BlueX Microelectronics Co., Ltd.

Bluetooth 5.0 **LE | MESH** SoC

System Installation of Evaluation Kit

BX2400-dRF0xp-S1x

BX2400-eRF01e-G1x

Version 1.7

Aug. 11th, 2021 released

http://www.bluexmicro.com

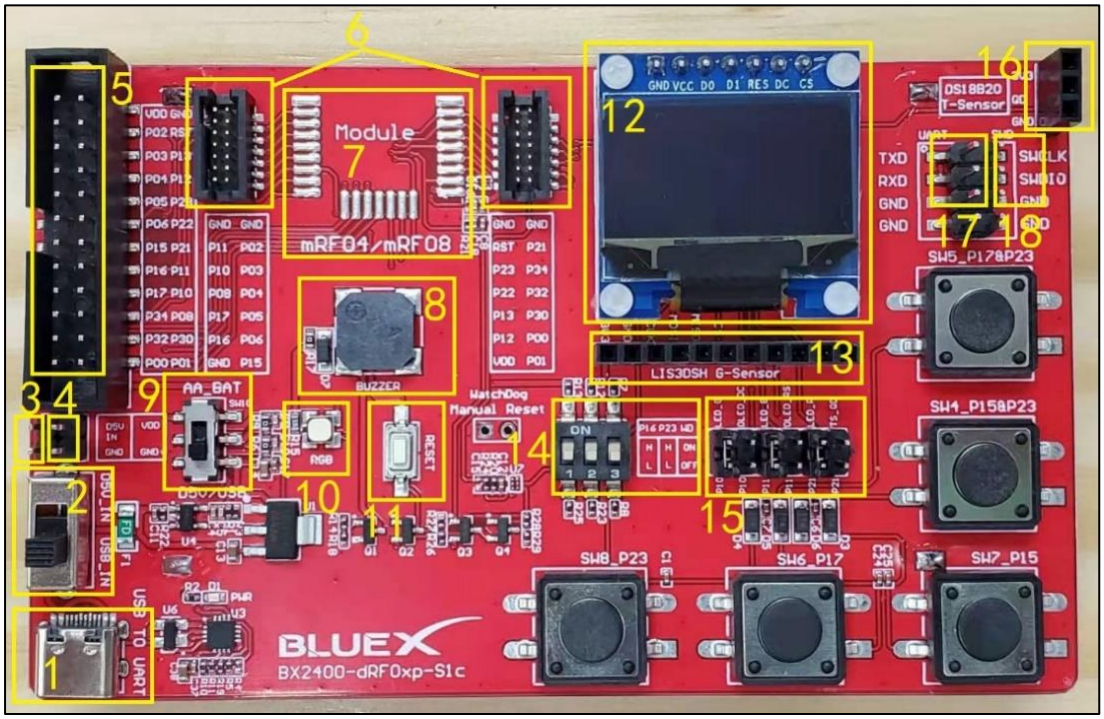
Contents

1. Evaluation Kit Introduciton

In this section, we'll introduce the function and usage of each EVK, and diagram attached at the end of each paragraph.

1.1 EVK of BX2400-dRF0xp-S1c

This EVK is applicable to all BlueX BLE chips except RF01. Items (1) to (18) will be introduced as below.



(1) USB Type C Connector

A. USB 5V power input.

B. It provides USB to convert to UART, and links to UART(P12/ P13) connector on module.

(2) Primary Power Switch

Please compare with #9, secondary power switch. Status listed as below:

#2 Switch	#9 Switch	EVK Power	Module Voltage
Up	Up	2ea AA batteries	3.0V
Down	Up	2ea AA batteries	3.0V
Up	Down	DC 5V from #3	4.2V
Down	Down	DC 5V from USB	4.2V

According to operating voltage ranging from 2.3V to 3.6V, please be noticed it can only be using 2ea AA batteries when BX2416 module on EVK.

(3) D5V External Power Connector

A. External power input port, DC 5V.

(4) RF0x Module Power Connector

A. Module power output connector, available for outputting power for external circuit.

B. When EVK using USB power or D5V, here it outputs 4.2V.

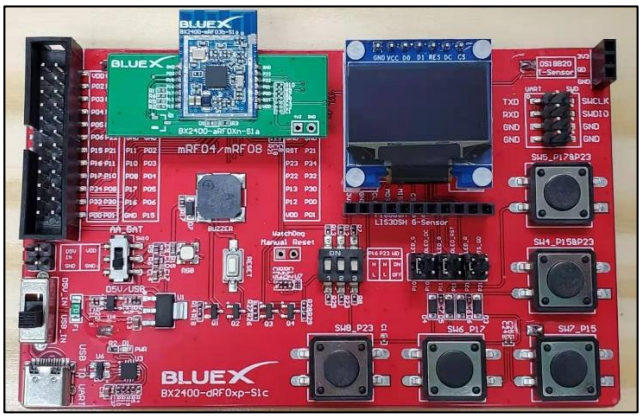
C. When EVK using 2ea AA batteries, here it outputs from batteries.

(5) IO Expanding Connector

A. RF0x Module IO and power expanding connector.

(6) Module Adapter Board

A. When BX2416/ RF03/ RF04/ RF08 modules welded on adapter board, plug in here on the EVK as below:



(7) RF04/ RF08 Module Welded Area

A. RF04/ RF08 Module can be welded here on the EVK.

(8) Buzzer

(9) Secondary Power Switch

Please refer to #2, primary power switch, for comparison.

(10) RGB LED

(11) RF0x Module Reset Button

A. Press this button to reset chip on module.

(12) OLED Display Screen

(13) LIS3DSH Acceleration Transducer Connector

(14) P16/ P23/ Watchdog DIP Switch

#14 Switch			Description
Left	P16	Up	BOOT Pin of chip. Chip activated from UART0 P12(TX)/ P13(RX) for firmware download.
		Down	Chip activated from Flash.
Mid	P23	Down	When using chips RF08 on module, switch this down before power-on.
Right	Watchdog	Up	Watchdog timeout period is around 25sec, and module will reset afterwards.
		Down	Switch down when no using it. If there's no Watchdog IC welded on EVK, no need to concern this switch.

(15) Circuit Connector (P10/ P11/ P21)

A. P10 for RGB LED green, or DC pin from OLED display screen.

B. P11 for RGB LED blue, or RST pin from OLED display screen.

C. P21 for RGB LED red, or QD pin from humidity sensors.

(16) DS18B20 Humidity Sensors Connector

(17) UART Connector

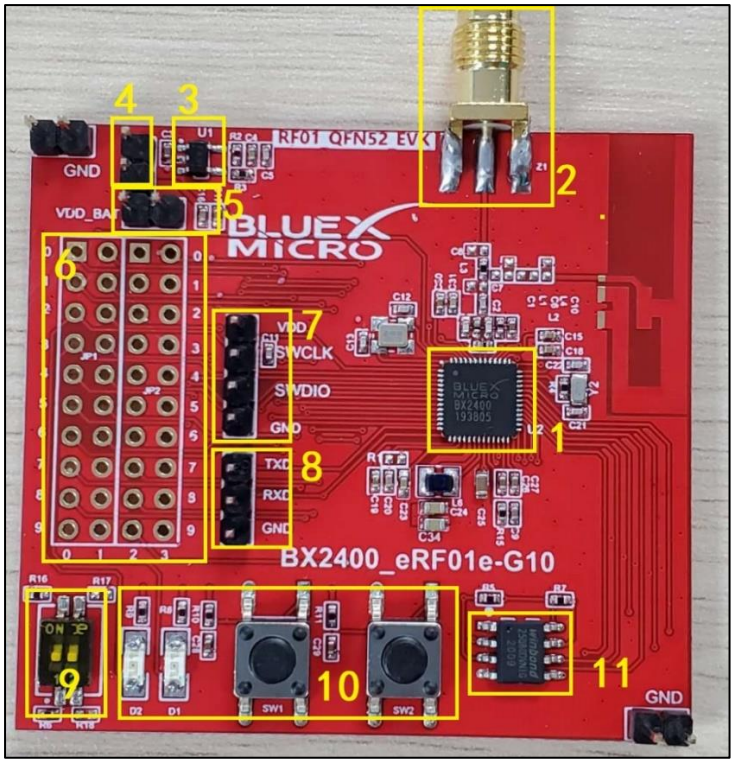
A. Connect to RF0x UART P12/ P13 connector.

(18) SWD Connector

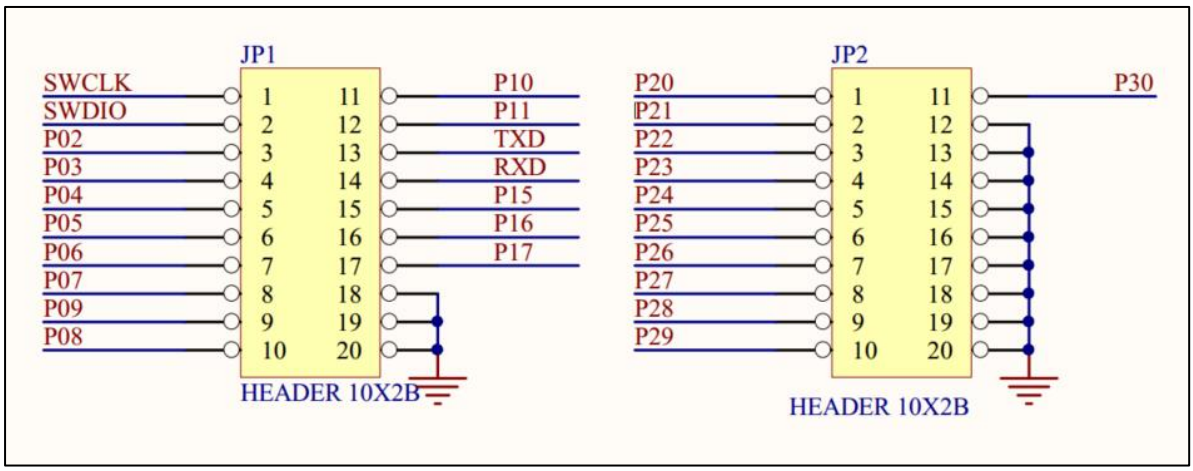
A. J-Link SWD debugging connector for RF0x module programming and softeare debugging.

1.2 EVK of BX2400-eRF01e-G10

This EVK is applicable to RF01. Items (1) to (11) will be introduced as below.



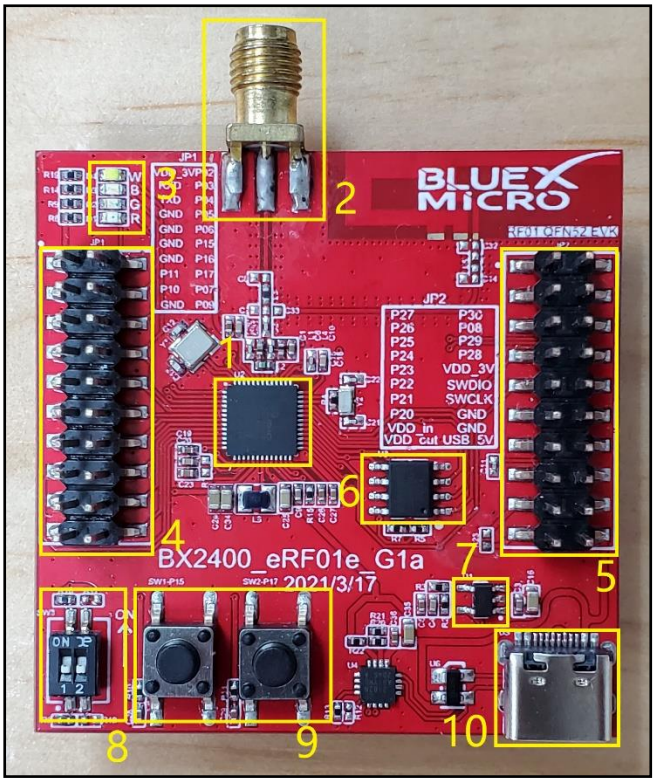
(1) RF01, QFN52, 6*6mm
(2) External Antenna Mount
(3) Power Supply 3.3V LDO
(4) Jumper Terminal
   A. Separate VDD_BAT and LDO. If unplugged, VDD_BAT and 3.3V LDO are disconnected, using for checking overall power consumption current.
(5) Battery Terminal
   A. VDD_BAT on the left, GND on the right.
   B. Should be in alliance with items#4. When connected #4, battery supplies RF01 through LDO. When not connected, battery supplies RF01 directly.
(6) IO External Connector: pinout as below



(7) SWD Debugging Connector
   A. P00-SWCLK, P01-SWDIO
(8) UART Serial Connector
   A. P12-TXD, P13-RXD
(9) P16/P23 DIP Switch
   A. P16 on the left, P23 on the right.
   B. Same as EVK of BX2400-dRF0xp-S1a. Please refer to #14 in paragraph 1.1 above.
(10) Button and LED
   A. KEY-P15/P17, LED-P02/P03. No special default and it's configuarable for user.
(11) SPI Flash IC
   A. CS#-P24, DO-P27, WP#-P28, HOLD#-P29, CLK-P25, DI-P26.

1.3 EVK of BX2400-eRF01e-G1a

This EVK is applicable to RF01. Items (1) to (10) will be introduced as below.

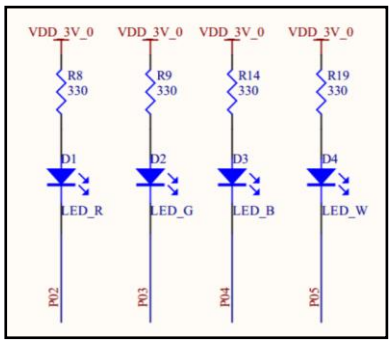


(1) RF01, QFN52, 6*6mm

(2) External Antenna Mount

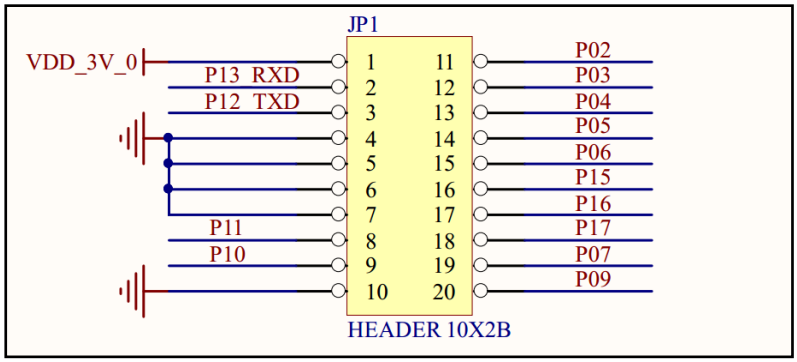
(3) RGBW LED

A. IO connect as below:



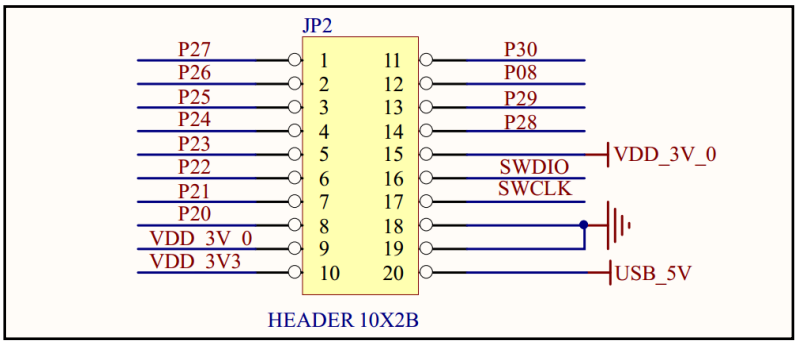
(4) IO External Connector

A. Pinout as below



B. VDD_3V_0 means 3.3V LDO output, power supply for RF01 VDD_BAT/1/2 PIN.

(5) Power, IO, and SWD connect as below:



A. Pin#15 and Pin#16 are RF01 SWD interface, using for debug and FW download.

(6) SPI Flash

A. CS#-P24, DO-P27, WP#-P28, HOLD#-P29, CLK-P25, DI-P26.

(7) Power Supply 3.3V LDO.

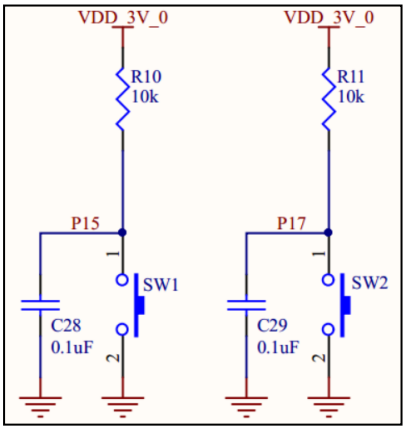
(8) P16/P23 DIP Switch

A. P16 on the left, P23 on the right.

B. Same as EVK of BX2400-dRF0xp-S1a. Please refer to #14 in paragraph 1.1 above.

(9) Button

A. IO connect as below:



(10) Type-C USB Connector

A. USB 5V power input.

B. It provides USB to convert to UART, and links to UART(P12/ P13) connector on module.

1.4 IO Introduction

(1) IO
   A. P00 to P29 are digital IO, available for GPIO.
   B. P30 to P35 are analog input, not available for GPIO.
   C. P00 and P01 are linked to SWCLK and SWDIP of J-Linkrespectively.

(2) UART
   A. P12 and P13 are TX and RX of UARTO respectively.

(3) SPI
   A. Supports SPI 2 channels at the most, and pins of SPIM and SPIS are fixed when processing.
   B. SPIM0 uses P02(CS1), P03(CS0), P04(CLK), P05(MISO), and P06(MOSI).
   C. SPIM1 uses P07(CS1), P08(CS0), P09(CLK), P10(MISO), and P11(MOSI).
   D. SPIS uses P03(CS), P04(CLK), P05(MISO), and P06(MOSI).

(4) I^2C
   A. Equipped with I^2C 2 channels, configuration available from P02 to P23.

(5) PWM
   A. Supports PWM 5 channels at the most, configuration available from P02 to P23.

(6) ADC
   A. Supports 6 channels of ADC data acquisition at the most. Independant analog IO of each(P30 to P35).

(7) External Interrupt
   A. P15, P16, P17, P22, and P23 are external interrupt pins to support wake-up from sleep mode.

2. Tools Download

Please download the version of Keil 5.0 and J-Link 6.3 at least.

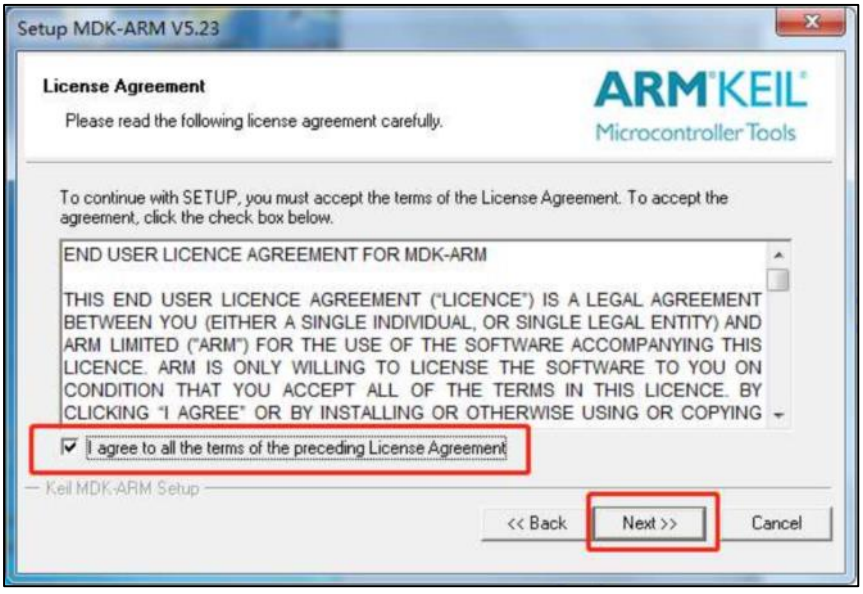
3. Tools Installation

3.1 Keil Installation

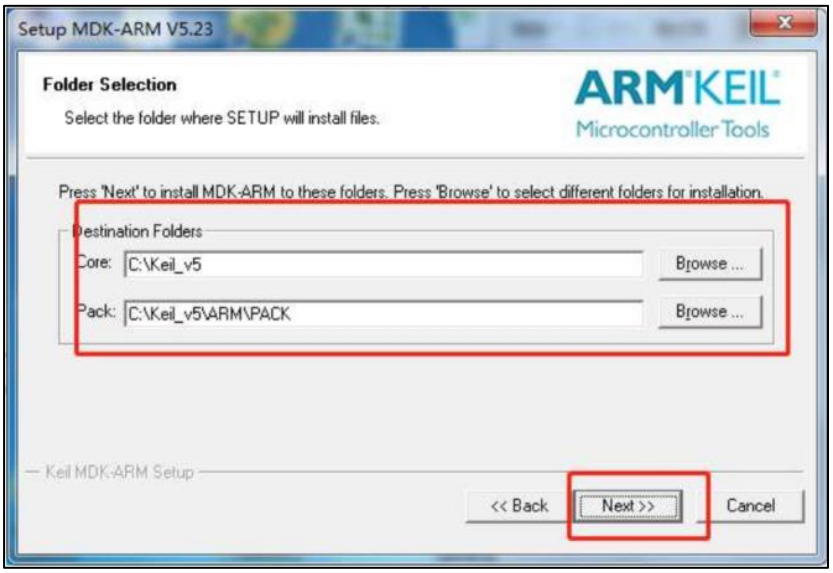
(1) Click the installation.

(2) Click [Next].

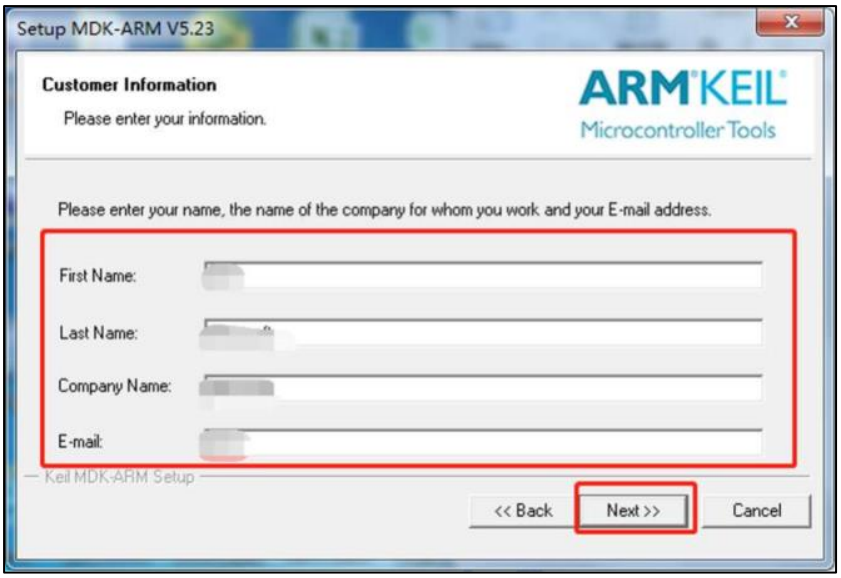
(3) Check [I agree all the terms of the preceding License Agreement], then click [Next].



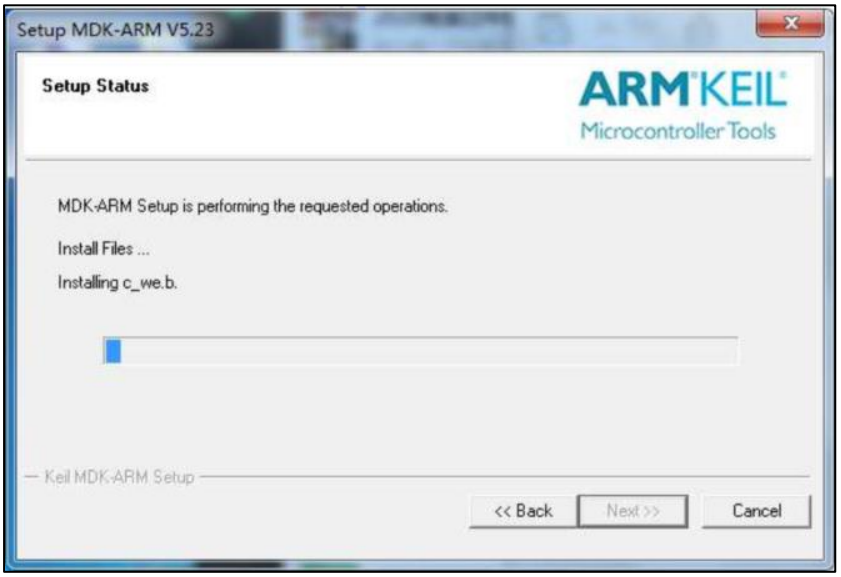
(4) Select the destination and click [Next].



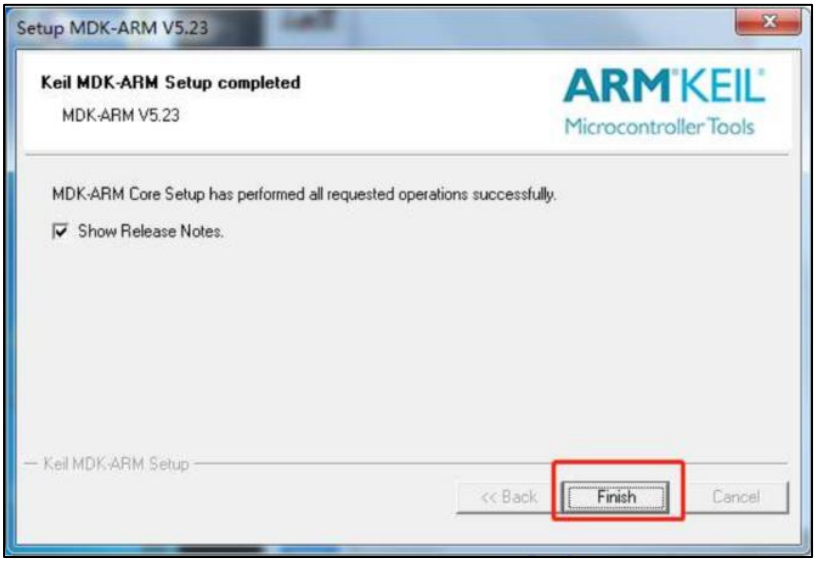
(5) Fill in information and click [Next].



(6) Wait for installing.

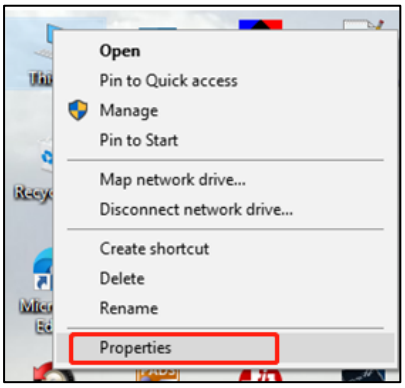


(7) Click [Finish] when it completes.

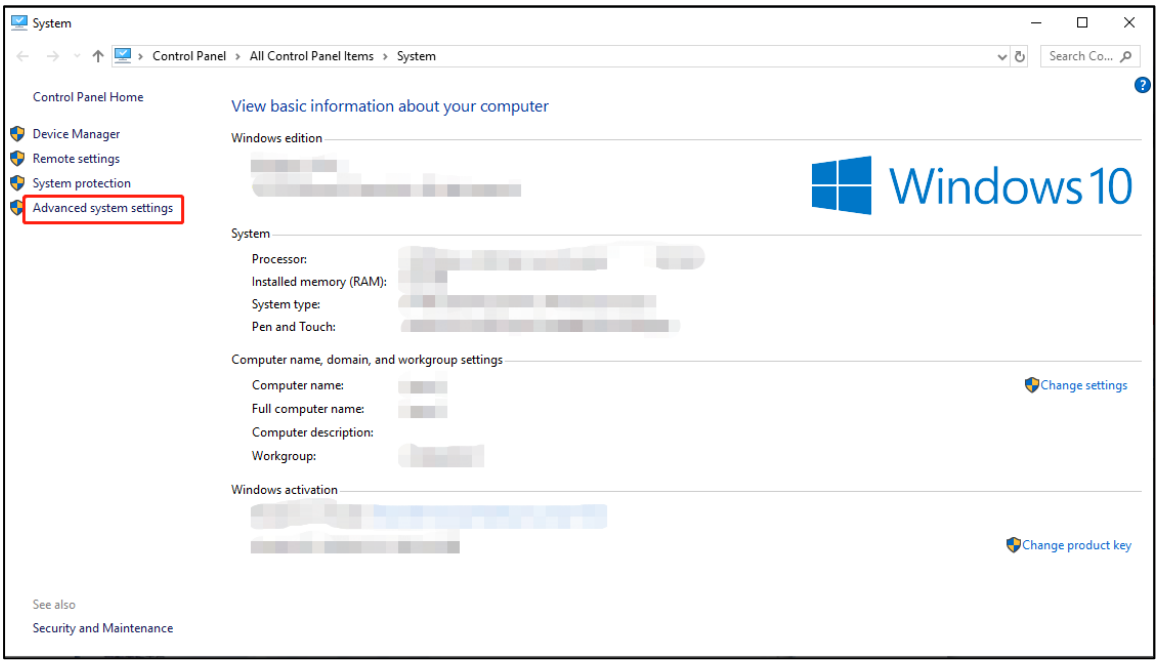


3.2 Environment Variables Setting

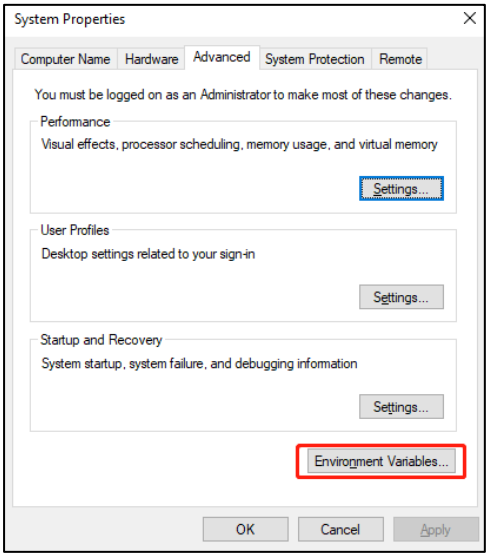
(1) Right-click on [My computer] and choose [Properties].



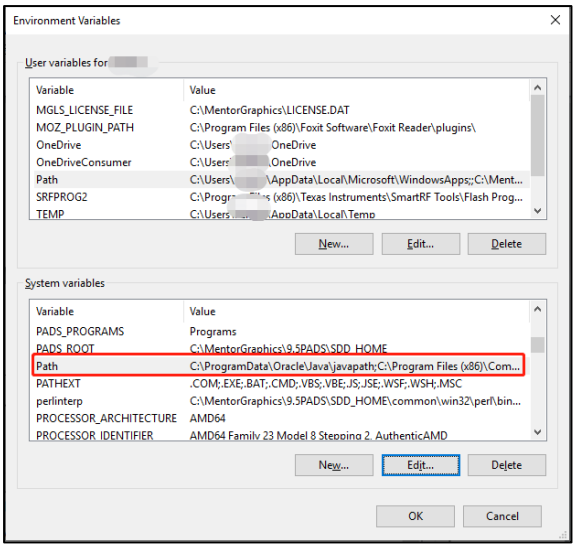
(2) Choose [Advance System Settings].



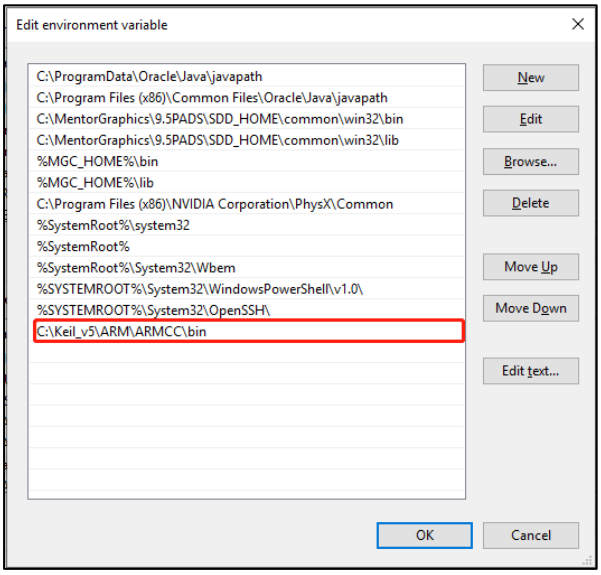
(3) Click [Enviroment Variables].



(4) Choose [Path] and then click [Edit].



(5) Choose bin file under Keil, and click [OK] to set.



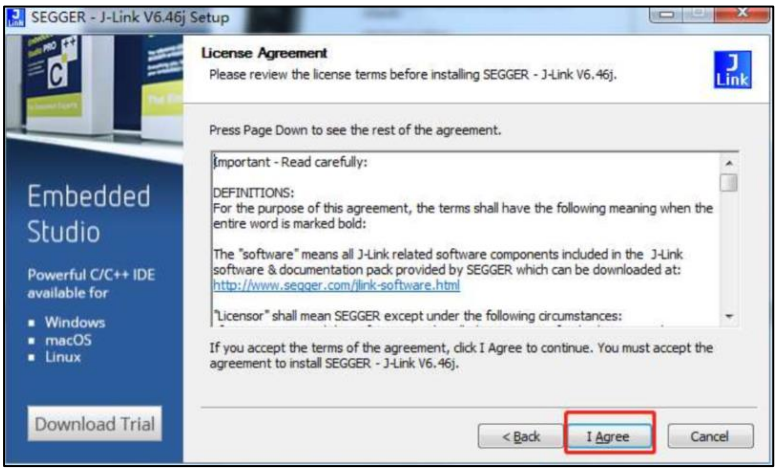
(6) Click [Confirm] and complete environment variables setting.

3.3 J-Link Installation

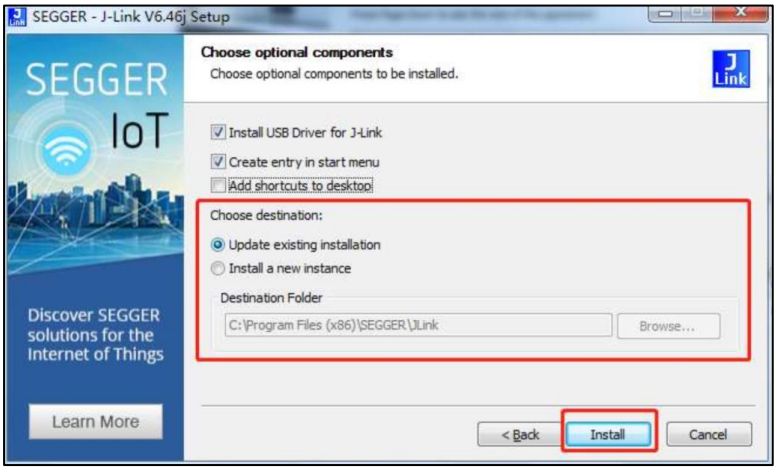
(1) Click the installation.

(2) Click [Next].

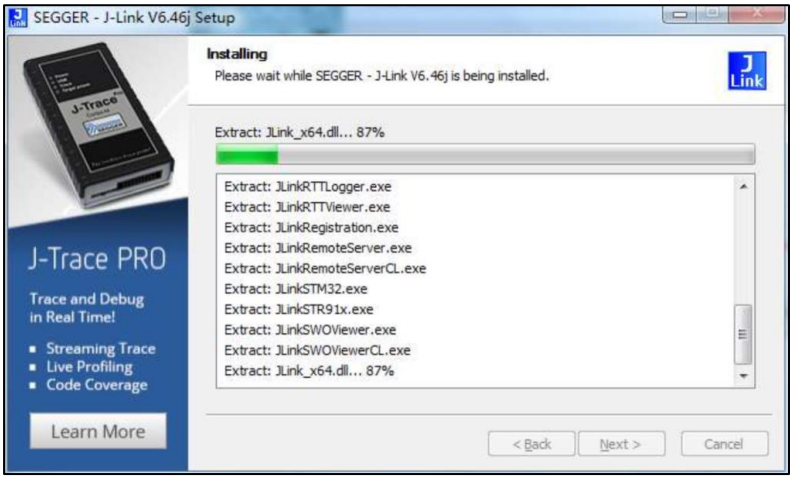
(3) Click [I Agree].



(4) Click [Install]. Please install it in the default destination and DO NOT revise.



(5) Wait for installing.



(6) Click [Finish] to complete.

4. J-Link Introduction

J-Link firmware should be version 6.0 at least, and hardware should be version 9.0 at least.

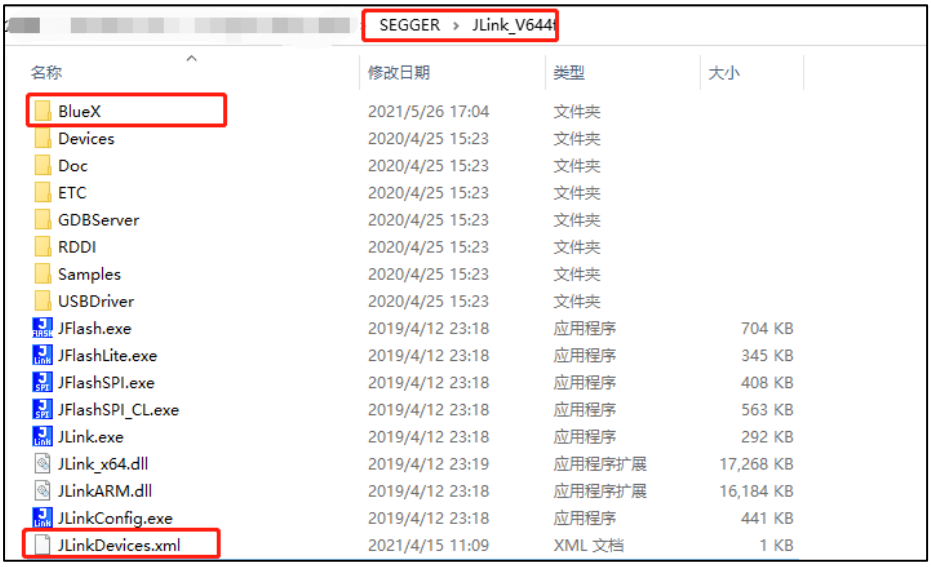
4.1 Procedure Programming

Taking SDK 3.x for example, download link as below:
https://www.bluexmicro.com/download/cid-6.html

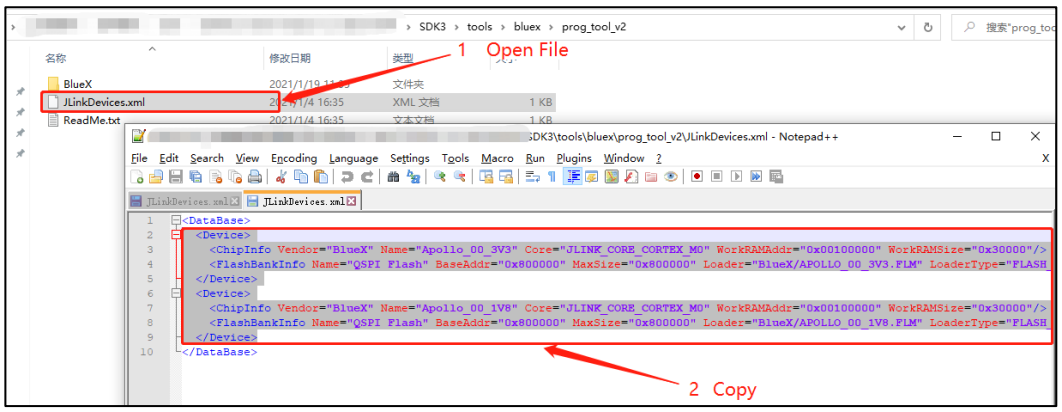
(1) Option 1: Download by J-Flash

A. Find [BlueX] file and [JLinkDevices.xml] under path of [SDK3\tools\bluex\prog_tool_v2] as below.

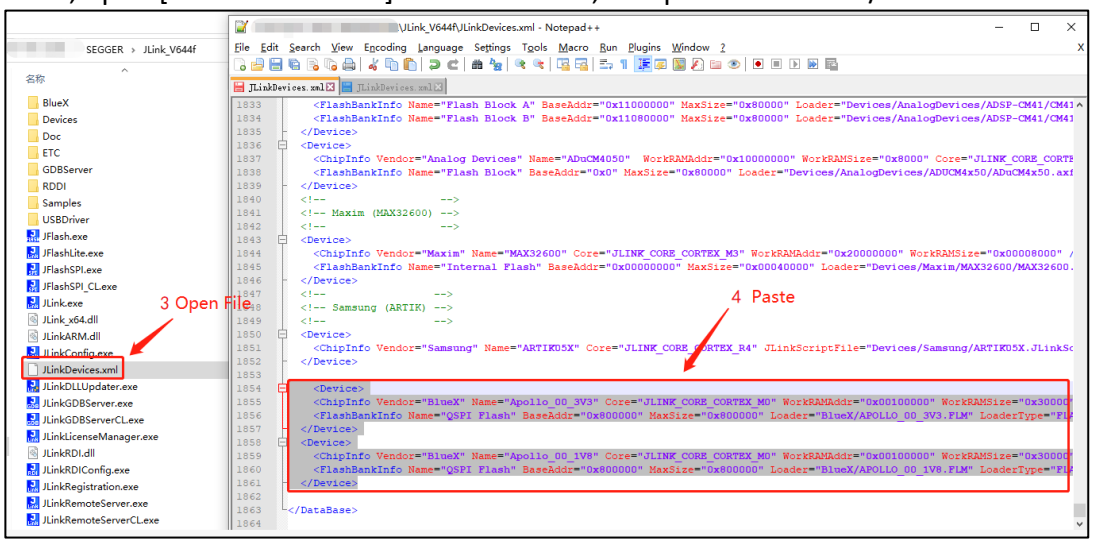
B. Copy [BlueX] file and [JlinkDevices.xml] to J-Link file as below.



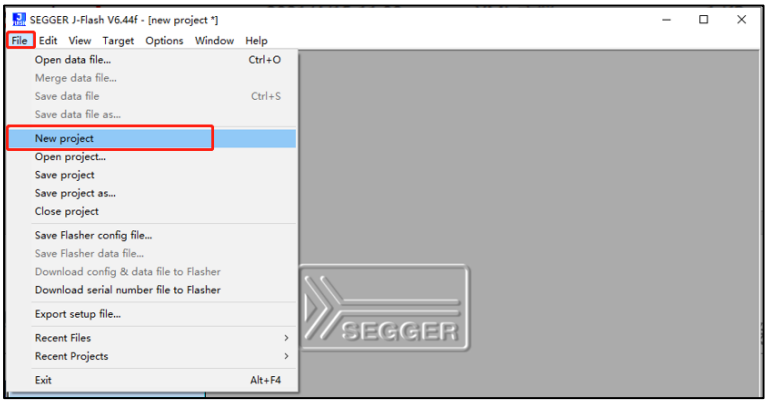
(A) If there's already [JLinkDevices.xml] file under J-Link, please follow steps as below. First, click [JLinkDevices.xml] file under SDK3.x. Then, copy content of Device in-between.



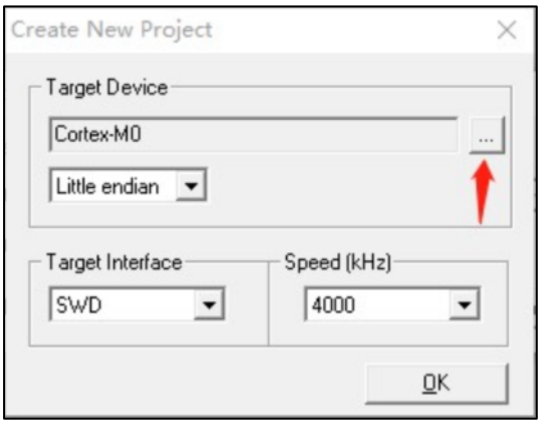
(B) Third, open [JLinkDevices.xml] file from J-Link, and paste it above </DataBase>.



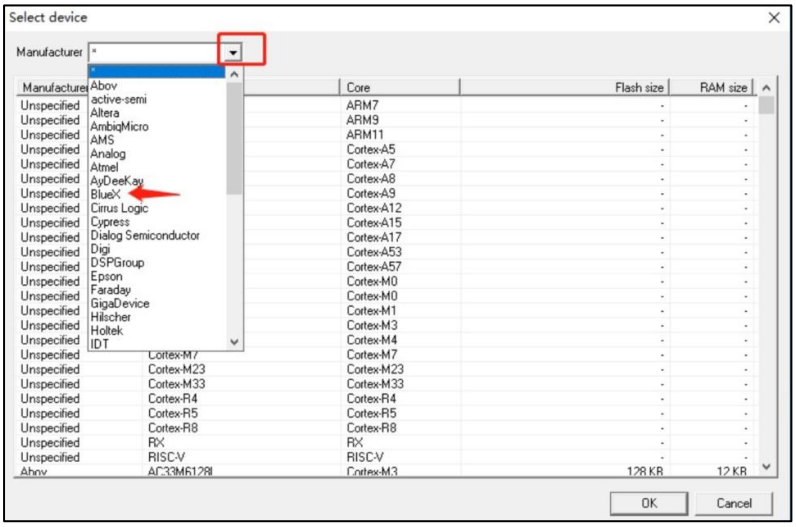
C. Click  to open J-Flash V6.44f and click [File] to choose [New Project] as below.



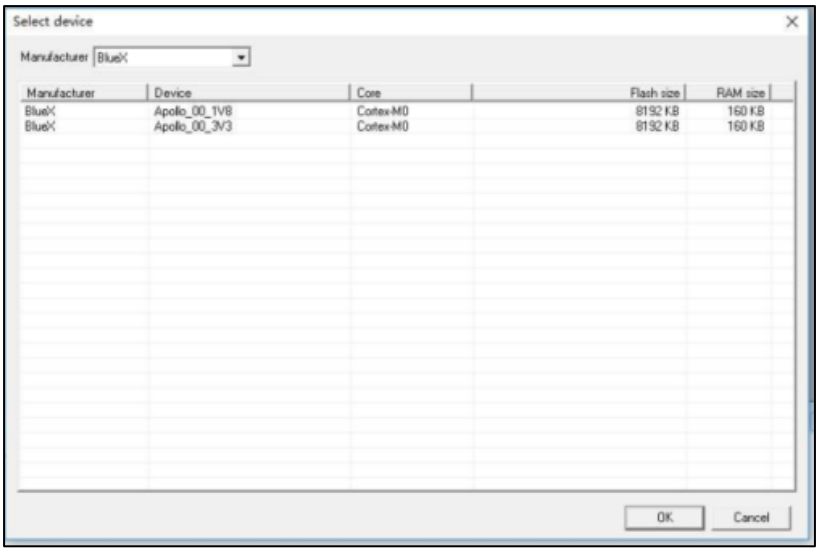
D. In [Create New Project], click the button indicated by red arrow as below.



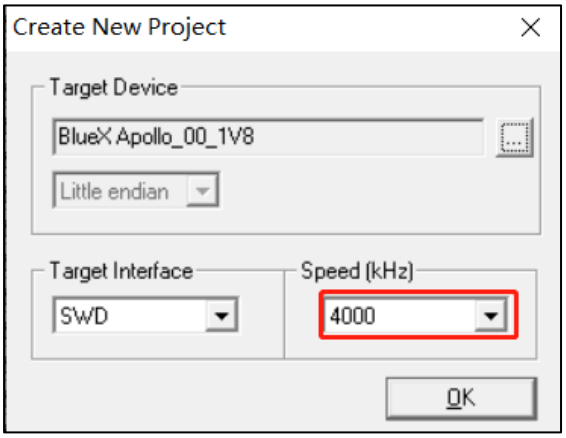
E. Roll down to choose [BlueX].



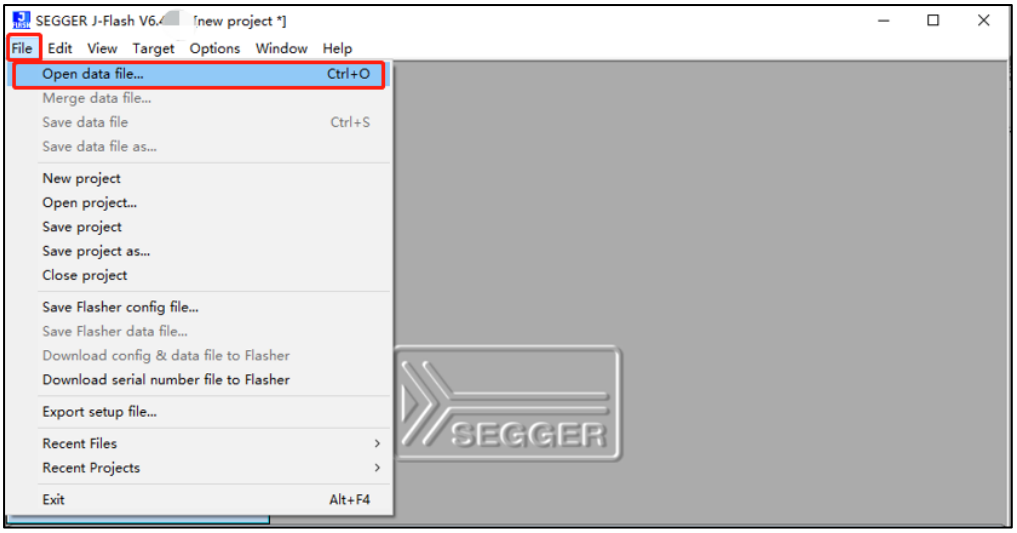
F. Choose program according to Module Flash voltage, then click [OK]. Choose [Apollo_00_3V3] when using RF01/RF03/RF04/BX2416/BX2417/BX2418 Module, or [Apollo_00_1V8] when using RF08.



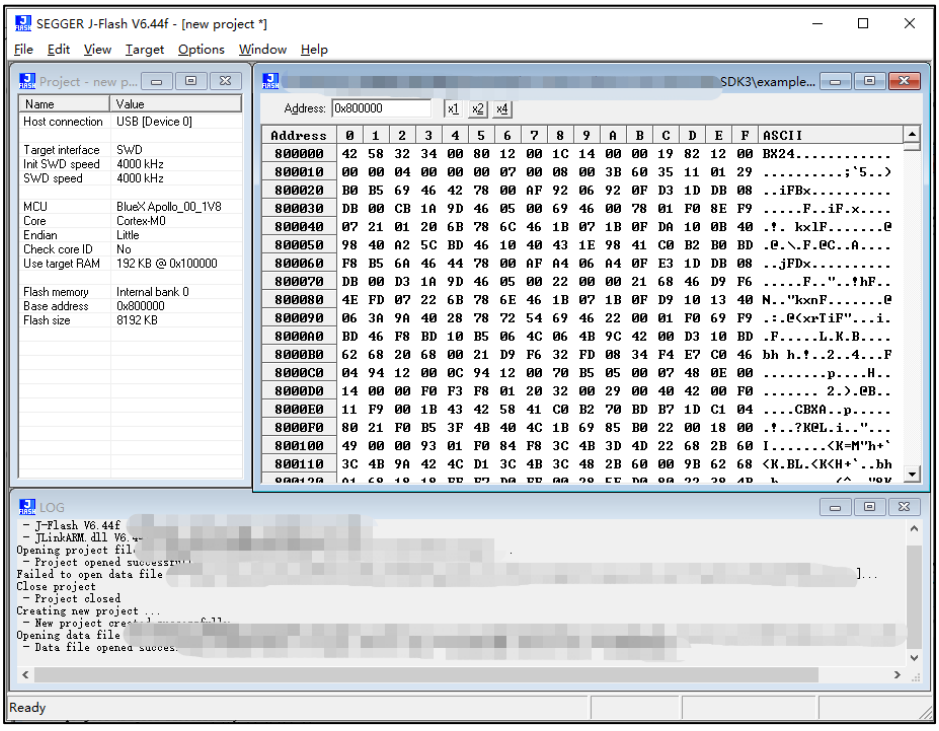
G. Back to [Create New Project] to choose [4000kHz] and click [OK].



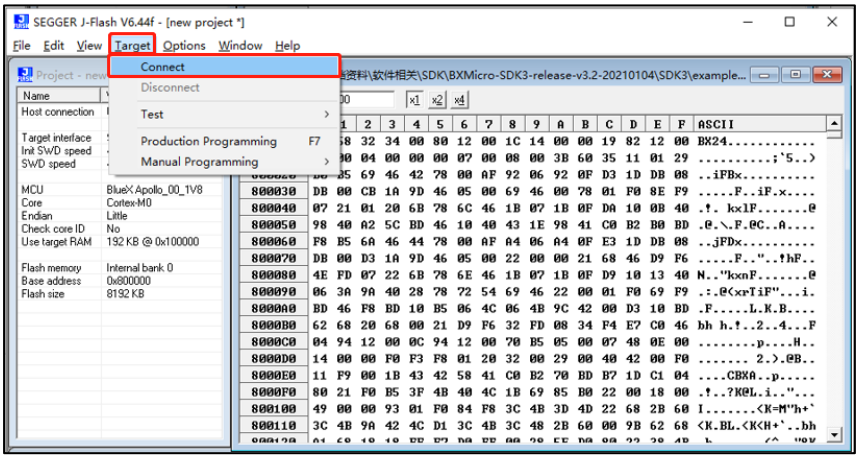
H. When configuration completed, click [File] then [Open data file] to select the firmware in hex file to download.



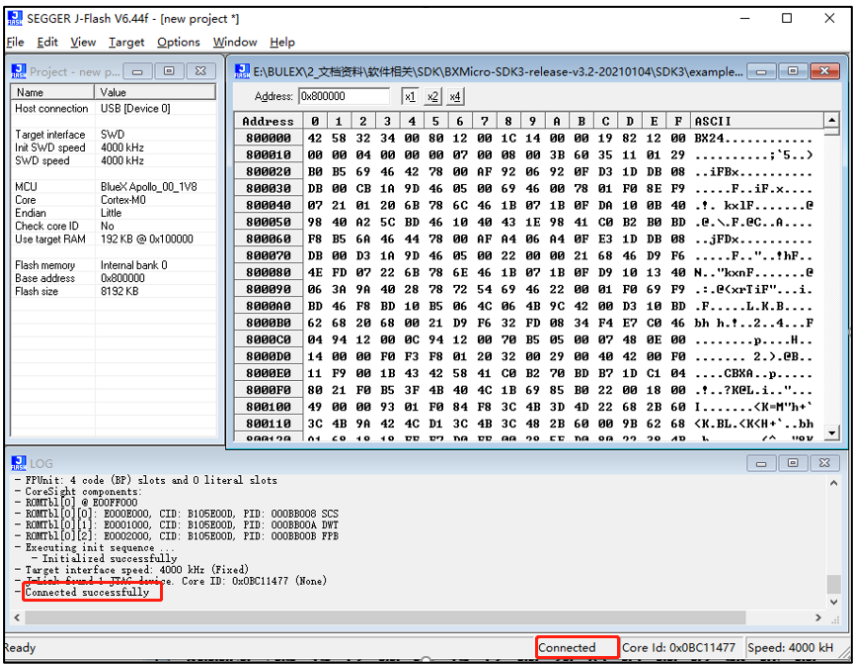
I. After selection, J-Flash will be as below.



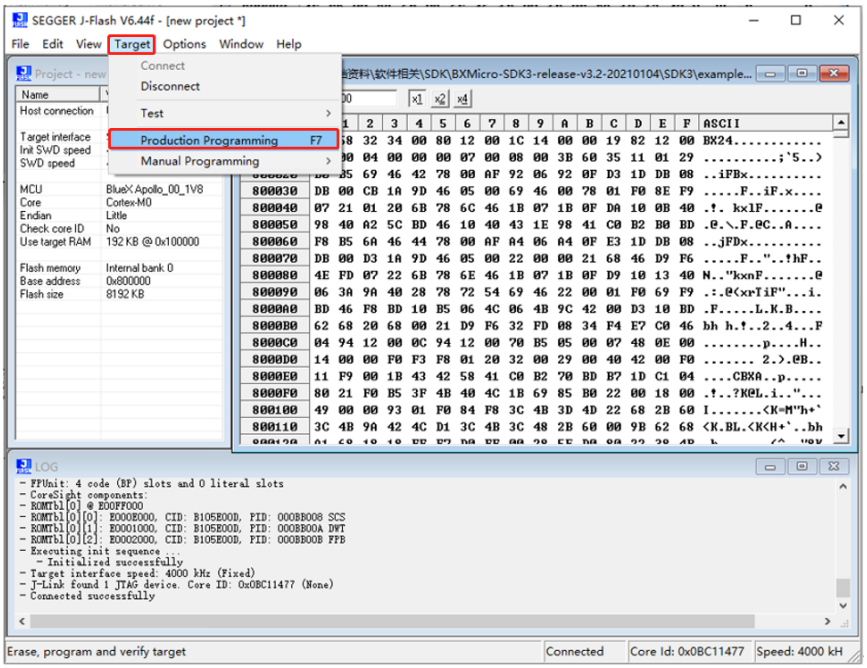
J. Connect EVK through J-Link SWD connector, and click [Target] to choose [Connect].



K. When connection success, it will be as below.



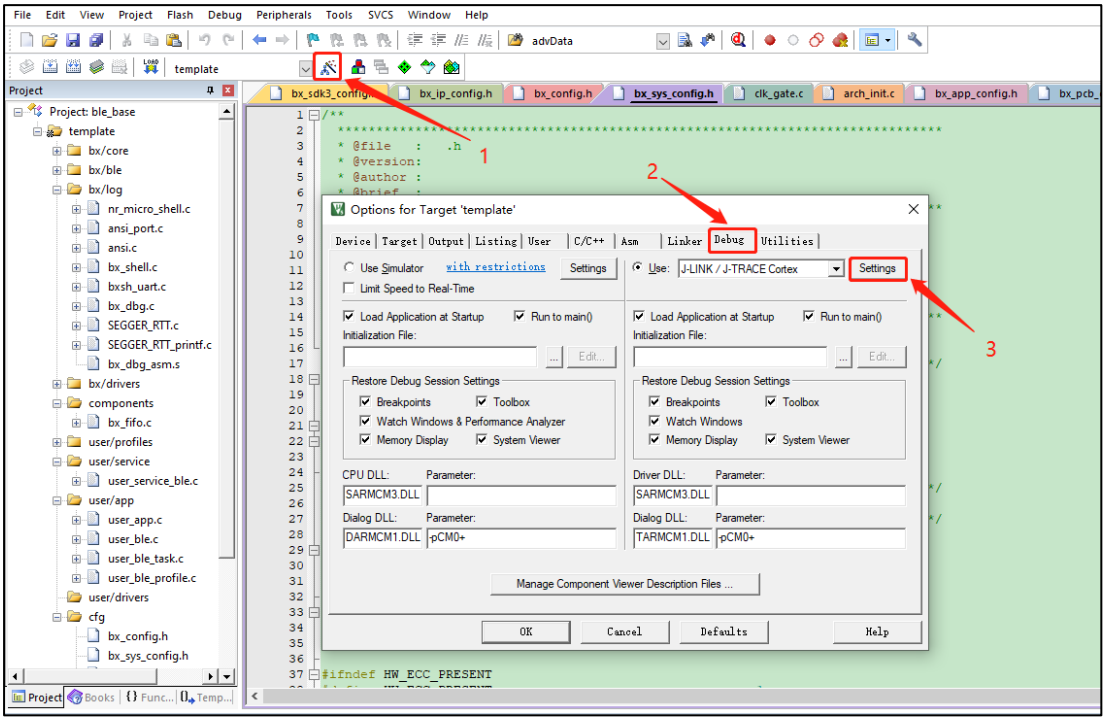
L. Click [Target] to choose [Produciton Programming] to download firmware.



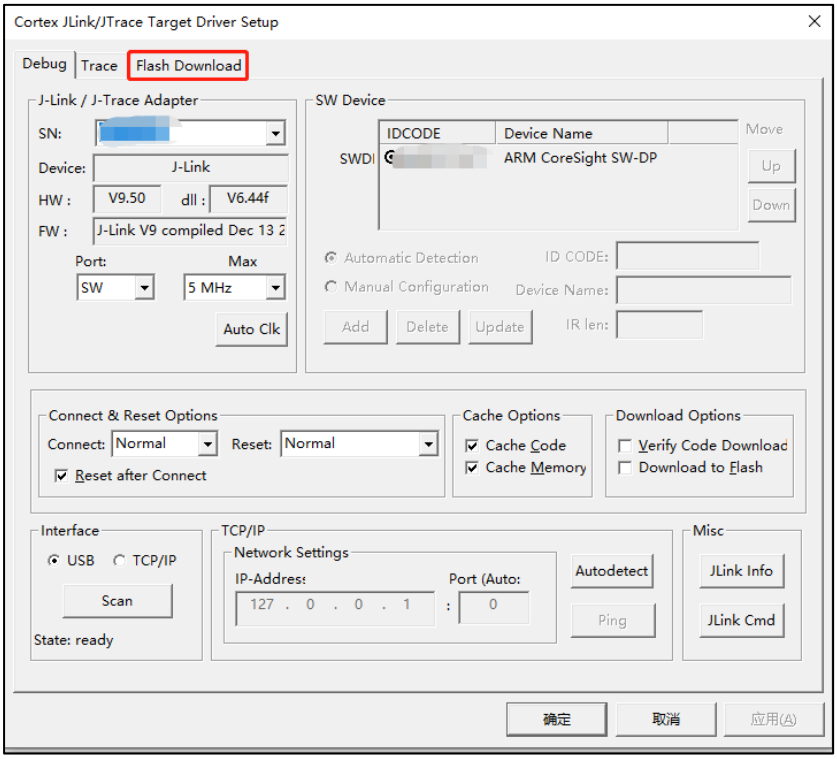
(2) Option 2: Download by Keil

A. Copy [APOLLO_00_1V8.FLM] and [APOLLO_00_3V3.FLM] of BlueX file to the path under Keil_v5/ARM/Flash as below.

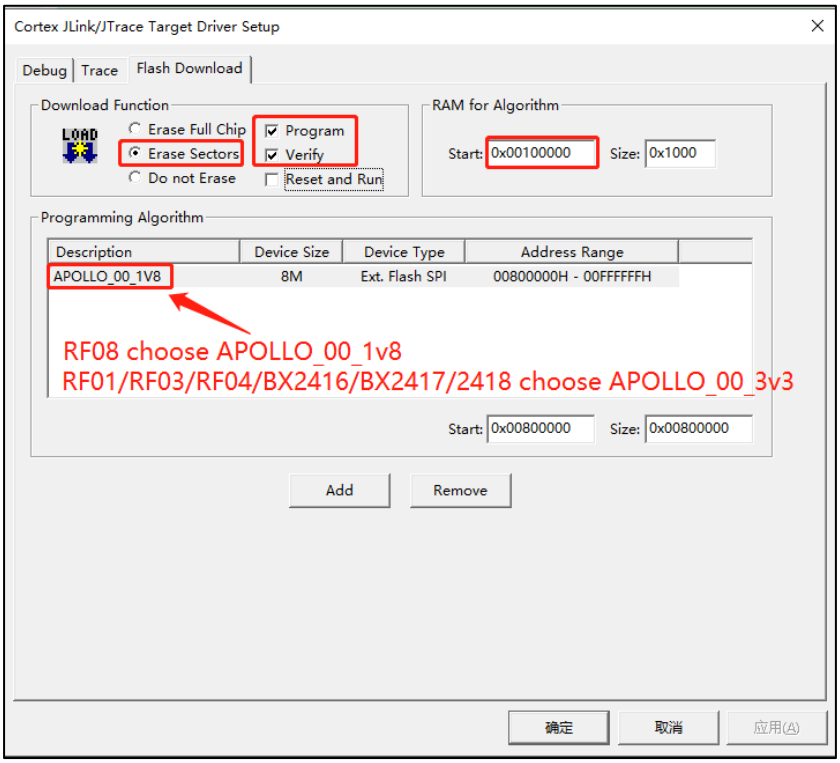
B. Follow the steps indicated in red arrow as below.



C. In the pop-up, choose [Flash Download].

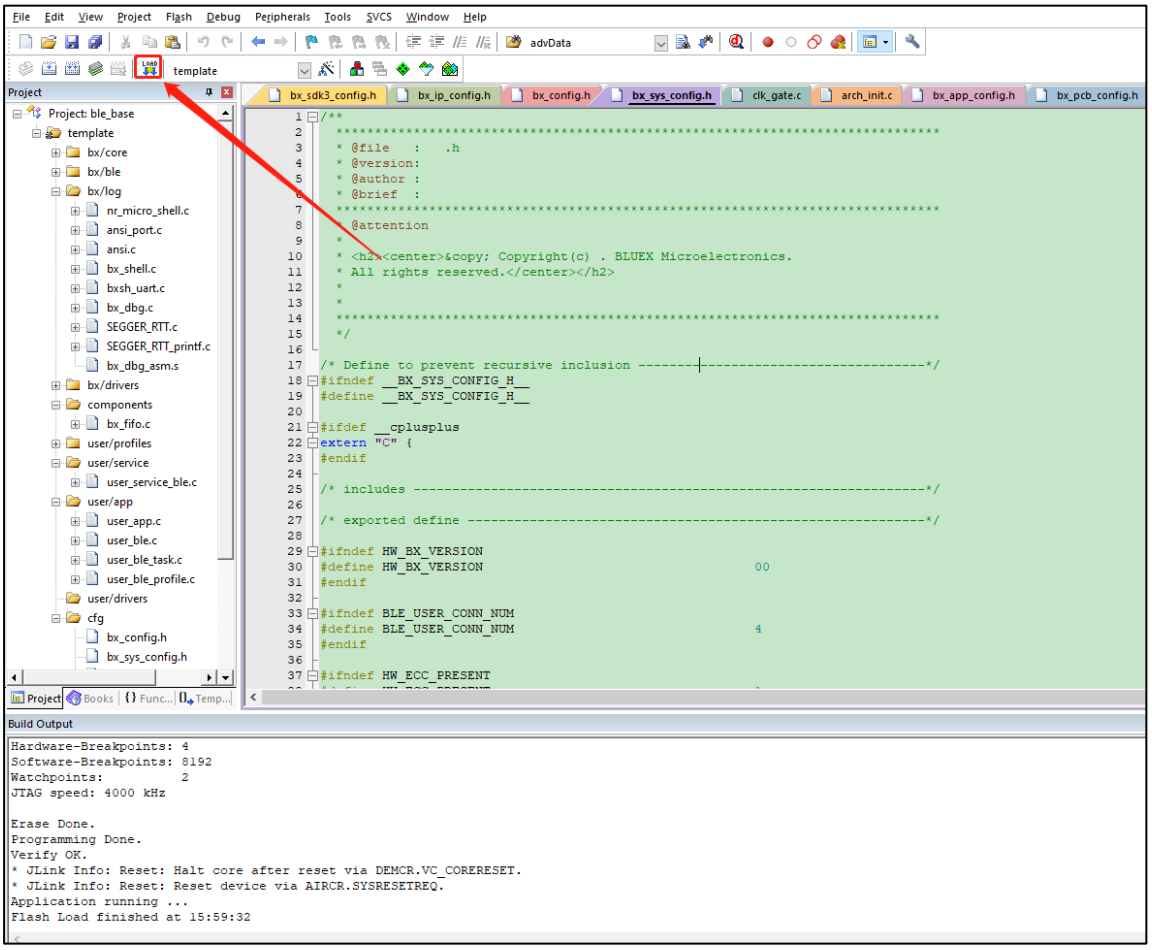


D. Follow the steps as below. Choose [Apollo_00_3V3] when using RF01/RF03/RF04/BX2416/BX2417/BX2418 Module, or [Apollo_00_1V8] when using RF08.



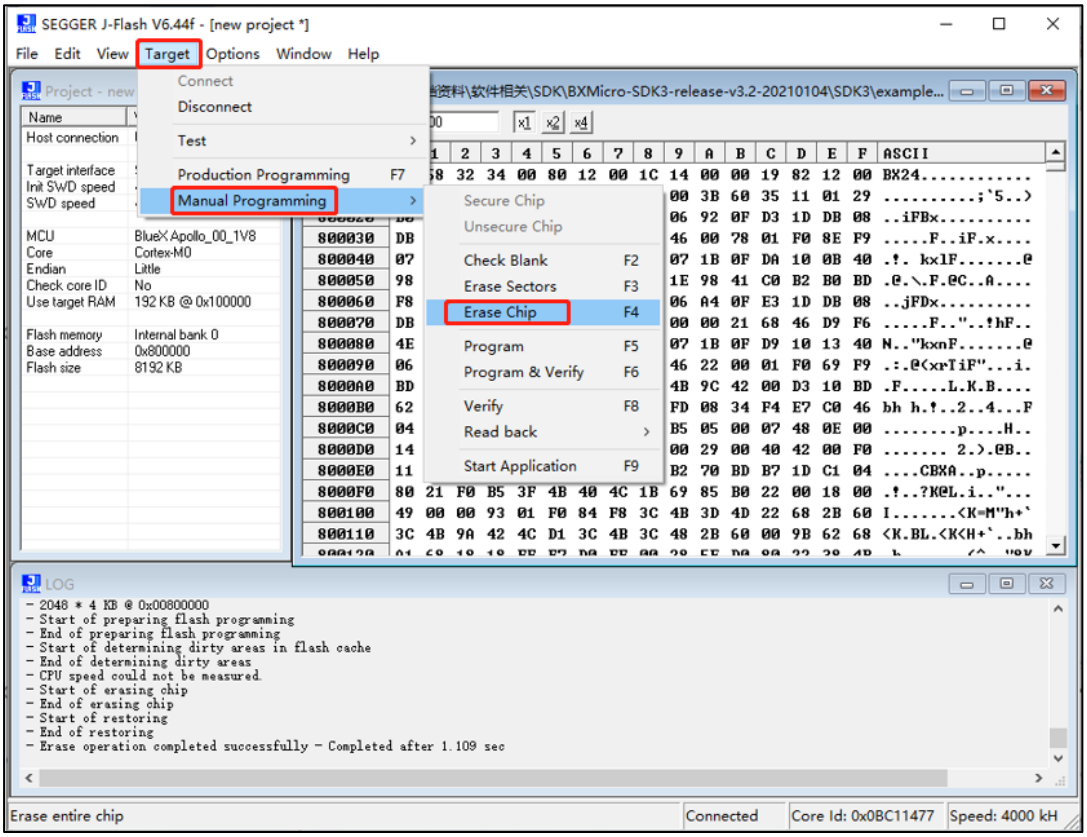
E. Before using this option, first, download bootloader of hex file by using J-Flash, e.g. [template_with_bootloader.hex] from SDK 3.x programming.

F. When connected to EVK by J-Link, procedures can be downloaded to EVK by the [Load] button indicated in red arrow as below.

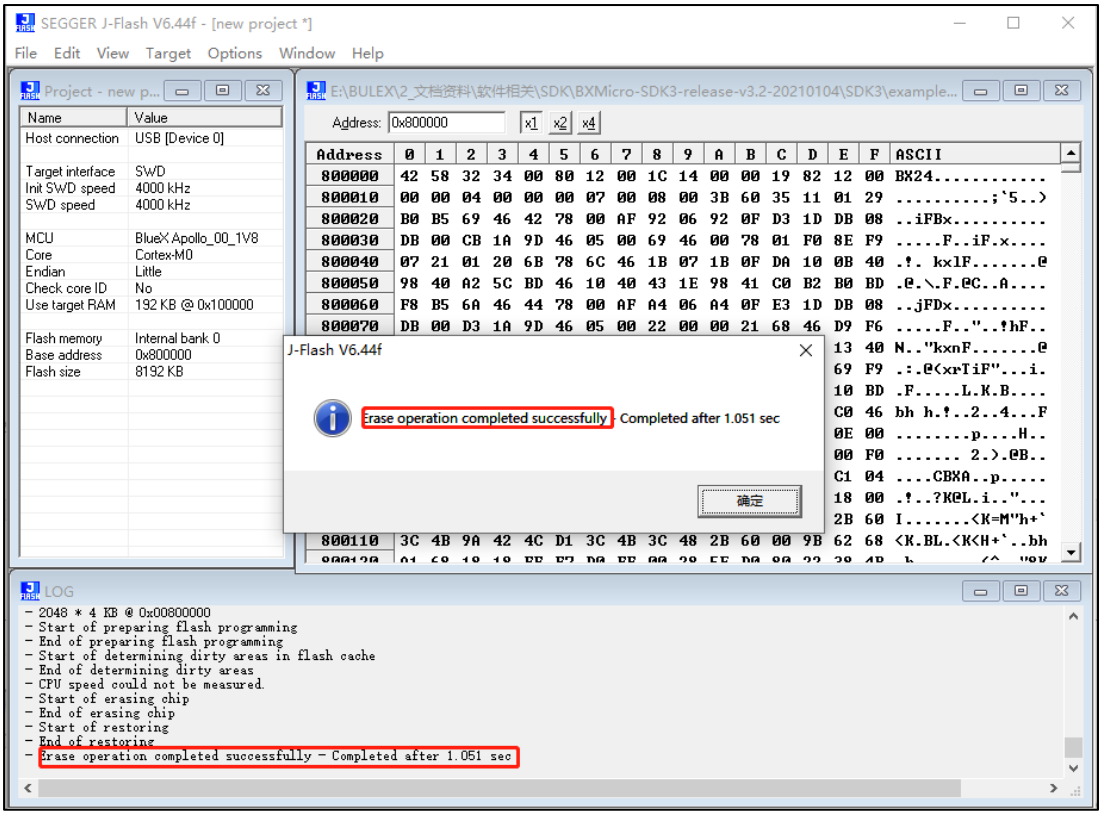


4.2 Erase Flash Procedure

(1) The same process as procedure programming. After connected to EVK by J-Flash, follow the stpes as below, or press [F4], to erase Flash.



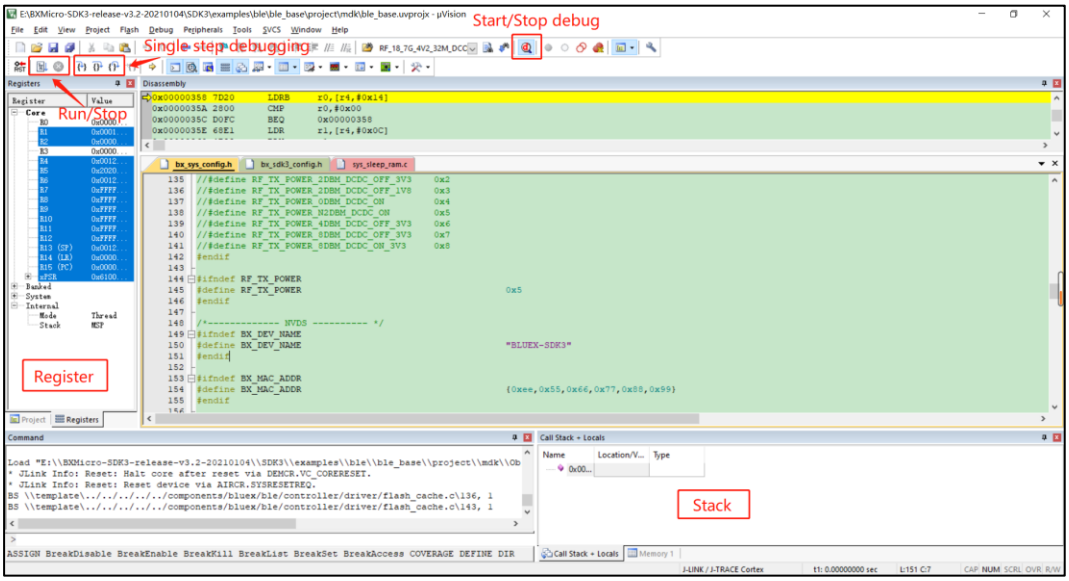
(2) When erase completed, it will be as below.



4.3 Degug and Check the Log

(1) Debug by Keil

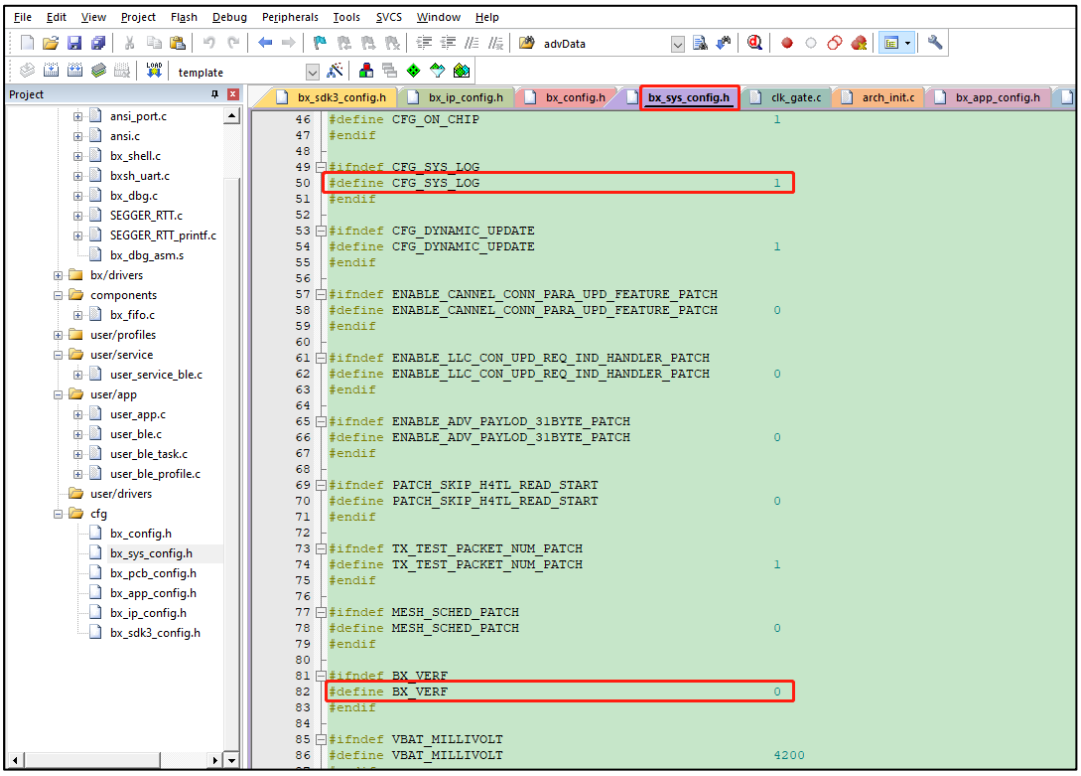
A. In Keil, click [Start Debug], and make sure J-Link is well-connected during debugging.



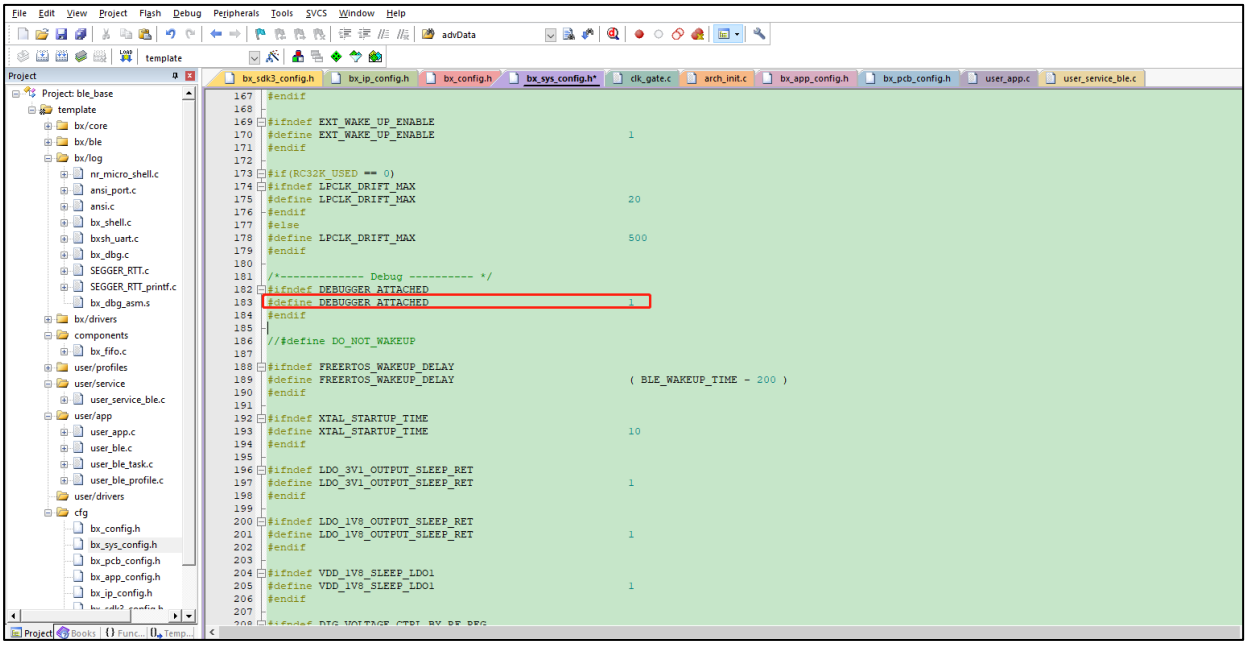
(2) Check Log by RTT Viewer

A. To output Log print, IC should be programmed with log-enabled firmware first.

B. In SDK 3.x, there're 2 macro definitions in [bx_sys_config.h] to setup Log. Follow the steps as below to activate RTT Log.

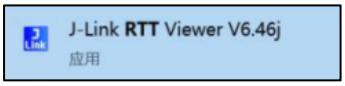


C. BlueX chips cannot connect J-Link during sleep mode. Developers can define [DEBUGGER_ATTACHED] of [bx_sys_config.h] as [1] as reference below. When [DEBUGGER_ATTACHED] defined as 1, chips can connect J-Link during sleep mode, which is easy for debugging. To reduce power consumption during sleep mode, please define [DEBUGGER_ATTACHED] as [0] after debugging.

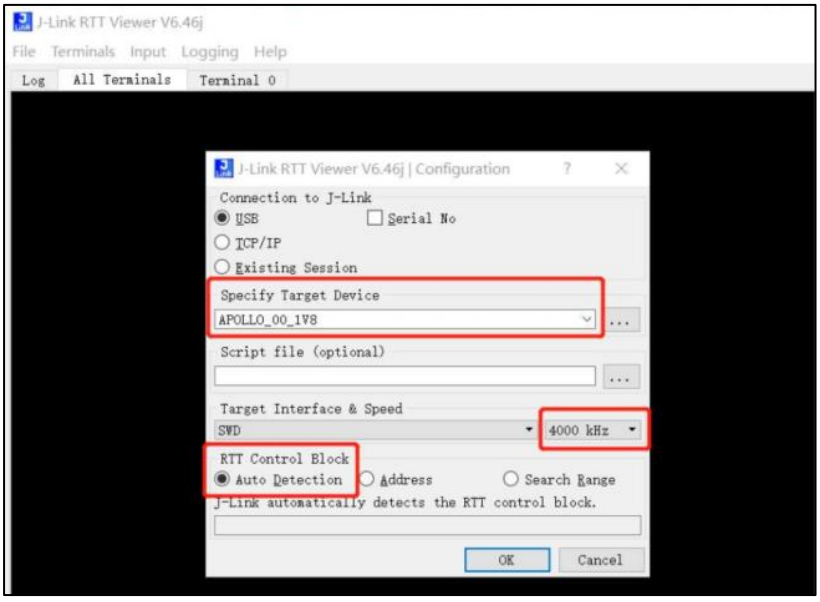


D. After adjustment above, use Keil to compile and program firmware to EVK, then use RTT Viewer to check the Log.

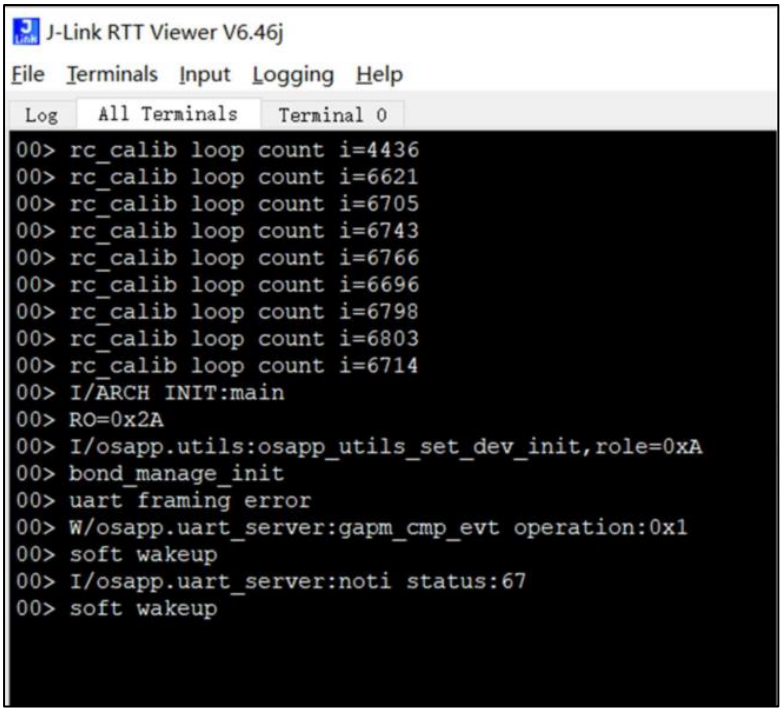
E. Check RTT Viewer.



F. In configuration, we need to setup [Specify Target Device] by choosing [APOLLO_00_1V8] or [APOLLO_00_3V3]. Next, choose [SWD] and [4000kHz] in Target Interface& Speed. Then, choose [Auto Detection] in RTT Control Block. When finished, click [OK] to check RTT Log.



G. RTT Log as below.

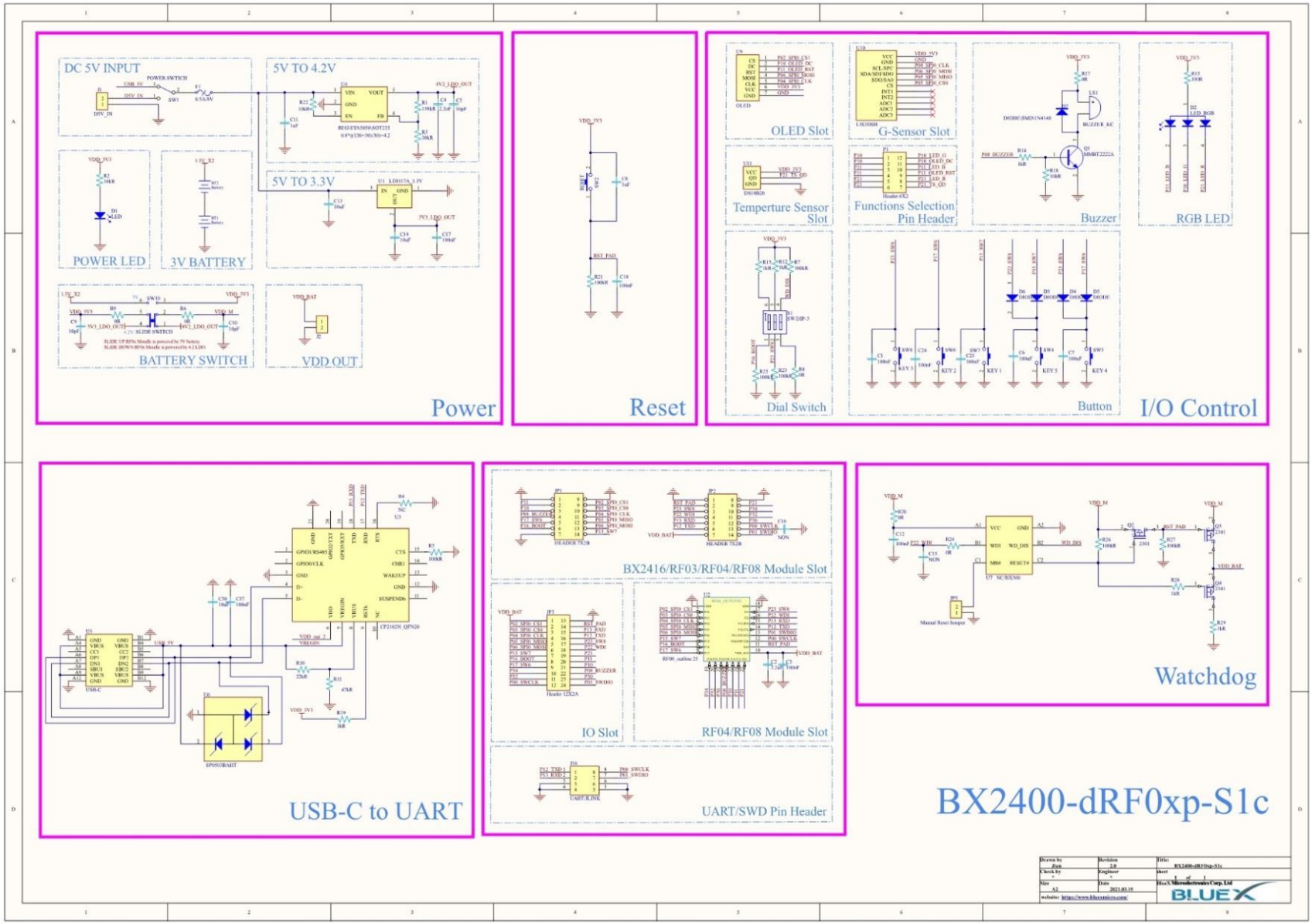


5. Revison History

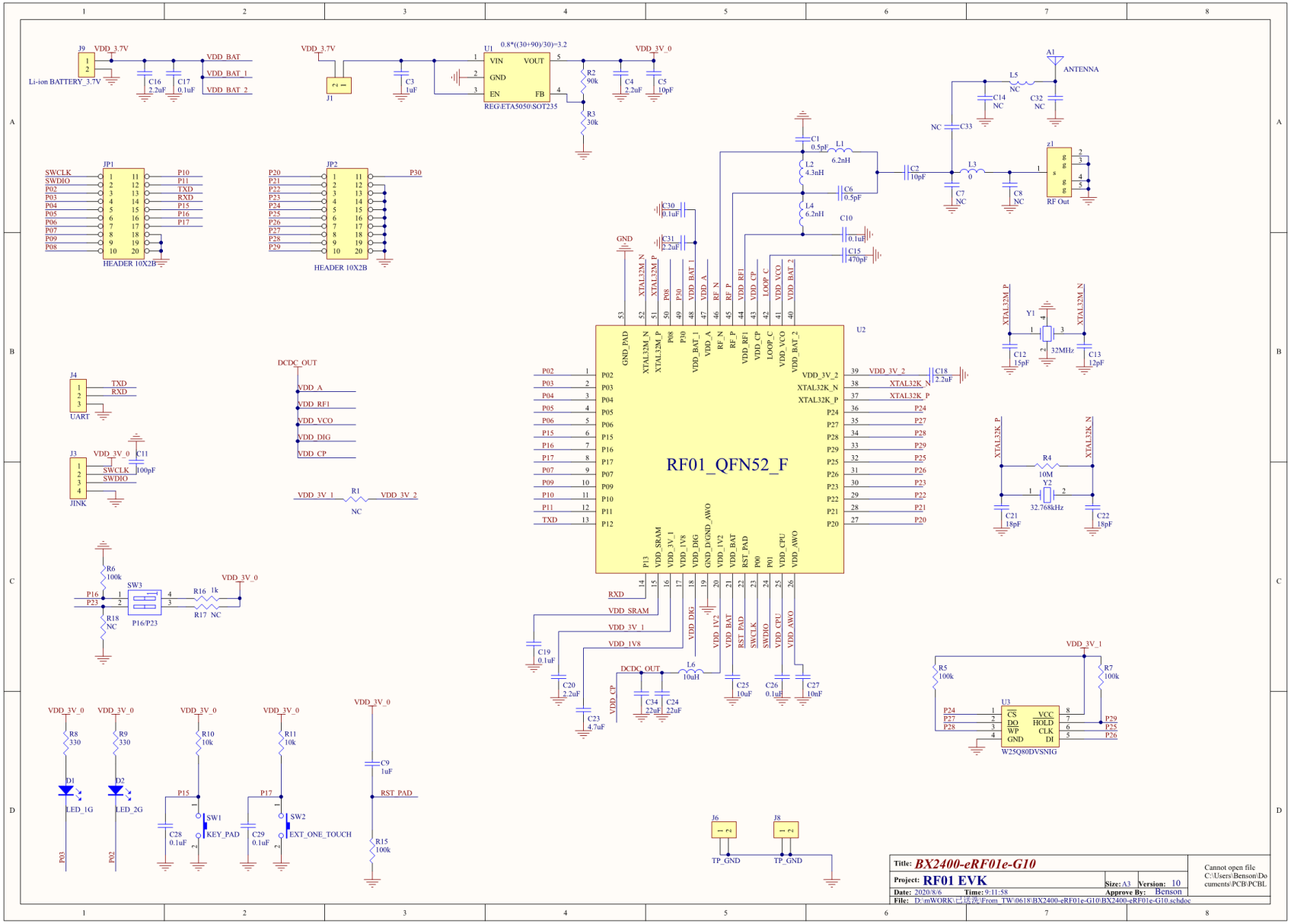
Version	Description	Date (YYYY/MM/DD)	Author
1.0	Initial version	2020/02/04	姚琪
1.1	Added content of ENK	2020/02/05	淡明洁
1.2	Amended content of debug	2020/03/03	夏杰
1.3	Amended content of EVK and cover, added index	2020/07/17	简任锋
1.4	Updated content of EVK, added appendix	2021/01/18	简任锋
1.5	Amended Chapter4 and updated pictures	2021/06/11	简任锋
1.6	English version update	2021/06/16	Michelle
1.7	Added BX2400-eRF01e-G1a diagram and EVK introduction	2021/08/11	简任锋

6. Appendix

6.1 Schematic of BX2400-dRF0xp-S1c



6.2 Schematic of BX2400-eRF01e-G10



6.3 Schematic of BX2400-eRF01e-G1