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, and can only be connected to other development boards through DuPont cables.
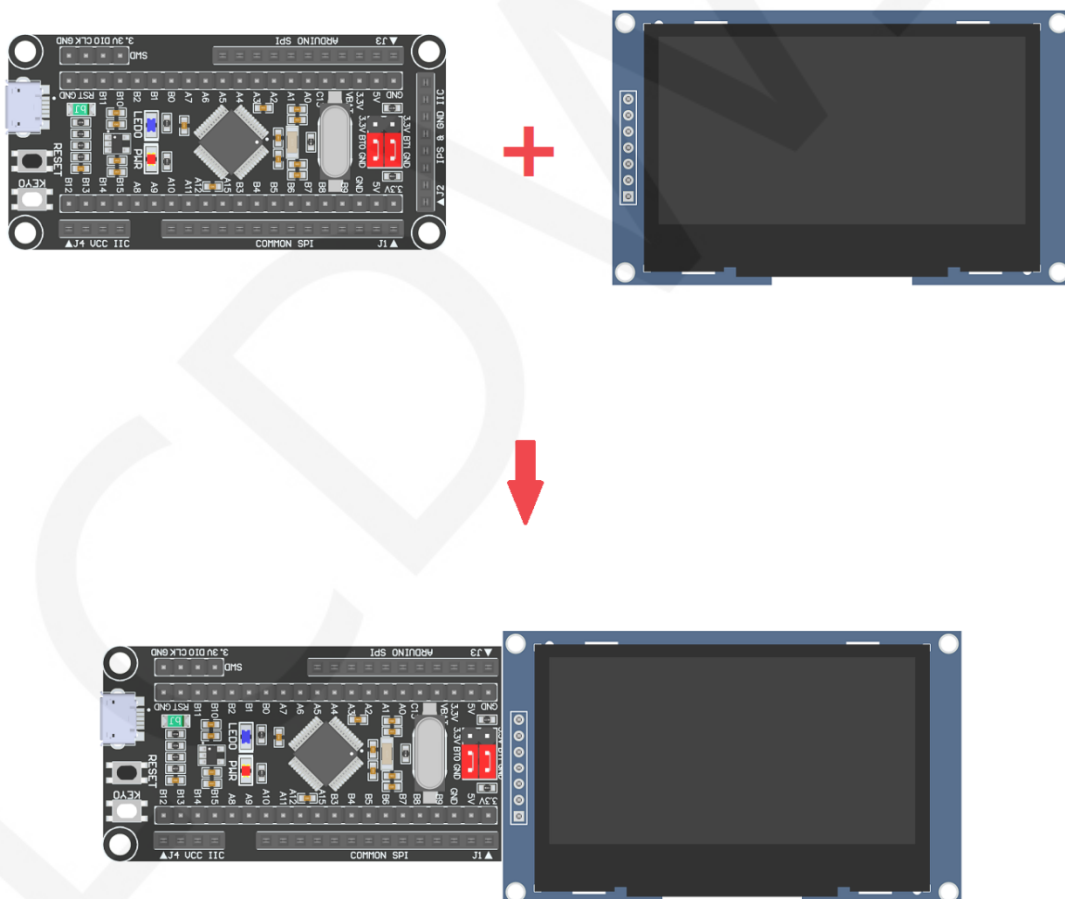

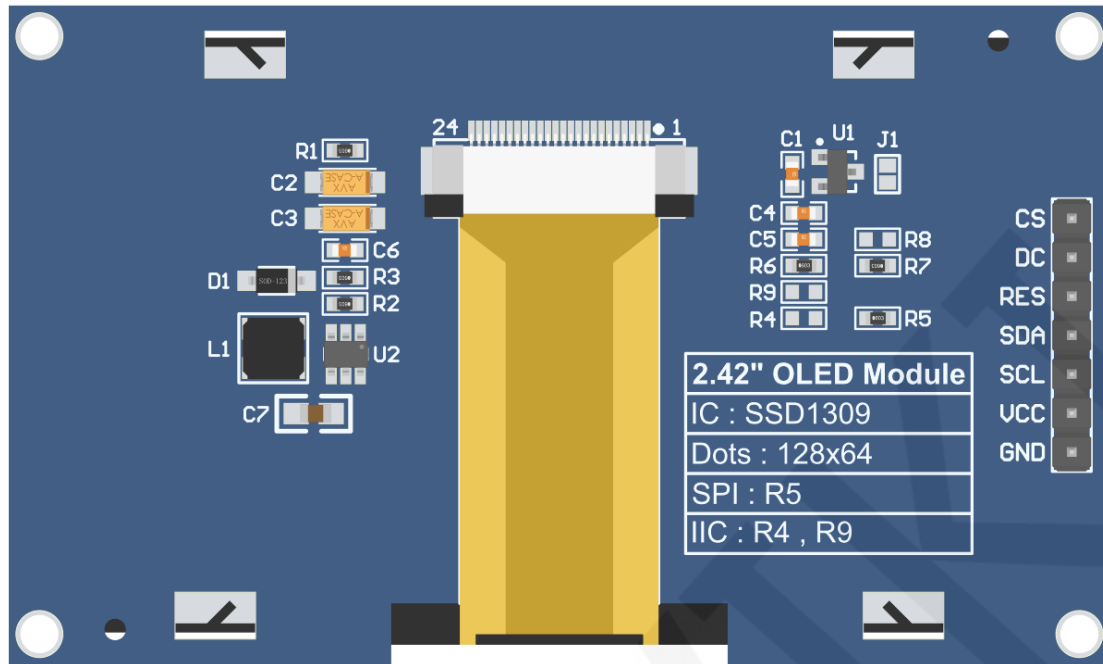**Figure 1: Module Inline STM32F103C8T6 Development Board**

Figure 2 Module Back Pins

NOTE:

A. Connect to a 5V microcontroller, which can short circuit J1 to keep the IO voltage and IO high level consistent;

B. R8 is not soldered by default. If there is no need to control the CS pin, R8 solders the 0R resistor to keep the CS signal grounded;

C. If SPI communication mode is selected, R5 will weld 0R resistor, and R4 and R9 will be disconnected;

D. If IIC communication mode is selected, R4 and R9 will be welded with 0R resistor, and R5 will be disconnected;

STM32F103C8T6 SPI Test Program Pin Direct Insertion Instructions			
Number	Module pins	Corresponding STM32F103 development board wiring pins	Remarks
1	GND	GND	OLED screen power supply ground
2	VCC	5V/3.3V	OLED screen power supply positive
3	SCL	PA5	SPI bus clock signal
4	SDA	PA7	SPI bus write data signal
5	RES	PB8	OLED screen reset control signal, low-level reset

6	DC	PB7	OLED screen command/data selection control signal High level: data, low level: command
7	CS	PB9	OLED screen chip selection control signal, effective at low level (if welding R8, CS pin may not be connected)

STM32F103C8T6 IIC Test Program Pin Direct Insertion Instructions			
Number	**Module pins**	**Corresponding STM32F103 development board wiring pins**	**Remarks**
1	GND	GND	OLED screen power supply ground
2	VCC	5V/3.3V	OLED screen power supply positive
3	SCL	PA5	IIC bus clock signal
4	SDA	PA7	IIC bus data signal
5	RES	PB8/3.3V	OLED screen reset control signal, low-level reset (if no control is required, the RES pin can be connected to a high-level (3.3V))
6	DC	PB7/GND/3.3V	IIC bus selects signal from device address When connecting to the PB7 pin, set it to low level: 0x78, and set it to high level: 0x7A Low level (connected to GND): 0x78, high level (connected to 3.3V): 0x7A
7	CS	PB9/GND	OLED screen chip selection control signal, effective at low levels When using IIC communication, there is no need for control. When connecting to PB9, PB9 must be set to low level or GND can be connected (if welding R8, CS pin can not be connected)

STM32F103RCT6 microcontroller SPI test program wiring instructions

Number	Module Pin	Corresponding to MiniSTM32 development board wiring pin	Remarks
1	GND	GND	OLED screen power supply ground
2	VCC	5V/3.3V	OLED screen power supply positive
3	SCL	PB13	SPI bus clock signal
4	SDA	PB15	SPI bus write data signal
5	RES	PB12	OLED screen reset control signal, low-level reset
6	DC	PB10	OLED screen command/data selection control signal High level: data, low level: command
7	CS	PB11	OLED screen chip selection control signal, effective at low level (if welding R8, CS pin may not be connected)

STM32F103RCT6 microcontroller IIC test program wiring instructions

Number	Module Pin	Corresponding to MiniSTM32 development board wiring pin	Remarks
1	GND	GND	OLED screen power supply ground
2	VCC	5V/3.3V	OLED screen power supply positive
3	SCL	PB13	IIC bus clock signal
4	SDA	PB15	IIC bus data signal
5	RES	PB12/3.3V	OLED screen reset control signal, low-level reset (if no control is required, the RES pin can be connected to a high-level (3.3V))

6	DC	PB10/GND/3.3V	IIC bus selects signal from device address When connecting to the P10 pin, set it to low level: 0x78, and set it to high level: 0x7A Low level (connected to GND): 0x78, high level (connected to 3.3V): 0x7A
7	CS	PB11/GND	OLED screen chip selection control signal, effective at low levels When using IIC communication, there is no need for control. When connecting to PB11, PB11 must be set to low level or GND can be connected (if welding R8, CS pin can not be connected)

STM32F103ZET6 microcontroller SPI test program wiring instructions			
Number	**Module Pin**	**Corresponding to Elite STM32 development board wiring pin**	**Remarks**
1	GND	GND	OLED screen power supply ground
2	VCC	5V/3.3V	OLED screen power supply positive
3	SCL	PB13	SPI bus clock signal
4	SDA	PB15	SPI bus write data signal
5	RES	PB12	OLED screen reset control signal, low-level reset
6	DC	PB10	OLED screen command/data selection control signal High level: data, low level: command
7	CS	PB11	OLED screen chip selection control signal, effective at low level (if welding R8, CS pin may not be connected)

STM32F103ZET6 microcontroller IIC test program wiring instructions

Number	Module Pin	Corresponding to Elite STM32 development board wiring pin	Remarks
1	GND	GND	OLED screen power supply ground
2	VCC	5V/3.3V	OLED screen power supply positive
3	SCL	PB13	IIC bus clock signal
4	SDA	PB15	IIC bus data signal
5	RES	PB12/3.3V	OLED screen reset control signal, low-level reset (if no control is required, the RES pin can be connected to a high-level (3.3V))
6	DC	PB10/GND/3.3V	IIC bus selects signal from device address When connecting to the PB10 pin, set it to low level: 0x78, and set it to high level: 0x7A Low level (connected to GND): 0x78, high level (connected to 3.3V): 0x7A
7	CS	PB11/GND	OLED screen chip selection control signal, effective at low levels When using IIC communication, there is no need for control. When connecting to PB11, PB11 must be set to low level or GND can be connected (if welding R8, CS pin can not be connected)

STM32F407ZGT6 microcontroller SPI test program wiring instructions

Number	Module Pin	Corresponding to Explorer STM32F4 development board wiring pin	Remarks
1	GND	GND	OLED screen power supply ground

2	**VCC**	5V/3.3V	OLED screen power supply positive
3	**SCL**	PB3	SPI bus clock signal
4	**SDA**	PB5	SPI bus write data signal
5	**RES**	PB12	OLED screen reset control signal, low-level reset
6	**DC**	PB14	OLED screen command/data selection control signal High level: data, low level: command
7	**CS**	PB15	OLED screen chip selection control signal, effective at low level (if welding R8, CS pin may not be connected)

STM32F407ZGT6 microcontroller IIC test program wiring instructions			
Number	**Module Pin**	**Corresponding to Explorer STM32F4 development board wiring pin**	**Remarks**
1	**GND**	GND	OLED screen power supply ground
2	**VCC**	5V/3.3V	OLED screen power supply positive
3	**SCL**	PB3	IIC bus clock signal
4	**SDA**	PB5	IIC bus data signal
5	**RES**	PB12/3.3V	OLED screen reset control signal, low-level reset (if no control is required, the RES pin can be connected to a high-level (3.3V))
6	**DC**	PB14/GND/3.3V	IIC bus selects signal from device address When connecting to the PB14 pin, set it to low level: 0x78, and set it to high level: 0x7A Low level (connected to GND): 0x78, high level (connected to 3.3V): 0x7A

7	CS	PB15/GND	OLED screen chip selection control signal, effective at low levels When using IIC communication, there is no need for control. When connecting to PB15, PB15 must be set to low level or GND can be connected (if welding R8, CS pin can not be connected)

| STM32F429IGT6 microcontroller SPI test program wiring instructions			
Number	**Module Pin**	**Corresponding to Apollo STM32F4/F7 development board wiring pin**	**Remarks**
1	GND	GND	OLED screen power supply ground
2	VCC	5V/3.3V	OLED screen power supply positive
3	SCL	PF7	SPI bus clock signal
4	SDA	PF9	SPI bus write data signal
5	RES	PD12	OLED screen reset control signal, low-level reset
6	DC	PD5	OLED screen command/data selection control signal High level: data, low level: command
7	CS	PD11	OLED screen chip selection control signal, effective at low level (if welding R8, CS pin may not be connected)

| STM32F429IGT6 microcontroller IIC test program wiring instructions			
Number	**Module Pin**	**Corresponding to Apollo STM32F4/F7 development board wiring pin**	**Remarks**
1	GND	GND	OLED screen power supply ground
2	VCC	5V/3.3V	OLED screen power supply positive

3	**SCL**	PF7	IIC bus clock signal
4	**SDA**	PF9	IIC bus data signal
5	**RES**	PD12/3.3V	OLED screen reset control signal, low-level reset (if no control is required, the RES pin can be connected to a high-level (3.3V))
6	**DC**	PD5/GND/3.3V	IIC bus selects signal from device address When connecting to the PD5 pin, set it to low level: 0x78, and set it to high level: 0x7A Low level (connected to GND): 0x78, high level (connected to 3.3V): 0x7A
7	**CS**	PD11/GND	OLED screen chip selection control signal, effective at low levels When using IIC communication, there is no need for control. When connecting to PD11, PD11 must be set to low level or GND can be connected (if welding R8, CS pin can not be connected)

3. Demo Function Description

This testing program includes 7 MCU testing programs including STM32F103C8T6, STM32F103RCT6, STM32F103ZET6, STM32F407ZGT6, STM32F429IGT6, STM32F767IGT6, STM32H743IIT6. 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:
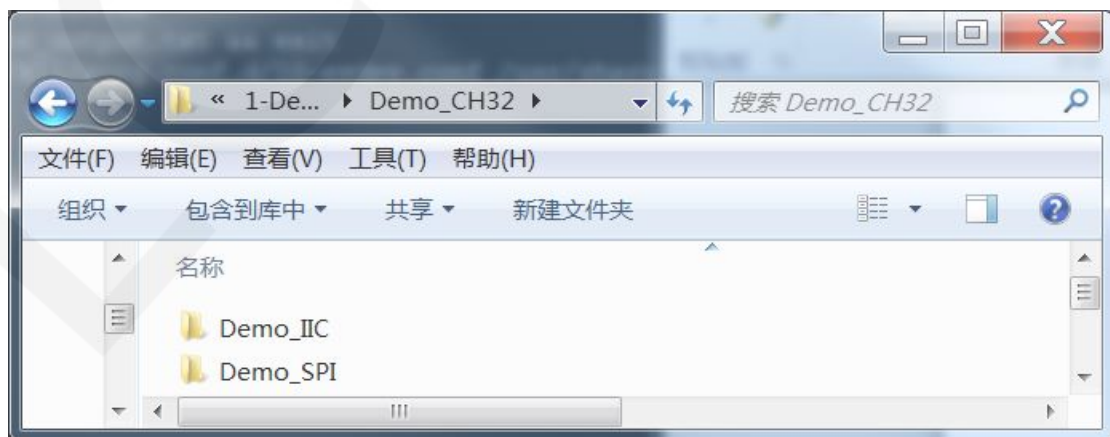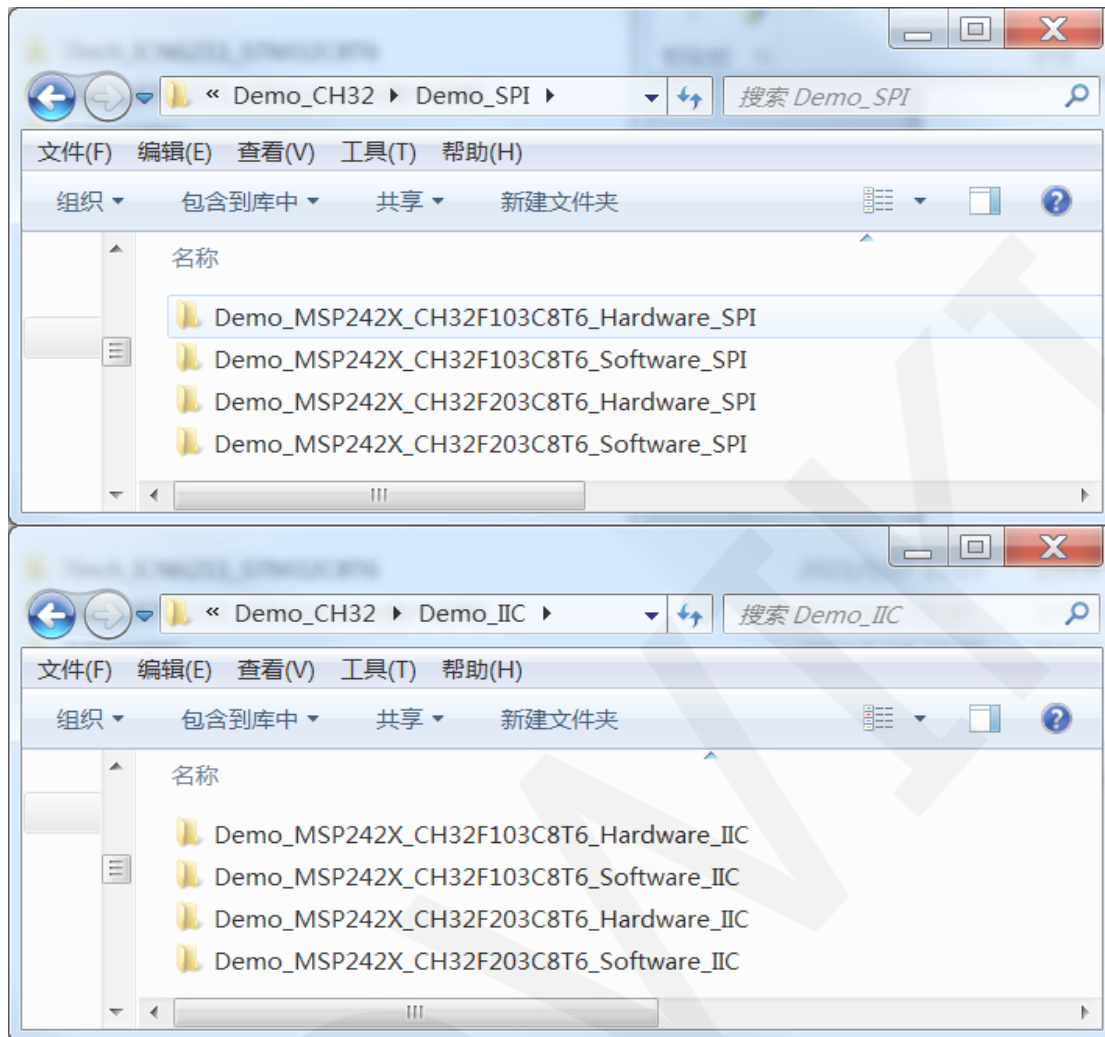
✦ Description of sample program content

The sample program includes the following content:

A. Home screen display;

B. Single color screen brushing

C. Rectangle drawing display;

D. Circular drawing display;

E. Triangle drawing display;

F. English display;

G. Display of numbers and symbols

H. Chinese display;

I. BMP monochrome image display;

J. Menu simulation display;

✧ Example program display direction switching instructions

Found macro definition **USE_HORIZONTAL** and **COLOR_STATE** in

HARDWARE\OLED\oled.h file, as shown in the following:

```
#define USE_HORIZONTAL    0 // 设置显示方向：0-正常，1-旋转180度
#define COLOR_STATE       0 // 设置显示模式：0-正常显示，1-反色显示
```

Modify USE_ HORIZONTAL and COLOR_ STATE macro according to the following

definition:

#define   USE_ HORIZONTAL   0   //0 ° rotation   (Default value)

#define   USE_ HORIZONTAL   1   //180 ° rotation

#define   COLOR_ STATE   0 //Black background, monochrome display

content(Default value)

#define   COLOR_ STATE   1 //Monochrome background, black display content

✧ Example program IIC slave device address modification instructions (only for IIC test programs)

First, locate the macro definition **IIC_SLAVE_ADDR** in the **HARDWARE\IIC\iic.h** file,

as shown in the following figure:

```
//定义IIC从设备地址
#define IIC_SLAVE_ADDR 0x78  //0x7A
```

Modify IIC_ SLAVE_ ADDR macro definition according to the following definition is

sufficient to:

#define IIC_ SLAVE_ ADDR 0x78   //Slave device address is 0x78 (default value)

#define IIC_ SLAVE_ ADDR 0x7A   //Slave device address is 0x7A

Next, find **OLED_Init_GPIO** function in the **HARDWARE\OLED\oled. c** file. If using

the 0x7A slave device address, there is no need to annotate the code

GPIO_SetBits(GPIOB,GPIO_Pin_7) (to make them effective). If using the 0x78

slave device address, the code **GPIO_SetBits(GPIOB,GPIO_Pin_7)** need to be

annotated (to make them ineffective), as shown in the following figure(Taking the

STM32F103C8T6 example program as an example):

```
void OLED_Init_GPIO(void)
{
  GPIO_InitTypeDef  GPIO_InitStructure;
  RCC_APB2PeriphClockCmd(RCC_APB2Periph_GPIOB, ENABLE);  //使能B端口时钟
  GPIO_InitStructure.GPIO_Pin = GPIO_Pin_7|GPIO_Pin_8|GPIO_Pin_9; //GPIOB10,11,12
  GPIO_InitStructure.GPIO_Mode = GPIO_Mode_Out_PP;     //推挽输出
  GPIO_InitStructure.GPIO_Speed = GPIO_Speed_50MHz;//速度50MHz
  GPIO_Init(GPIOB, &GPIO_InitStructure);    //初始化GPIOB10、11、12
  GPIO_SetBits(GPIOB,GPIO_Pin_8);
  GPIO_ResetBits(GPIOB,GPIO_Pin_7|GPIO_Pin_9);
  //slave address is 0x7A, select the folllow define:
  //GPIO_SetBits(GPIOB,GPIO_Pin_7);
}
```

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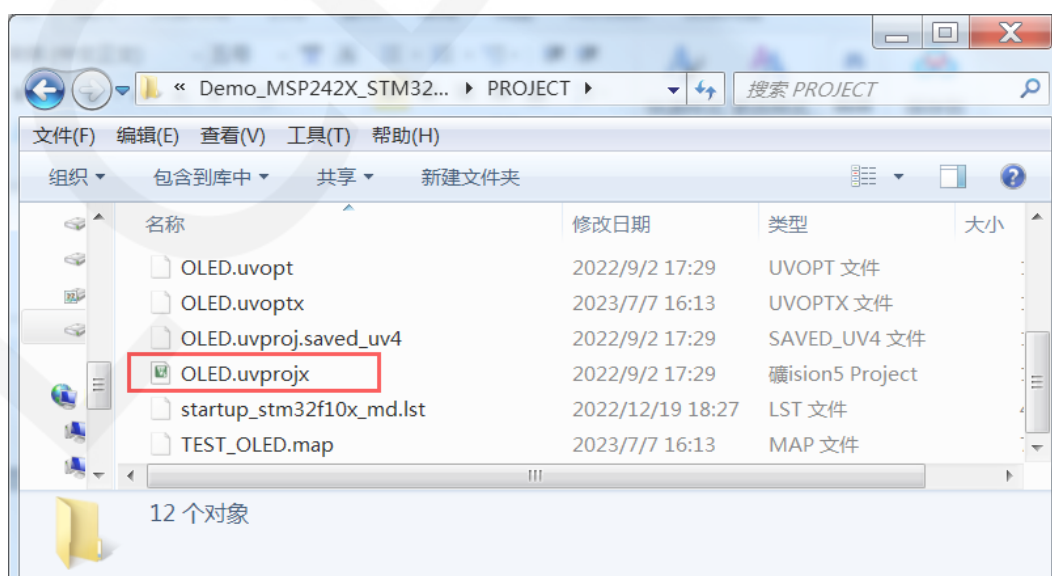
After opening the sample project, you can make modifications to the project code (or not). After the modifications are completed, click the compile button to compile the code. The following prompt appears, indicating successful compilation, as shown in the following figure:
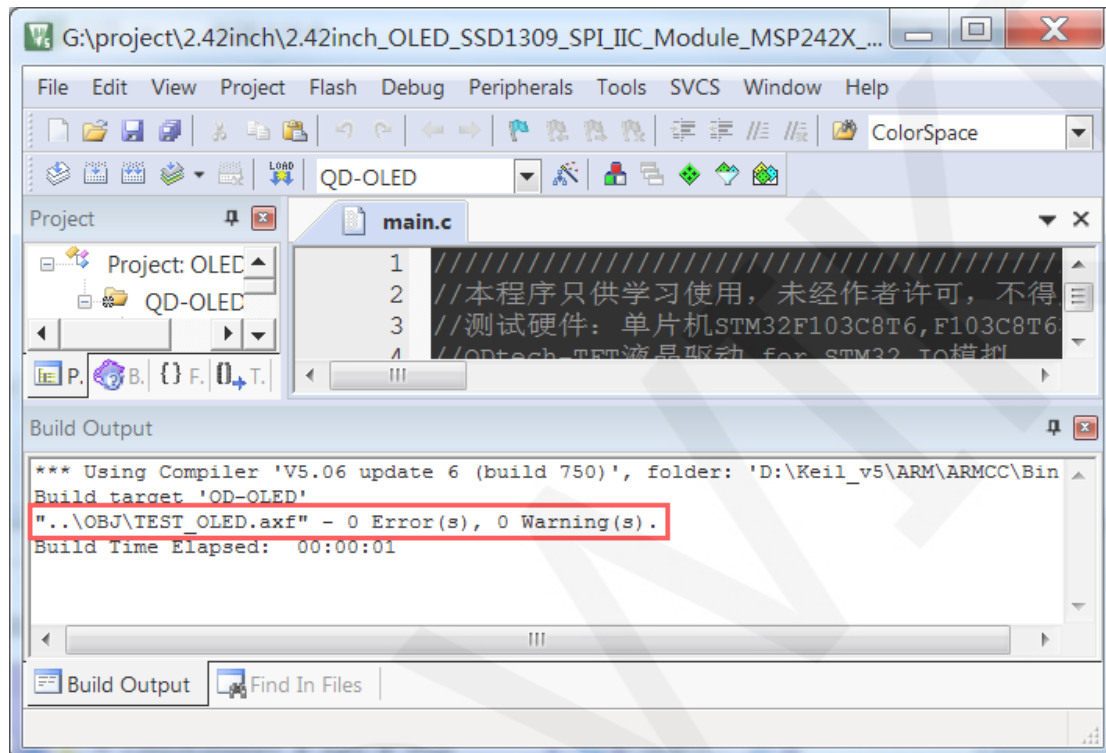

✦ Download and Run Programs

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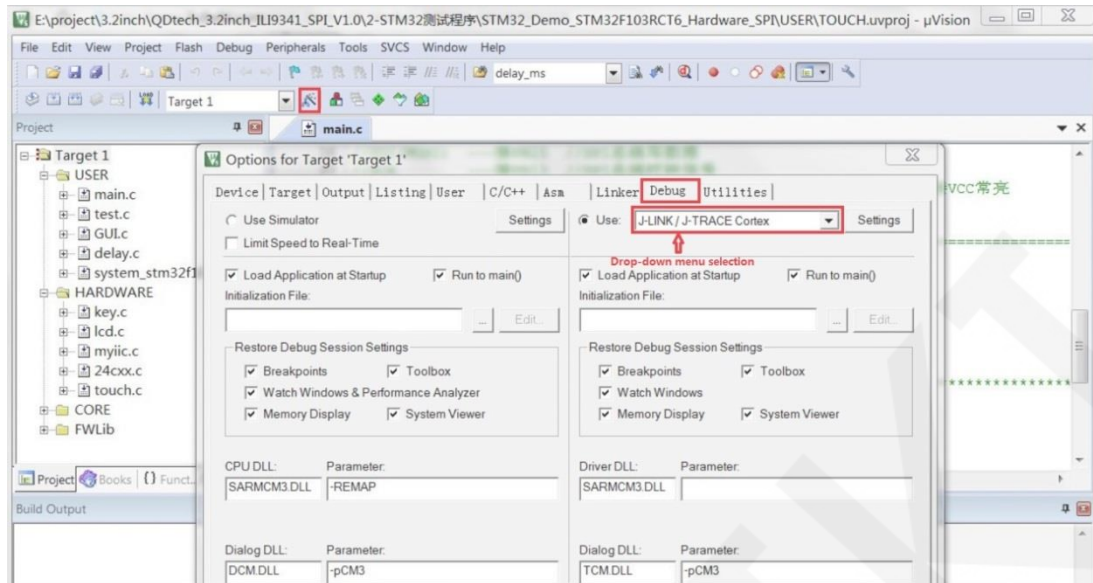
B. Click on **Settings** again, set ort to **SW** and Max to **2MHz**, as shown in the following:
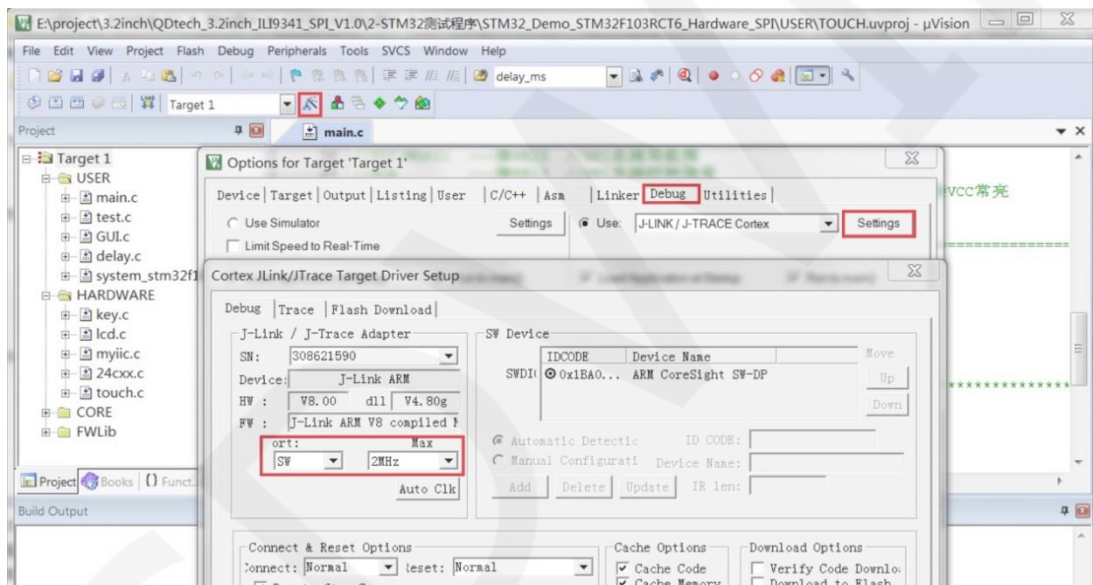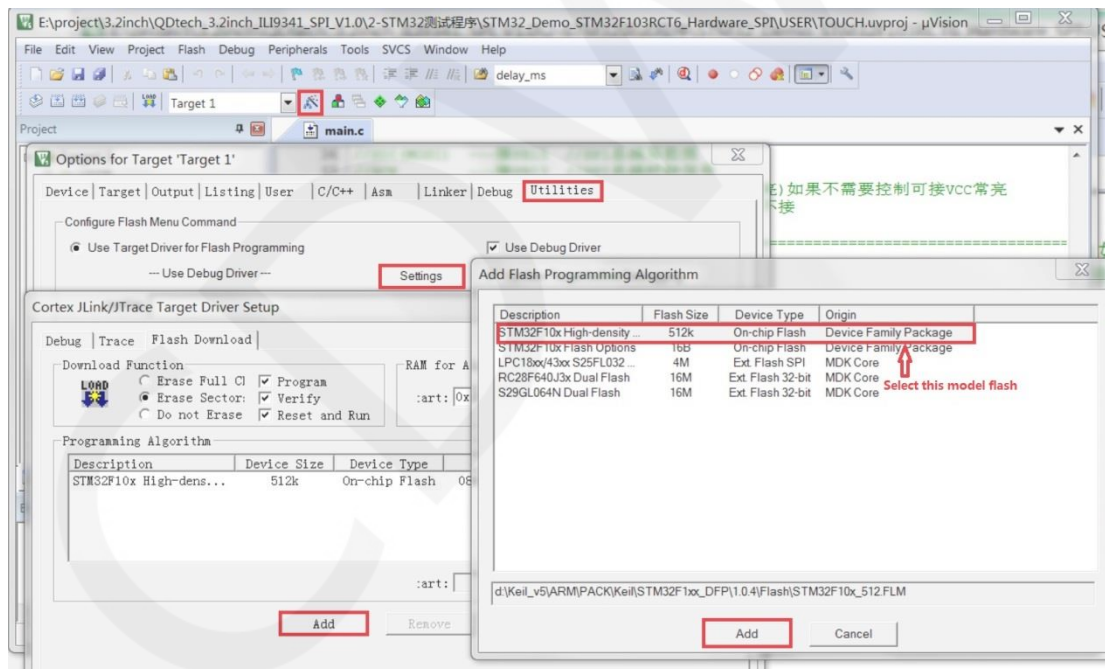

C. Select the microcontroller model, click on the **magic wand icon** ->**Device** ->select

the **STM32F103RC** microcontroller model, as shown in the following figure:
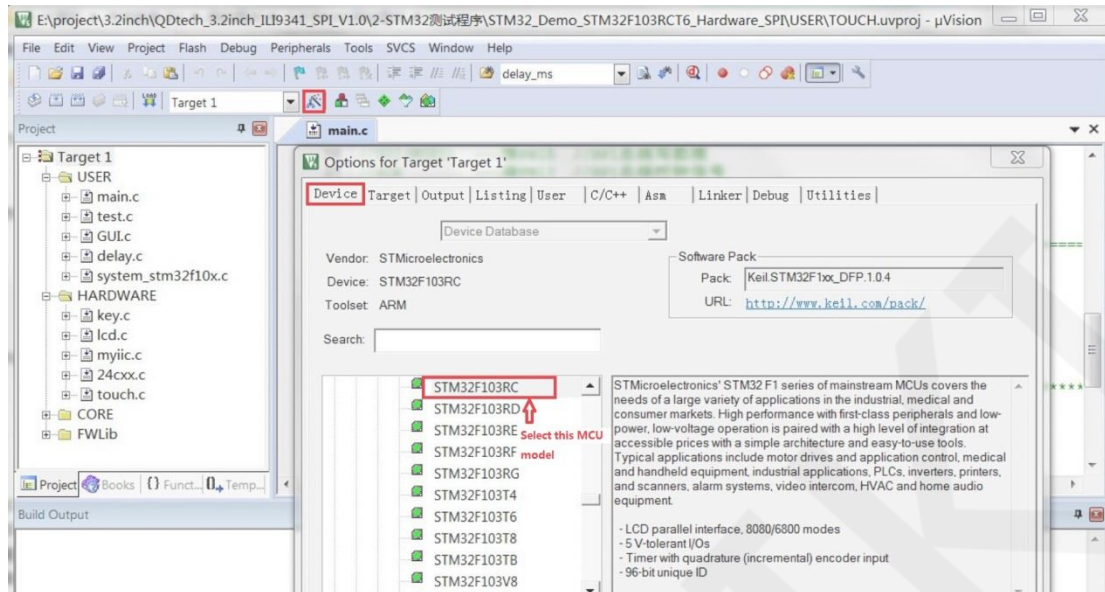
D. Select the flash model (if selected, please ignore it), click

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:
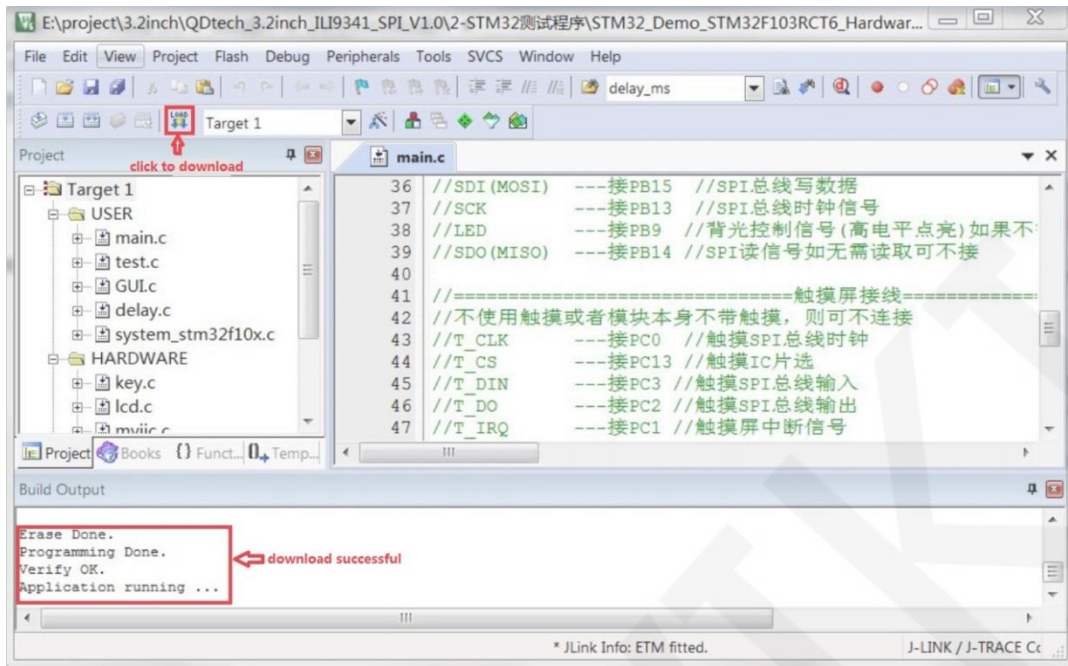
F. After the program is successfully downloaded, if the module does not respond, you need to press the reset button or power off and restart to run normally. If you want the program to automatically run after successful download, you need to press the following settings:
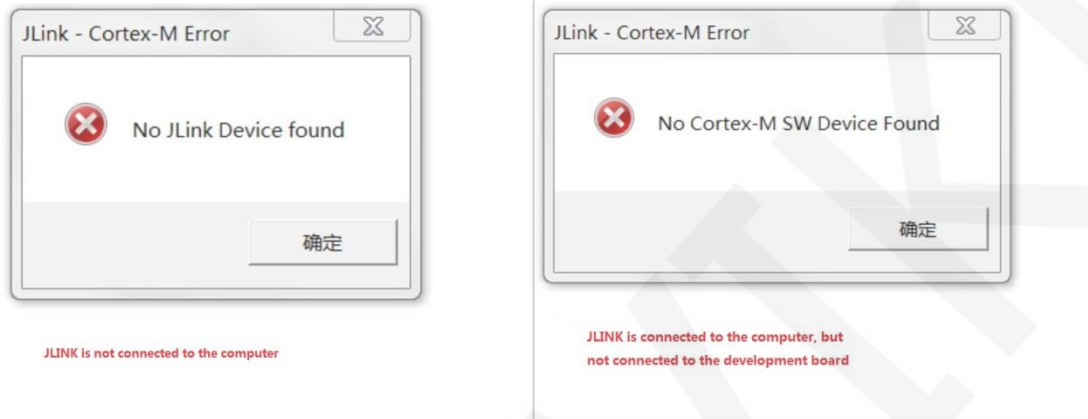
Click on the **magic wand icon** ->**Utilities** ->**Settings** ->check **Reset and run**, as shown in the following figure:
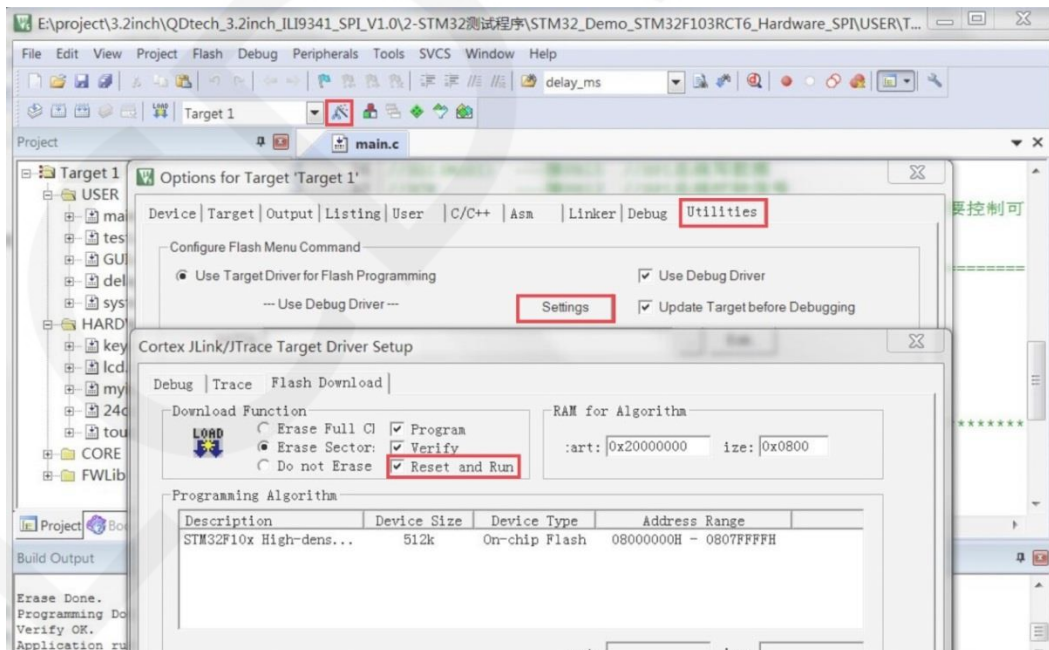
G. If the display module displays characters and graphics normally, it indicates that
the program has run successfully.

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:

JLink - Cortex-M Error
❌ No JLink Device found
确定

JLINK is not connected to the computer

JLink - Cortex-M Error
❌ No Cortex-M SW Device Found
确定

JLINK is connected to the computer, but
not connected to the development board

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

μVision
⚠ Error: Flash Download failed - "Cortex-M3"
确定