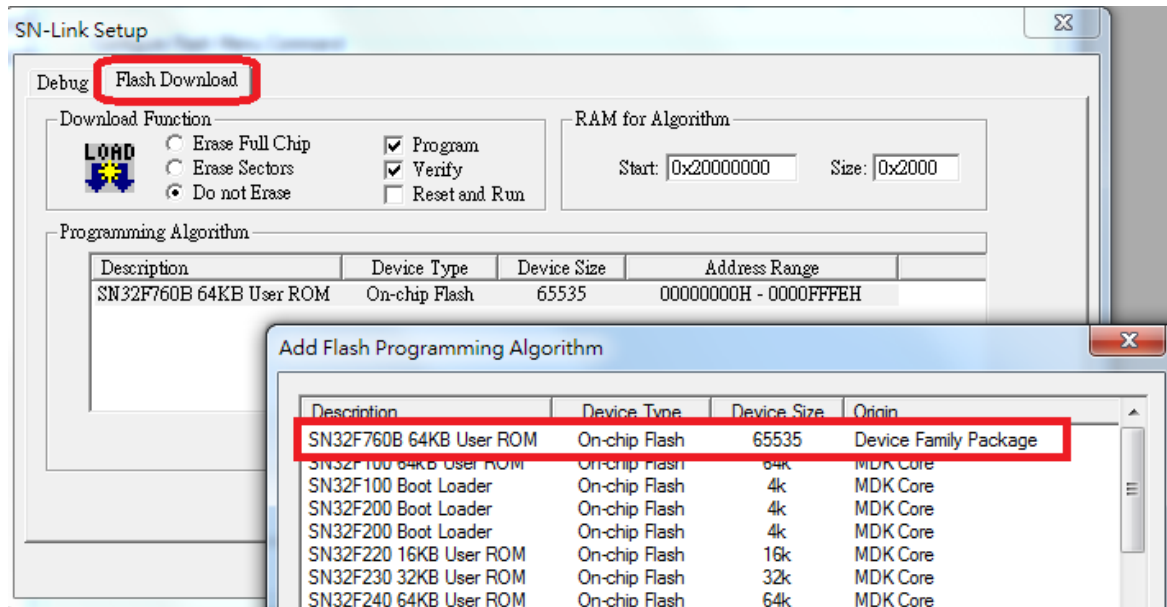
D. If other ICE is used, please refer to its user guide.

7.5 Press "Utility", select the used ICE, and then press "Settings".



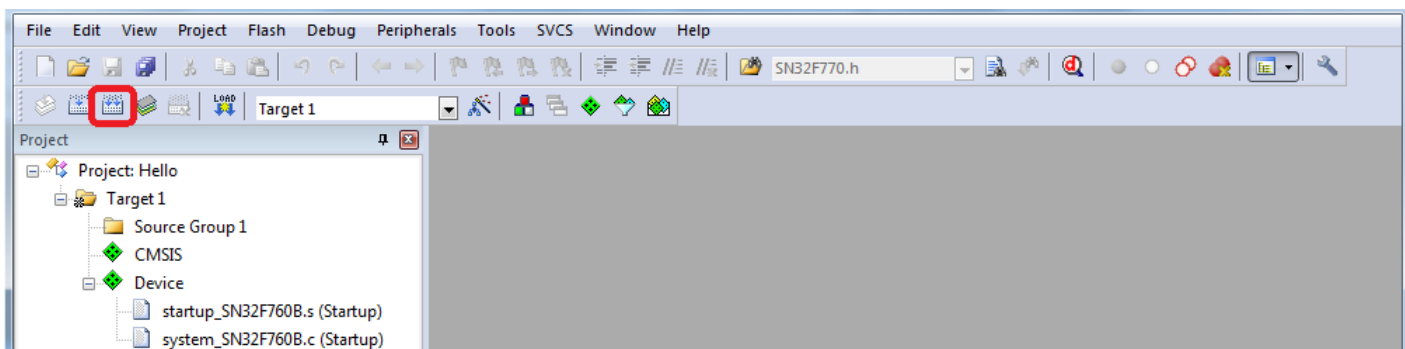
* **Note: Please do NOT select "Use Debug Driver".**

7.6 Configure and choose the correct Programming algorithm for MCU in use as below.



* **Note: Click "Add" → "SN32F770 32KB User ROM" shall be seen in the pop window. If "SN32F770 32KB User ROM" can NOT be found, please make sure the step 3 of [3.1 Build a New Project](#) is completed.**

8. Return to main page to start coding.
9. After coding, click the "Rebuild" button as below, Keil MDK will start to compile.



10. If compile successfully, the version of HexConverter and the calculated Checksum will be showed in the message box.

The screenshot shows the Keil uVision IDE interface. The main window displays the source file `main.c` with the following content:

```

1  /****** (C) COPYRIGHT 2017 SONiX *****/
2  * COMPANY:   SONiX
3  * DATE:     2017/07
4  * AUTHOR:   SA1
5  * IC:       SN32F760B
6
7  * REVISION  Date      User      Description
8  * 0.1      2017/07/07  SA1      1. First version released
9  *
10 *
11 *
12 *
13 * THE PRESENT SOFTWARE WHICH IS FOR GUIDANCE ONLY AIMS AT PROVIDING CUSTOMERS
14 * WITH CODING INFORMATION REGARDING THEIR PRODUCTS TIME TO MARKET.
15 * SONiX SHALL NOT BE HELD LIABLE FOR ANY DIRECT, INDIRECT OR CONSEQUENTIAL
16 * DAMAGES WITH RESPECT TO ANY CLAIMS ARISING FROM THE CONTENT OF SUCH SOFTWARE
17 * AND/OR THE USE MADE BY CUSTOMERS OF THE CODING INFORMATION CONTAINED HEREIN
18 * IN CONNECTION WITH THEIR PRODUCTS.
19 *
20 *
21 /*_____ I N C L U D E S _____*/
22 #include <SN32F760B.h>
23 #include <SN32F700_Def.h>
24
25
26 /*_____ D E C L A R A T I O N S _____*/
27
28
29 /*_____ D E F I N I T I O N S _____*/
30
31

```

The Build Output window at the bottom shows the following text:

```

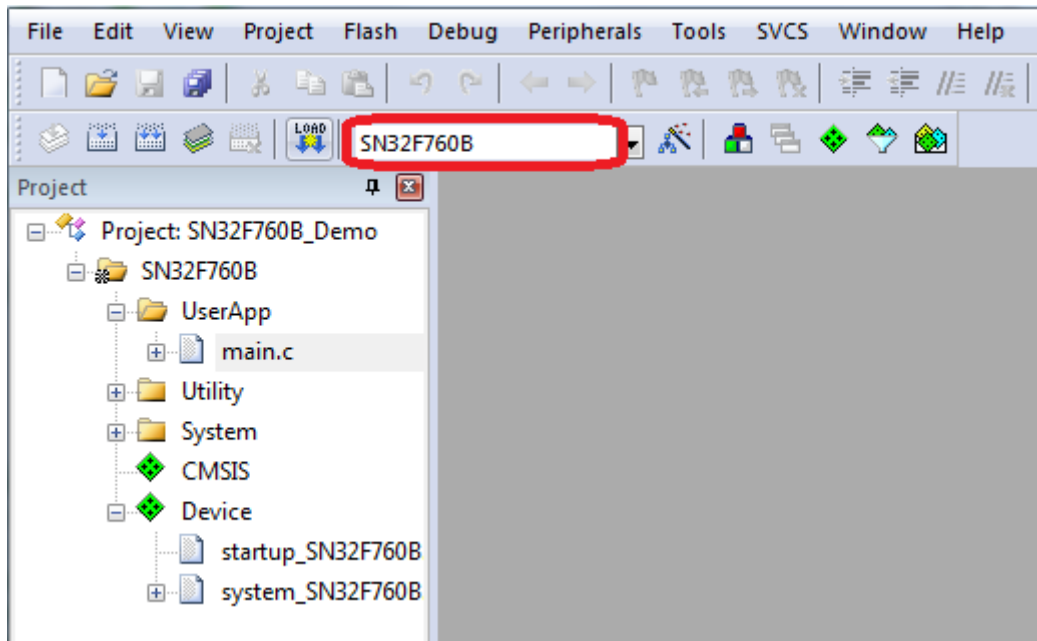
FromELF: creating hex file...
After Build - User command #1: HexConvert.exe SN32F760B "D:\32bit MCU\6.7. SH32E80A\4. STK package\SN32F760B_Startkit_Pac
HexConvertVer = V07
Hex File.ini no set SN32F760B RomSize
".\obj\SN32F760B.axf" - 0 Error(s), 0 Warning(s).
Build Time Elapsed: 00:00:05

```

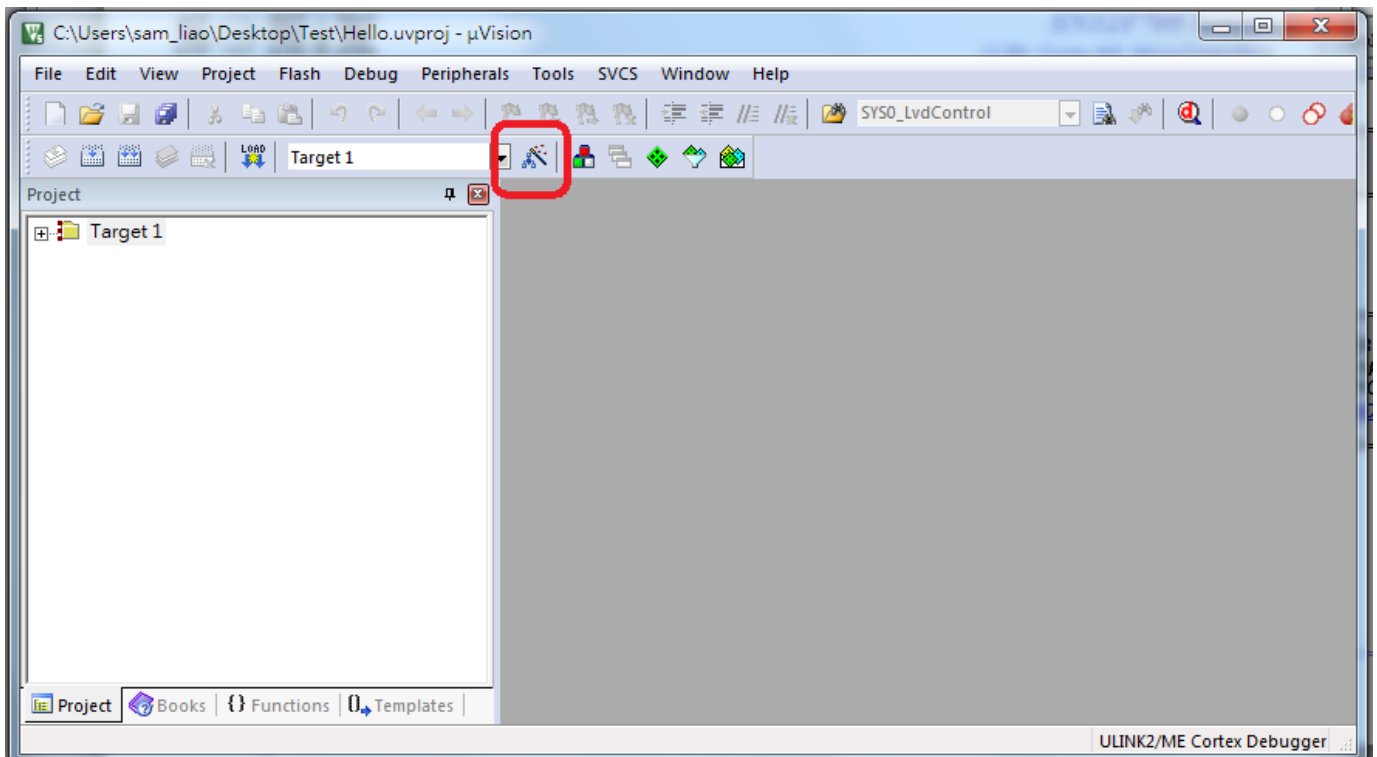
The text in the Build Output window is circled in red in the original image.

3.2 Use SONiX Sample Code

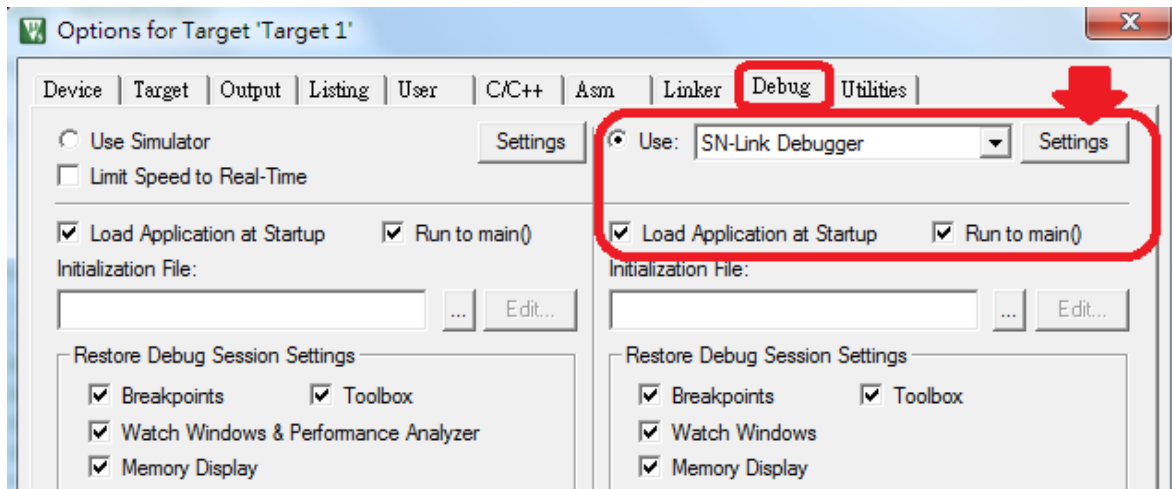
1. Open any project of SN32F760B Firmware Library with MRK-ARM, and then select the desired target MCU.



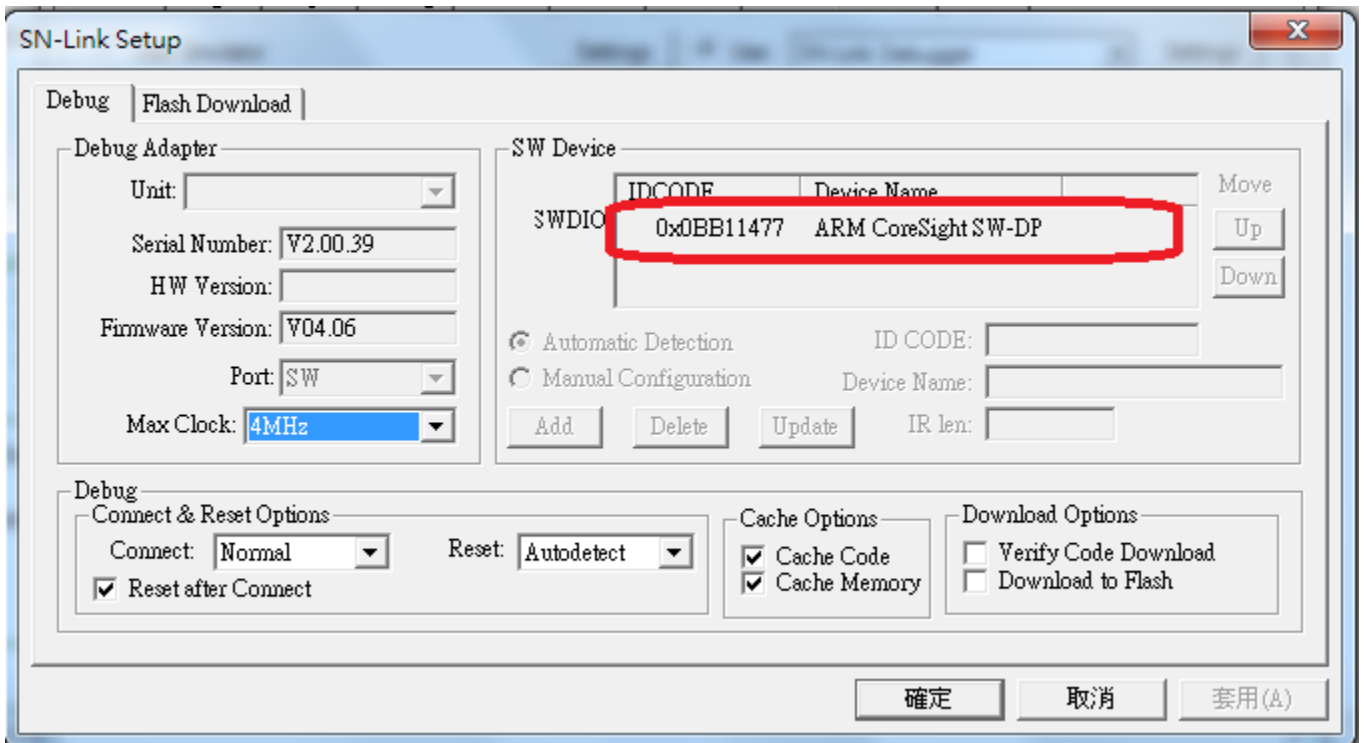
2. Press "Target Options"



3. Enter "Target Options" page, click "Debug" tab, and set as the following settings, and then click "Settings" button.



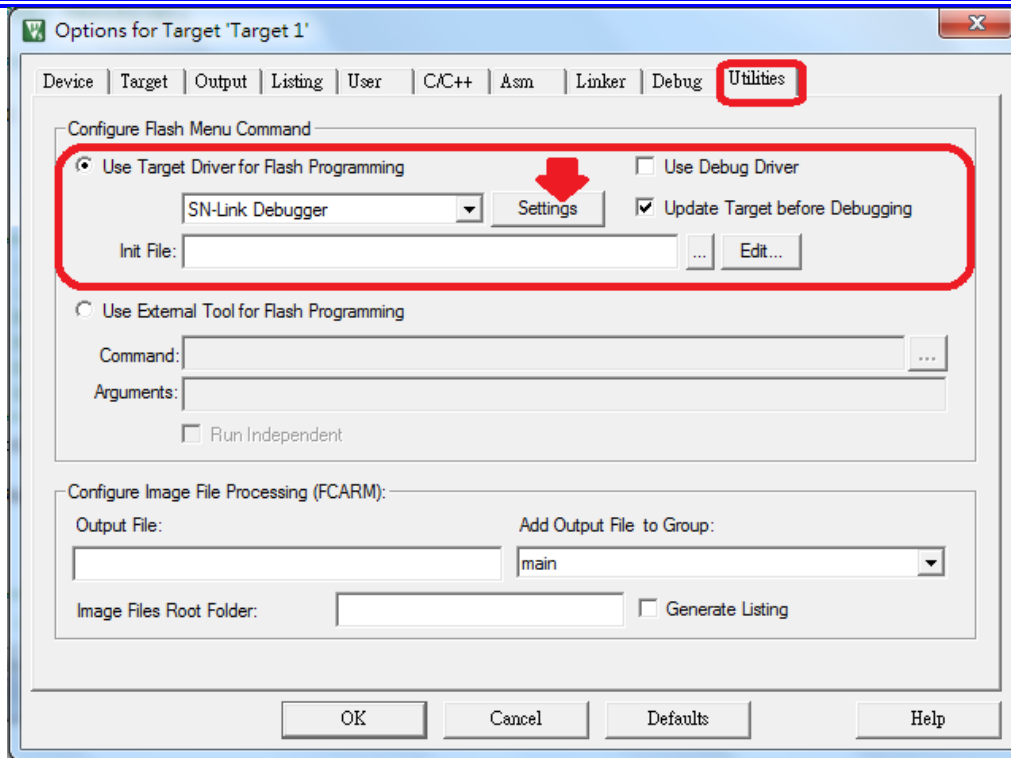
4. Enter Setup page, KEIL shall be able to get and the status of MCU if ICE is connected correctly.



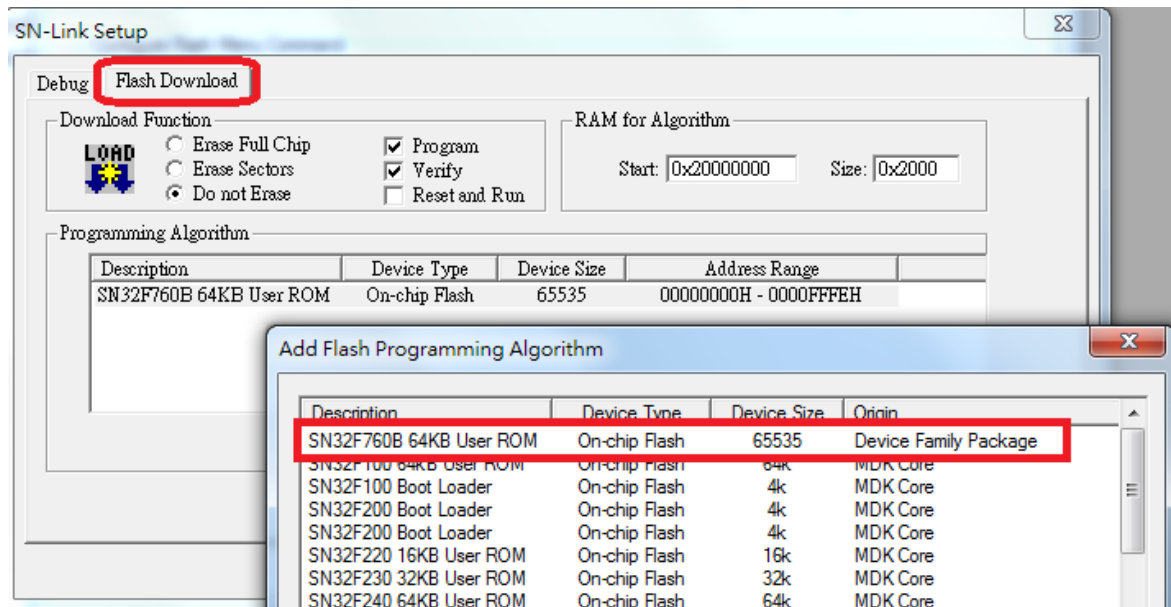
* **Note: If the used ICE is NOT SN-LINK, please refer to the step 7.4 of [3.1 Build a New Project](#).**

5. Press "Utility" tab, choose the used ICE, and then click "Settings" button.

* **Note: Please do NOT select "Use Debug Driver".**

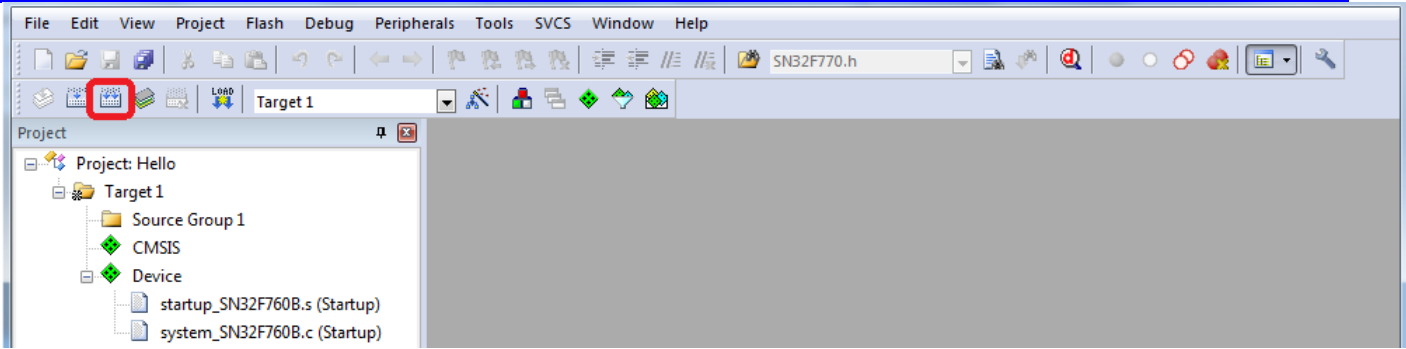


6. The following setting shall be seen.

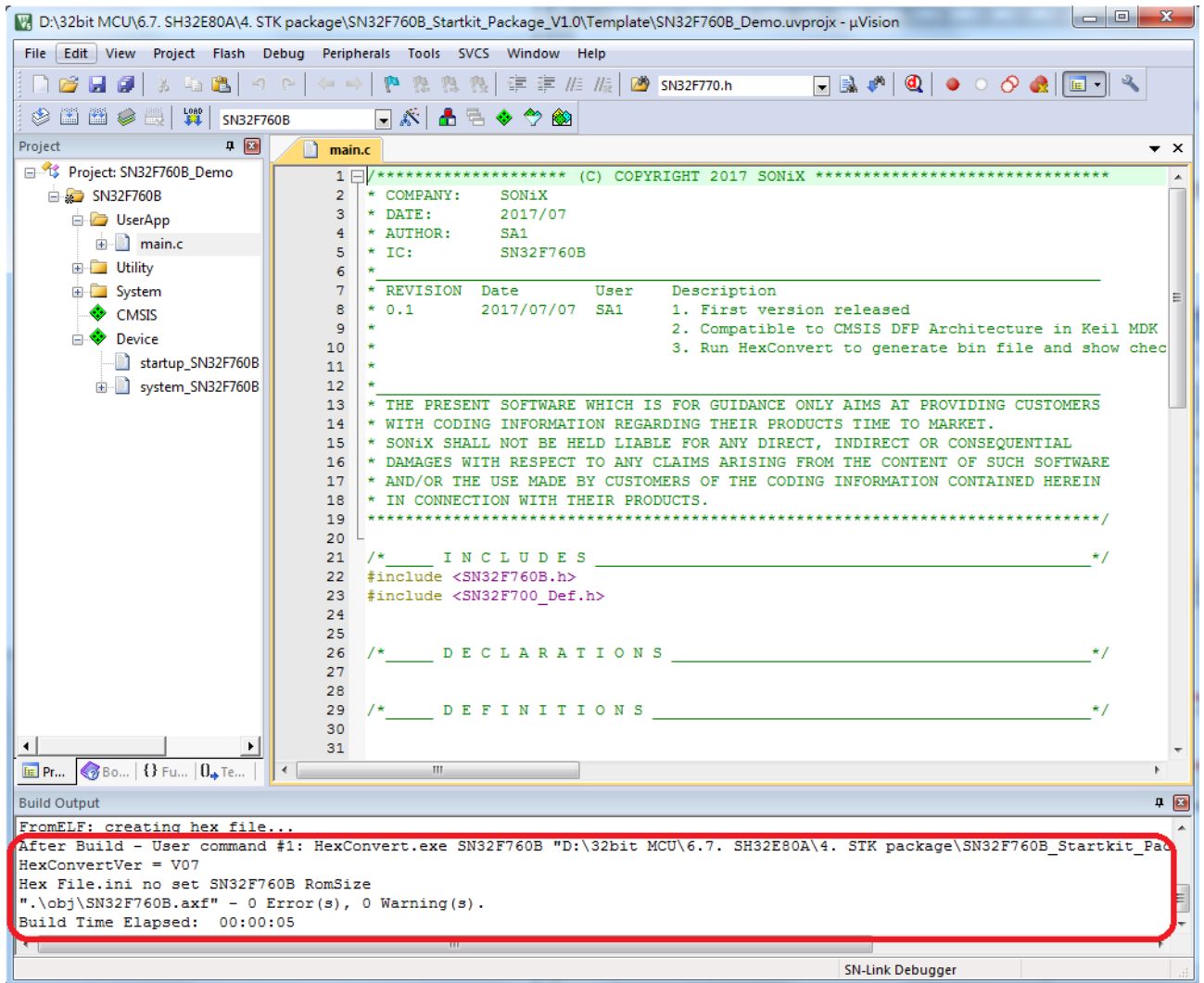


* **Note:** Click "Add" → "SN32F760B 64KB User ROM" shall be seen in the pop window. If "SN32F760B 64KB User ROM" can NOT be found, please make sure the step 3 of [3.1 Build a New Project](#) is completed.

- Please click "OK" to exit "Target Options".
- Click the "Rebuild" button as below, Keil MDK will start to compile.

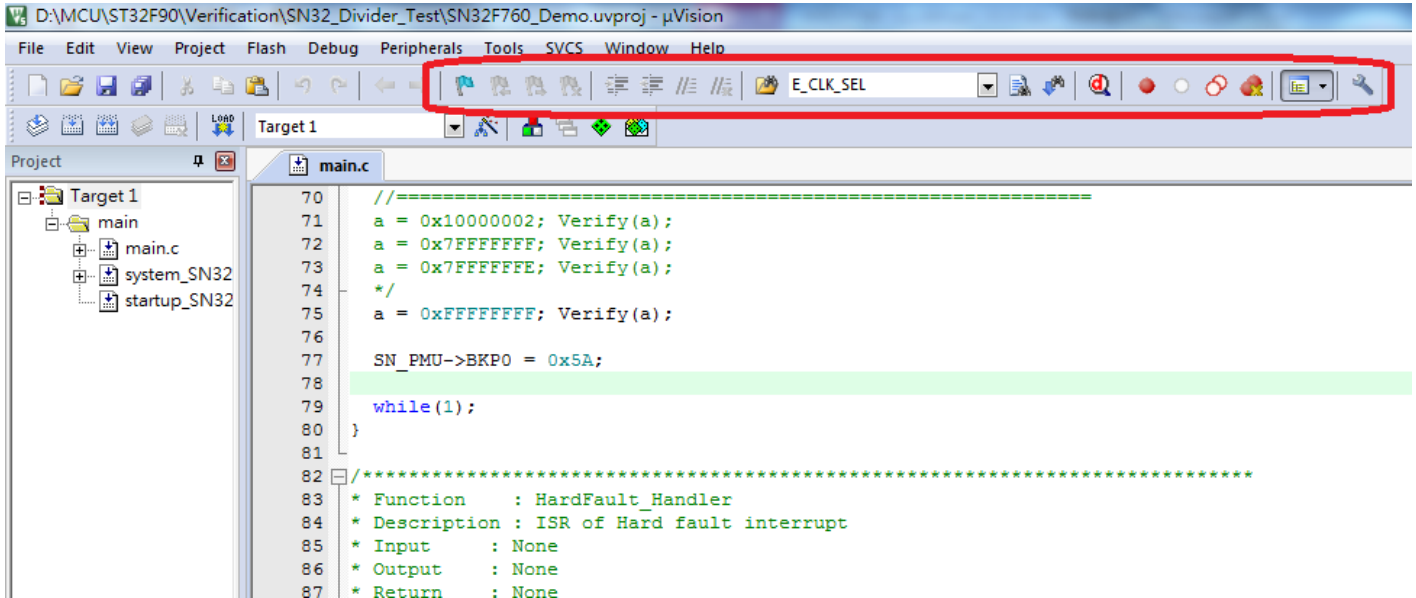


9. After compiling, the version of HexConverter and the calculated Checksum will be showed in the message box.

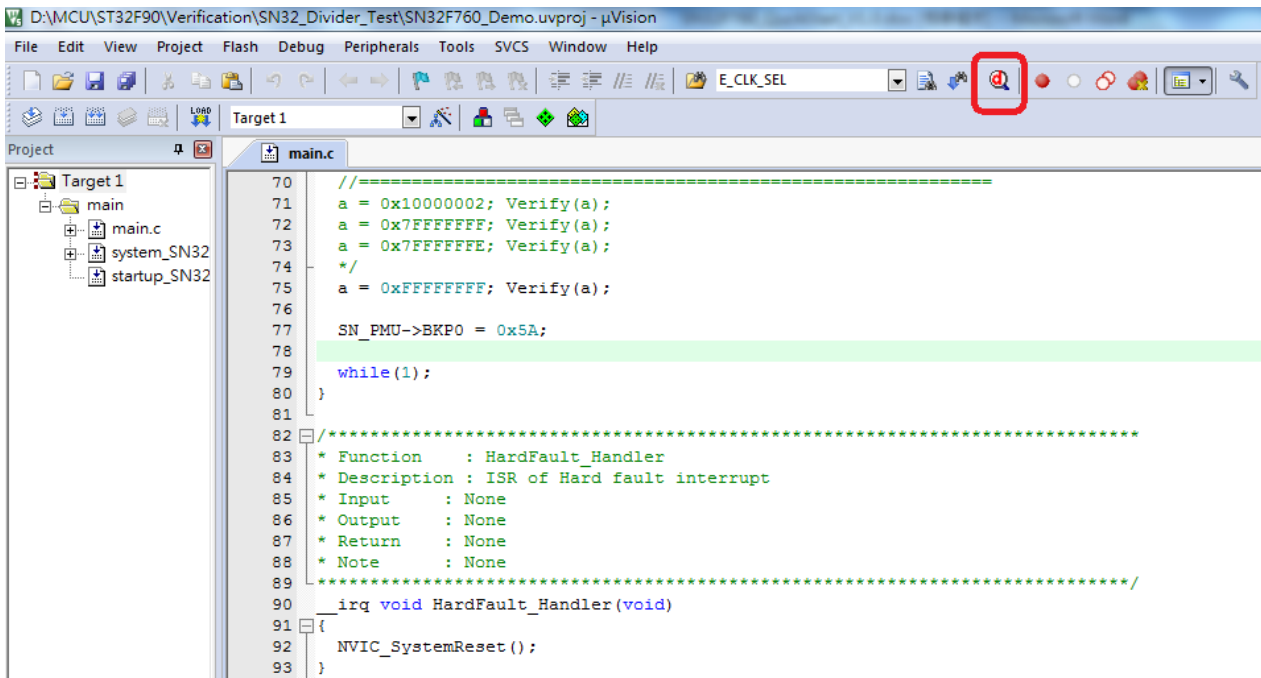


3.3 Debug

The users can develop and debug with MDK-ARM after above settings.



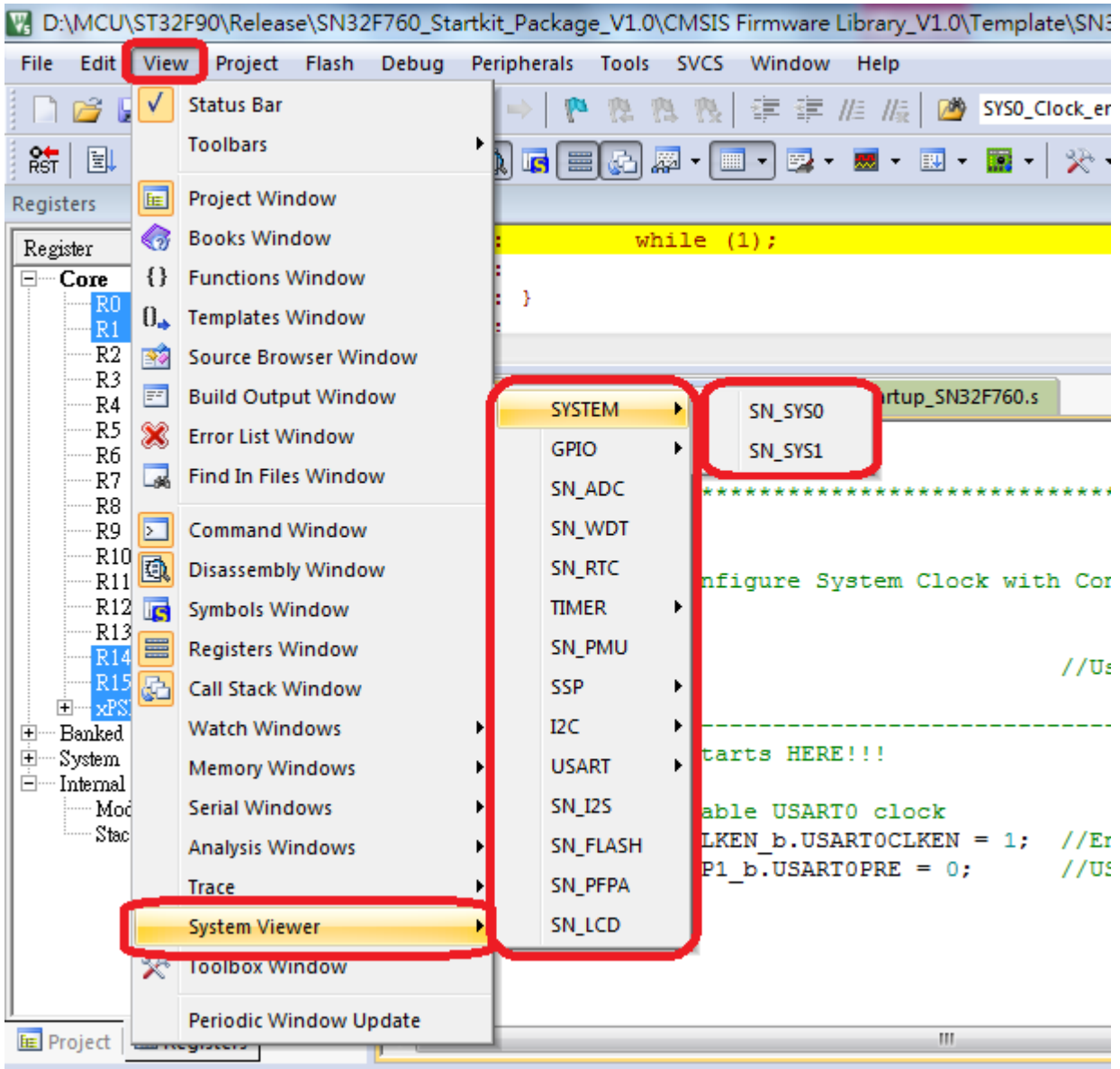
Click the button (“Start/Stop Debug Session”) below to start debugging.



3.3.1 CMSIS-SVD (System View Debug)

SVD is the debug standard of CMSIS, and it is a useless debug tool for users.

1. Before entering debug mode, click "View", and then select the registers which to be watched from the "System Viewer" list.



2. Take SN_SYS0 as example, we can see the following messages in KEIL debug window.

SN_SYS0	
Property	Value
ANBC...	0x00000001
IH...	1: Enable = Enable IHRC
CSST	0x00000001
IH...	1: 1 = IHRC is Ready
CLKCFG	0
SY...	0: IHRC = IHRC is used as system clock
SY...	0: IHRC = IHRC is system clock
AHBCP	0x00000002
A...	2: 010 = FAHB=FSYSCLK/4
RSTST	0x00000011
S...	1: 1 = SW reset occurred
W...	0: 0 = No WDT reset occurred
LV...	0: 0 = No LVD reset occurred
EX...	0: 0 = No Extenral reset occurred
P...	1: 1 = POR occurred
LVDC...	0x00000022
LV...	2: 2.40V = LVD reset threshold is 2.40V
LV...	2: 2.40V = LVD interrupt threshold is 2....
LV...	0: Diabale = Disable LVD reset

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