

Test platform introduction:

This set of STM32 test programs use the development board of the ALIENTEK, as follows:

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

MCU: STM32F103RCT6, STM32F103ZET6, STM32F407ZGT6,

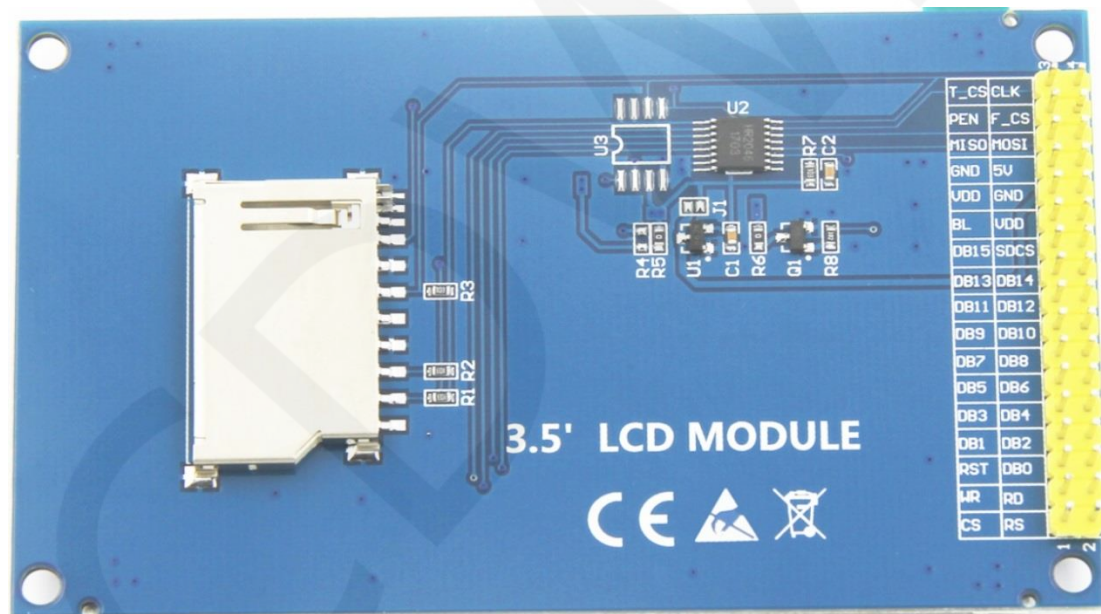
STM32F429IGT6, STM32F767IGT6, STM32H743IIT6

Main frequency: 72MHz, 72MHz, 168MHz, 180MHz, 216MHz, 400MHz

(Corresponding to the above MCU)

Crystal frequency: 8MHz, 8MHz, 8MHz, 25MHz, 25MHz, 25MHz (Corresponding to the above MCU)

Wiring instructions:



Picture1. Module Pin silk screen picture

Note:

1. If using the IO simulation test program, you need to connect the module to the development board (except MiniSTM32) with DuPont line;
2. If you use the FSMC test program, you can plug the module directly into the TFTLCD slot of the development board;

3. The STM32F103RCT6 microcontroller does not have the FSMC function, but the module can also be plugged directly into the MiniSTM32 development board;

Important Note:

1. The following pin numbers 1~34 are the pin number of Module pin with PCB backplane of our company. If you purchase a bare screen, please refer to the pin definition of the bare screen specification, refer to the wiring according to the signal type instead of directly Wire according to the following module pin numbers. For example: CS is 1 pin on our module. It may be x pin on different size bare screen. The following wiring program instructions tell you to connect CS signal to the P1.3 pin of C51 microcontroller.
2. About VCC supply voltage: If you purchase a module with PCB backplane, VCC/VDD can be connected to 5V or 3.3V (module has integrated ultra low dropout 5V to 3V circuit), if you buy a bare screen LCD, remember only Can connect to 3.3V.
3. About the backlight voltage: The module with the PCB backplane has integrated triode backlight control circuit, which only needs to input the high level of the BL pin or the PWM wave to illuminate the backlight. If you are buying a bare screen, the LEDAx is connected to 3.0V-3.3V and the LEDKx is grounded.

STM32F103RCT6 microcontroller test program directly insert instructions			
Number	Module Pin	Corresponding to MiniSTM32 development board directly insert pin	Remarks
1	CS	PC9	LCD reset control pin(low level enable)
2	RS	PC8	LCD register / data selection control pin (high level: register, low level: data)
3	WR	PC7	LCD write control pin

4	RD	PC6	LCD read control pin
5	RST	PC4	LCD reset control pin(low level reset)
6	DB0	PB0	LCD data bus low 8-bit pin
7	DB1	PB1	
8	DB2	PB2	
9	DB3	PB3	
10	DB4	PB4	
11	DB5	PB5	
12	DB6	PB6	
13	DB7	PB7	
14	DB8	PB8	LCD data bus high 8-bit pin
15	DB9	PB9	
16	DB10	PB10	
17	DB11	PB11	
18	DB12	PB12	
19	DB13	PB13	
20	DB14	PB14	
21	DB15	PB15	
22	SDCS	No need to connect	SD card selection control pin (used when using the SD card expansion function, this test program is not used)
23	BL	PC10	LCD backlight control pin(High level light)
24	VDD	3.3V/5V	Module power positive pin (module has integrated voltage regulator IC, so the power supply can be connected to 5V or 3.3V)
25	VDD	3.3V/5V	
26	GND	GND	Module power ground pin
27	GND	GND	
28	5V	No need to connect	LCD backlight power positive pin (default shared onboard backlight power supply, this pin can not be connected)
29	MISO	PC2	Touch screen SPI bus data input pin
30	MOSI	PC3	Touch screen SPI bus data output pin
31	PEN	PC1	Touch screen interrupt detection pin (Low level when a touch occurs)

32	F_CS	No need to connect	Flash chip select control pin (used when using the Flash extension function, this test program is not used)
33	T_CS	PC13	Touch screen IC chip select control pin(Low level enable)
34	CLK	PC0	Touch screen SPI bus clock control pin

STM32F103ZET6 microcontroller test program wiring instructions

Number	Module Pin	Corresponding to Elite STM32 development board wiring pin		Remarks
		IO Simulation	FSMC	
1	CS	PC9	PG12	LCD reset control pin(low level enable)
2	RS	PC8	PG0	LCD register / data selection control pin (high level: register, low level: data)
3	WR	PC7	PD5	LCD write control pin
4	RD	PC6	PD4	LCD read control pin
5	RST	PC4	reset pin	LCD reset control pin(low level reset)
6	DB0	PF0	PD14	LCD data bus low 8-bit pin
7	DB1	PF1	PD15	
8	DB2	PF2	PD0	
9	DB3	PF3	PD1	
10	DB4	PF4	PE7	
11	DB5	PF5	PE8	
12	DB6	PF6	PE9	
13	DB7	PF7	PE10	
14	DB8	PF8	PE11	LCD data bus high 8-bit pin
15	DB9	PF9	PE12	
16	DB10	PF10	PE13	
17	DB11	PF11	PE14	
18	DB12	PF12	PE15	
19	DB13	PF13	PD8	
20	DB14	PF14	PD9	

21	DB15	PF15	PD10	
22	SDCS	No need to connect	No need to connect	SD card selection control pin (used when using the SD card expansion function, this test program is not used)
23	BL	PC10	PB0	LCD backlight control pin(High level light)
24	VDD	3.3V/5V	3.3V/5V	Module power positive pin (module has integrated voltage regulator IC, so the power supply can be connected to 5V or 3.3V)
25	VDD	3.3V/5V	3.3V/5V	
26	GND	GND	GND	
27	GND	GND	GND	Module power ground pin
28	5V	No need to connect	No need to connect	LCD backlight power positive pin (default shared onboard backlight power supply, this pin can not be connected)
29	MISO	PC2	PB2	Touch screen SPI bus data input pin
30	MOSI	PC3	PF9	Touch screen SPI bus data output pin
31	PEN	PC1	PF10	Touch screen interrupt detection pin (Low level when a touch occurs)
32	F_CS	No need to connect	No need to connect	Flash chip select control pin (used when using the Flash extension function, this test program is not used)
33	T_CS	PC13	PF11	Touch screen IC chip select control pin(Low level enable)
34	CLK	PC0	PB1	Touch screen SPI bus clock control pin

STM32F103ZET6 microcontroller test program wiring instructions

Number	Module Pin	Corresponding to WarShip STM32 development board wiring pin			Remarks
		IO Simulation	FSMC		
			V2	V3	
1	CS	PC9	PG12	PG12	LCD reset control pin(low level enable)

2	RS	PC8	PG0	PG0	LCD register / data selection control pin (high level: register, low level: data)
3	WR	PC7	PD5	PD5	LCD write control pin
4	RD	PC6	PD4	PD4	LCD read control pin
5	RST	PC4	reset pin	reset pin	LCD reset control pin(low level reset)
6	DB0	PF0	PD14	PD14	LCD data bus low 8-bit pin
7	DB1	PF1	PD15	PD15	
8	DB2	PF2	PD0	PD0	
9	DB3	PF3	PD1	PD1	
10	DB4	PF4	PE7	PE7	
11	DB5	PF5	PE8	PE8	
12	DB6	PF6	PE9	PE9	
13	DB7	PF7	PE10	PE10	
14	DB8	PF8	PE11	PE11	LCD data bus high 8-bit pin
15	DB9	PF9	PE12	PE12	
16	DB10	PF10	PE13	PE13	
17	DB11	PF11	PE14	PE14	
18	DB12	PF12	PE15	PE15	
19	DB13	PF13	PD8	PD8	
20	DB14	PF14	PD9	PD9	
21	DB15	PF15	PD10	PD10	
22	SDCS	No need to connect	No need to connect	No need to connect	SD card selection control pin (used when using the SD card expansion function, this test program is not used)
23	BL	PC10	PB0	PB0	LCD backlight control pin(High level light)
24	VDD	3.3V/5V	3.3V/5V	3.3V/5V	Module power positive pin (module has integrated voltage regulator IC, so the power supply can be connected to 5V or 3.3V)
25	VDD	3.3V/5V	3.3V/5V	3.3V/5V	
26	GND	GND	GND	GND	Module power ground pin
27	GND	GND	GND	GND	
28	5V	No need to connect	No need to connect	No need to connect	LCD backlight power positive pin (default shared onboard backlight power supply, this pin can not be connected)

29	MISO	PC2	PF8	PB2	Touch screen SPI bus data input pin
30	MOSI	PC3	PF9	PF9	Touch screen SPI bus data output pin
31	PEN	PC1	PF10	PF10	Touch screen interrupt detection pin (Low level when a touch occurs)
32	F_CS	No need to connect	No need to connect	No need to connect	Flash chip select control pin (used when using the Flash extension function, this test program is not used)
33	T_CS	PC13	PB2	PF11	Touch screen IC chip select control pin(Low level enable)
34	CLK	PC0	PB1	PB1	Touch screen SPI bus clock control pin

STM32F407ZGT6 microcontroller test program wiring instructions

Number	Module Pin	Corresponding to Explorer STM32F4 development board wiring pin		Remarks
		IO Simulation	FSMC	
1	CS	PC9	PG12	LCD reset control pin(low level enable)
2	RS	PC8	PF12	LCD register / data selection control pin (high level: register, low level: data)
3	WR	PC7	PD5	LCD write control pin
4	RD	PC6	PD4	LCD read control pin
5	RST	PC4	reset pin	LCD reset control pin(low level reset)
6	DB0	PG0	PD14	LCD data bus low 8-bit pin
7	DB1	PG1	PD15	
8	DB2	PG2	PD0	
9	DB3	PG3	PD1	
10	DB4	PG4	PE7	
11	DB5	PG5	PE8	
12	DB6	PG6	PE9	
13	DB7	PG7	PE10	
14	DB8	PG8	PE11	LCD data bus high 8-bit pin
15	DB9	PG9	PE12	

16	DB10	PG10	PE13	
17	DB11	PG11	PE14	
18	DB12	PG12	PE15	
19	DB13	PG13	PD8	
20	DB14	PG14	PD9	
21	DB15	PG15	PD10	
22	SDCS	No need to connect	No need to connect	SD card selection control pin (used when using the SD card expansion function, this test program is not used)
23	BL	PC10	PB15	LCD backlight control pin(High level light)
24	VDD	3.3V/5V	3.3V/5V	Module power positive pin (module has integrated voltage regulator IC, so the power supply can be connected to 5V or 3.3V)
25	VDD	3.3V/5V	3.3V/5V	
26	GND	GND	GND	Module power ground pin
27	GND	GND	GND	
28	5V	No need to connect	No need to connect	LCD backlight power positive pin (default shared onboard backlight power supply, this pin can not be connected)
29	MISO	PF2	PB2	Touch screen SPI bus data input pin
30	MOSI	PF3	PF11	Touch screen SPI bus data output pin
31	PEN	PF1	PB1	Touch screen interrupt detection pin (Low level when a touch occurs)
32	F_CS	No need to connect	No need to connect	Flash chip select control pin (used when using the Flash extension function, this test program is not used)
33	T_CS	PF13	PC13	Touch screen IC chip select control pin(Low level enable)
34	CLK	PF0	PB0	Touch screen SPI bus clock control pin

STM32F429IGT6、STM32F767IGT6、STM32H743IIT6 microcontroller test program wiring instructions

Number	Module Pin	Corresponding to Apollo STM32F4/F7 development board wiring pin		Remarks
		IO Simulation	FSMC	
1	CS	PC9	PD7	LCD reset control pin(low level enable)
2	RS	PC8	PD13	LCD register / data selection control pin (high level: register, low level: data)
3	WR	PC7	PD5	LCD write control pin
4	RD	PC6	PD4	LCD read control pin
5	RST	PC4	reset pin	LCD reset control pin(low level reset)
6	DB0	PE0	PD14	LCD data bus low 8-bit pin
7	DB1	PE1	PD15	
8	DB2	PE2	PD0	
9	DB3	PE3	PD1	
10	DB4	PE4	PE7	
11	DB5	PE5	PE8	
12	DB6	PE6	PE9	
13	DB7	PE7	PE10	
14	DB8	PE8	PE11	LCD data bus high 8-bit pin
15	DB9	PE9	PE12	
16	DB10	PE10	PE13	
17	DB11	PE11	PE14	
18	DB12	PE12	PE15	
19	DB13	PE13	PD8	
20	DB14	PE14	PD9	
21	DB15	PE15	PD10	
22	SDCS	No need to connect	No need to connect	SD card selection control pin (used when using the SD card expansion function, this test program is not used)
23	BL	PC10	PB5	LCD backlight control pin(High level light)

24	VDD	3.3V/5V	3.3V/5V	Module power positive pin (module has integrated voltage regulator IC, so the power supply can be connected to 5V or 3.3V)
25	VDD	3.3V/5V	3.3V/5V	
26	GND	GND	GND	Module power ground pin
27	GND	GND	GND	
28	5V	No need to connect	No need to connect	LCD backlight power positive pin (default shared onboard backlight power supply, this pin can not be connected)
29	MISO	PH11	PG3	Touch screen SPI bus data input pin
30	MOSI	PH12	PI3	Touch screen SPI bus data output pin
31	PEN	PH10	PH7	Touch screen interrupt detection pin (Low level when a touch occurs)
32	F_CS	No need to connect	No need to connect	Flash chip select control pin (used when using the Flash extension function, this test program is not used)
33	T_CS	PH13	PI8	Touch screen IC chip select control pin (Low level enable)
34	CLK	PH9	PH6	Touch screen SPI bus clock control pin

Demo function description:

1. This test program is applicable to STM32F103RCT6, STM32F103ZET6, STM32F407ZGT6, STM32F429IGT6, STM32F767IGT6, STM32H743IIT6 six STM32 MCU platforms;
2. Please find the corresponding development board for wiring according to the above wiring instructions;
3. The IO simulation test program in this test program supports 8-bit mode and 16-bit data bus mode switching. For the specific method, see the following mode switching instructions;
4. This set of test program supports display switching in four directions. For details, see the following instructions for switching directions;
5. This set of test procedures contains the following test items:
 - A. the main interface displays the test;

- B. read ID and color value test;
- C. simple brush test;
- D. rectangular drawing and filling test;
- E. circular drawing and filling test;
- F. triangle drawing and filling test;
- G. English display test;
- H. Chinese display test;
- I. picture display test;
- J. rotating display test;
- K. touch screen handwriting test;

Mode switching instructions:

Find the macro definition `LCD_USE8BIT_MODEL` in `lcd.h`, as shown below:

```
#define LCD_USE8BIT_MODEL 0 //定义数据总线是否使用8位模式 0,使用16位模式.1,使用8位模式  
////////////////////////////////////
```

`LCD_USE8BIT_MODEL 0 // Use 16-bit data bus mode`

`LCD_USE8BIT_MODEL 1 // Use 8-bit data bus mode`

Note:

1. This set of test programs uses the 16-bit data bus mode by default;
2. The FSMC test program does not support data bus mode switching. The default is 16-bit FSMC bus
3. Not every LCD screen supports 8-bit/16-bit mode. Please check with us to see if you have purchased it;
4. After the 8/16-bit switch is performed on the software, the hardware also needs to be changed to the corresponding mode to be able to drive normally. The module hardware does not support 8/16 bit mode switching, Please refer to the module schematic for specific instructions. Please consult us for how to modify the bare screen.

Display direction switching instructions:

Find the macro definition **USE_HORIZONTAL** in **lcd.h** as shown below:

```
////////////////////////////////////// 用户配置区 ////////////////////////////////////////  
#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 //Clockwise 0° Rotate
USE_HORIZONTAL 1 //Clockwise 90° Rotate
USE_HORIZONTAL 2 //Clockwise 180° Rotate
USE_HORIZONTAL 3 //Clockwise 270° Rotate