

## 1. Introduction to Testing Platform

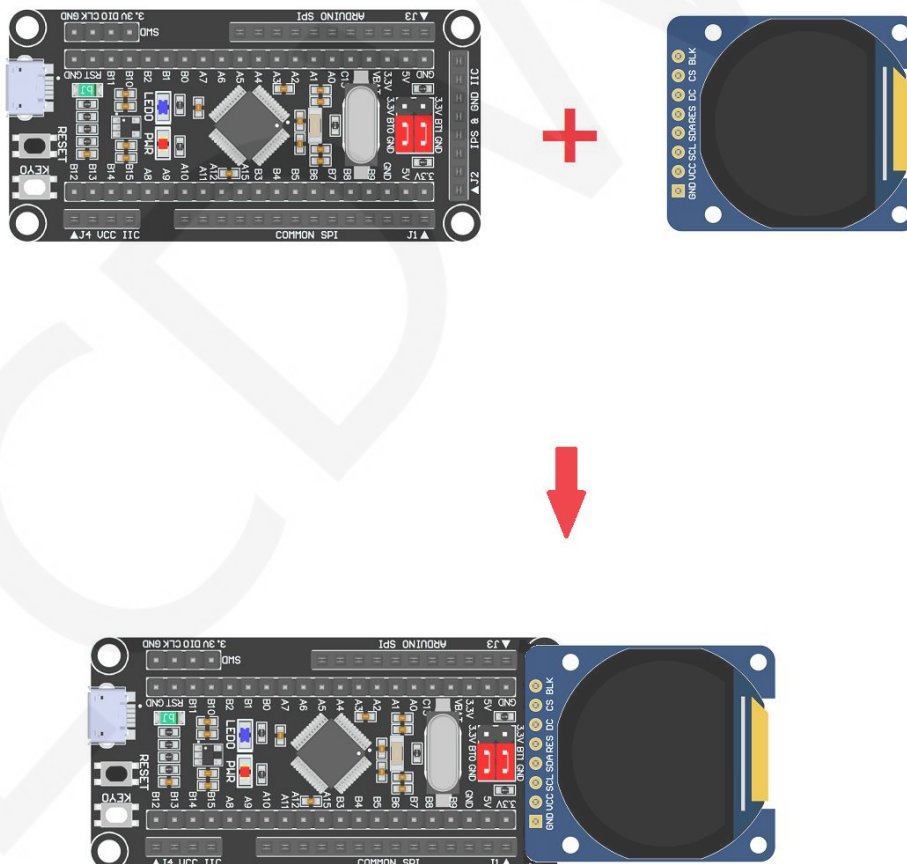
Development board: STM32F103C8T6, MiniSTM32, Elite STM32, Explorer STM32F4,  
Apollo STM32F4/F7

MCU: STM32F103C8T6, STM32F103RCT6, STM32F103ZET6, STM32F407ZGT6,  
STM32F429IGT6

Frequency: 72MHz、72MHz、72MHz、168MHz、180MHz (Corresponding to the above  
MCU)

## 2. Pin connection instructions

This display module can be directly plugged into the STM32F103C8T6  
development board (as shown in the figure below), and can only be connected to other  
development boards through DuPont cables.



Picture1. Module inline STM32F103C8T6 development board

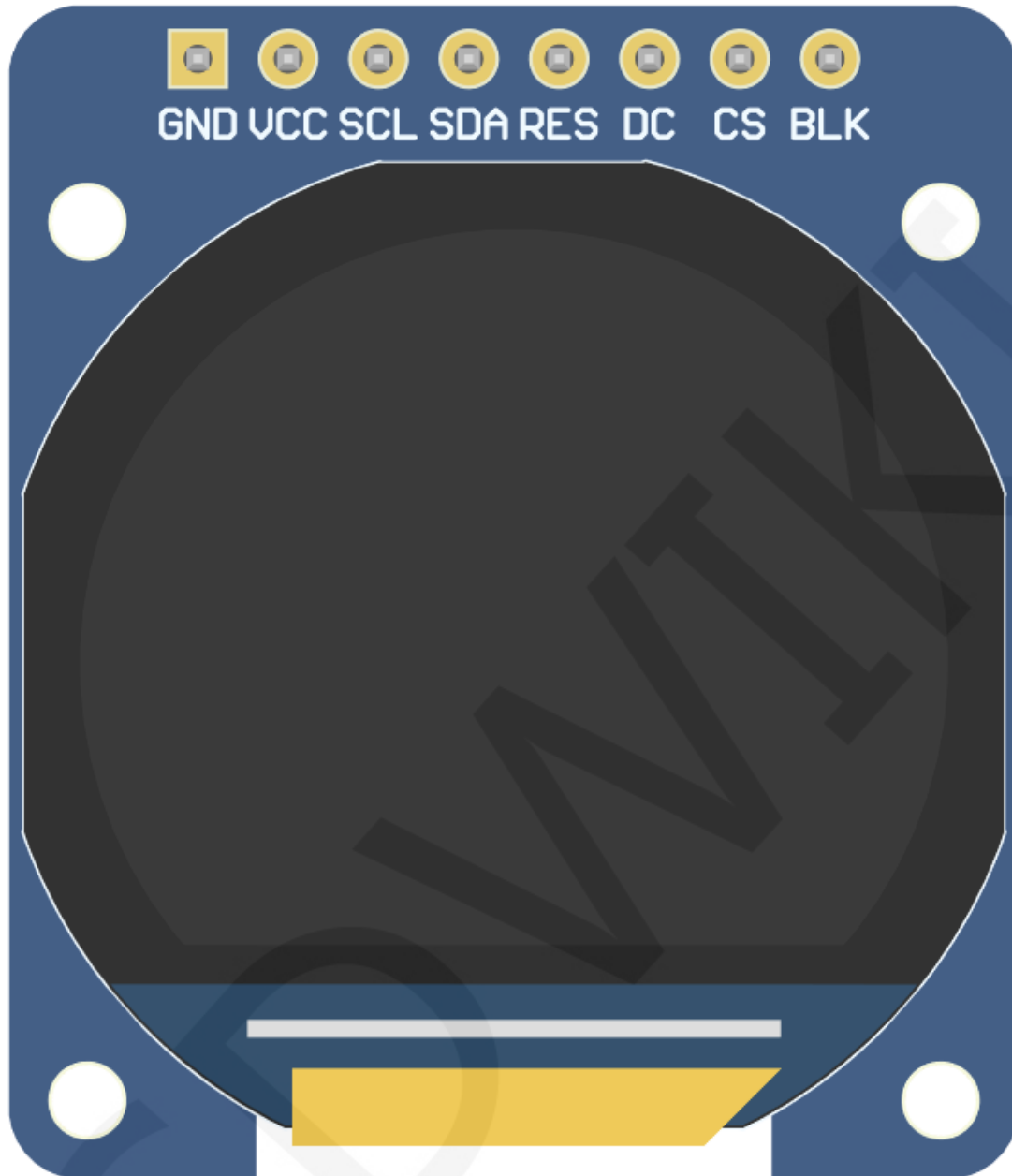


Figure 2 Module front pin diagram

STM32F103C8T6 Test Program Pin Direct Insertion Instructions			
Number	Module pins	Corresponding STM32F103 development board wiring pins	Remarks
1	GND	GND	LCD Power ground
2	VCC	5V/3.3V	LCD power positive(It is recommended to connect to 5V. When connected to 3.3V, the backlight brightness will be slightly dim)

3	<b>SCL</b>	PA5	LCD SPI bus clock signal
4	<b>SDA</b>	PA7	LCD SPI bus write data signal
5	<b>RES</b>	PB8	LCD reset control signal, Low level reset
6	<b>DC</b>	PB7	LCD command / data selection control signal High level: data, low level: command
7	<b>CS</b>	PB9	LCD selection control signal, Low level active
8	<b>BLK</b>	PB6	LCD backlight control signal (If you need control, please connect the pins. If you don't need control, you can skip it)

### STM32F103RCT6 microcontroller test program wiring instructions

Number	Module Pin	Corresponding to MiniSTM32 development board wiring pin	Remarks
1	<b>GND</b>	GND	LCD Power ground
2	<b>VCC</b>	5V/3.3V	LCD power positive(It is recommended to connect to 5V. When connected to 3.3V, the backlight brightness will be slightly dim)
3	<b>SCL</b>	PB13	LCD SPI bus clock signal
4	<b>SDA</b>	PB15	LCD SPI bus write data signal
5	<b>RES</b>	PB12	LCD reset control signal, Low level reset
6	<b>DC</b>	PB10	LCD command / data selection control signal High level: data, low level: command
7	<b>CS</b>	PB11	LCD selection control signal, Low level active
8	<b>BLK</b>	PB9	LCD backlight control signal (If you need control, please connect the pins. If you don't need control, you can skip it)

### STM32F103ZET6 microcontroller test program wiring instructions

Number	Module Pin	Corresponding to Elite STM32 development board wiring pin	Remarks
1	GND	GND	LCD Power ground
2	VCC	5V/3.3V	LCD power positive(It is recommended to connect to 5V. When connected to 3.3V, the backlight brightness will be slightly dim)
3	SCL	PB13	LCD SPI bus clock signal
4	SDA	PB15	LCD SPI bus write data signal
5	RES	PB12	LCD reset control signal, Low level reset
6	DC	PB10	LCD command / data selection control signal High level: data, low level: command
7	CS	PB11	LCD selection control signal, Low level active
8	BLK	PB9	LCD backlight control signal (If you need control, please connect the pins. If you don't need control, you can skip it)

### STM32F407ZGT6 microcontroller test program wiring instructions

Number	Module Pin	Corresponding to Explorer STM32F4 development board wiring pin	Remarks
1	GND	GND	LCD Power ground
2	VCC	5V/3.3V	LCD power positive(It is recommended to connect to 5V. When connected to 3.3V, the backlight brightness will be slightly dim)
3	SCL	PB3	LCD SPI bus clock signal
4	SDA	PB5	LCD SPI bus write data signal
5	RES	PB12	LCD reset control signal, Low level reset
6	DC	PB14	LCD command / data selection control signal

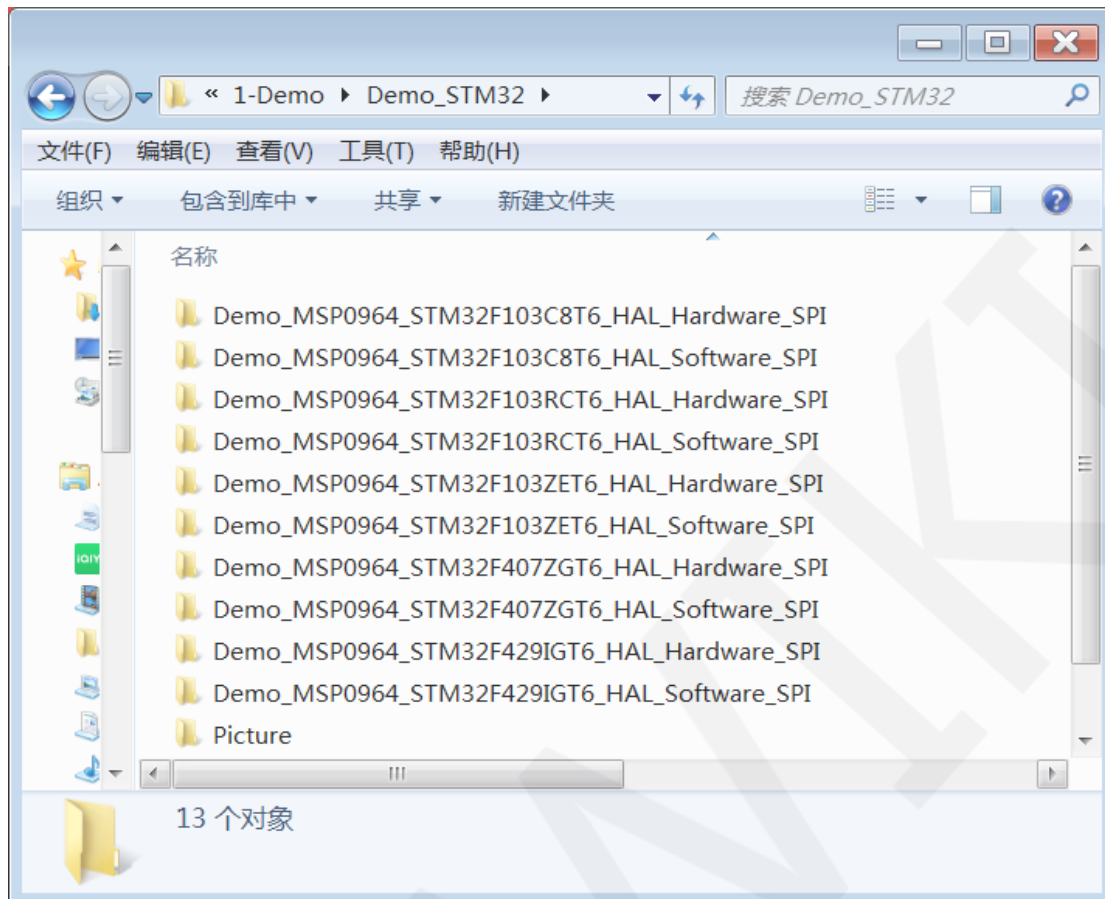
			High level: data, low level: command
7	CS	PB15	LCD selection control signal, Low level active
8	BLK	PB13	LCD backlight control signal (If you need control, please connect the pins. If you don't need control, you can skip it)

### STM32F429IGT6 microcontroller test program wiring instructions

Number	Module Pin	Corresponding to Apollo STM32F4/F7 development board wiring pin	Remarks
1	GND	GND	LCD Power ground
2	VCC	5V/3.3V	LCD power positive(It is recommended to connect to 5V. When connected to 3.3V, the backlight brightness will be slightly dim)
3	SCL	PF7	LCD SPI bus clock signal
4	SDA	PF9	LCD SPI bus write data signal
5	RES	PD12	LCD reset control signal, Low level reset
6	DC	PD5	LCD command / data selection control signal High level: data, low level: command
7	CS	PD11	LCD selection control signal, Low level active
8	BLK	PD6	LCD backlight control signal (If you need control, please connect the pins. If you don't need control, you can skip it)

### 3. Demo Function Description

This testing program includes 5 MCU testing programs including STM32F103C8T6, STM32F103RCT6, STM32F103ZET6, STM32F407ZGT6, STM32F429IGT6. Each MCU testing program includes two functions: software SPI and hardware SPI, which are located in **Demo\_STM32** directory, as shown in the following figure:



### ✧ Description of sample program content

The sample program includes the following test items:

- A. Main interface display;
- B. Menu interface display;
- C. Simple screen swiping;
- D. Drawing and filling of rectangles;
- E. Draw and fill a circle;
- F. Triangle drawing and filling;
- G. English display;
- H. Chinese display;
- I. Image display;
- J. Dynamic digital display;
- K. Rotating display;

## ✧ Example program display direction switching instructions

Found macro definition **USE\_HORIZONTAL** in **LCD.h**, as shown in the following:

```
#define USE_HORIZONTAL 0 //定义液晶屏顺时针旋转方向 0-0度旋转, 1-90度旋转, 2-180度旋转, 3-270度旋转
```

```
USE_HORIZONTAL 0 //0°rotate
```

```
USE_HORIZONTAL 1 //90°rotate
```

```
USE_HORIZONTAL 2 //180°rotate
```

```
USE_HORIZONTAL 3 //270°rotate
```

## 4. Demo Usage Instructions

### ✧ Installing development tool software

Firstly, you need to install the development tool software, which uses Keil5.

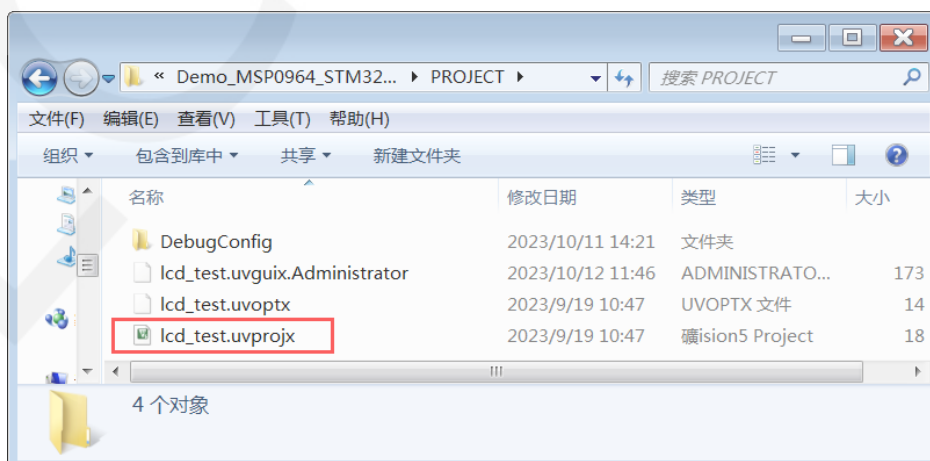
Please refer to the online download and installation methods for yourself.

### ✧ Installing Device Library

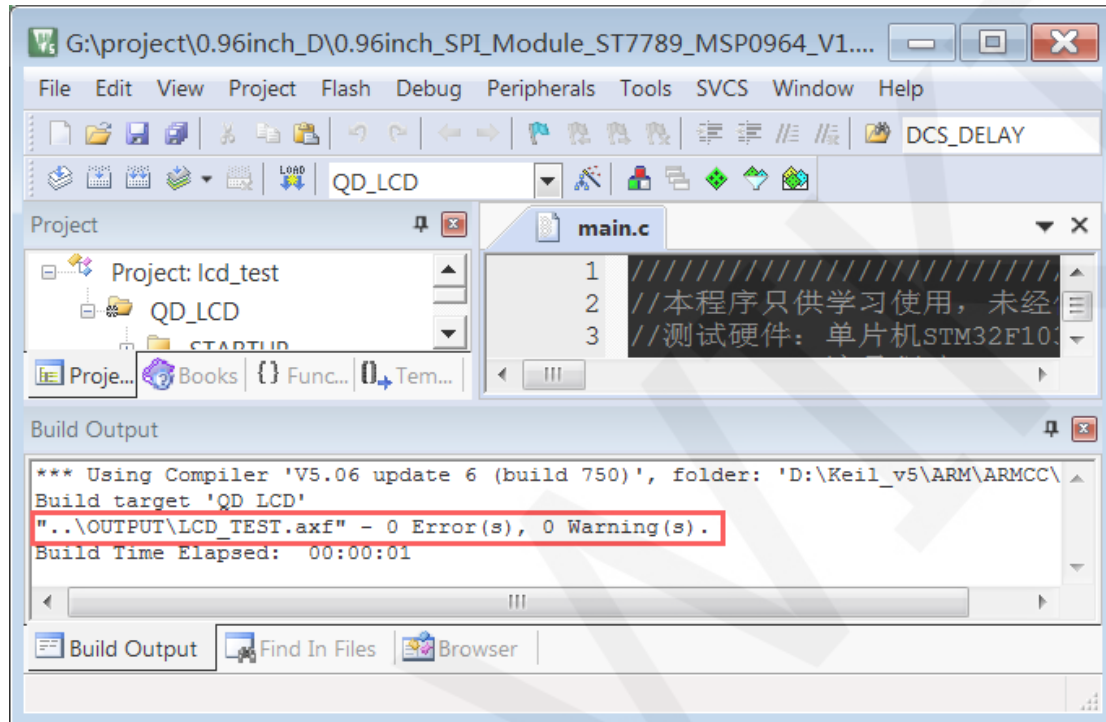
After the successful installation of the tool software, it is necessary to install several MCU device libraries, otherwise the project cannot be established, and compilation and download cannot be carried out. Please consult online for the installation method of the device library.

### ✧ Compiling Programs

After the library installation is completed, open the **PROJECT** directory under the sample program, locate the **uvprojx** file, double-click to open the sample project, as shown in the following figure:



After opening the sample project, you can make modifications to the project code (or not). After the modifications are completed, click the compile button to compile the code. The following prompt appears, indicating successful compilation, as shown in the following figure:



## ❖ Download and Run Programs

The development board supports SWD download and Jlink download

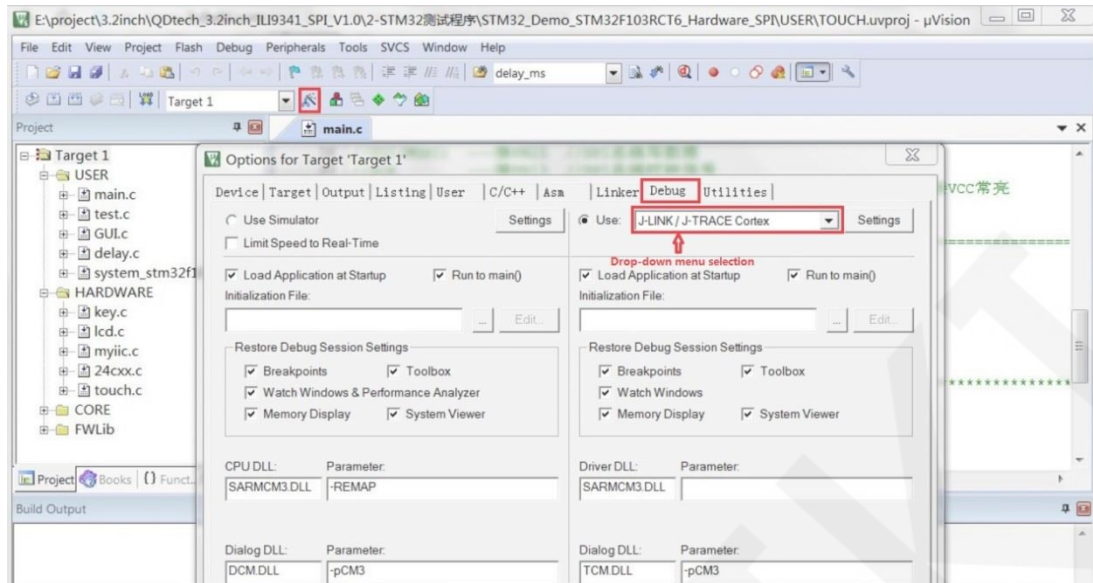
Here is an introduction to Jlink download. For other download methods, please refer to the documentation in the development board documentation package or consult the internet.

The steps for downloading Jlink are as follows (using the STM32F103RCT6 development board as an example):

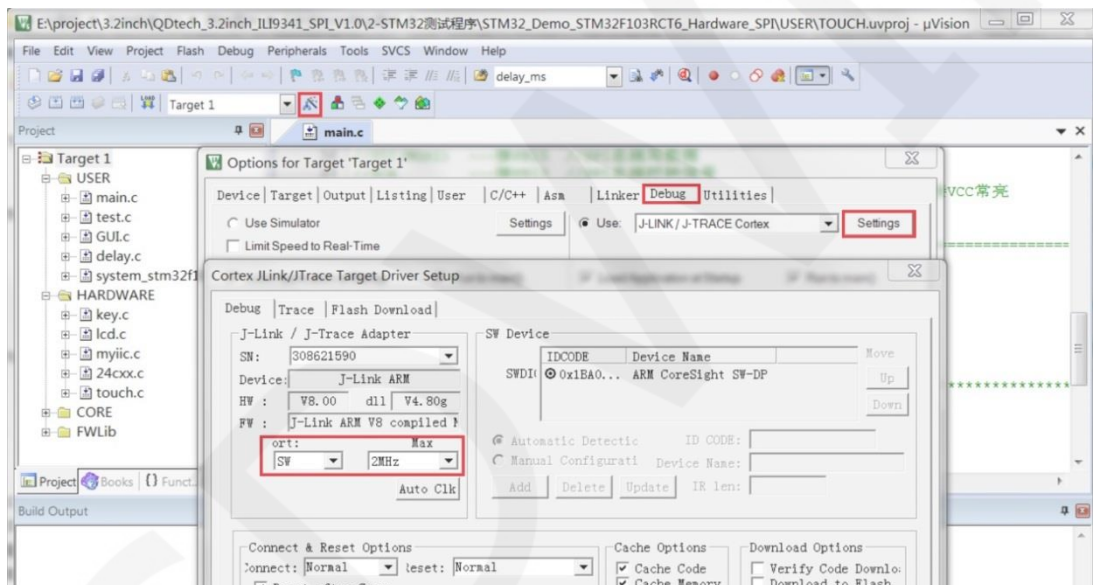
- A. After the program compilation is completed, proceed with the program download.

First, connect **JTAG** to the computer and development board, click on the **magic wand icon** ->**Debug** ->**drop-down menu**, and select **J-LINK/J-TRACE Cortex**, as shown in the following figure:

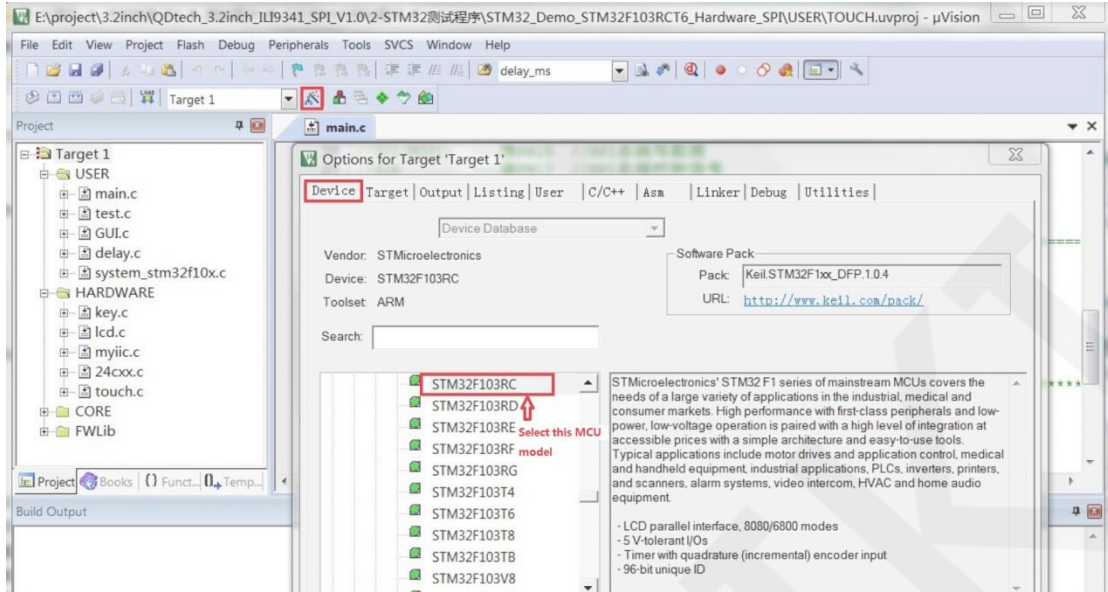




B. Click on **Settings** again, set **ort** to **SW** and **Max** to **2MHz**, as shown in the following:

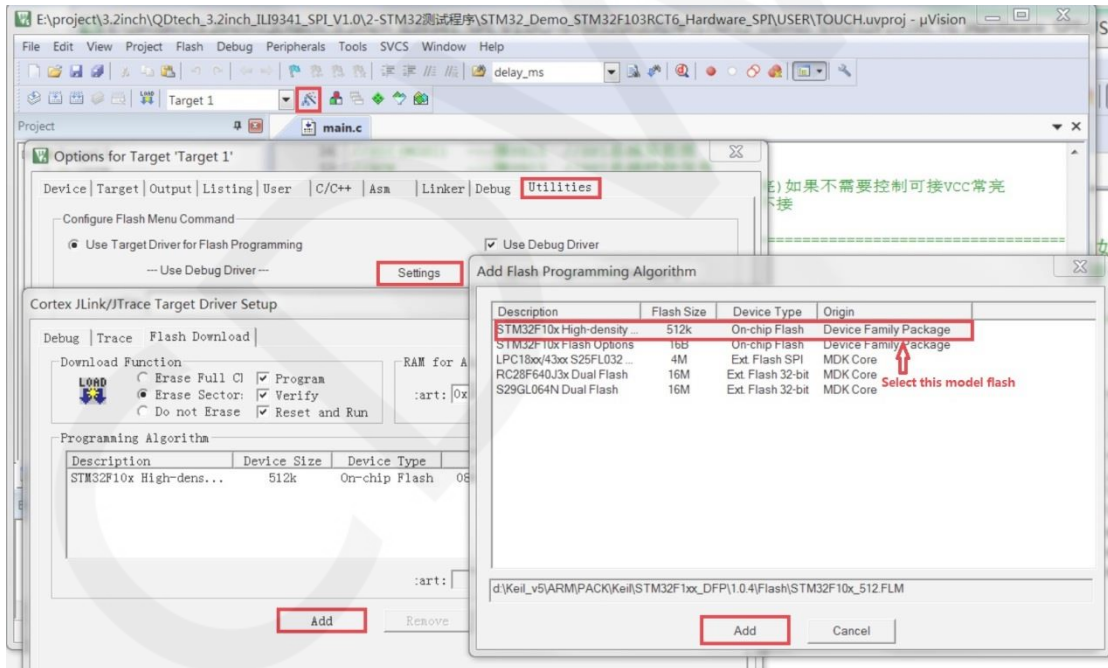


C. Select the microcontroller model, click on the **magic wand icon** -> **Device** -> select the **STM32F103RC** microcontroller model, as shown in the following figure:

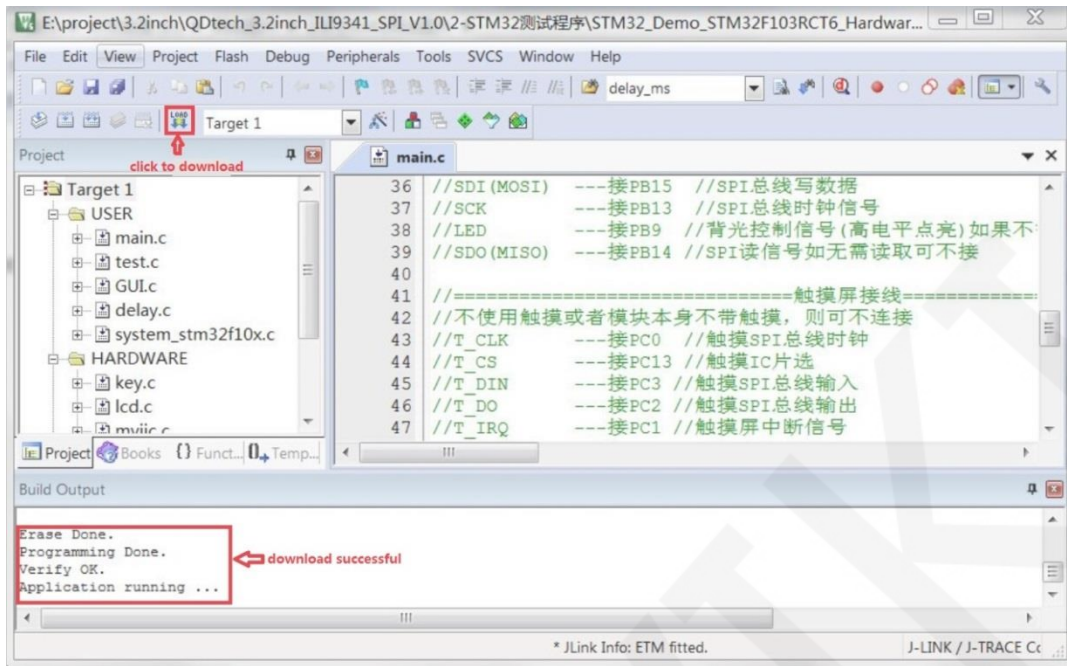


D. Select the flash model (if selected, please ignore it), click

**Utilities>Settings>Add>select STM32F10x High density Flash ->Add**, as shown in the following figure:

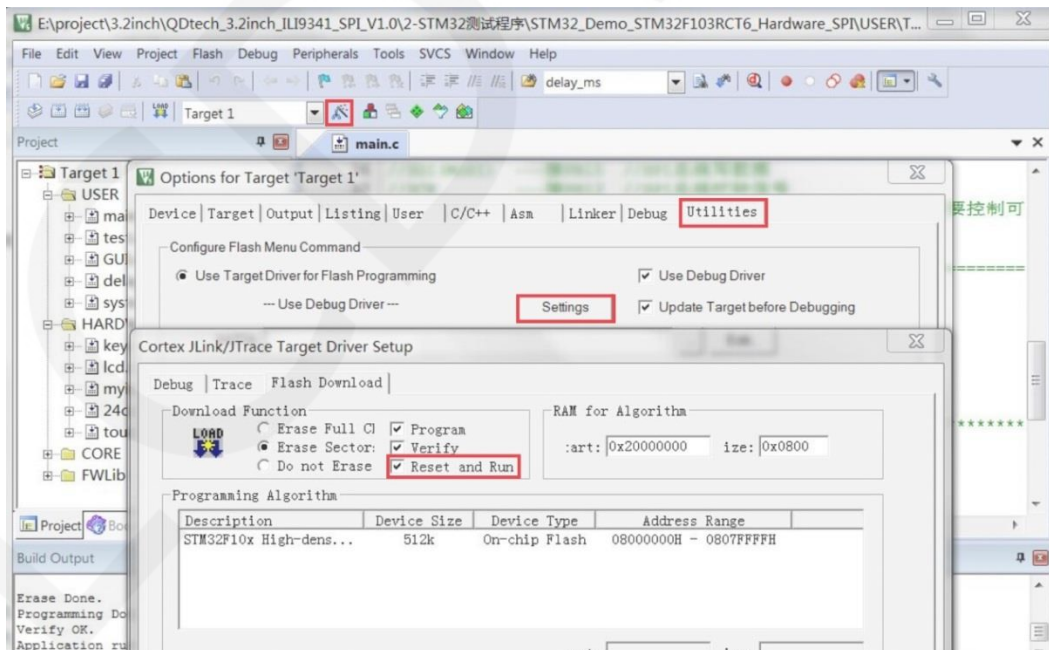


E. After setting up both JTAG and flash, the program can be downloaded. Download the program, click the **download** button, and download the hex file to the development board. If the prompt "**Programming Done. Verify OK.**" appears, it indicates successful download, as shown in the following figure:



F. After the program is successfully downloaded, if the module does not respond, you need to press the reset button or power off and restart to run normally. If you want the program to automatically run after successful download, you need to press the following settings:

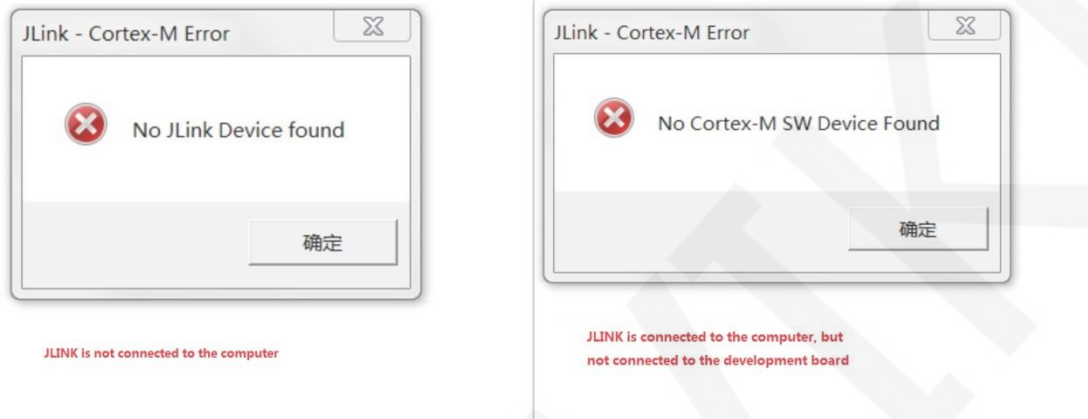
Click on the **magic wand icon** -> **Utilities** -> **Settings** -> check **Reset and run**, as shown in the following figure:



- G. If the display module displays characters and graphics normally, it indicates that the program has run successfully.

**NOTE:**

- A. When downloading the program, if the following error occurs, it indicates that the JTAG setting is incorrect. Please follow step B to set it:



- B. If the following error occurs, it indicates that the flash setting is incorrect. Please follow step D to set it:

