

SN34F780 Series

QUICK START

SN34F788
SN34F787
SN34F785

SONiX 32-Bit Cortex-M4F Micro-Controller

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AMENDENT HISTORY

Version	Date	Description
1.0	2023/10/04	First version released.
1.1	2023/11/28	1. Update SN34F780 Starter-kit Board description.

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1 OVERVIEW

The purpose of this document is to make the users be familiar with SONiX SN34F780 Quick Start Development Package and the settings of Keil MDK-ARM.

1.1 SN34F780 QUICK START DEVELOPMENT PACKAGE

SN34F780 Quick Start Development Package includes

H/W

1. SN34F780 Starter Kit Board
2. SN-LINK-V3

S/W

1. SN34F78X SDK Files
2. SN34F780 Flash Algorithm file
3. SN34F780 FW Library
4. SN34F780 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 M4 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.

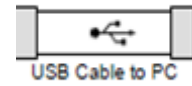
2 SETUP



SONiX 32-bit MCU Starter-Kit.



SN-LINK-V3.0



USB Cable to PC

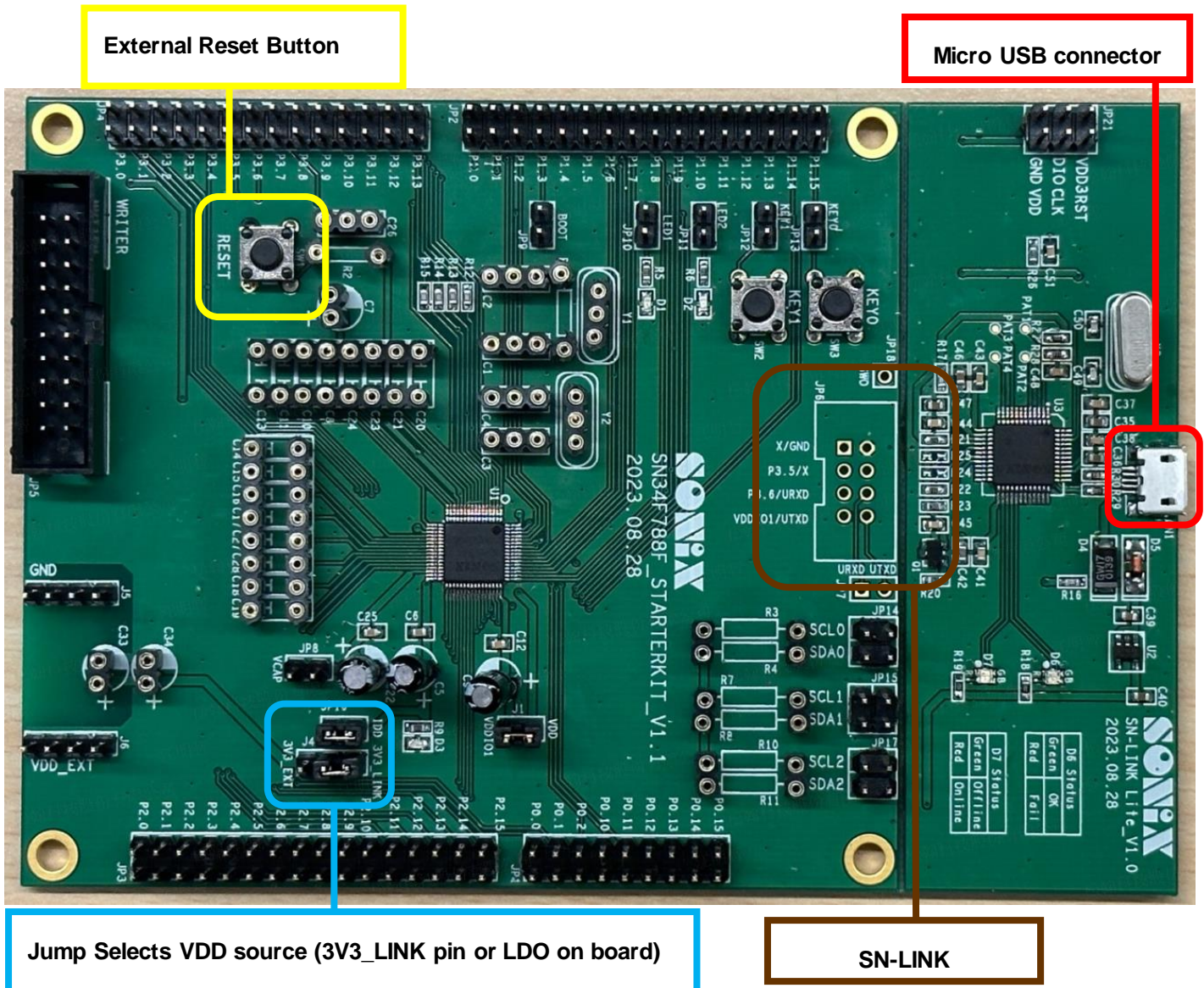


IDE/SDK

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 SN34F780 Starter-kit Board



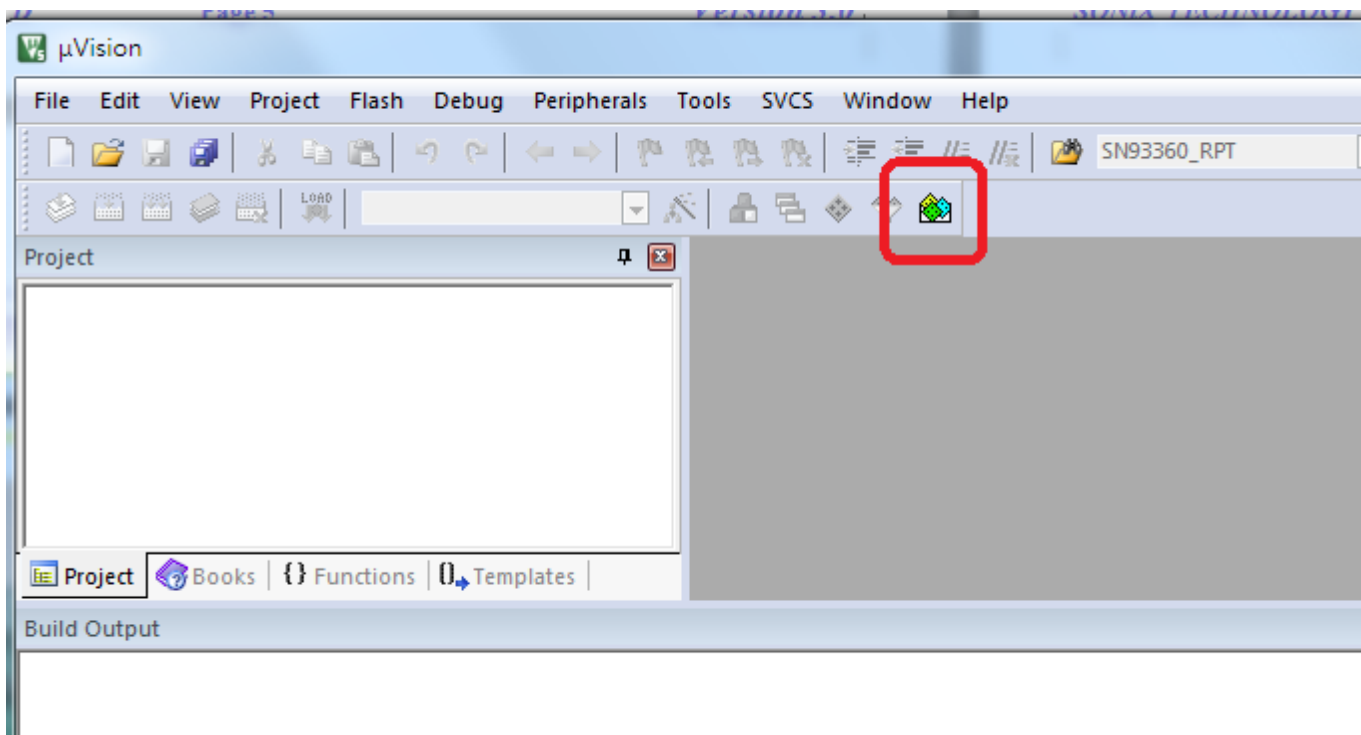
- U1 : SN34F788FG real chip
- JP5 : WRITER connector
- U2 : 3.3V LDO (3V3_LINK) from Micro USB 5V.
- J4 : VDD power connector: Choose the source of VDD(VDD_EXT or 3.3V LDO on board).
- J6 : VDD_EXT is 3V3_EXT.
- JP16 : For measuring current. Default short.
- J1 : VDDIO1 power connector. Default short VDD.
- RESET button : External reset trigger source.
- JP6 : SN-LINK connector when SN-LINK Lite is not connected
- JP9 : Short to force MCU stay in Boot loader.
- Y1: External high-speed X'tal for SN34F788FG
- Y2: External low-speed 32.768KHz X'tal for SN34F788FG
- Y3: External high-speed X'tal for SN-LINK Lite

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.

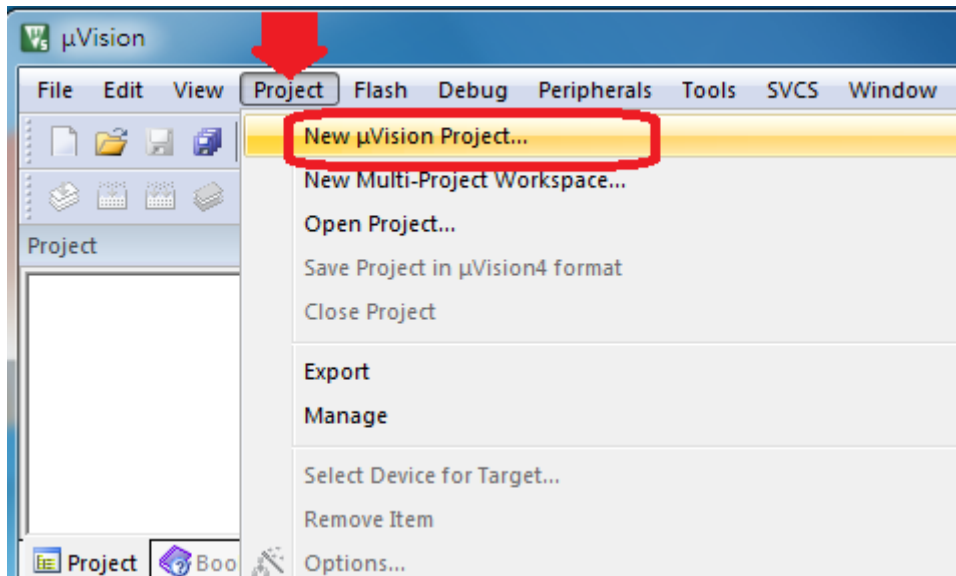


3. Please install SN34F78X SDK VX.X related files.
4. Please double click Hex2Bin_Vxx.exe inside SN34F780_Startkit_Package_VX.X\Tools\Hex2Bin to install HexConverter, it will be installed in the same path which Keil MDK is installed. In Chapter 3, we will show you how to set the project setting to use this tool, which can help to generate the bin file and calculate the checksum.

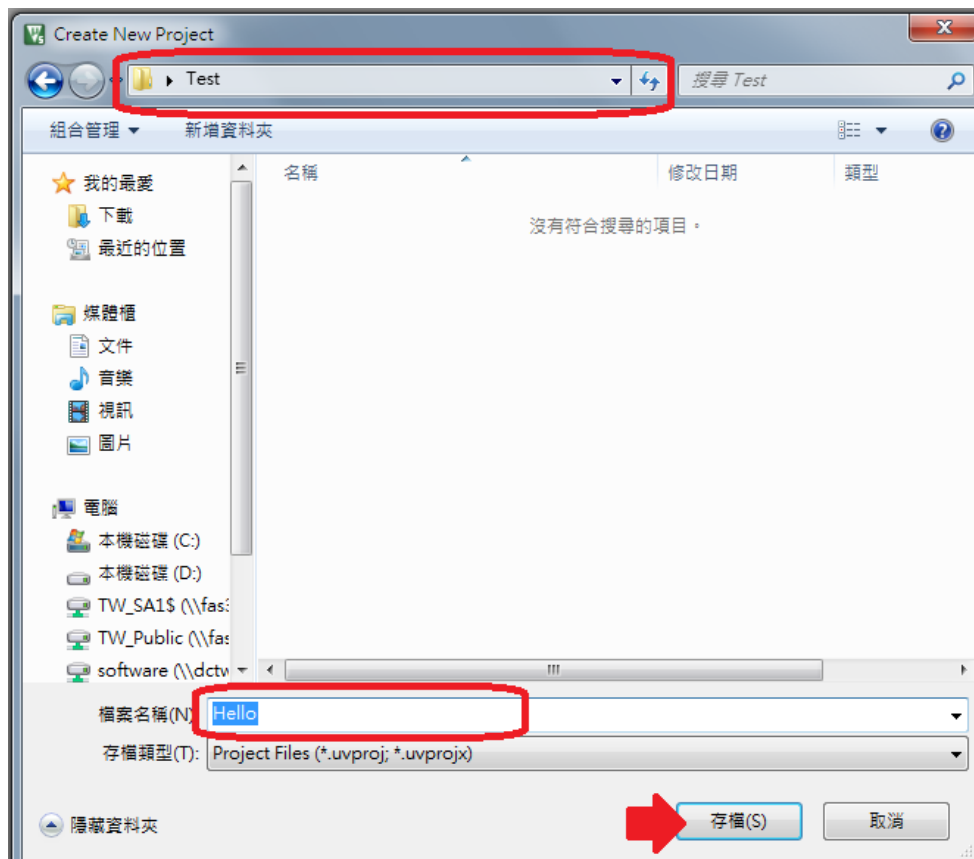
3 DEVELOP

3.1 Build a New Project

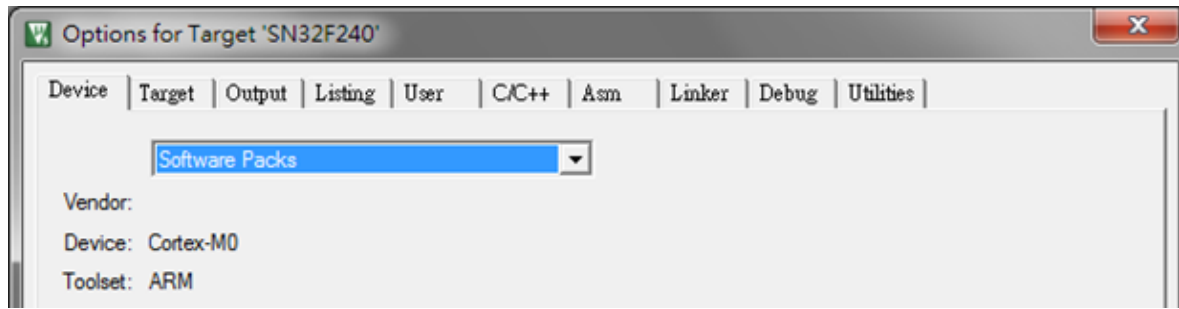
1. Press "Project", and then select "New uVision Project".



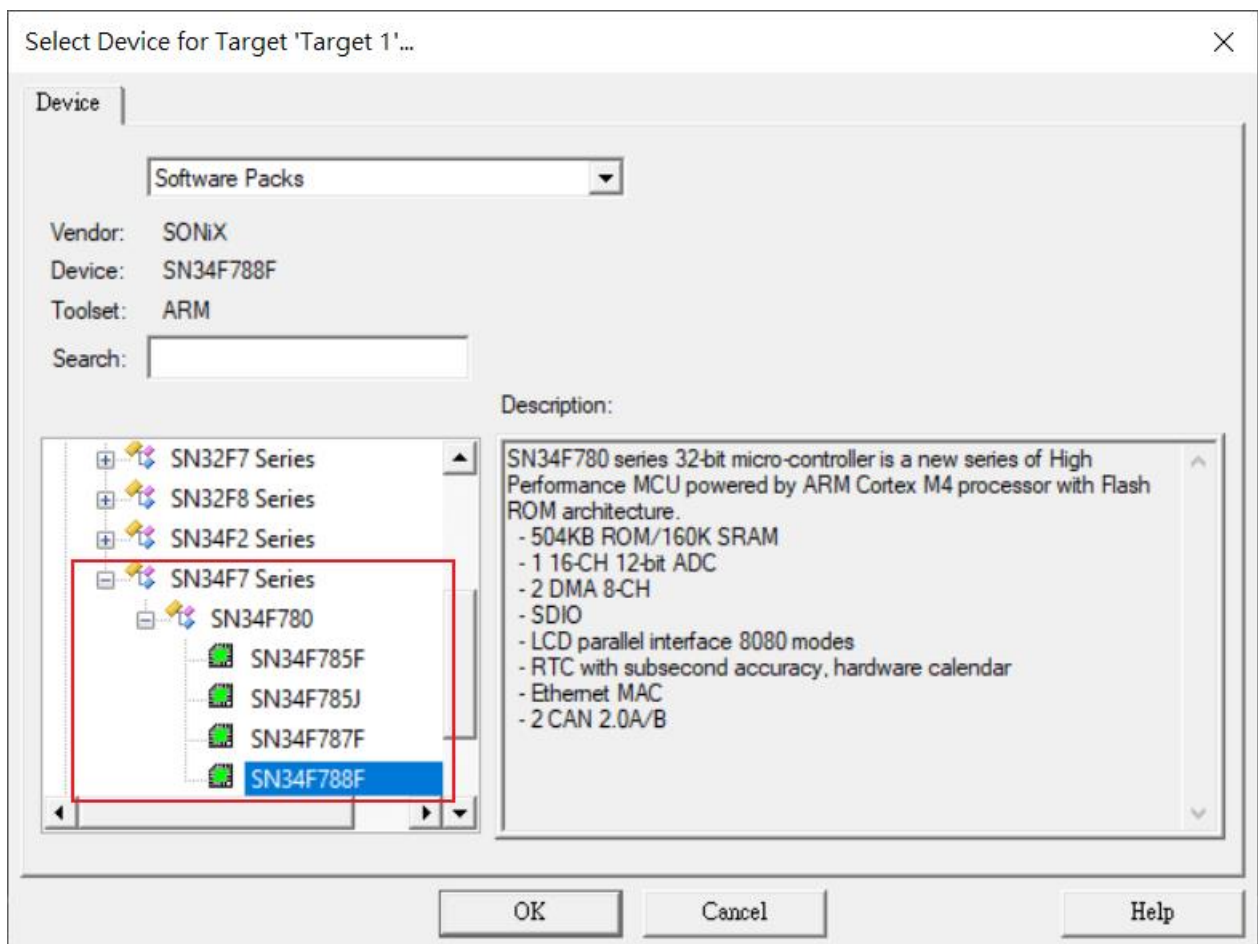
2. Choose the folder which is used to build the project, fill in the project name, and press "Save(S)".



3. Please select “Software Packs”.



4. Search “SONiX”, take SN34F780 series MCU for example, select “SN34F7 Series” → “SN34F780” → Either package (“SN34F788F” for example), and then press “OK” button.

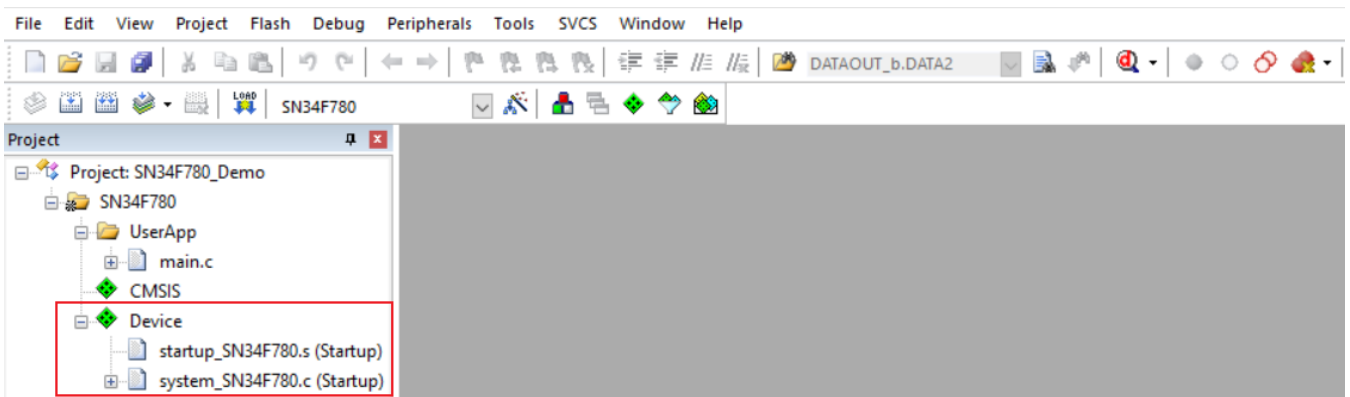


5. Please check both "CMSIS" → "CORE" and "Device" → "Startup", and then press "OK" button.

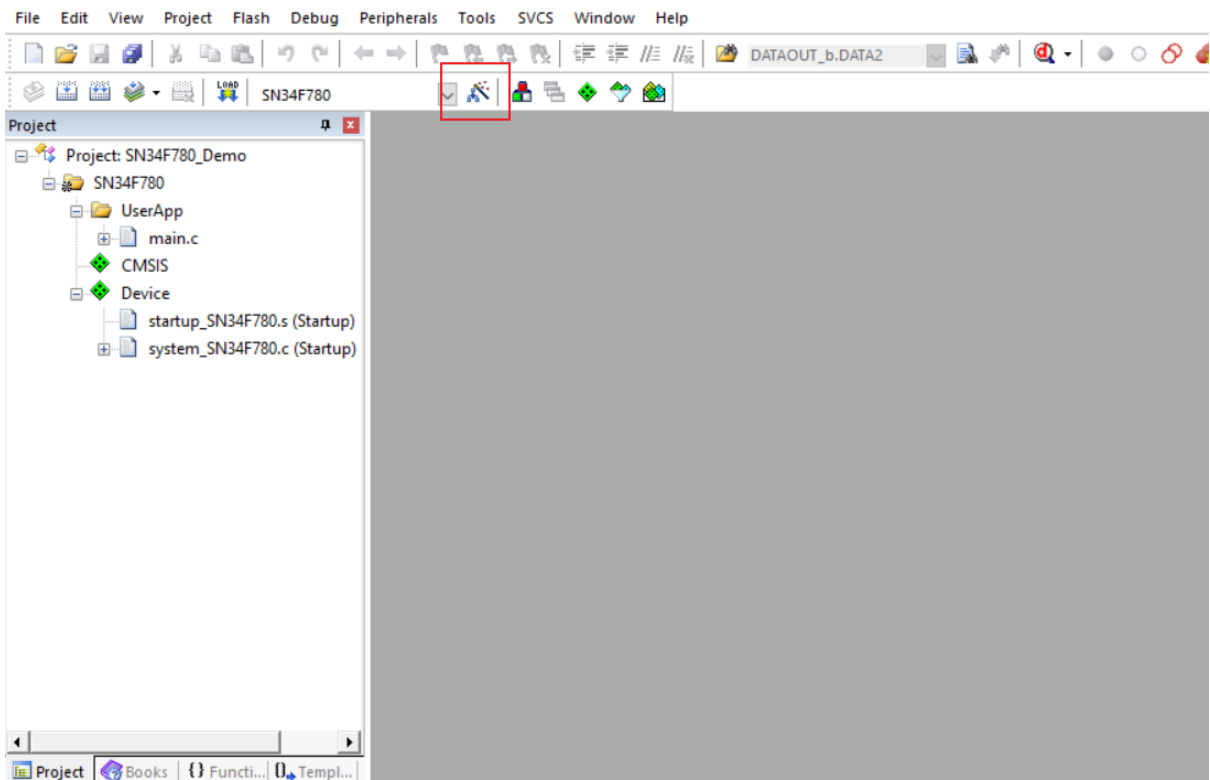
Manage Run-Time Environment

Software Component	Sel.	Variant	Version	Description
CMSIS	<input checked="" type="checkbox"/>			Cortex Microcontroller Software Interface Components
CORE	<input checked="" type="checkbox"/>		5.3.0	CMSIS-CORE for Cortex-M, SC000, SC300, ARMv8-M, ARMv8.1-M
DSP	<input type="checkbox"/>	Library	1.7.0	CMSIS-DSP Library for Cortex-M, SC000, and SC300
NN Lib	<input type="checkbox"/>		1.2.0	CMSIS-NN Neural Network Library
RTOS (API)	<input type="checkbox"/>		1.0.0	CMSIS-RTOS API for Cortex-M, SC000, and SC300
RTOS2 (API)	<input type="checkbox"/>		2.1.3	CMSIS-RTOS API for Cortex-M, SC000, and SC300
CMSIS Driver	<input type="checkbox"/>			Unified Device Drivers compliant to CMSIS-Driver Specifications
Compiler	<input type="checkbox"/>	ARM Compiler	1.6.0	Compiler Extensions for ARM Compiler 5 and ARM Compiler 6
Device	<input checked="" type="checkbox"/>			Startup, System Setup
Startup	<input checked="" type="checkbox"/>		1.0.0	System startup for SN34F780 Devices
File System	<input type="checkbox"/>	MDK-Plus	6.13.0	File Access on various storage devices
Graphics	<input type="checkbox"/>	MDK-Plus	5.50.0	User Interface on graphical LCD displays
Network	<input type="checkbox"/>	MDK-Plus	7.12.0	IPv4 Networking using Ethernet or Serial protocols
USB	<input type="checkbox"/>	MDK-Plus	6.13.7	USB Communication with various device classes

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

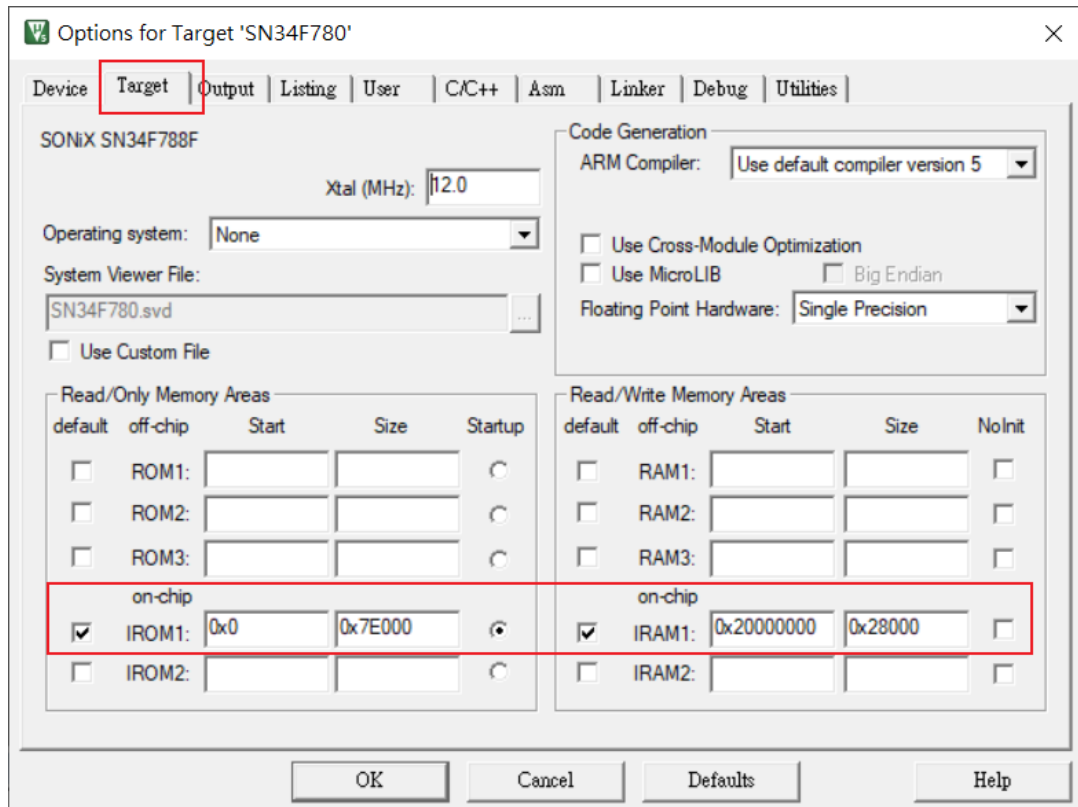


7. Press "Target Options".

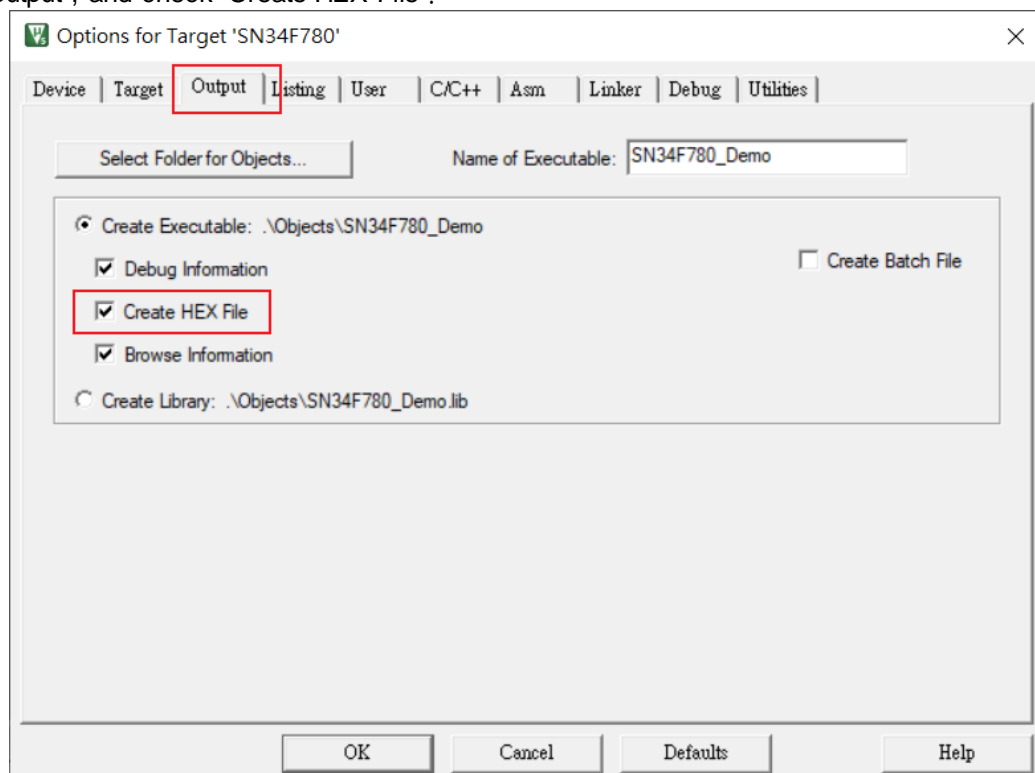


7.1 Press "Target", set the proper size of ROM and RAM correctly for each MCU type.

A. SN34F780 (ROM 504KB, RAM 160KB)

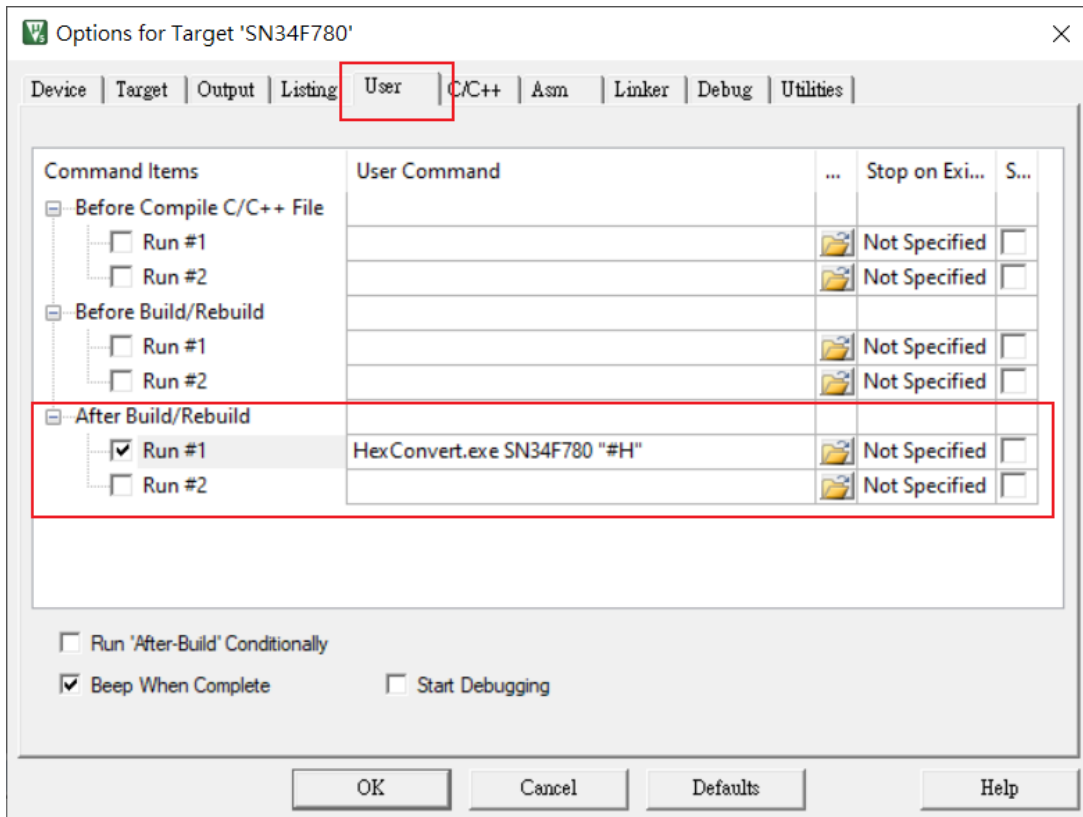


7.2 Press "Output", and check "Create HEX File".



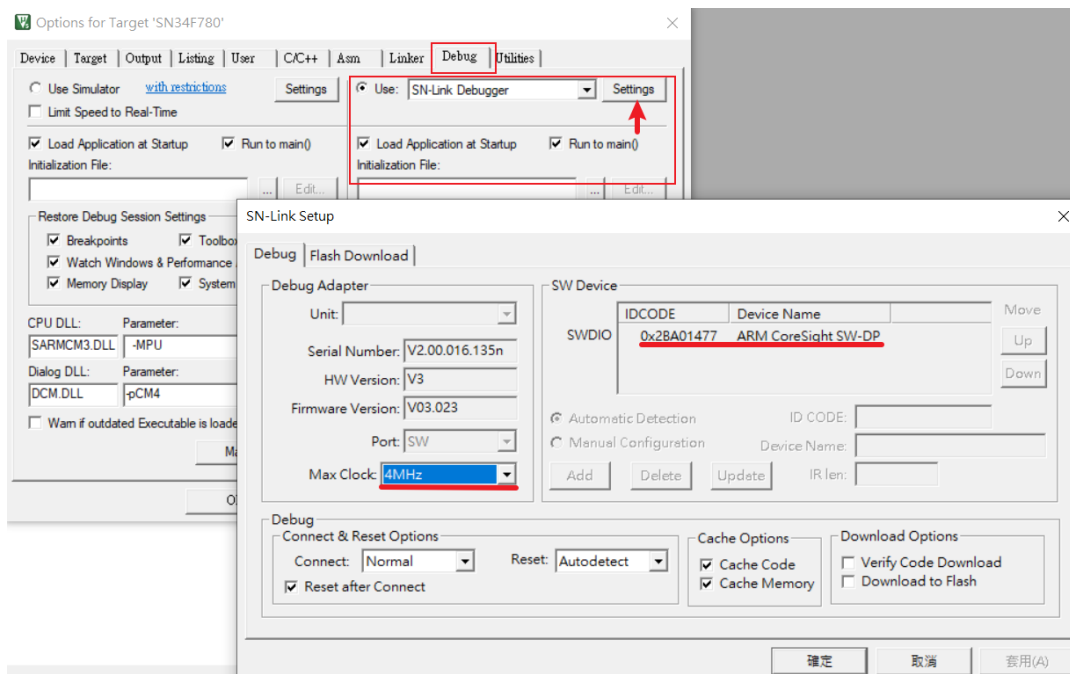
7.3 Press "User", check "Run #1:", and then fill in the command below for each MCU type.

SN34F780 → HexConvert.exe SN34F780 "#H"

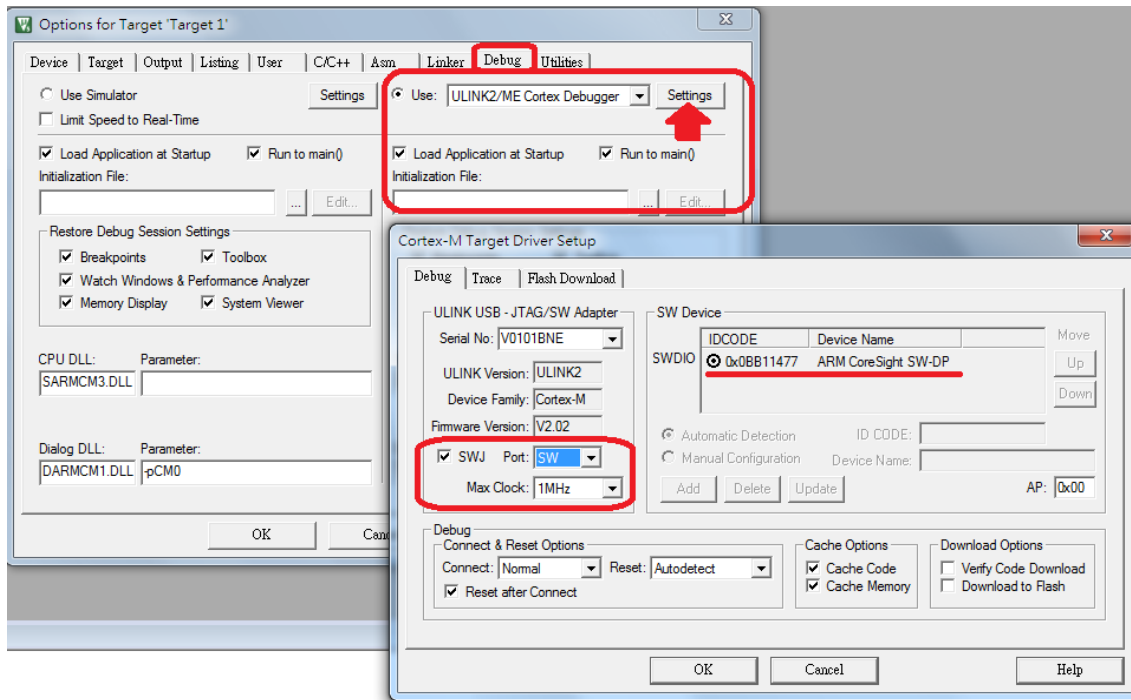


7.4 Press "Debug", and then press "Settings" to configure the ICE used. KEIL shall be able to get and the status of MCU if ICE is configured and connected correctly.

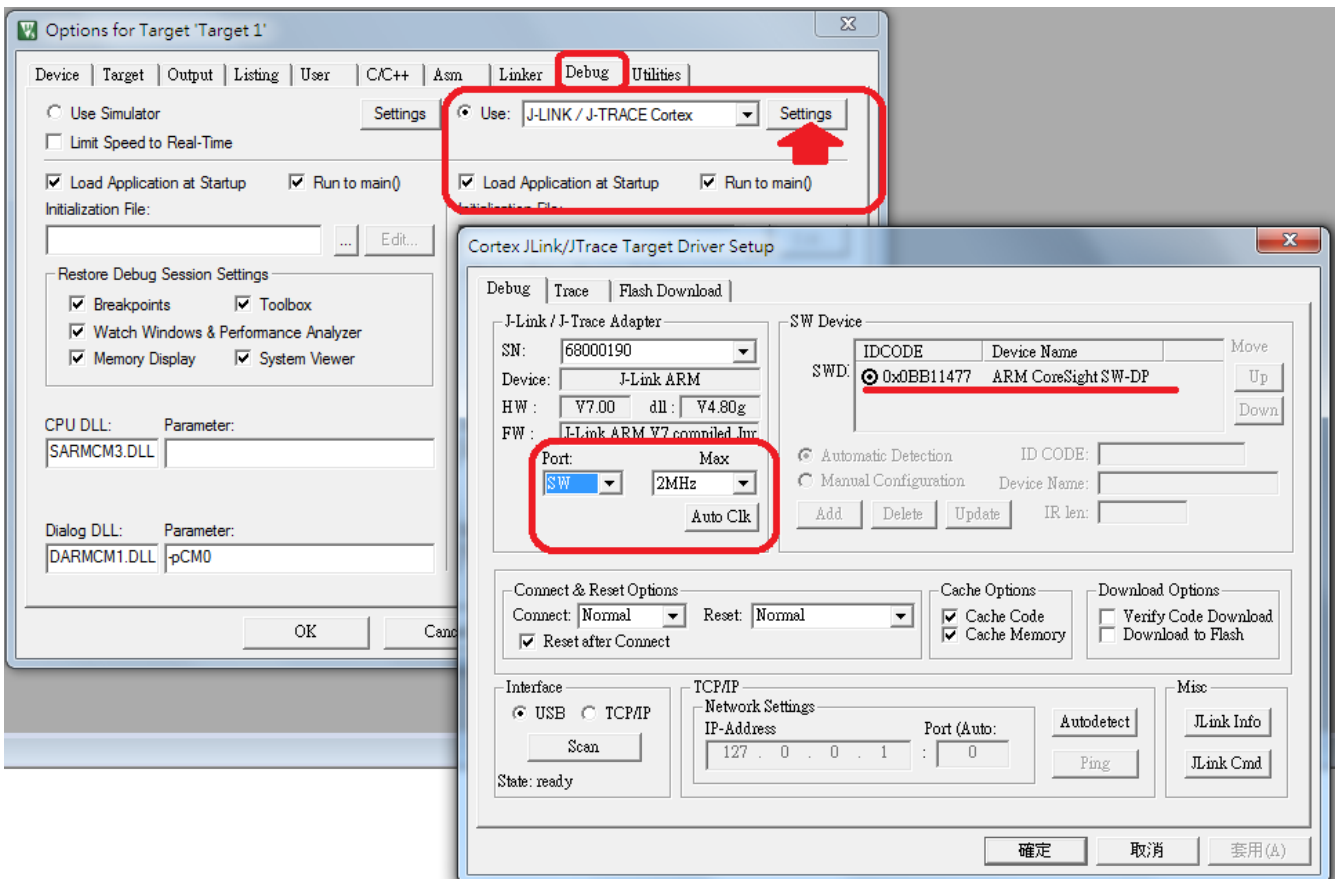
A. Use SN-LINK, setup the ICE speed (Max Clock)



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

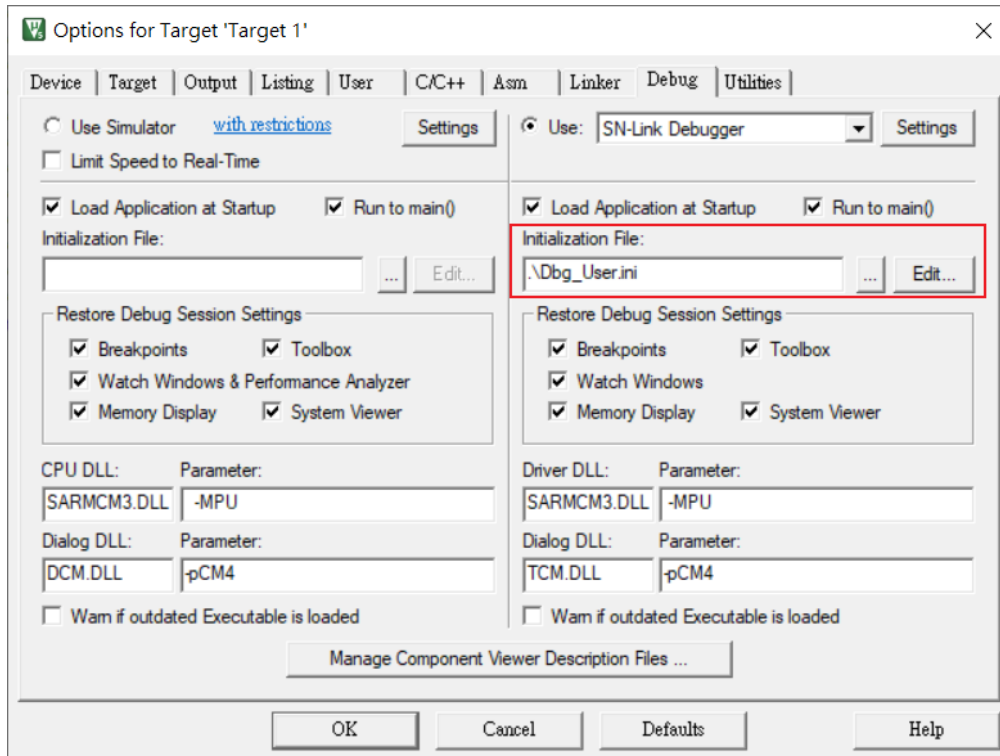


C. Use J-LINK, set Port as "SW", and setup the ICE speed (Max)

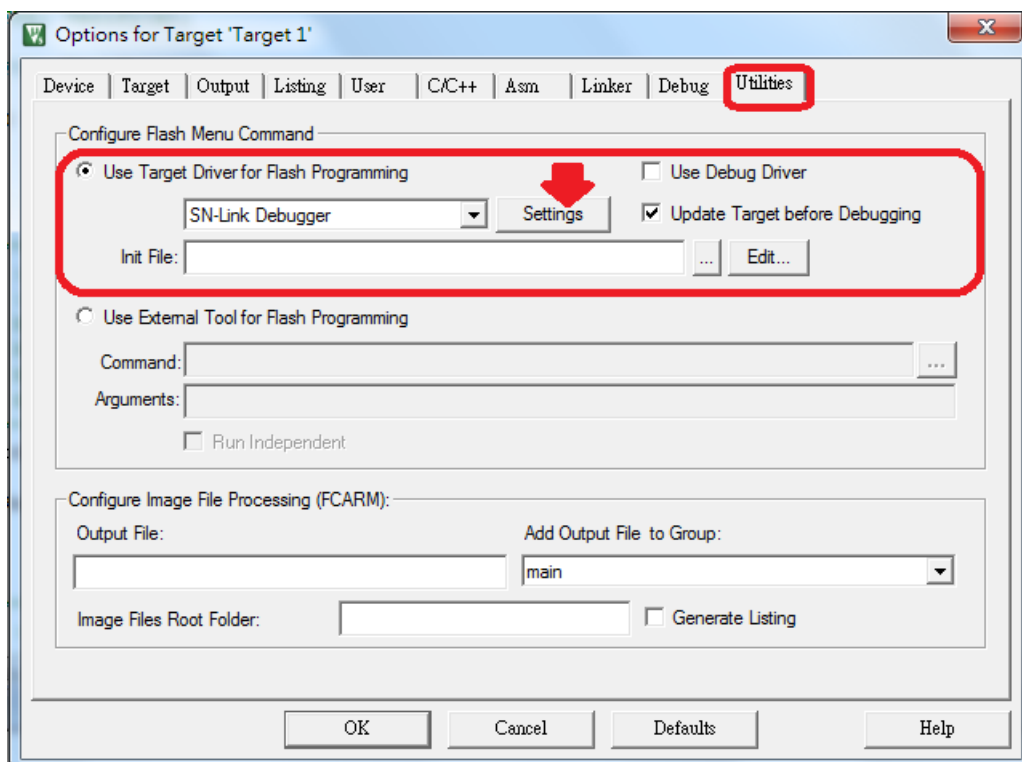


D. If other ICE is used, please refer to its user guide.

7.5 Press "Debug" and then "Edit..." to load the initialization file "Dbg_User.ini". Keil can use this file to remap the shadow memory to the user code area to avoid debugging errors when the CPU is running in Boot ROM.

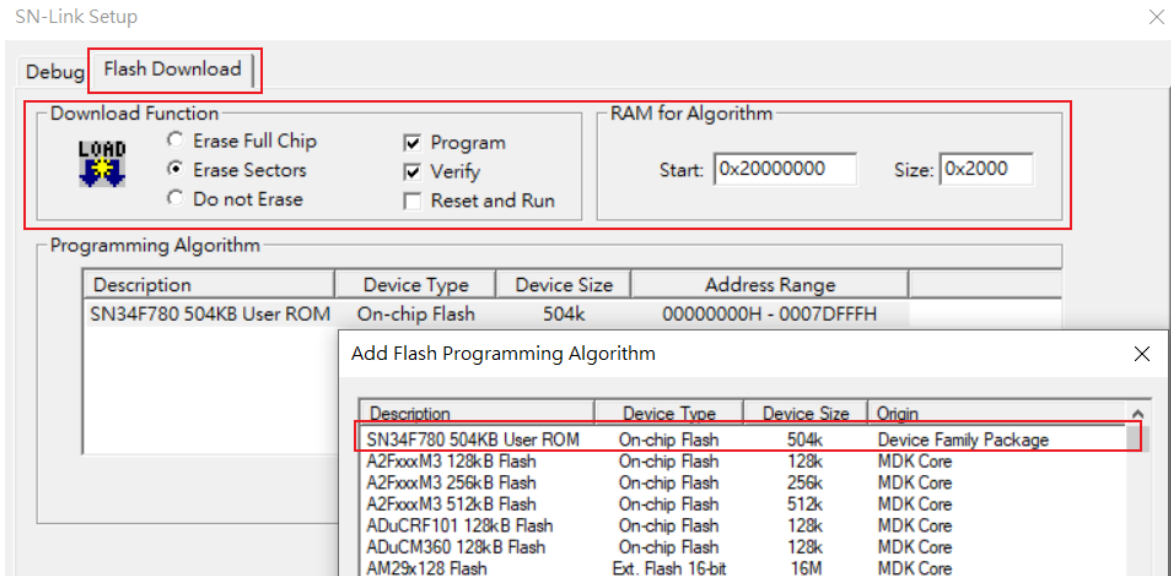


7.6 Press "Utility", select the used ICE, and then press "Settings".



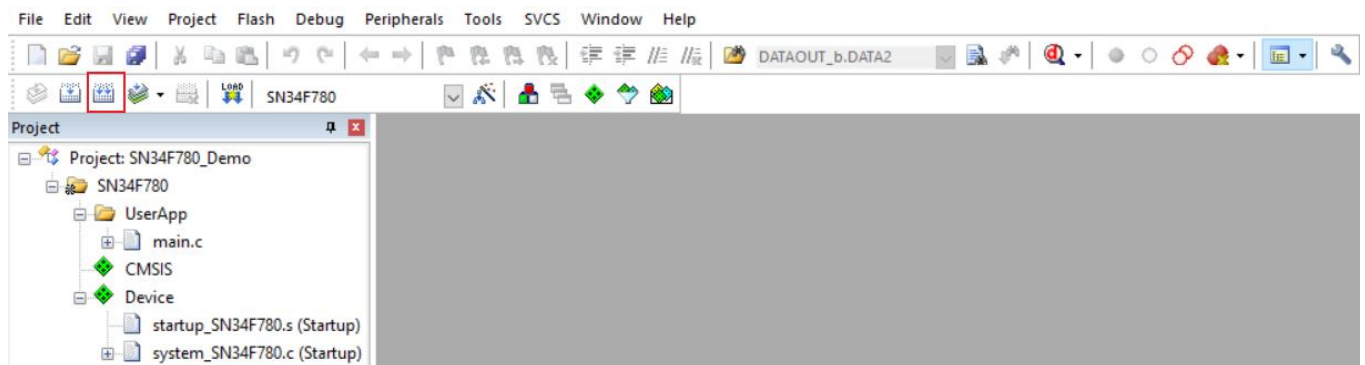
* **Note: Please do NOT select "Use Debug Driver".**

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

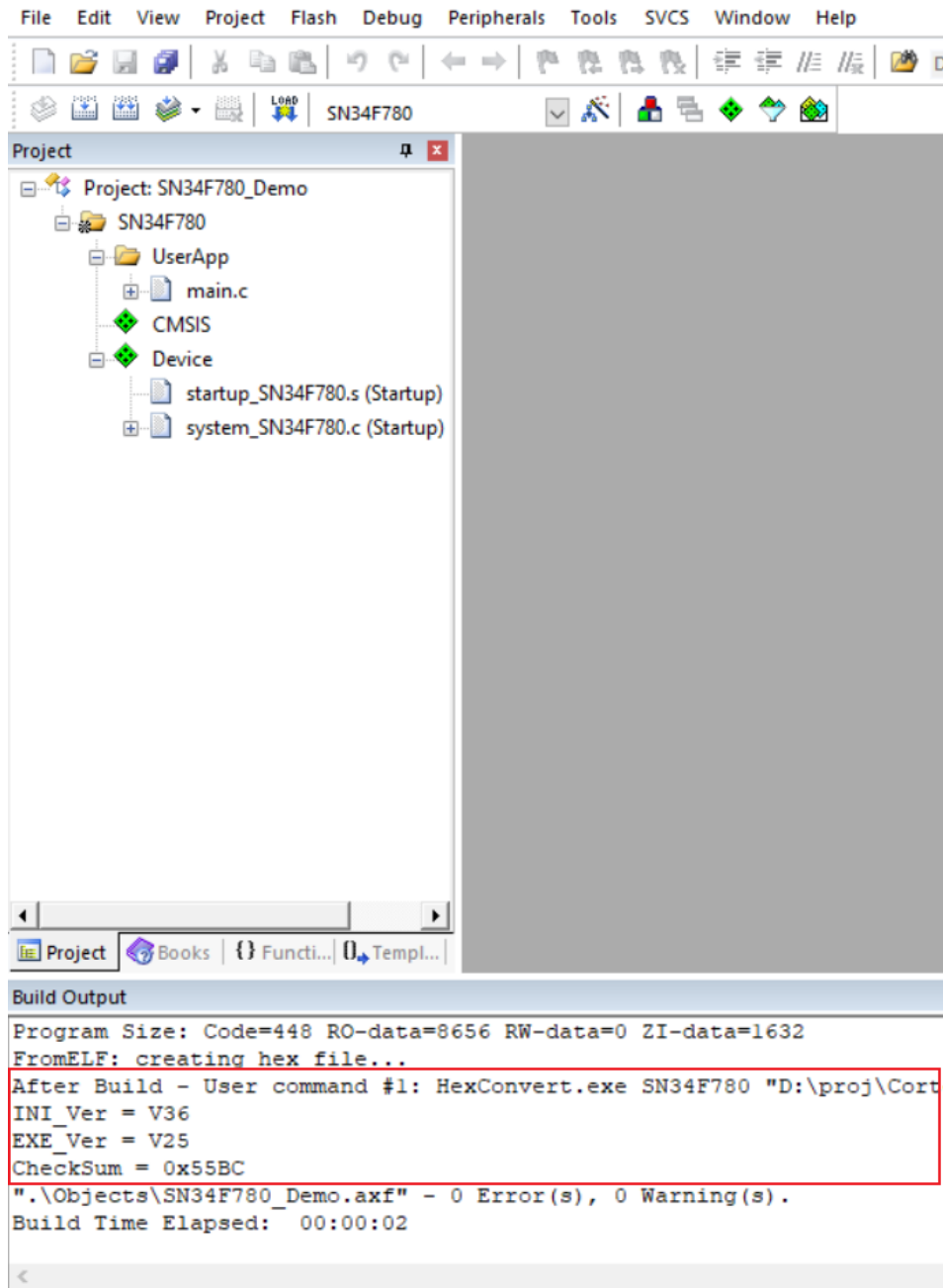


* **Note:** Click "Add" → "SN34F780 504KB User ROM" shall be seen in the pop window. If "SN34F780 504KB User ROM" can NOT be found, please make sure the step 3 of [3.1 Build a New Project](#) is completed.

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.

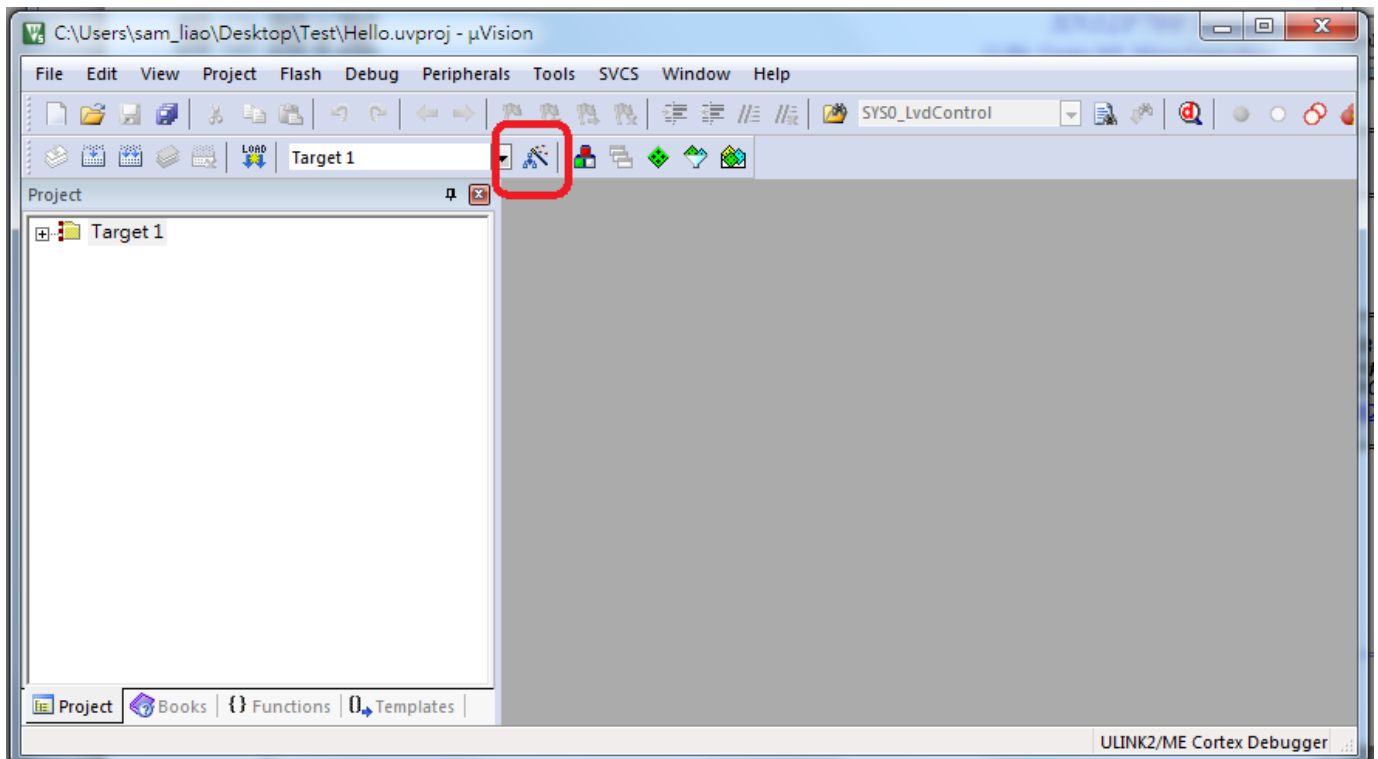


3.2 Use SONiX Sample Code

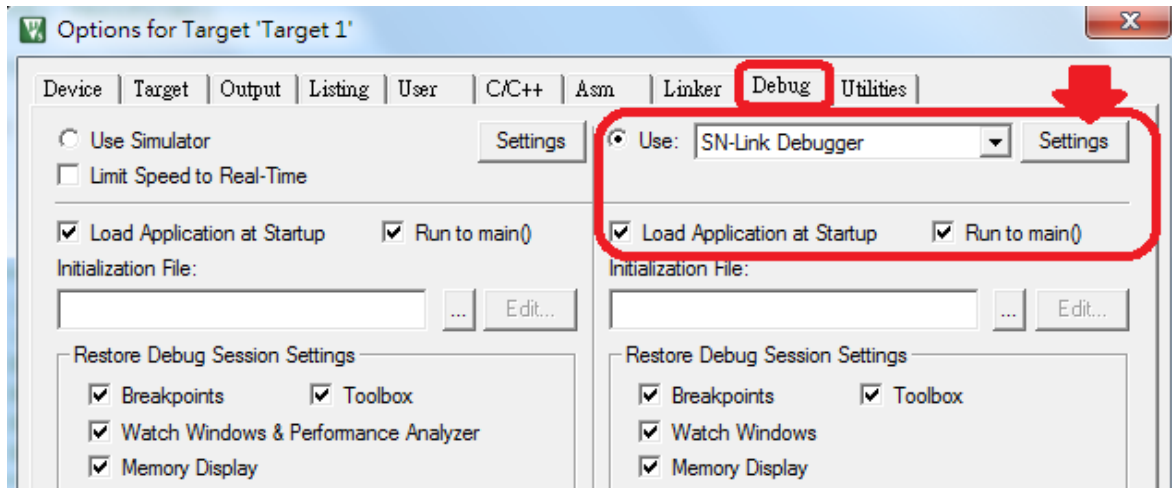
1. Open any project of SN34F780 Firmware Library with MRK-ARM, and then select the desired target MCU.



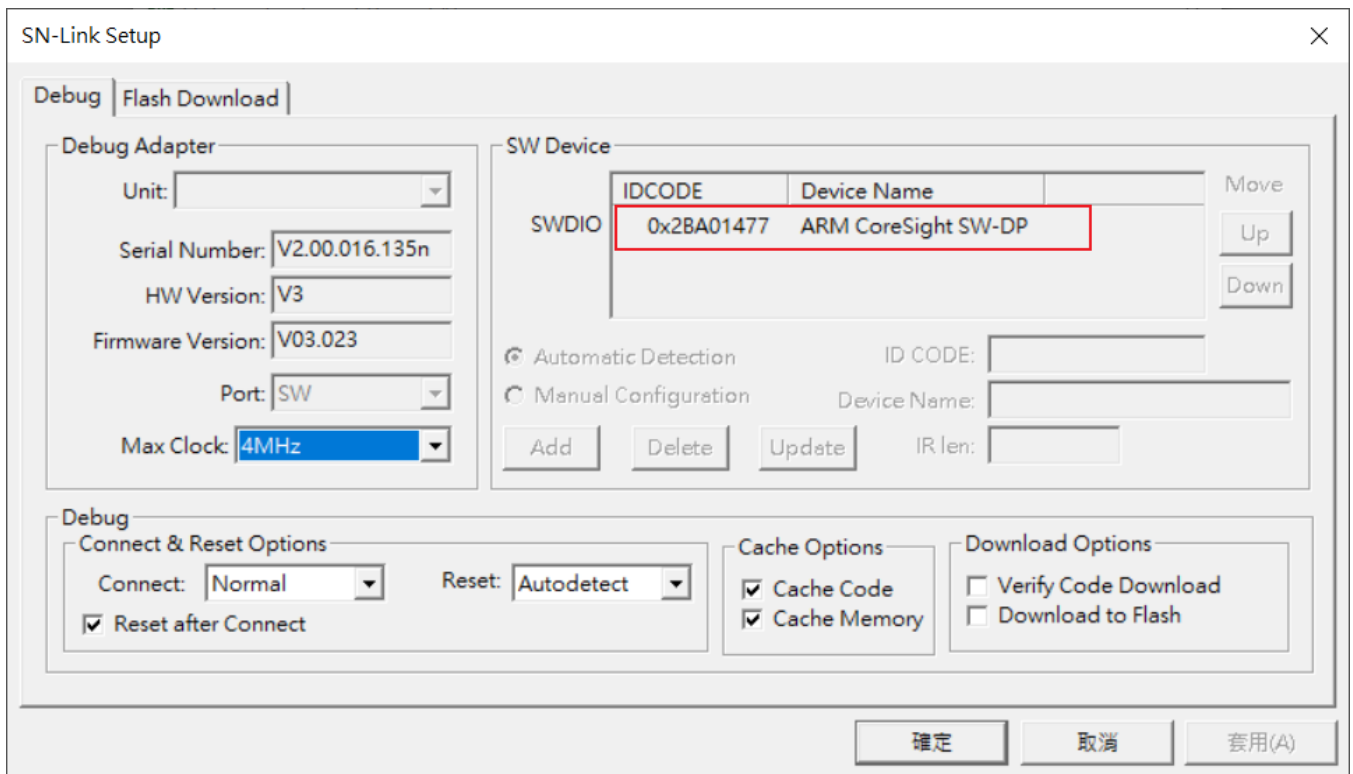
2. Press "Target Options"



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

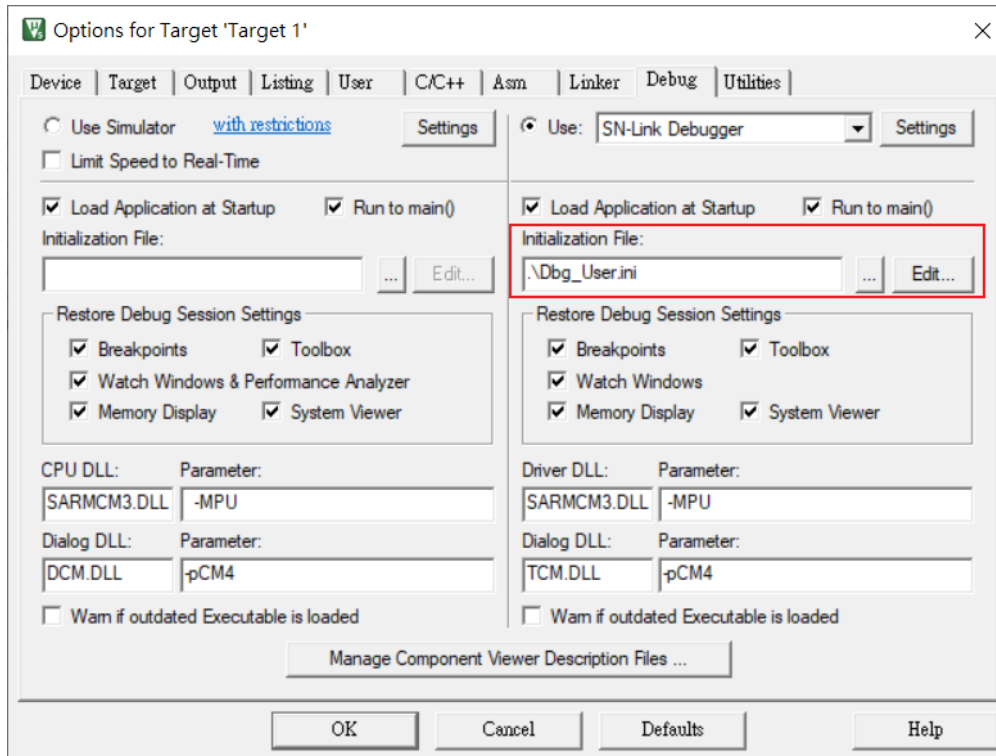


- Enter Setup page, KEIL shall be able to get and the status of MCU if ICE is connected correctly.

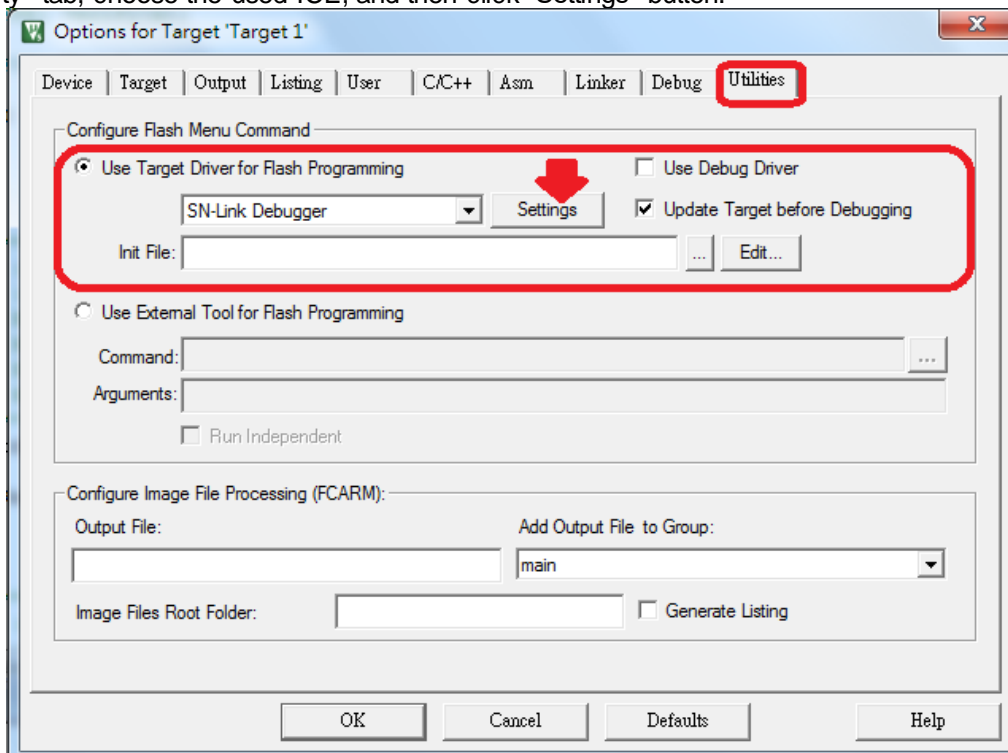


* **Note:** If the used ICE is NOT SN-LINK, please refer to the step 7.4 of [3.1 Build a New Project](#).

- Press "Debug" and then "Edit..." to load the initialization file "Dbg_User.ini". Keil can use this file to remap the shadow memory to the user code area to avoid debugging errors when the CPU is running in Boot ROM.

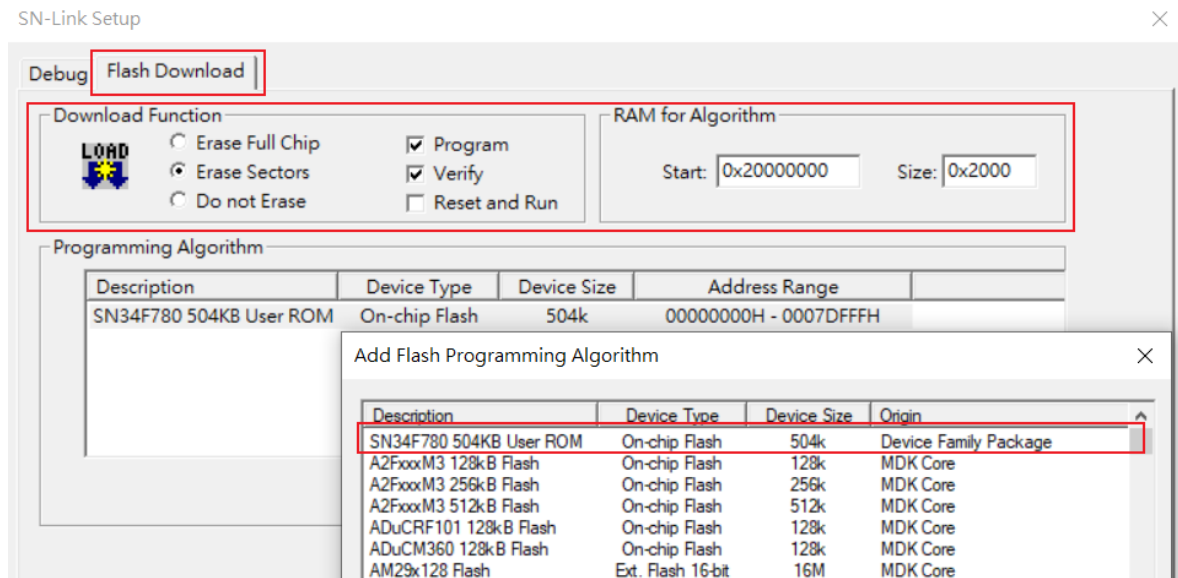


- Press "Utility" tab, choose the used ICE, and then click "Settings" button.



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

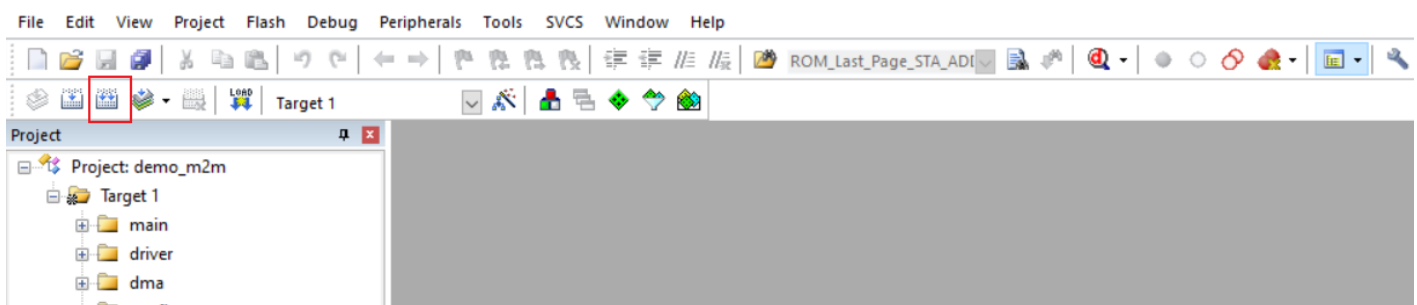
7. The following setting shall be seen.



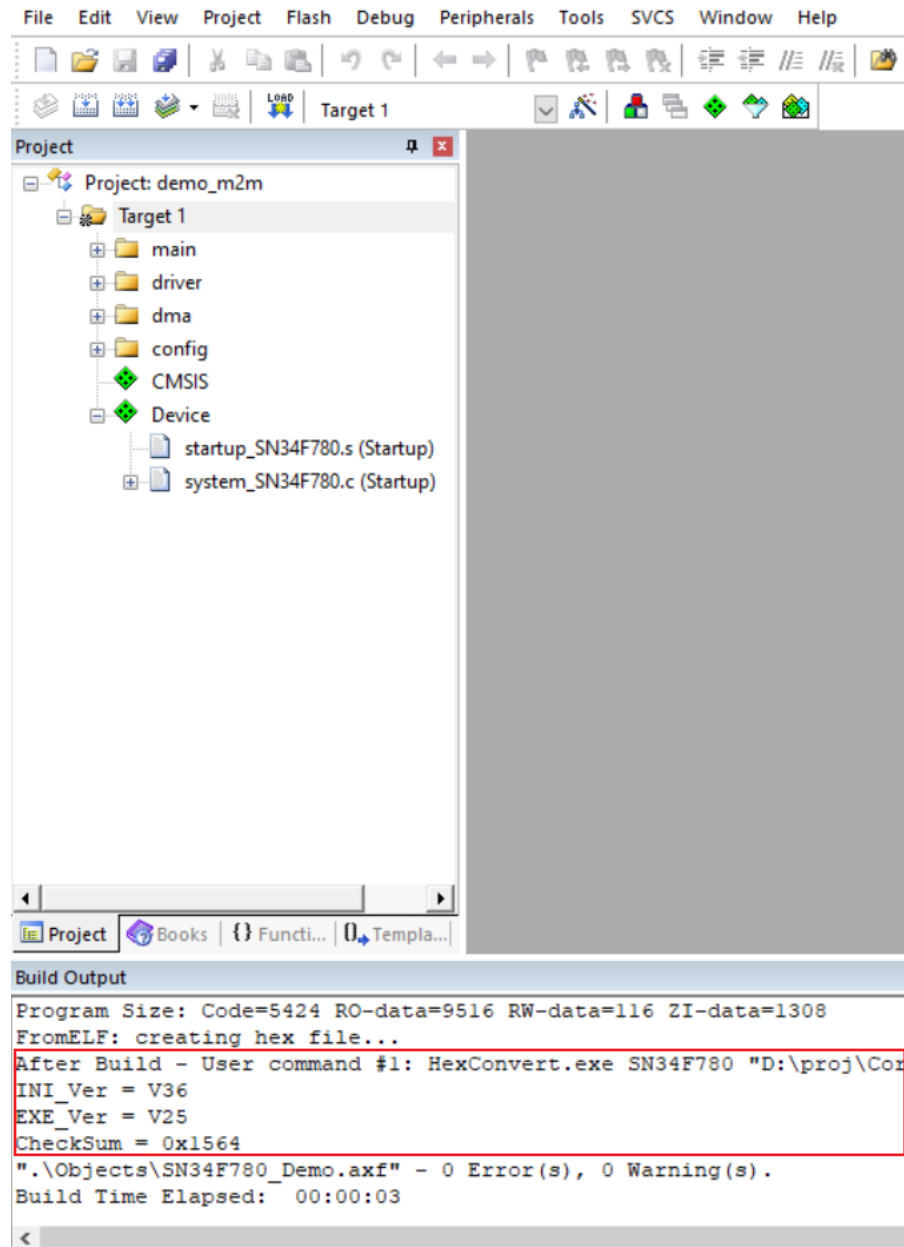
* **Note:** Click "Add" → "SN34F780 504KB User ROM" shall be seen in the pop window. If "SN34F780 504KB User ROM" can NOT be found, please make sure the step 3 of [3.1 Build a New Project](#) is completed.

8. Please click "OK" to exit "Target Options".

9. Click the "Rebuild" button as below, Keil MDK will start to compile.

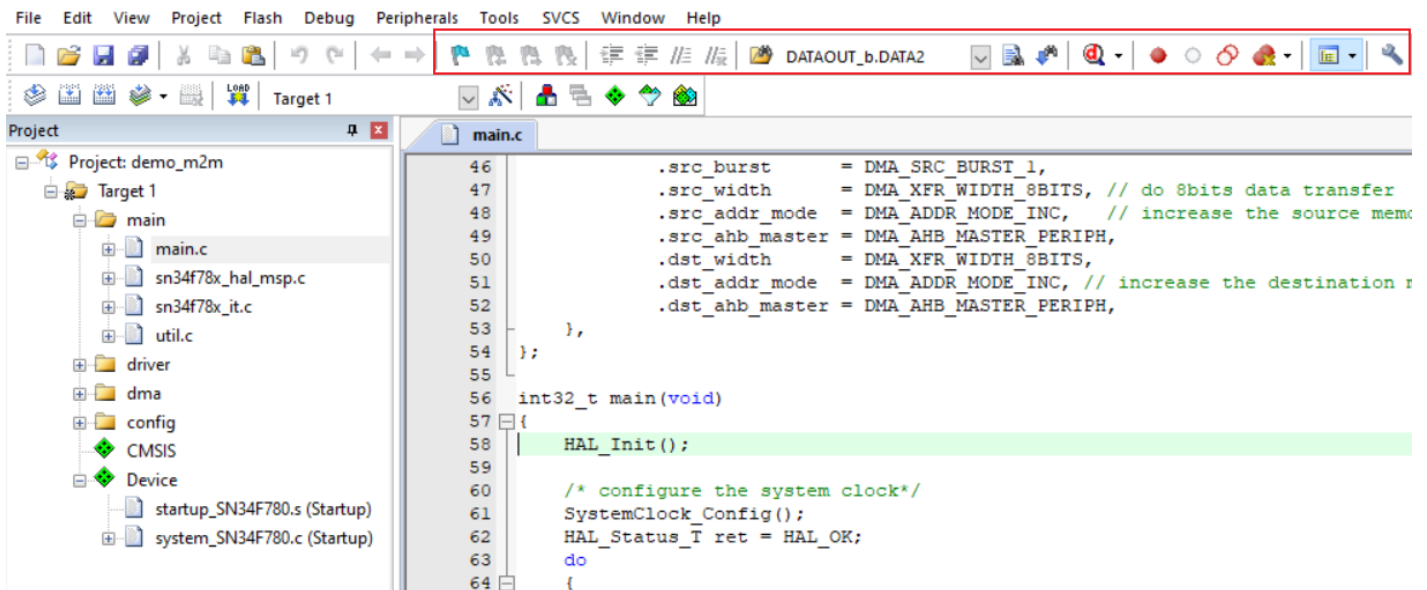


10. After compiling, the version of HexConverter and the calculated Checksum will be showed in the message box.

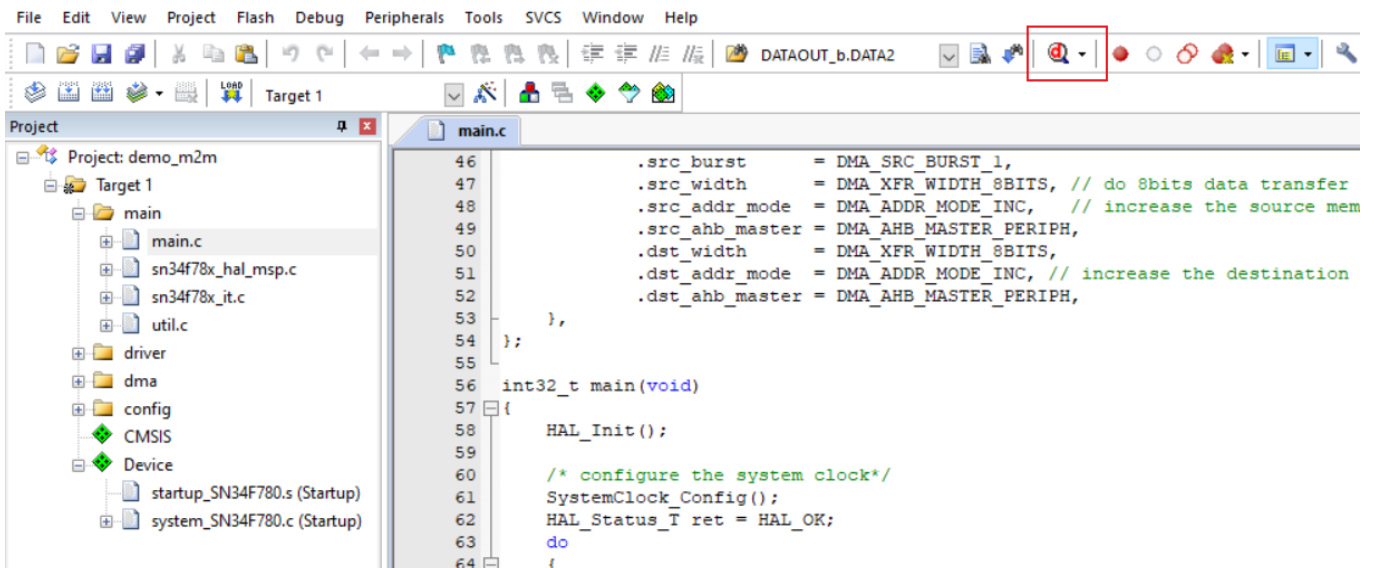


3.3 Debug

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



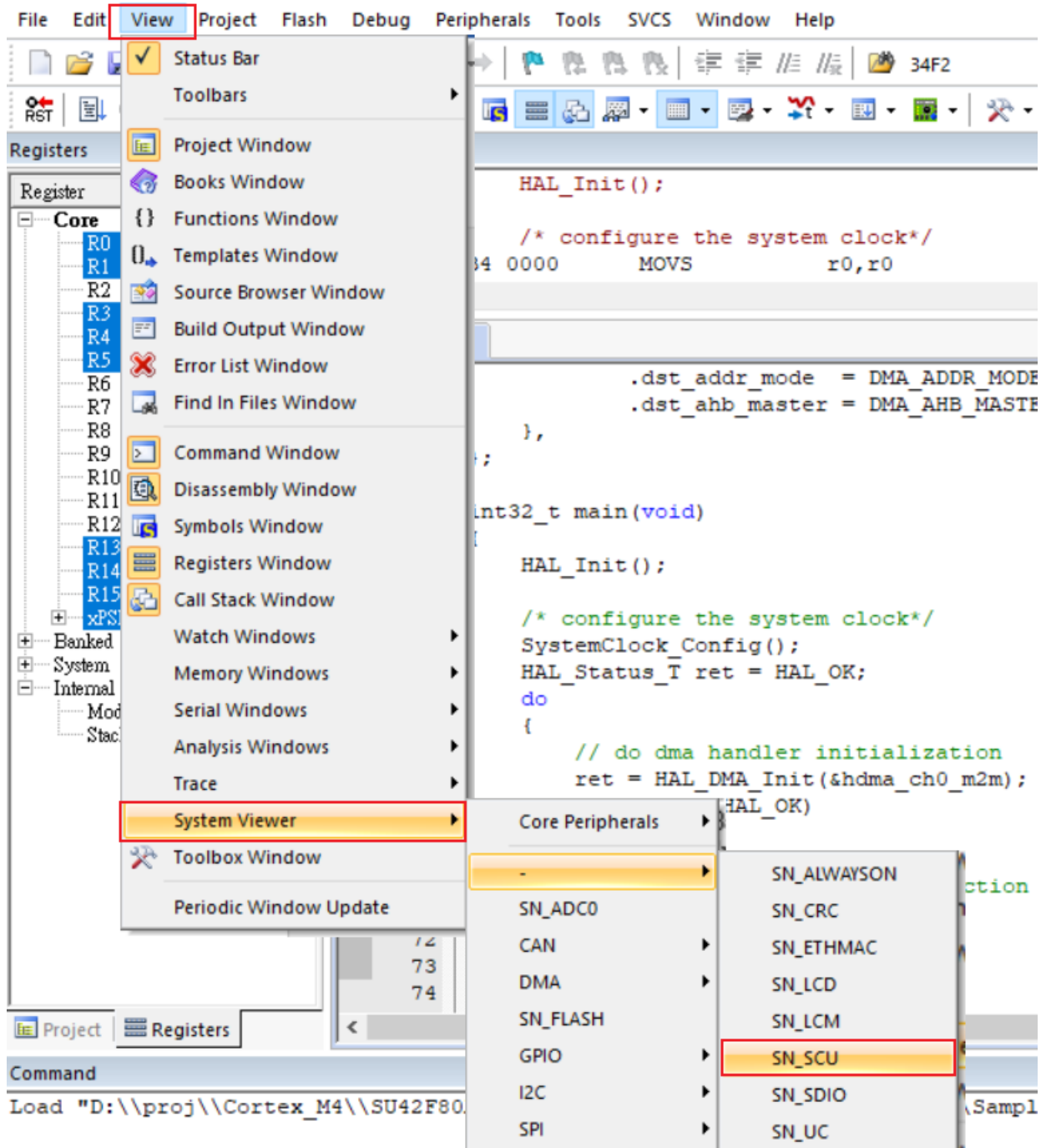
Click the button (“Start/Stop Debug Session”) below to start debugging.



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_SCU as example, we can see the following messages in KEIL debug window.

SN_SCU	
Property	Value
BTUP_STS	0x00008000
GPIO_HOLD	0: Release = GPIO was controlled by
EXTRSTF	0: No = No External reset occurred
WDTRSTF	0: No = No Watchdog reset occurred
DPDWKF	0: No = No wakeup from DPD mode
LVDRSTF	0: No = No LVD reset occurred
SWRSTF	1: Occurred = Software reset occurred
RTCWKF	0: 0x0 = No wakeup by RTC alarm
P0WKF	0: 0x0 = No wakeup by GPIO0 intern
P1WKF	0: 0x0 = No wakeup by GPIO1 intern
P2WKF	0: 0x0 = No wakeup by GPIO2 intern
P3WKF	0: 0x0 = No wakeup by GPIO3 intern
USBDWKF	0: 0x0 = No wakeup by USB Device r
ETHWKF	0: 0x0 = No wakeup by Ethernet wak
USBHWKF	0: 0x0 = No wakeup by USB Host rec
BTUP_CTRL	0x01FE0000
CHIPID	0x00004280
VERSION	0x00030100
PWRMODE	0x01000000
RIS	0x00000800
IE	0
PERRSTCTL	0x0000000F
PLLCTRL	0x40000300
PPLEN	0: Disable = Disable PLL
PLLSTABLE	0: Not stable = PLL is not stable

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