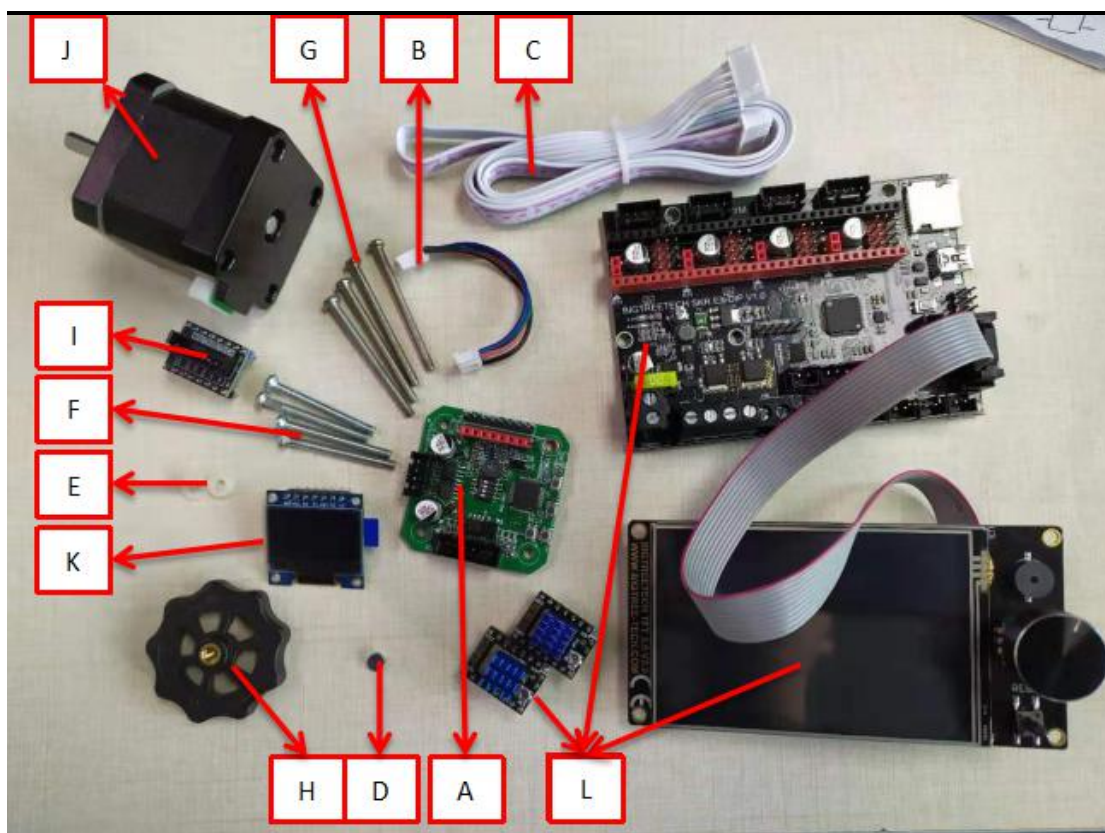
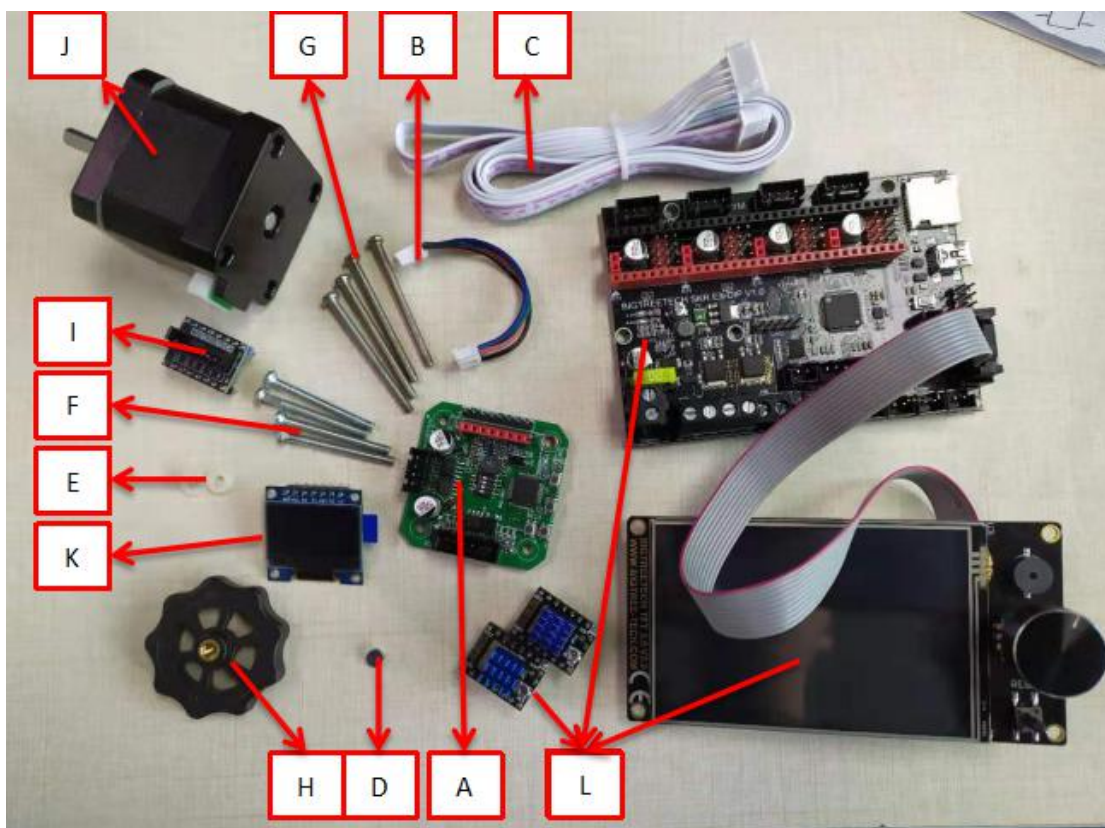


## 3D 打印机-Ender3 机型闭环驱动模组安装说明

### 一、闭环驱动模组安装





1. 所需材料：(单个轴)

A. 闭环驱动控制板 S42B

B. 电机与闭环驱动板连接线，长度 5cm

C. 闭环驱动板与主控板连接线，长度 1m

D. 磁铁：径向磁铁，直径 5mm，厚度 2mm

E. 白色垫片：1.4mm 厚，M3，数量 8 个

F. Ender3 机型装配螺丝：M3,长度 34mm，数量 4 个

G. 其他机型装配螺丝：M3,长度 40mm ，数量 4 个

H. 热床螺母：孔径 M4,外直径约 40mm

I. 驱动电路转接板

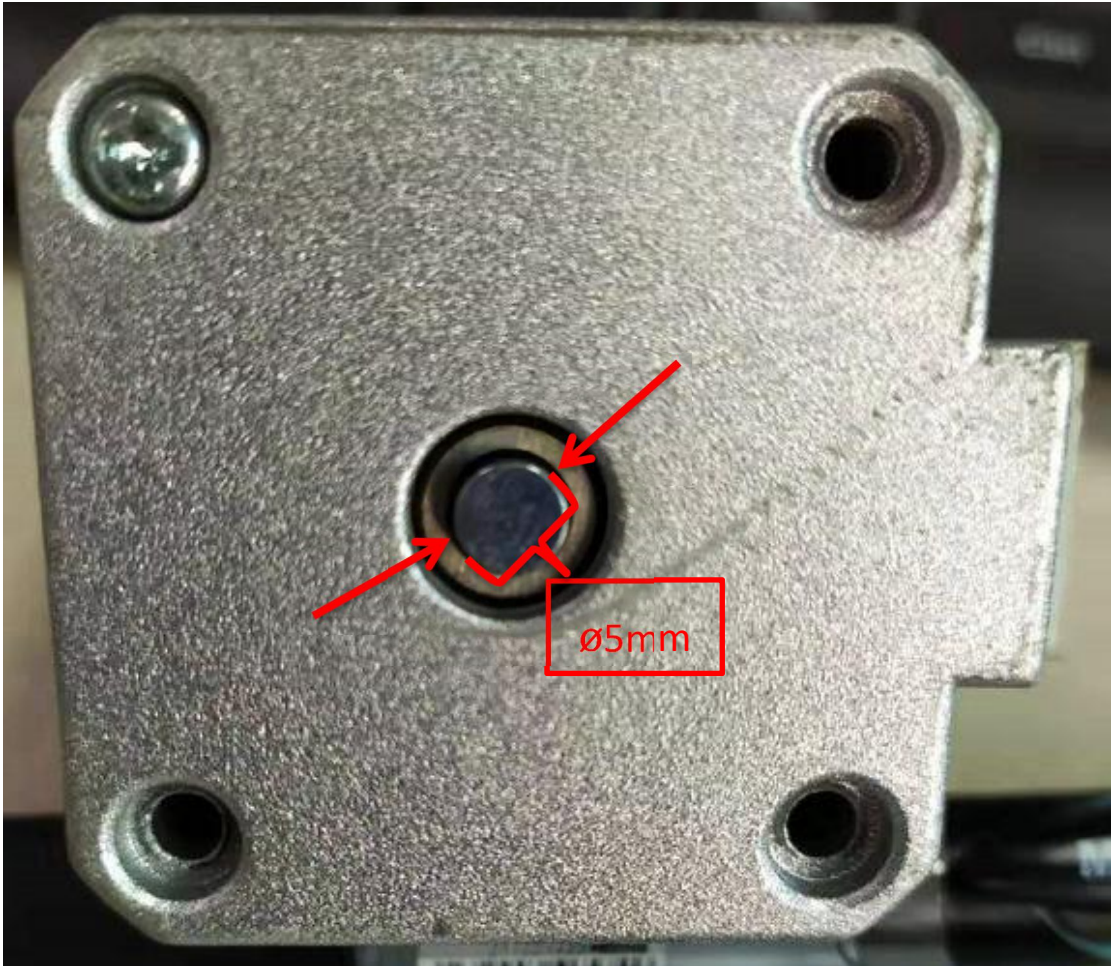
J. 42 步进电机，步距角  $1.8^{\circ}$

K. OLED 屏

L. 3d 打印机主板（**只需一块**）：SKR E3-DIP + TMC2209（Z 轴、E0）+BTT TFT35 V3.0

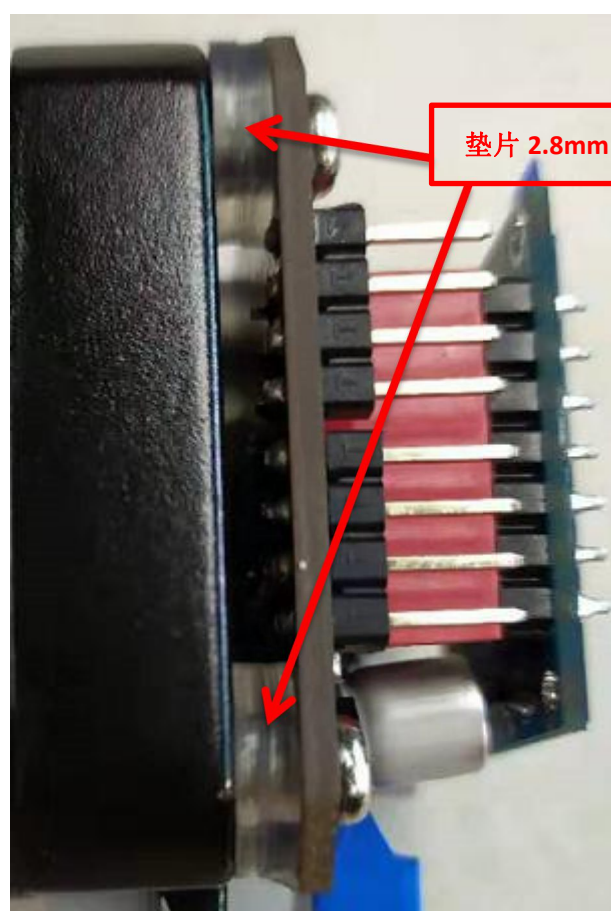
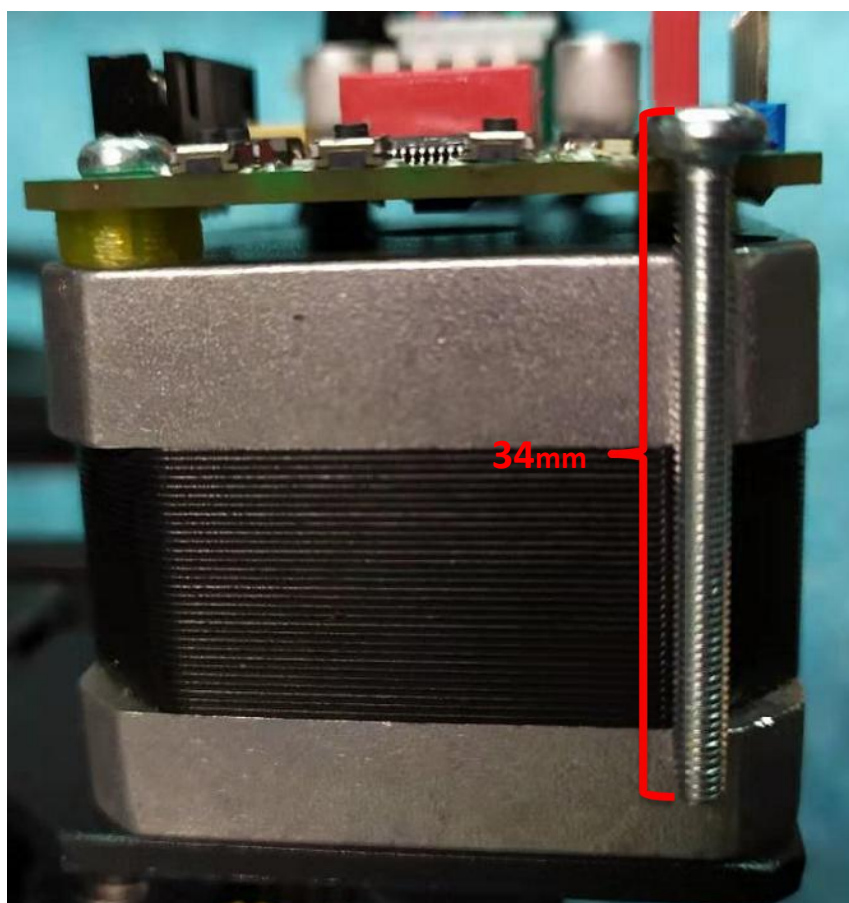
2. 磁铁安装，**务必在电机轴中心位置！**

**磁铁规格：径向磁铁，直径 5mm x 2mm 厚。**最好在轴中心用胶水固定磁铁，若果使用的是液体胶水，注意不要让液体流入电机轴缝隙

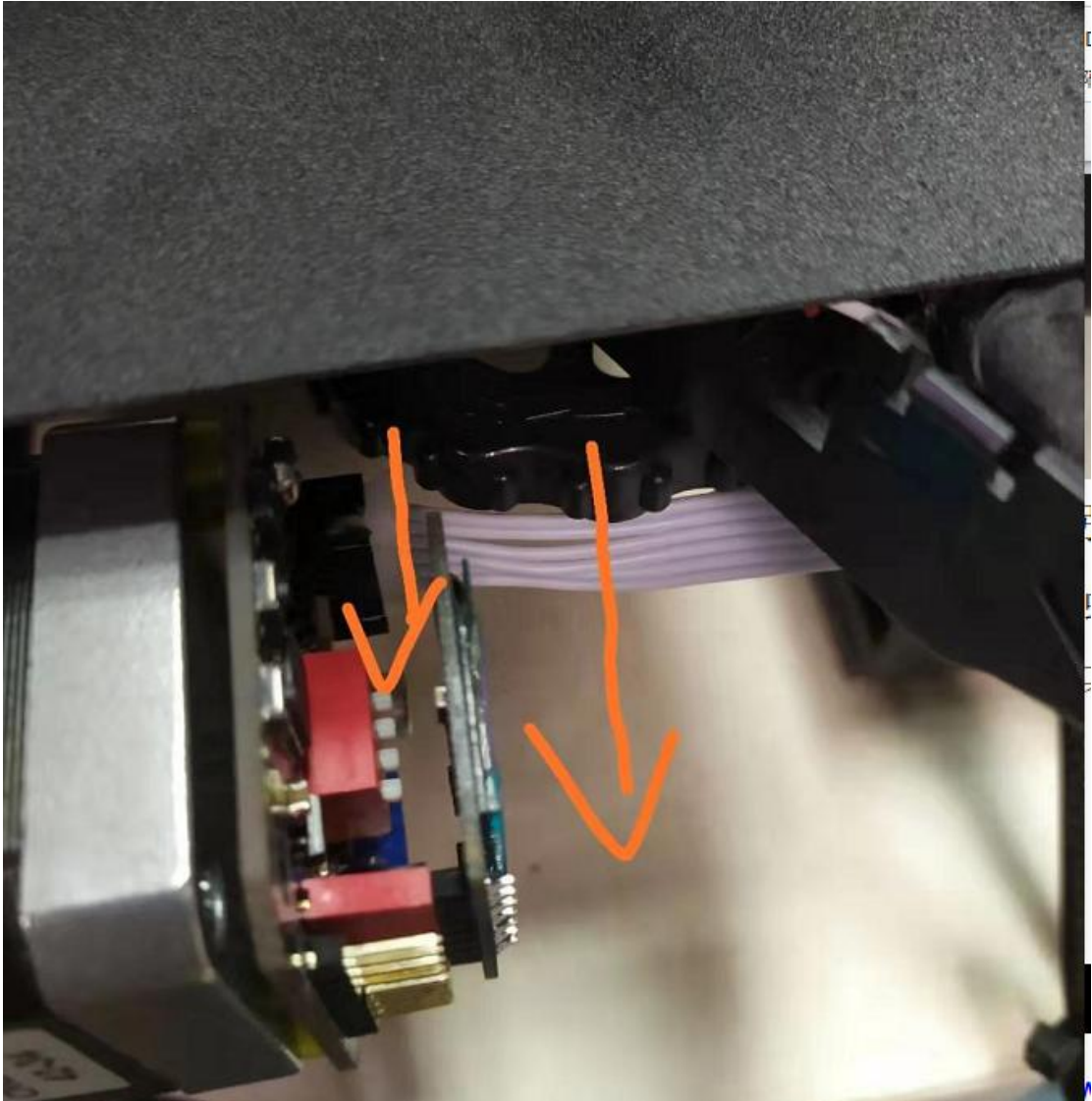


3. 垫片安装，大约 1.4mm 厚的垫片 2 个，加了垫片之后原电机上的螺杆可能不够长，需要更换同类型，大约要 34mm 长的螺杆。





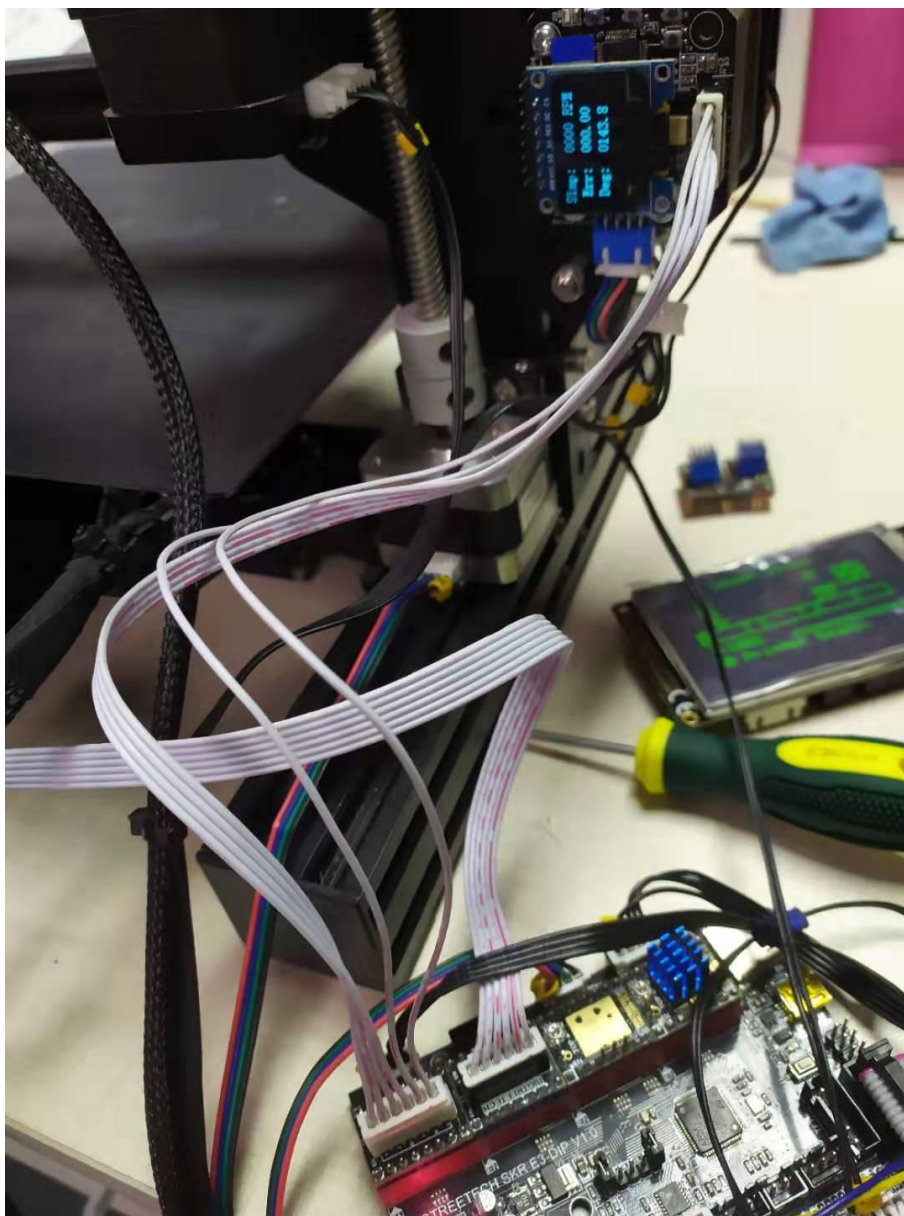
4. Y 轴安装需要特别注意，由于热床的螺帽比较大，因此靠近电机这个角的螺帽需要更换为小号的螺帽，在参数设置好后，可以将屏幕拆除。避免在打印时，Y 轴出现不能回家的现象。



需更换热床螺帽为：

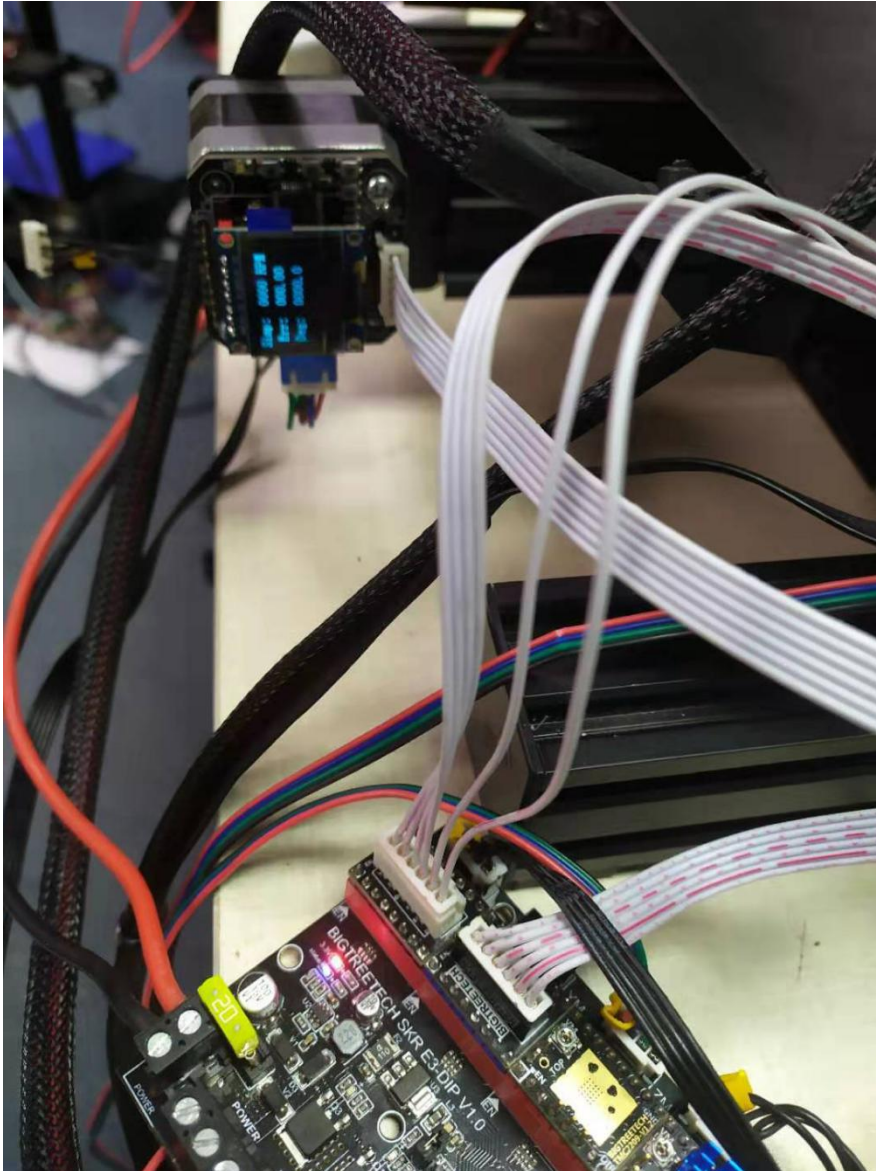


5. 按装完成后上电，如图 X 轴



Y 轴，参数设置完成后需要将屏幕拆下即可。





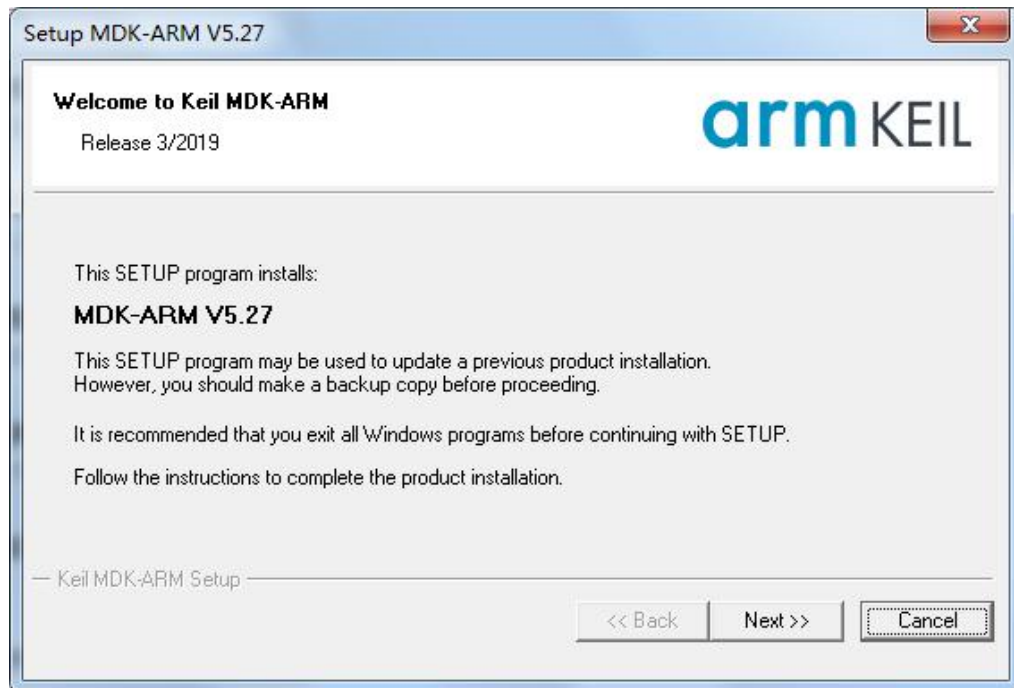
## 二、开发工具安装

- 1) 在官网 <http://www2.keil.com/mdk5/527> 下载安装包,  
其他 MDK 版本安装方式相同, 建议用 MDK5 以后的版本。
- 2) 找到刚下载完成的安装包, 如图:





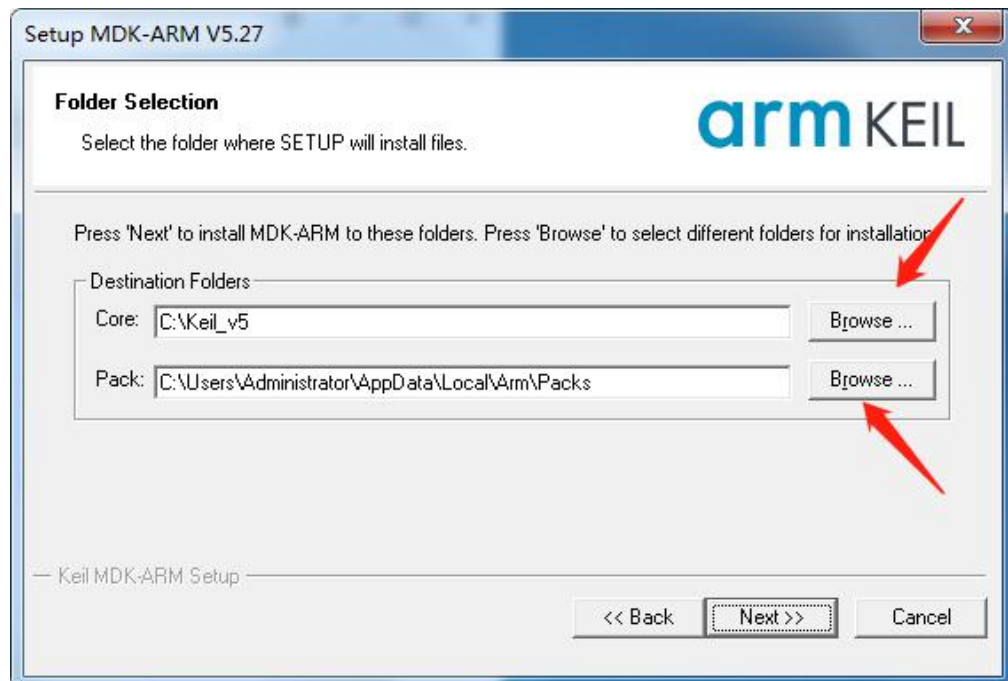
3) 双击打开 MDK527，点击 Next



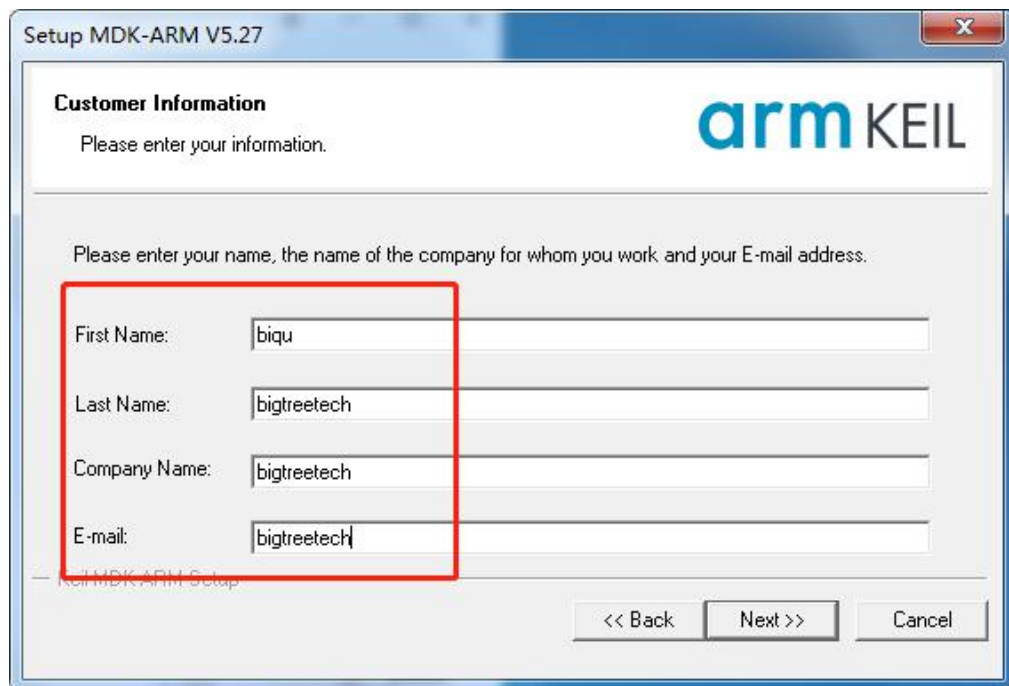
4) 勾选 I agree to all the term of the preceding License Agreement , 然后点击 Next



- 5) 设置安装路径，这里只修改了安装路径，点击 Core 后面的 Browse 更改安装路径，建议安装在除 C 盘以外的其它盘可以在 D 盘或其它盘创建一个 MDK 文件夹，然后点击 Next.



6) 任意填写上述用户信息，然后点击 Next



Setup MDK-ARM V5.27

**Customer Information**

Please enter your information.

Please enter your name, the name of the company for whom you work and your E-mail address.

First Name:

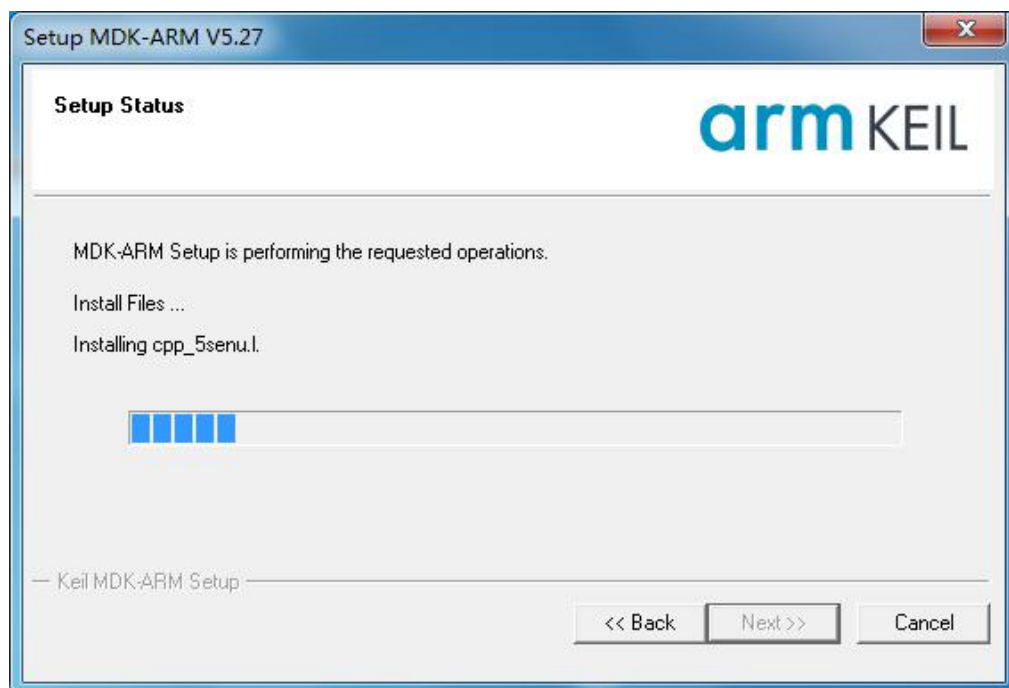
Last Name:

Company Name:

E-mail:

<< Back   Next >>   Cancel

7) 安装中...



Setup MDK-ARM V5.27

**Setup Status**

MDK-ARM Setup is performing the requested operations.

Install Files ...

Installing cpp\_5senu.l.

Progress bar: [|||||]

<< Back   Next >>   Cancel



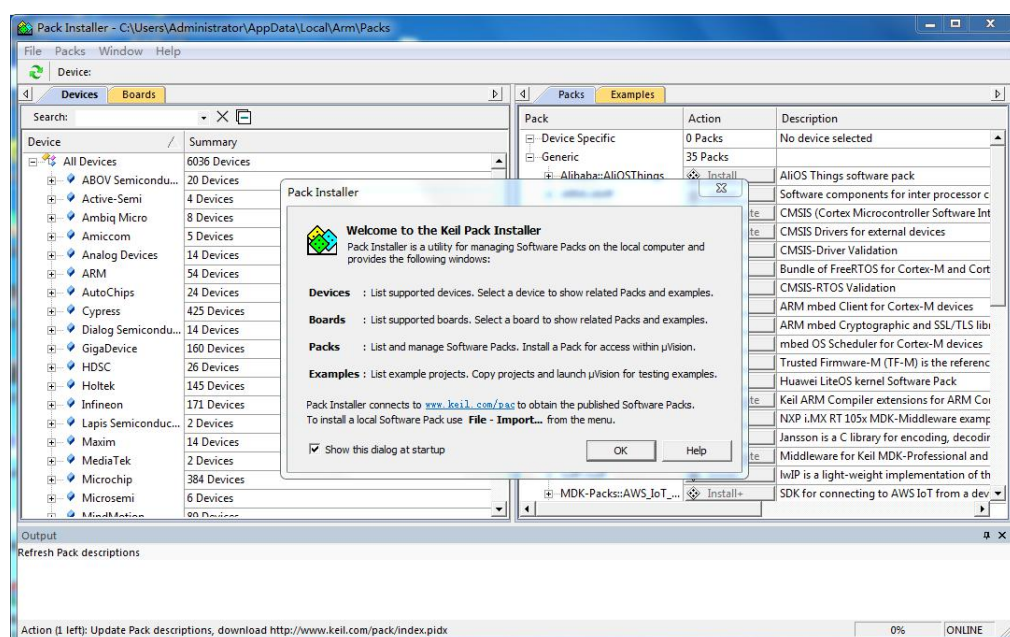
8) 若弹出下面的额界面，点击安装即可



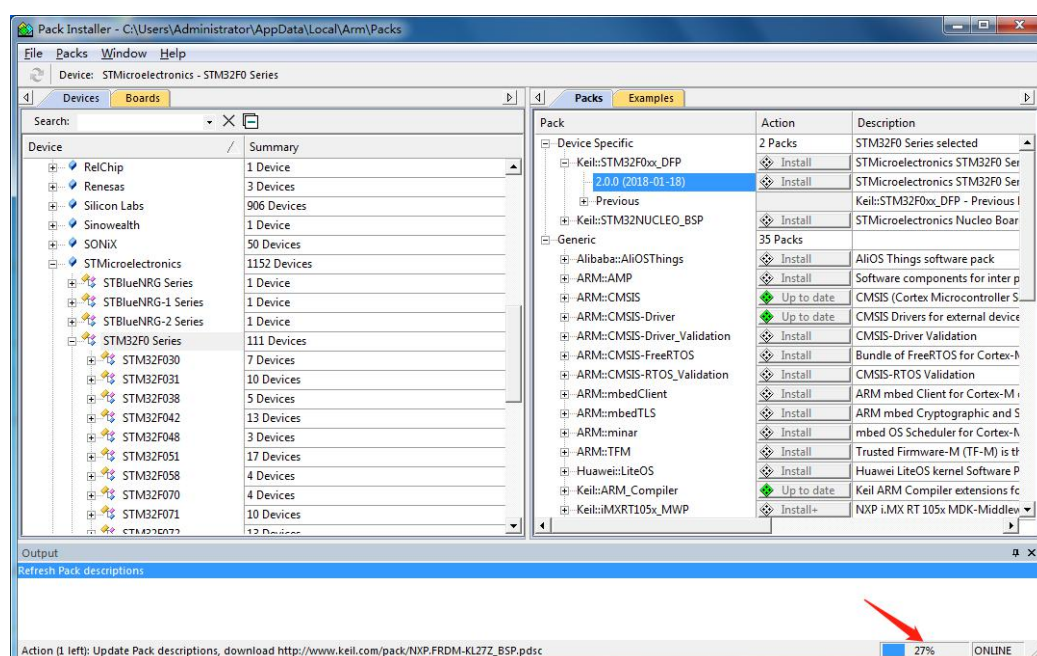
9) 点击 Finish



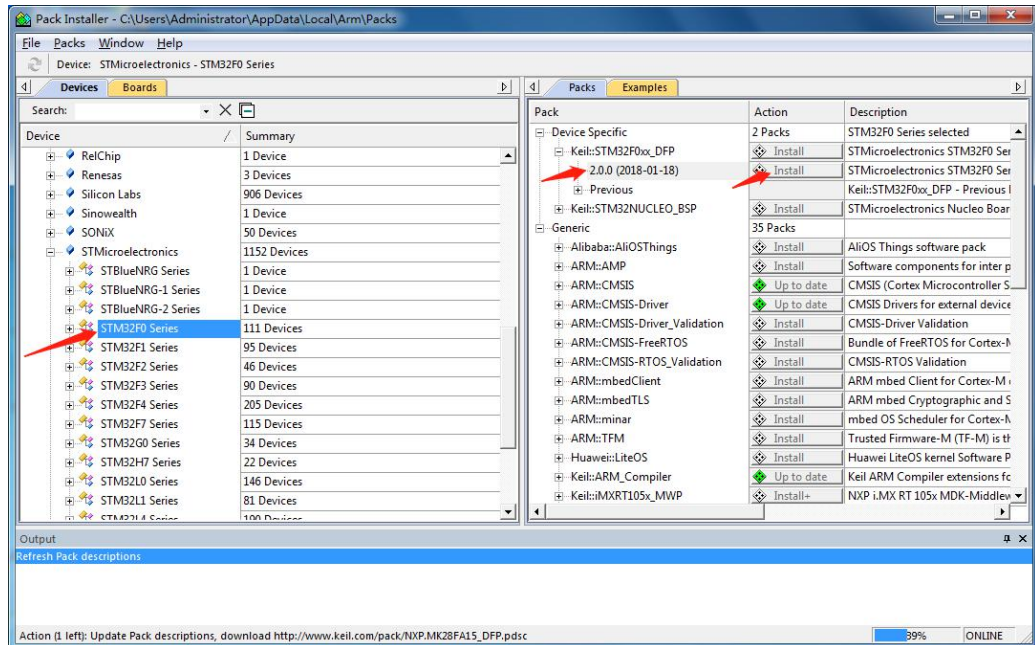
10) 若安装完成以后弹出以下界面，点击 OK 或是即可



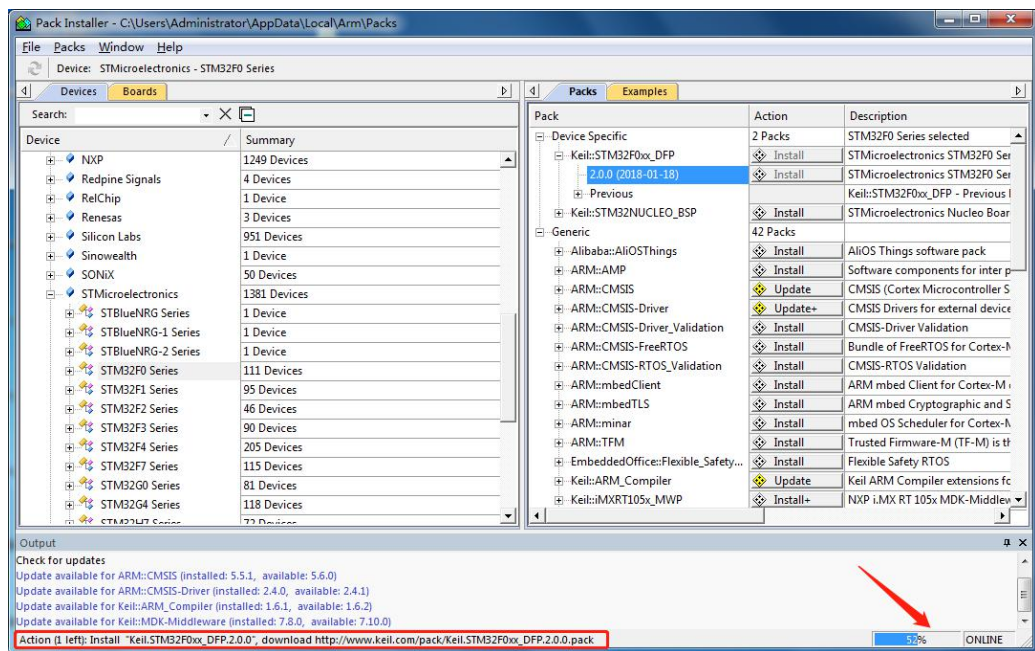
11) 等待芯片库更新到本地，需要有网才能自动完成。



12) 选择需要安装的库 STM32F0 系列，点击 Install

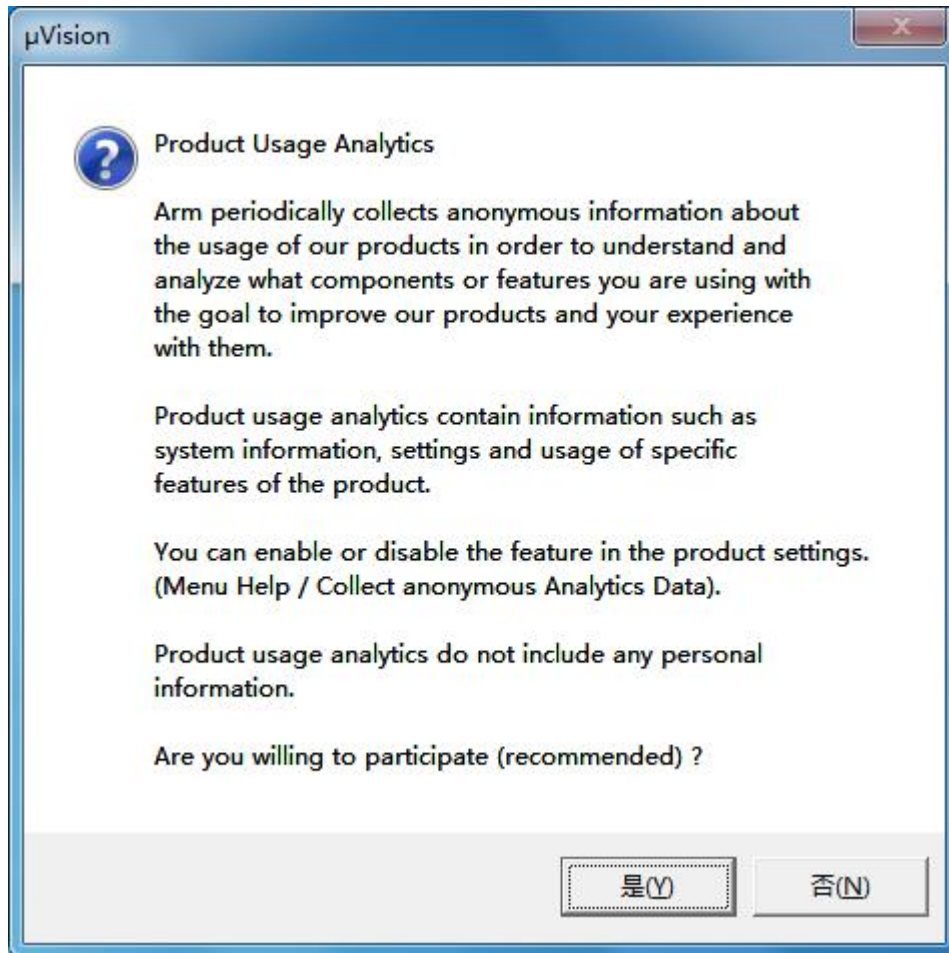


13) 等待安装完成...

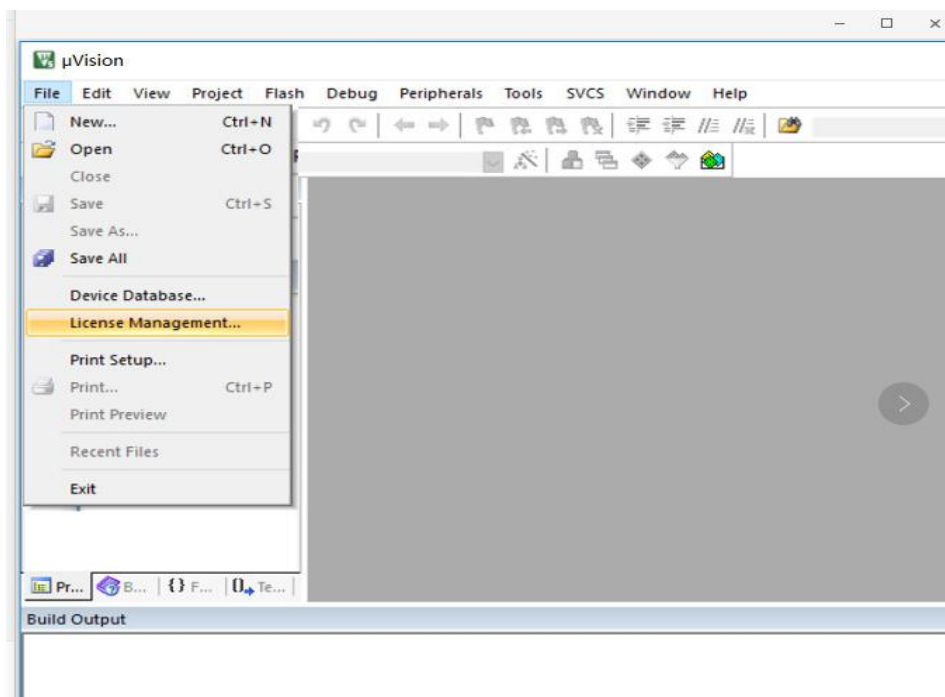


14) 芯片库安装完成后，以管理员身份运行电脑桌面的  
Keil uVision5  
若出现以下界面点击是即可

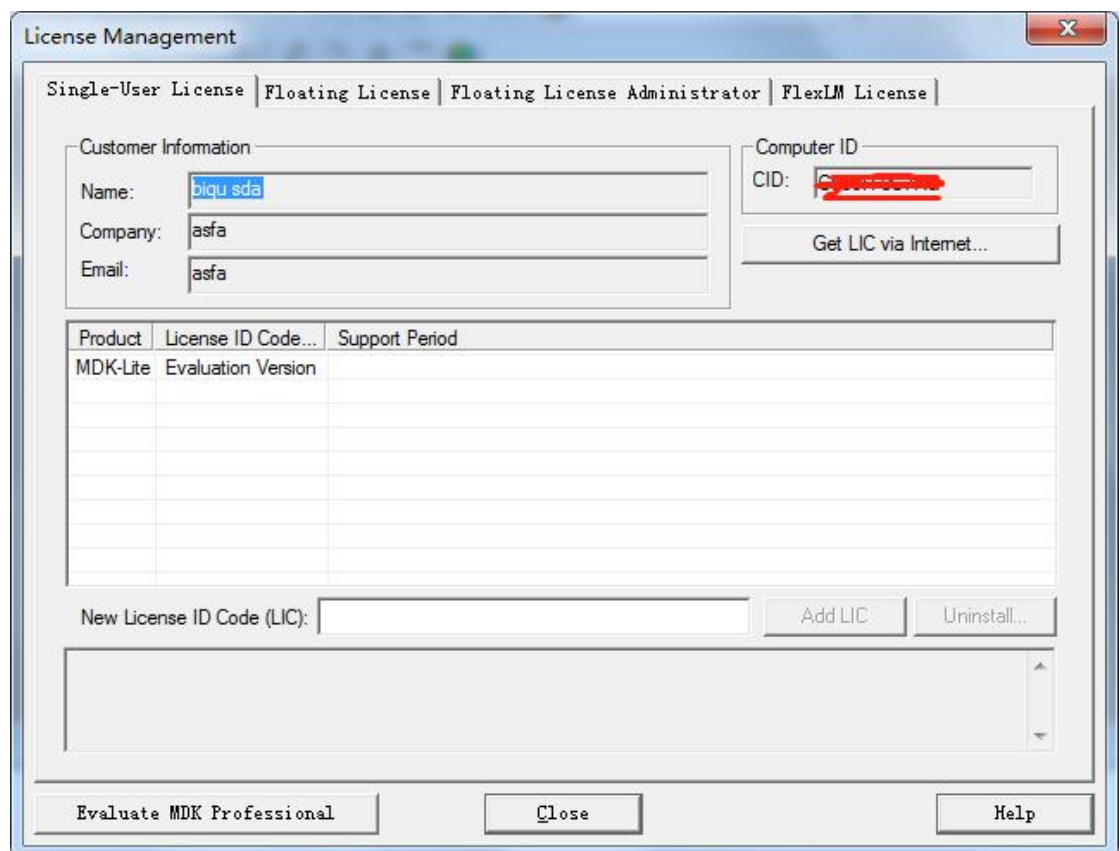




15) 点击菜单栏 File，然后点击 Licence Management 选项



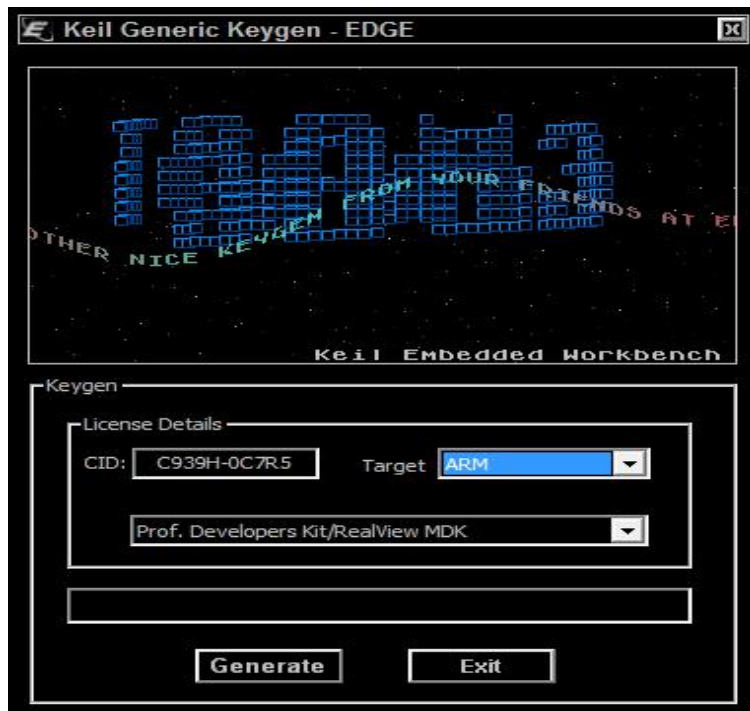
## 16) 复制 CID 中的内容



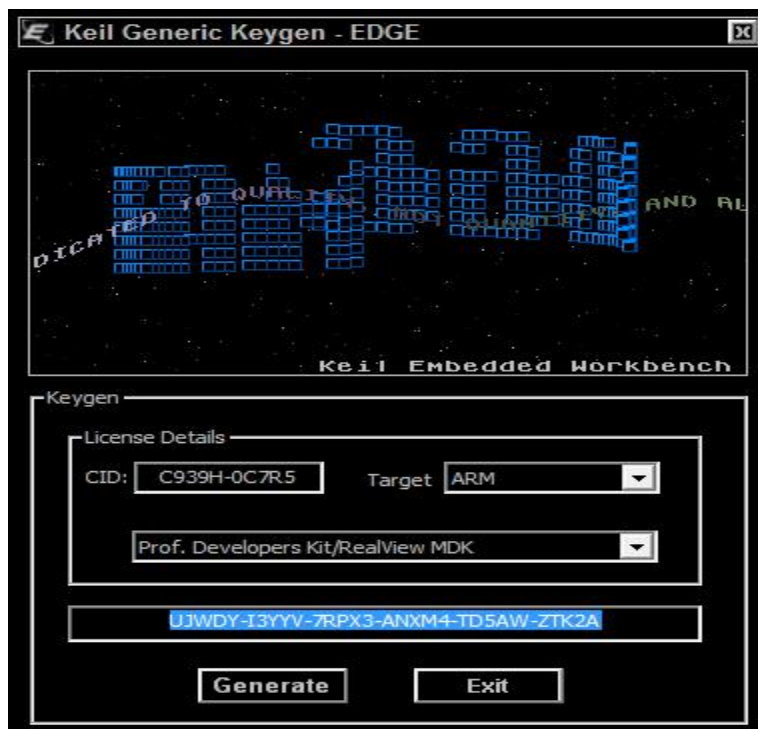
## 17) 以管理员身份运行注册机



- 18) 在 CID 中粘贴上两步中的 CID  
然后选择 Target 选项中的 ARM 选项，再点击  
Generate 按钮

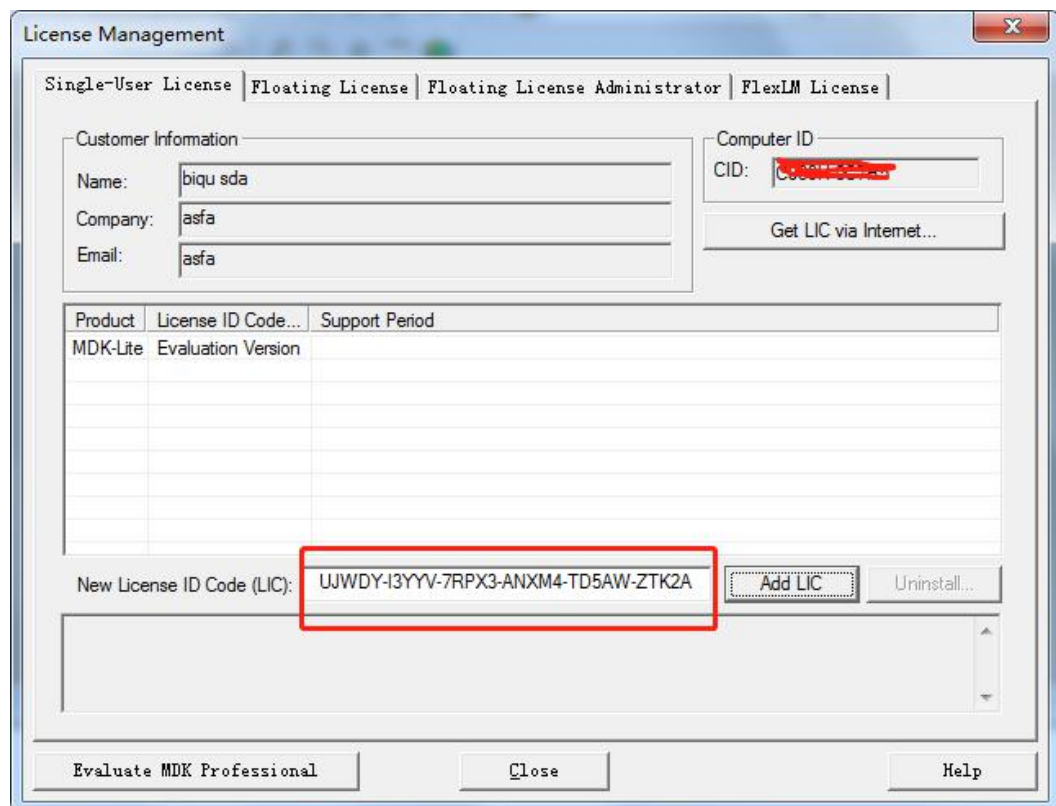


- 19) 复制最下面方框中的内容

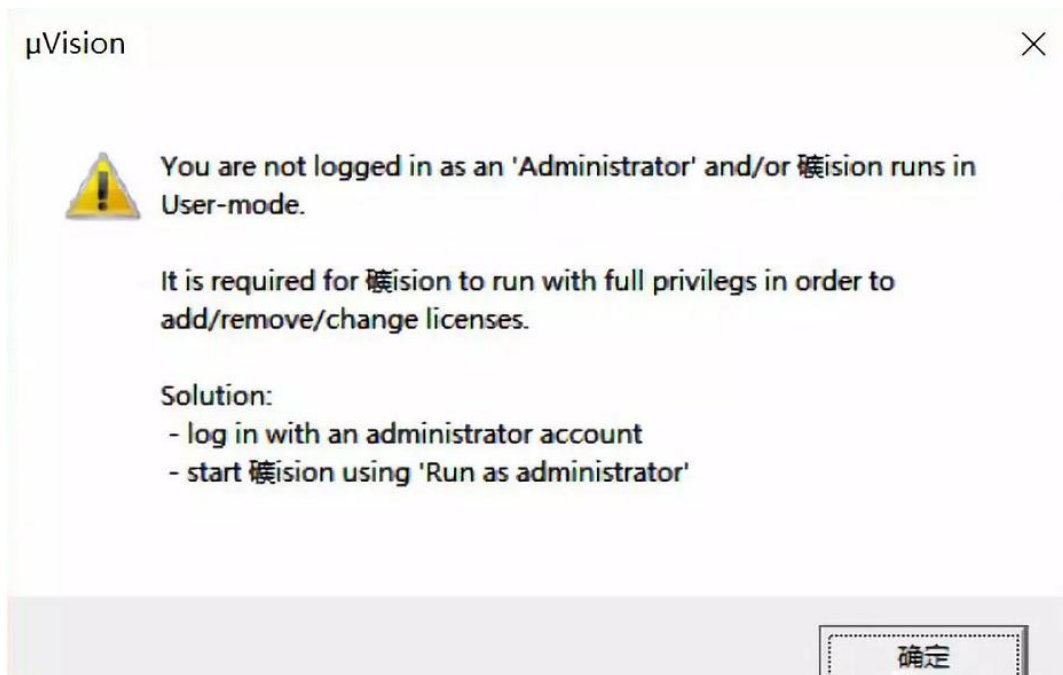




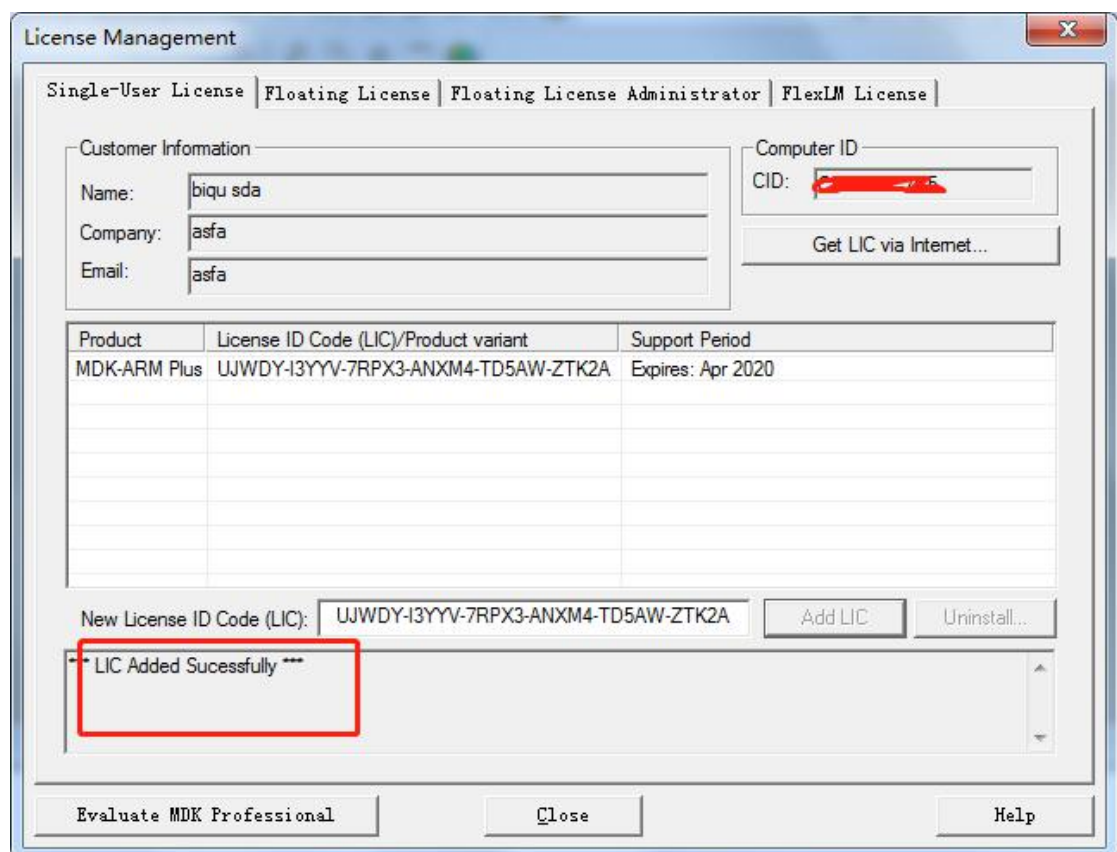
20) 把复制的内容粘贴在 Licence Mangement 中的 LIC 方框中



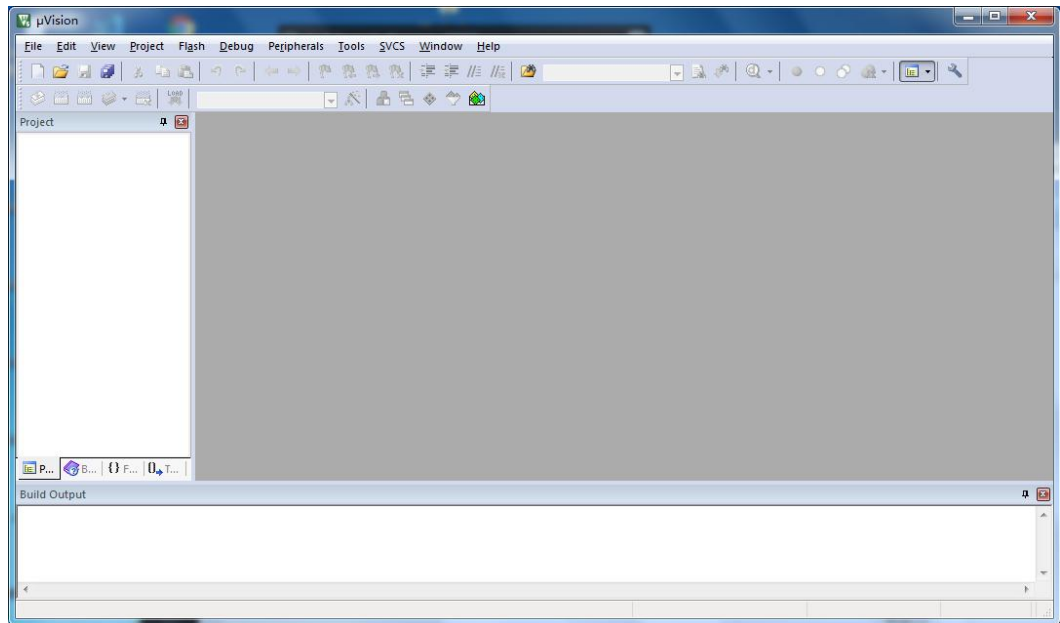
21) 点击 Add LIC,若此时出现下面的警告界面则说明没有以管理员身份运行。



22) 出现以下界面后 点击 Close



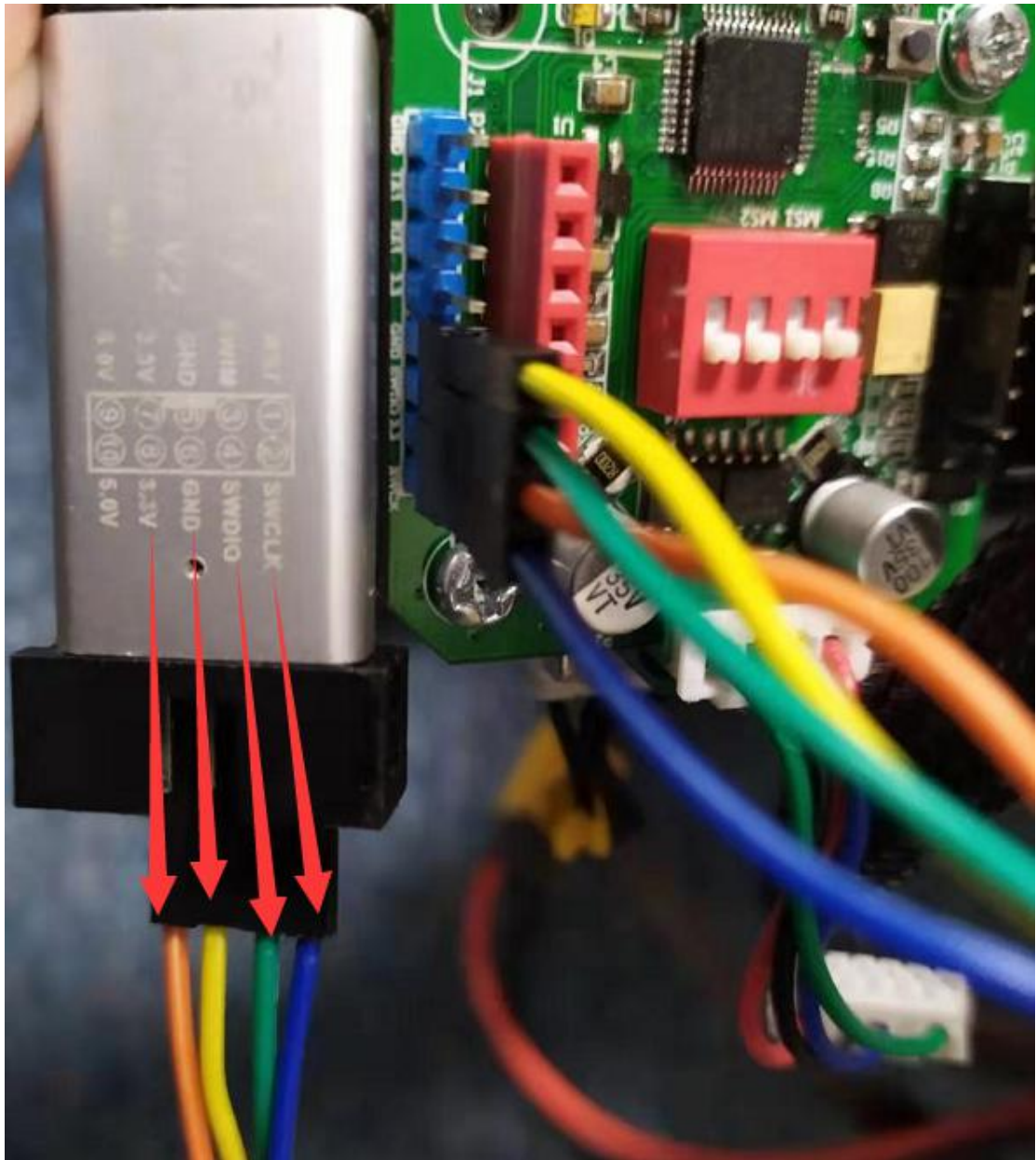
23) 恭喜您！软件安装完成



24) 以上安装完成之后就可以用仿真器（[jlink 或者 ST-Link 或其它仿真器](#)）连接我们的闭环驱动模组, 进行在线仿真调试啦！这里以 ST-link 的 SWD 烧录仿真模式为例作说明，J-link 同理。

硬件连接，如图：

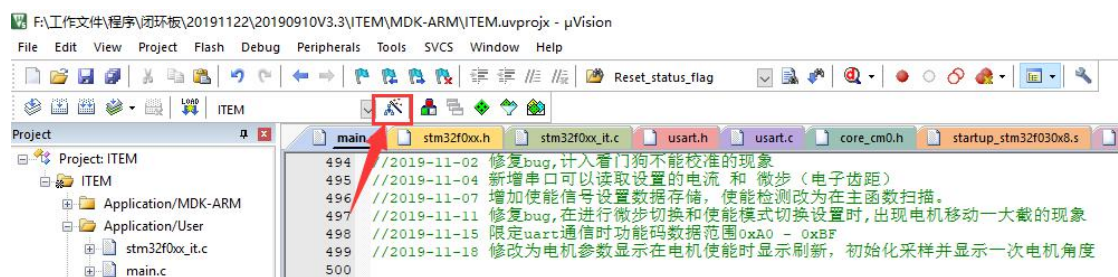




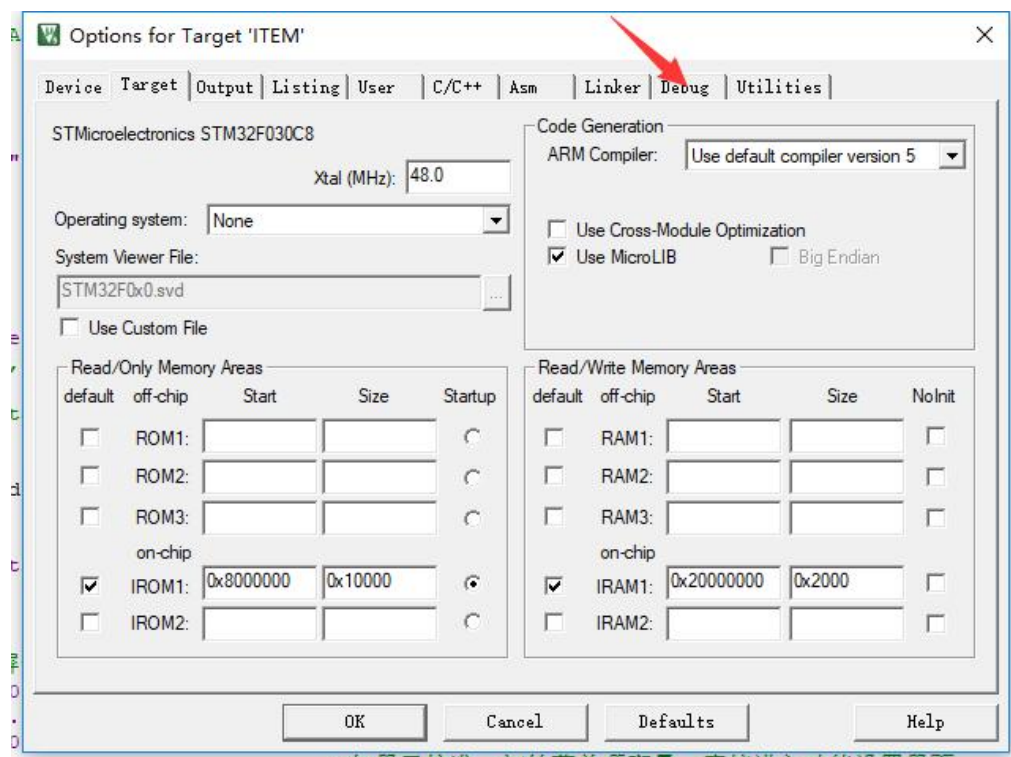
25) 从 <https://github.com/> 下载固件源码文件，双击打开工程

名称	修改日期	类型	大小
DebugConfig	2019/11/22 10:18	文件夹	
ITEM	2019/11/25 10:20	文件夹	
RTE	2019/11/22 10:18	文件夹	
EventRecorderStub.scvd	2019/11/25 10:20	SCVD 文件	1 KB
ITEM.uvguix.BiQu_	2019/11/25 18:47	BIQU_ 文件	183 KB
ITEM.uvguix.Bruce	2019/9/17 20:53	BRUCE 文件	177 KB
ITEM.uvguix.Vsion	2019/10/31 0:04	VISION 文件	183 KB
ITEM.uvoptx	2019/11/25 18:47	UVOPTX 文件	21 KB
ITEM.uvprojx	2019/11/21 18:07	碘ision5 Project	18 KB
JLinkLog.txt	2019/11/25 10:26	文本文档	3,904 KB
JLinkSettings.ini	2019/10/10 9:49	Configuration Se...	1 KB
startup_stm32f030x8.lst	2019/11/21 18:07	MASM Listing	30 KB
startup_stm32f030x8.s	2019/4/15 10:43	Assembler Source	11 KB

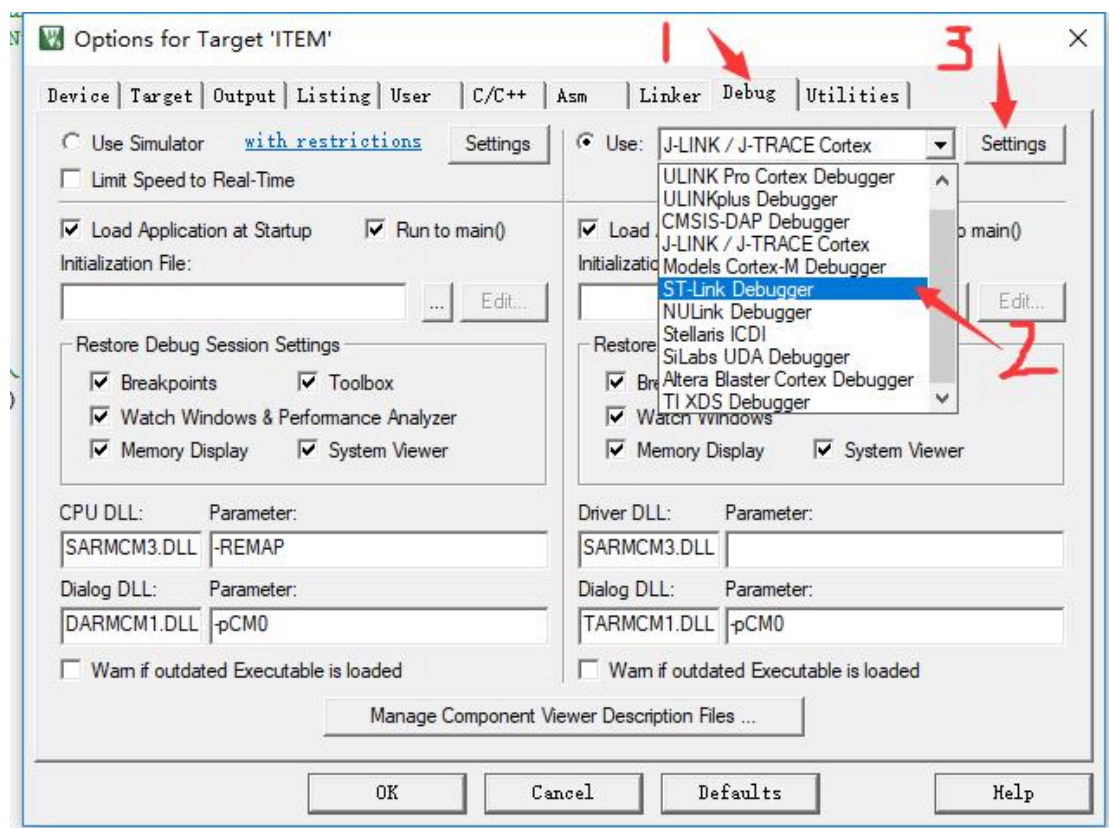
## 26) 点击“魔术棒”



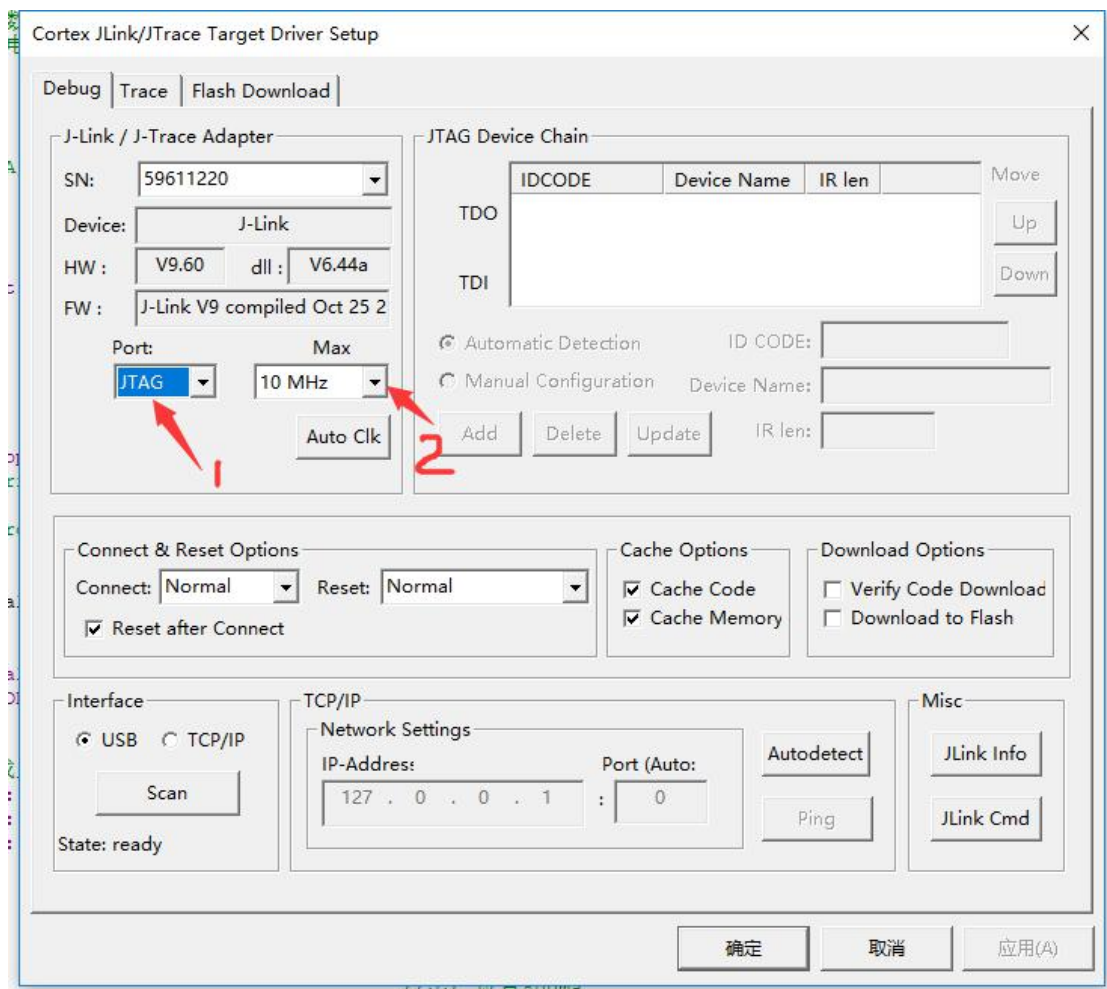
## 27) 选择 Debug 选项



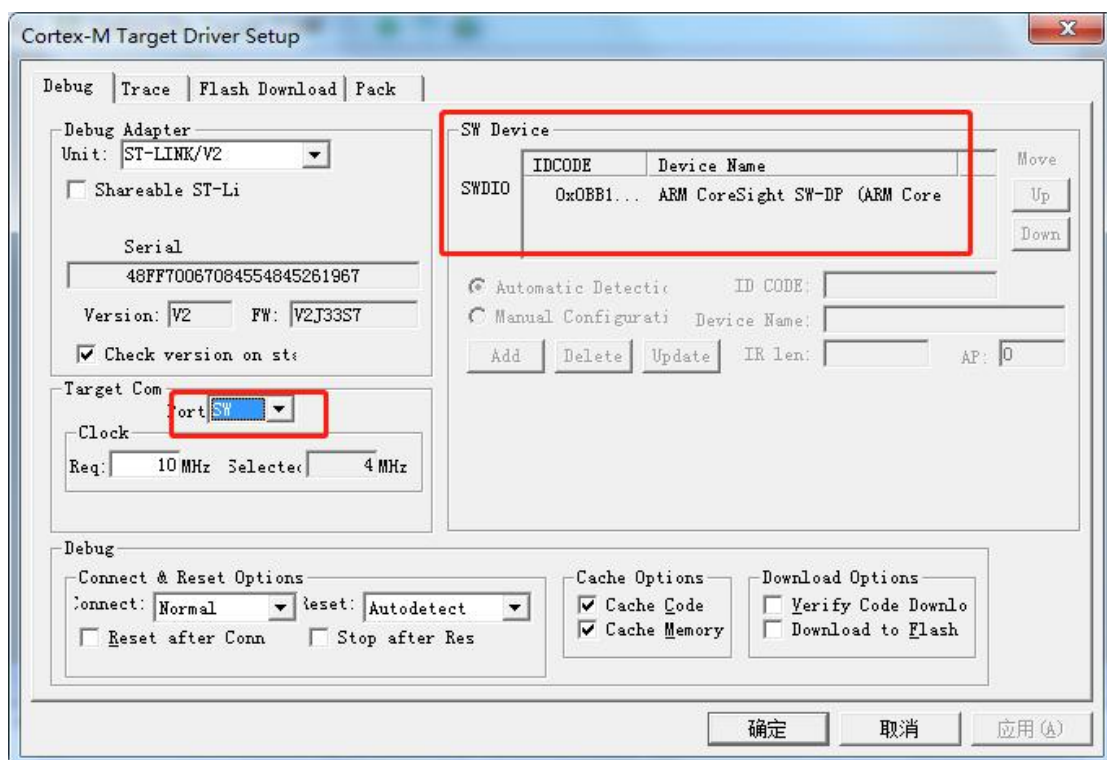
28) 选择仿真器类型为 ST-Link，并点击 Settings ，按图示完成 3 步操作



29) 如果是 J-Link 仿真器，需要选择仿真器仿真模式为 SWD 模式，如果不是，忽略这一步

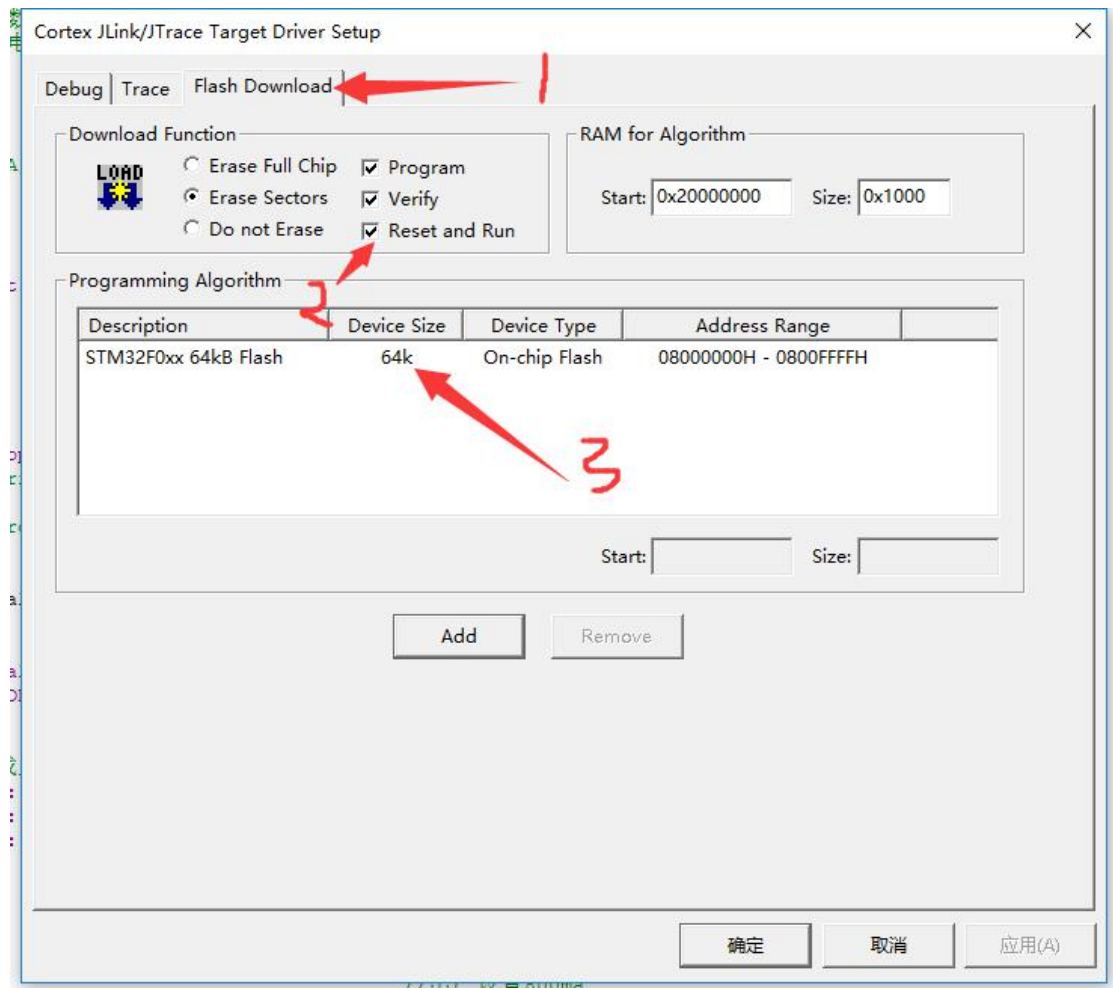



30) 出现如下图示，恭喜您硬件连接成功





31) 点击 Flash Download 选项卡，设置烧录时，块擦除方式擦除 flash，设置 Reset and Run，选择芯片 Flash 大小，如下图标所示，完成后点击确定



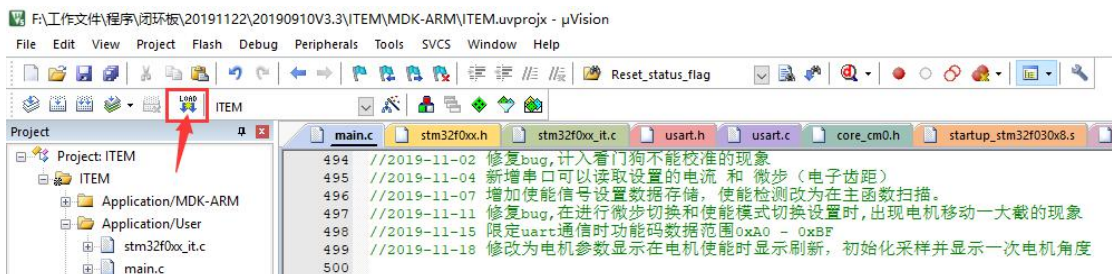
32) 点击  按钮，开始编译程序




```
Build Output

compiling stm32f0xx_ll_exti.c...
compiling stm32f0xx_ll_gpio.c...
compiling stm32f0xx_ll_utils.c...
compiling oled.c...
compiling usart.c...
compiling display.c...
linking...
Program Size: Code=15176 RO-data=11108 RW-data=144 ZI-data=3104
FromELF: creating hex file...
"ITEM\ITEM.axf" - 0 Error(s), 1 Warning(s).
Build Time Elapsed: 00:00:11
```

33) 点击 LOAD 按钮，完成程序烧录



34) 在工程界面，点击  可以进行仿真调试。

### 三、Marlin2.0 固件配置

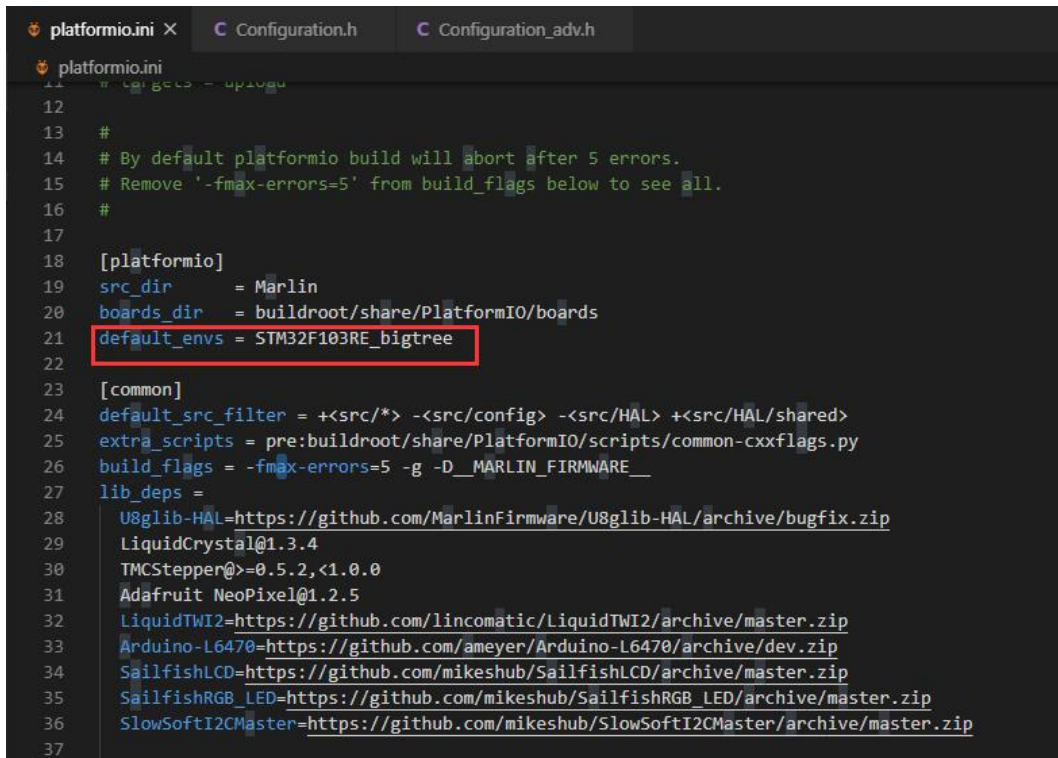
以 X、Y 轴闭环驱动模组，Z 轴 TMC2209 UART 模式,挤出机 E0，TMC2209 UART 模式为例，作如下说明:

主控制板: BOARD\_BIGTREE\_SKR\_E3\_DIP

闭环驱动板: 42 步进电机闭环驱动板

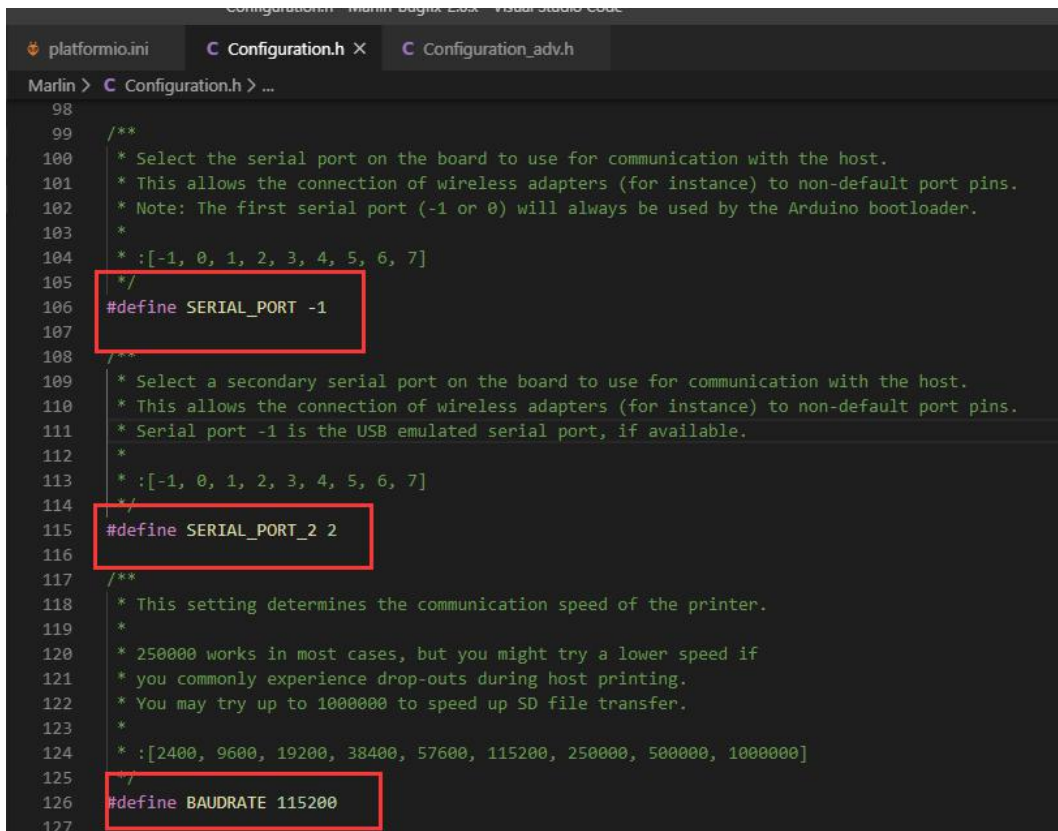
显示屏型号: BIGTREETECH TFT35V3.0

配置如下：修改板的环境



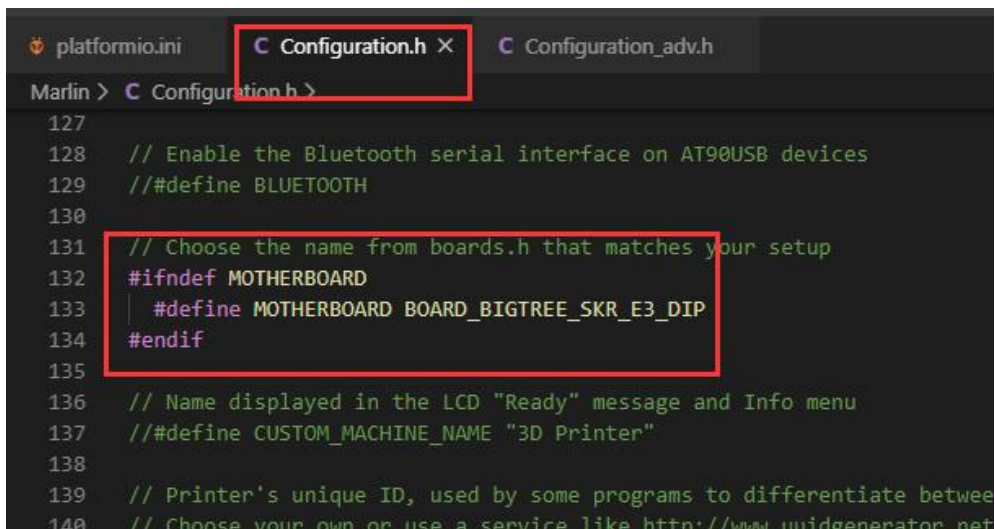
```
platformio.ini
12
13 #
14 # By default platformio build will abort after 5 errors.
15 # Remove '-fmax-errors=5' from build_flags below to see all.
16 #
17
18 [platformio]
19 src_dir = Marlin
20 boards_dir = buildroot/share/PlatformIO/boards
21 default_envs = STM32F103RE_bigtreetech
22
23 [common]
24 default_src_filter = +<src/*> -<src/config> -<src/HAL> +<src/HAL/shared>
25 extra_scripts = pre:buildroot/share/PlatformIO/scripts/common-cxxflags.py
26 build_flags = -fmax-errors=5 -g -D_MARLIN_FIRMWARE__
27 lib_deps =
28   U8glib-HAL=https://github.com/MarlinFirmware/U8glib-HAL/archive/bugfix.zip
29   LiquidCrystal@1.3.4
30   TMCStepper@=0.5.2,<1.0.0
31   Adafruit NeoPixel@1.2.5
32   LiquidTWI2=https://github.com/lincomatic/LiquidTWI2/archive/master.zip
33   Arduino-L6470=https://github.com/ameyer/Arduino-L6470/archive/dev.zip
34   SailfishLCD=https://github.com/mikeshub/SailfishLCD/archive/master.zip
35   SailfishRGB_LED=https://github.com/mikeshub/SailfishRGB_LED/archive/master.zip
36   SlowSoftI2CMaster=https://github.com/mikeshub/SlowSoftI2CMaster/archive/master.zip
37
```

设置串口号和波特率



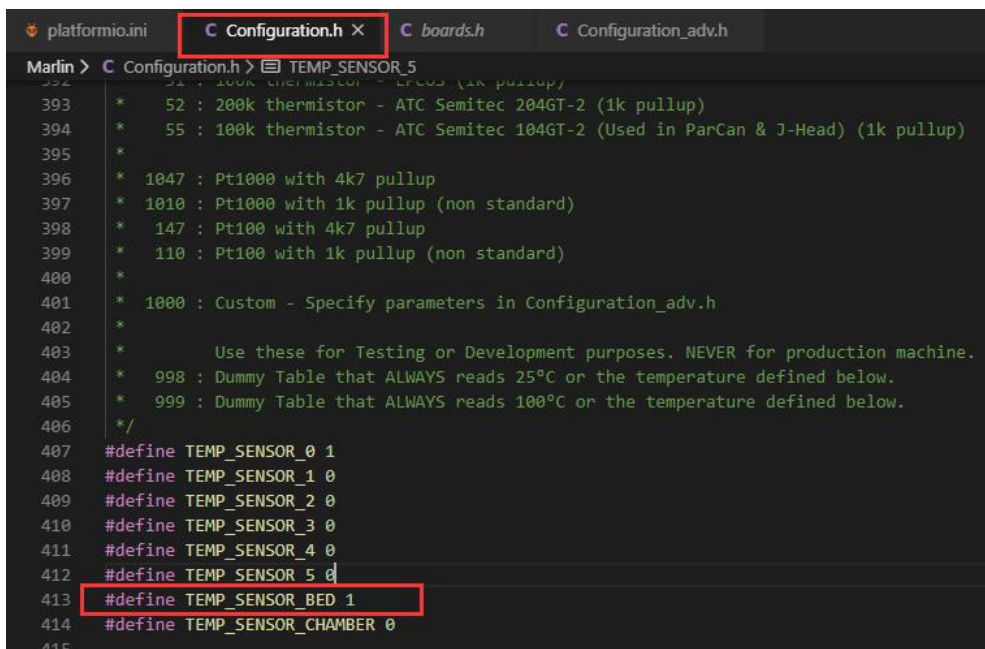
```
Configuration.h
98
99 /**
100  * Select the serial port on the board to use for communication with the host.
101  * This allows the connection of wireless adapters (for instance) to non-default port pins.
102  * Note: The first serial port (-1 or 0) will always be used by the Arduino bootloader.
103  *
104  * :[-1, 0, 1, 2, 3, 4, 5, 6, 7]
105  */
106 #define SERIAL_PORT -1
107
108 /**
109  * Select a secondary serial port on the board to use for communication with the host.
110  * This allows the connection of wireless adapters (for instance) to non-default port pins.
111  * Serial port -1 is the USB emulated serial port, if available.
112  *
113  * :[-1, 0, 1, 2, 3, 4, 5, 6, 7]
114  */
115 #define SERIAL_PORT_2 2
116
117 /**
118  * This setting determines the communication speed of the printer.
119  *
120  * 250000 works in most cases, but you might try a lower speed if
121  * you commonly experience drop-outs during host printing.
122  * You may try up to 1000000 to speed up SD file transfer.
123  *
124  * :[2400, 9600, 19200, 38400, 57600, 115200, 250000, 500000, 1000000]
125  */
126 #define BAUDRATE 115200
127
```

选择板的 pin 配置文件



```
platformio.ini Configuration.h X Configuration_adv.h
Marlin > Configuration.h >
127
128 // Enable the Bluetooth serial interface on AT90USB devices
129 // #define BLUETOOTH
130
131 // Choose the name from boards.h that matches your setup
132 #ifndef MOTHERBOARD
133   #define MOTHERBOARD BOARD_BIGTREE_SKR_E3_DIP
134 #endif
135
136 // Name displayed in the LCD "Ready" message and Info menu
137 // #define CUSTOM_MACHINE_NAME "3D Printer"
138
139 // Printer's unique ID, used by some programs to differentiate between machines
140 // Choose your own or use a service like http://www.uuidgenerator.net
```

打开热床（默认加热棒 0 是打开的）



```
platformio.ini Configuration.h X boards.h Configuration_adv.h
Marlin > Configuration.h > TEMP_SENSOR_5
393 * 52 : 200k thermistor - ATC Semitec 204GT-2 (1k pullup)
394 * 55 : 100k thermistor - ATC Semitec 104GT-2 (Used in ParCan & J-Head) (1k pullup)
395 *
396 * 1047 : Pt1000 with 4k7 pullup
397 * 1010 : Pt1000 with 1k pullup (non standard)
398 * 147 : Pt100 with 4k7 pullup
399 * 110 : Pt100 with 1k pullup (non standard)
400 *
401 * 1000 : Custom - Specify parameters in Configuration_adv.h
402 *
403 * Use these for Testing or Development purposes. NEVER for production machine.
404 * 998 : Dummy Table that ALWAYS reads 25°C or the temperature defined below.
405 * 999 : Dummy Table that ALWAYS reads 100°C or the temperature defined below.
406 */
407 #define TEMP_SENSOR_0 1
408 #define TEMP_SENSOR_1 0
409 #define TEMP_SENSOR_2 0
410 #define TEMP_SENSOR_3 0
411 #define TEMP_SENSOR_4 0
412 #define TEMP_SENSOR_5 0
413 #define TEMP_SENSOR_BED 1
414 #define TEMP_SENSOR_CHAMBER 0
415
```

使能 TMC2209 UART 模式



```
platformio.ini C Configuration.h X boards.h Configuration_adv.h
Marlin > C Configuration.h > ...
648 /**
649  * Stepper Drivers
650  *
651  * These settings allow Marlin to tune stepper driver timing and enable advanced options for
652  * stepper drivers that support them. You may also override timing options in Configuration_adv.h.
653  *
654  * A4988 is assumed for unspecified drivers.
655  *
656  * Options: A4988, A5984, DRV8825, LV8729, L6470, TB6560, TB6600, TMC2100,
657  *           TMC2130, TMC2130_STANDALONE, TMC2160, TMC2160_STANDALONE,
658  *           TMC2208, TMC2208_STANDALONE, TMC2209, TMC2209_STANDALONE,
659  *           TMC26X, TMC26X_STANDALONE, TMC2660, TMC2660_STANDALONE,
660  *           TMC5130, TMC5130_STANDALONE, TMC5160, TMC5160_STANDALONE
661  * :['A4988', 'A5984', 'DRV8825', 'LV8729', 'L6470', 'TB6560', 'TB6600', 'TMC2100', 'TMC2130', 'TMC2
662  */
663 // #define X_DRIVER_TYPE  A4988
664 // #define Y_DRIVER_TYPE  TMC2209
665 #define Z_DRIVER_TYPE  TMC2209
666 // #define X2_DRIVER_TYPE  A4988
667 // #define Y2_DRIVER_TYPE  A4988
668 // #define Z2_DRIVER_TYPE  A4988
669 // #define Z3_DRIVER_TYPE  A4988
670 #define E0_DRIVER_TYPE  TMC2209
671 // #define E1_DRIVER_TYPE  A4988
672 // #define E2_DRIVER_TYPE  A4988
673 // #define E3_DRIVER_TYPE  A4988
674 // #define E4_DRIVER_TYPE  A4988
675 // #define E5_DRIVER_TYPE  A4988
676
```

设置细分和最大加速度

```
platformio.ini C Configuration.h X boards.h Configuration_adv.h
Marlin > C Configuration.h > ...
714 // #define DEFAULT_AXIS_STEPS_PER_UNIT
715 /**
716  * Default Axis Steps Per Unit (steps/mm)
717  * Override with M92
718  *
719  * X, Y, Z, E0 [, E1[, E2...]]
720 */
721 #define DEFAULT_AXIS_STEPS_PER_UNIT { 204.8, 204.8, 800, 96*2 }
722 /**
723  * Default Max Feed Rate (mm/s)
724  * Override with M203
725  *
726  * X, Y, Z, E0 [, E1[, E2...]]
727 */
728 #define DEFAULT_MAX_FEEDRATE { 300, 300, 5, 25 }
729 // #define LIMITED_MAX_FR_EDITING // Limit edit via M203 or LCD to DEFAULT_MAX_FEEDRATE
730 #if ENABLED(LIMITED_MAX_FR_EDITING)
731   #define MAX_FEEDRATE_EDIT_VALUES { 600, 600, 10, 50 } // ...or, set your own edit limits
732 #endif
733 /**
734  * Default Max Acceleration (change/s) change = mm/s
735  * (Maximum start speed for accelerated moves)
736  * Override with M201
737  *
738  * X, Y, Z, E0 [, E1[, E2...]]
739 */
740 #define DEFAULT_MAX_ACCELERATION { 550, 550, 100, 5000 }
741
```

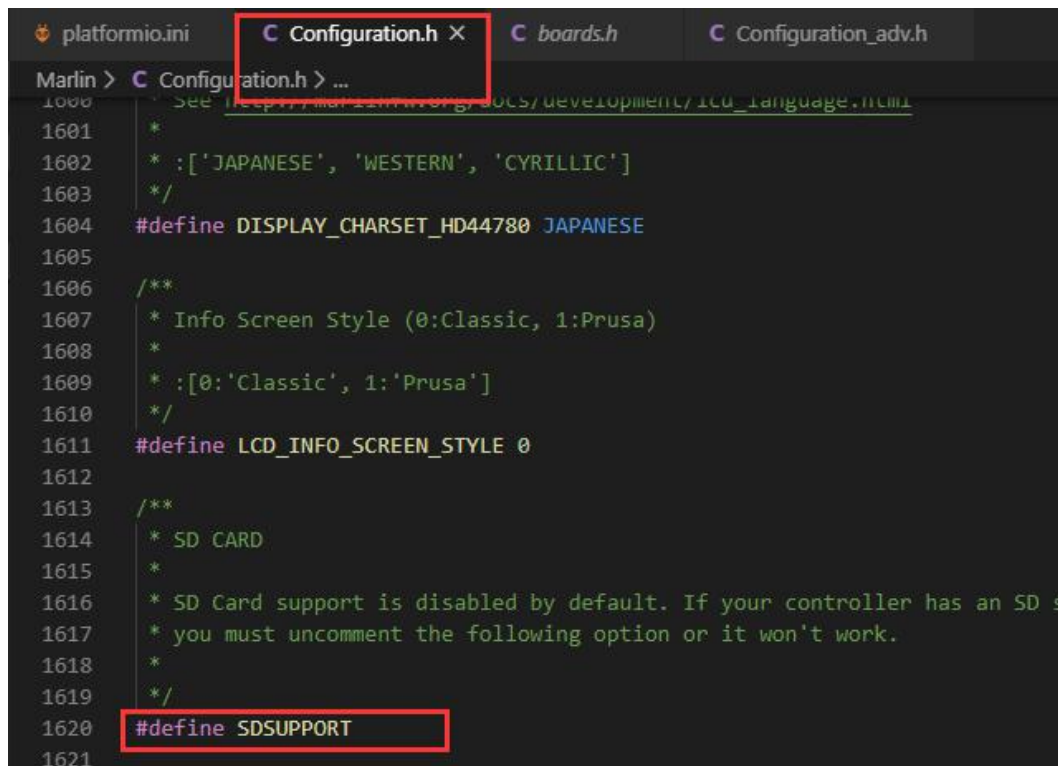
设置 Z 轴和 E0 的方向

```
platformio.ini  Configuration.h  boards.h  Configuration_adv.h
Marlin > Configuration.h > INVERT_X_DIR
1008 #define DISABLE_Y false
1009 #define DISABLE_Z false
1010
1011 // Warn on display about possibly reduced accuracy
1012 // #define DISABLE_REduced_ACCURACY_WARNING
1013
1014 // @section extruder
1015
1016 #define DISABLE_E false // For all extruders
1017 #define DISABLE_INACTIVE_EXTRUDER // Keep only the active extruder enabled
1018
1019 // @section machine
1020
1021 // Invert the stepper direction. Change (or reverse the motor connector) if an
1022 #define INVERT_X_DIR false
1023 #define INVERT_Y_DIR true
1024 #define INVERT_Z_DIR true
1025
1026 // @section extruder
1027
1028 // For direct drive extruder v9 set to true, for geared extruder set to false.
1029 #define INVERT_E0_DIR false
1030 #define INVERT_E1_DIR false
1031 #define INVERT_E2_DIR false
1032 #define INVERT_E3_DIR false
1033 #define INVERT_E4_DIR false
1034 #define INVERT_E5_DIR false
```

设置热床的大小，默认 200mm 以实际为准

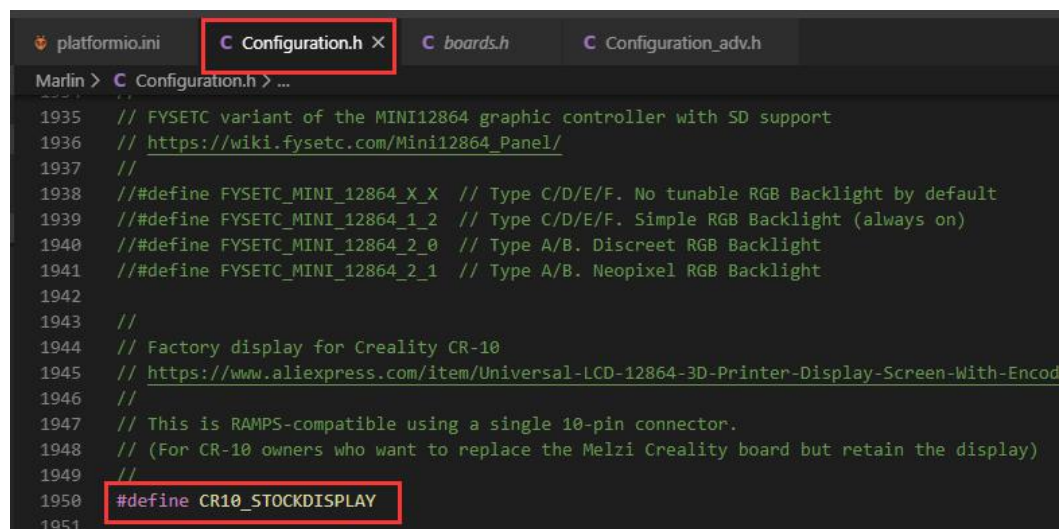
```
platformio.ini  Configuration.h  boards.h  Configuration_adv.h
Marlin > Configuration.h > Z_MAX_POS
1042 // #define Z_HOMING_HEIGHT 4 // (mm) Primary Z height before homing (0=0)
1043 // Be sure you have this distance over your
1044
1045 // Direction of endstops when homing; 1=MAX, -1=MIN
1046 // :[-1,1]
1047 #define X_HOME_DIR -1
1048 #define Y_HOME_DIR -1
1049 #define Z_HOME_DIR -1
1050
1051 // @section machine
1052
1053 // The size of the print bed
1054 #define X_BED_SIZE 200
1055 #define Y_BED_SIZE 200
1056
1057 // Travel limits (mm) after homing, corresponding to endstop positions.
1058 #define X_MIN_POS 0
1059 #define Y_MIN_POS 0
1060 #define Z_MIN_POS 0
1061 #define X_MAX_POS X_BED_SIZE
1062 #define Y_MAX_POS Y_BED_SIZE
1063 #define Z_MAX_POS 200
```

打开 SD 卡功能



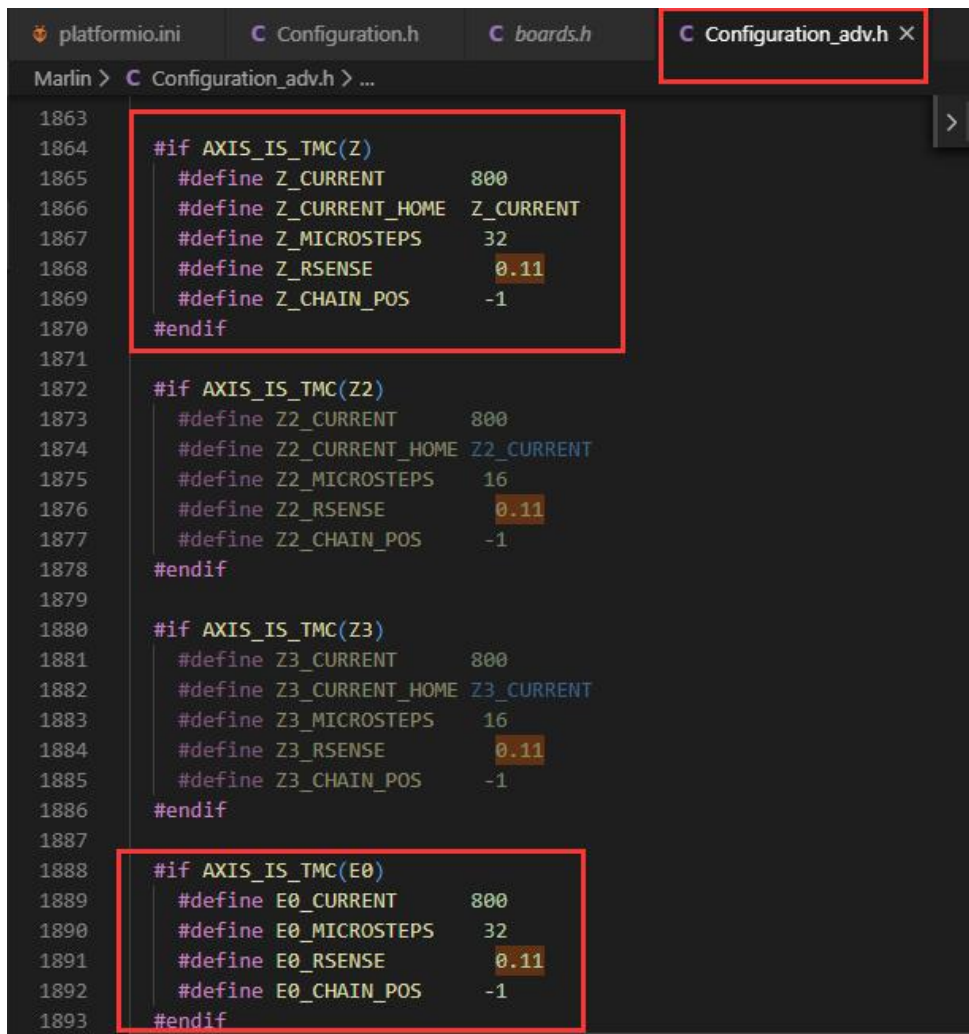
```
platformio.ini Configuration.h X boards.h Configuration_adv.h
Marlin > Configuration.h > ...
1600 * SEE https://marlinfw.org/docs/development/lcd\_language.html
1601 *
1602 * :['JAPANESE', 'WESTERN', 'CYRILLIC']
1603 */
1604 #define DISPLAY_CHARSET_HD44780 JAPANESE
1605
1606 /**
1607  * Info Screen Style (0:Classic, 1:Prusa)
1608  *
1609  * :[0:'Classic', 1:'Prusa']
1610  */
1611 #define LCD_INFO_SCREEN_STYLE 0
1612
1613 /**
1614  * SD CARD
1615  *
1616  * SD Card support is disabled by default. If your controller has an SD s
1617  * you must uncomment the following option or it won't work.
1618  *
1619  */
1620 #define SDSUPPORT
1621
```

打开屏幕显示



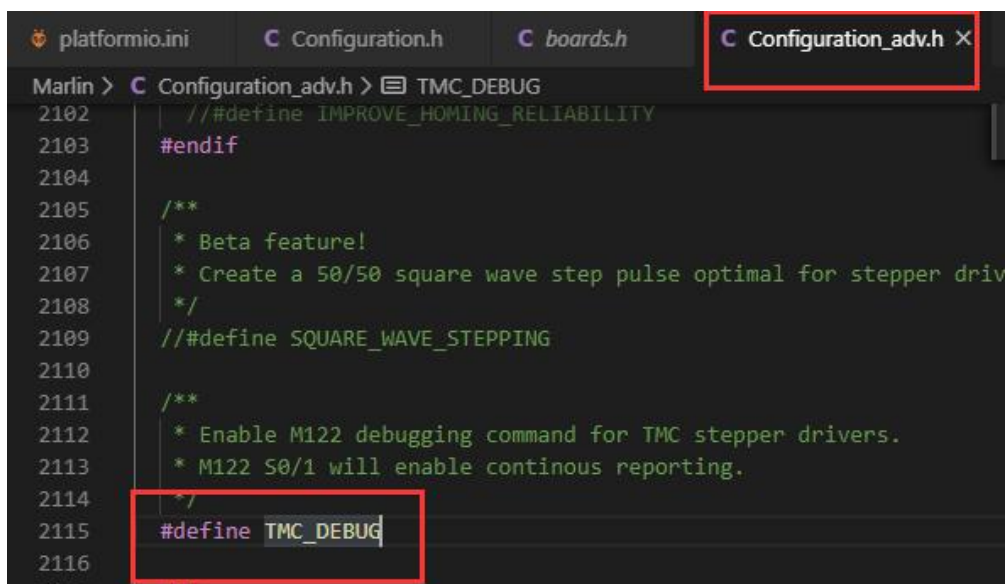
```
platformio.ini Configuration.h X boards.h Configuration_adv.h
Marlin > Configuration.h > ...
1935 // FYSETC variant of the MINI12864 graphic controller with SD support
1936 // https://wiki.fysetc.com/Mini12864\_Panel/
1937 //
1938 // #define FYSETC_MINI_12864_X_X // Type C/D/E/F. No tunable RGB Backlight by default
1939 // #define FYSETC_MINI_12864_1_2 // Type C/D/E/F. Simple RGB Backlight (always on)
1940 // #define FYSETC_MINI_12864_2_0 // Type A/B. Discreet RGB Backlight
1941 // #define FYSETC_MINI_12864_2_1 // Type A/B. Neopixel RGB Backlight
1942 //
1943 //
1944 // Factory display for Creality CR-10
1945 // https://www.aliexpress.com/item/Universal-LCD-12864-3D-Printer-Display-Screen-With-Encoder
1946 //
1947 // This is RAMPS-compatible using a single 10-pin connector.
1948 // (For CR-10 owners who want to replace the Melzi Creality board but retain the display)
1949 //
1950 #define CR10_STOCKDISPLAY
1951
```

设置 Z 轴和 E0 的电流和细分



```
1863
1864 #if AXIS_IS_TMC(Z)
1865   #define Z_CURRENT      800
1866   #define Z_CURRENT_HOME Z_CURRENT
1867   #define Z_MICROSTEPS   32
1868   #define Z_RSENSE       0.11
1869   #define Z_CHAIN_POS    -1
1870 #endif
1871
1872 #if AXIS_IS_TMC(Z2)
1873   #define Z2_CURRENT      800
1874   #define Z2_CURRENT_HOME Z2_CURRENT
1875   #define Z2_MICROSTEPS   16
1876   #define Z2_RSENSE       0.11
1877   #define Z2_CHAIN_POS    -1
1878 #endif
1879
1880 #if AXIS_IS_TMC(Z3)
1881   #define Z3_CURRENT      800
1882   #define Z3_CURRENT_HOME Z3_CURRENT
1883   #define Z3_MICROSTEPS   16
1884   #define Z3_RSENSE       0.11
1885   #define Z3_CHAIN_POS    -1
1886 #endif
1887
1888 #if AXIS_IS_TMC(E0)
1889   #define E0_CURRENT      800
1890   #define E0_MICROSTEPS   32
1891   #define E0_RSENSE       0.11
1892   #define E0_CHAIN_POS    -1
1893 #endif
```

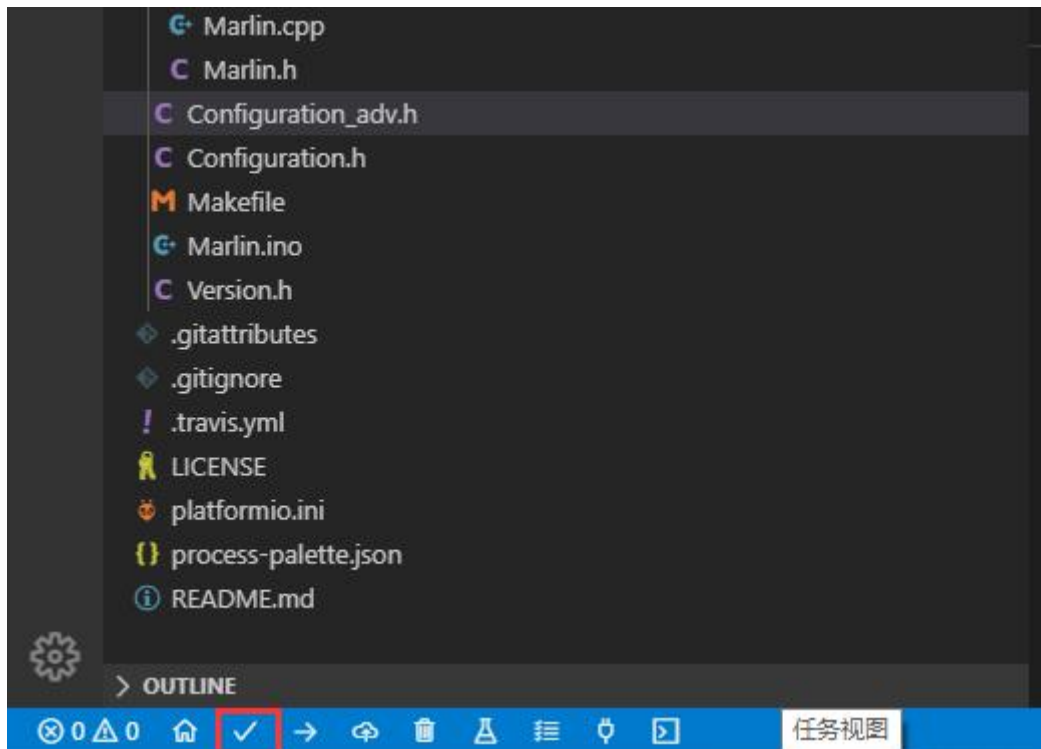
打开 TMC\_Debug 功能，便于用串口调试助手查看驱动异常信息



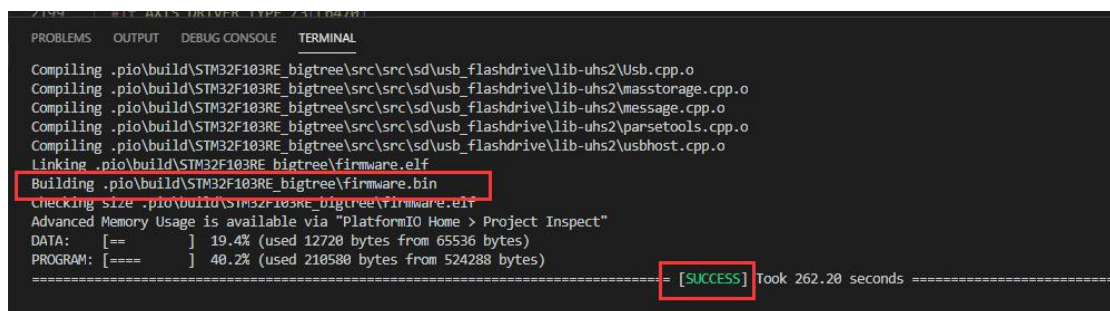
```
platformio.ini Configuration.h boards.h Configuration_adv.h X
Marlin > Configuration_adv.h > TMC_DEBUG
2102 // #define IMPROVE_HOMING_RELIABILITY
2103 #endif
2104
2105 /**
2106  * Beta feature!
2107  * Create a 50/50 square wave step pulse optimal for stepper driv
2108  */
2109 // #define SQUARE_WAVE_STEPPING
2110
2111 /**
2112  * Enable M122 debugging command for TMC stepper drivers.
2113  * M122 S0/1 will enable continous reporting.
2114  */
2115 #define TMC_DEBUG
2116
```



以上设置完成后，在编译器的左下方点击编译按钮，开始编译



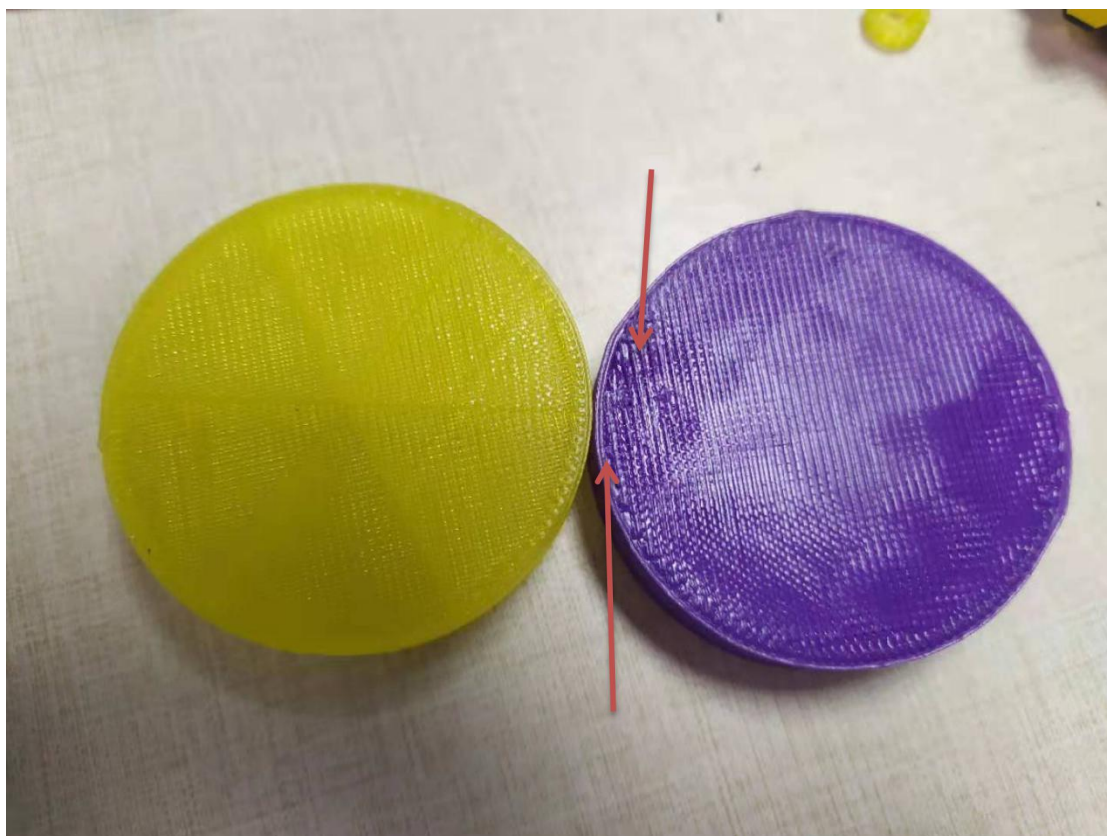
编译成功后，直接在.pio\build\STM32F103RE\_bigtreet 路径下找到 firmware.bin 文件，考入文件到 TF 卡中，然后将 TF 卡插入主板，按下复位键完成固件更新。



#### 四、打印不良图示



原因：皮带比较松，导致结构不稳，造成打印件错位。



原因：皮带比较松，导致结构不稳，造成打印件错位。



打印正常



打印时，有角没粘住，或有异物从挤出头掉落到打印件里。





以上是在调试打印时遇到比较突出的问题，主要异常是结构稳定性不好导致，如有其它疑问可以联系我们的售后!!!