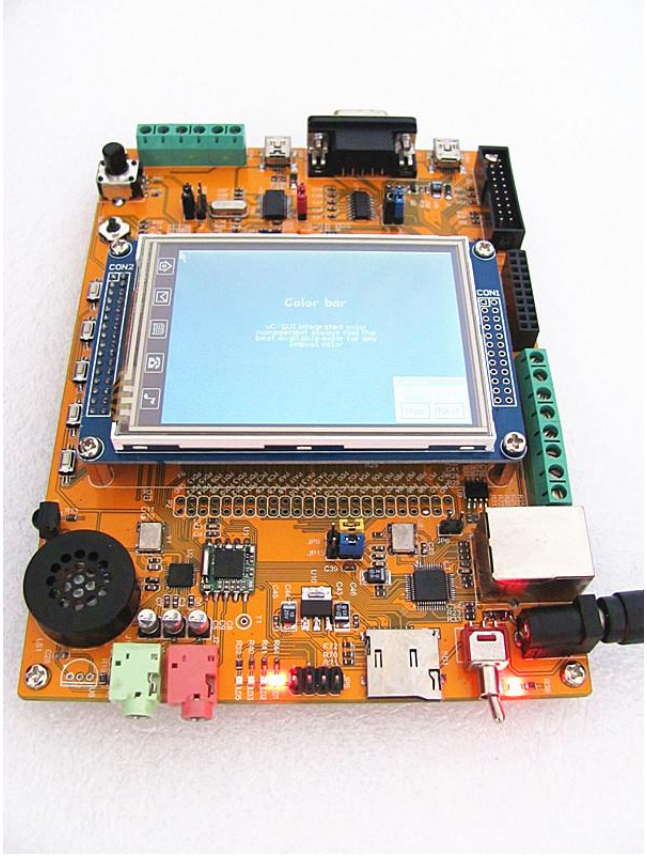
Cortex-M3 107 Development Board

User's Manual



1, Chapter 1 Hardware Articles

1.1 Golden Dragon STM 32F 107VCT6 development board Introduction

Golden Dragon 107 development board embedded with STM 32F 107VC STMicroelectronics, launched new STM32 interconnect type(connectivity) family of microcontrollers in a strong performance, this chip integrates a variety of high-performance industry-standard interface, and STM32 different types of products are perfect in pin and software compatibility, you can easily adapt to more applications. The new STM32 standard peripherals include 10 timers, two 12 M sample / s AD (analog-to-digital converter) (rapidly alternating mode 2M sample / s), two 12-bit DA (digital-to-analog converter), two I 2C interface, five USART interfaces and three SPI ports and high-quality digital audio interface IIS, STM 32F 107 has a full-speed USB (OTG) interface, two CAN2.0B interface, and Ethernet 10/100 MAC modules. This chip can meet the industrial, medical, building automation, home audio and home appliance market a variety of products needs!

1.2 Developer-board resources

STM 32F 107VCT6, ARM Cortex-M3 core, clocked at 72MHz, contains an internal 256K bytes of FLASH and 64K bytes of SRAM

A 10M / 100M Ethernet interface, standard RJ45 interface, support for parallel adaptive crossover cable

One USB 2.0 OTG full-speed interface, as a USB slave, also can be used as USB HOST

A standard 3.2 / 4/5/7 inch TFT LCD interface with touch screen

An I2S audio decoder chip WM8978, music player supports MP3 software solution, high-quality

An FM radio chip TEA5767

2 headphone jack

An SD card interface

A 2.4G wireless communication module interface

An infrared receiver head

A camera interface, optional OV7670 module

A temperature sensor interface, optional DS18B20

Two CAN bus interface

An RS485 interface

An RS232 serial port, DB9 total

A USB to serial chip PL2303 notebook easier to use

An SPI FLASH chip, W25Q16, more convenient storage fonts

An IIC interface EEPROM chip, 24c 02, capacity 2K

1 small speaker

A reset button to control the entire board hardware reset

4 function buttons, including the the WAKEUP wake-up function and Temper invasion of function

A five keys

A power indicator, LD2, red

4 user status indicator, LD1, LD3, LD4, LD5 red

2 startup mode select Configure port

An RTC real time clock backup battery holder

1 standard JTAG / SWD Emulator Debugger download interface

The way potentiometer adjustable resistance analog input, you can do the analog-to-digital conversion experiments

A digital-to-analog converter DAC interface is connected to the terminals

An ADC analog-to-digital conversion interface is connected to the terminals

A PWM interface is connected to the terminals

A DC5V Power Interface

A power switch that controls power to the entire board.

In addition to the the crystal occupied IO pin, all the other IO ports lead to the extended double pin

2, Chapter 2 Thematic Explanation

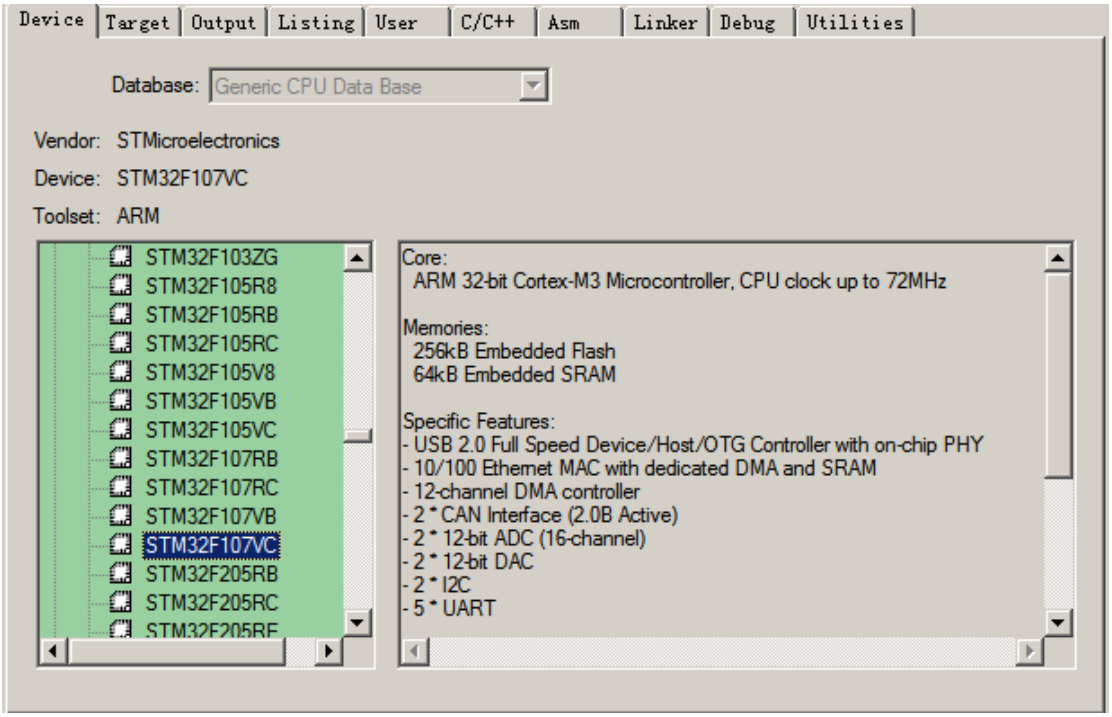
2.1 Theme I: MDK install and download

In Web Search “Red Dragon development board Lecture1”

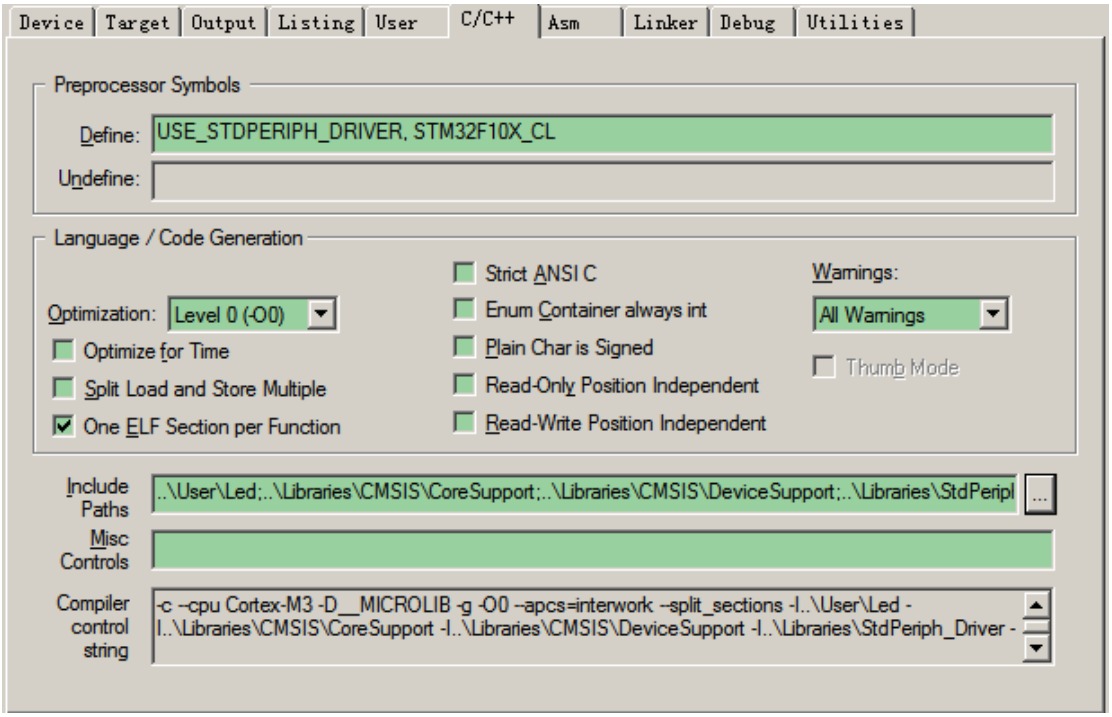
Note that has several different points:

Red Dragon is 104 pin STM32F103ZE,while Golden Dragon is stm32f 107vc, so there are several differences as following of choosing chip

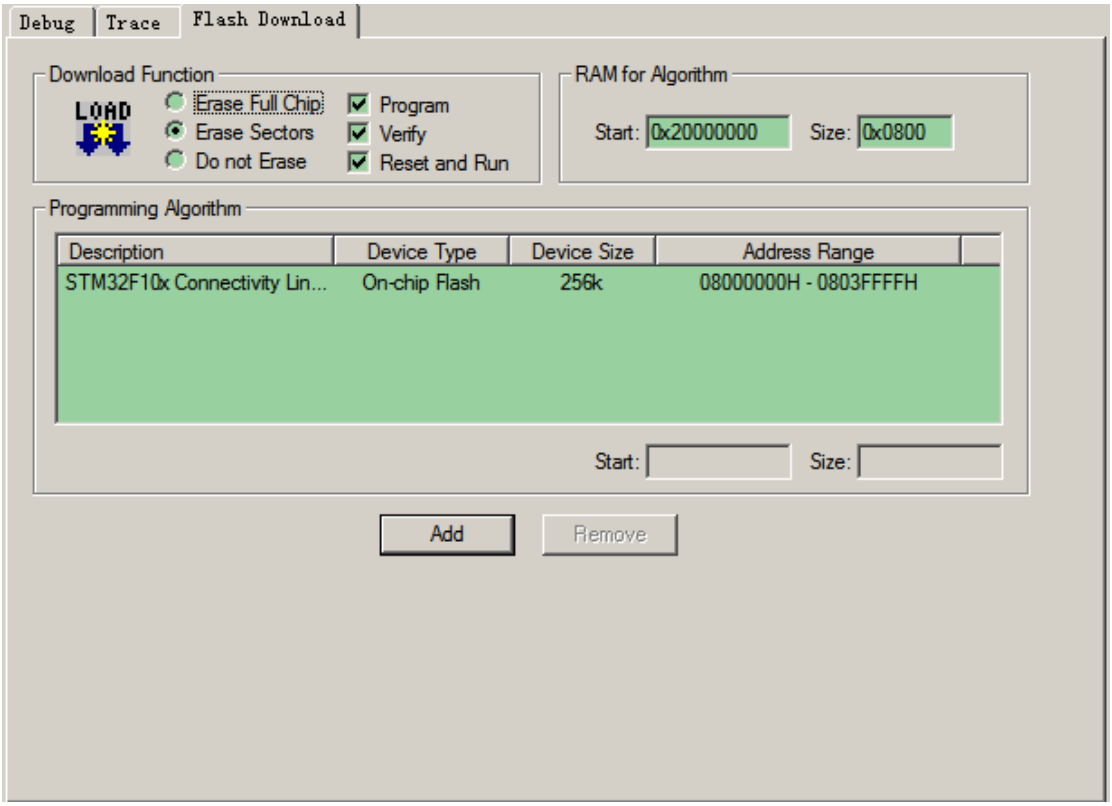
a. select chip, select STM32F107VC,



b. macro defined (library, if not the library,then it can be ignored), the difference is mainly between the * _CL and * _HD



c. flash



Flash choose 256k

2.2 Theme II: JFLASH use

Tip: If you use this method to download,please try power-off and power-on test again, when comes to the interrupted program it must be repower-on.

2.21: J flash install:

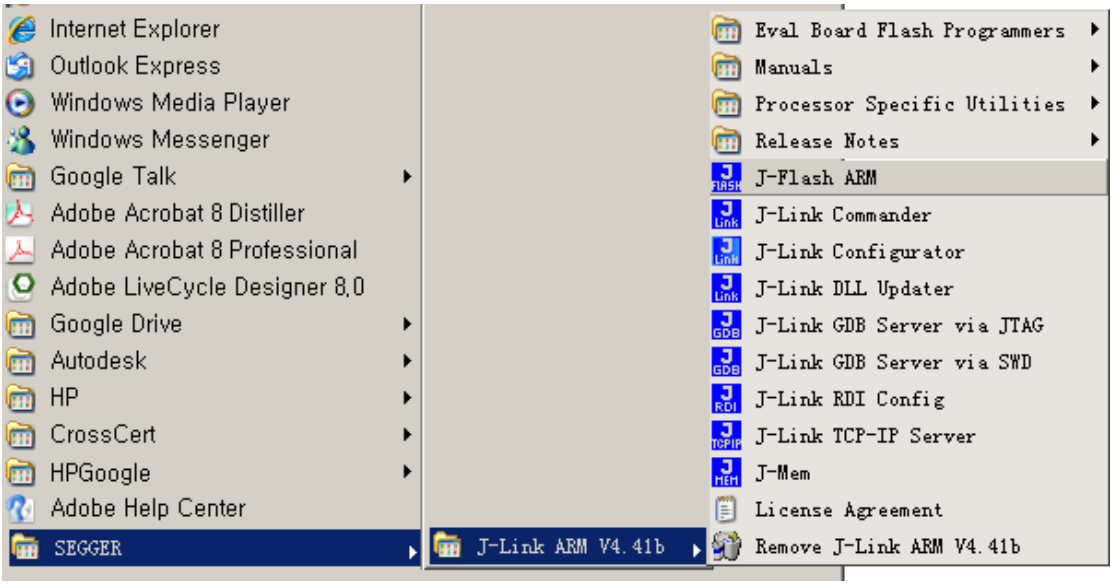
Software in the CD-ROM CD-ROM directory

Golden Dragon 107 development board \ 5. Install the Sofware \ JLINK simulation drive

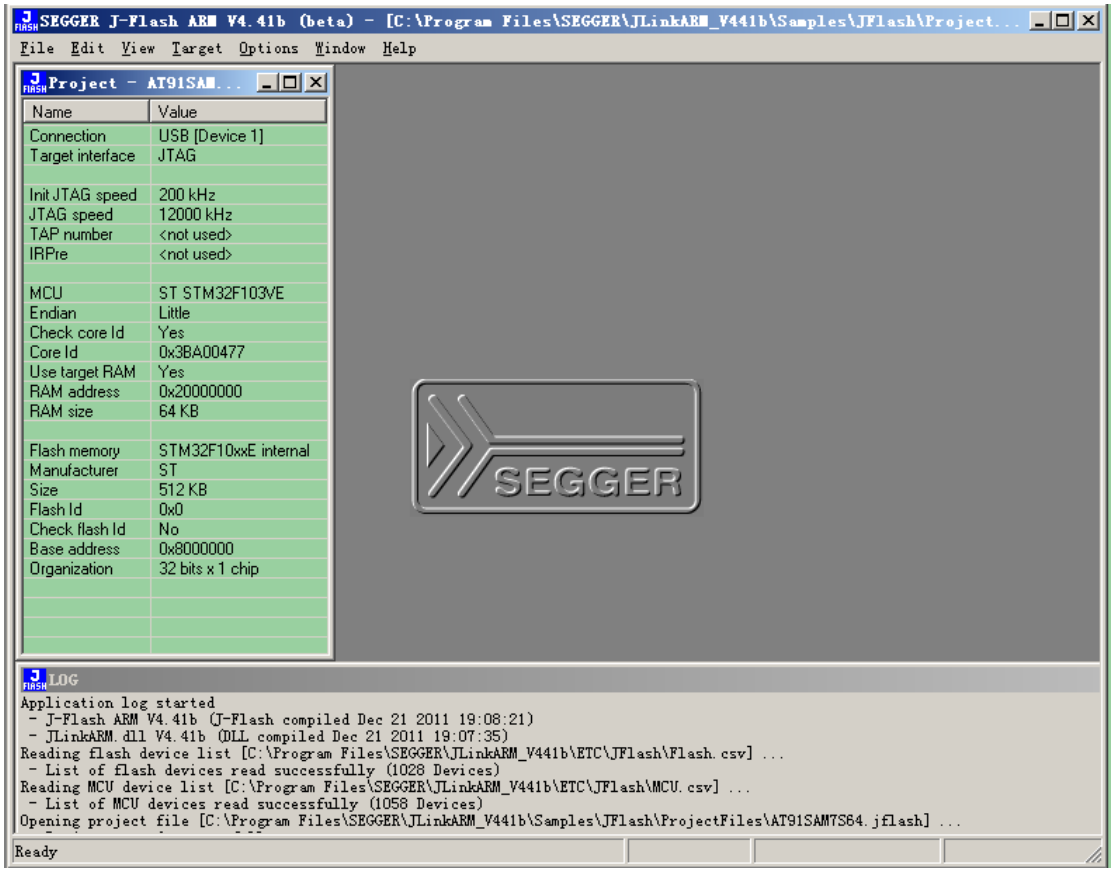
Click .exe file and it can run directly ,next, to the new online version, Baidu and Google can receive

2.22jflash open

Found in your Start menu

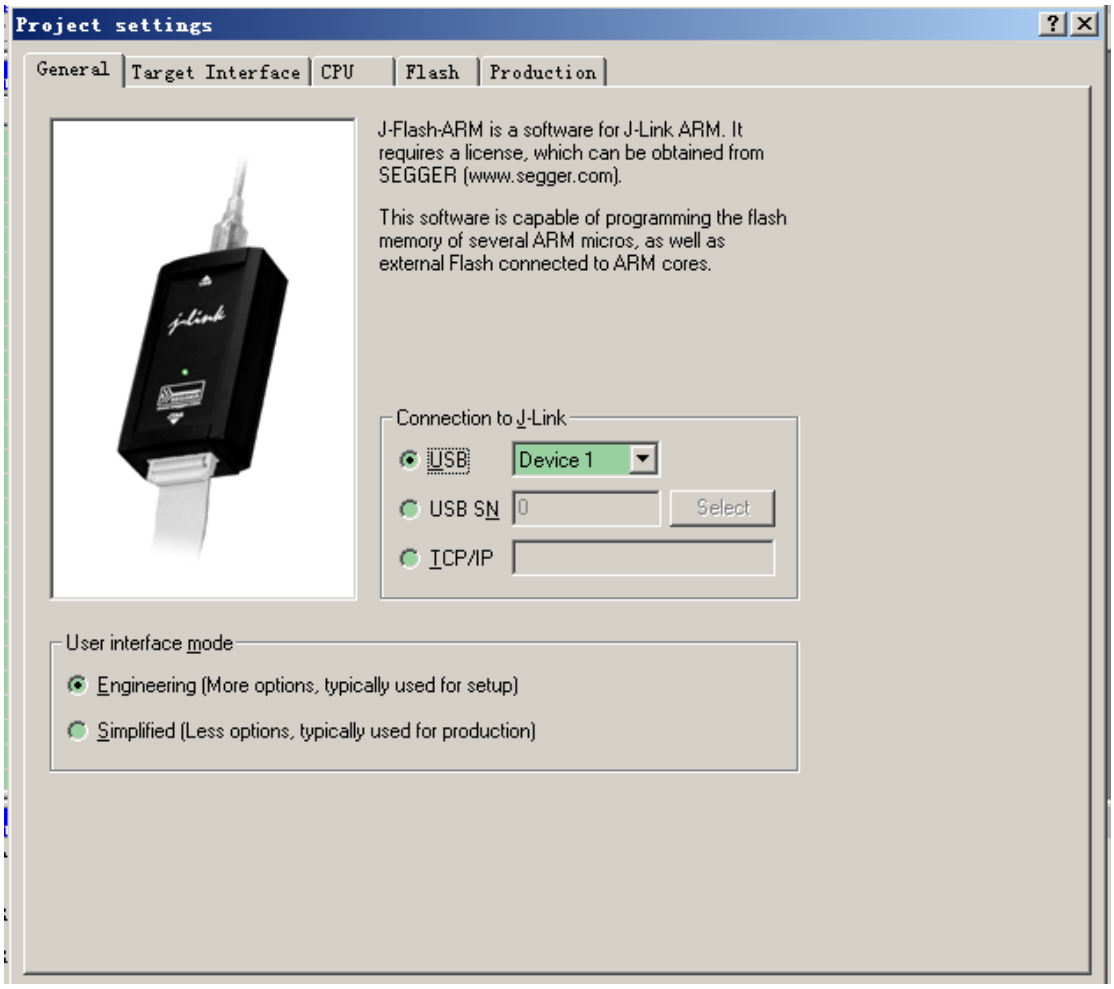


Click j-stuff ARM to open software and interface, similar to the above, as shown

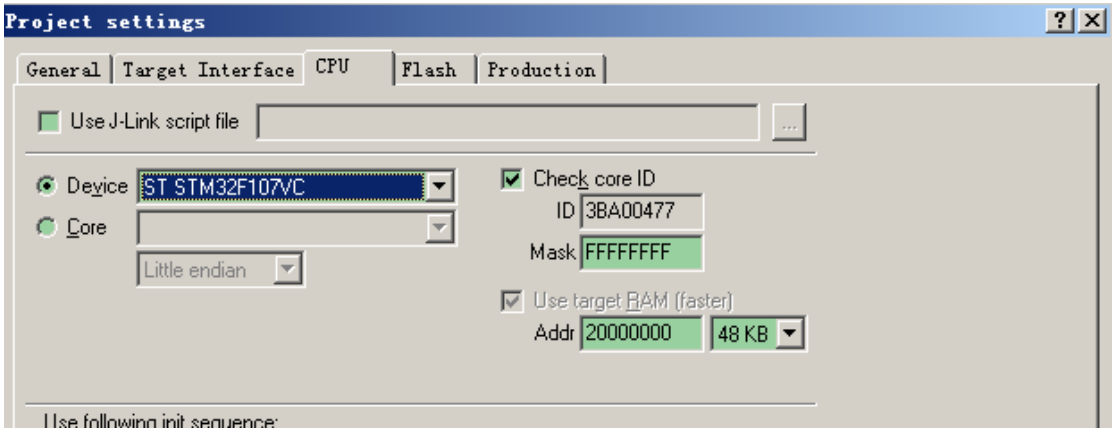


2.2.3jflash configuration

1. Select chip: shortcut keys alt-f 7 following interface pops up

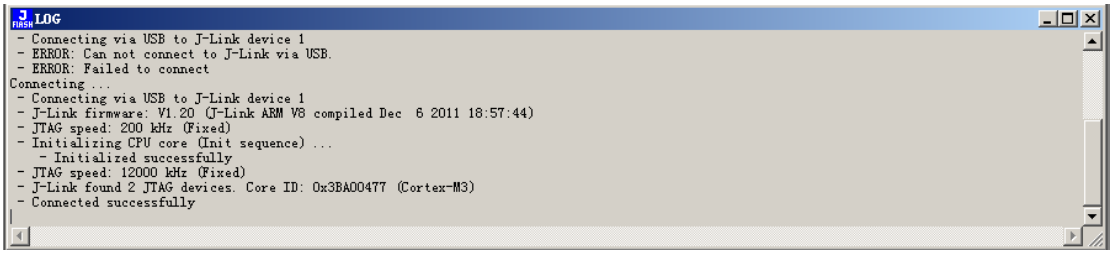


Click the label target interface, here, to select SWD or JTAG, if one can not, try the other one, keep the other one default, and then click on the CPU tab, set the following figure



And then OK to exit

Then click on target-> Connect, and then output the following prompt, indicating that the connection is successful (the premise is pluging the jlink board power supply, can not be used ulink)



Bottom is the connection success tips

Then click the file to select the file you want to download it, if it is hex file can be downloaded directly, if it is a bin file, according to the project's settings, select the address of the bin file download

Then press f7 it can automatically erase and download the following is the success of the interface, now you can re-power.

2.3 Theme III: serial download

Serial download: This method is slow, there may be an error, it is recommended to use jlink

2.3.1 Installing the software

Cortex-M4 107 development board to install the Sofware \ISP Download \ ST original \Um0462

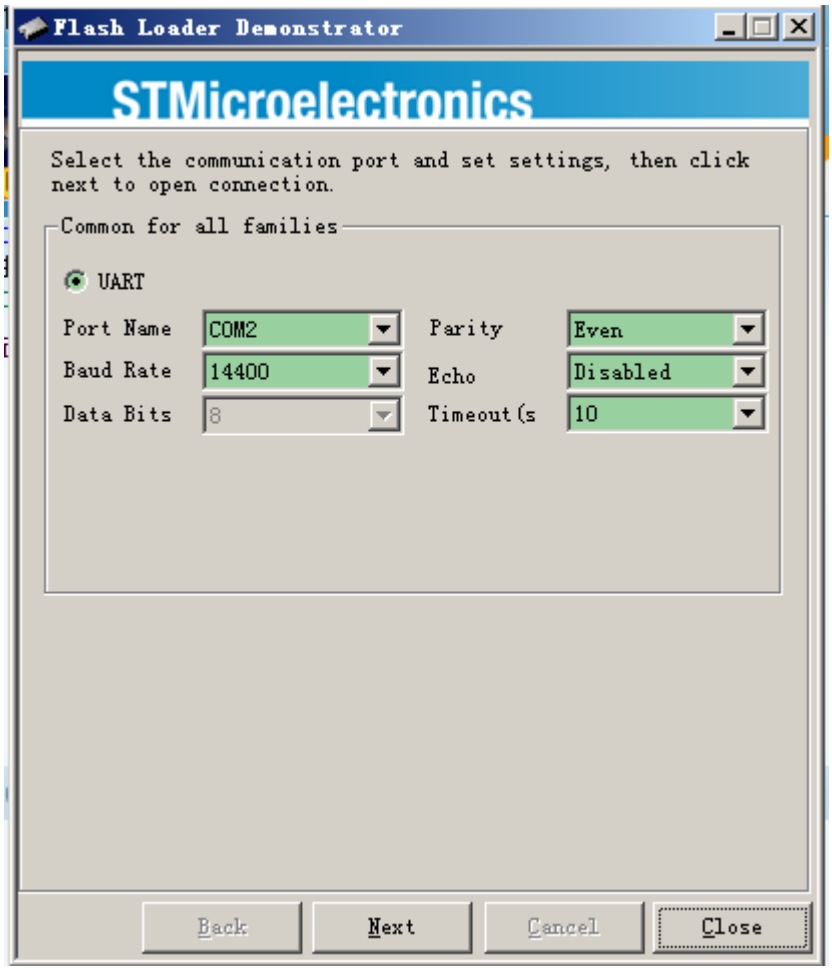
Or directory

Cortex-M4 107 development board \ 5. Install the software-Sofware \ Flash_Loader (ST official serial download tools)

Recommended to download new version

Click Install

Click the flash loader demo to open software



The port name you plugged into the development board serial number, baud rate, the best from 115,200 down, keep the default, this time need to set up a development board jumper

B oot1 ,2-3

B oot0 ,1-2

J p10 ,2-3

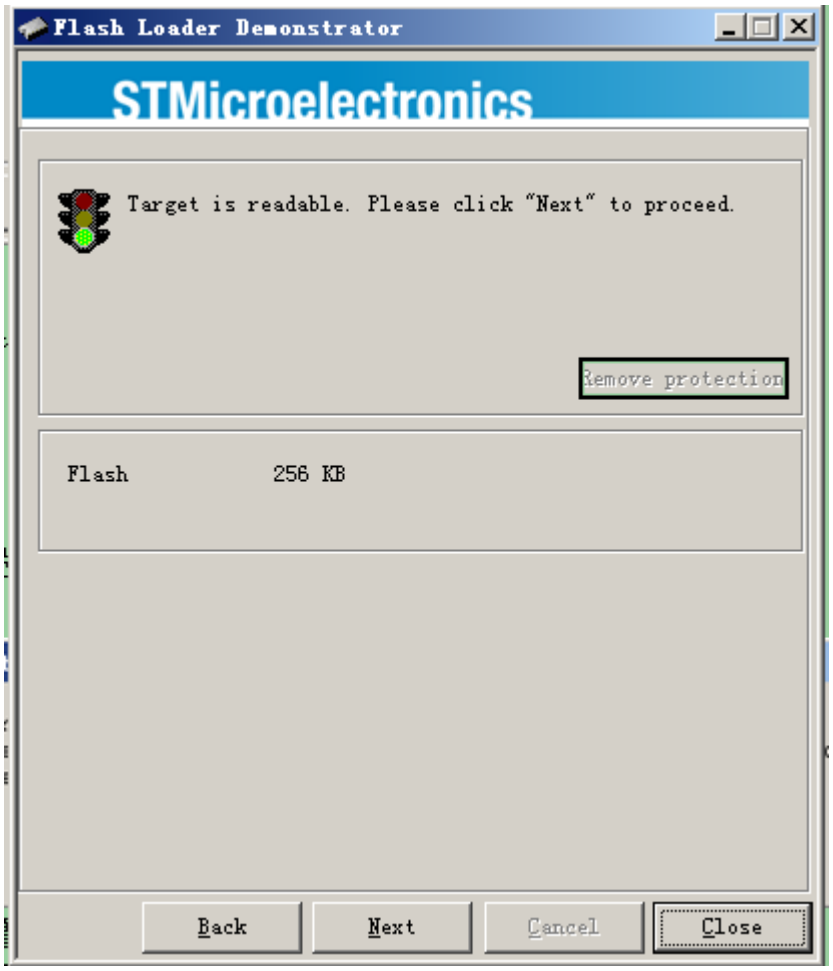
J p11 ,2-3

9-pin serial port plugged into the development board

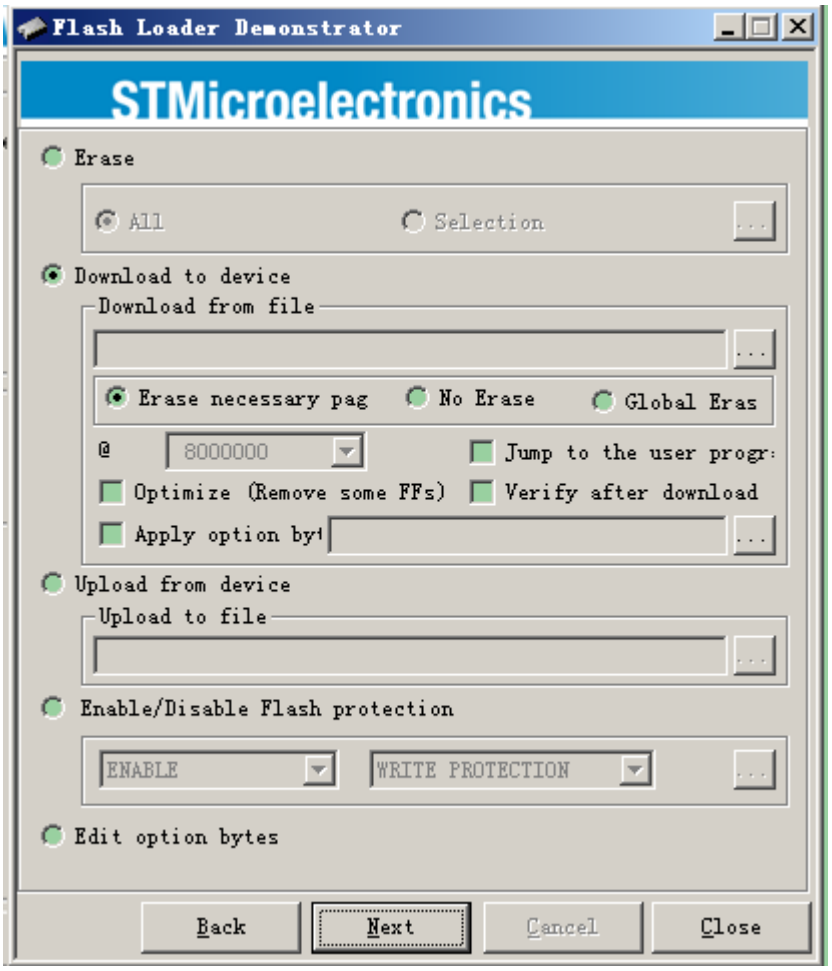
Reset the board, click on the next following interface

The development board is not set up correctly,

When the following interface, complete.



If you can not get out, you can only download with the serial port 2, set the jumpers JP3 is 2-3, and then plug in the usb cable to the USB-1, and then close the software, and re-open, and then press the reset button (must) software next will appear at the interface, and then click next to the next step, next step has been to the following interface



Here Download FROM file select the file you want to download and select full chip erase,or erase that need to erase, other default, and then next download
After the success

2.4 Theme IV: DFU use

First of all we need to first understand the DFU concept, Baidu search "stm32 DFU" or "DFU"

S TM32 dfu, simple saying, first with jlink or the ulink or serial, the period of application programmed into the flash start address (address) the program begins execution, this code by judge things, determined to run the application, or enter download mode

2.4.1 Installing the PC DFU software

Wang Bao-GoldDragon Golden Dragon 107 development board \ 5. Install the software-Sofware \ DfuSe, I hope you look the official manual about the use of dfu below

After the software is installed, you will need to download a period equivalent to the bootloader program to the development board (must)Then set jumper jjp10, JP11 to 1-2 do usb

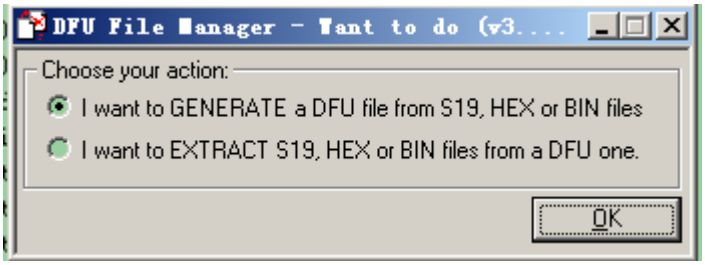
Plug in the mini usb cable to USB2, you need to install the driver, (Reference UM0412_DFUSe "in the CD-ROM search) 1.3.2 Hardware installation
After installation,

Device Manager the STM Device in DFU mode, to prove that the installation was successful (We are into DFU mode by default, you can view)

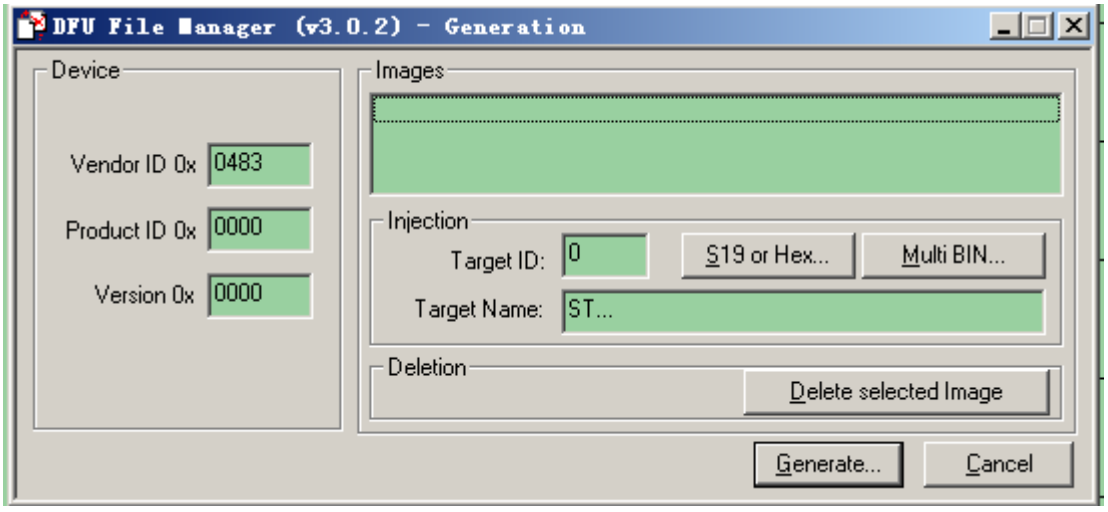
```
057   /* Check if the Key push-button on STM3210x
058   if (DFU_Button_Read() != 0x00)
059   { /* Test if user code is programmed starti
060     if (((*(__IO uint32_t*)ApplicationAddress
```

The line 58 M ain.c file modify

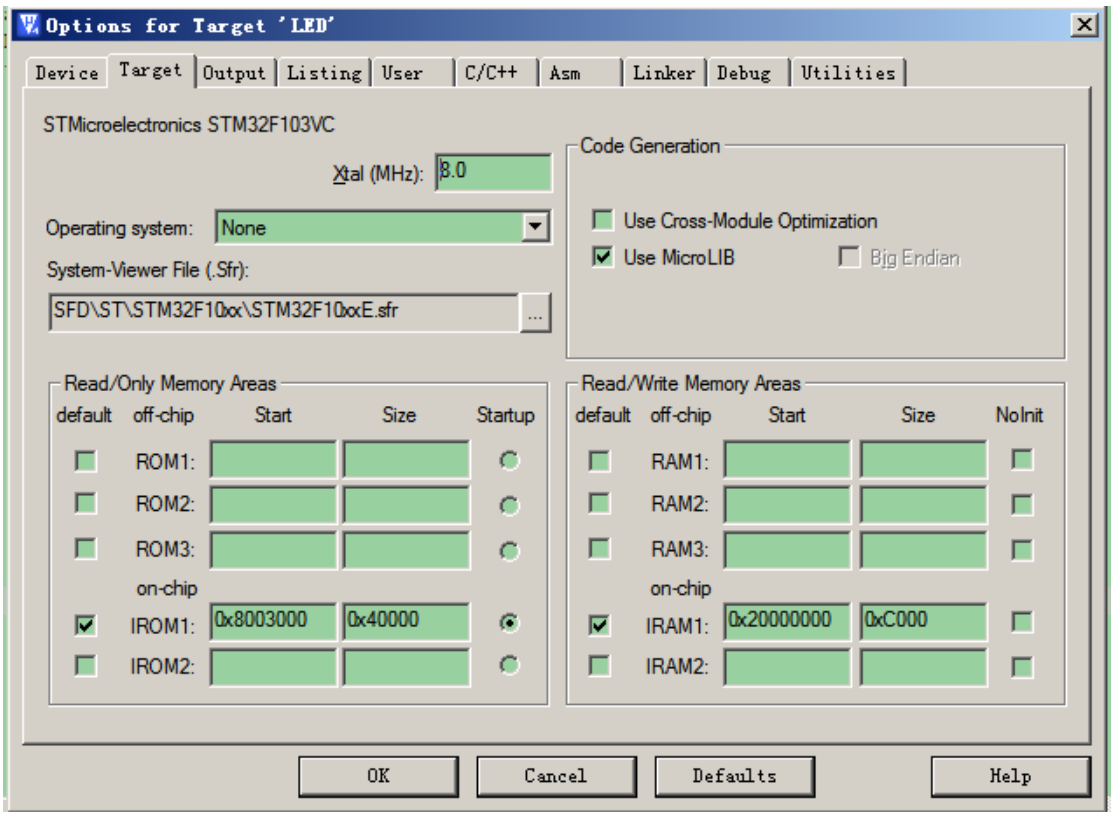
At this point we need to make DFU file
First, open the DFU file management software



Select a point ok, go to the next interface

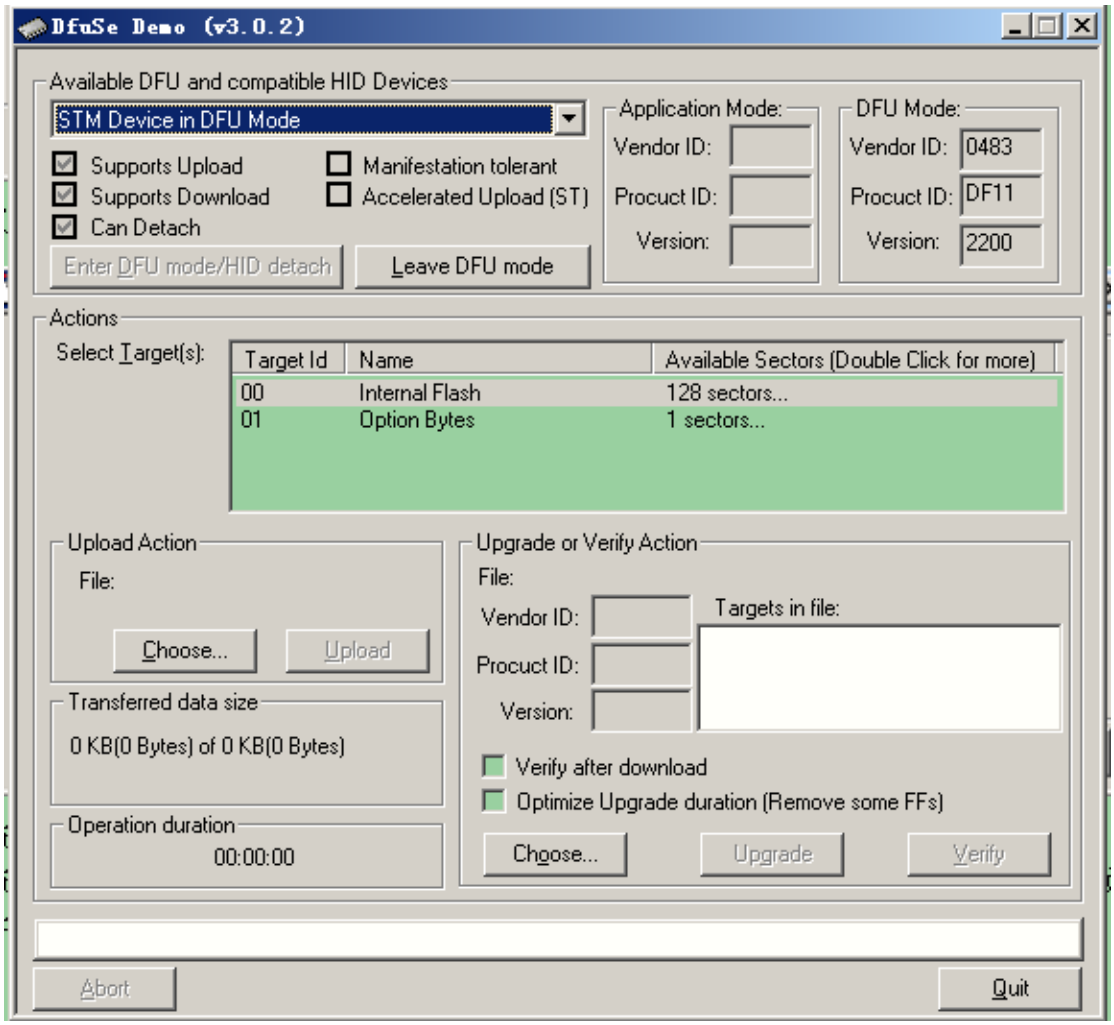


Point S19 or hex, you need to determine the execution address can not cover the address of the bootloader, or dfu can only be used once, and the program may not work properly, the compile-time address needs to be set to 0x08003000, because this is the address of the procedures defined at compile time, change addresses need to pay attention to the scale, and settings ect., select compiled hex file
Click generated to produce the DFU file, we need to exit the soft
Hex file produced using the following method

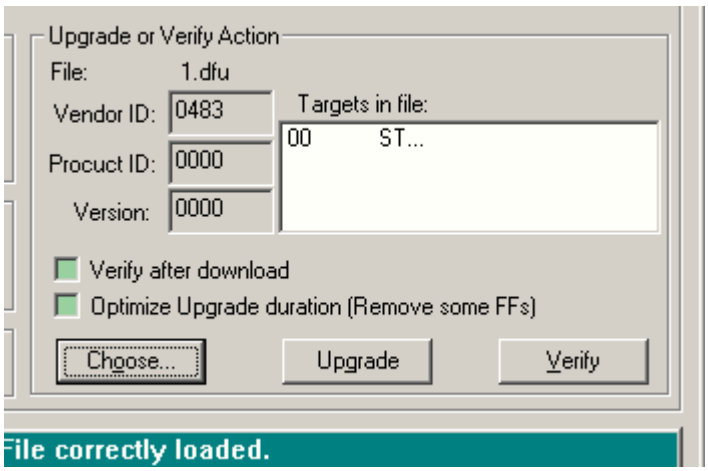


Set flash start address 0x80003000

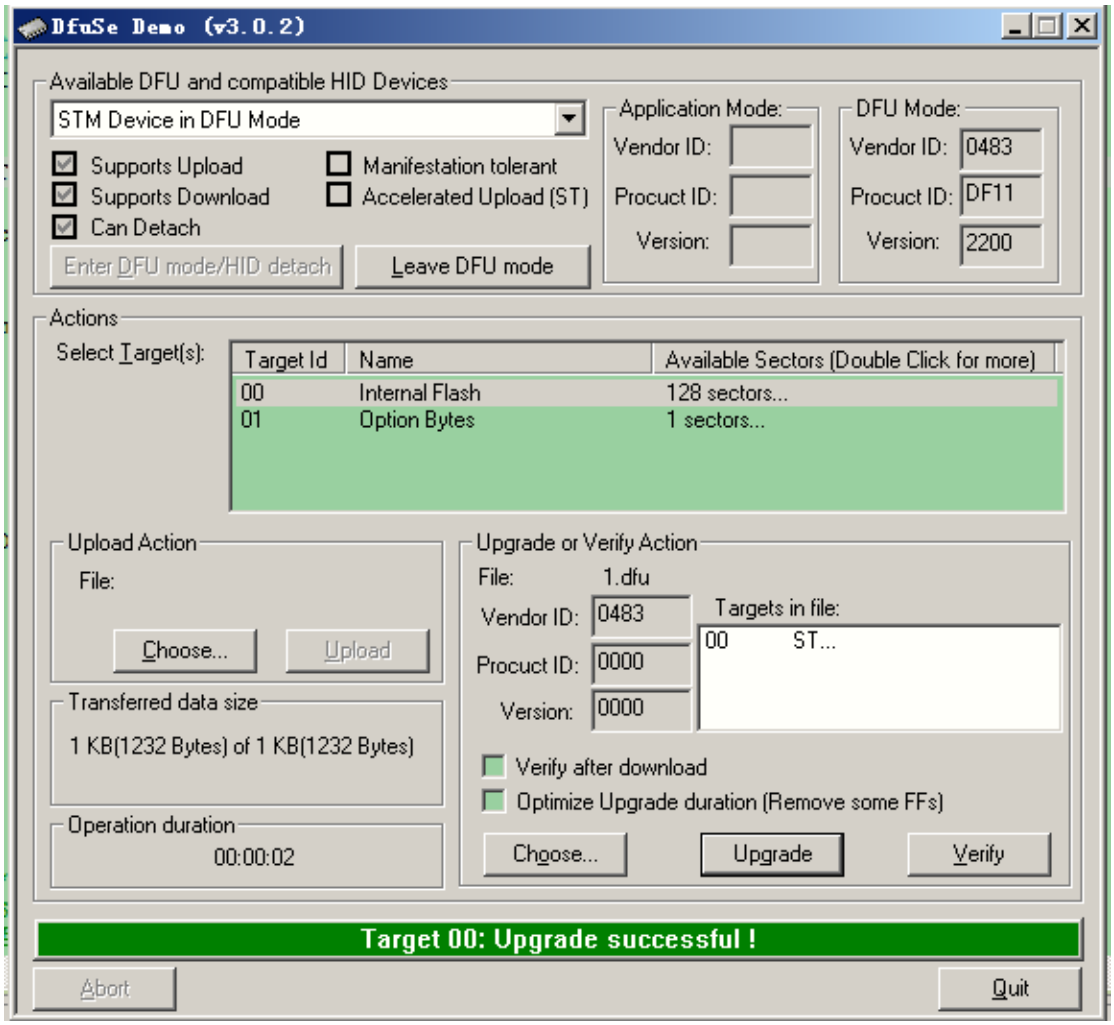
Then we open dfu to download software



And then select the upgrade or verigy action below choose button, select just the production of dfu file



And then click with the upgrade, download the file, following the success interface



After downloading the program, reset will run the application, if you press and hold the s5 key, you can re-enter the DFU mode, and executes the program download

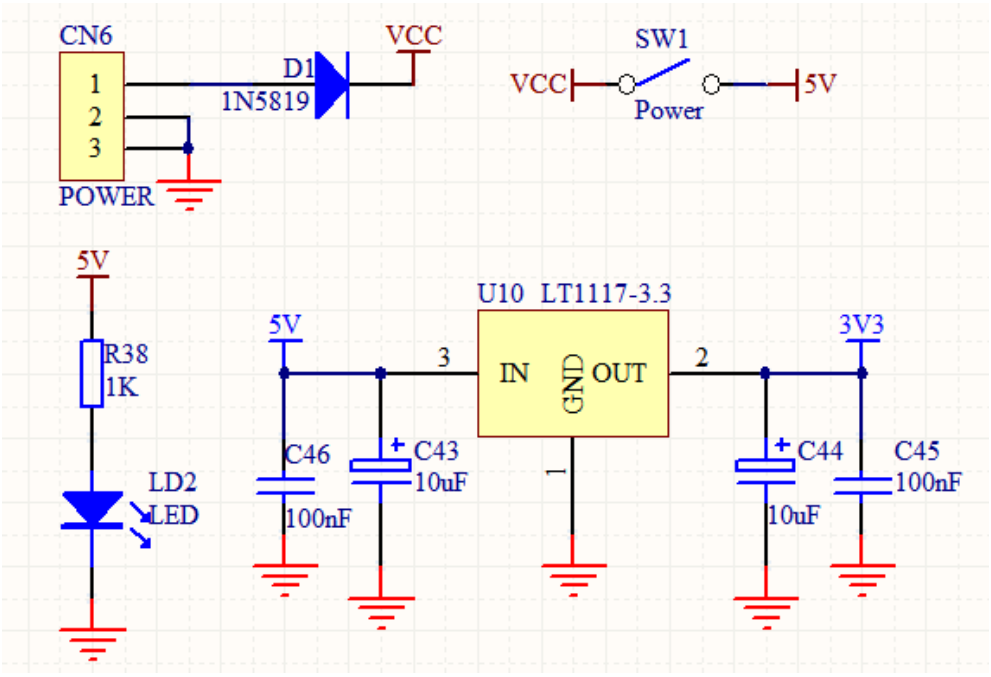
3, Chapter 3 Golden Dragon 107 development board hardware

Basics

3.1 power supply scheme

DC 5V adapter power supply corresponds to CN6 interface

LD2 turned bright when switch SW1 on, 5V voltage power go through 1117to supply power to the board

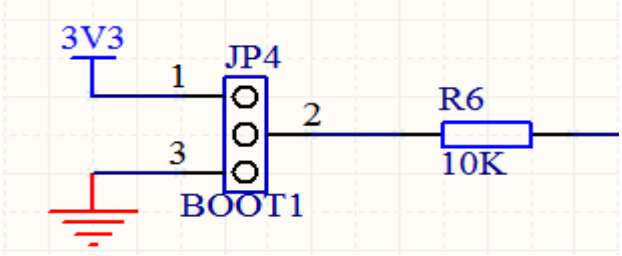


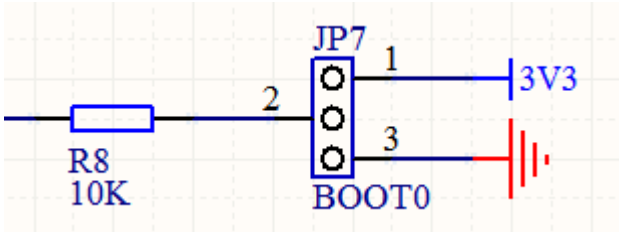
USB-powered

Two Mini USB can power the board USB1 act as a serial transfer function, used for serial communication. USB2 can be used for USB communication experiment.

Note; Do not use more than one interface to the board power supply to avoid excessive current burn regulator chip

3.2 Boot settings





Mode	BOOT1	BOOT0	Boot Mode	Explanation
1	ANY	2--3	User Mode	Program to the on-chip Flash,commonly used
2	2--3	1--2	System Boot	Serial download, run-time set-back mode 1

3	1--2	1--2	SRAM Boot	Download to SRAM, debugging

Note: BOOT0 connection to MCU boot0 pin (PIN94) boot1 then the PB2 pin

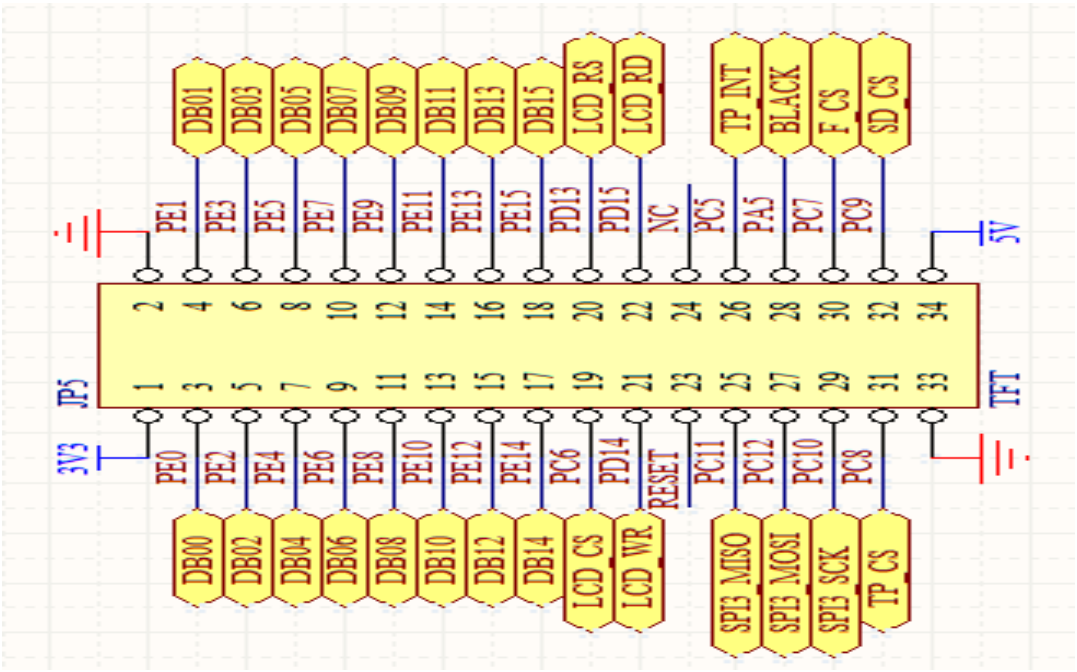
3.3 clock source

For STM 32F 107 provides a two-chip clock, Y2 is a 25MHz system clock, Y3 is 32.768Hz RTC clock.

We start to understand the role of Y2, the system runs the need for coordination, like the rhythmic beating of the human heart. Y2 is a passive 25MHz crystal oscillator, the frequency is too slow for the M3, the MCU's internal increase of PLL frequency multiplier, multiplier to the stability of the system 72MHz, careful not to exceed this frequency, otherwise enter the void HardFault_Handler (void), it is not strange.

Y3 frequency Why choose 32.768Hz presumably played the MCU people know, behind the RTC routines thereby providing a clock source.

3.4 TFT interface



Golden Dragon 107 LCD interface 34PIN compatible with our launch of the 3.2-inch, 4.3-inch, 7-inch color screen, each color with the corresponding routines, according to the diagram, drawing up this table:

Name	Effect		Name	Effect
3V3			GND	
DB00	Bi-directional data port PE00		DB01	Bi-directional data port PE01
DB02	Bi-directional data port PE02		DB03	Bi-directional data port PE03
DB04	Bi-directional data port PE04		DB05	Bi-directional data port PE05
DB06	Bi-directional data port		DB07	Bi-directional data port

	PE06			PE07
DB08	Bi-directional data port PE08		DB09	Bi-directional data port PE09
DB10	Bi-directional data port PE10		DB11	Bi-directional data port PE11
DB12	Bi-directional data port PE12		DB13	Bi-directional data port PE13
DB14	Bi-directional data port PE14		DB15	Bi-directional data port PE15
LCD_CS	Display chip select signals		LCD_RS	Data / command
LCD_WR	Write Enable		LCD_RD	Read Enable
RESET	Reset signal		NC	No Connect
SPI3_MISO	The SPI3 data input		TP_INT	Touch screen interrupt output
SPI3_MOSI	The SPI3 data output		BLACK	Backlight feet
SPI3_SCK	SPI3synchronous clock signal		F_CS	Screen contains the Flash chip select
TP_CS	Touch screen enabled		SD_CS	Screen are set out SD card option
5V	7-inch screen		GND	7-inch screen

Note:

1, the liquid crystal DB00 to DB15 are bi-directional, and when the ID is read as an input interface

2,MCU with TFT communication can be divided into two modes of 68,008,080, we use the 8080 parallel mode, which determine the RS WR RD of the definition, and timing.

3,3.2 inch screen Flash, 4.3-inch and 7-inch screen with each the 16M the Flash (W25Q16 of), can be used to store data or font file.

4, the Touchscreen SD card SPI_Flash, are spent SPI3, the distinction between a chip select signal. Use one-time election, the remaining two-chip should be pulled.

4,Chapter 4 The fourth basic experiment Quick Start

4.1 Golden Dragon 107 list of basic routines

The basis of routine class			
Number	Routine name	Jumper settings	Experimental phenomena
1	【 01 】 dragon plate _LED,		LED flashing
2	[02] Golden Dragon board _EXTI		Keys to control LED light off
3	[12] Golden Dragon board _UART	JP10 JP11 inserted 2-3	Serial 1/2 transceiver has
4	[04] Golden Dragon board_ADC		Rotation the VR1, print serial 1
5	【 05 】 dragon plate _DAC,		Output sine wave, using an oscilloscope
6	[06] Golden Dragon plate _internal temperature		3.2 'TFT display, there is an error
7	[07] Golden Dragon board_RTC,		
8	[08] Golden Dragon board _TIMER		Timer delay, LED light off
9	【 09 】 the dragon board_SD_Test (board)		Simple test print SD card information.
10	[10] the Dragon the board_SD_Test (screen)		Simple test print SD card information.
11	[11] Golden Dragon plate _ 24C 02	JP6 plug	Serial port to achieve human-computer interaction

12	[12] Golden Dragon board_W25Q16		Read and write simple experiment
13	[13] Golden Dragon board_RS485	The JP3 plug 1 - 2	Two board communication
14	[14] Golden Dragon board _CAN	JP13 plug 2 - 3	Two board communication
15	[15] Golden Dragon plate _ 24L 01	The JP13 plug 1-2	Two board communication
16	[16] Golden Dragon board _Camera		3.2 'OV7670 data collection
17	[17] Golden Dragon board_DS18B20		3.2 'display temperature, optional
18	[18] Golden Dragon plate _infrared		Infrared remote control, to control the display
19	[19] Golden Dragon board_USB_Device	JP10 JP11 inserted 1 - 2	With three experimental
20	[20] Golden Dragon board_USB_OTG		With two experiments
21	[21] Golden Dragon board_ETH_LWIP		Web achieve human-computer interaction
22	[22] Golden Dragon board_TEA5767		WM8978 amplifier FMsignal
23	[23] the Golden Dragon board_MP3 soft solution		With RT-Thread

Color class (3.2)			
1	[01] The Golden Dragon board _ drawing API (3.2 ')		Painted graphics, display in the British character
2	[02] Golden Dragon plate _ refresh test (3.2 ')		Scraper speed test
3	[03] Golden Dragon board _ Touch the test (3.2 ')		Calibration and drawing board
4	[04] Golden Dragon plate _ adjustable backlight (3.2 ')		PWM regulator
5	[05] The the Golden Dragon board _ electronic photo frame (3.2 ')		The SD card is inserted in the back of the screen
6	[06] of Golden Dragon board _HZK16 (3.2 ')		SD card is inserted in the board
7	[07] Golden Dragon board _uCOS + uCGUI (3.2 ')		
Color class (4.3)			
1	[01] The the Golden Dragon		

	board _ drawing API (4.3 ')		
2	[02] Golden Dragon plate _ refresh test (4.3 ')		
3	[03] The the Golden Dragon board _ Touch the test (4.3 ')		
4	[04] Golden Dragon plate _ adjustable backlight (4.3 ')		
5	[05] The Golden Dragon board _ electronic photo frame (4.3 ')		
6	[06] of Golden Dragon board _HZK16 (4.3 ')		
7	[07] Golden Dragon board _uCOS + uCGUI (4.3 ')		
Color class (7.0)			
1	[01] The Golden Dragon board _ drawing API (7 ')		
2	[02] Golden Dragon board _ scraper test (7)		
3	[03] The Golden Dragon board _ Touch the test (7 ')		
4	[04] Golden Dragon plate _ adjustable backlight (7 ')		
5	[05] The the Golden Dragon board _ electronic photo frame (7 ')		
6	[06] of Golden Dragon board _HZK16 (7 ')		
7	[07] Dragon Cricket _uCOS, + uCGUI (7 ')		

5, Chapter 5 Routines

5.1 [01] LED light experiment

Experimental phenomena: the download process, press the reset button S3, the four LED flashing water

Jumper settings:

Hardware:

Software analysis:

5.2 [02] key external interrupt experimental

Experimental phenomena: the download process, press the reset S3, the LD1 flashing; press S1, LD3 dynamically flashing; press S2, LD4 move State flashes

Jumper settings:

Hardware:

Software analysis:

the void NVIC_Configuration (void); / * interrupt packet, specify the external interrupt preemption priority and sub-priority * /

void BUTTON_Configuration (void); / * configure the interrupt input pin, floating input pull-up input can be * /

GPIO_EXTILineConfig (GPIO_PortSourceGPIOD, GPIO_PinSource11);

GPIO_EXTILineConfig (GPIO_PortSourceGPIOD, GPIO_PinSource12);

/ * To specify the port as an interrupt input mode * /

the void EXTI_Configuration (void); / * external interrupt configuration, edge-triggered or level-triggered * /

void EXTI15_10_IRQHandler (void) ;/ * write interrupt function, this function STM 32F 10x_it.c * /

5.3 [03] The serial transceiver experiment

Experimental phenomena: serial 1 serial port 2 can print serial, serial port 1 with receiving data to control the LED light off

Jumper settings: set the serial port, JP10 and JP11 plug 2 - 3; set the serial port 2, JP3 plug 2 - 3

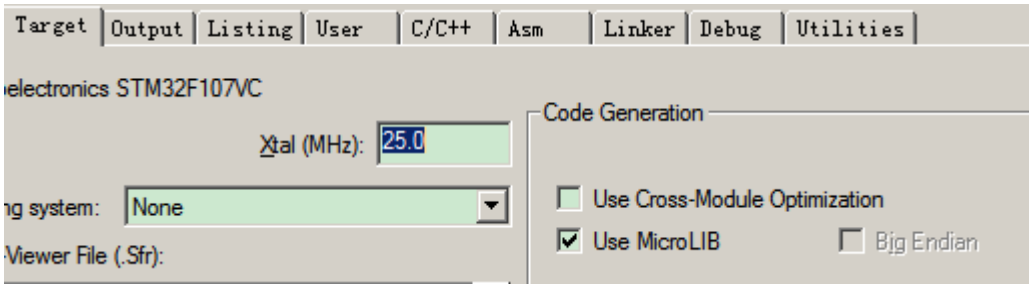
Hardware:

Software analysis:

This is an example of a serial transceivers including a serial port 1 and 2, serial 1-DB9 male or USB serial line. Serial 2 direct plugMini USB line corresponding interfaces on the board is the USB-1, the need to install the PL2303 driver, please find on the CD, to determine whether the driver installation was successful, "My Computer -> Device Manager -> Ports (COM & LPT) "

The driver installation OK, remember the serial number, open the serial port debugging assistant - SSCOM3.2 is Niexiao fierce "

Understand the experimental results, let us now to analyze the source code, serial output using printf, subsequent serial debugging using this method, key settings, the use of micro-library, as shown below selecting part



This is a serial send function, general way,

```
to void USART2_SendString (uint8_t * ch)
{
        while (* ch! = 0)
        {
                while (! USART_GetFlagStatus (USART2, USART_FLAG_TXE));
                USART_SendData (USART2, * ch);
                ch + +;
        }
}
```

This function, the serial port of the receiving handler, used to control the LED changes

```
void USART1_IRQHandler (void)
{
        uint8_t temp1;
        if (USART_GetITStatus (USART1, USART_IT_RXNE) == SET)
```

```
        {
                USART_ClearITPendingBit (USART1, USART_IT_RXNE);
                temp1 = USART_ReceiveData (USART1);
                switch (temp1)
                {
                        case 'a': the LED1 ();, LED3 (0); LED4 (0), LED2 (0);;
break;
                        case 'b': LED1 (0); LED2 (1); LED3 (0); LED4 (0); break;
                        case 'C': LED1 (0); the LED2 (0); LED3 (1); LED4 (0);
break;
                        case 'd': LED1 (0); the LED2 (0); LED3 (0); LED4 (1);
break;
                        default:
         break;
                }
        }
}
```

5.4 [04] AD conversion experiments

Experimental phenomena: the use of serial port 1, open the serial port debugging assistant, download the program, press the reset button S3.LD1 starts flashing. The PC collected voltage, rotating VR1 voltage value following the change!

Jumper settings: JP10 and JP11 are inserted 1 - 2, use the serial port 1

Hardware:

Software analysis:

5.5 [05] DAC output sine wave experiments

Experimental phenomena: the download process, press the reset button S3, CN3 the DAC output measured with an oscilloscope, you can see the sine Wave, frequency 8.78KHZ.

Jumper settings:

Hardware:

Software analysis:

Modify the trigger time of the timer can be obtained waveforms of different frequencies, the maximum 140kHz. It depends on the waveform generation algorithm.

5.6 [06] internal temperature sensor experimental

Experimental phenomena: the download process, press the reset button S3, LD1 flashes, which means that the program has been running;

Plug 3.2-inch TFT screen displays the internal temperature of the collected values.

Jumper settings:

Hardware:

Software analysis:

5.7 [07] RTC experiment
Experimental phenomena: the initial time through the serial port settings RTC
Jumper settings: JP10, JP11 jump 2 - 3, use the serial port 1
Hardware:
Software analysis:

Follow the prompts, we in turn set every minute, such as 12: 12:12
After setting the time in seconds hex operation, see screenshot.

5.8 [08] timer delay experiments
Experimental phenomena: the download process, press the reset button S3, LD1 flashes fast, LD5 slow flashing
Jumper settings:
Hardware:
Software analysis:
LD1 is a simple delay, LD5 precision delay timer

5.9 [09] SD card testing laboratories (card is inserted in the board)
Experimental phenomena: TF card is inserted in development board SD1, open the serial port debugging assistant. Download program, press the reset button S3, TF Card information to PC (the specific content View works information.txt). As used herein, 2G TF card test.
Jumper settings: JP10 JP11 2 - 3 are inserted, use the serial port 1
Hardware:
Software analysis:

5.10 [10] SD card testing laboratories (the card is inserted in the back of the screen)
Experimental phenomena: the TF card is inserted in the on 3.2/4.3/7 inch deck (in the back of the display), the experimental phenomena Example 5.9.
If the test is, however, common problem is poor contact card and transposon!
Jumper settings: JP10 JP11 are inserted 2 - 3, use the serial port 1
Hardware:
Software analysis:

5.11 [11] IIC EEPORM (24C, 02) testing laboratories
Experimental phenomena: plug in the serial cable, open the serial port debugging assistant, set the baud rate to 57600. Download the program, press the reset Key S3, print a test, follow the prompts;
Jumper settings: JP10 and JP11 are inserted 2 - 3, use the serial port 1; the JP6 plug jumper cap, using the 24C 02
Hardware:
Software analysis:

When the system is running, the the serial printing operation information, in accordance with syntax operation to complete 24C 02 of reading and writing, such as
r 50:20 0x20 (32) bytes of data read from address 0x50
w 50:02 44 55 66 77 write 4 bytes of data from address 0x50 (44446677)

5.12 [12] SPI Flash (W25Q16), testing laboratories
Experimental phenomena: Plug the serial cable, open the serial port debugging assistant, a baud rate of 115200, download the program, press the reset button S3 PC side display W25Q16 information, and read and write operations results.
Jumper settings: JP10 and JP11 are inserted 2 - 3, use the serial port 1
Hardware:
Software analysis:

5.13 [13] RS485 communication experiment
Experimental phenomena: the two boards CN9 485 wiring terminals 485 A then A, B, then B.
When received from the machine to the host sends the character 'a', the LD1 start blinking!
Jumper settings: JP3 inserted for 1 - 2 RS485 function
Hardware:
Software analysis:
The following two statements the same project, use a shield
Usart_SendChar (USART2, 'a'); / * 485 send * /
DAT = Usart_GetCahr (USART2); / * 485 receiver * /

When the slave receives 'a', LD1 starts flashing, the program is as follows:

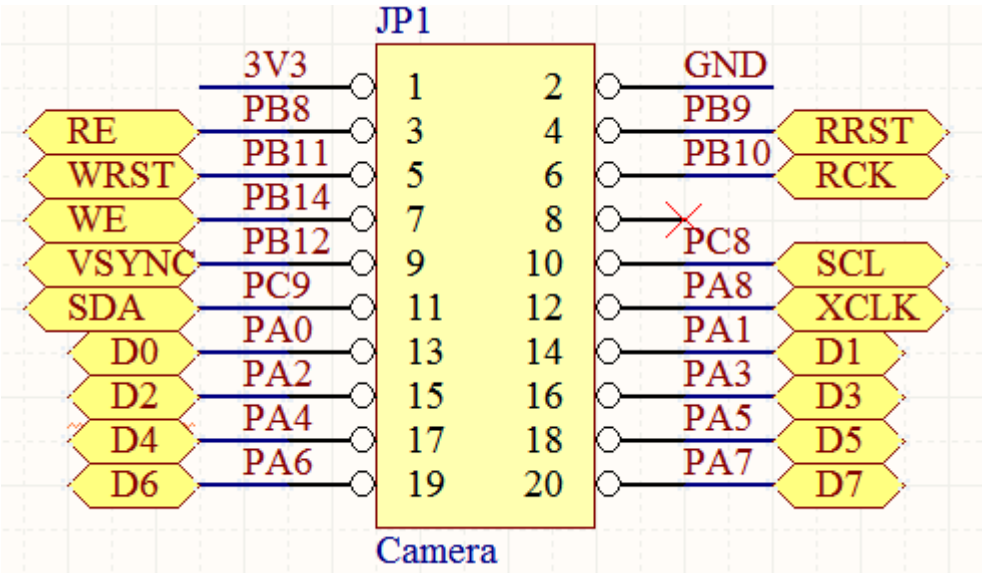
```
if (dat == 'a')
{
        while (1)
        {
                LED1 (1);
                DELAY (100);
                LED1 (0);
                DELAY (100);
        }
}
```

5.14 [14] CAN communication experiment
Experimental phenomena: the use of serial debugging assistant USART1 send data to the host, the host passes the data through the CAN1 Passed to the slave; slave receives data through USART1 print to the PC;

Jumper settings: JP13 plug 2 - 3 using the CAN 2 - 3 JP10 and JP11 plug to use the serial port 1, JP3
Hardware:
Software analysis:
The present experiment spent USART1 and CAN1 CAN1 CAN communication of the two plates, and interactive information board PC USART1

5.15 [15] NRF 24L 01 wireless communication experiment
Experimental phenomena: 24L 01 inserted in two on the board (outward), separately download the program to send and receive, then Received normal LD5 light, while the serial print the received data "abcd"
Jumper settings: JP13 plug 1 - 2 NRF 24L 01 JP10 and JP11 plug the 1 - 2 serial
Hardware:
Software analysis:

5.16 (16) camera (OV7670) experiments
Experimental phenomena:
Jumper settings:
Hardware:



Name	Function		Name	Function
\ RE	FIFO (AL422B) read enable		\ RRST	Read reset active low
\ The WRST	Write Reset		RCK	Read clock
WE	Write Enable			
VSYNC	The OV7670 frame synchronization		SCL	OV7670 SCCB Clock Line
SDA	OV7670 SCCB Data Line		XCLK	The OV7670 system clock input
D0	FIFO data output pin D0		D1	FIFO Data Output foot D1
D2	FIFO data output pin D2		D3	FIFO Data Output foot D3

D4	FIFO data output pin D4		D5	FIFO data output pin D5
D6	FIFO data output pin D6		D7	FIFO Data Output foot D7

Software analysis:

5.17 [17] external temperature sensor (DS18B20) experiment

Experimental phenomena: the download process, press the reset key S3 LCD is displayed in the lower-left corner of the "DS18B20 Init OK!"

The middle of the screen shows the collected temperature, hold hands the U6, see temperature rise

Jumper settings:

Hardware:

Software analysis:

5.18 [18] infrared testing laboratories

Experimental phenomena: the download process, press the reset button S3, LCD display infrared test interface with the remote control Control LCD Display

Jumper settings:

Hardware:

Software analysis:

5.19 [19-A] Human Input USB device

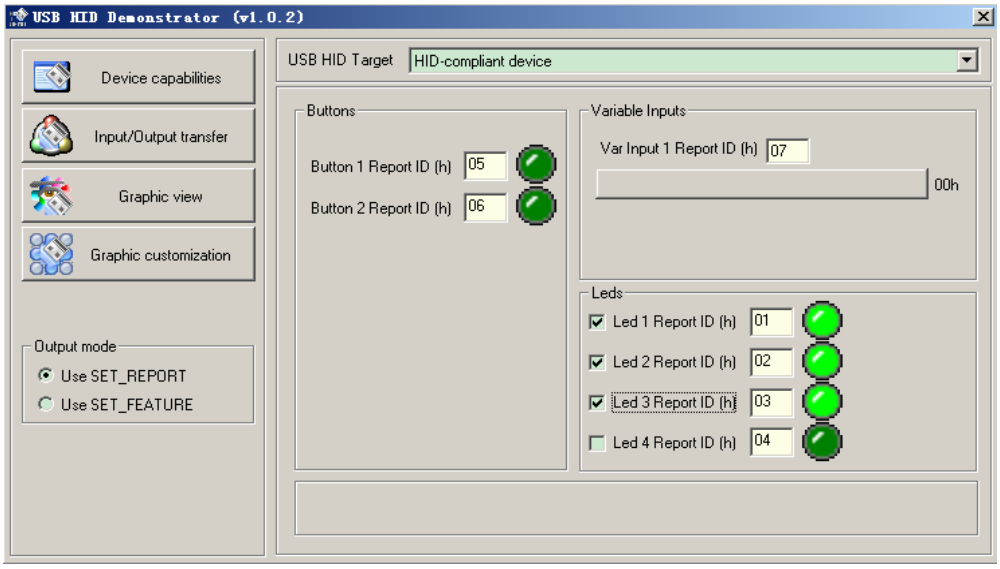
Experimental phenomena:

Jumper settings: JP10, JP11 1 - 2 are inserted using a USB communication

Hardware:

Software analysis:

Of course, you have to unplug your USB input devices such as a USB mouse and keyboard, that we open test software



The software in the CD-ROM installed, open the interface as shown, first see the USB HID target shows
LEDs Click to check control development board LED light off change

[19-B] virtual serial port of the USB device
Experimental phenomena: the download process, press the reset button S3 PC side prompted STM32 Virtual COM

At this point we see the Device Manager does not recognize the device, install the driver, you can use the serial device.
Jumper settings: JP10, JP11 plug the 1 - 2 using a USB
Hardware:
Software analysis:
[19-C] USB device DFU (device firmware update)
Experimental phenomena: PC Tips STM32 DFU device, refer to our manual can be DFU download
Jumper settings:
Hardware:
Software analysis:

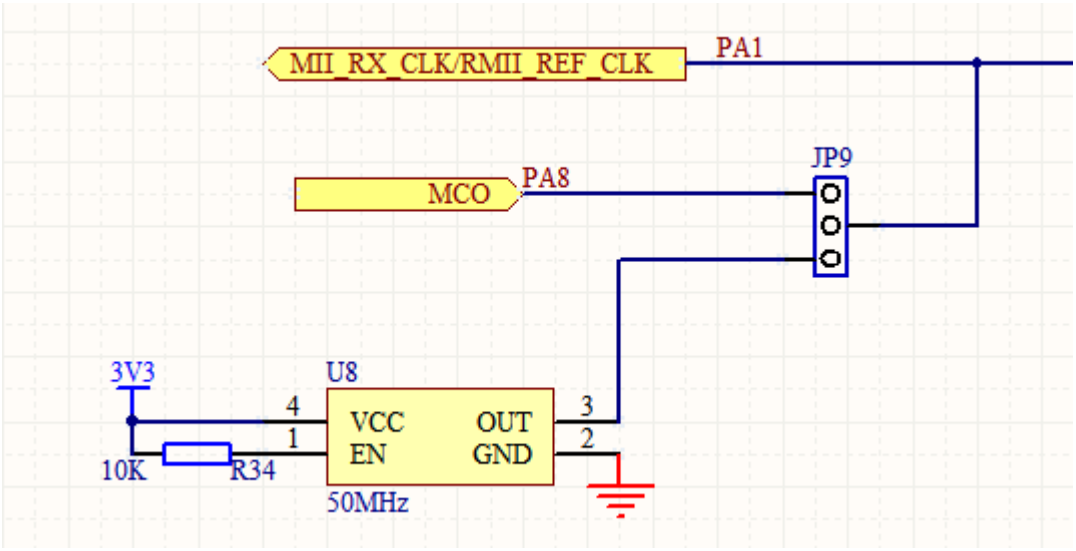
5.20 [20] Jinlong board _USB_OTG
Experimental phenomena: Use the USB adapter cable Mini-side plug USB-2, another paragraph insert U disk, download the program, press the reset button S3, You can see the LCD display U disk information
Jumper settings: JP10 JP11 plug 1 - 2
Hardware:
Software analysis:

5.21 [21] Jinlong board _ETH_LWIP
Experimental phenomena: the network cable to connect your PC and the development board, set the PC side
Jumper settings: JP9 plug the 2 - 3, the STM32 MCO output synchronous clock
Hardware:

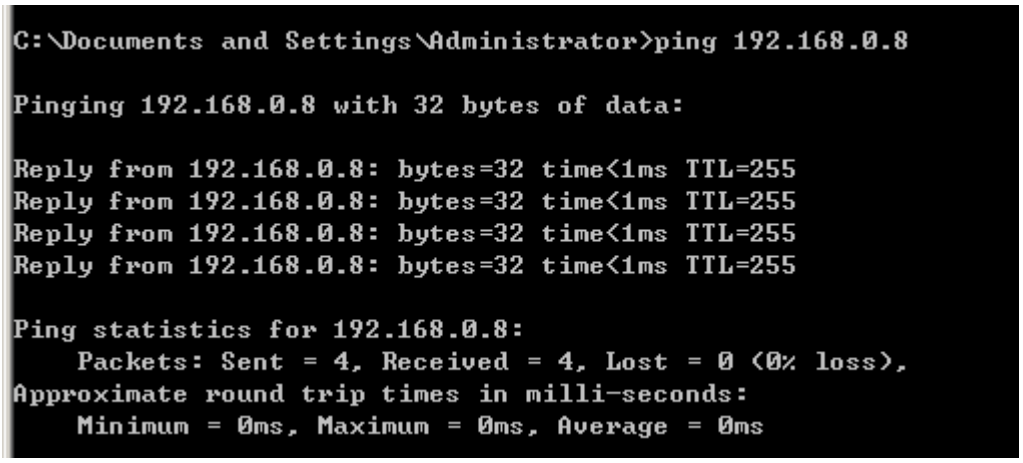
Name	Function
ETH_RMII _TX_EN (PB11)	
ETH_RMII_TXD0 (PB12)	
ETH_RMII_TXD1 (PB13)	
ETH_RMII_RXD0 (PD9)	
ETH_RMII_RXD1 (PD10)	
ETH_MDC (PC1)	
ETH_MDIO (PA2)	
ETH_RMII_CRSDV (PD8)	
ETH_RMII_REF_CLK (PA1)	

MCO (PA8)	

The following is a network chip DP83848 clock source is set, there are two options, one is active crystal, another the MCU clock FootPA8.



Software analysis:



Ping through, open IE, enter 192.168.0.8 in the address bar hit the Enter key, which is the pop-up test page

We see the body of the page, above three options button to jump to the home page, LED control, ADC conversion

Here briefly earlier, Led control is controlled through a web development board LED lights off

ADC Status bar is the acquisition value of the adjustable resistor VR1 passed to the web display

5.22 [22] Jinlong board _TEA5767

Experimental phenomena: the the T1 antenna position plug wires, signal enhancement, download the program, press the reset button S3, from small The speaker issued in the received FM signal.

Jumper settings:
Hardware:
Software analysis:

5.23 [23] Jinlong board _MP3 soft solution
Experimental phenomena: 2G SanDisk card inserted on the board, the project a.mp3 copied to the SD card, download the program, Press the reset button S3, then came the beautiful music from the speaker. You can connect the serial cable to view Print information!
Jumper settings:
Hardware:
Software analysis:

6,Chapter 6, Color Papers

6.1 [01] LCD underlying driver experiment

Experimental phenomena: plug in the 3.2-inch screen, download the program, press the reset button S3, you can see the LCD display characters, Chinese characters, Image (custom), there is a straight line, circle and filled areas.

Jumper settings:

Hardware:

Software analysis:

6.2 [02] LCD refresh testing laboratories

Experimental phenomena: Plug in the 3.2-inch screen, press the reset button S3 LCD in different colors scraper

Jumper settings:

Hardware:

Software analysis:

6.3 [03] touch screen testing laboratories

Experimental phenomena: plug in the 3.2-inch screen, press the reset button S3, LCD display calibration point, click for calibration.Calibration into Function, you can use the touch pen drawing.

Jumper settings:

Hardware:

Software analysis:

This is the value of the of four calibration point touch screen collected in accordance with from left to right, from top-down order, these four values is successful calibration, you can observe the characteristics of the data

Name	The position of the display	Touch value	
Point 1	(20, 20)	(0x60, 0x742)	
Point 2	(780, 20)	(0x 79a, 0x 75C)	
Point 3	(20, 460)	(0x51, 0x80)	
Point 4	(780, 460)	(0x76b, 0xA3)	

Note that this function resistive screen there is a difference, you can use the following way of compensation

Draw_Big_Point (Pen_Point.X0, Pen_Point.Y0-5) ;/ / drawing

6.4 [04] backlight adjustable experiments

Experimental phenomena:

Jumper settings:

Hardware:

Software analysis:

6.5 [05] Digital Photo Frame experiment

Experimental phenomena: the engineering test images are copied to the SD card, then plug it into the back of the screen deck. Download program, press Under the reset button S3, LCD display the picture SD card, which electronic photo frame!

Jumper settings:

Hardware:

Software analysis:

6.6 [06] 16 * 16 characters programming and display experiment

Experimental phenomena: the sys file in the project folder together with the font file HZK16 copied to the SD card, then the SD card is inserted Into the deck of the development board, and plug in the 3.2-inch screen. Download the program, press the reset button for several seconds, the screen Display Kanji content.

Jumper settings:

Hardware:

Software analysis:

```
if (! SD_Init ())
{
    LCD_ShowString (0, 280, "SD Init OK!", BLACK, BROWN); / * SD card initialization OK * /
}
else LCD_ShowString (0, 280, "SD Init Failure!", BLACK, BROWN); / * SD card initialization OK * /

if (! W25Q16_Init ())
{
    LCD_ShowString (0, 300, "W25Q16 Init OK!", BLACK, BROWN);
    WriteHZ16 (); / * programming 16 * 16 font * /
}
else
{
    LCD_ShowString (0, 300, "W25Q16 Init Failure!", BLACK, BROWN);
}
```

Schematics know SD card and W25Q16 are connected in SPI1 the SPI configuration after the end of the SD card is initialized and W25Q16, the initialization results displayed in the bottom left of the screen.

In the the write library of function, such a judgment statement, used to mark the character is written to, the customer can use if masked, until the display OK!

SPI_Flash_Read (dataflash, 0x 1f 0000,2); / * read flag to determine whether the font * /
if (DataFlash [0]! = 0xaa | | dataflash [1]! = 0x55)
{
.....
}

6.7 【07】 uCOS + uCGUI test experiment

The experiment phenomenon: plug in the 3.2-inch screen, download the program, press the reset button S3, with uCGUI the system ran up

Jumper settings:

Hardware:

Software analysis: