

# **SOC LINK Series Programmer & Simulator User Manual**

Shenzhen SinOne Microelectronics Co., Ltd.

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## Statement

The User Manual mainly describes the operating instructions for SOC LINK Series Programmer & Simulator. Before use SOC LINK simulation or mass production development, please carefully read the user manual of related products and timely update programmer firmware and development tools to the latest version.

The Company reserves the right of final interpretation of all products.

Please refer to the following link for the latest specification of related products:

<http://www.socmcu.com/>

Please visit the following link for the latest development tools:

<http://www.socmcu.com/>

# 1. Introduction to Programmer & Simulator

## Tools

Self-developed by Shenzhen SinOne Microelectronics Co., Ltd. (hereinafter referred to as “SOC”), SOC MCU development/mass production tools are composed of online development tools, mass production programmers and PC software. Online development kits are used for developing and debugging, and mass production programmer is used for batch programming of chips.

Before using the tool, it is recommended to visit <http://www.socmcu.com> to obtain the latest user manual and read it carefully.

For any problems, suggestions or comments during the use, please contact [0755-26652552](tel:0755-26652552) or email to [SOC\\_support@socmcu.com](mailto:SOC_support@socmcu.com).

The following table lists the similarities and differences between SC LINK PRO and SC LINK:

Type	SC LINK PRO	SC LINK
Programming Tool	SOC Programming Tool	
Keil C Plug-ins	SOC_KEIL_Setup	
Applicable product	SC95F, SC92F, SC93F	
Simulation	√	√
Online programming	√	√
Offline programming	√	√
ISP	√	×
OLED display	√	×
Output voltage	Software control	Manual control
Multi-code	40	10

## 1.1 Programmer & Simulator: SC LINK PRO



Name	All Models	Function Description
SC LINK PRO	SC LINK PRO + 4PIN/5PIN Cable	<ul style="list-style-type: none"> <li>● SOC programmer &amp; simulator</li> <li>● Applicable to online and offline programming and simulation for SOC 8051 series and debugging of Touch Key chips</li> <li>● Automatic IC inspection without any action</li> <li>● Available to connect programmer interface</li> <li>● ISP upgrade</li> <li>● OLED display</li> <li>● Multi-code management</li> <li>● Programming in partition</li> </ul>

## 1.2 Programmer & Simulator: SC LINK



Name	All Models	Function Description
SC LINK	SC LINK + 4PIN Cable	<ul style="list-style-type: none"> <li>● SOC programmer &amp; simulator</li> <li>● Applicable to online and offline programming and simulation for SOC 8051 series and debugging of Touch Key chips</li> <li>● Automatic IC inspection without any action</li> <li>● Available to connect programmer interface</li> <li>● Multi-code management</li> <li>● Programming in partition</li> </ul>

## 2. Programmer & Simulator SC LINK PRO

### 2.1 Hardware Description

#### 2.1.1 Specifications

Parameter Name	Min	Max	Unit	Test Conditions
Operating Voltage	4.5	5.5	V	
Operating Current (idle)	-	70	mA	Operating Voltage=5.0V
Output Current	-	400	mA	Operating Voltage=5.0V Supply Current≥500mA
Supply Voltage of Programming Interface (5V)	Equal to Supply Voltage		V	
Supply Voltage of Programming Interface (3.3V)	3.2	3.4	V	Operating Voltage≥4.5V
Length of External Programming Cable	-	60	cm	Operating Voltage≤5.0V
Capacitance Range between VDD and VSS upon Programming on Board	-	1000	uF	Operating Voltage≤5.0V

#### 2.1.2 Descriptions

SC LINK PRO is designed for SOC 8051 series IC offline/online programming & simulation and TouchKey debugging.



- ① USB Interface: Used for connecting PC and power supply
- ② Programming buttons: Programming start in offline programming mode; Keep holding and power on will enter firmware upgrading mode
- ③ RUN Lamp: Red light indicates power on
- ④ Busy Lamp: Red light, lamp flashes means IC programing in offline programming mode or firmware upgrading
- ⑤ OK Lamp: Blue light indicates programming completed
- ⑥ NG Lamp: Red light means programming failed
- ⑦ Cable Interface: The cable interface below is sorted subject to the actual sequence with the function category distinguished by the font color: blue for programming interface, black for programmer interface and

red for power output interface

<b>VDD</b>	<b>DIO</b>	<b>VSS</b>	<b>CLK</b>	<b>RST</b>	<b>VUSB</b>
<b>GND</b>	<b>OK</b>	<b>NG</b>	<b>Busy</b>	<b>Start</b>	<b>3.3V</b>

### 2.1.2.1 Function Description for Programming Interface

(1) Use 4PIN cable for ICP programming, details are shown in Figure 2.1.2-1.

Table 2.1.2-1

Descriptions for ICP Programming Interface	
Name	Function Description
<b>VDD,VSS</b>	Power and ground (pin) of programmed IC
<b>CLK,DIO</b>	Programming signal interface, connecting tCLK and tDIO of target IC

(2) Use 5PIN cable for ISP programming, details are shown in Table 2.1.2-2.

Table 2.1.2-2

Description for ISP Programming Interface	
Name	Function Description
<b>VDD,VSS</b>	Power and ground (pin) of programmed IC
<b>CLK,DIO</b>	UART communication interface, connecting RX and TX of target IC
<b>RST</b>	Control target IC reset in ISP mode

### 2.1.2.2 Description for Programming Voltage

The voltage can be switched automatically by programmer based on the upper computer, which becomes valid only upon **Programming/Null Checking/Erasing**.

### 2.1.2.3 Function Descriptions for Programmer Interface

Name	Function Descriptions
<b>GND</b>	SC LINK PRO signal ground
<b>OK</b>	Programming status interface, low level indicates programming is completed
<b>NG</b>	Programming status interface, low level indicates programming failed
<b>Busy</b>	Programming status interface, low level indicates programming is in progress
<b>Start</b>	Programming start signal interface, low level indicates valid
<b>3.3V</b>	Programmer power supply, <b>Note: Only 3.3V rather than 5V can be selected!</b>

## 2.2 SC LINK PRO OLED Display

SC LINK PRO programmer comes with an OLED display for programming information. Supported functions are as follows:

- (1) Display USB connection status and the UID of current programmer after connecting to PC;
- (2) Display the name of currently programmed IC in offline programming mode;
- (3) Display the programming Option checksum of the loaded code;
- (4) Display CRC checksum of the loaded code;
- (5) Display the programming state after offline programming is completed;
- (6) Display the programming count allowed in limited programming mode after power-on;
- (7) Save the limited programming count and sequence number after power-down;
- (8) Display the voltage of current programming in online mode;

### 2.2.1 Display Connection Status in Online Programming Mode

When SC LINK PRO is in online programming mode, OLED will display “LINK: USB” to indicate that it is currently connected to PC, and will display SOC LOGO, the unique ID (UID) of current programmer and currently default programming voltage, as shown in Figure 2.2.1.



Figure 2.2.1 SC LINK PRO Display View

### 2.2.2 Conventional Programming Display in Offline Mode

In offline programming mode of SC LINK PRO, OLED will display the downloaded project file that has been preloaded, including IC name, CRC Checksum (CS), Programming Option (OP) and Programming Status (SA). Figure 2.2.2 shows the display with programming succeeded, in which OK is displayed and blue light is on.



Figure 2.2.2 SC LINK PRO Display under Conventional Offline Programming

### 2.2.3 S/N Programming Display

(1) First download the project code checked with limited programming to SC LINK PRO, then use offline programming mode to display IC name, CRC Checksum (CS), Programming Option (OP) and Programming Status (SA) during power-on and programming process. Figure 2.2.3-1 shows programming in progress; once the programming is completed, the S/N currently written in will be displayed, as shown in Figure 2.2.3-2.

(2) S/N programming supports power-off memory function.



Figure 2.2.3-1 SC LINK PRO S/N Offline Programming in Progress



Figure 2.2.3-2 SC LINK PRO S/N Offline Programming Completed

## 2.2.4 Limited Programming Count Display

(1) First download the project code checked with limited programming to SC LINK PRO, every time when programming button is pressed, OLED will display the remaining programming counts until the maximum is used up, and then Error status will appear, as shown in Figure 2.2.4-1 and 2.2.4-2.

(2) Limited programming mode supports power-off memory function.



Figure 2.2.4-1 Programming with Limited Counts Completed



Figure 1.2.4-2 Programming Failed with Limited Counts Used Up

## 2.2.5 Description for Display Names on SC LINK PRO OLED

A variety of code names are displayed on SC LINK PRO OLED with related interpretations and meanings shown as follows:

Code Name	Meanings
IC	IC name of currently loaded project
CS	CRC Checksum of currently loaded project (Refer to the SOC Programming Tool for this checksum)
OP	The programming option code of currently loaded project (Refer to the programming software for this checksum)
SN	S/N currently written in
LN	Remaining programming counts for currently loaded project
SA	Current programming status (BUSY/OK/ERR)
U	Currently programming voltage
LINK	Link
ID	The Unique ID of current programmer
lap Update	Enter IAP mode for firmware upgrading

## 2.2.6 Description for Error Code of Programming

When MCU programming fails, NG indicator will light on with error type displayed on OLED. Meanings for error codes are shown as follows:

Error Code	Descriptions for Error Code	Solutions
ERR_1	The connection between SC LINK PRO and the signal pin of programmed IC is abnormal and unable to enter JTAG	<ol style="list-style-type: none"> <li>1. Check if MCU is placed correctly or if the pin is shorted or disconnected;</li> <li>2. Check if the programming cable is connected improperly;</li> </ol>
ERR_2	Programming error	Please try again;
ERR_3	The limited count of programming is 0;	Please download the project file again;
ERR_5	S/N programming error	Please check if the address programming is out of range
ERR_6	Error in Flash data downloaded	Please replace SC LINK PRO and try again

## 2.3 SC LINK PRO Simulation

### 2.3.1 Configurations before Simulation

SC LINK PRO provides MCU online simulation for SOC 92/93/95 series, which is available for debugging, step debugging, step-over debugging and RST operations for up to 8 breakpoints (7 for users, and 1 as hidden breakpoint), to view and modify RAM and SFR and debug the program in development stage. Before using, complete the following configurations.

### 2.3.2 SC LINK PRO Simulation Operations

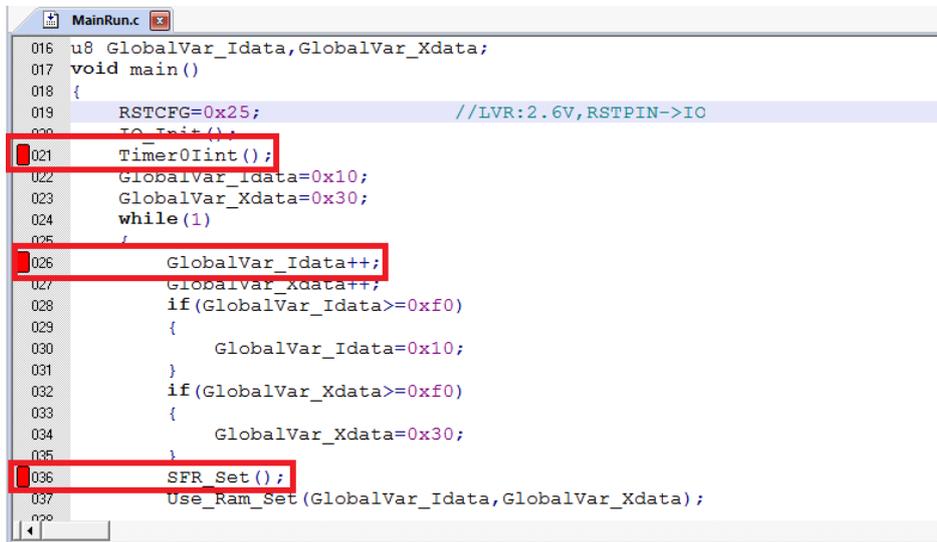
After above configurations are completed, user can perform simulation for up to 8 breakpoints, 7 for users and 1 as hidden breakpoint. For the convenience of description, a specific example is given here to complete breakpoint simulation based on the following steps.

#### 2.3.2.1 Set/Delete Breakpoint

**Breakpoint Setup:** Double click the left mouse on source program line of the preset breakpoint, or press “F9” button, or click the shortcut icon “Insert/Remove breakpoint” (on the right of “Debug” button). When the red block appears on the left of the line, the setting is succeeded.

**Breakpoint Cancel:** Before pre-cancelling the breakpoint, double click the left mouse, or press “F9” button, or click the shortcut icon “Insert/Remove breakpoint” (on the right of “Debug” button). When the red block disappears on the left of the line, the setting is succeeded.

**Note:** Before simulation, it is required to pre-set the breakpoint. The breakpoint can be set/deleted during the simulation process, as shown in the figure below:



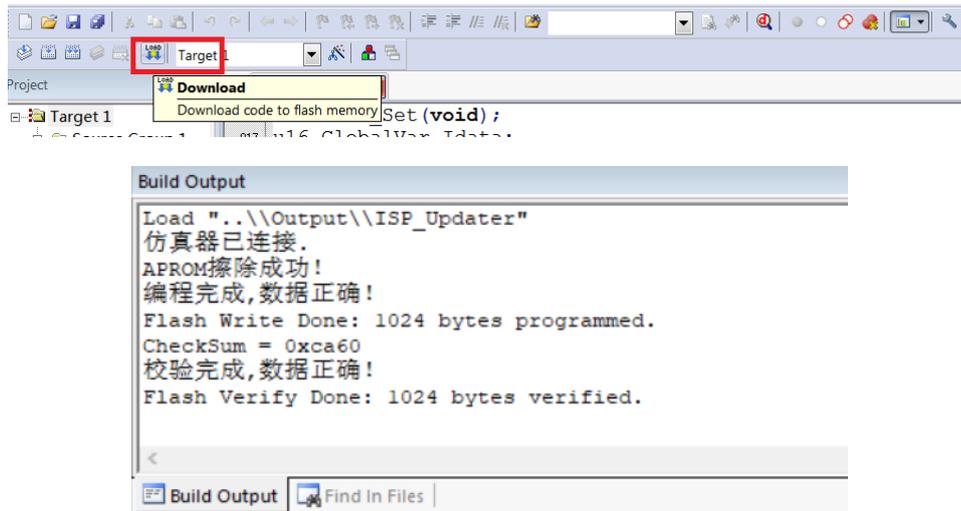
```

MainRun.c
016 u8 GlobalVar_Idata,GlobalVar_Xdata;
017 void main()
018 {
019     RSTCFG=0x25; //LVR:2.6V,RSTPIN->IO
020     IO_Init();
021     Timer0Iint();
022     GlobalVar_Idata=0x10;
023     GlobalVar_Xdata=0x30;
024     while(1)
025     {
026         GlobalVar_Idata++;
027         GlobalVar_Xdata++;
028         if(GlobalVar_Idata>=0xf0)
029         {
030             GlobalVar_Idata=0x10;
031         }
032         if(GlobalVar_Xdata>=0xf0)
033         {
034             GlobalVar_Xdata=0x30;
035         }
036         SFR_Set();
037         Use_Ram_Set(GlobalVar_Idata,GlobalVar_Xdata);
038     }
039 }
    
```

#### 2.3.2.2 Download Program

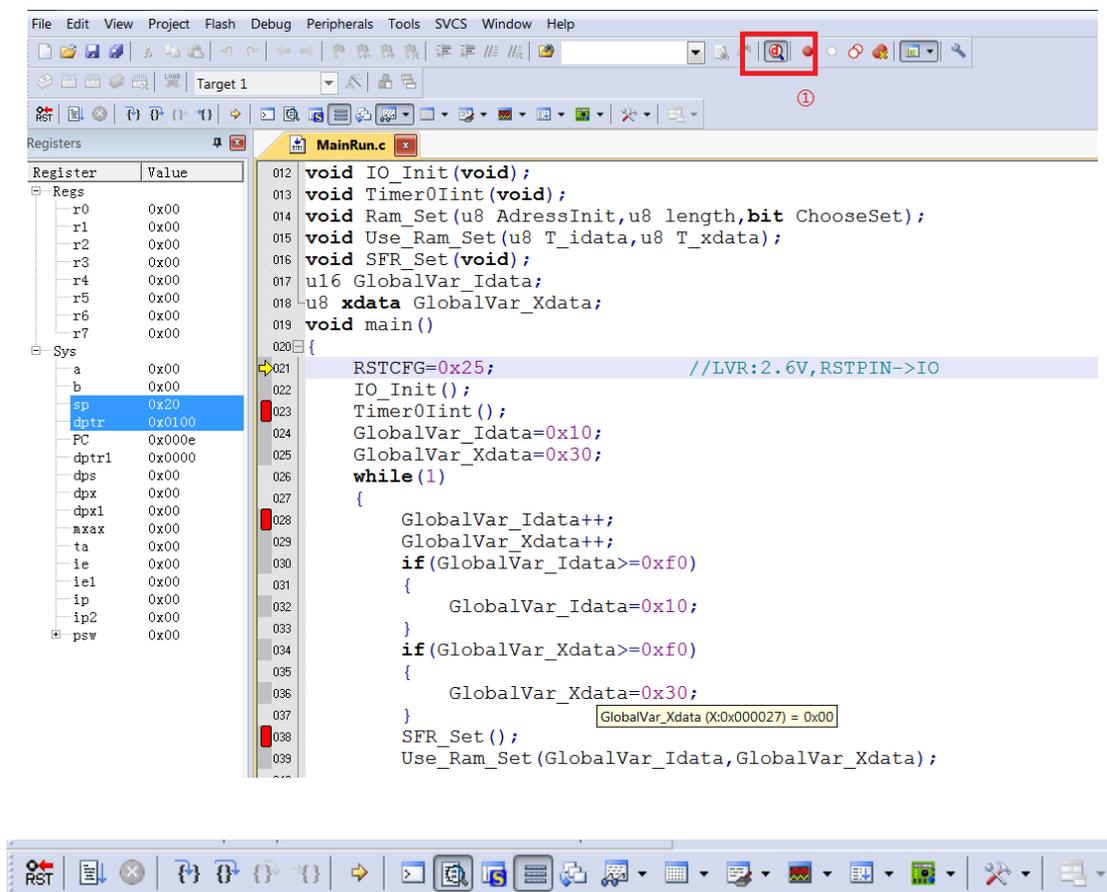
After the programming is completed, click the shortcut icon “Download” to complete the code programming. The programming depends on “ProgramSetting” in “Programming Option”, check “Programming” and “Verifying” to program and then verify “Download” process and output relevant information in “Build OutPut” Window.

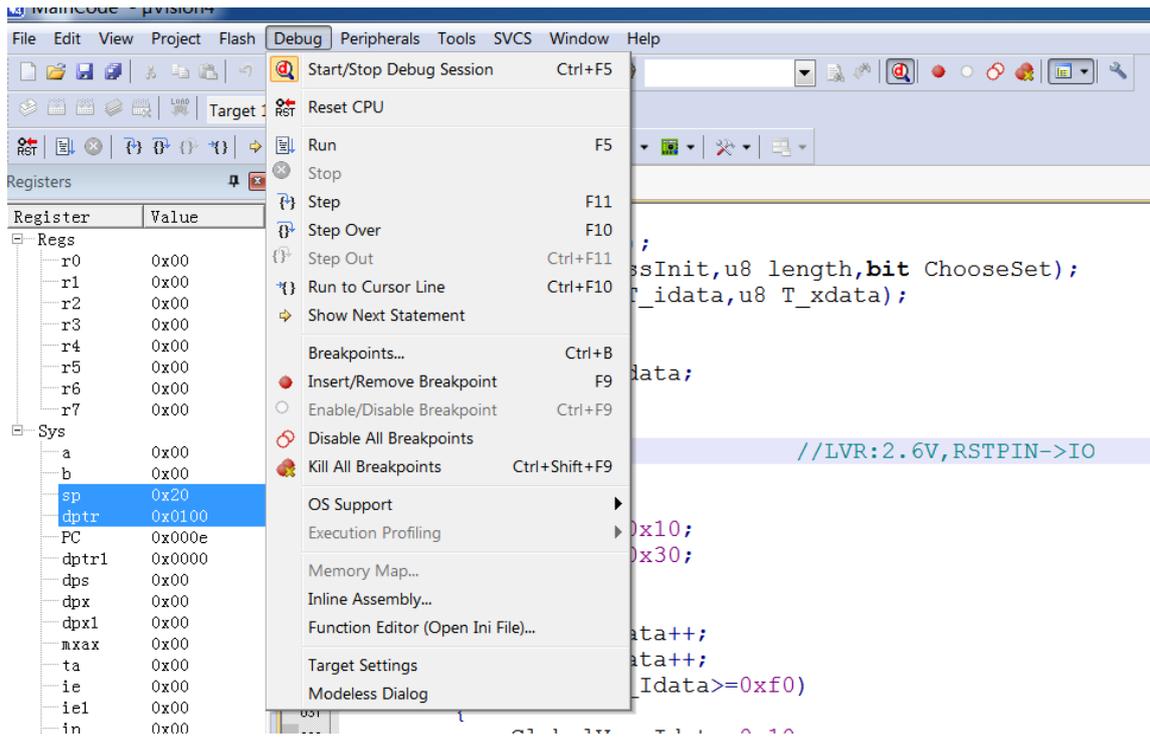
**Note:** If Download fails, an error message is displayed. Or else, Download succeeds.



### 2.3.2.3 Enter/Exit Simulation

After the program Download succeeds, click the shortcut icon “Start/Stop Debug Session” button, or press the shortcut key “Ctrl+F5” or click “Debug-> Start/Stop Debug Session”, as shown in the figure below. After entering correctly, “D” button is in sunk state indicating it is open; click it again to exit the debug and “D” button is in smooth state indicating it is closed. After entering the simulation debugging interface, debug-related menus will be added on the toolbar, including Reset, Run, Stop, Pause, Step, Step Over, Step Out, Run to Cursor Line, Show Next Statement, Command Window, Disassembly Window, Symbol Window, System Register Window, Call Stack Window, Observation Window, Memory Window and Serial Port Window, etc. Menus in the toolbar mentioned above can be found in current “Debug” menu bar. For ease of operations, subsequent operations are performed from the toolbar.





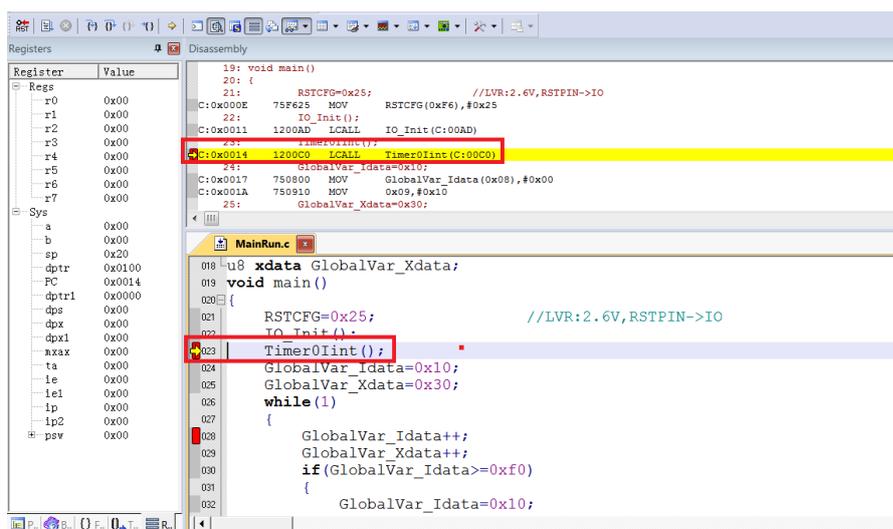
If it fails to enter the debugging interface, please check if the configuration is correct before simulation.

## 2.3.3 Simulation Run Operations

Once entering the simulation status, you can perform a series of simulation operations, including Full-speed Run to Breakpoint (Run), Step Track (Step), Step Over, Run to Cursor Line and Reset.

### 2.3.3.1 Full-speed Run to Breakpoint (Run)

Set up the breakpoint before entering the simulation status, click the shortcut icon "Run" button or "F5" to run to the breakpoint at full speed, as shown in the figure below:



In the figure above, when running at full speed to the first breakpoint and stopping at this breakpoint, a yellow debugging arrow appears to the left of the breakpoint, pointing to the current stop line. If you open the Disassembly window, such yellow debugging arrow also appears, pointing to the PC address of current program.

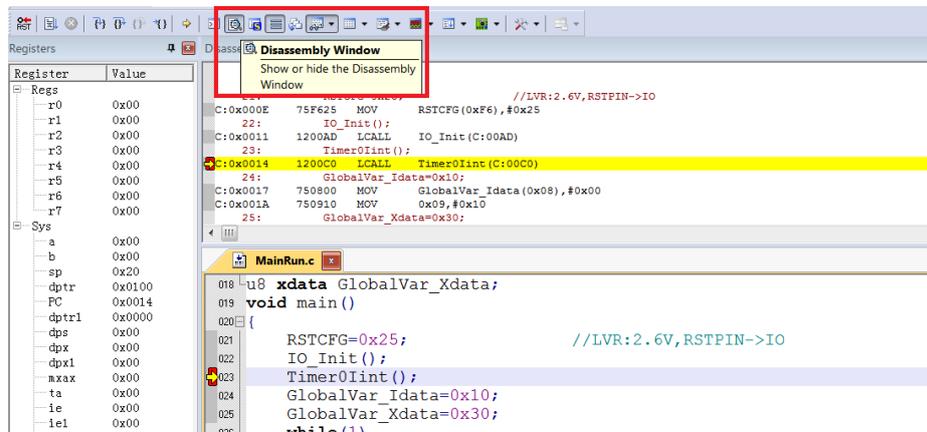
After entering the simulation status, the program will stop at 0x00 address by default, that is, PC points to

0x00. When running at full speed to the first breakpoint, it will run from this address to the first breakpoint before stopping. Compared with other simulation operations, the execution speed is the fastest.

### 2.3.3.2 Step Track (Step)

**Step Track means the program stops after executing a line each time.**

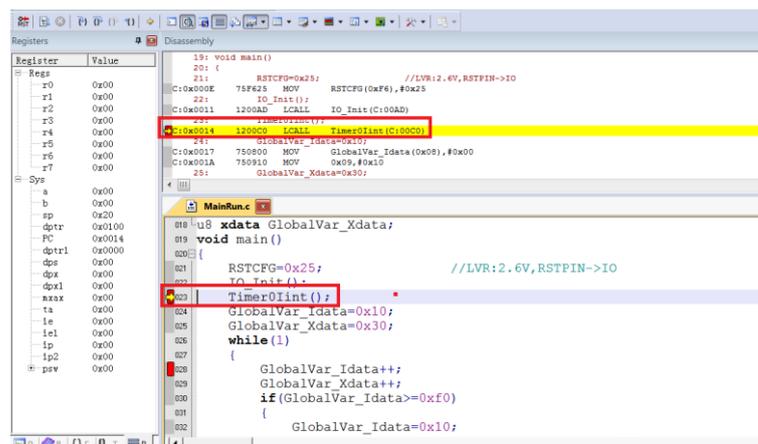
- ① Click the shortcut icon “Stop” button or press the shortcut key “F11”, the program will run one step at a time. It should be noted that the step running process will be different in C Source Program window for “Disassembly” window to be open or closed by default. It is recommended to keep “Disassembly” window in open state during the Step process.
- ② Open/close “Disassembly” window. Click the shortcut icon “Disassembly Window”, the sunk state indicates on, “Disassembly” window will appear at this time, and disassemble the current program line; the smooth state indicates off, “Disassembly” window will disappear

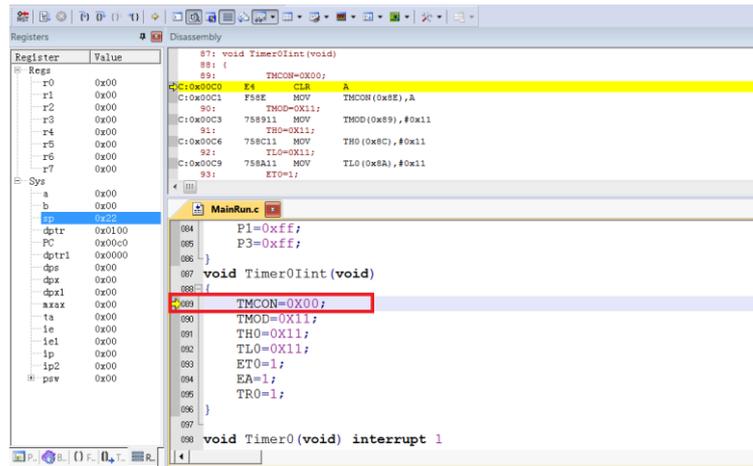


- ③ Open the “Disassembly” window and run Step

The current program stops at the function body Timer0Init(), press F11 to execute the program line that current yellow arrow points to, and then the arrow will point to the next line. The result is shown below. Press F11 repeatedly to execute the program line by line.

Open the “Disassembly” window and execute the disassembly line by default; To execute the source code line, left click the source code interface.





### 2.3.3.3 Step Over

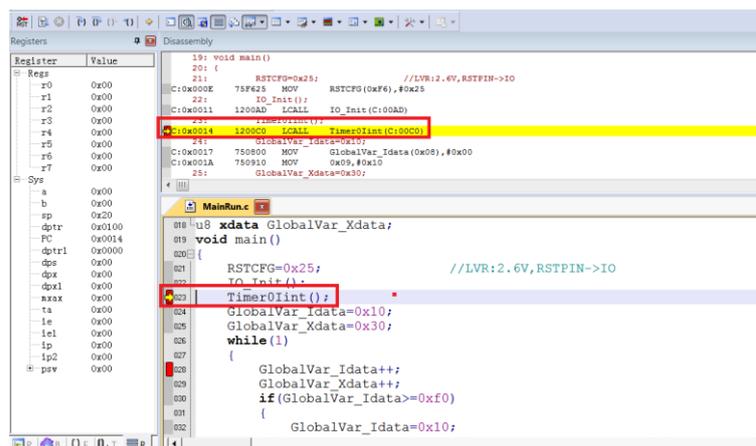
When executing the program to a subfunction or CALL/LCALL in the assembly, the operation will run the subfunction at full speed to the next command rather than stepping into the subfunction.

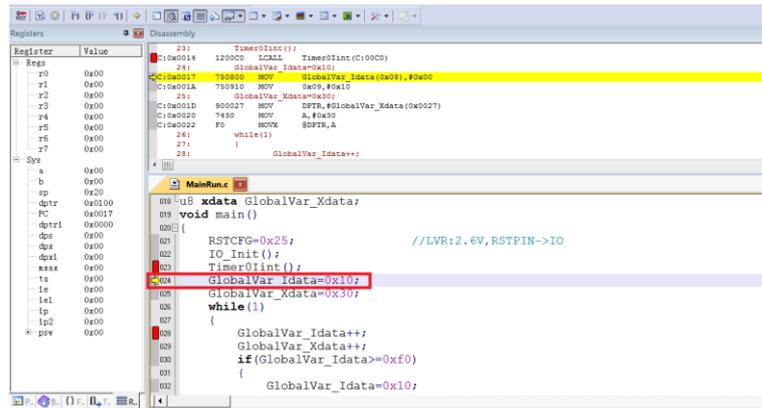
**Note:**

- ① If the position where the program is executed is not a subfunction, the operation will obtain the same result as that of step track;
- ② If any breakpoint exists in the subfunction, the program will stop at the breakpoint first.

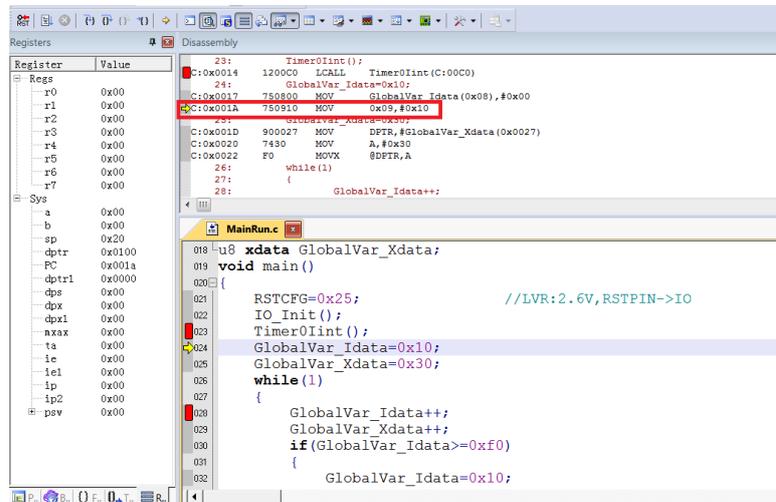
Click the shortcut icon “Step Over” or the shortcut key “F10”.

Still take the current breakpoint stopping at Timer0Init() as an example, press F10, keep the cursor outside the function and run this function at full speed, then the yellow arrow will point to the next line, as shown in the figure below:





Continue pressing F10 and observe the Disassembly window, its running results will be the same as that of Step Track, as shown in the figure below:



### 2.3.3.4 Run to Cursor Line

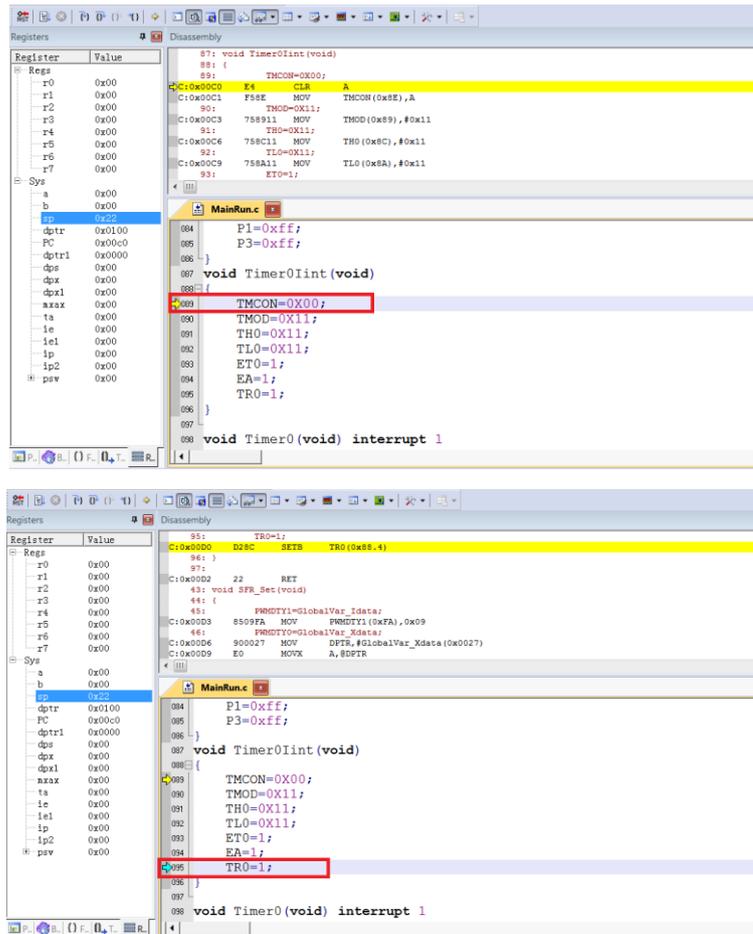
If the simulation efficiency between breakpoints through Step Track or Step Over is low and expected to run to the source line directly, run Run to Cursor Line.

Press the shortcut icon “Run to Cursor Line” or the shortcut key “Ctrl+F10”.

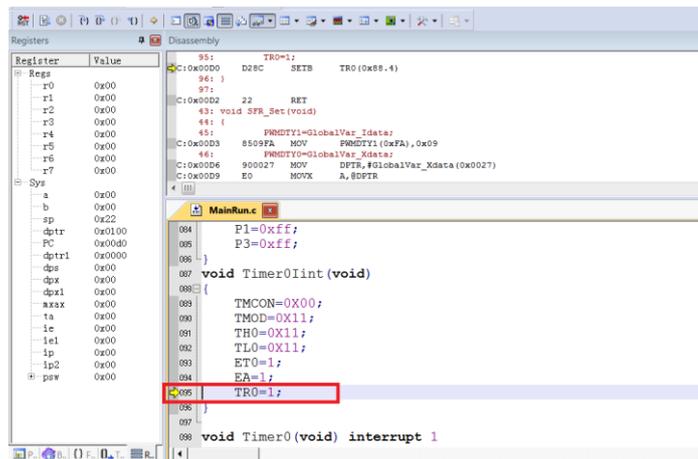
For example, as shown in Figure 3.2.2, select “Run to Cursor Line” to directly stop the program at the last line of Timer0Init() function.

Position Cursor: Left click the program line preset and a blue arrow appears indicating the line is selected, as shown in the figure below:

Note: The preset program line must be operable from the line with current yellow arrow, otherwise running to the cursor will become invalid.

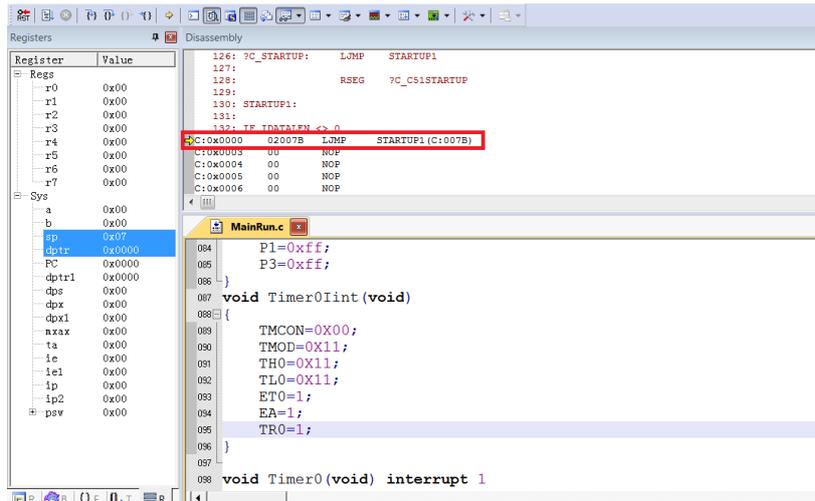


Press Ctrl+F10 and run to the cursor line at full speed before stopping, then the yellow arrow will appear at positioned cursor line, as shown in the figure below:



### 2.3.3.5 Reset

Click "Reset" button to reset the program with the yellow arrow pointing to the address 0x00, as shown in the figure below:



## 2.3.4 View and Modify Variables

### 2.3.4.1 Use Watch Windows to View and Modify Variables

In simulation debugging mode, view or modify current variable by Watch Windows

① Open Watch Windows

Click the shortcut icon "Watch Windows" to show 3 optional windows: Locals, Watch1, Watch2. Any Window icon with light yellow background indicates it is checked, and a sub-window appears at the bottom of KEIL interface, as shown in Figure 2.2.4-1; When clicking "Watch1" or "Watch2", a Watch interface appears at the bottom of KEIL interface, as shown in Figure 2.2.4-2



Fig. 2.2.4-1

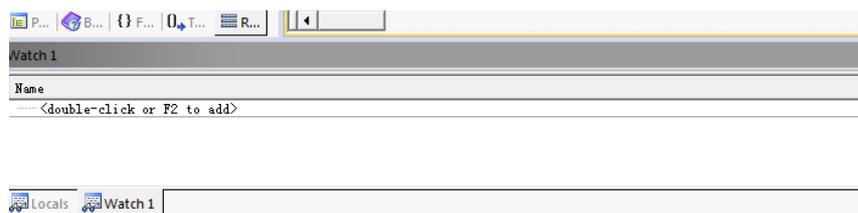


Fig. 2.2.4-2

② Fill in the variable to be pre-viewed/pre-modified

In the "Name" column, enter the Name of a variable that must exist in the source code, otherwise it is invalid. At this time, the value of current variable appears in corresponding "Value" column, as shown in Figure 2.2.4-3

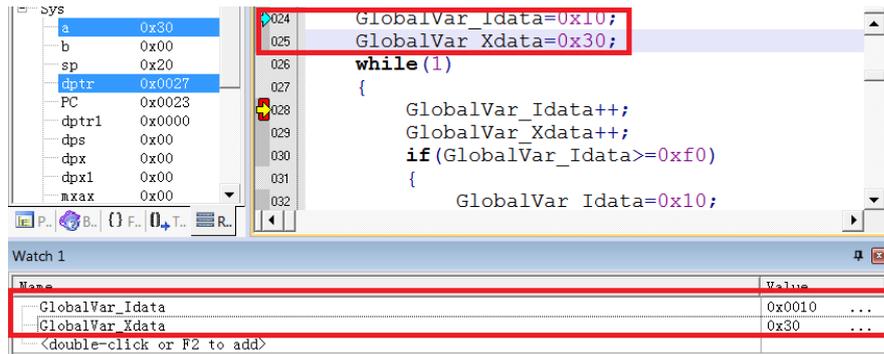


Fig. 2.2.4-3

In the figure above, add the variable GlobalVar\_Idata and GlobalVar\_Xdata, the values in Watch1 are 0x0010 and 0x30 respectively.

Besides, in C source code interface, when the mouse moves over the variable name, its value, type and address will appear as well, as shown in Figure 2.2.4-4.



Fig. 2.2.4-4

① Modify the value of variable

In the “Value” column of the variable to be modified, double click and modify the value, then click the left mouse at any position, the variable column will turn to dark color, as shown in Figure 2.2.4-5.

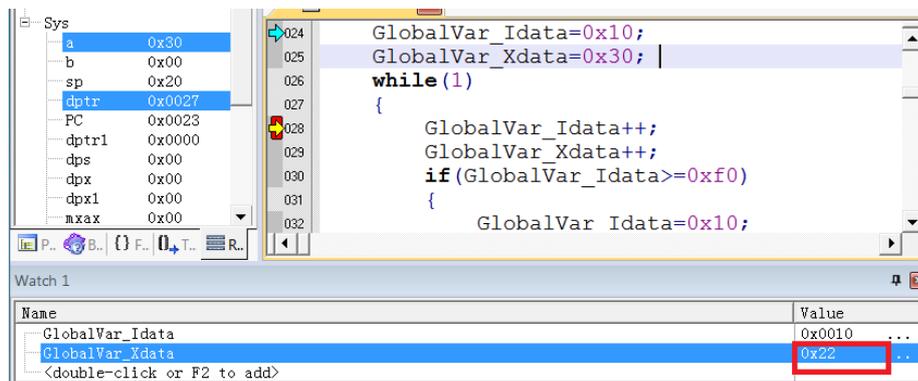


Fig. 2.2.4-5

In the figure above, the value of GlobalVar\_Xdata is modified as 0x22.

### 2.3.4.2 Use Memory Window to View and Modify Variable

① Open Memory Windows

Click “Memory Windows” to show 4 optional windows: Memory1 - Memory4, as shown in Figure 2.2.4-6. Any Window icon with light yellow background indicates it is checked, and a sub-window appears at the bottom of KEIL interface; when clicking any window, a Memory interface appears at the bottom of KEIL interface, as shown in Figure 2.2.4-7.

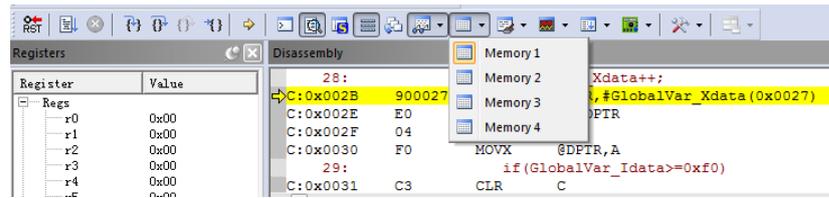


Fig. 2.2.4-6

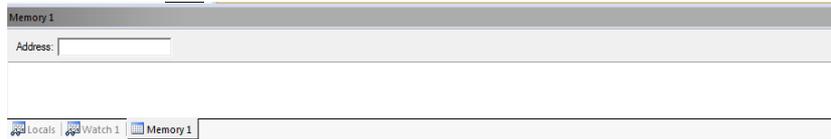


Fig. 2.2.4-7

③ View/modify variable by address

In Memory interface, the Address column is used to input the starting address of memory to be displayed. If the address and memory area of current variable are known, perform the following commands.  
 Ram data area: D:xx; RAM idata area: I:xx; Ram Xdata area: X:xx.

After completing the commands above, the value of variable beginning with Start Address will be displayed, and you can also double-click to modify it.

Take GlobalVar\_Xdata as an example, use 0x27 as the Start Address and view the value of Xdata area, as shown in Figure. 2.2.4-8.

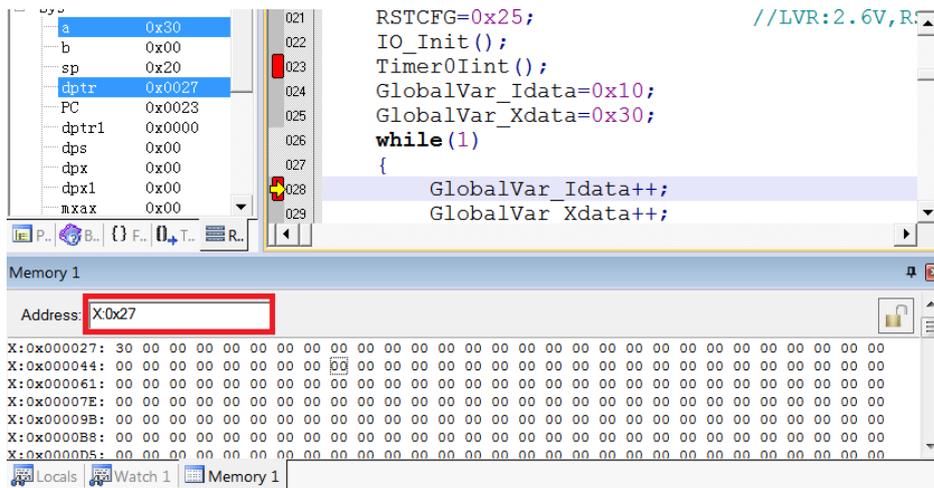


Fig. 2.2.4-8

In the figure above, the address value of X:0x000027 is 0x30, that is, the value of GlobalVar\_Xdata is 0x30, same as the results observed in Watch1, as shown in Figure 2.2.4-3.

Likewise, you can also modify the value of variable here, shown as follow:

1. Double click the value of the address in Memory to modify, as shown in Figure 2.2.4-9

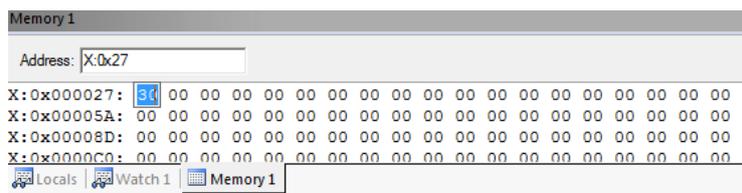
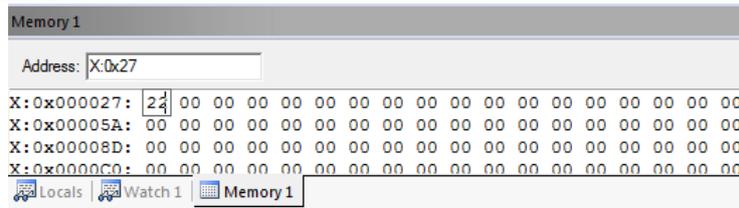


Fig. 2.2.4-9

2. Fill in a new value and click at any position to complete, as shown in Figure 2.2.4-10



Note: If the variable address is not clear, we recommend using Watch Windows.

### 2.3.4.3 View and Modify SFR

① Open Watch Windows

Same as the Watch window opened in viewing and modifying variables

② Fill in SFR name to be pre-viewed/pre-modified

Fill in SFR name to be operated in “Name” column, this SFR must exist in the head file, otherwise it is invalid. At this time, the value of this SFR appears in corresponding “Value” column, as shown in Figure 2.2.4-11.

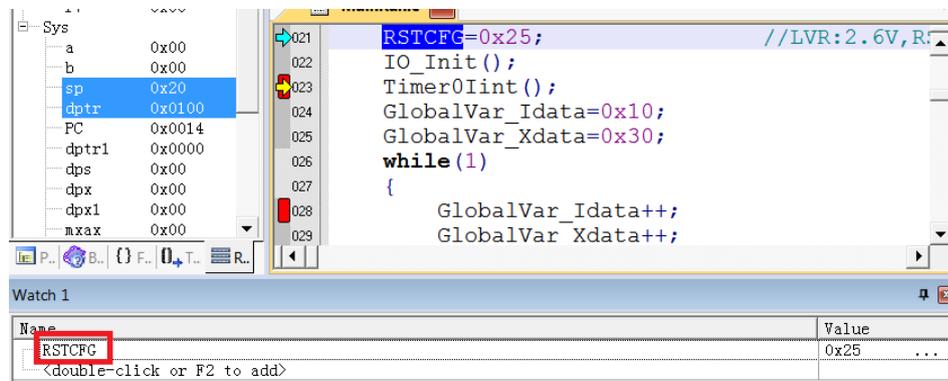


Fig. 2.2.4-11

In the “Value” column of the SFR to be modified, double click and modify the value, then click the left mouse at any position, the variable column will turn to dark color, as shown in Figure 2.2.4-12.

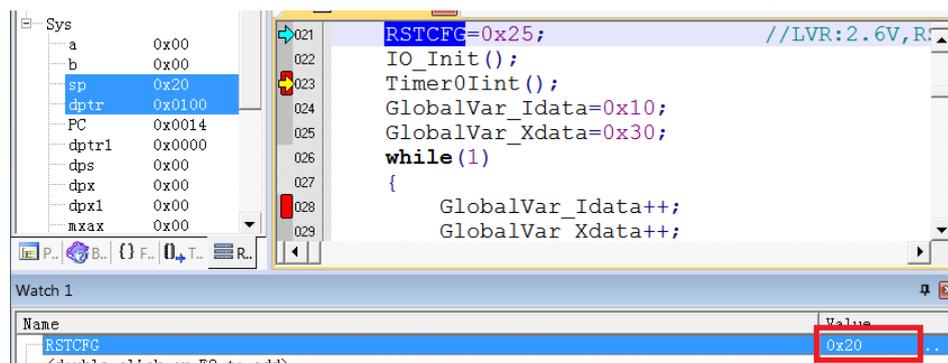
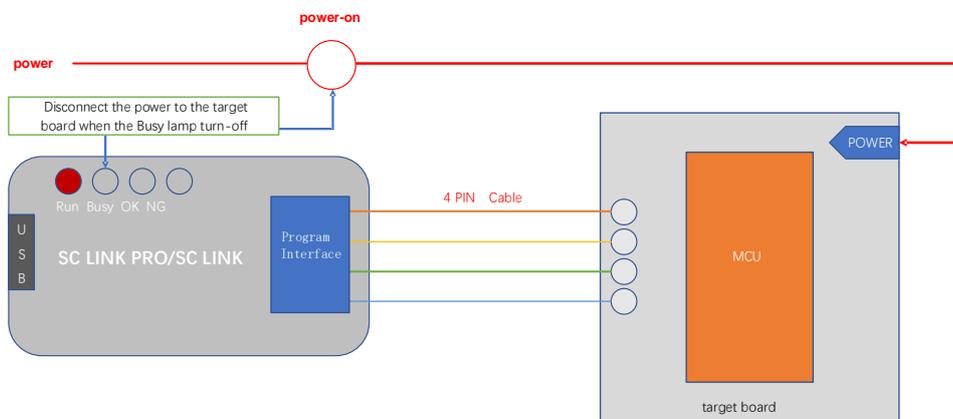
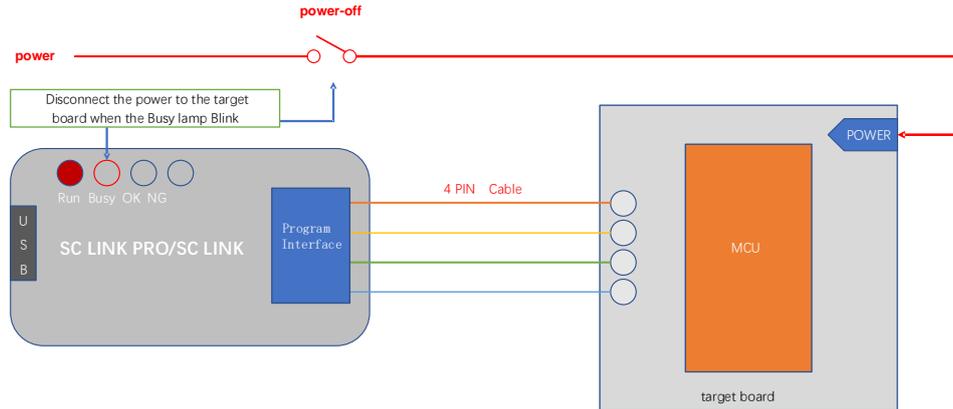


Fig. 2.2.4-12

### 2.3.5 Descriptions for External Power Supply Simulation

Steps for external power supply simulation:

- ① Power on the target board with external power supply;
- ② Connect the target board with SC LINK PRO in power-off state;
- ③ Connect SC LINK PRO to PC via USB;
- ④ Open KEIL software, configure the programming options and click “Download”;
- ⑤ Disconnect the power to the target board once Busy lamp of SC LINK PRO starts flashing;



⑦ Connect the power to target board until Busy lamp turns off; when Busy lamp turns on, it enters Download mode;

After Download is completed, you can enter the simulation mode without powering on again.

## 2.3.6 Notes for Simulation

- ① The programming interface CLK and DIO will be occupied during the simulation process, and do not operate these 2 IOs in the simulated code area;
- ② During the simulation process, do not disconnect USB or programming interface directly to avoid Keil breakdown. To disconnect USB or programming interface, exit Debut mode first.
- ③ For notes of external power supply simulation, see [2.2.5 Descriptions for External Power Supply Simulation.](#)

## 2.4 Instructions for SC LINK PRO Programming

### 2.4.1 Firmware Upgrading

The firmware of SC LINK PRO features online upgrading to add new functions or correct problems. Specific methods for firmware upgrading are shown below:

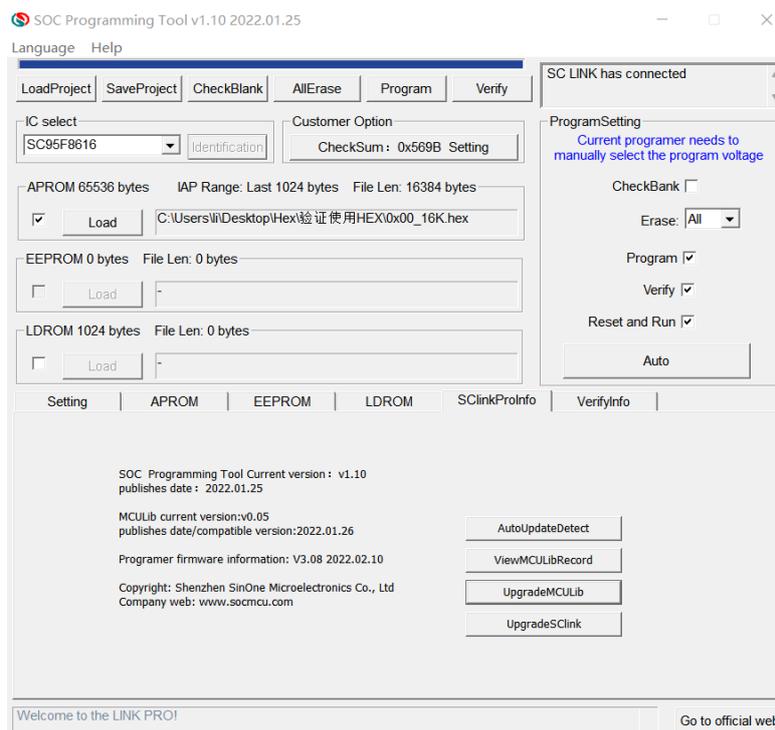
- ① For better experience, please visit <http://www.socmcu.com> to download the latest firmware files;
- ② There are 2 ways to enter IAP update mode. You are advised to select **Mode 1** for there is no need to plug SC LINK PRO:

- (1) **Mode 1:** After connecting SC LINK PRO to PC, open SOC Programming Tool and click “**Upgrade Programmer Firmware**” on “**Programmer Information**” menu. At this time, Busy lamp on SC LINK PRO (red) will flash, indicating that it enters Firmware Upgrading mode;
- (2) **Mode 2:** In power-off state of SC LINK PRO, long press “Programming” button, connect it to PC USB, at this time, Busy lamp on SC LINK PRO (red) will flash, indicating that it enters Firmware Upgrading mode;
  1. In “Open File” dialog box, locate the firmware file (.iap file) and click “Open”;
  2. Pop up the dialog box to display the current version and the version to be updated, and click “OK” button;
  3. After the update is completed, SC LINK PRO will exit Firmware Upgrading mode automatically;
  4. View the version information of upgraded firmware in “**Programmer Information**”.

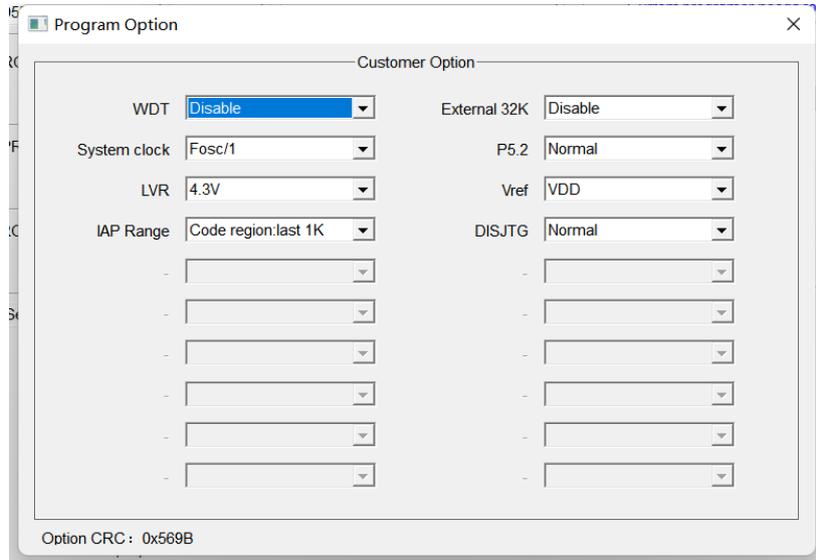
**Note:** During the process of firmware upgrading, you are not advised to perform other operations.

### 2.4.2 Steps for Online Programming

- ① Connect SC LINK PRO with the programming interface of target board;
- ② Connect SC LINK PRO to PC via USB cable, open SOC Programming Tool and select IC model from the drop-down list of “Chip Select”;



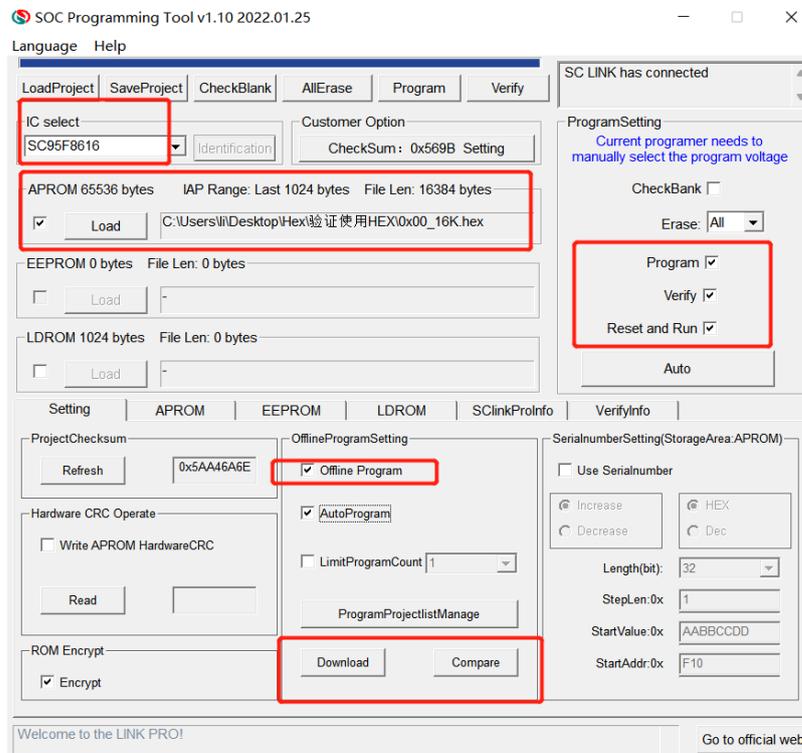
- ③ Check the target area to be programmed and click “Load” to load the code file to be programmed (HEX/BIN file);
- ④ Configure IC option in “option” tab;



- ⑤ Select programming voltage and check Erasing, Programming and Verifying, etc.;
- ⑥ Click “Auto Programming” button to perform corresponding programming and verifying;

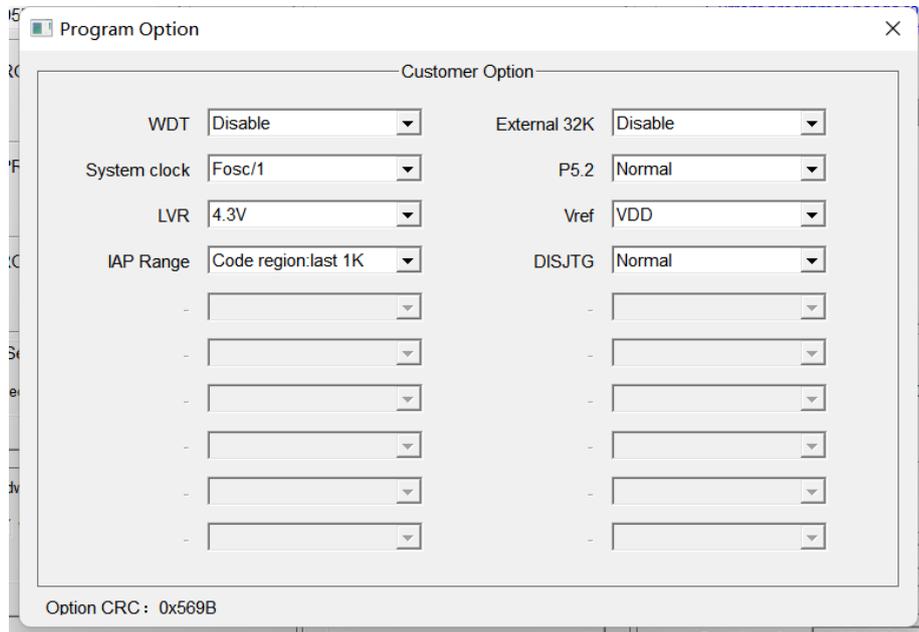
### 2.4.3 Steps for Offline Programming

- ① Connect SC LINK PRO to PC via USB cable, open SOC Programming Tool and select IC model from the drop-down list of “Chip Select”;



- ② Check the programming area, click “Load” to load the code file to be programmed (HEX/BIN file);
- ③ Check the operation checkbox in “ProgramSetting”, such as Program + Verify;
- ④ Select Programming mode: Check “Auto Programming” for automatic programming mode, and uncheck for manual programming mode:

1. In manual programming mode, press the button to program;
  2. In auto programming mode, SC LINK PRO will complete IC detection and programming automatically after power-on.
- ⑤ Configure IC option in “option” tab;

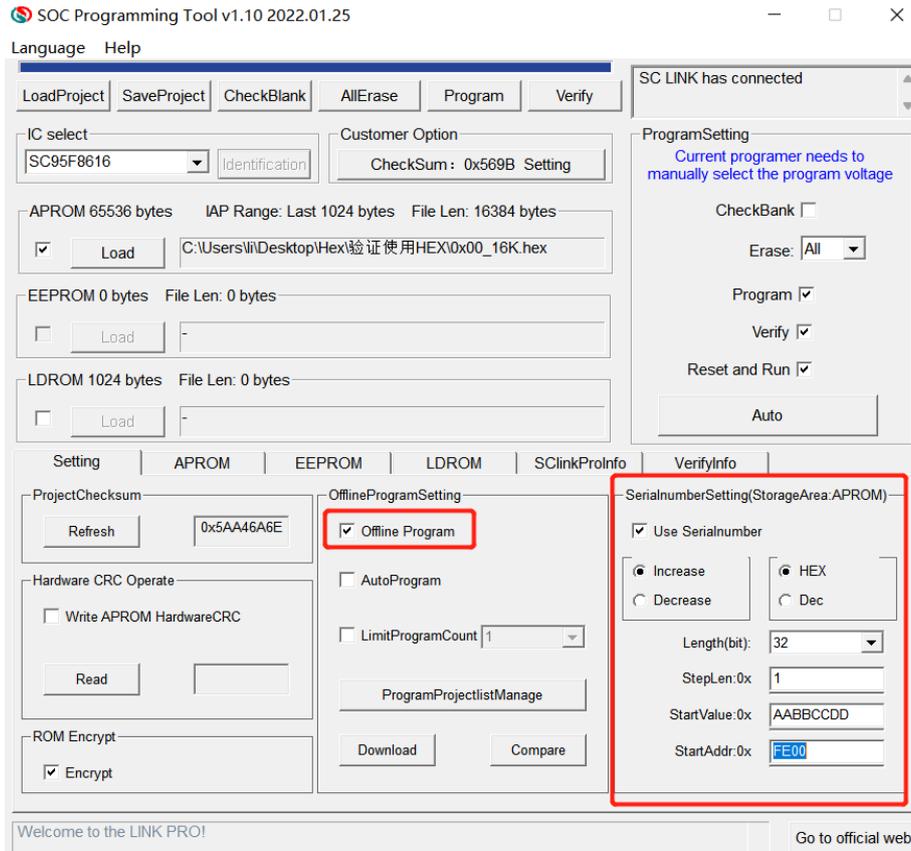


- ⑥ Click “Download” button and download the code file to SC LINK PRO;
- ⑦ Disconnect SC LINK PRO with PC USB, and use the external power supply via USB to power SC LINK PRO to start programming.

## 2.4.4 Comparison

To confirm if the programming code and configured items loaded by SC LINK PRO are correct, connect SC LINK PRO to PC via USB and open SOC Programming Tool, and then click “Compare” button to check if the current programming configurations and programming codes loaded consistent with the contents loaded in SC LINK PRO.

## 2.4.5 Instruction for S/N

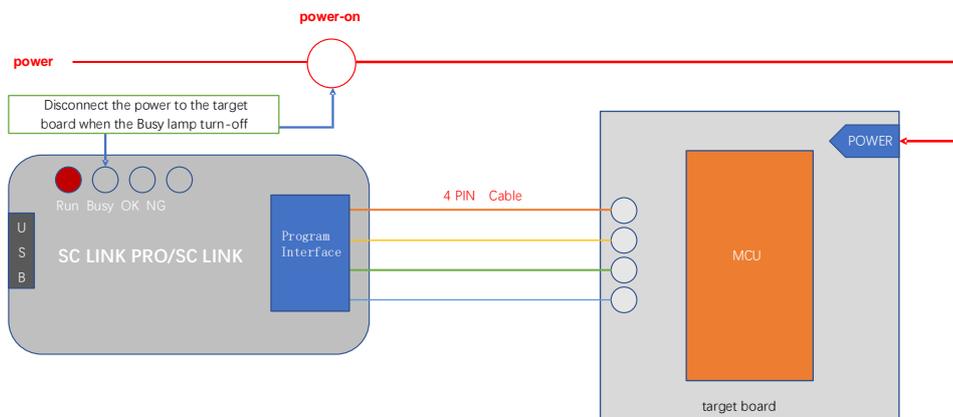
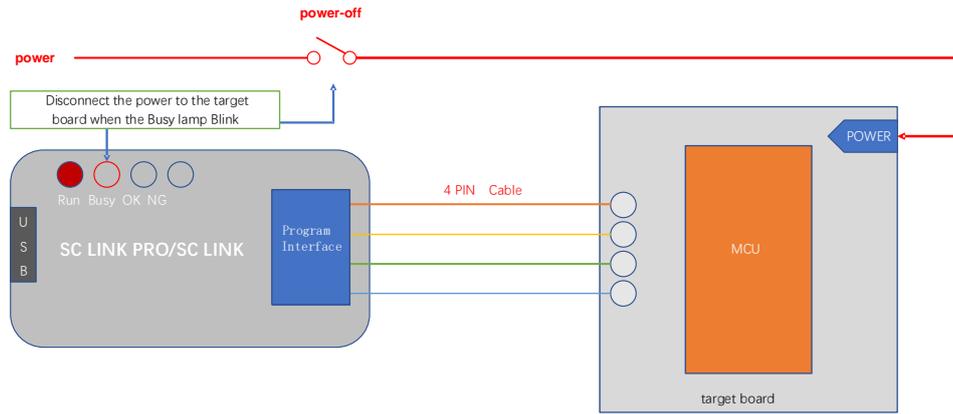


- ① S/N function is available for SC LINK PRO in offline mode.
- ② Low S/N data is stored in low address, for example, write 32BITS S/N 0XAABCCDD in 0X0F10, the value written for 0X0F10 is 0XDD, the value written for 0X0F11 is 0XCC, the value written for 0X0F12 is 0XBB and the value written for 0X0F13 is 0XAA.
- ③ The S/N must be 4 bytes in length with the start address of a multiple of 4 (such as 0F10H, 0A04H, etc.), otherwise, an error will be reported upon programming.
- ④ It is recommended to set the S/N address outside the program space so as to avoid the program code from being covered by S/N data, resulting in being unable to perform verifying operation after programming.
- ⑤ S/N supports power-off memory function.

## 2.4.6 Descriptions for External Power Supply Programming

Steps for external power supply programming:

- ① Power on the target board with external power supply;
- ② Connect the target board with SC LINK PRO in power-off state;
- ③ Connect SC LINK PRO to PC via USB;
- ④ Open SOC Programming Tool, configure the programming options and click “Programming”;
- ⑤ Disconnect the power to the target board once Busy lamp of SC LINK PRO starts flashing;

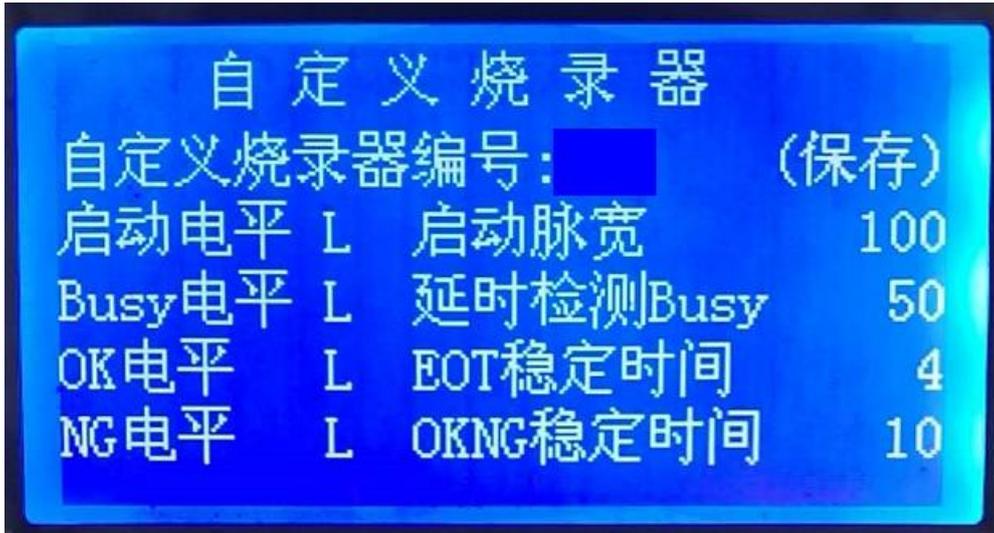


- ⑥ Connect the power to target board once Busy lamp turns off; when Busy lamp turns on, it enters
- ⑦ After programming is completed, disconnect the target board to ensure that the programmed IC exits Programming mode.

## 2.4.7 Instructions for Connecting Programmer

For ease of operation, we use programmer control interface to control IC programming with software programming instead of manual programming.

- ① Please use manual programming mode with unchecking “Auto Programming” option when downloading the programming program in SOC Programming Tool.
- ② Start in programmer control interface is the start input channel for programming and valid in low level. It is recommended to release the pull-down operation of start after detecting low level of busy interface signal is output when starting the programming for start;
- ③ After decrease the level for start, detect NG signal interface, OK signal interface and busy signal interface; low level in NG signal interface indicates programming is failed, low level in OK signal interface indicates programming is succeeded and low level in busy signal interface indicates programming in progress; only one signal interface can be output in low level at a time; if more than two signal interfaces have low levels at the same time or all single interfaces have high levels, programming shall be stopped .
- ④ Programmer programming-related parameters are set as follows:



## 2.4.8 Notes for Programming

① Overload protection and reminds:

1. A maximum output current of SC LINK PRO is 400mA; if the load exceeds this range, self-resettable fuse will be enabled;
2. If overload occurs, please perform IC programming in external power supply mode

② For notes of programming in offline programming mode, see [2.3.6 Descriptions for External Power Supply](#) Programming;

③ In any programming mode, any pin of programmed IC connected to other power-on system will result in programming failure;

④ For IC on-board programming, you are advised to remove the peripheral capacitance of programming pin CLK and DIO.

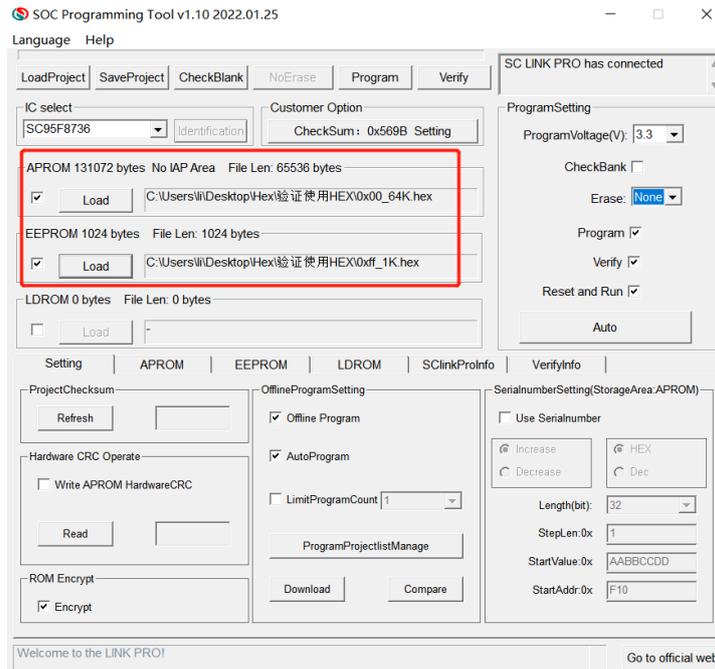
⑤ **For 95 series Flash-type IC programming, please check “Sector Block or Full Erase” for programming, otherwise it may result in programming failure.**

## 2.4.9 Instruction for EEPROM Area Programming

① Select the programming area:

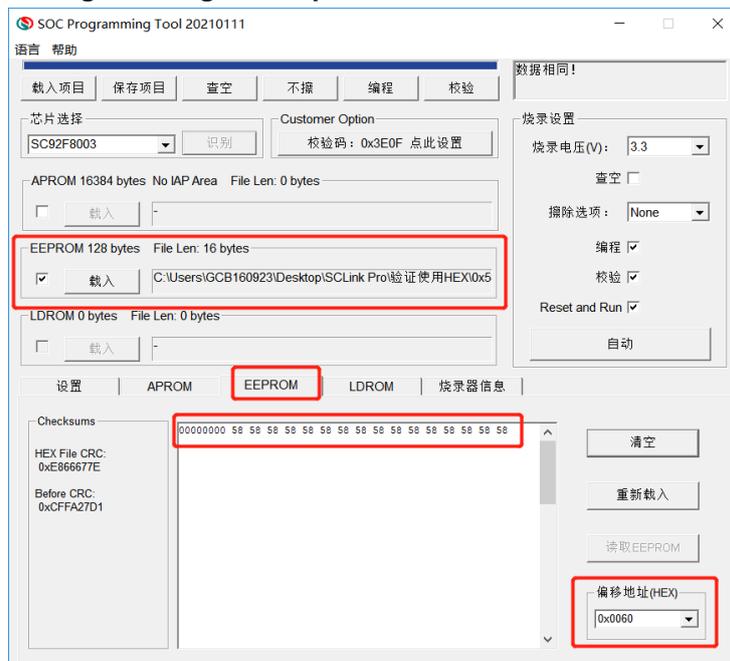
1. If both APROM and EEPROM are programmed, check “APROM+EEPROM” at the same time
2. If only EEPROM is programmed, only check “EEPROM”

APROM+EEPROM is used as the example for subsequent instructions

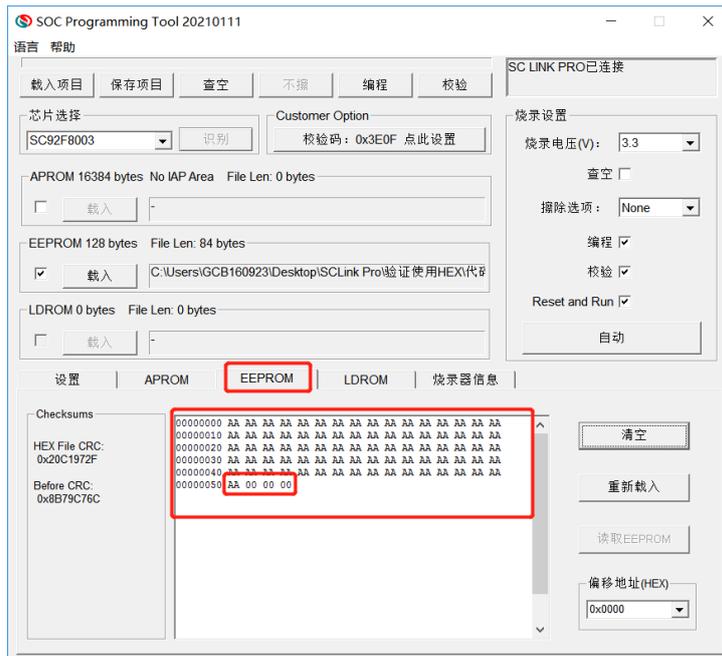


② Select EEPROM tab and configure the start address of EEPROM, this address determines the start address for programming in EEPROM. Select corresponding start address, the code programmed to EEPROM will be written from this start address. As shown in the figure below, if the start address is 0x0060, the first byte for this code (0x00) will be written in 0x0060 in EEPROM and the second byte (0x01) will be written in 0x0061 in EEPROM, and so forth until all codes are written in EEPROM.

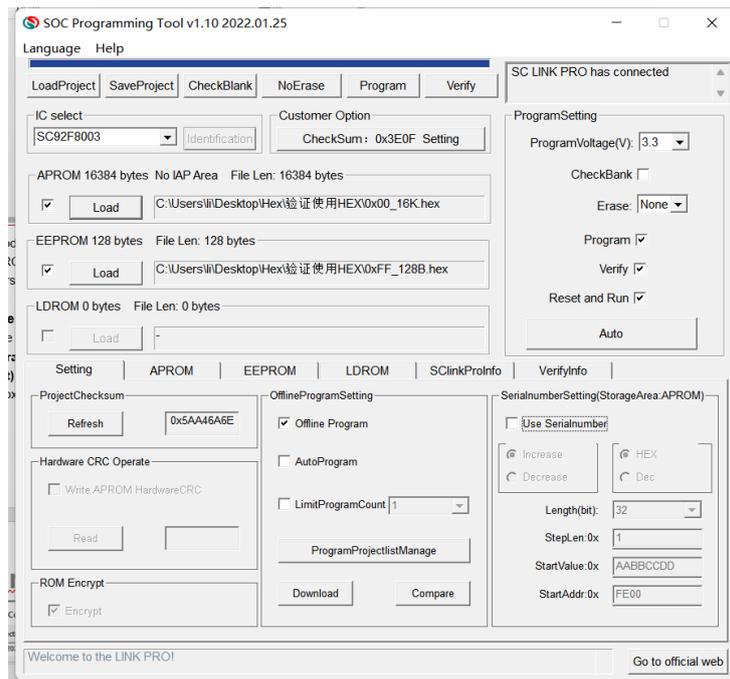
**Note: If the offset address is 0x0000, EEPROM length will be limited by the software; if the offset address is the non-zero address, the offset address + length is composed of 128 bytes at most with the former being the integer multiple of 4.**



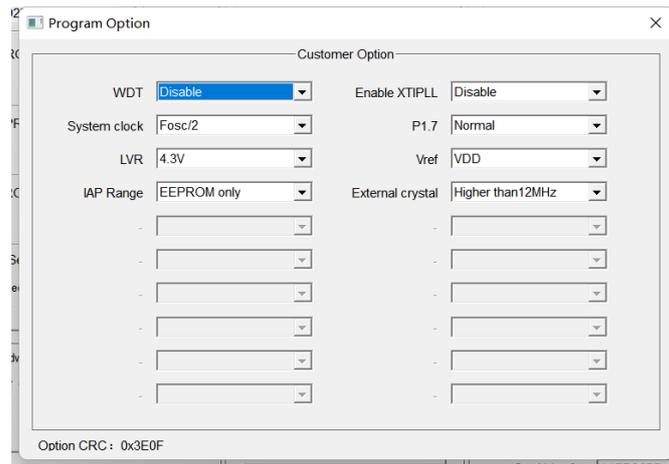
③ If the length of the code programmed into EEPROM is not a multiple of 4, the address less than a multiple of 4 will be added with 0 automatically. As shown in the figure below, the address of last 3 bytes less than a multiple of 4 is added with 0 automatically.



④ Load APROM and EEPROM file respectively, where, HEX file loaded in EEPROM is the file to be programmed in EEPROM (You can generate the file by the example project “EEPROM Project” provided by SOC)



⑤ After the files are loaded, confirm the code checksum and option



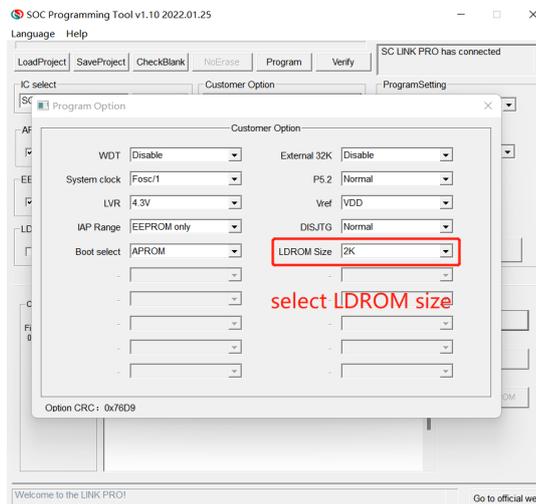
⑥ Connect SC LINK PRO, check “Program + Verify” and click “Auto”

## 2.4.10 Instruction for LDROM Area Programming

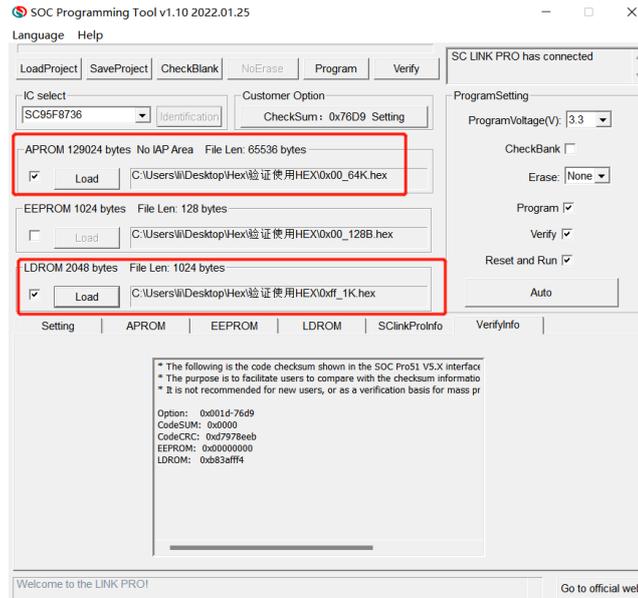
① Programming area selection:

1. If you need APROM area and LDROM area to burn at the same time, you need to check APROM+LDROM at the same time, specific IC LDROM need to see the specification to determine, some IC can directly tick LDRAM for programming, such as 95F861X. Some ics need to select the size of LDRAM above OPTION before they can be used, such as 95F873X
2. If only the LDROM area is program separately, only select LDROM

The following uses APROM+LDROM, IC 95F8736 as an example.



② Load APROM and LDROM files respectively, where: HEX file loaded in LDROM area is the file to be program in LDROM area.



- ③ File loading is complete, confirm the code checksum is correct, confirm option is correct
- ④ Connect SCLINK, select fan eraser for erasing, check "programming + Verification", and click "Automatic"

## 2.4.11 Multi-code Management

### 2.4.11.1 Introduction to Multi-code Management

Multi-code management function supports storing multiple project on SC LINK PRO so as to facilitate batch programming for multiple project codes. Before using multi-code management, please confirm the following:

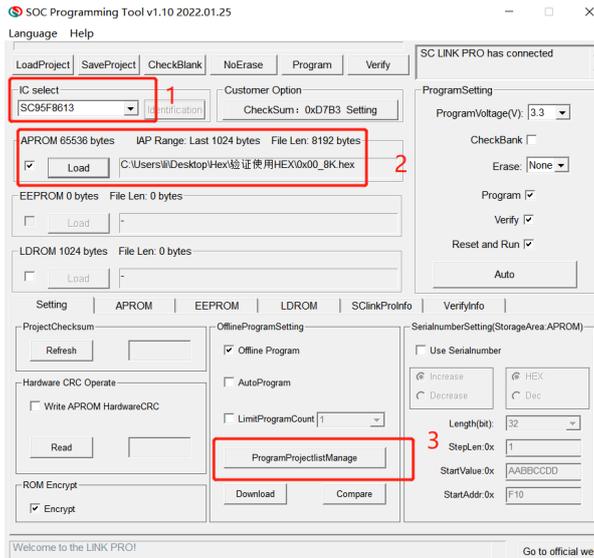
(1) Preparations: ① SC LINK PRO; ② SOC Programming Tool v0.10 or later; ③ Firmware V0.1 and later.

(2) Before using multi-code programming mode, please carefully read [2.3.10 Notes for Multi-code Management](#).

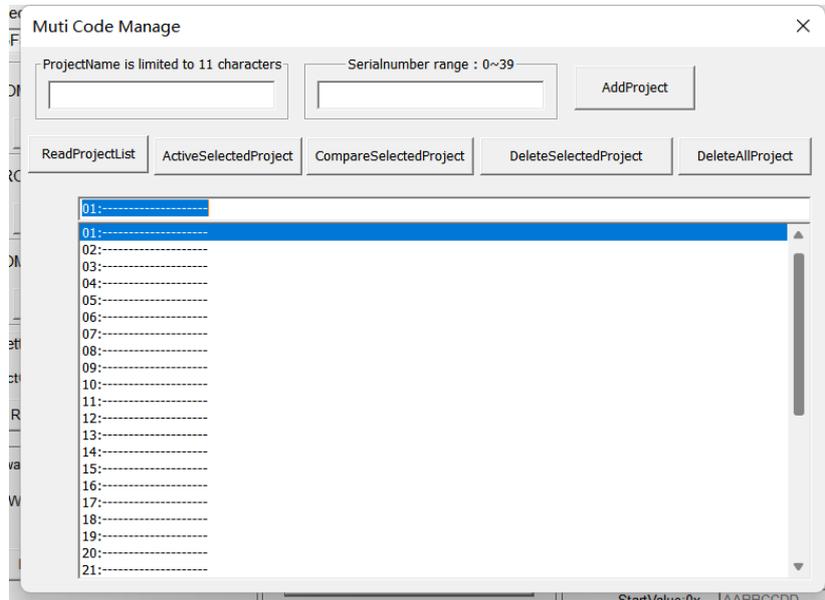
### 2.4.11.2 Instructions for Multi-code Management

#### 1. Add Multiple-code Project List

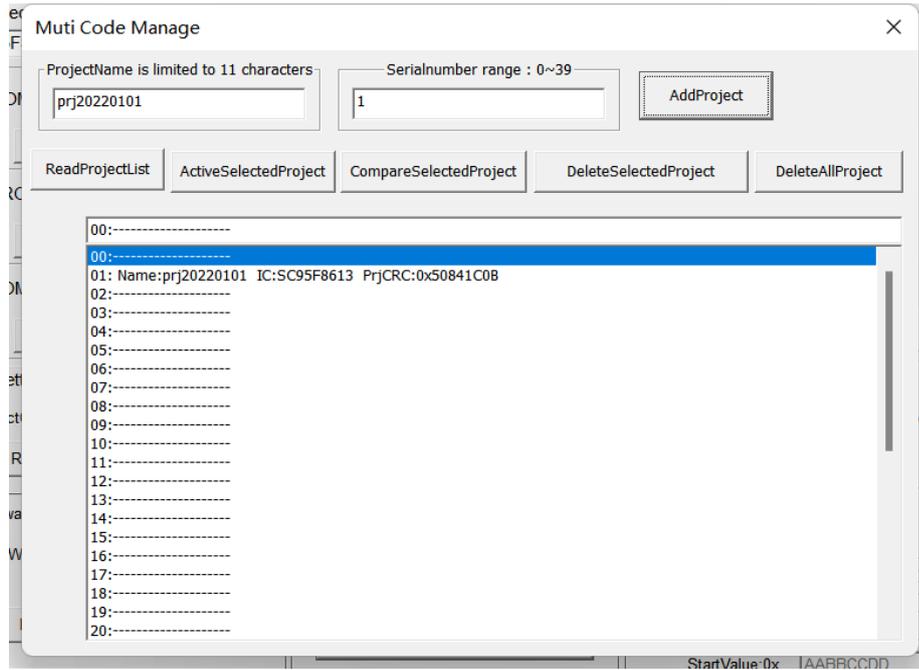
(1) Open SOC Programming Tool v0.10 or later, as shown in the figure below, select the target chip model, load the target programming code to APROM or other area and confirm the project ProgramSettings, then click "Programming Project List Management" button to enter Multi-code Management page. **(Note: It is unable to enter multi-code management in Partition Programming Mode; To exit the Partition Programming mode, refer to [2.3.11.3 Operating Procedures for Partition Programming](#))**



(3) Then enter “Multi-code Management” page, it is empty for first use (no project list), as shown in the figure below.



(4) As shown in the figure below, input the project name to be saved in “Project Name” column (English character with no more than 11 characters), then fill in the No. in “No. Range”, and click “Add Code Project” to save the loaded project to SC LINK PRO.

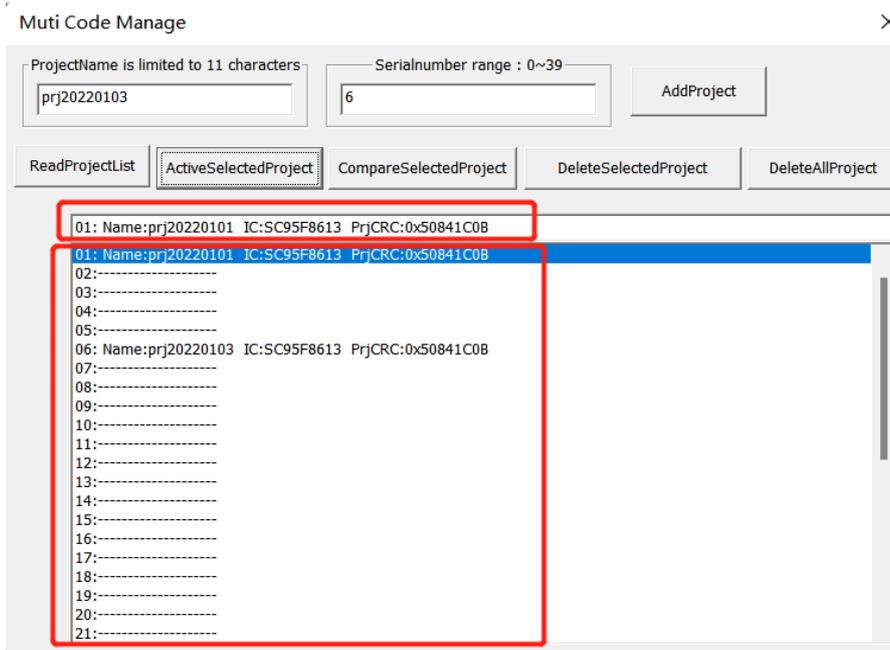


(5) After adding the code project, you can see the information of the added project (including project No., project name, IC name and CRC of target code project, etc.).

(6) For SC LINK Pro users, up to 40 Code projects can be added, all of which can be saved to the external memory of the programmer.

### 2. Activate Multi-code Project List

(1) If at least one Code project is added to the project list, select this project and click “Activate Selected Project” (**Note: In offline programming mode, priority to programming shall be given to the activated project in multi-code project list**), then you can see the information of activated project in the text box at the upper of the project list; if the text box is empty, no project is activated. A project is activated as shown in the figure below.



### 3. Delete Multi-code Project List

(1) Delete the selected project. For multiple project lists, you can delete unnecessary multi-code projects; select a project and click “Delete Selected Project” to delete the selected code project from the memory of

the programmer.

(2) Delete all projects. For multiple project lists, you click “Delete All Projects” to delete all multiple-code projects added.

#### 4. Read Multi-code Project List

After the programmer has added and stored multiple-code projects, you can click “Read Project List” through online programming tool to obtain the information of added project list.

#### 5. Compare Multi-code Project List

After a project is added to the multi-code project list, select the project to be compared and then click “Compare Selected Project” to compare it with the current loaded project or project code. If yes, the data is the same. If not, it indicates that the data of currently activated project is inconsistent with that of loaded project code. Besides, you can also compare the CRC in the project list with the checksum of the loaded project code.

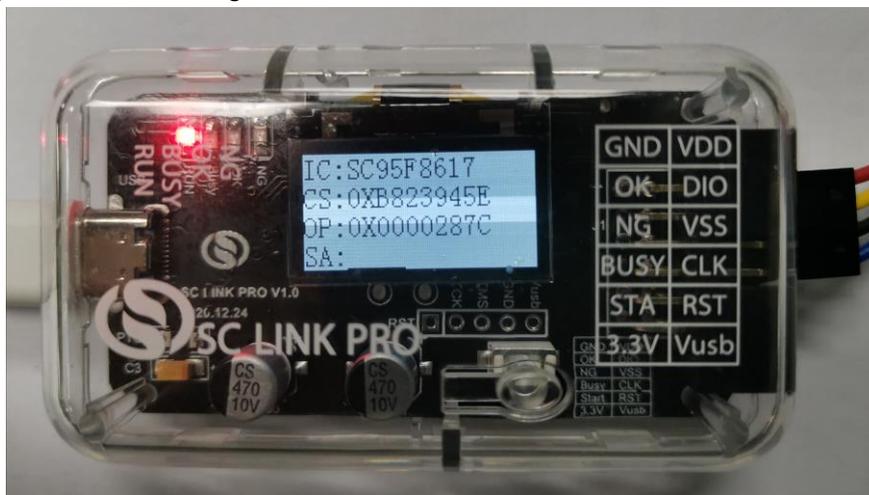
#### 6. Exit Multi-code Management

When multi-code management is not required, delete the activated multi-code projects or all projects to exit multi-code management and restore the normal programming mode.

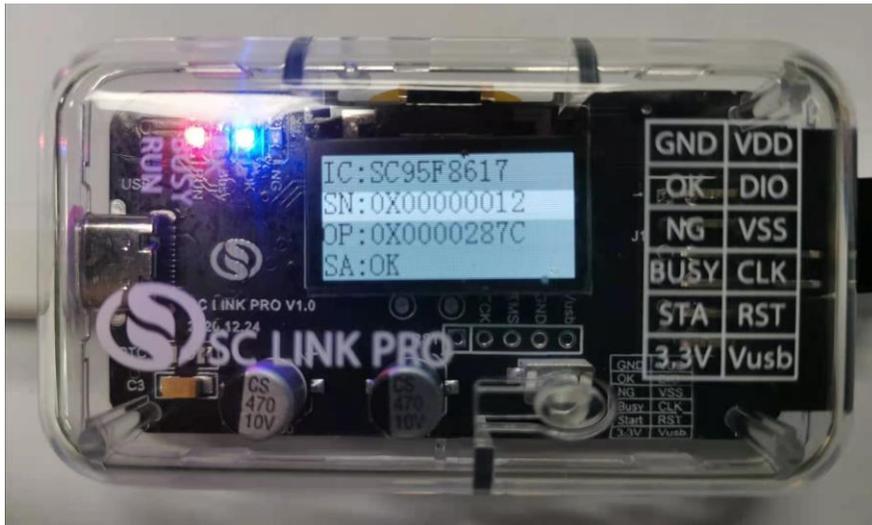
#### 7. Programming Multi-code Project

For the multi-code project already activated, you can program and check the target project in offline programming mode.

As shown in the figure below, black characters on the white background are displayed on OLED, indicating that it enters Multi-code Project Programming mode. After pressing “Programming” button, you can see the programming is succeeded. At this time, the project code activated in Multi-Code project list has already been programmed to the target IC.



Offline Programming in Multi-Code Programming Mode



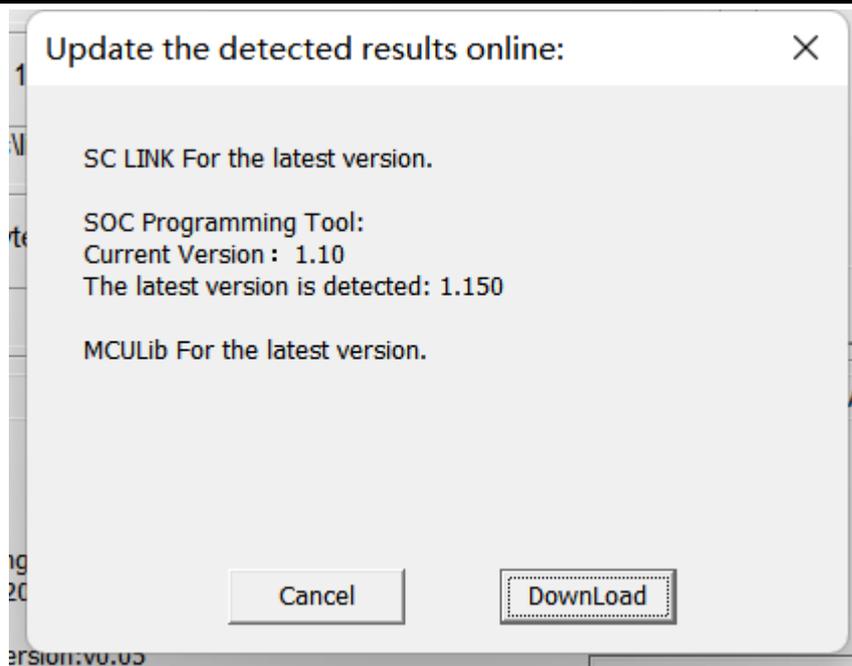
Offline Programming Succeeded in Multi-Code Mode

### 2.4.11.3 Notes for Multi-Code Management

1. Before using the multi-code management, close the partition programming first (For partition programming, please refer to [2.3.11 Partition Programming](#)).
2. If there is no activated project or no project at all in Multi-code Project list, the multi-Code management is invalid. At this time, it is in ordinary programming mode, and the project code downloaded offline will be programmed.
3. If there is any activated project in multi-code project list, this activated project will be programmed offline.
4. In each Code project downloaded, APROM and LDROM support a maximum of 128KB and 4KB respectively.
5. When the black characters on the white background are displayed on OLED in offline programming mode, it indicates it is currently the multi-code in activated state and will program this activated project code; Displaying the white characters on the black background on OLED indicates that it is in normal programming mode currently.

### 2.4.12 Automatic Upgrading Detection

SOC Programming Tool supports featuring online upgrade detection, can automatically detect the version of programming tool, MCU library and SC LINK PRO firmware under the circumstance of user PC connecting to the network; when a new version is found, the system will prompt user the new version detected and provide the download address. The figure below shows the popped-up online detection update dialogue box.



## 2.5 Frequently-asked Questions and Answers

SC LINK PRO Abnormalities	Cause	Solution
<b>Online programming display: “Please connect MCU with the programmer”, or the offline programming is failed</b>	The programming cable is connected abnormally	Check if four programming cables are connected properly
	The programming cable is too long	The length of SC LINK PRO programming cable can not exceed 60cm
	CLK or DIO pins of the chips have 100pF capacitance to GND	The capacitance on the programming signal interface may cause programming timing error, when programming by using SC LINK PRO, the capacitance to GND of the programmed CLK and DIO shall be within 100pF
	Resistance exists between SC LINK PRO programming interface and the chip programming interface	Try to avoid series resistance between the lead-out point of programming and the chip; if it is unavoidable, guarantee the series resistance value does not exceeds 100R, and minimize the programming cable upon programming
	CLK and DIO of chips are connected to the same digital tube	In circuit design, try to avoid connecting CLK and DIO of the chip to the same digital tube
<b>Four indicators flash at the same time</b>	Short circuit in VDD and VSS of programming target board/chip	Troubleshoot before programming
<b>Busy lamp keeps flashing in online programming mode</b>	SC LINK PRO enters Firmware Upgrading mode	Upgrade firmware
<b>Running lamp keeps off after power-on</b>	The supply voltage is abnormal	Check if the supply voltage of SC LINK PRO is not less than 4.5V

## 3. Programmer & Simulator SC LINK

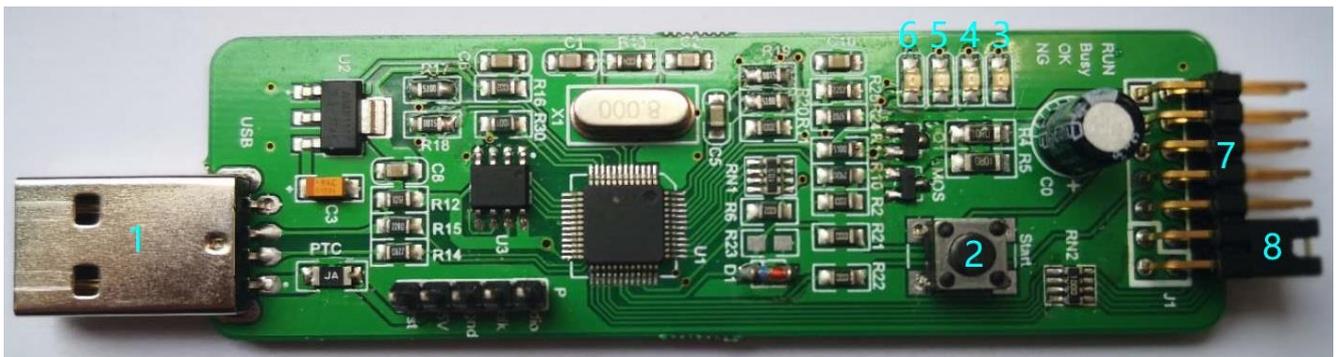
### 3.1 Hardware Description

#### 3.1.1 Specifications

Parameter Name	Min	Max	Unit	Test Conditions
Operating Voltage	4.5	5.5	V	
Operating Current (idle)	-	70	mA	Operating Voltage=5.0V
Output Current	-	400	mA	Operating Voltage=5.0V Supply Current≥500mA
Supply Voltage of Programming Interface (5V)	Equal to Supply Voltage		V	
Supply Voltage of Programming Interface (3.3V)	3.2	3.4	V	Operating Voltage≥4.5V
Length of External Programming Cable	-	60	cm	Operating Voltage≤5.0V
Capacitance Range between VDD and VSS upon Programming on Board	-	1000	uF	Operating Voltage≤5.0V

#### 3.1.2 Descriptions

SC LINK is suitable for offline/online writing, simulation and TouchKey debugging of SOC 8051 series IC.



- ① USB Interface: Used for connecting PC and power supply
- ② Programming buttons: Programming start in offline programming mode; Keep holding and power on will enter firmware upgrading mode
- ③ RUN Lamp: Red light indicates power on
- ④ Busy Lamp: Red light, lamp flashes means IC programming in offline programming mode or firmware upgrading
- ⑤ OK Lamp: Blue light indicates programming completed
- ⑥ NG Lamp: Red light means programming failed
- ⑦ Cable Interface: The cable interface below is sorted subject to the actual sequence with the function category distinguished by the font color: blue for programming interface, black for programmer interface

and red for power output interface

- ⑧ Select short tap cap for firing voltage tap

<b>VDD</b>	<b>DIO</b>	<b>VSS</b>	<b>CLK</b>	<b>3.3V</b>	<b>voltage tap</b>	<b>5V</b>
<b>GND</b>	<b>OK</b>	<b>NG</b>	<b>Busy</b>	<b>Start</b>	<b>3.3V</b>	<b>5V</b>

### 3.1.2.1 Function Description for Programming Interface

Use 4PIN cable for ICP programming, details are shown in Figure

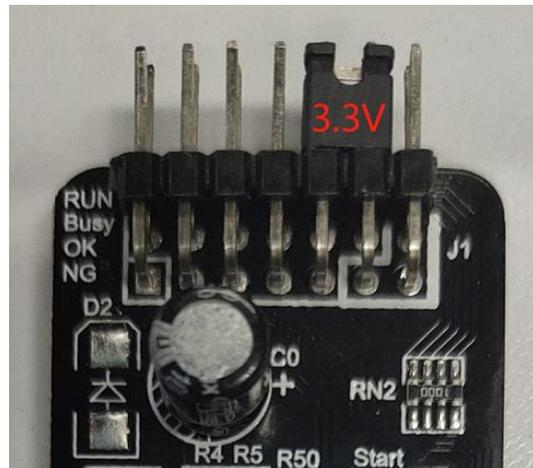
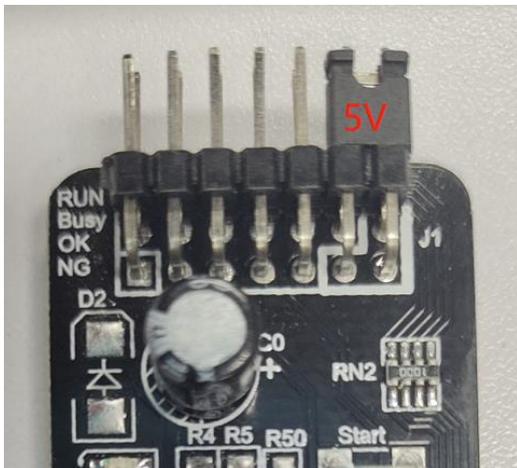
Name	Function Description
<b>VDD,VSS</b>	Power and ground (pin) of programmed IC
<b>CLK,DIO</b>	Programming signal interface, connecting tCLK and tDIO of target IC

### 3.1.2.2 Description for Programming Voltage

The user can select the firing voltage according to the tap voltage of the short-circuit cap and the corresponding corresponding, the following is specific:

Name	Function Description
<b>Voltage</b>	The IC voltage tap can be selected by pin, and the tap cap can be used to select the voltage tap
<b>5V</b>	Short-circuited with "voltage tap", the firing voltage is the supply voltage of SC LINK
<b>3.3V</b>	Short-connected with "voltage tap", the firing voltage is 3.3V

The figure on the left below is the connection mode of 5V voltage tap cap, and the figure on the right is the connection mode of 3.3V voltage tap cap



### 3.1.2.3 Function Descriptions for Programmer Interface

Name	Function Descriptions
<b>GND</b>	SC LINK PRO signal ground
<b>OK</b>	Programming status interface, low level indicates programming is completed
<b>NG</b>	Programming status interface, low level indicates programming failed
<b>Busy</b>	Programming status interface, low level indicates programming is in progress
<b>Start</b>	Programming start signal interface, low level indicates valid
<b>3.3V</b>	Programmer power supply, <b>Note: Only 3.3V rather than 5V can be selected!</b>

## 3.2 Instructions for SC LINK Simulation

### 3.2.1 Configurations before Simulation

SC LINK provides MCU online simulation for SOC 92/93/95 series, which is available for debugging, step debugging, step-over debugging and RST operations for up to 8 breakpoints (7 for users, and 1 as hidden breakpoint), to view and modify RAM and SFR and debug the program in development stage. Before using, complete the following configurations. For details about how to install the Keil plug-in, see [5.1 Install Keil C Plug-in](#). After installing the Keil plug-in, configure the Keil. [5.2 Set Keil Interface](#).

Programing and simulation interface [3.3 Instructions for SC LINK Programming](#). After the above configuration is complete, you can continue the simulation.

### 3.2.2 SC LINK Simulation Operations

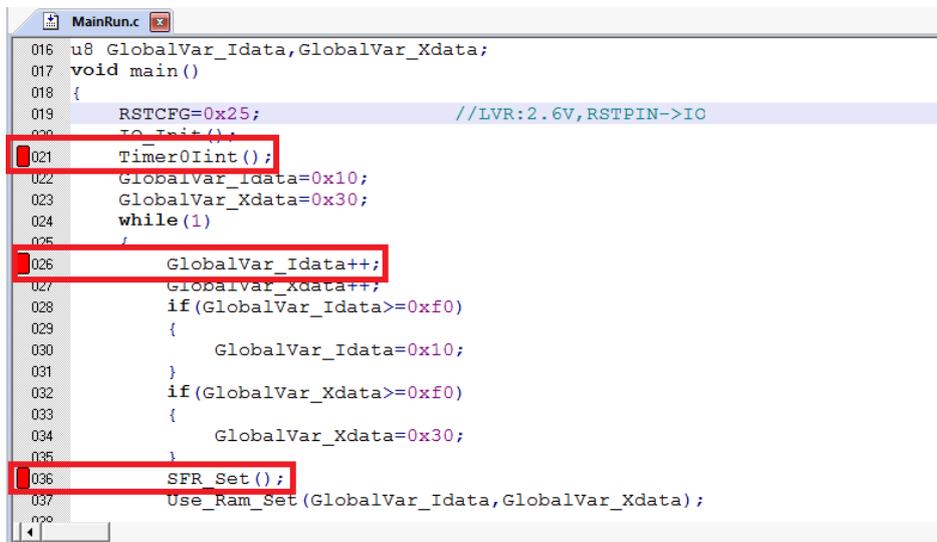
After above configurations are completed, user can perform simulation for up to 8 breakpoints, 7 for users and 1 as hidden breakpoint. For the convenience of description, a specific example is given here to complete breakpoint simulation based on the following steps.

#### 3.2.2.1 Set/Delete Breakpoint

Breakpoint Setup: Double click the left mouse on source program line of the preset breakpoint, or press “F9” button, or click the shortcut icon “Insert/Remove breakpoint” (on the right of “Debug” button). When the red block appears on the left of the line, the setting is succeeded.

Breakpoint Cancel: Before pre-cancelling the breakpoint, double click the left mouse, or press “F9” button, or click the shortcut icon “Insert/Remove breakpoint” (on the right of “Debug” button). When the red block disappears on the left of the line, the setting is succeeded.

**Note:** Before simulation, it is required to pre-set the breakpoint. The breakpoint can be set/deleted during the simulation process, as shown in the figure below:



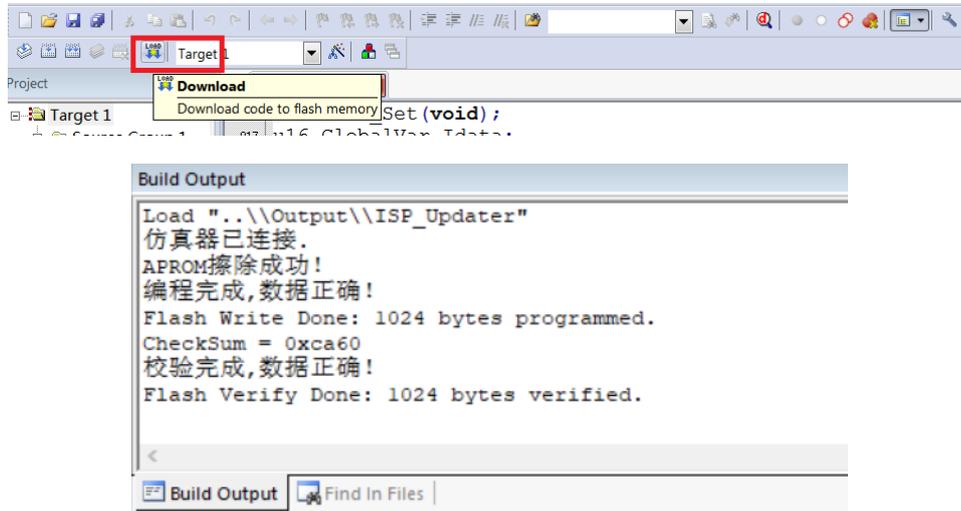
```
016 u8 GlobalVar_Idata,GlobalVar_Xdata;
017 void main ()
018 {
019     RSTCFG=0x25;           //LVR:2.6V,RSTPIN->IO
020     IO_Init();
021     Timer0Iint();
022     GlobalVar_Idata=0x10;
023     GlobalVar_Xdata=0x30;
024     while (1)
025     {
026         GlobalVar_Idata++;
027         GlobalVar_Xdata++;
028         if(GlobalVar_Idata>=0xf0)
029         {
030             GlobalVar_Idata=0x10;
031         }
032         if(GlobalVar_Xdata>=0xf0)
033         {
034             GlobalVar_Xdata=0x30;
035         }
036         SFR_Set();
037         Use_Ram_Set(GlobalVar_Idata,GlobalVar_Xdata);
038     }
039 }
```

#### 3.2.2.2 Download Program

After the programming is completed, click the shortcut icon “Download” to complete the code programming.

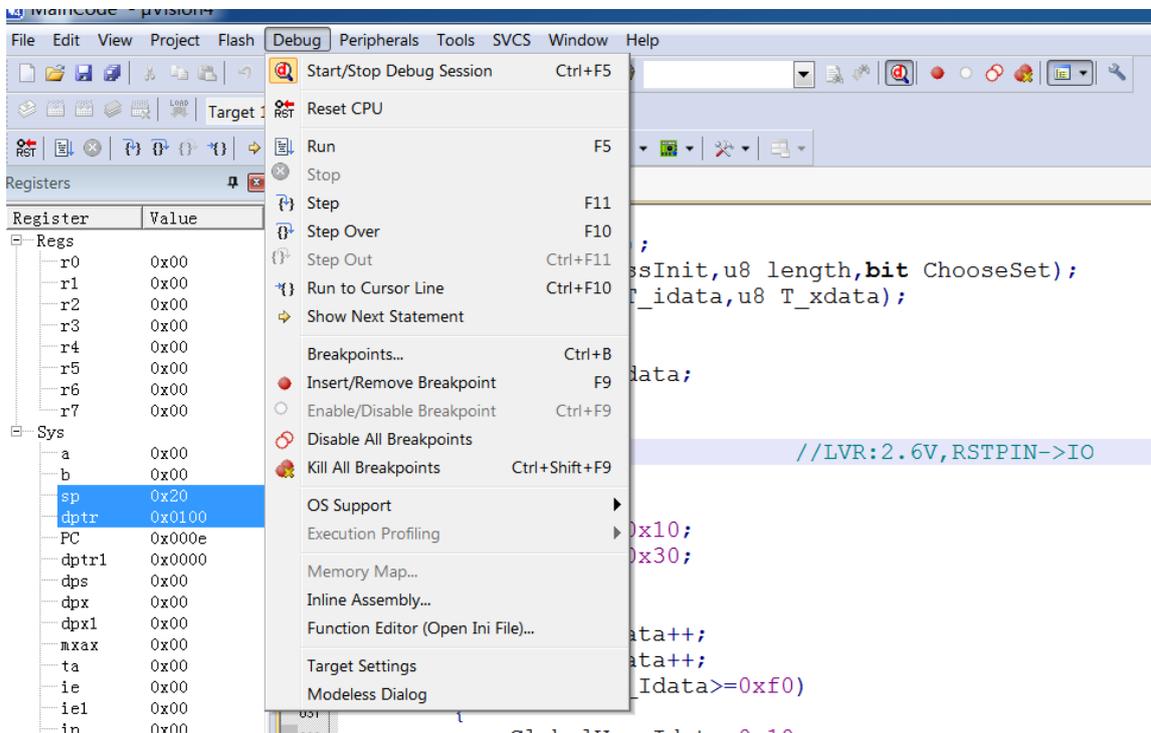
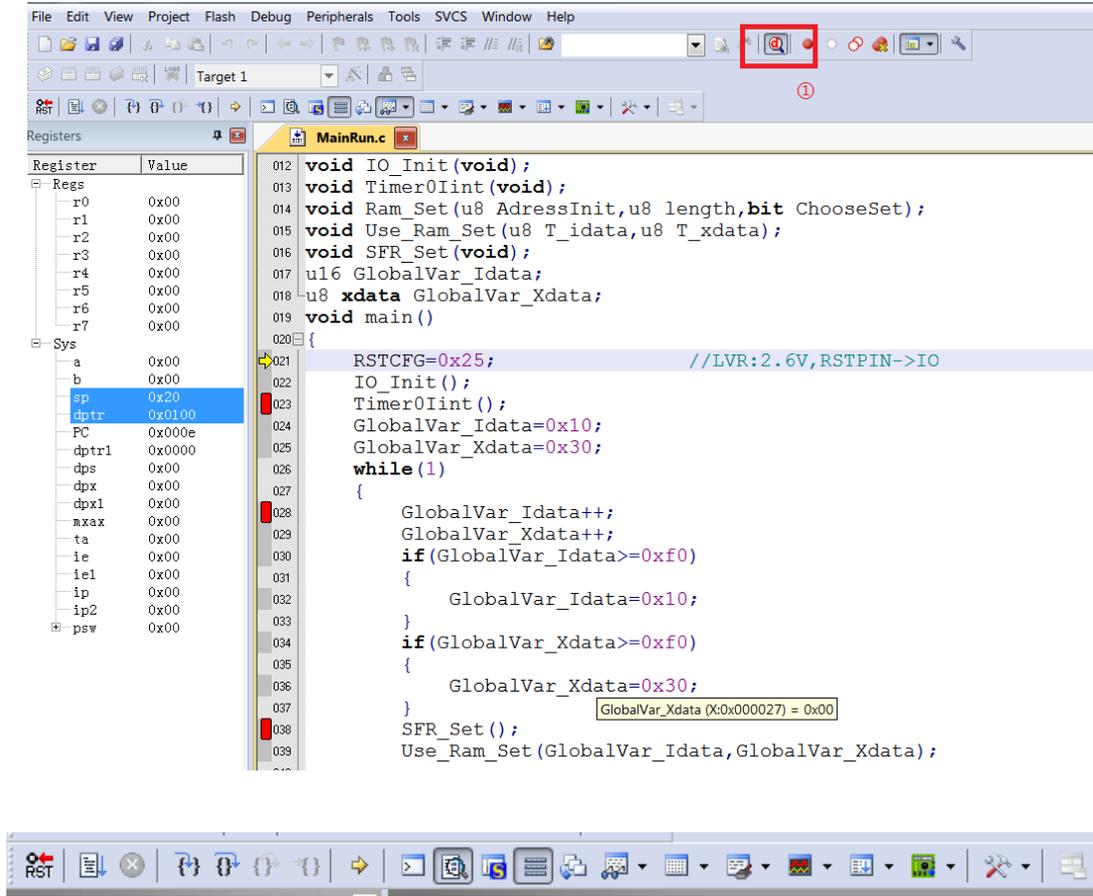
The programming depends on “ProgramSetting” in “Programming Option”, check “Programming” and “Verifying” to program and then verify “Download” process and output relevant information in “Build OutPut” Window.

**Note: If Download fails, an error message is displayed. Or else, Download succeeds.**



### 3.2.2.3 Enter/Exit Simulation

After the program Download succeeds, click the shortcut icon “Start/Stop Debug Session” button, or press the shortcut key “Ctrl+F5” or click “Debug-> Start/Stop Debug Session”, as shown in the figure below. After entering correctly, “D” button is in sunk state indicating it is open; click it again to exit the debug and “D” button is in smooth state indicating it is closed. After entering the simulation debugging interface, debug-related menus will be added on the toolbar, including Reset, Run, Stop, Pause, Step, Step Over, Step Out, Run to Cursor Line, Show Next Statement, Command Window, Disassembly Window, Symbol Window, System Register Window, Call Stack Window, Observation Window, Memory Window and Serial Port Window, etc. Menus in the toolbar mentioned above can be found in current “Debug” menu bar. For ease of operations, subsequent operations are performed from the toolbar.



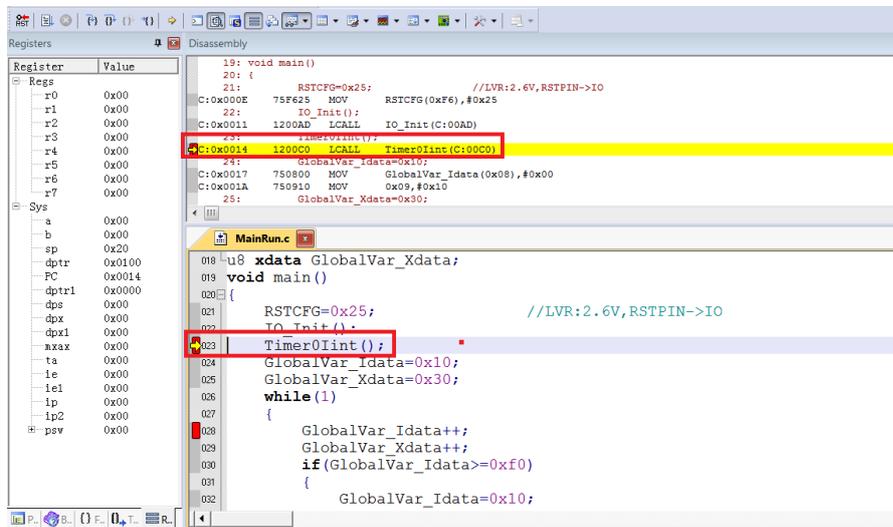
If it fails to enter the debugging interface, please check if the configuration is correct before simulation.

### 3.2.3 Simulation Run Operations

Once entering the simulation status, you can perform a series of simulation operations, including Full-speed Run to Breakpoint (Run), Step Track (Step), Step Over, Run to Cursor Line and Reset.

### 3.2.3.1 Full-speed Run to Breakpoint (Run)

Set up the breakpoint before entering the simulation status, click the shortcut icon “Run” button or “F5” to run to the breakpoint at full speed, as shown in the figure below:



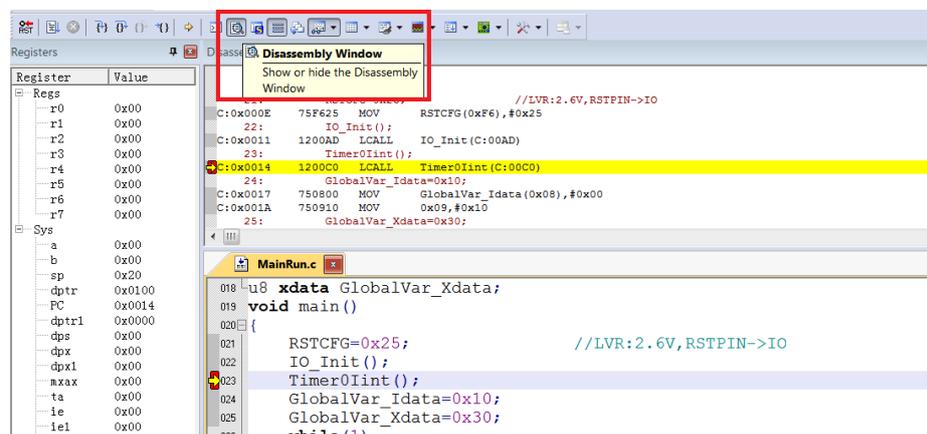
In the figure above, when running at full speed to the first breakpoint and stopping at this breakpoint, a yellow debugging arrow appears to the left of the breakpoint, pointing to the current stop line. If you open the Disassembly window, such yellow debugging arrow also appears, pointing to the PC address of current program.

After entering the simulation status, the program will stop at 0x00 address by default, that is, PC points to 0x00. When running at full speed to the first breakpoint, it will run from this address to the first breakpoint before stopping. Compared with other simulation operations, the execution speed is the fastest.

### 3.2.3.2 Step Track (Step)

**Step Track means the program stops after executing a line each time.**

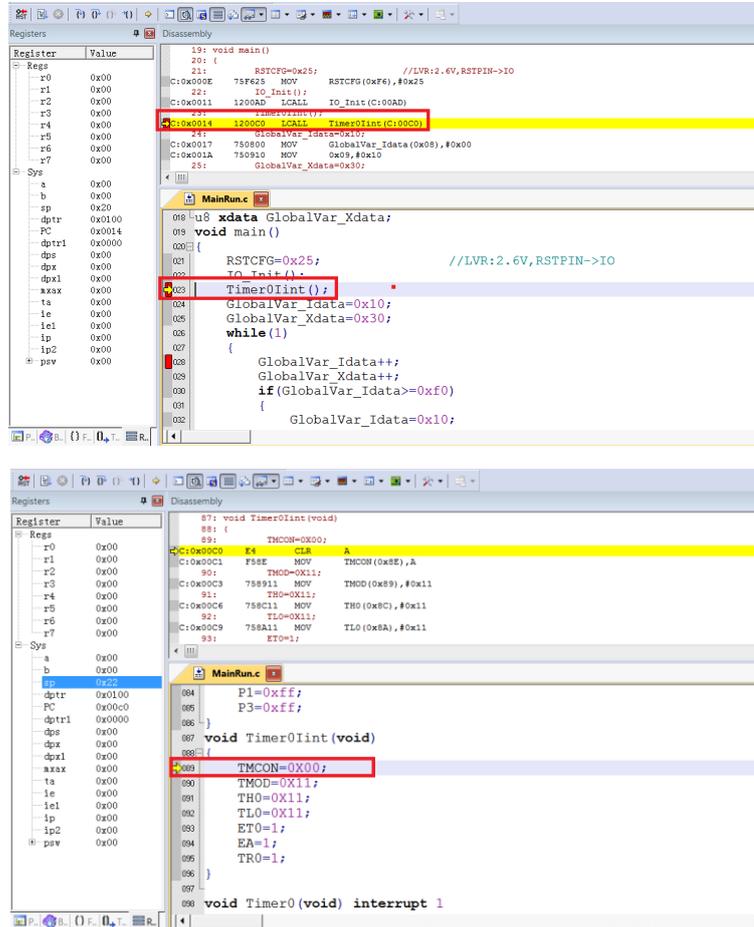
- ① Click the shortcut icon “Stop” button or press the shortcut key “F11”, the program will run one step at a time. It should be noted that the step running process will be different in C Source Program window for “Disassembly” window to be open or closed by default. It is recommended to keep “Disassembly” window in open state during the Step process.
- ② Open/close “Disassembly” window. Click the shortcut icon “Disassembly Window”, the sunk state indicates on, “Disassembly” window will appear at this time, and disassemble the current program line; the smooth state indicates off, “Disassembly” window will disappear



- ③ Open the “Disassembly” window and run Step

The current program stops at the function body Timer0Init(), press F11 to execute the program line that current yellow arrow points to, and then the arrow will point to the next line. The result is shown below. Press F11 repeatedly to execute the program line by line.

Open the “Disassembly” window and execute the disassembly line by default; To execute the source code line, left click the source code interface.



### 3.2.3.3 Step Over

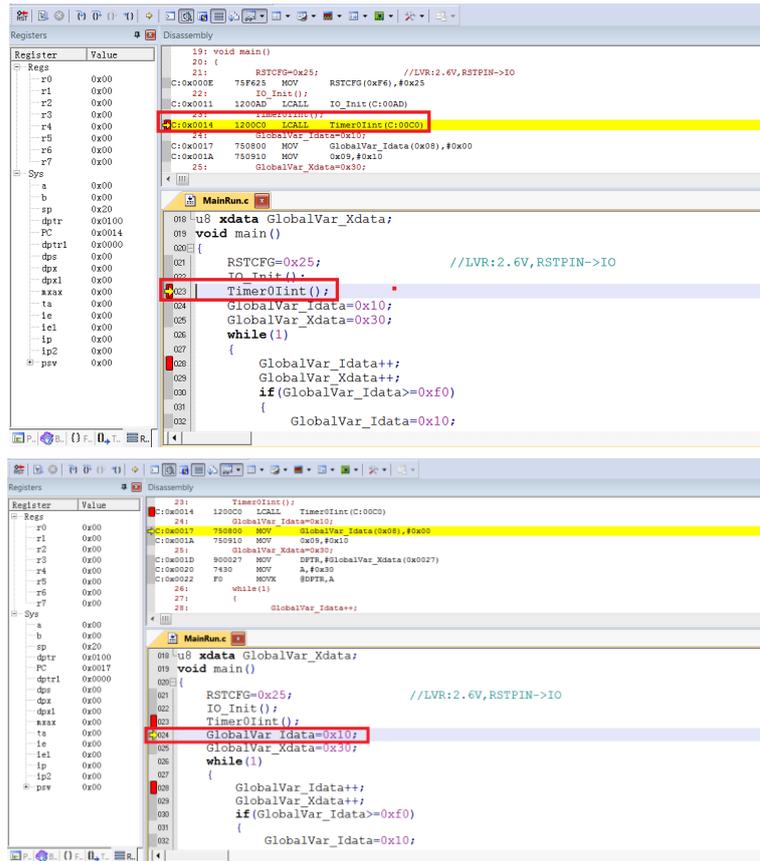
When executing the program to a subfunction or CALL/LCALL in the assembly, the operation will run the subfunction at full speed to the next command rather than stepping into the subfunction.

**Note:**

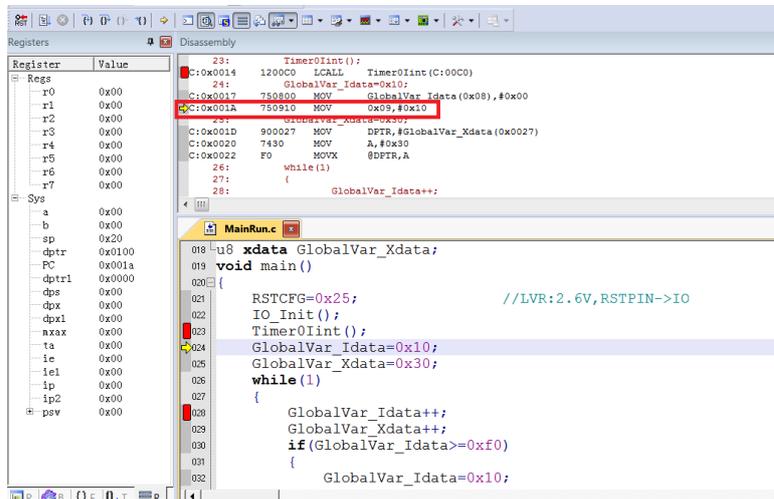
- ① If the position where the program is executed is not a subfunction, the operation will obtain the same result as that of step track;
- ② If any breakpoint exists in the subfunction, the program will stop at the breakpoint first.

Click the shortcut icon “Step Over” or the shortcut key “F10”.

Still take the current breakpoint stopping at Timer0Init() as an example, press F10, keep the cursor outside the function and run this function at full speed, then the yellow arrow will point to the next line, as shown in the figure below:



Continue pressing F10 and observe the Disassembly window, its running results will be the same as that of Step Track, as shown in the figure below:



### 3.2.3.4 Run to Cursor Line

If the simulation efficiency between breakpoints through Step Track or Step Over is low and expected to run to the source line directly, run Run to Cursor Line.

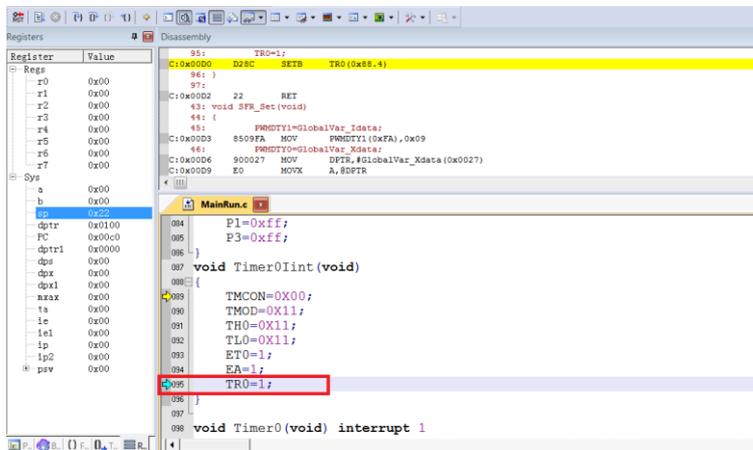
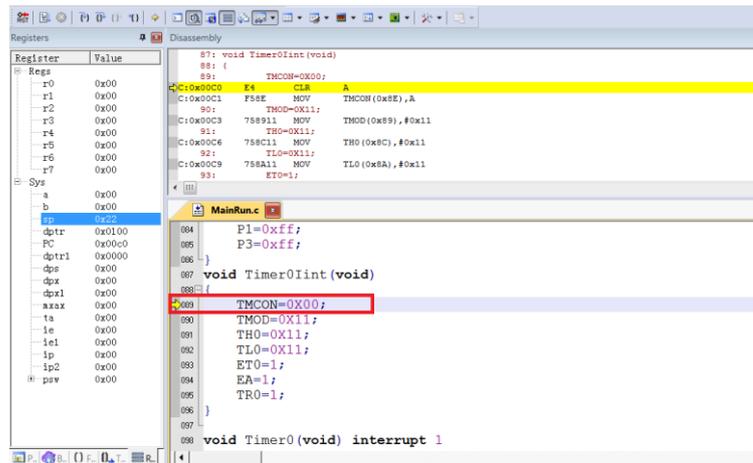
Press the shortcut icon "Run to Cursor Line" or the shortcut key "Ctrl+F10".

For example, as shown in Figure 3.2.2, select "Run to Cursor Line" to directly stop the program at the last line of Timer0Init() function.

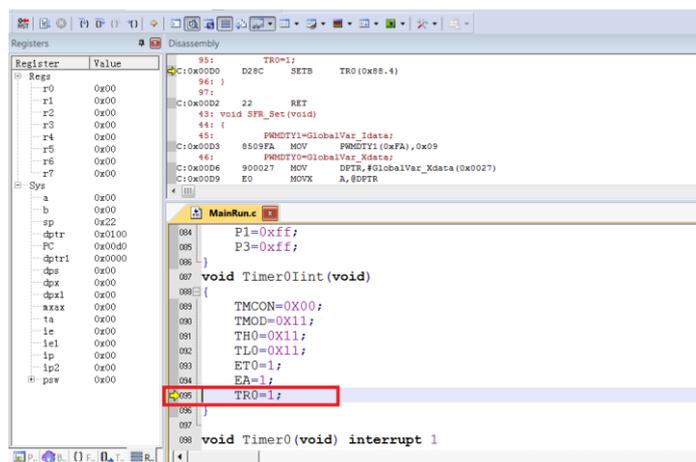
Position Cursor: Left click the program line preset and a blue arrow appears indicating the line is selected, as shown in the figure below:

Note: The preset program line must be operable from the line with current yellow arrow, otherwise running to

the cursor will become invalid.

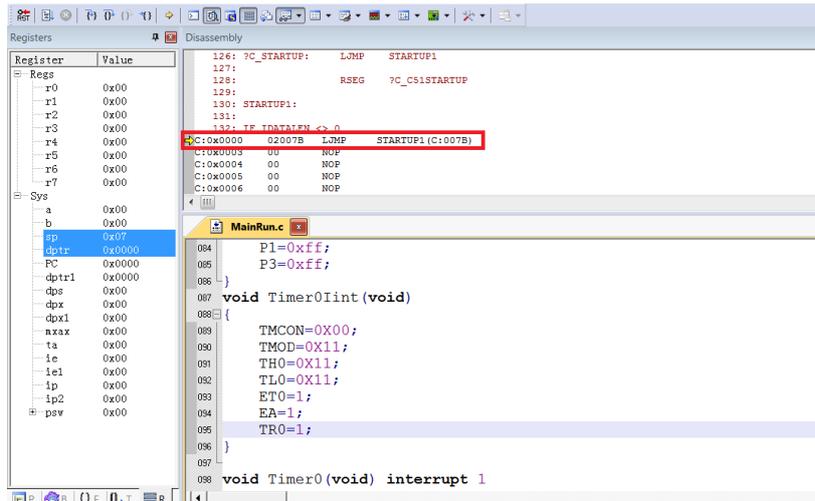


Press Ctrl+F10 and run to the cursor line at full speed before stopping, then the yellow arrow will appear at positioned cursor line, as shown in the figure below:



### 3.2.3.5 Reset

Click “Reset” button to reset the program with the yellow arrow pointing to the address 0x00, as shown in the figure below:



## 3.2.4 View and Modify Variables

### 3.2.4.1 Use Watch Windows to View and Modify Variables

In simulation debugging mode, view or modify current variable by Watch Windows

① Open Watch Windows

Click the shortcut icon "Watch Windows" to show 3 optional windows: Locals, Watch1, Watch2. Any Window icon with light yellow background indicates it is checked, and a sub-window appears at the bottom of KEIL interface, as shown in Figure 3.2.4-1; When clicking "Watch1" or "Watch2", a Watch interface appears at the bottom of KEIL interface, as shown in Figure 3.2.4-2

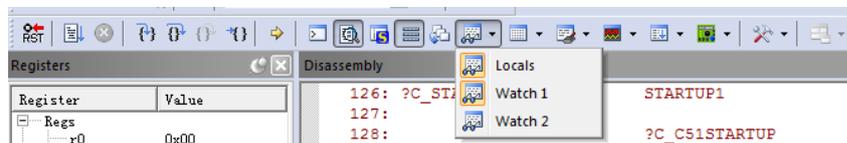


Fig. 3.2.4-1

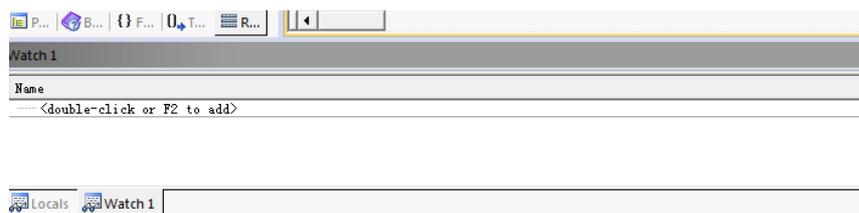


Fig. 3.2.4-2

② Fill in the variable to be pre-viewed/pre-modified

In the "Name" column, enter the Name of a variable that must exist in the source code, otherwise it is invalid. At this time, the value of current variable appears in corresponding "Value" column, as shown in Figure 2.2.4-3

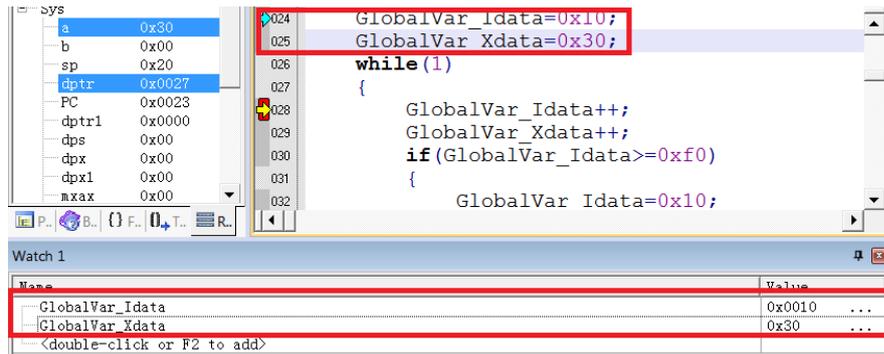


Fig. 3.2.4-3

In the figure above, add the variable GlobalVar\_Idata and GlobalVar\_Xdata, the values in Watch1 are 0x0010 and 0x30 respectively.

Besides, in C source code interface, when the mouse moves over the variable name, its value, type and address will appear as well, as shown in Figure 3.2.4-4.



Fig. 3.2.4-4

② Modify the value of variable

In the “Value” column of the variable to be modified, double click and modify the value, then click the left mouse at any position, the variable column will turn to dark color, as shown in Figure 3.2.4-5.

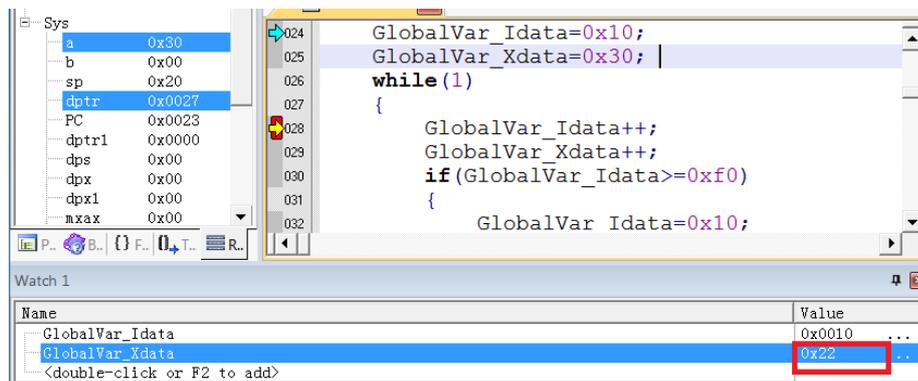


Fig. 3.2.4-5

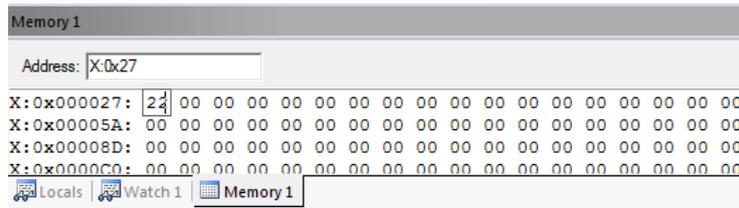
In the figure above, the value of GlobalVar\_Xdata is modified as 0x22.

### 3.2.4.2 Use Memory Window to View and Modify Variable

② Open Memory Windows

Click “Memory Windows” to show 4 optional windows: Memory1 - Memory4, as shown in Figure 2.2.4-6. Any Window icon with light yellow background indicates it is checked, and a sub-window appears at the bottom of KEIL interface; when clicking any window, a Memory interface appears at the bottom of KEIL interface, as shown in Figure 2.2.4-7.





Note: If the variable address is not clear, we recommend using Watch Windows.

### 3.2.4.3 View and Modify SFR

① Open Watch Windows

Same as the Watch window opened in viewing and modifying variables

② Fill in SFR name to be pre-viewed/pre-modified

Fill in SFR name to be operated in “Name” column, this SFR must exist in the head file, otherwise it is invalid. At this time, the value of this SFR appears in corresponding “Value” column, as shown in Figure 3.2.4-11.

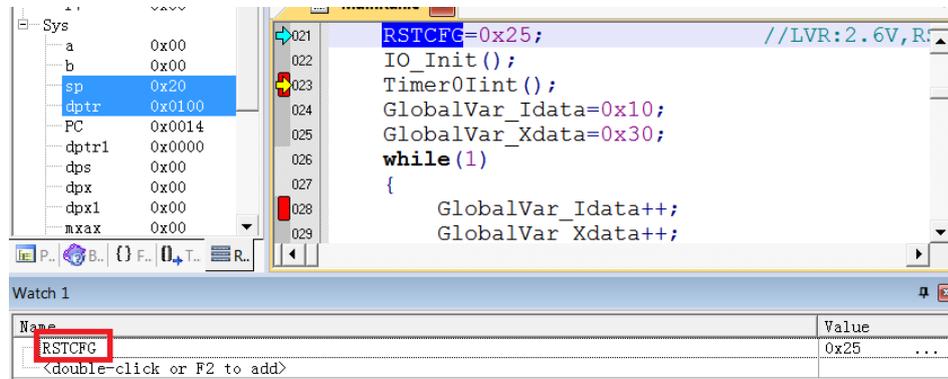


Fig. 3.2.4-11

In the “Value” column of the SFR to be modified, double click and modify the value, then click the left mouse at any position, the variable column will turn to dark color, as shown in Figure 3.2.4-12.

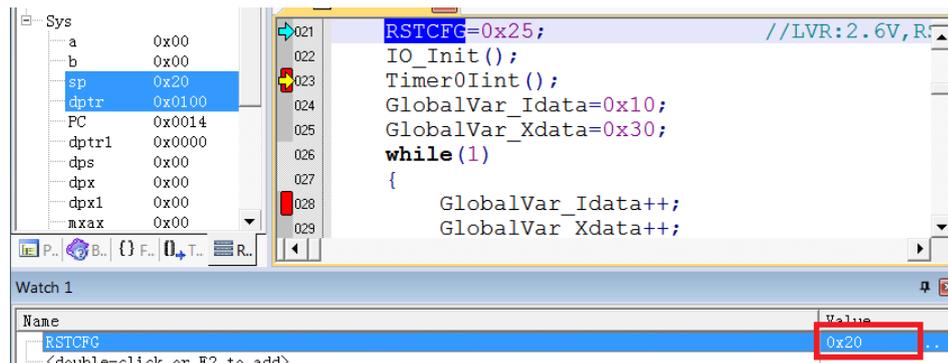


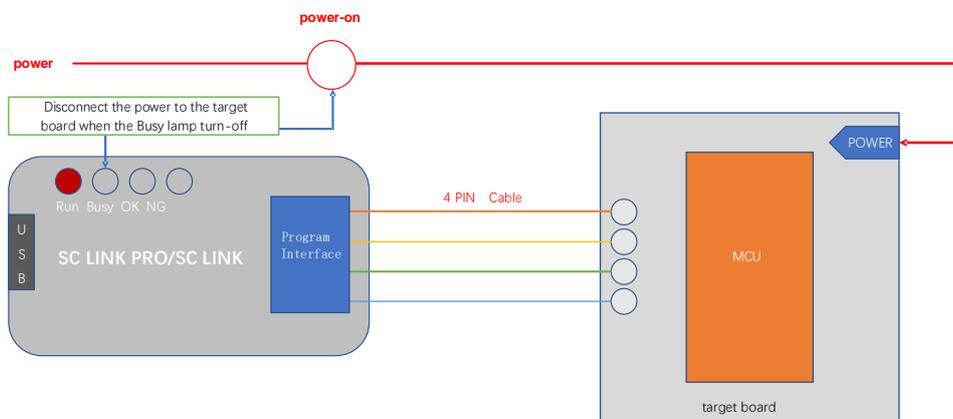
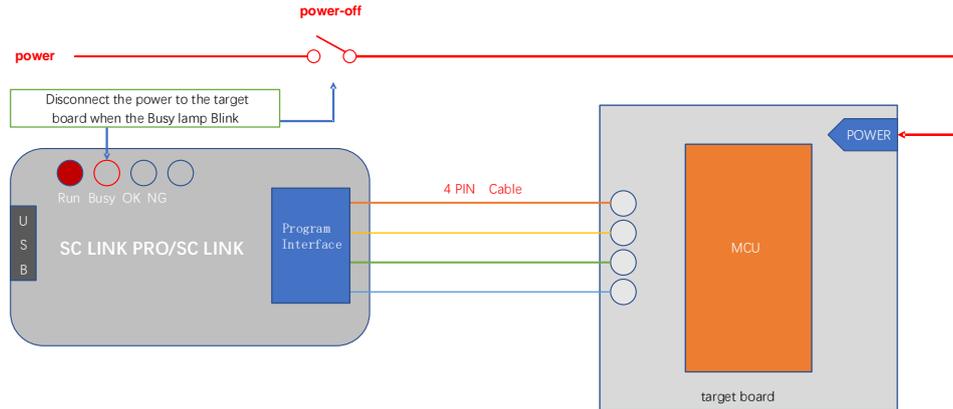
Fig. 3.2.4-12

### 3.2.5 Descriptions for External Power Supply Simulation

Steps for external power supply simulation:

- ① In order to prevent SC LINK damage, **please be sure to unplug the short-circuit cap of SC LINK voltage range selection in the simulation mode of external power supply firing!**
- ② Connect the target board to the SC LINK. The target board is powered on, and the SC LINK is powered off;
- ③ Connect SC LINK to computer through USB cable;
- ④ Open keil software, configure programming options and click Download;

- ⑤ Disconnect the power supply of the target board when the power indicator begins to blink.



- ⑥ When the power indicator turns off, power on the target board. When the power indicator turns steady on, the Download mode is entered. The Download is complete, without electricity again into the simulation.

## 3.2.6 Notes for Simulation

- ① The programming interface CLK and DIO will be occupied during the simulation process, and do not operate these 2 IOs in the simulated code area;
- ② During the simulation process, do not disconnect USB or programming interface directly to avoid Keil breakdown. To disconnect USB or programming interface, exit Debut mode first.
- ③ For notes of external power supply simulation, see [3.2.5 Descriptions for External Power Supply Simulation.](#)

## 3.3 Instructions for SC LINK Programming

### 3.3.1 Firmware Upgrading

The firmware of SC LINK features online upgrading to add new functions or correct problems. Specific methods for firmware upgrading are shown below:

- ① For better experience, please visit <http://www.socmcu.com> to download the latest firmware files;
- ② SC LINK power off Press and hold the programming button, and then connect to the USB port of the

computer. At this time, the RUN indicator (red light) on SC LINK will blink, indicating that the firmware upgrade mode has entered.

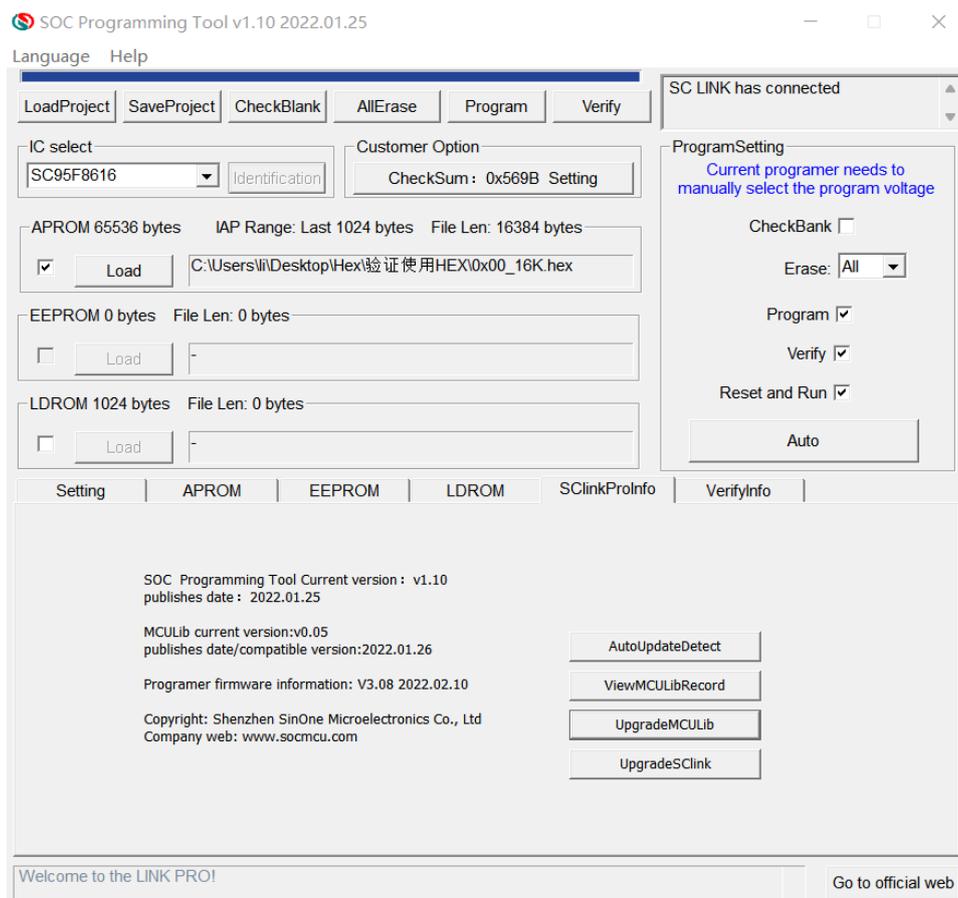
- ③ Open SOC Programming Tool and click “**Upgrade Programmer Firmware**” on “**Programmer Information**” menu.
- ④ In “Open File” dialog box, locate the firmware file (.iap file) and click “Open”;
- ⑤ Pop up the dialog box to display the current version and the version to be updated, and click “OK” button;
- ⑥ After the firmware update is complete, disconnect the USB connection between the SC LINK and the PC to exit the firmware upgrade mode;
- ⑦ It can be used normally after being powered on again

**Note:**

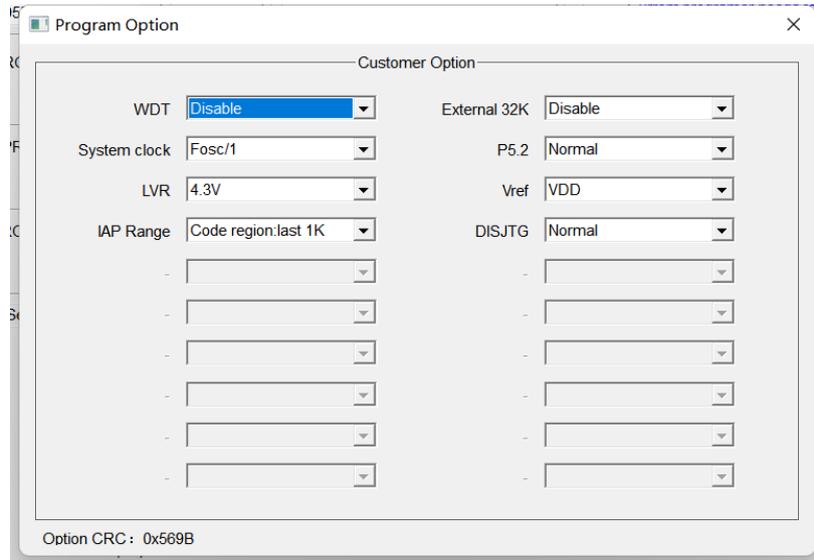
1. please confirm before upgrade the firmware to upgrade the firmware file is ready;
2. The upgrade process is interrupted will lead to abnormal SCLINIK;
3. In the process of firmware upgrade, user is not recommended for other operation.

### 3.3.2 Steps for Online Programming

- ① Connect SC LINK with the programming interface of target board
- ② Connect SC LINK to PC via USB cable, open SOC Programming Tool and select IC model from the drop-down list of “Chip Select”;



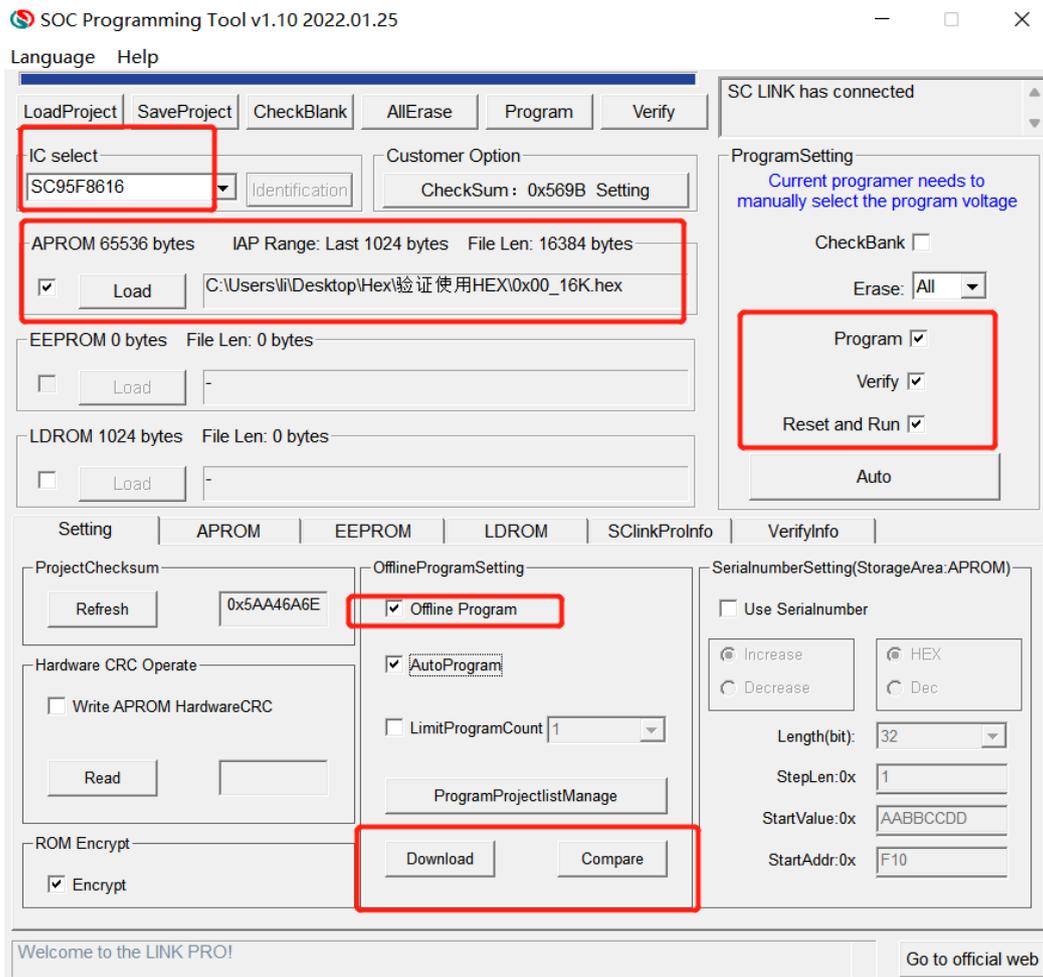
- ③ Check the target area to be programmed and click “Load” to load the code file to be programmed (HEX/BIN file);
- ④ Configure IC option in “option” tab;



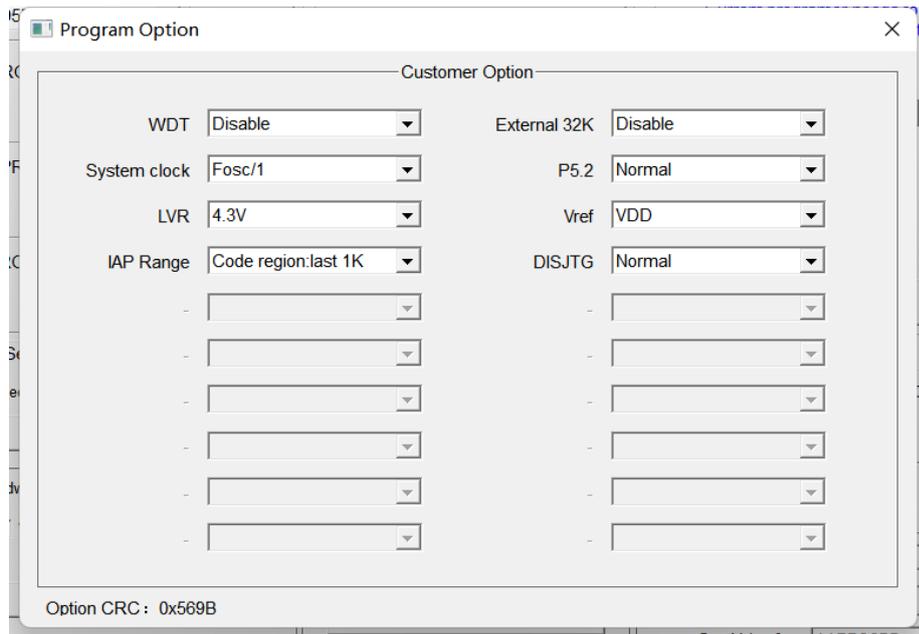
- ⑤ Select programming voltage and check Erasing, Programming and Verifying, etc.;
- ⑥ Click “Auto Programming” button to perform corresponding programming and verifying;

### 3.3.3 Steps for Offline Programming

- ① Connect SC LINK PRO to PC via USB cable, open SOC Programming Tool and select IC model from the drop-down list of “Chip Select”;



- ② Check the programming area, click “Load” to load the code file to be programmed (HEX/BIN file);
- ③ Check the operation checkbox in “ProgramSetting”, such as Program + Verify;
- ④ Select Programming mode: Check “Auto Programming” for automatic programming mode, and uncheck for manual programming mode:
  1. In manual programming mode, press the button to program;
  2. In auto programming mode, SC LINK PRO will complete IC detection and programming automatically after power-on.
- ⑤ Configure IC option in “option” tab;

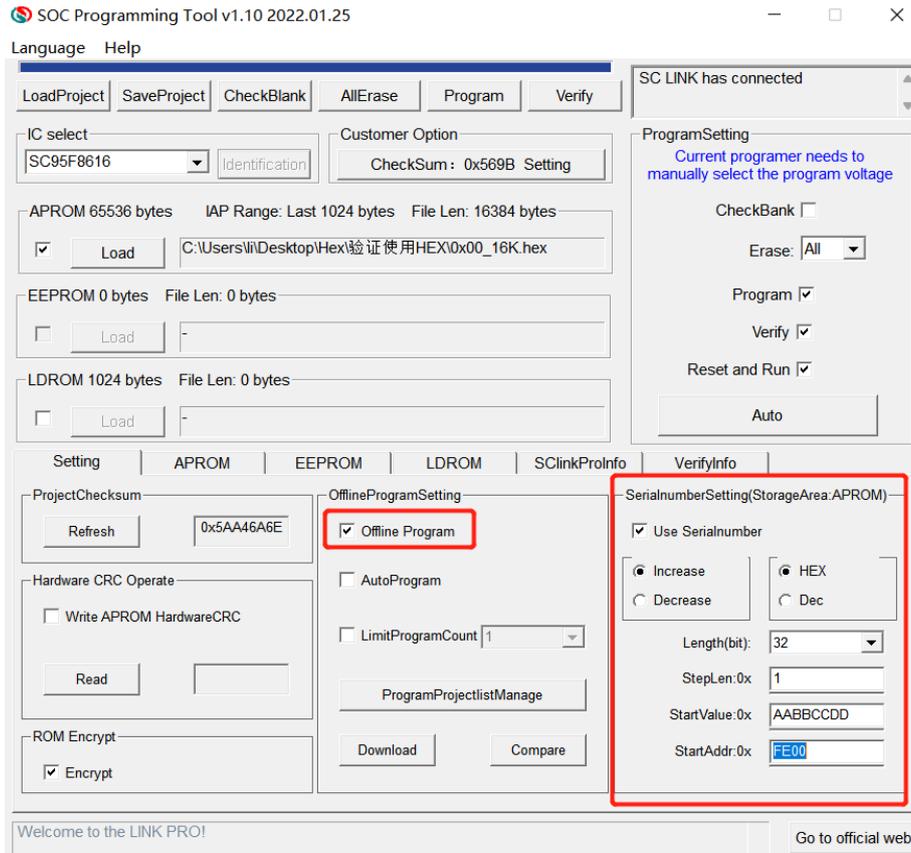


- ⑥ Click “Download” button and download the code file to SC LINK
- ⑦ Disconnect SC LINK with PC USB, and use the external power supply via USB to power SC LINK to start programming.

### 3.3.4 Comparison

To confirm if the programming code and configured items loaded by SC LINK are correct, connect SC LINK PRO to PC via USB and open SOC Programming Tool, and then click “Compare” button to check if the current programming configurations and programming codes loaded consistent with the contents loaded in SC LINK.

### 3.3.5 Instruction for S/N

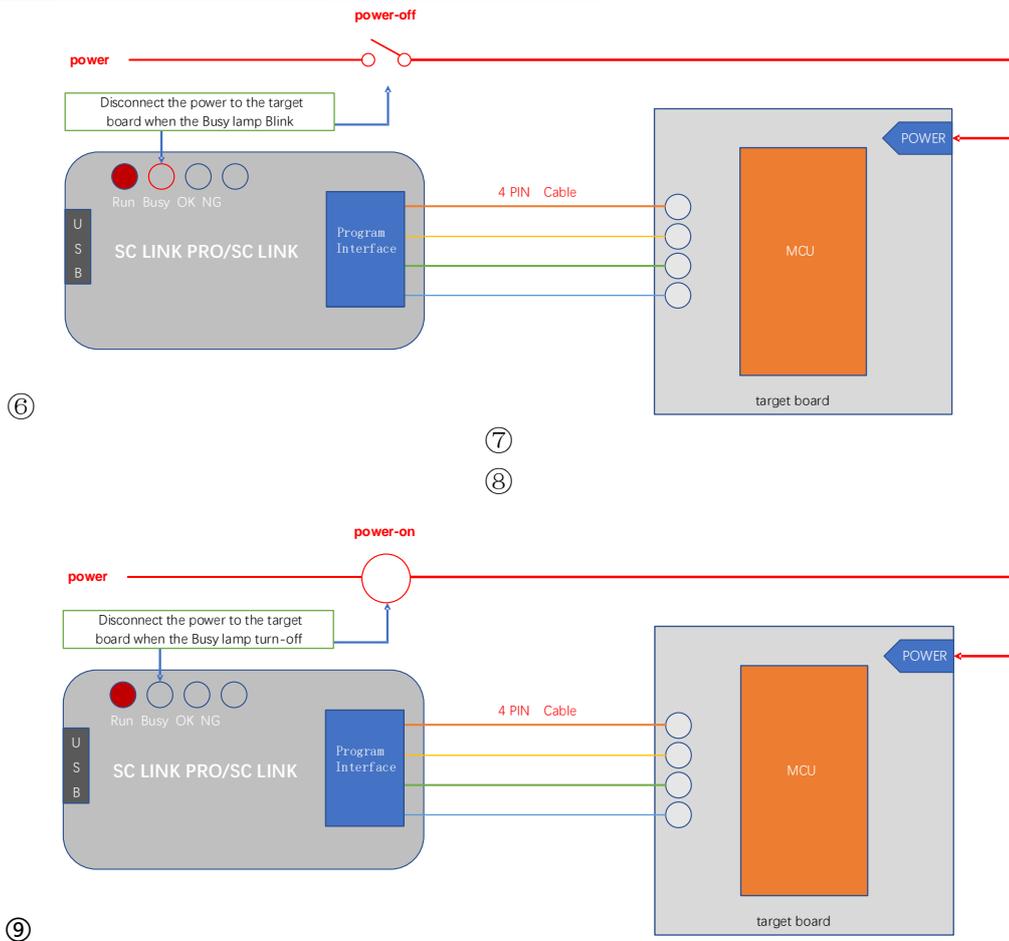


- ① S/N function is available for SC LINK in offline mode.
- ② Low S/N data is stored in low address, for example, write 32BITS S/N 0XAABBCDD in 0xFE00, the value written for 0xFE00 is 0XDD, the value written for 0xFE01 is 0XCC, the value written for 0xFE02 is 0XBB and the value written for 0xFE03 is 0XAA.
- ③ The S/N must be 4 bytes in length with the start address of a multiple of 4 (such as 0F10H, 0A04H, etc.), otherwise, an error will be reported upon programming.
- ④ It is recommended to set the S/N address outside the program space so as to avoid the program code from being covered by S/N data, resulting in being unable to perform verifying operation after programming.
- ⑤ S/N supports power-off memory function.

### 3.3.6 Descriptions for External Power Supply Programming

Steps for external power supply programming:

- ① To prevent SC LINK from being damaged, remove the short-circuit cap for SC LINK voltage tap selection in external power supply programming mode.
- ② Connect the target board to the SC LINK. The target board is powered on, and the SC LINK is powered off.
- ③ Connect SC LINK to computer through USB cable;
- ④ Open SOC Programming Tool, configure the programming options and send the programming command;
- ⑤ Disconnect the power supply of the target board when the power indicator begins to blink.

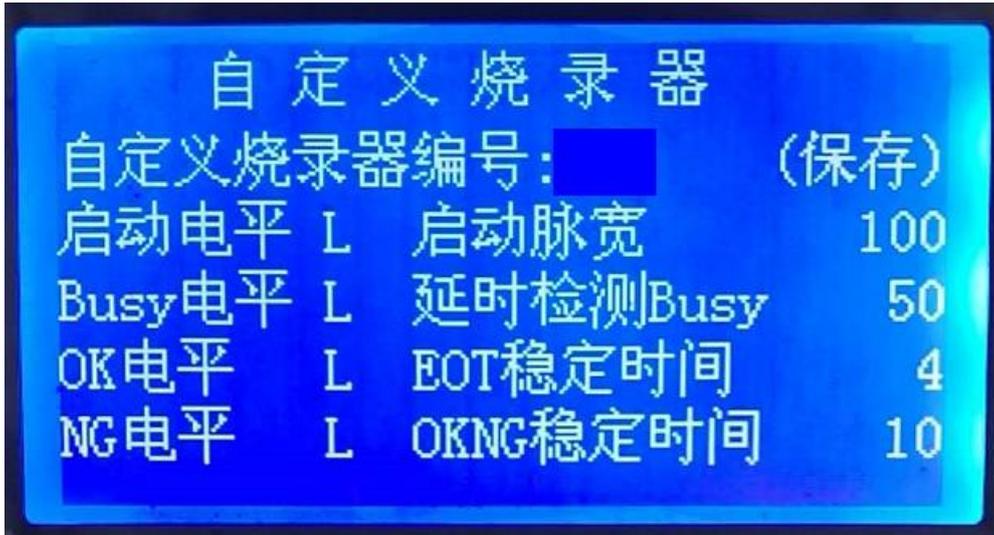


- ⑩ When the power indicator is off, switch on the power supply of the target board. When the power indicator turns steady on, it enters the programming mode.
- ⑪ After the programming is completed, the target board needs to be completely powered off to ensure that the IC has been program out of the programming mode.

### 3.3.7 Instructions for Connecting Programmer

For ease of operation, we use programmer control interface to control IC programming with software programming instead of manual programming.

- ① Please use manual programming mode with unchecking “Auto Programming” option when downloading the programming program in SOC Programming Tool.
- ② Start in programmer control interface is the start input channel for programming and valid in low level. It is recommended to release the pull-down operation of start after detecting low level of busy interface signal is output when starting the programming for start;
- ③ After decrease the level for start, detect NG signal interface, OK signal interface and busy signal interface; low level in NG signal interface indicates programming is failed, low level in OK signal interface indicates programming is succeeded and low level in busy signal interface indicates programming in progress; only one signal interface can be output in low level at a time; if more than two signal interfaces have low levels at the same time or all single interfaces have high levels, programming shall be stopped .
- ④ Programmer programming-related parameters are set as follows:

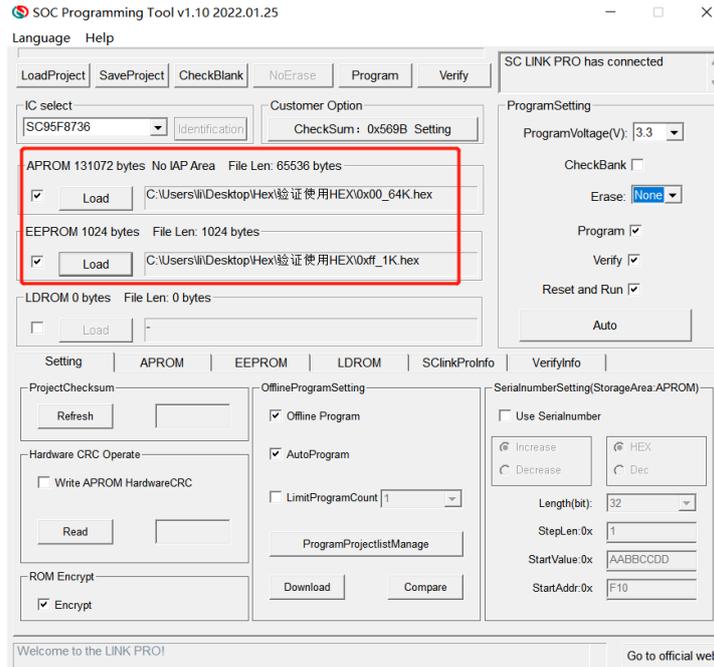


### 3.3.8 Notes for Programming

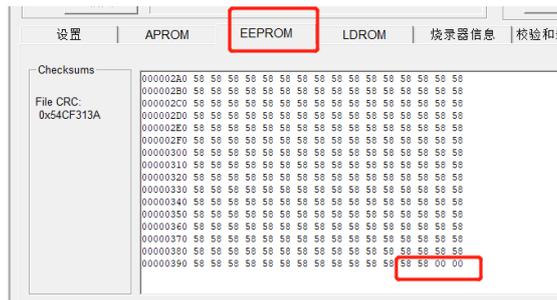
- ① Overload protection and reminds:
  1. A maximum output current of SC LINK PRO is 400mA; if the load exceeds this range, self-resettable fuse will be enabled;
  2. If overload occurs, please perform IC programming in external power supply mode
- ② For notes of programming in offline programming mode, see [2.3.6 Descriptions for External Power Supply Programming](#);
- ③ In any programming mode, any pin of programmed IC connected to other power-on system will result in programming failure;
- ④ For IC on-board programming, you are advised to remove the peripheral capacitance of programming pin CLK and DIO.
- ⑤ **When you program an IC with a Sector partition ROM, select Erasing or erasing the Sector block in the erasing option. Otherwise, the program may fail.**

### 3.3.9 Instruction for EEPROM Area Programming

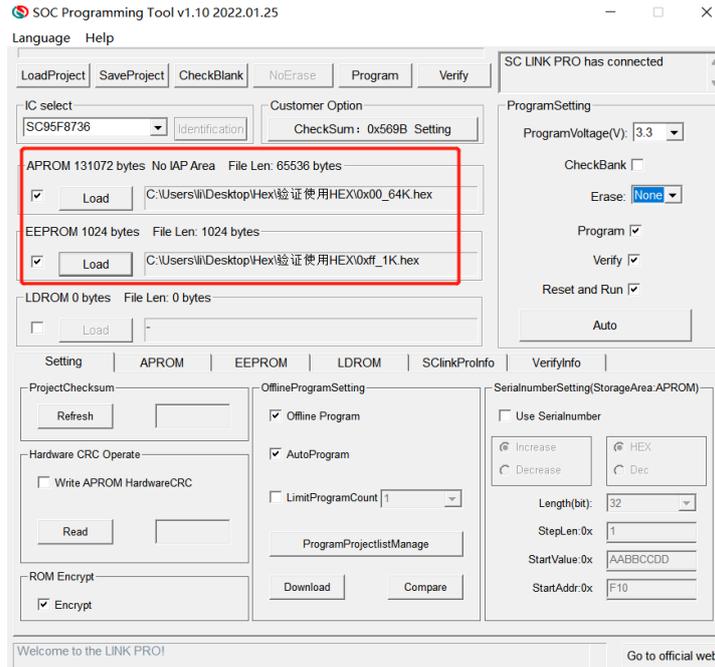
- ① Select the programming area:
  1. If both APROM and EEPROM are programmed, check "APROM+EEPROM" at the same time
  2. If only EEPROM is programmed, only check "EEPROM"
 APROM+EEPROM is used as the example for subsequent instructions



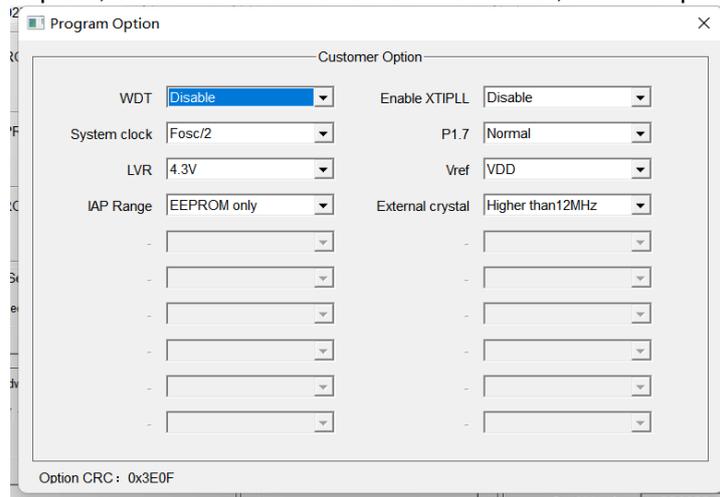
- ② If the length of the code program into the EEPROM is not a multiple of 4, the address that is less than a multiple of 4 is automatically added with 0. As shown in the figure below, the last 3byte of the code automatically fills 0 for the address whose multiple is less than 4.



- ③ Load APROM and EEPROM files respectively, where: THE HEX file loaded in the EEPROM area is the FILE to be program in the EEPROM area (users can generate it through the example Project "EEPROM Project" provided by SOC)



- ④ File loading is complete, confirm the code checksum is correct, confirm option is correct

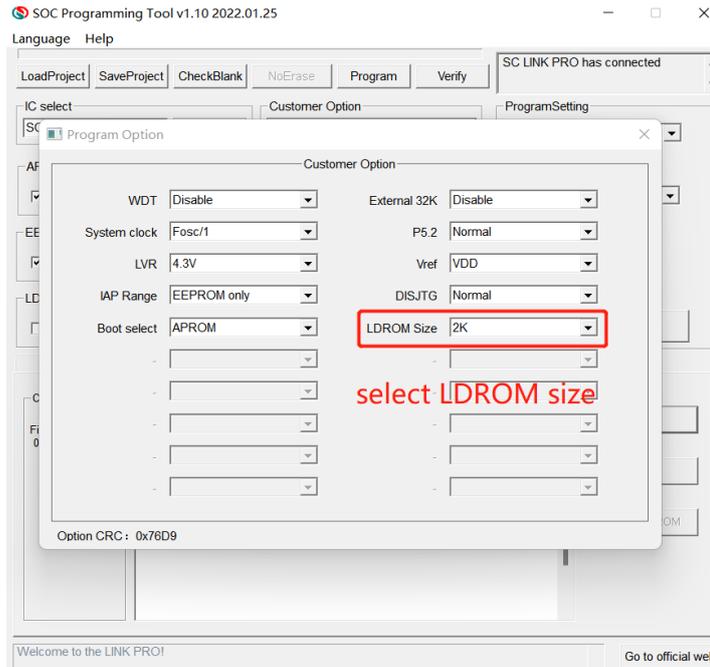


- ⑤ Connect SC LINK PRO, check "Program + Verify" and click "Auto"

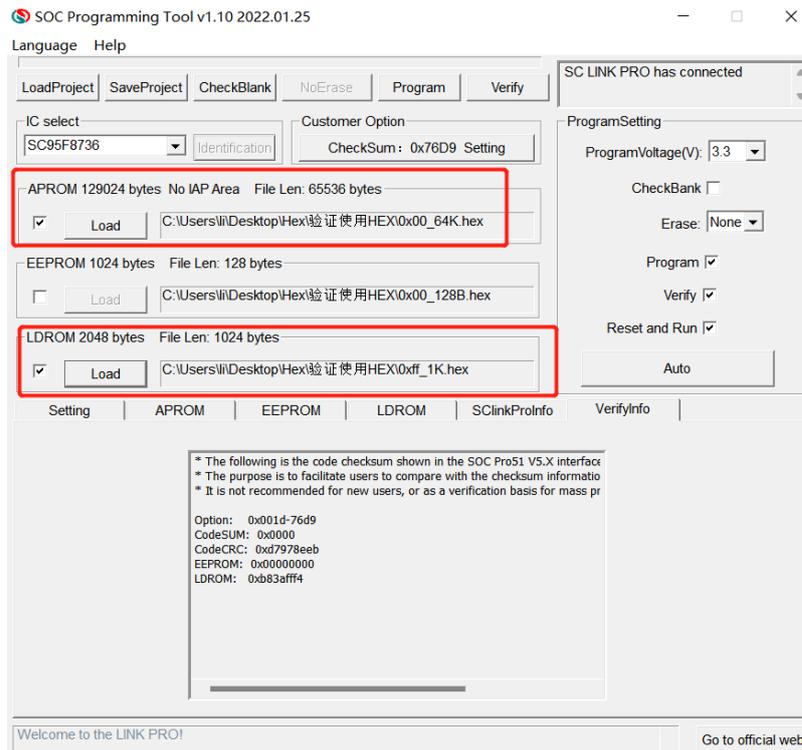
### 3.3.10 LDROM Area Programming Description

- ① Programming area selection:
1. If you need APROM area and LDROM area to burn at the same time, you need to check APROM+LDROM at the same time, specific IC LDROM need to see the specification to determine, some IC can directly tick LDRAM for programming, such as 95F861X. Some ics need to select the size of LDRAM above OPTION before they can be used, such as 95F873X
  2. If only the LDROM area is program separately, only select LDROM

The following uses APROM+LDROM, IC 95F8736 as an example.



- ② Load APROM and LDROM files respectively, where: HEX file loaded in LDROM area is the file to be program in LDROM area.



- ③ File loading is complete, confirm the code checksum is correct, confirm option is correct  
 ④ Connect SCLINK, select fan eraser for erasing, check "programming + Verification", and click "Automatic"

## 3.3.11 Multi-code Management

### 3.3.11.1 Introduction to Multi-code Management

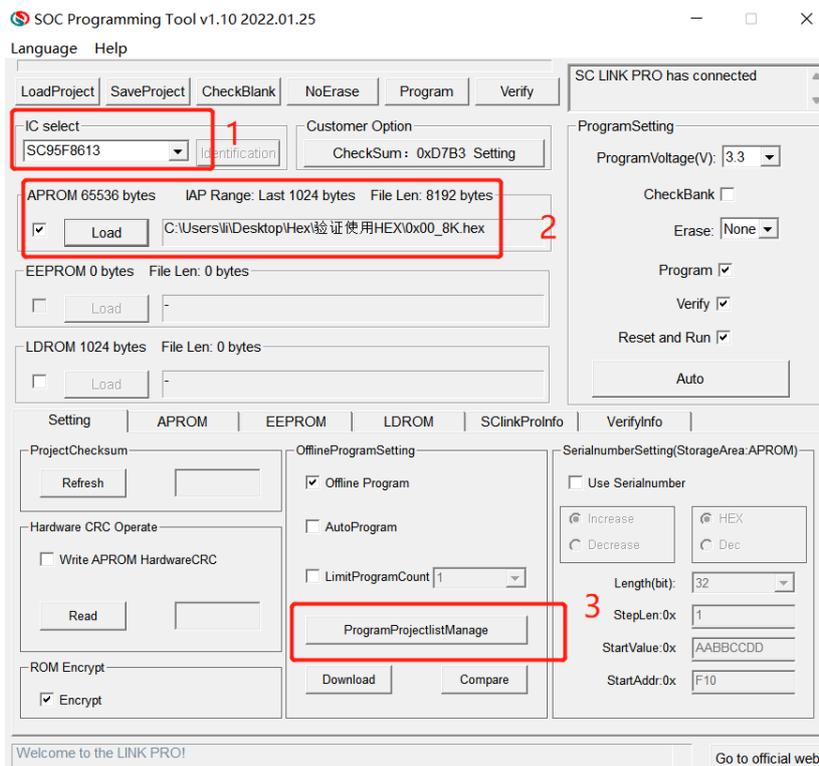
Multi-code management function supports storing multiple project on SC LINK so as to facilitate batch programming for multiple project codes. Before using multi-code management, please confirm the following:

- (1) Preparations: ① SC LINK; ② SOC Programming Tool v0.10 or later; ③ Firmware V0.1 and later.
- (2) Before using multi-code programming mode, please carefully read [3.3.11.3 Notes for Multi-Code Management](#).

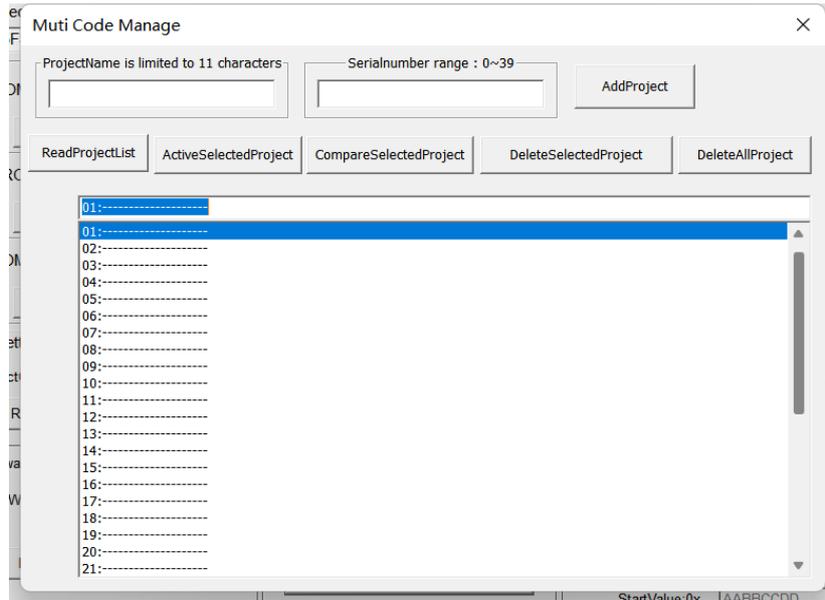
### 3.3.11.2 Instructions for Multi-code Management

#### 1.Add Multiple-code Project List

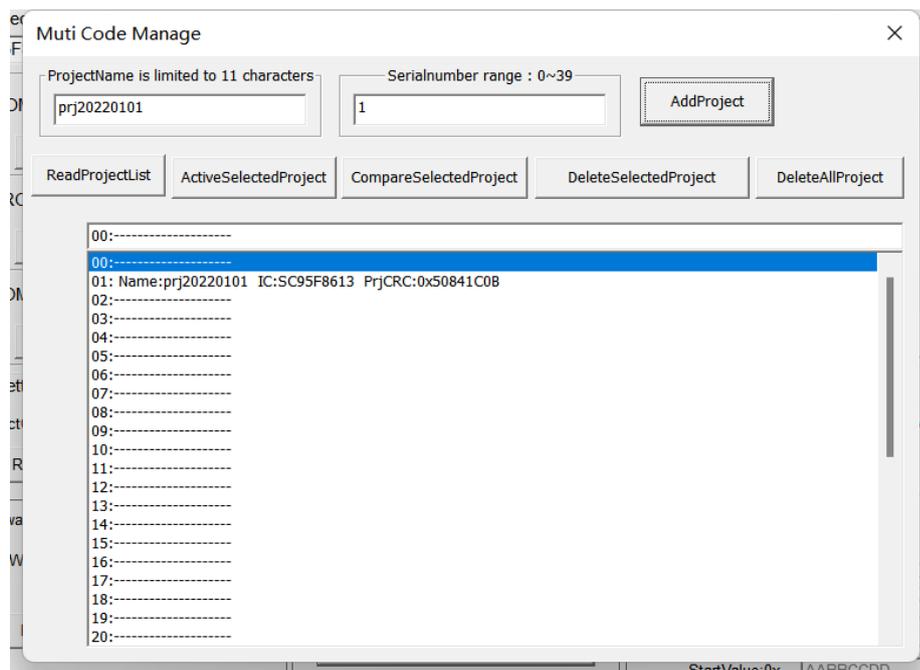
(1) Open SOC Programming Tool v0.10 or later, as shown in the figure below, select the target chip model, load the target programming code to APROM or other area and confirm the project ProgramSettings, then click “Programming Project List Management” button to enter Multi-code Management page.



- (2) Then enter “Multi-code Management” page, it is empty for first use (no project list), as shown in the figure below.



- (3) As shown in the figure below, input the project name to be saved in “Project Name” column (English character with no more than 11 characters), then fill in the No. in “No. Range”, and click “Add Code Project” to save the loaded project to SC LINK.

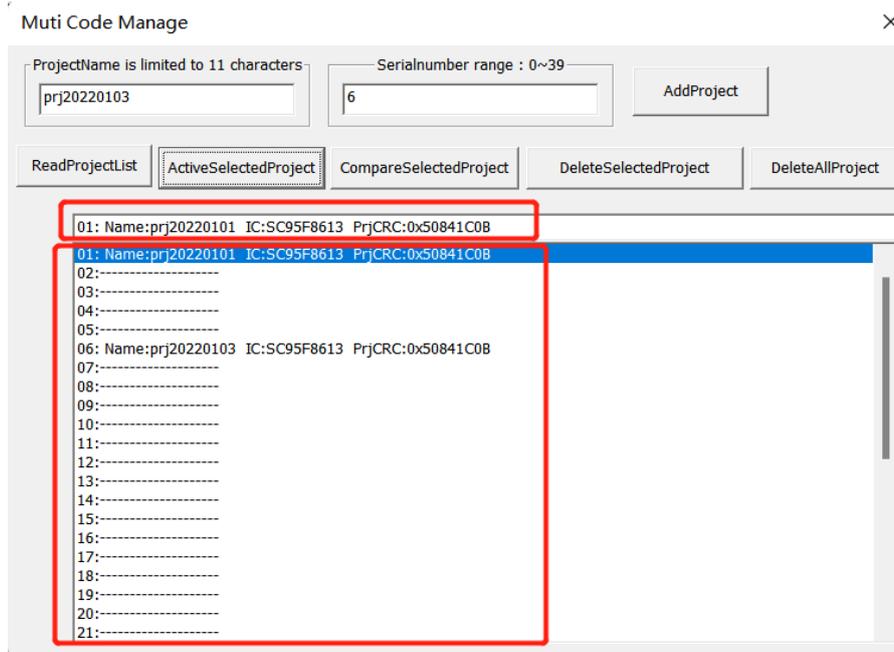


(4) After adding the code project, you can see the information of the added project (including project No., project name, IC name and CRC of target code project, etc.).

(5) For SC LINK users, up to 40 Code projects can be added, all of which can be saved to the external memory of the programmer.

## 2. Activate Multi-code Project List

(1) If at least one Code project is added to the project list, select this project and click “Activate Selected Project” **(Note: In offline programming mode, priority to programming shall be given to the activated project in multi-code project list)**, then you can see the information of activated project in the text box at the upper of the project list; if the text box is empty, no project is activated. A project is activated as shown in the figure below.



### 3. Delete Multi-code Project List

(1) Delete the selected project. For multiple project lists, you can delete unnecessary multi-code projects; select a project and click “Delete Selected Project” to delete the selected code project from the memory of the programmer.

(2) Delete all projects. For multiple project lists, you click “Delete All Projects” to delete all multiple-code projects added.

### 4. Read Multi-code Project List

After the programmer has added and stored multiple-code projects, you can click “Read Project List” through online programming tool to obtain the information of added project list.

### 5. Compare Multi-code Project List

After a project is added to the multi-code project list, select the project to be compared and then click “Compare Selected Project” to compare it with the current loaded project or project code. If yes, the data is the same. If not, it indicates that the data of currently activated project is inconsistent with that of loaded project code. Besides, you can also compare the CRC in the project list with the checksum of the loaded project code.

### 6. Exit Multi-code Management

When multi-code management is not required, delete the activated multi-code projects or all projects to exit multi-code management and restore the normal programming mode.

### 7. Programming Multi-code Project

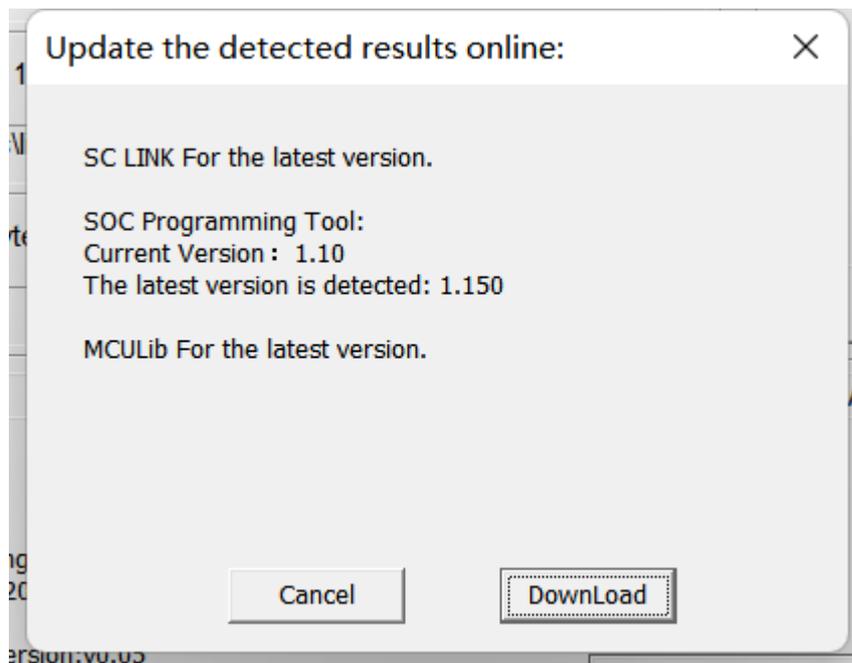
When there is already an active multi-code project, the target project can be program and verified by offline programming.

## 3.3.11.3 Notes for Multi-Code Management

1. If there is no activated project or no project at all in Multi-code Project list, the multi-Code management is invalid. At this time, it is in ordinary programming mode, and the project code downloaded offline will be programmed.
2. If there is any activated project in multi-code project list, this activated project will be programmed offline.
3. In each Code project downloaded, APROM and LDROM support a maximum of 128KB and 4KB respectively.

### 3.3.12 Automatic Upgrading Detection

SOC Programming Tool supports featuring online upgrade detection, can automatically detect the version of programming tool, MCU library and SC LINK PRO firmware under the circumstance of user PC connecting to the network; when a new version is found, the system will prompt user the new version detected and provide the download address. The figure below shows the popped-up online detection update dialogue box.



## 3.4 Frequently-asked Questions and Answers

### 3.4.1 Exceptions and solutions

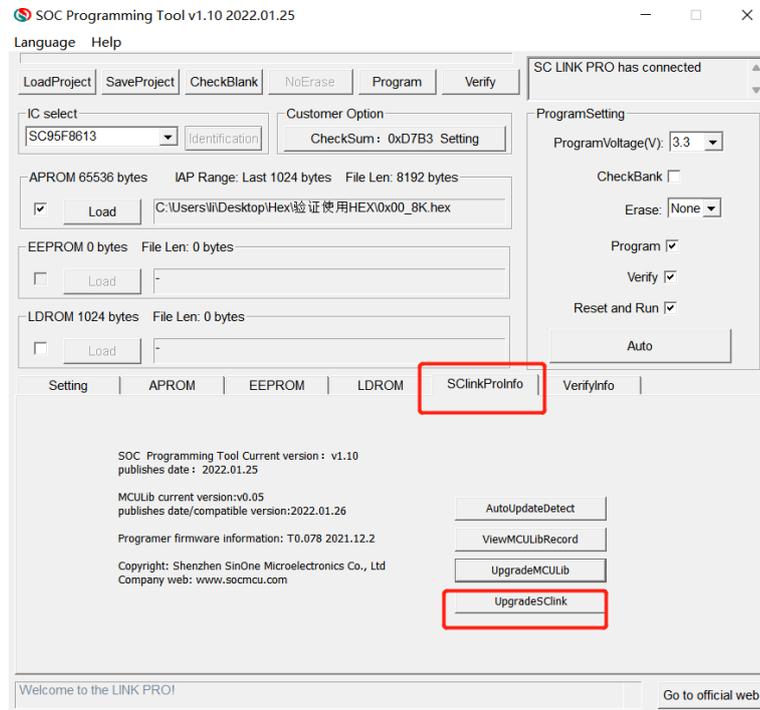
SC LINK V3.XX Abnormalities	Cause	Solution
<b>Online programming display: “Please connect MCU with the programmer”, or the offline programming is failed</b>	The programming cable is connected abnormally	Check if four programming cables are connected properly
	The programming cable is too long	The length of SC LINK programming cable can not exceed 60cm
	The programming cable is connected abnormally	Check if four programming cables are connected properly
	CLK or DIO pins of the chips have 100pF capacitance to GND	The capacitance on the programming signal interface may cause programming timing error, when programming by using SC LINK, the capacitance to GND of the programmed CLK and DIO shall be within 100pF
	Resistance exists between SC LINK programming interface and the chip programming interface	Try to avoid series resistance between the lead-out point of programming and the chip; if it is unavoidable, guarantee the series resistance value does not exceeds 100R, and minimize the programming cable upon programming
	CLK and DIO of chips are connected to the same digital tube	In circuit design, try to avoid connecting CLK and DIO of the chip to the same digital tube
<b>Four indicators flash at the same time</b>	Short circuit in VDD and VSS of programming target board/chip	Troubleshoot before programming
<b>Busy lamp keeps flashing in online programming mode</b>	SC LINK enters Firmware Upgrading mode	Power on SC LINK again
<b>Running lamp keeps off after power-on</b>	The supply voltage is abnormal	Check if the supply voltage of SC LINK is not less than 4.5V
<b>The version displayed on the soc programming tool is incompatible</b>	The firmware version is incompatible	Upgrade the SC LINK firmware. For details, see <a href="#">3.4.2 SC LINKV3.XX Firmware Upgrade</a>

### 3.4.2 SC LINKV3.XX Firmware Upgrade

The procedure for upgrading to SC LINK V3.xx is as follows:

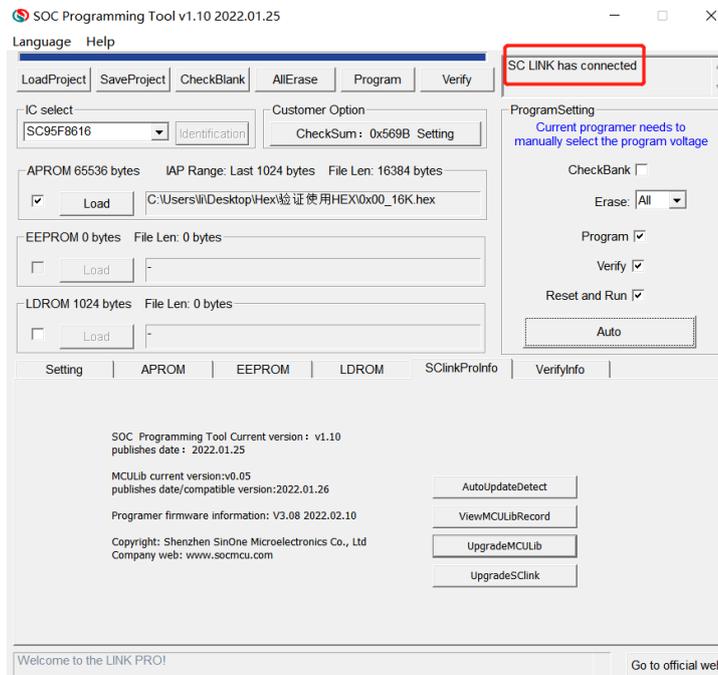
- ① Open the SOC Programming Tool and observe the firmware status of SC LINK. If the firmware version is incompatible as shown in the following figure, download the V3.xx firmware from the Official website of Sin One.

② After unplugging the SC LINK, hold down the KEY on the SC LINK and insert it into the USB port of the PC. At this time, the RUN indicator on the SC LINK keeps blinking and the firmware upgrade mode enters. Click upgrade programmer firmware of programmer information to upgrade the firmware.



③ Select the firmware downloaded from the official website to update the firmware.

④ After upgrading the firmware, unplug SC LINK and reinsert SC LINK. Then open the SOC Programming Tool. If it can identify SC LINK, indicates that SC LINK has been successfully updated to v3.xx.



**Note: When upgrading firmware, long press the KEY and then insert it into the USB port of the PC to enter the firmware upgrade mode!**

## 4. SOC Programming Tool

### 4.1 Overview

Developed by Shenzhen SinOne Microelectronics Co., Ltd. (hereinafter referred to as “SOC”), SOC Programming Tool is designed for PC tools of SOC series programming, which shall be used together with SC LINK PRO&SC LINK.

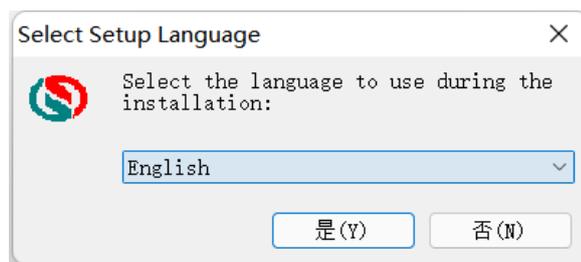
The software supports windows xp/2000/vista/7/10/11 operating systems. By default, it is installed in the directory of “C:\Program Files\SOC\SOC Programming Tool” and created in Start Menu and desktop shortcut, you can modify these default settings during installation.

Your are advised to carefully read the help files before using the software and visit SinOne official website: <http://www.socmcu.com> to obtain the latest MCU manual and software version.

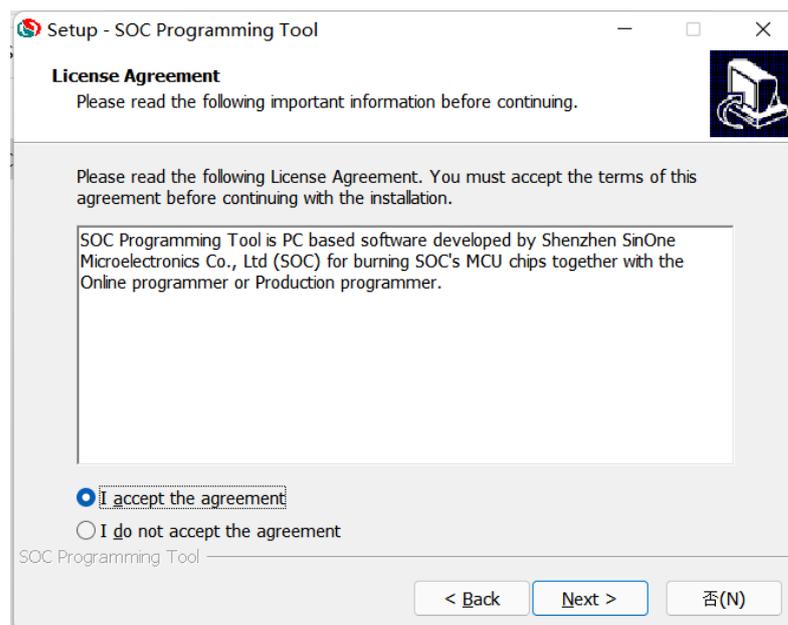
For any question, suggestion or opinion, call [0755-26652552](tel:0755-26652552) or email to: [SOC\\_support@socmcu.com](mailto:SOC_support@socmcu.com).

### 4.2 Install SOC Programming Tool

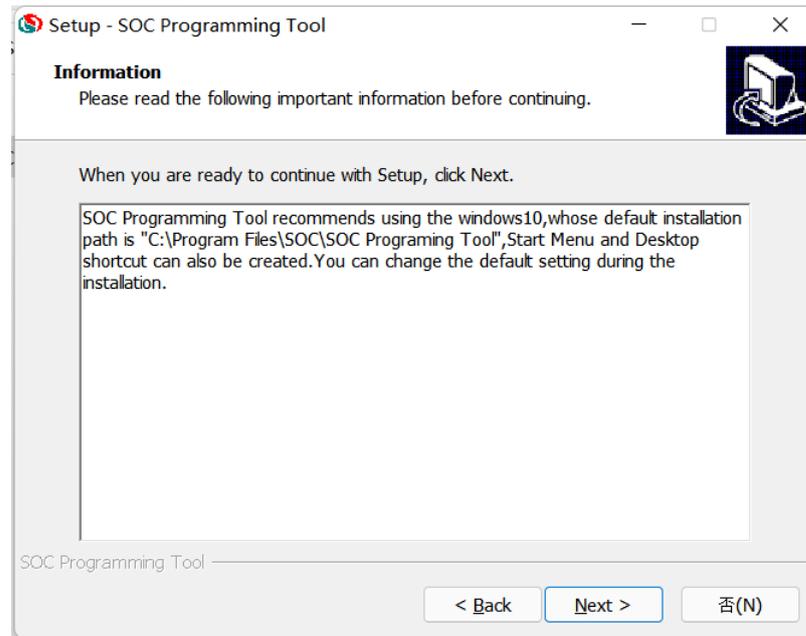
- ① Double click SOC Programming Tool vx.x.exe



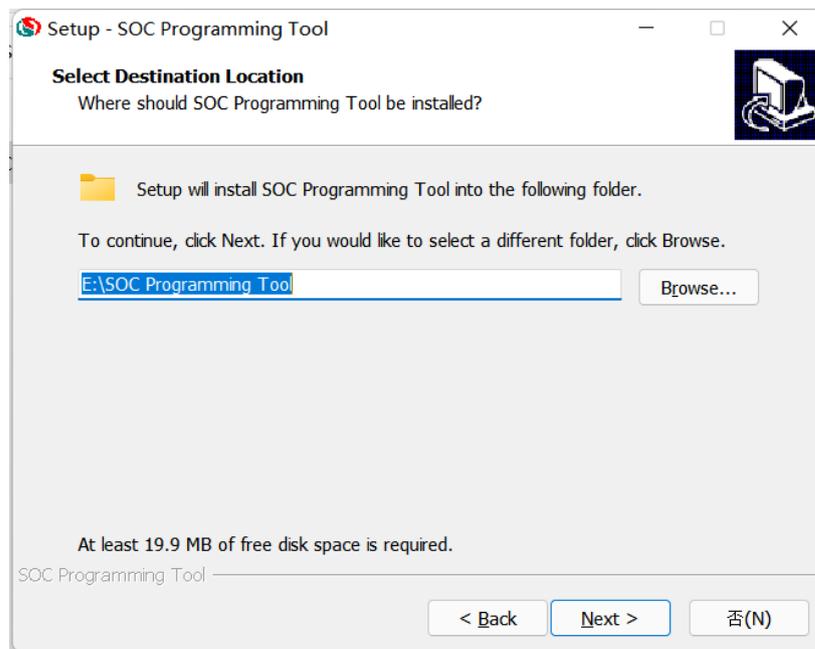
- ② Select “SC”, “TC” or “EN”, and click “OK” button



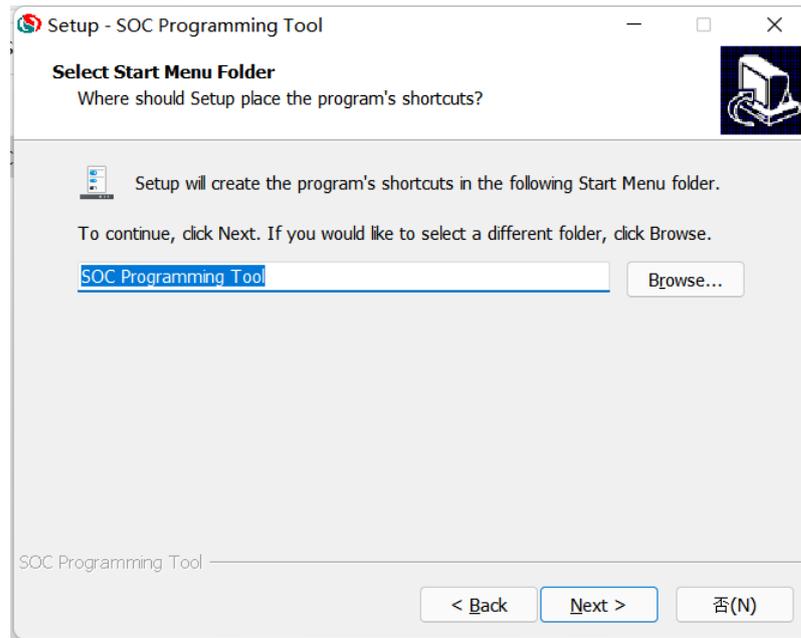
- ③ View the licence, select “I Agree” and then click “Next” button



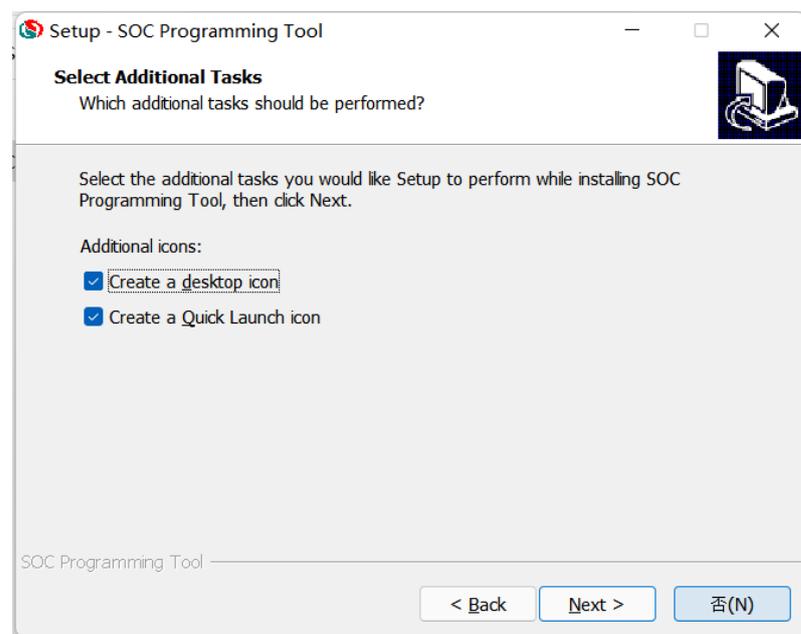
④ View the installation instruction and click “Next” button



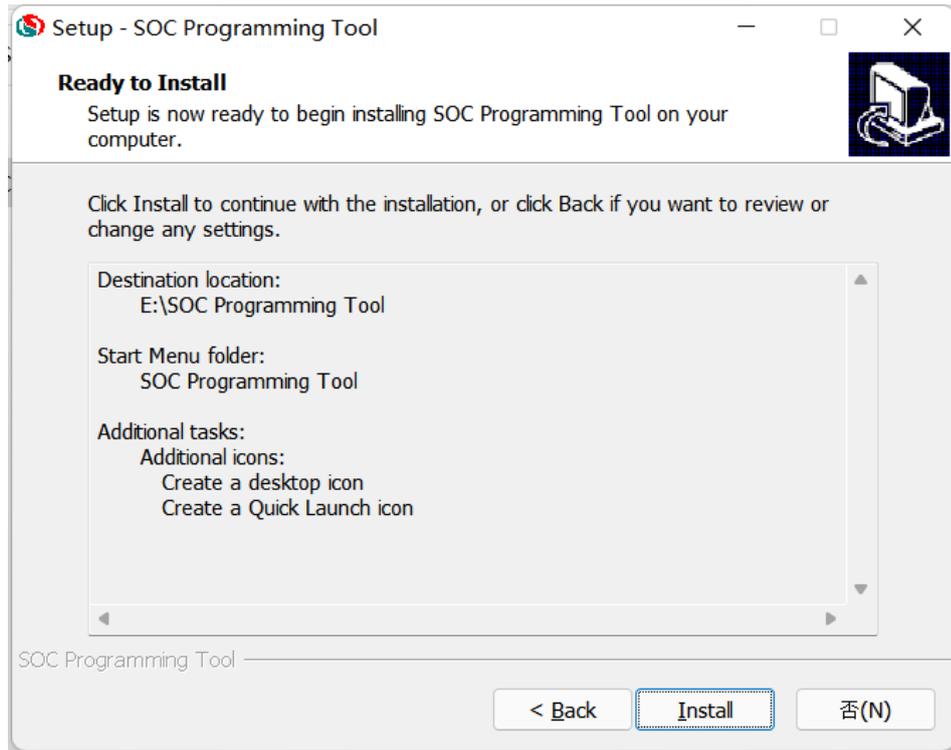
⑤ The default installation path is in “C:\Program Files(x86)\SOC\SOC Programming Tool”, and you can modify it as needed , then click “Next” button



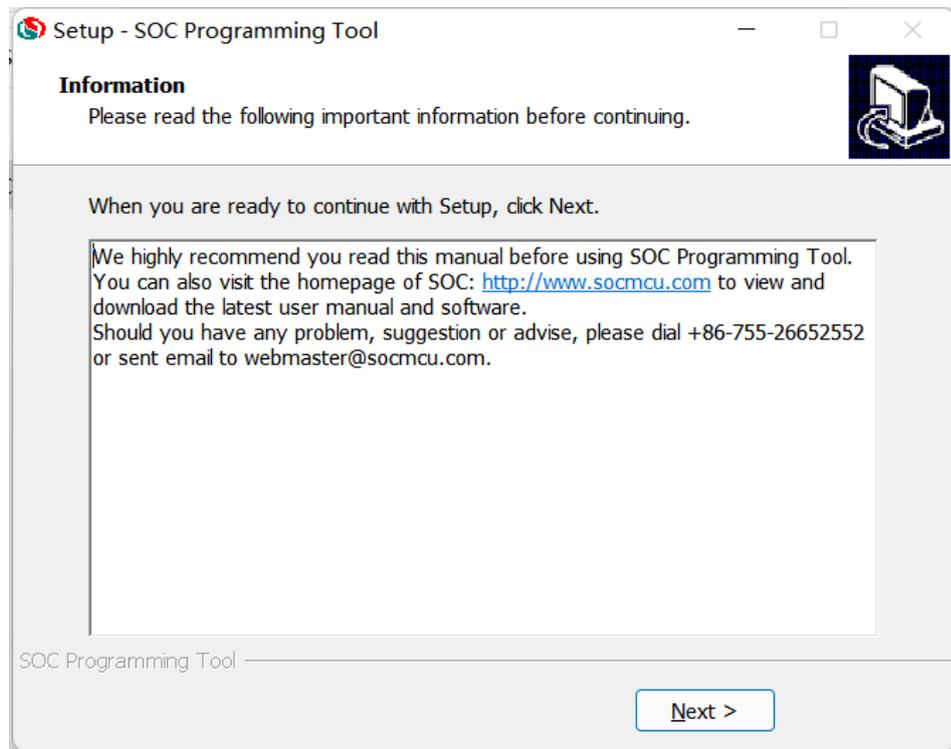
- ⑤ Set the name of this folder on Start Menu with “SOC Programming Tool” by default; you can modify it as needed, then click “Next” button



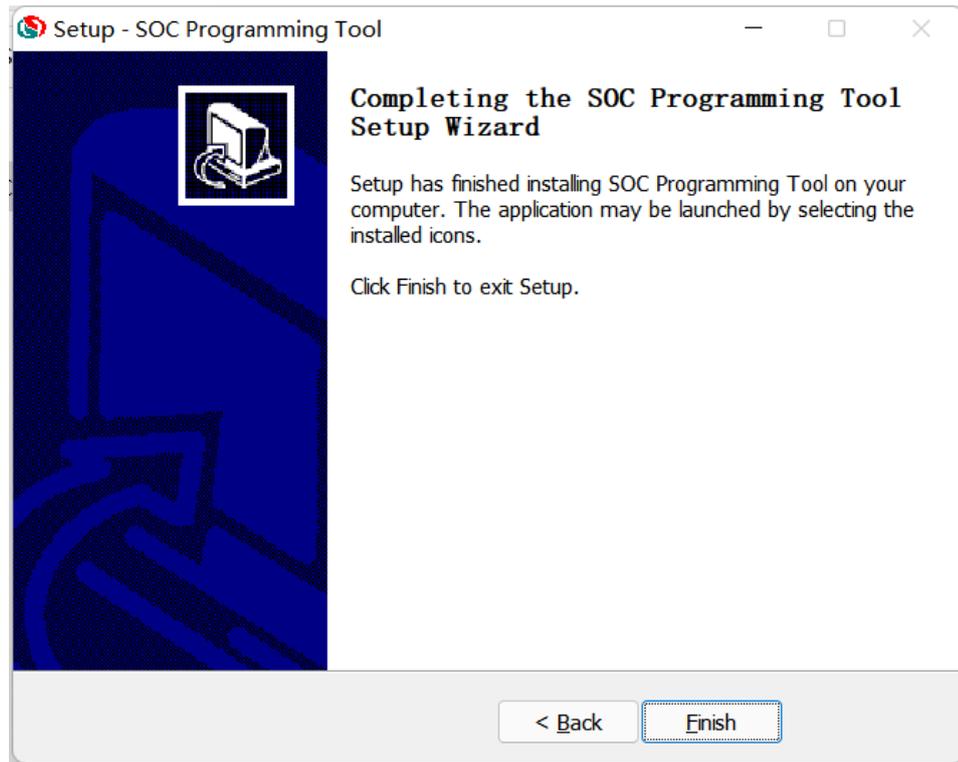
- ⑦ Create desktop shortcut and quick launch bar shortcut by default; you can modify them as needed, then click “Next” button



⑧ Double check all installation options, then click “Install” button

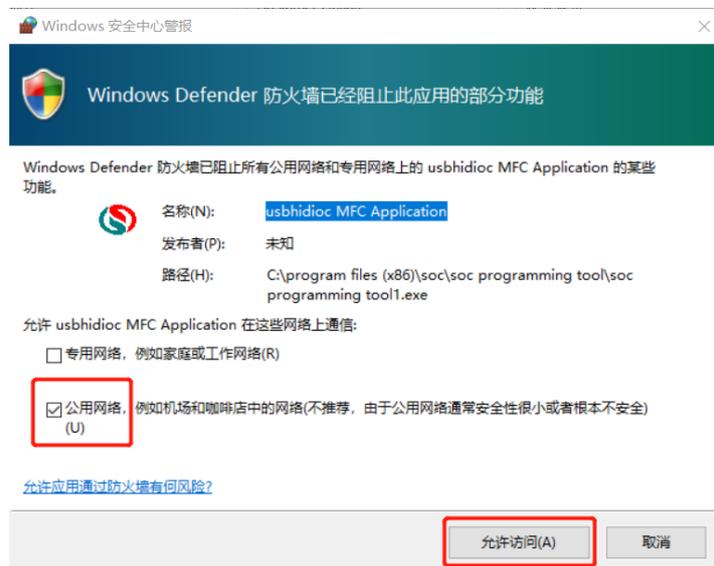


⑨ After installation, related notes will be displayed, click “Next” button

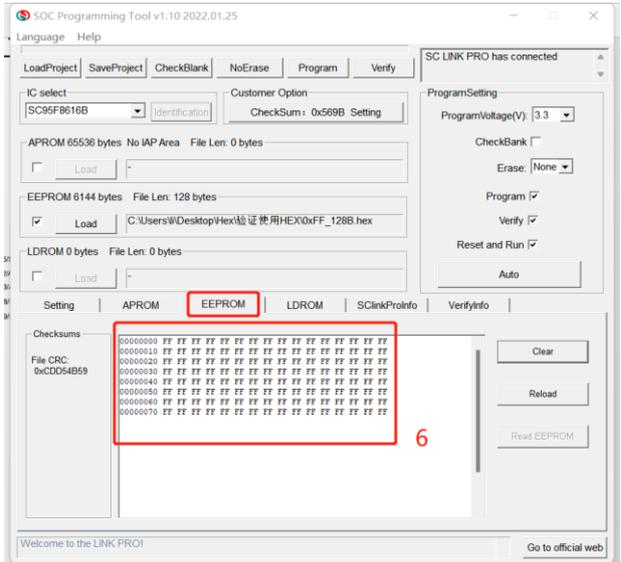
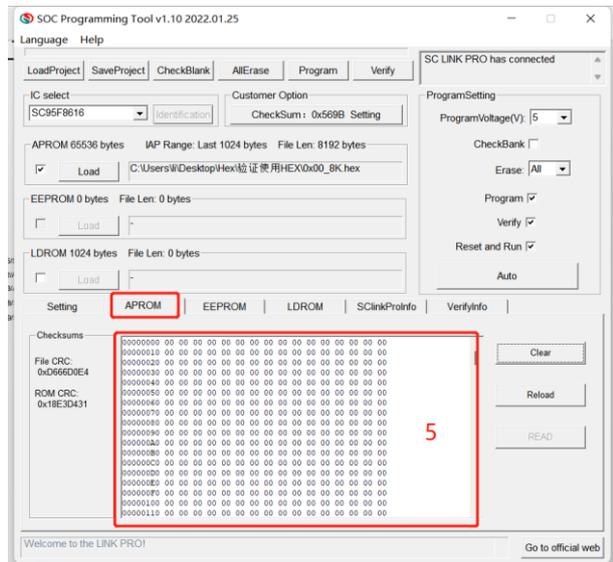
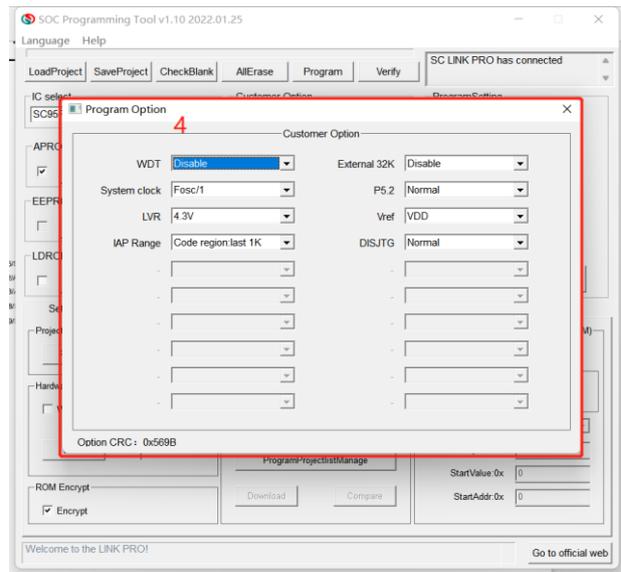
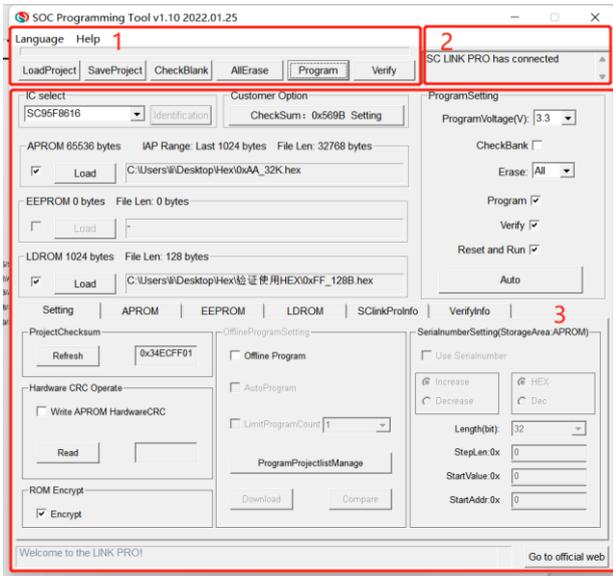


⑩ Check/uncheck “Run SOC Programming Tool”, and click “Complete” to complete.

**Note: After installation, if any network communication message pops up upon opening SOC Programming Tool for the first time, please select “Public Network” to avoid missing important notifications and updates related to the tool!**



## 4.3 Software Interface



### 1) Menu Bar and Operation Buttons and Progress Bar Display Area:

Menu Bar and Shortcut button: Load Project, Save, Programming, Verify, Auto, Erasing, Null Checking and Help.

### 2) Operating Prompt Bar:

Display the operating prompt information during the operation process.

### 3) ProgramSetting Interface:

Chip Model Option, File Load, Programming Area, S/N, Auto Programming, Offline Programming Options, etc..

### 4) Option Setting Interface

Set corresponding WDT, System Clock and LVR for different MCU model as needed.

### 5) APROM Code Display Window:

Display the loaded or read code in current APROM.

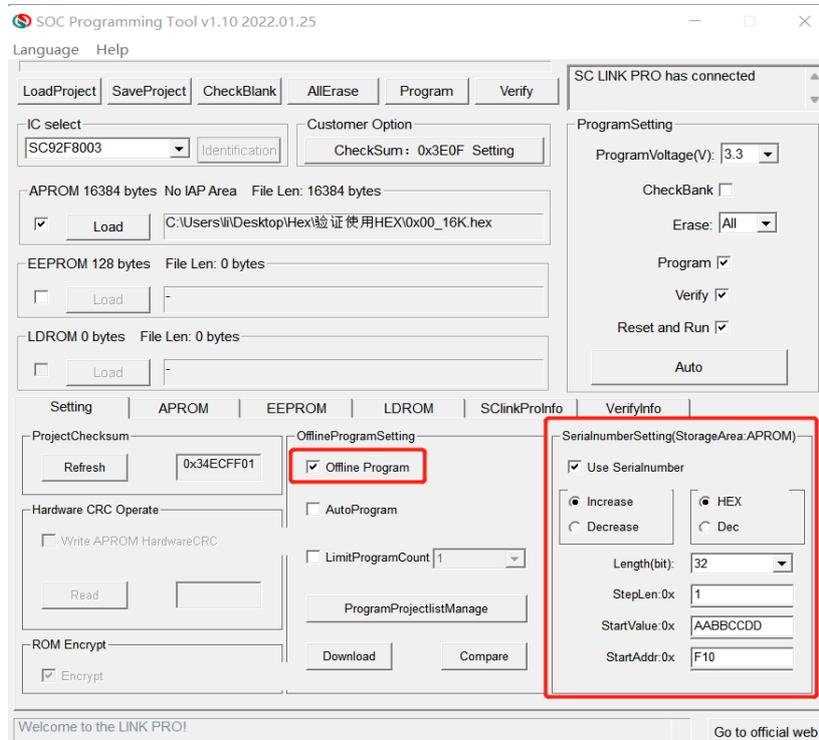
### 6) EEPROM Code File Window:

Display the loaded or read code in current EEPROM.

No.	Function Name	Function Descriptions
1	<b>Load Project</b>	Load saved project file (with the extension of ". socprj")
2	<b>Save</b>	Save Program Code, ProgramSetting (Chip Model, Programming Area, S/N, Programming Options, etc.) as the project file (with the extension of ". socprj")
3	<b>Null Checking</b>	Check if the program code exists in MCU
4	<b>Erasing</b>	Erase the code in MCU
5	<b>Programming</b>	Program the loaded program code and settings to MCU
6	<b>Verify</b>	Check if MCU is programmed correctly
7	<b>APROM Load</b>	Load program codes to APROM
8	<b>EEPROM Load</b>	Load program codes to EEPROM
9	<b>LDRROM Load</b>	Load program codes to LDRROM
10	<b>Programming Voltage</b>	Select programming voltage as needed
11	<b>Auto</b>	Perform automatic operations (Null Checking, Erasing, Programming, Check, Reset and Run) as needed;
12	<b>Programming Option</b>	Select if it is required to encrypt, write/read CRC and to display the checksum of currently loaded project when programming
13	<b>Offline Programming Option</b>	<p>1. Automatic Programming: Check it to automatically detect MCU in offline programming mode, and perform programming automatically if detected, with no need to press START button.</p> <p>2. Limit programming counts: Check it to set the limit programming count with the upper limit of 1,000,000. If the limit is exceeded, the programmer will stop programming.</p>
14	<b>S/N Settings</b>	<p>Write a group of number in MCU Flash:</p> <p>Optional</p> <p>User-defined start value</p> <p>User-defined step value</p> <p>User-defined store address</p> <p>Hexadecimal increment mode by default</p>
15	<b>EEPROM Offset Address</b>	User-defined the start address to write EEPROM
16	<b>Option Settings</b>	Set MCU programming configurations

## 4.4 Function Descriptions

### 4.4.1 Descriptions for S/N



- ① The S/N function is currently available for SC LINK PRO in offline mode only.
- ② Low S/N data is stored in low address, for example, write 32 BITS S/N 0XAABCCDD in 0X0F10, the value written for 0X0F10 is 0XDD, the value written for 0X0F11 is 0XCC, the value written for 0X0F12 is 0XB B and the value written for 0X0F13 is 0XAA.
- ③ The S/N must be 4 bytes in length with the start address of a multiple of 4 (such as 0F10H, 0A04H, etc.), otherwise, an error will be reported upon programming.
- ④ It is recommended to set the S/N address outside the program space so as to avoid the program code from being covered by S/N data, resulting in being unable to perform verifying operation after programming.

### 4.4.2 MCU Library Upgrading

With SOC Programming Tool, IC model programmable and corresponding configuration parameters can be set by using MCU library file; When any new IC is introduced or the configuration parameters of current IC are adjusted, SOC will update the library file and publish it on the official website (<http://www.socmcu.com>).

To update MCU library:

- ① Download the latest MCU library file in SinOne official website (<http://www.socmcu.com>).
- ② Open SOC Programming Tool and click “Upgrade Chip Library File” on “Programmer Information” Menu.
- ③ Locate MCU library file (.mculib/.mcux file) in “Open File” dialog box, and click “Open”.
- ④ After upgrading is completed, restart SOC Programming Tool.

### 4.4.3 Firmware Upgrading

The firmware of SC LINK PRO features online upgrading to add new features or correct problems.

Firmware upgrading method: For the methods for SC LINK PRO firmware upgrading online, see [2.3.1 Firmware Upgrading](#)

### 4.4.4 Check Offline Programming Options

Figure 4.4.6 shows settings of SOC Programming Tool offline programming options, only valid in SC LINK PRO offline mode.

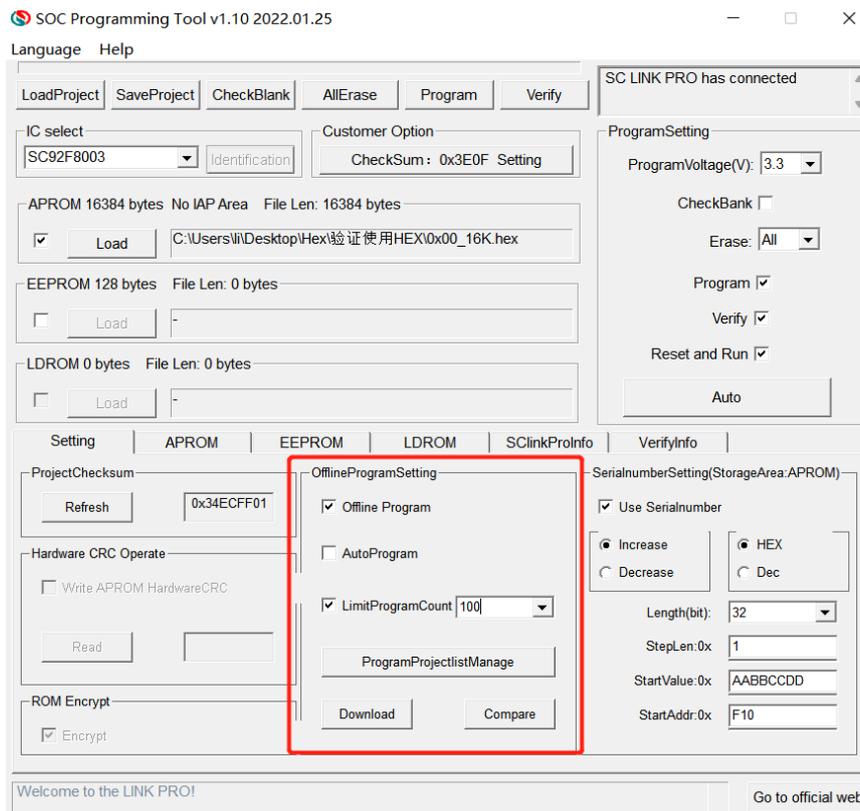


Fig. 4.4.6 Settings of Offline Programming Options

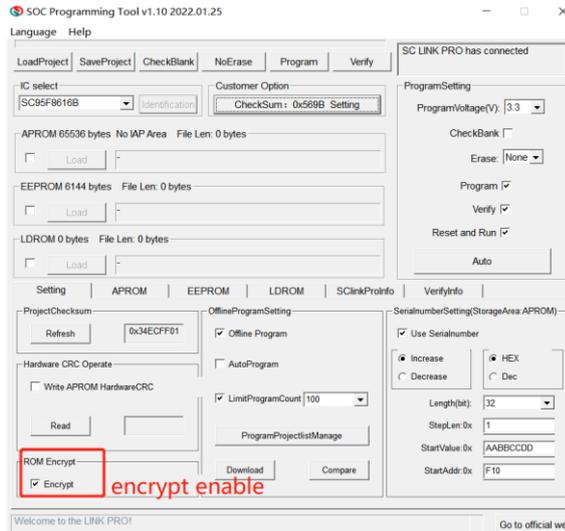
Functions are described as follows:

1. Auto Programming: Check it for the programmer to detect IC automatically; perform programming automatically if detected without any triggering action.
2. Limit programming counts: Check it to set the limit programming count with the upper limit of 1,000,000. If the limit is exceeded, the programmer will stop programming.

### 4.4.5 Security Encryption

#### 4.4.5.1 Security Encryption Functions and Features

All IC of SinnOne have encryption function, among which the 95F series, 92L series and part of 92F series IC allow users to choose whether to enable the security encryption function, while other series forcibly enable the security encryption function by default and users cannot disable it. For IC models with configurable security encryption function, you can select whether to encrypt the IC securely by configuring the Encryption control in the "ROM Encryption" option on the host computer interface.

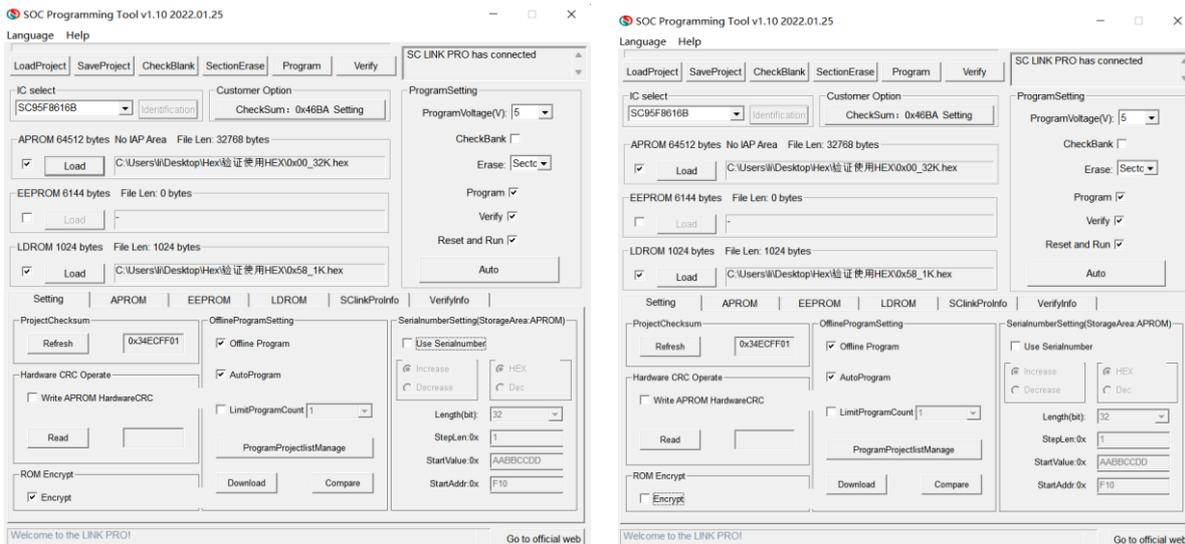


Security encryption features of SinOne series IC are as follows (configurable IC for security encryption function) :

1. Regardless of whether the security encryption function is selected, as long as the user through the programmer to an encrypted IC to perform programming rewrite, if the operation target is LDROM or APROM+LDROM, the programmer will be forced to erase APROM and LDROM, and then perform write operation
2. The only way to enable secure encryption is to check secure encryption and write
3. The only way to disable secure encryption is to turn it off and write
4. Secure encryption does not affect IAP functionality

### 4.4.5.2 Secure encryption procedure

When the "encryption" option in the chip model IC of the burning interface is lit up, if you want to turn off the encryption function, you should deselect "encryption"), the configuration interface is as follows:



Left: enable encryption Right: disable encryption

If you want to use encryption, after configuring "encryption", the "programming" operation will be triggered. The encrypted configuration will be written to the chip by the writer, and the encryption configuration will be completed. If you want to use encryption, after configuring "encryption", the "programming" operation will be triggered. The encrypted configuration will be written to the chip by the writer, and the encryption configuration will be completed.

### 4.4.5.3 The relationship between the encryption of the programmed IC and the erasure of the programming area

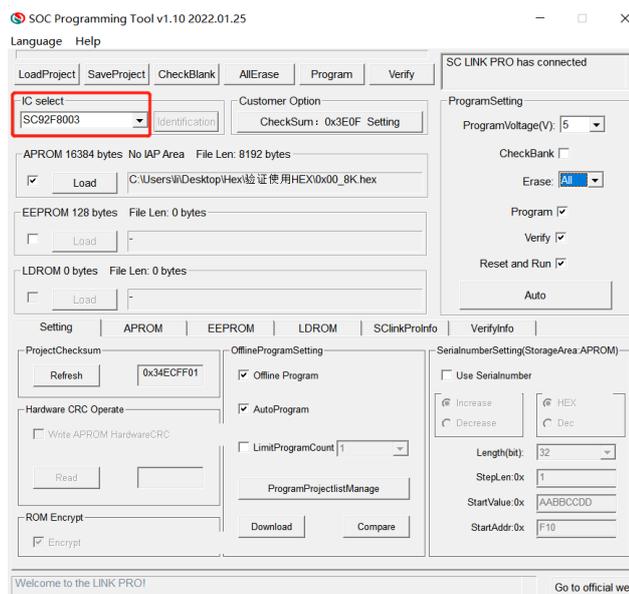
1. This relationship applies only to the IC whose security encryption function can be configured.  
To prevent users from forgetting to set the secure encryption mode, the "encryption" setting in the ROM encryption option is automatically checked
2. Whether the burned IC is encrypted or not will have different effects on THE APROM and LDROM of IC, and the corresponding relationship is as follows:

IC encryption \ Programming area	APROM	LDROM	APROM+LDROM
Not encrypted	The LINK will forcibly erase APROM before rewriting	The LINK will forcibly erase LDROM before rewriting	The LINK will forcibly erase APROM+LDROM before rewriting
Encrypted	The LINK will forcibly erase APROM before rewriting	The LINK will forcibly erase APROM+LDROM before rewriting	The LINK will forcibly erase APROM+LDROM before rewriting

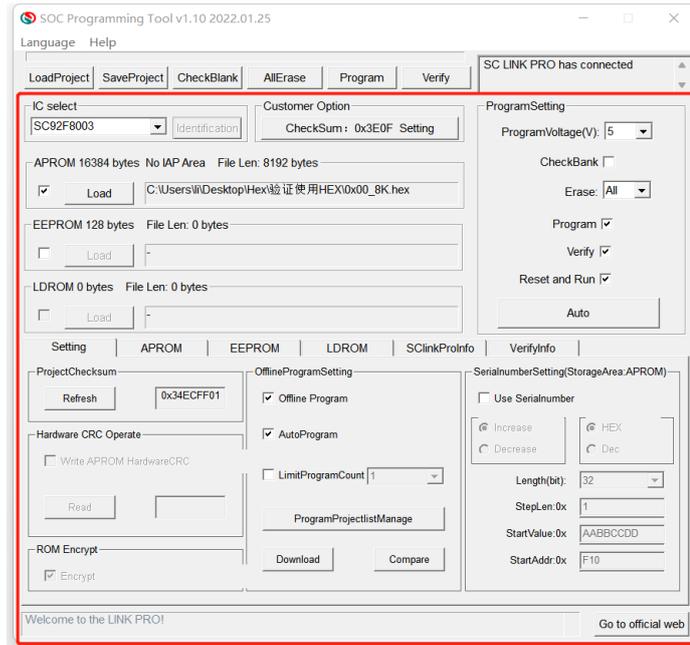
## 4.5 ICP Online Programming

Take using SC LINK PRO program SC92F8003 as an example.

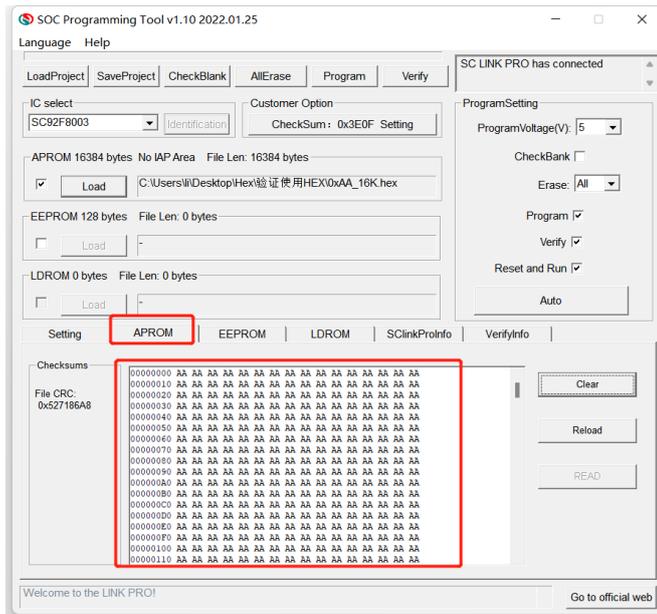
- ① Connect SC LINK PRO to SC92F8003 with 4PIN cables in the right direction.
- ② Connect online programmer SC LINK PRO to PC with USB cable.
- ③ Open SOC Programming Tool.
- ④ Select the chip model to be programmed at the drop-down list of "Chip Select", such as SC92F8003 in the example.



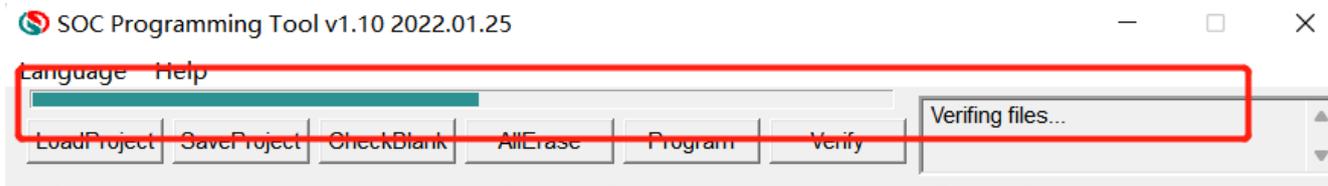
1. After the chip model is selected, its related interface contents (such as programming type, ProgramSetting, etc.) will be adjusted based on its resources automatically;

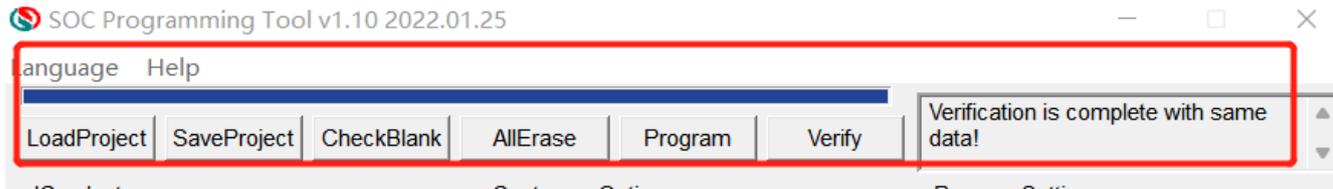


2. Check corresponding programming area, click “Load” and locate the code file to be loaded (.hex file or bin file) in the popped-up window, then click “Open” to display the program codes in corresponding area. The figure below shows the HEX file loaded after selecting APROM;



3. Set up S/N function as needed (if no need, skip this step);
4. Click “Programming” button to program the code file and corresponding settings to MCU;
5. SOC Programming Tool will pop up a window, showing the progress of “Programming”. After the programming is completed, the window will prompt the programming is succeeded.



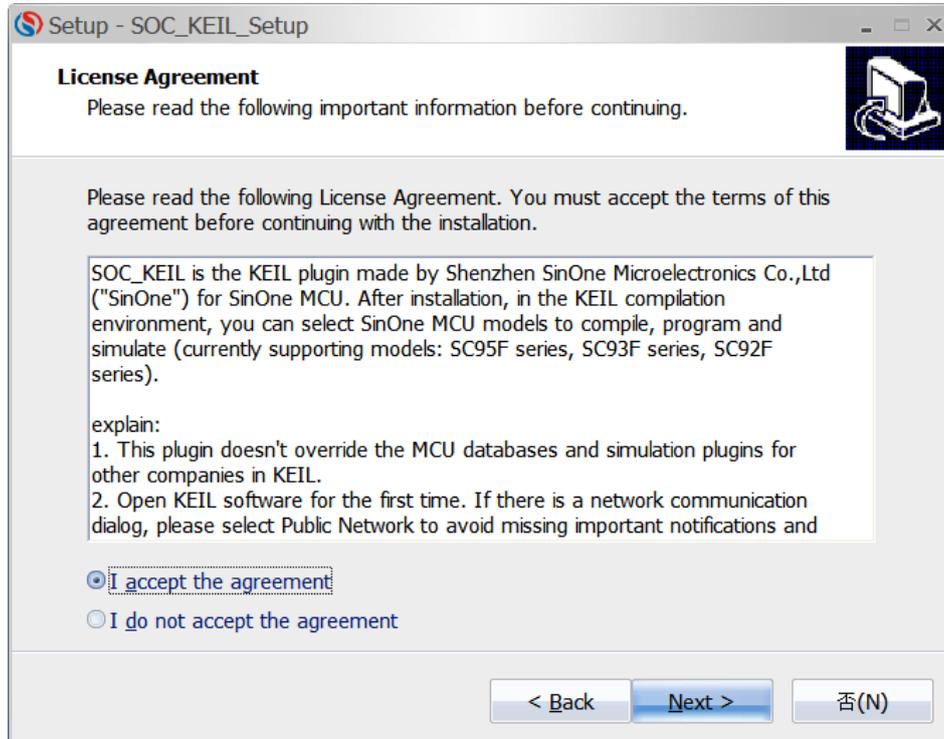


6. Programming is completed.

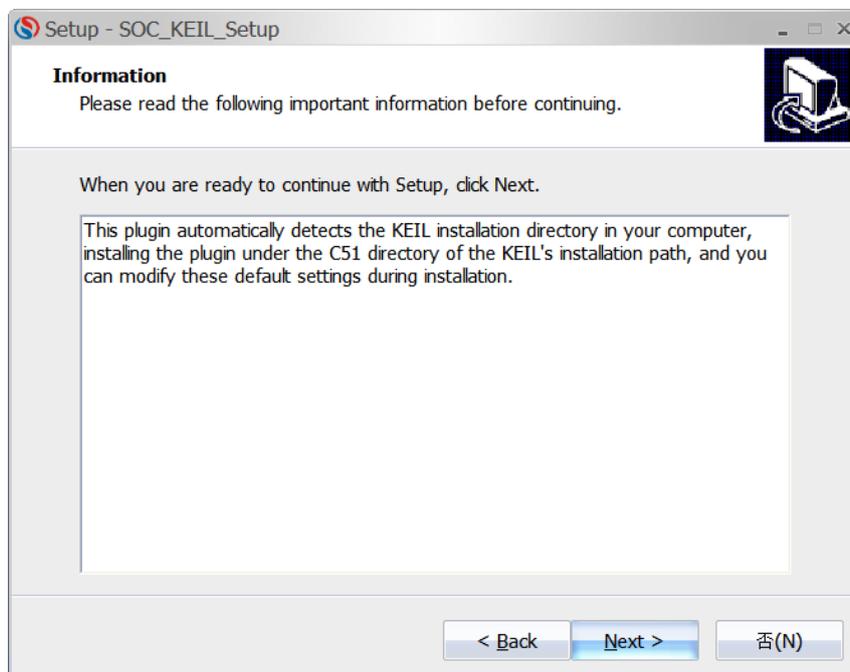
## 5 Keil C Plug-ins

### 5.1 Install Simulation Plug-ins

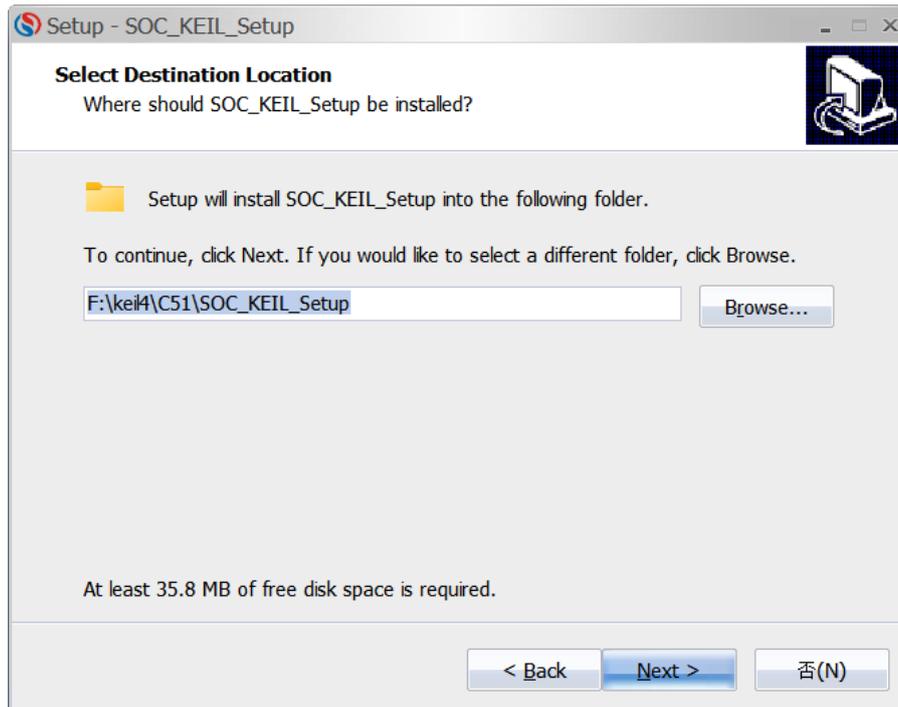
- ① Double click SOC\_KEIL\_Setup Vx.xxx.exe, view the license, select “I agree”, then click “Next”



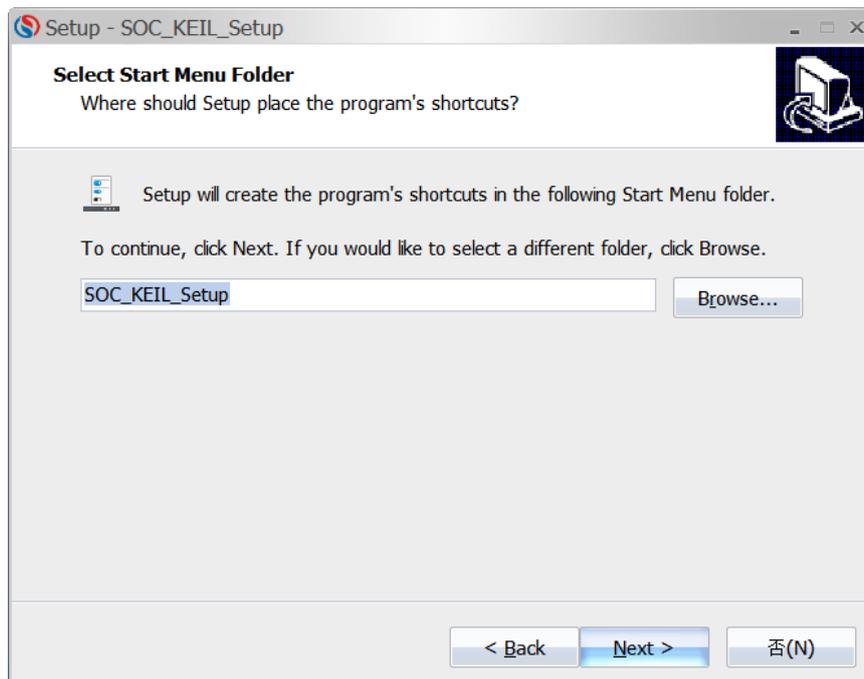
- ② View the license, select “I agree”, then click “Next”



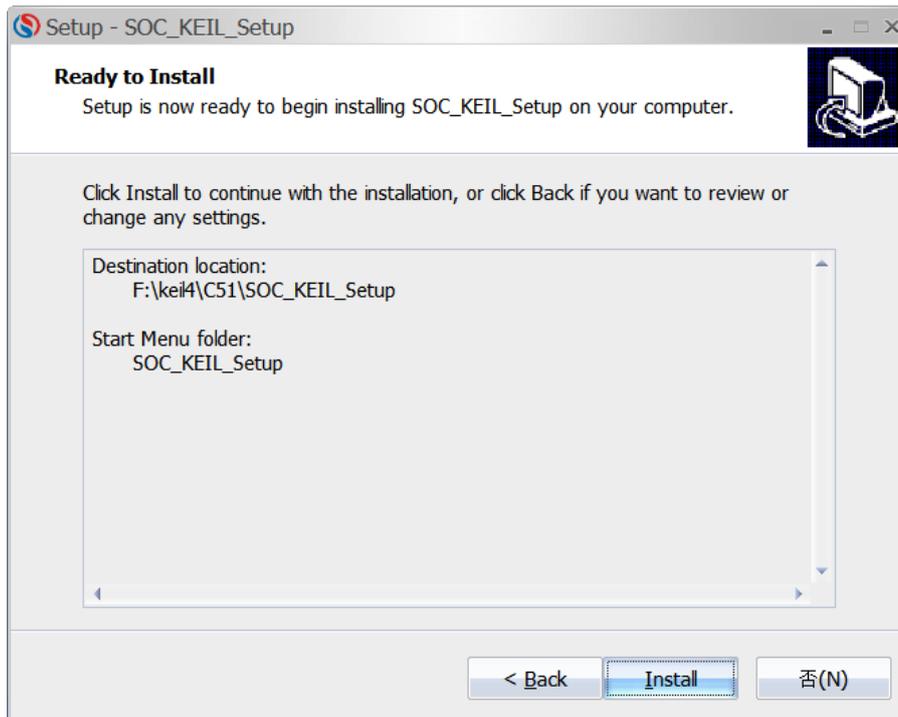
- ③ The default installation path is in the directory for Keil installed, you can modify this path, then click “Next” button



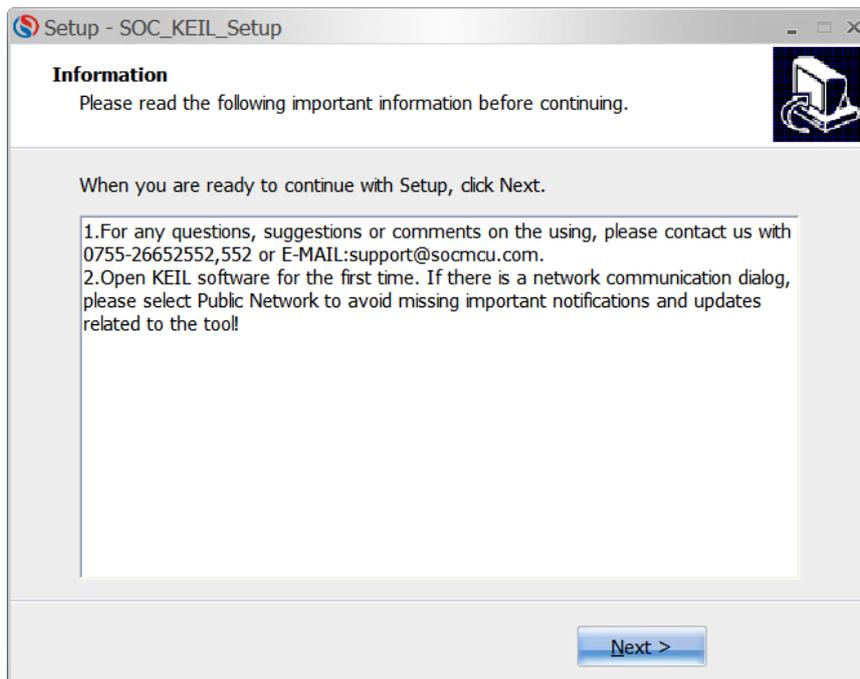
- ④ Set the name of this folder on Start Menu with SOC\_KEIL\_SCLINKPRO in default. You can modify the name as needed, then click “Next” button

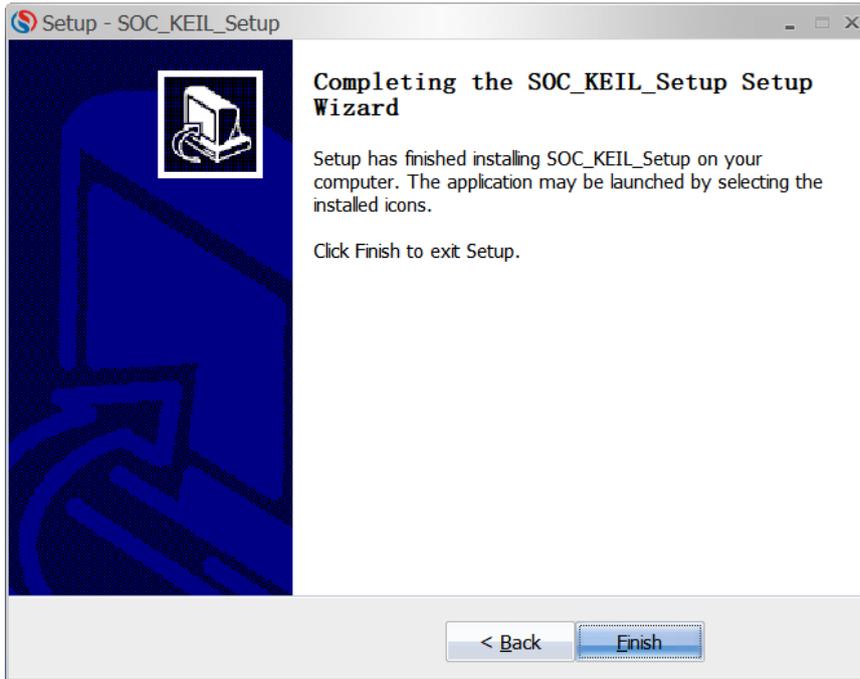


- ⑥ Confirm the installation path and click “Next” button



⑦ For installation, click “Next” and then click “Install” to complete the installation, and read related help information

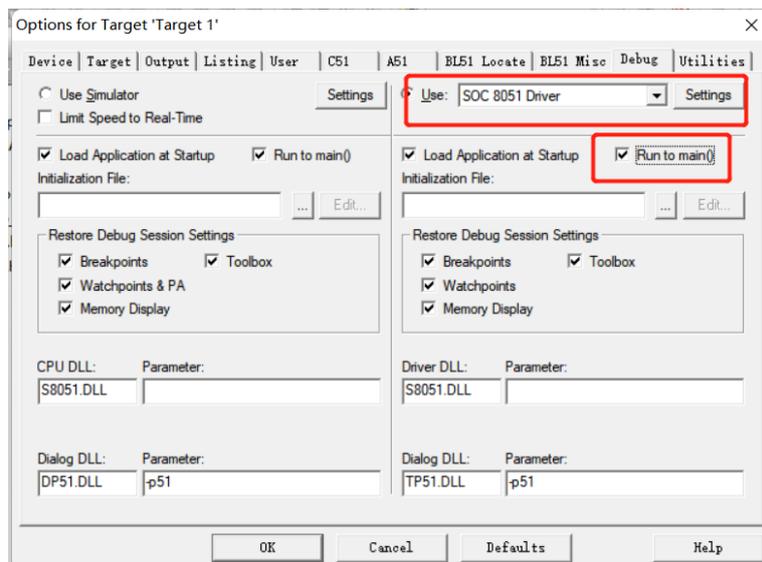




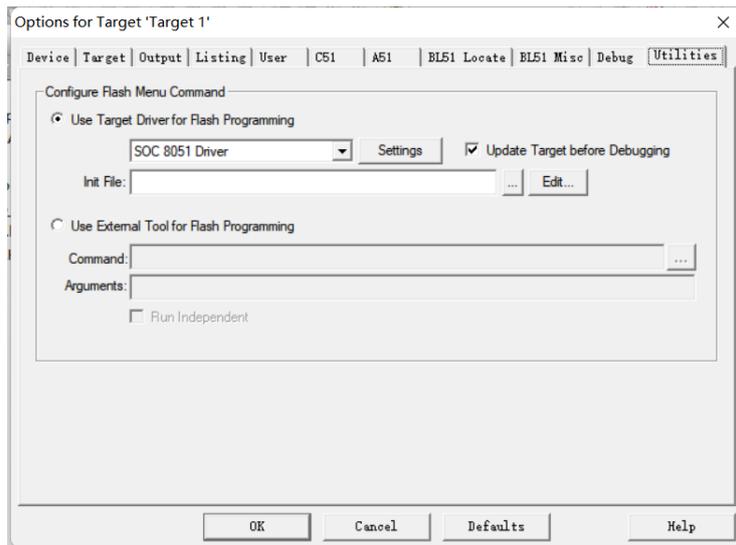
**Note:** After installation, if any network communication message pops up upon opening KEIL software for the first time, please select “Public Network” to avoid missing important notifications and updates related to the tool!

## 5.2 Set Keil Interface

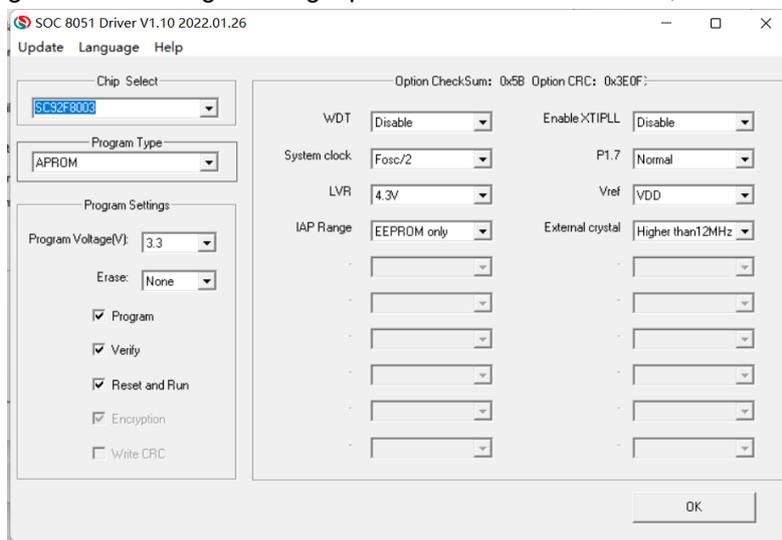
① Open Keil project file, click the shortcut icon “Target Option”, select “Debug” in “Target Option” interface, click “Use” and select “SOC 8051 Driver”, and then check “Run to main()”, as shown in the figure below:



② Click “Utilities” and select “SOC 8051 Driver” from “Use Target Driver for Flash Programming”, as shown in the figure below:



③ Click “Settings” to enter “Programming Option Information Interface”, as shown in the figure below:



④ Programming Option Information Configuration.

1. Chip Select: Select IC name for pre-programming or simulation.
2. ProgramSetting: Select automatic programming, including erasing, programming, verifying, etc.
3. Programming Options: Set Code Option as needed.
4. Programming Area: APROM or EEPROM
5. Upgrade: Upgrade the library file.
6. Help: Version-related information.

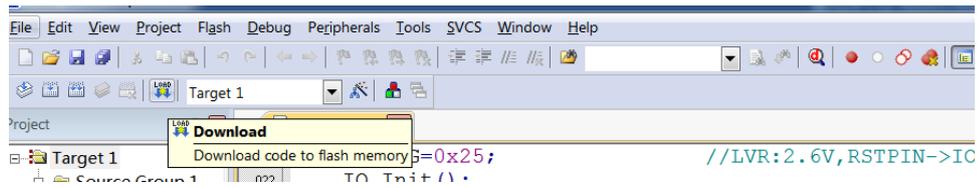
**Note: If the required IC model is not found in chip option or the corresponding model found can not be simulated, it is required to click “Upgrade” to enter the upgrade interface.**

Upgrade MCU Library: Upgrade “.socmculib” library file provided by SOC. Select “Upgrade MCU Library”, select the library file to be upgraded, and click “Open” to complete the upgrading.

Upgrade Firmware: Upgrade the firmware of programmer provided by SOC.

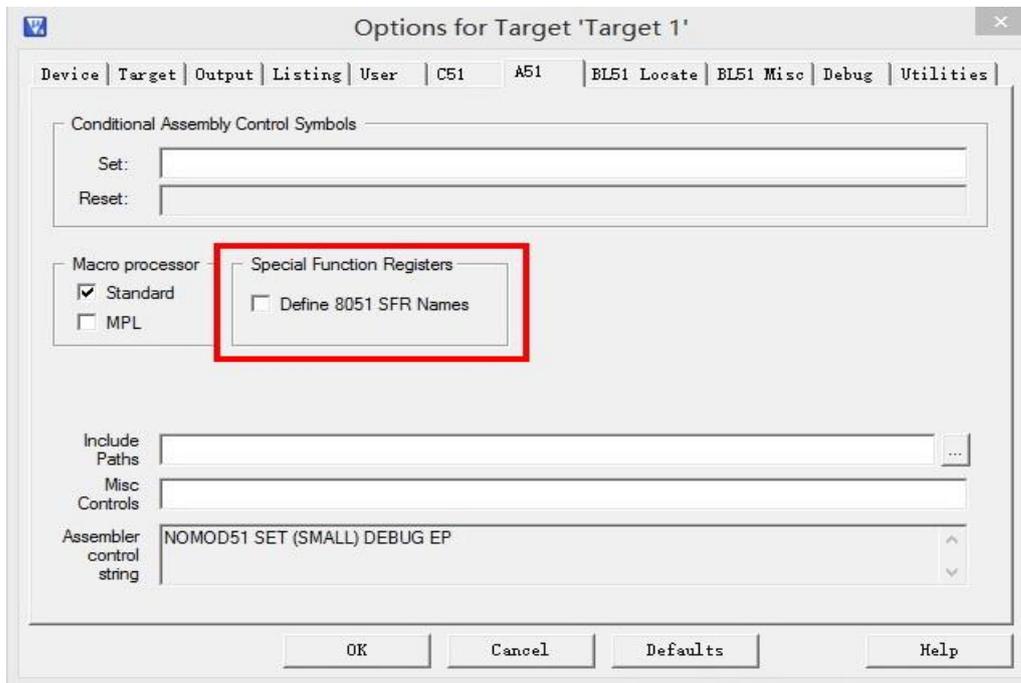
⑤ Download shortcut key

“Download” will perform IC operations according to programming Option configurations, not only programming code and Code Option selected , but also erasing, programming and verifying according to ProgramSetting shown in the figure below.



## 5.3 Notes for Keil C Plug-ins

- ① Before using Keil C to create SOC MCU project, please visit SinOne official website (<http://www.socmcu.com>) to download and install the latest SOC Keil C library file. After installation, SOC MCU model library file, MCU head file and Demo program will be stored in SOC folder under Keil C installation directory.
- ② SOC MCU head file already contains the common name of SFR, so please uncheck "Define 8051 SFR Names" in A51 column of project setting when using Keil C to create SOC MCU project to avoid error reporting.



## 6 Revision History

Revision	Changes	Date
V0.1	Initial Release.	March 2022