LCDWIKI MSP2833 2.8inch IPS SPI Module User Manual

Contents

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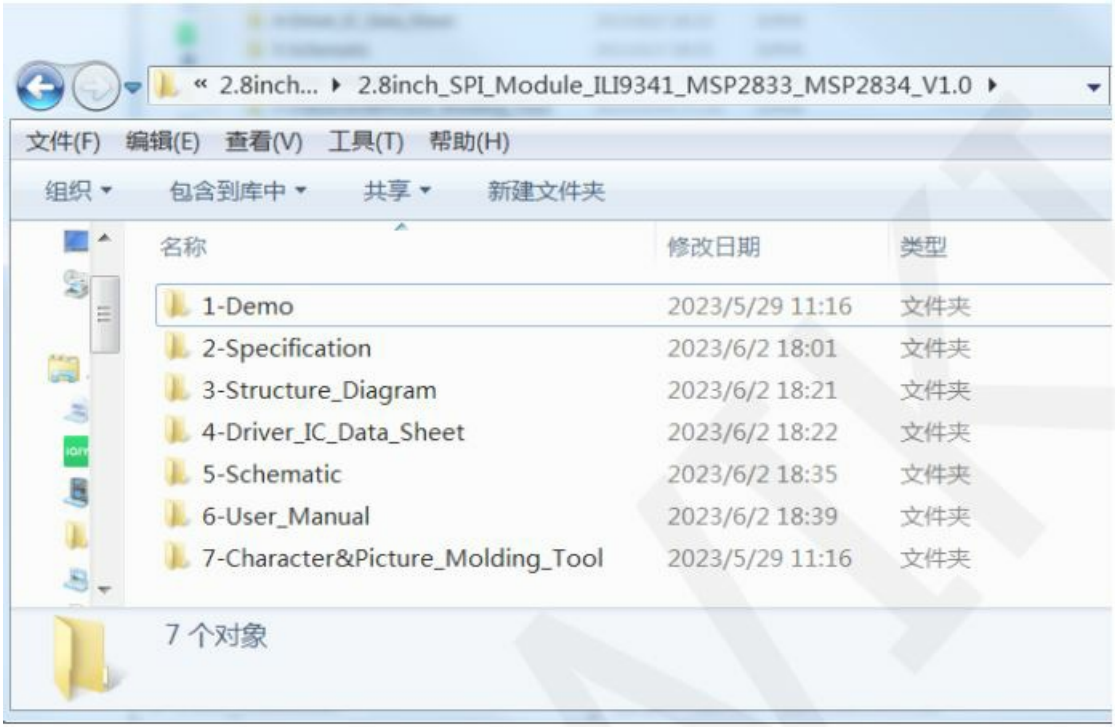
Resource Description

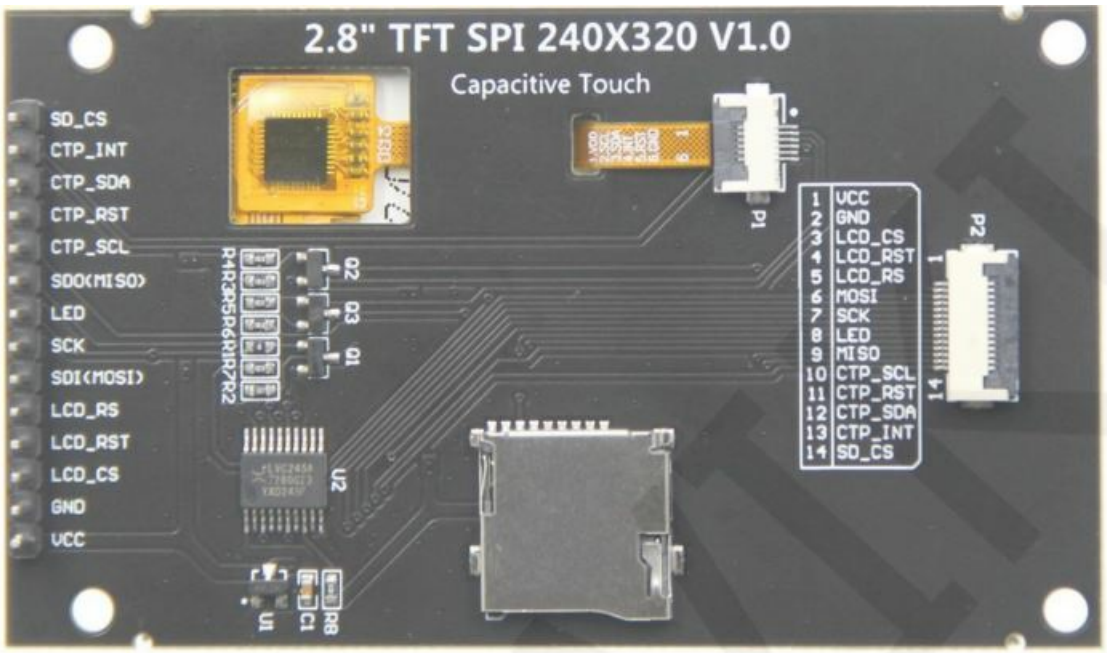
The resource directory is shown in the following figure:



Directory	Content Description
1-Demo	Contains sample programs and usage instructions for each MCU
2-Specification	Including LCD screen specifications and product specifications
3-Structure_Diagram	Including touch screen size structure documents, product size structure documents
4-Driver- IC- Data- Sheet	Including LCD screen driver IC Datasheet and Touch Screen d river IC Datasheet
5-Schematic	Including product hardware schematic diagram, LCD Altium co mponent diagram, and PCB packaging
6-User Manual	Contains product user instructions document
7-Character&Picture_Molding_Tool	Contains image extraction software, character extraction softw are, and software usage instructions. The image and text displ ay tests in the sample program require the use of these two software for mold taking.

Interface Description

The interface on the back of the module is shown in the following figure:



Number	Module Pin	Pin Function Description
1	VCC	LCD power positive
2	GND	LCD Power ground
3	LCD_CS	LCD selection control signal, Low level active
4	LCD_RST	LCD reset control signal, Low level reset
5	LCD_RS	LCD command / data selection control signal High level: data, low level: command
6	SDI(MOSI)	SPI bus write data signal(SD card and LCD screen used together)
7	SCK	SPI bus clock signal(SD card and LCD screen used together)
8	LED	LCD backlight control signal (If you need control, please connect the pins. If you don't need control, you can skip it)
9	SDO(MISO)	SPI bus read data signal (SD card and LCD screen used together)
10	CTP_SCL	Capacitive touch screen IIC bus clock signal (modules without touch screens do not need to be connected)
11	CTP_RST	Capacitor touch screen reset control signal, low-level reset (modules without touch screens do not need to be connected)
12	CTP_SDA	Capacitive touch screen IIC bus data signal (modules without touch screens do not need to be connected)
13	CTP_INT	Capacitor touch screen IIC bus touch interrupt signal, when generating touch, input low level to the main control (modules without touch screens do not need to be connected)
14	SD_CS	SD card selection control signal, low level active (without SD card function, can be disconnected)

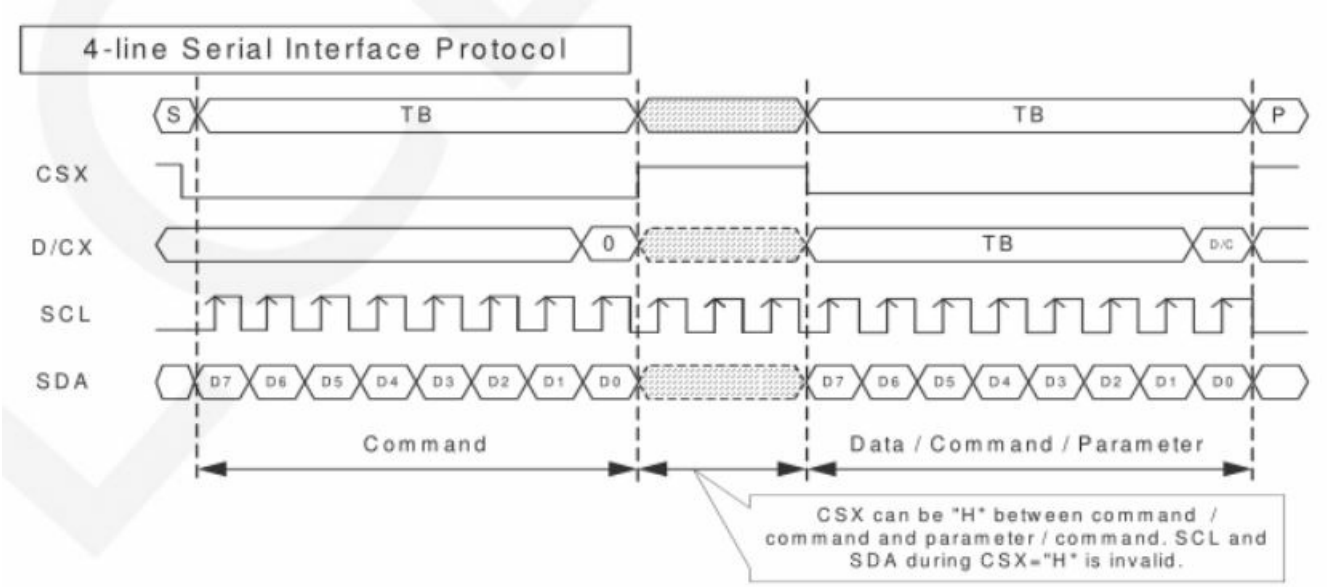
Working principle

Introduction to ILI9341 Controller

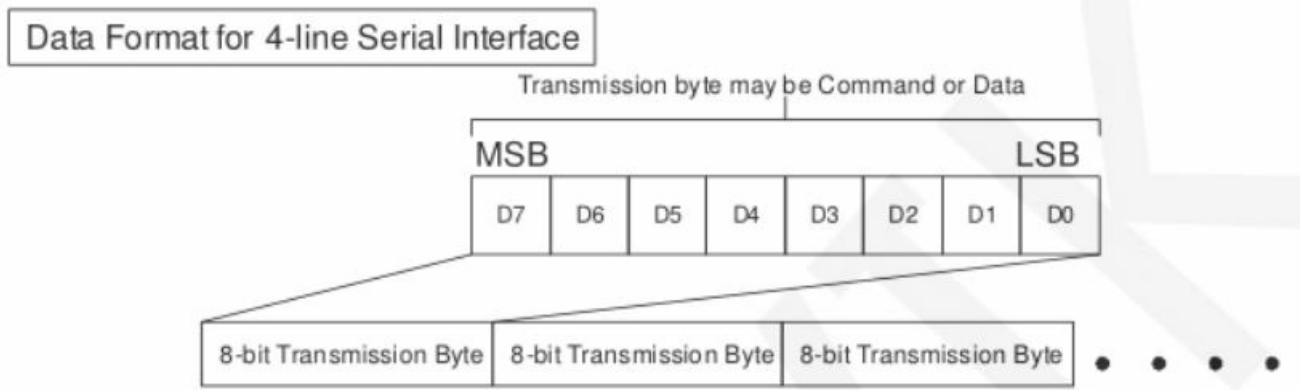
The ILI9341 controller supports a maximum resolution of 240*320 and a 172800-byte GRAM. It also supports 8-bit, 9-bit, 16-bit, and 18-bit parallel port data buses. It also supports 3-wire and 4-wire SPI serial ports. Since parallel control requires a large number of IO ports, the most common one is SPI serial port control. The ILI9341 also supports 65K, 262K RGB color display, display color is very rich, while supporting rotating display and scroll display and video playback, display in a variety of ways. The ILI9341 controller uses 16bit (RGB565) to control a pixel display, so it can display up to 65K colors per pixel. The pixel address setting is performed in the order of rows and columns, and the incrementing and decreasing direction is determined by the scanning mode. The ILI9341 display method is performed by setting the address and then setting the color value.

Introduction to SPI Communication Protocol

The writing mode timing of the 4 4-wire SPI bus is shown in the following figure:



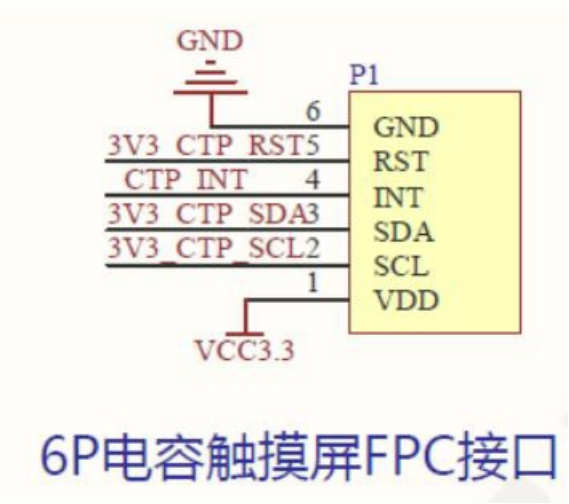
CSX is a slave chip selection, and the chip will only be enabled when CSX is at low power level. D/CX is the data/command control pin of the chip. When DCX is writing commands at low levels, data is written at high levels SCL is the SPI bus clock, with each rising edge transmitting 1 bit of data; SDA is the data transmitted by SPI, which transmits 8 bits of data at once. The data format is shown in the following figure:



High bit first, transmit first. For SPI communication, data has a transmission timing, with a combination of real-time clock phase (CPHA) and clock polarity (CPOL): The level of CPOL determines the idle state level of the serial synchronous clock, with CPOL=0, indicating a low level. CPOL pair transmission protocol The discussion did not have much influence; The height of CPHA determines whether the serial synchronous clock collects data on the first or second clock jump edge, When CPHL=0, perform data collection at the first transition edge; The combination of these two forms four SPI communication methods, and SPI0 is commonly used in China, where CPHL=0 and CPOL=0

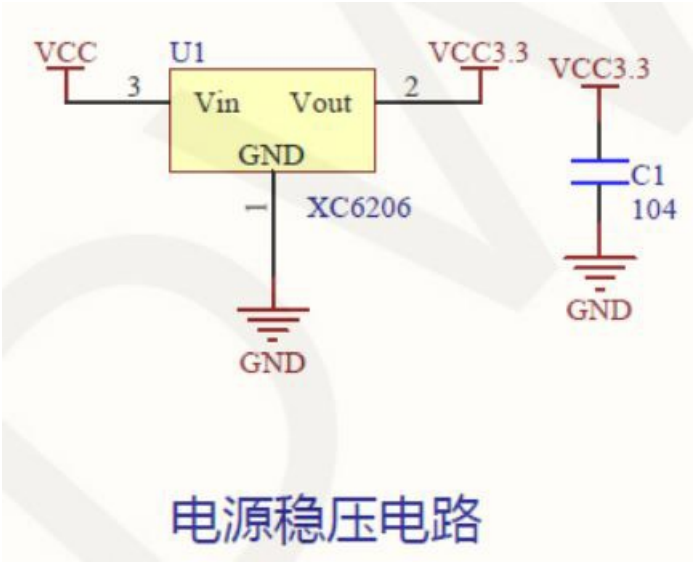
Hardware Description

6P capacitive touch screen FPC interface



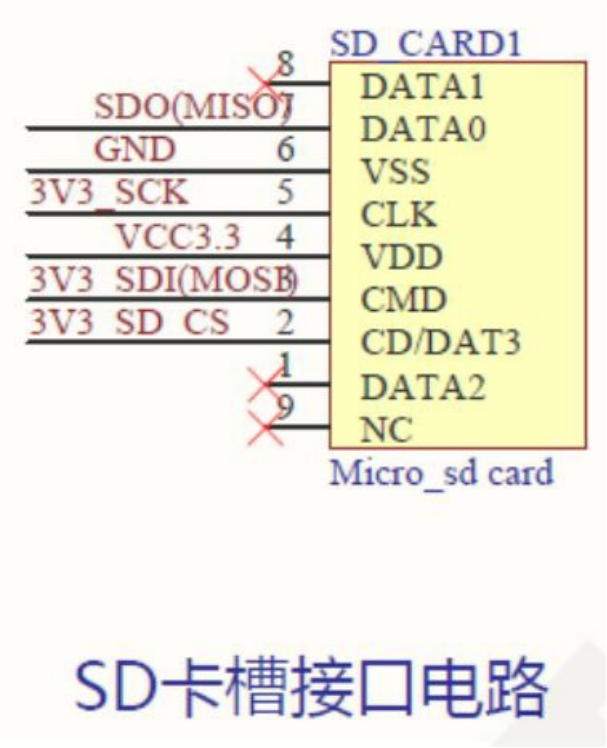
P1 is a flip over FPC holder with a spacing of 6P 0.5mm, used to connect the 6P FPC cable of the capacitive touch screen and connect touch signals.

Power supply voltage stabilizing circuit



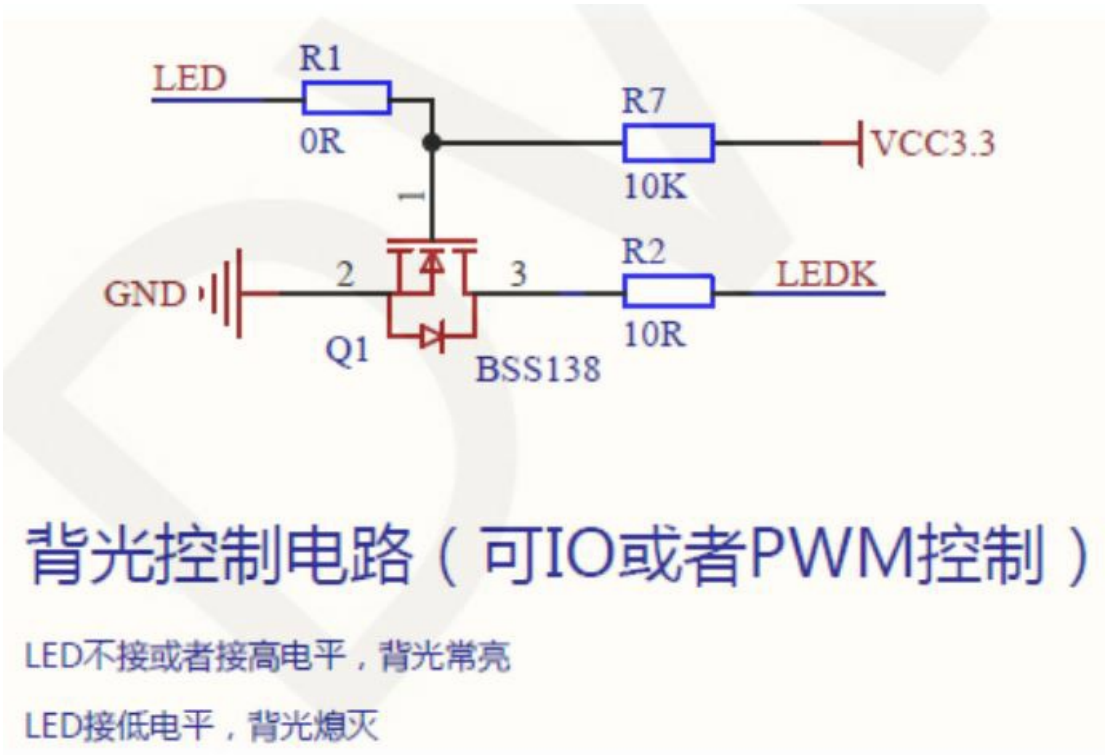
This circuit is used to stabilize the input voltage of the module, where VCC is the external input voltage, VCC3.3V is the module input voltage, and C1 is the bypass filter capacitor. VCC can be connected to 5V or 3.3V, and it is recommended to connect to 5V because only by connecting to 5V can VCC3.3 output 3.3V. If connected to 3.3V, VCC3.3 output voltage will be less than 3.3V, which will cause the backlight brightness of the LCD screen to darken.

SD card slot interface circuit



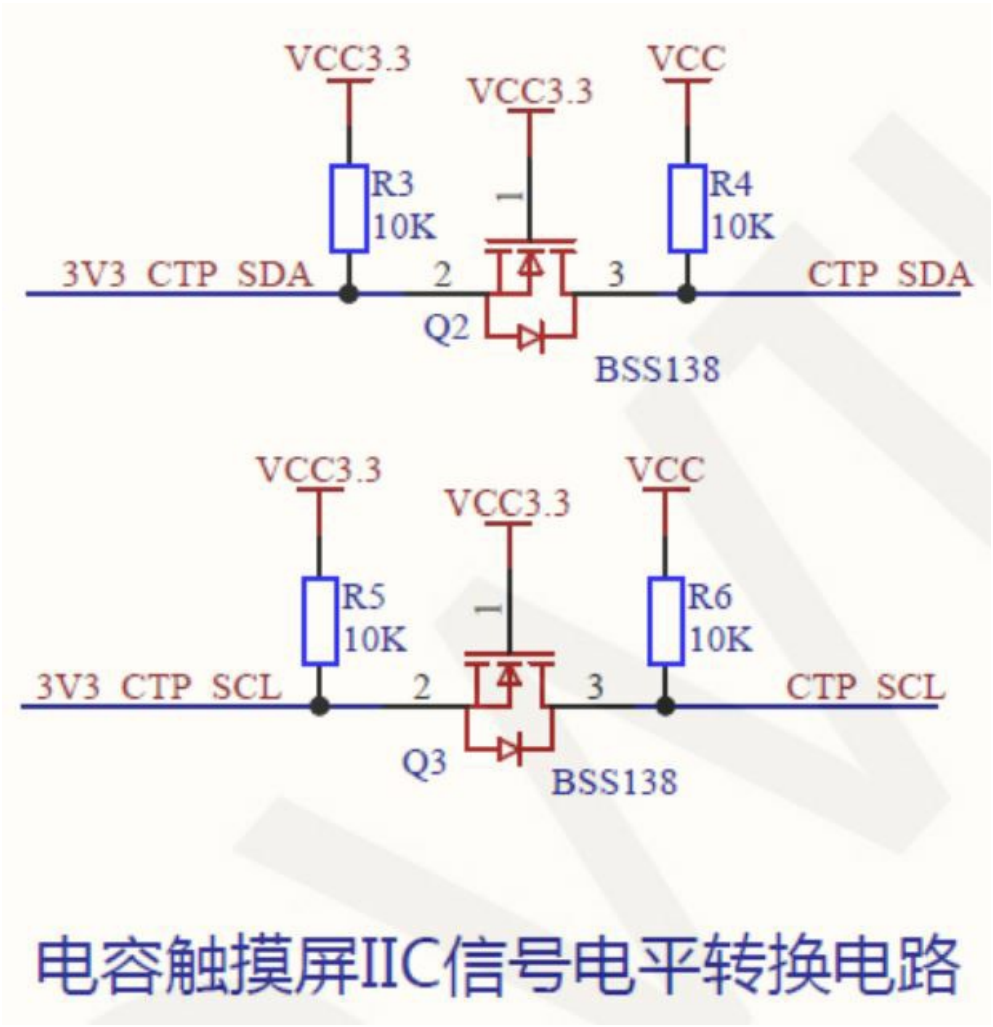
SD_ CARD1 is a Micro SD card slot for inserting Micro SD cards, making it easy to use SD card expansion functions. The SPI bus and LCD used are shared.

Backlight control circuit



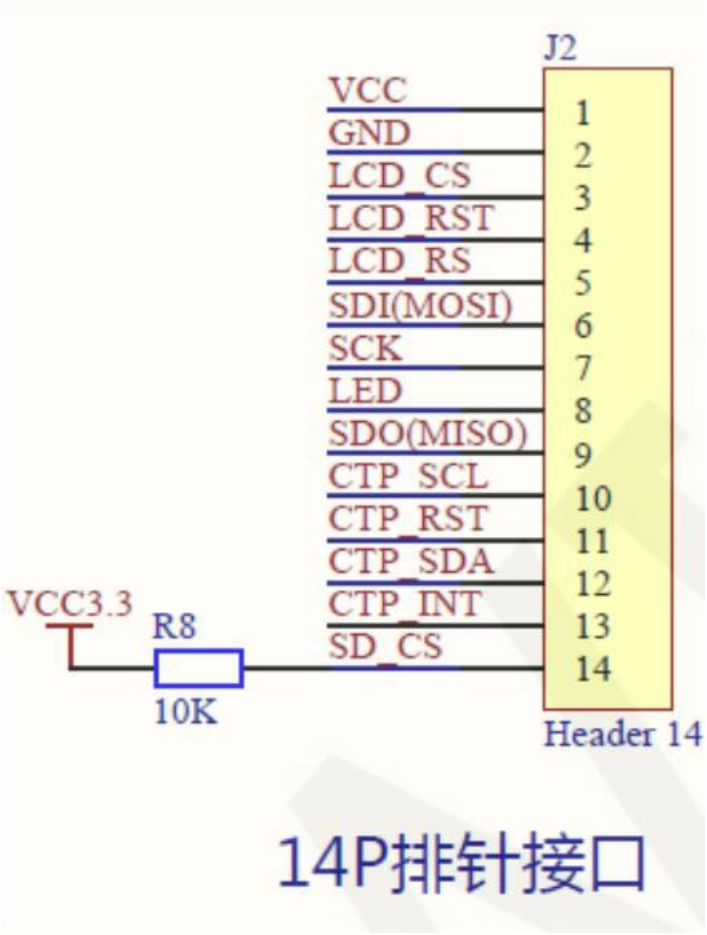
R1 is reserved for compatibility with the J3Y control circuit, directly using a 0 ohm resistor. R2 is the backlight current limiting resistor, R7 is the pull-up resistor, and Q1 is the BSS138 N channel field-effect transistor. LED is the control signal, and LEDK is connected to the negative pole of the backlight. When the LED is suspended (without a control signal), due to R7 pull-up, the source of BSS138 is at a high level, with its gate and drain conducting, LEDK grounded, and the backlight circuit conducting, thus turning on the light. When the LED input is low, the source of BSS138 is low, its gate and drain are cut off, LDEK is suspended, and the backlight circuit is cut off, thus turning off the light; When the LED input is at a high level, the source of BSS138 is at a high level, its gate and drain are conductive, LDEK is grounded, and the backlight circuit is conductive, thus turning on the light;

Capacitor touch screen IIC signal level conversion circuit



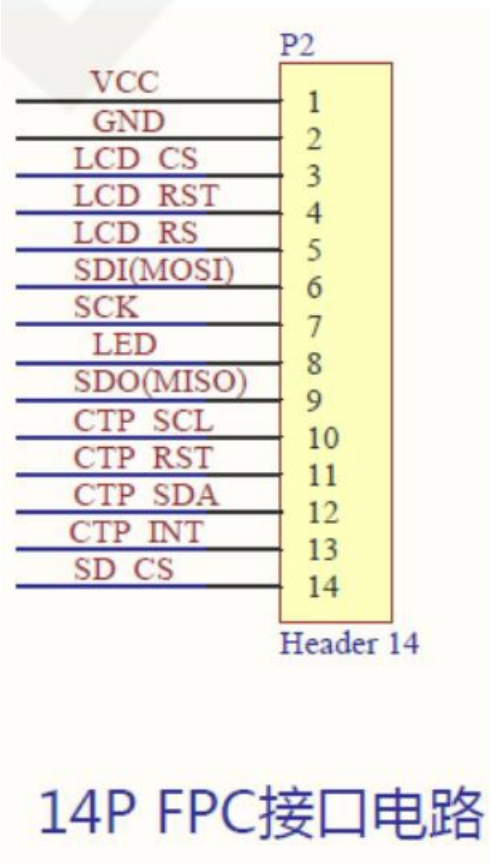
R3, R4, R5 and R6 are pull-up resistor, and Q2 and Q3 are BSS138 N-channel FETs. CTP_ SDA CTP_ IIC signal input from SCL main control terminal, 3V3_ CTP_ SDA 3V3_ CTP_ SCL is the converted IIC signal. The function of this circuit is to convert the 5V or 3.3V IIC signal input from the main control terminal into a 3.3V IIC signal, and then input it into the capacitive touch module (because the capacitive touch module can only receive 3.3V signals). It can also convert the 3.3V signal output from the capacitive touch module into a 5V signal and input it to the main control. The principle is (taking SDA as an example): the source of BSS138 is always at 3.3V level, and when CTP_ SDA is at low level, the drain of BSS138 is at level, the source voltage is higher than the drain, the gate and drain are conducting, and the gate is also at low level, 3V3_ CTP_ SDA is a low level; When CTP_ SDA is at high level, with the drain 5V level of BSS138. The source voltage is lower than the drain, and the gate and drain are cut off. The gate is pulled up to 3.3V high level, with 3V3_ CTP_ SDA is a high level. vice versa.

14P Header pin interface



J2 is 14P pin, R8 is the pull-up resistor of SD card CS pin. The 14P pin is used to connect to the main control, which can be directly inserted or connected through a DuPont cable. Because the SD card and LCD share the SPI bus, first pull up the CS pin of the SD card to disable its functions and avoid SPI bus device conflicts when the module is in use.

14P FPC interface circuit

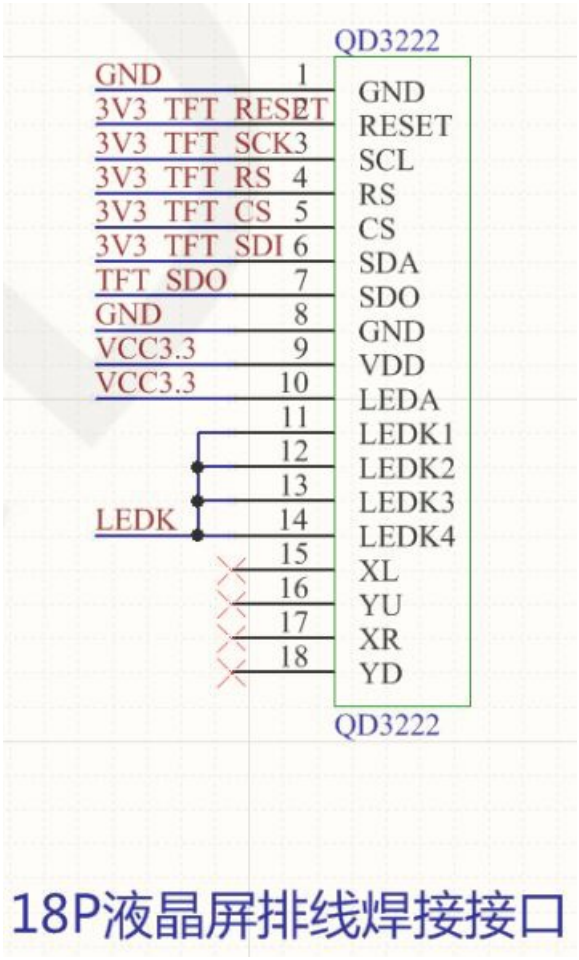


P2 is the module 14P FPC cable interface, which can only be connected to the main control through the FPC cable.

Control signal level conversion circuit

U2 is a level conversion IC that converts between 5V and 3.3V. This circuit only uses the one one-way function of 5V to 3.3V, and the signals that the module needs to write are converted through this circuit.

18P LCD screen cable welding interface



QD3222 is a 18P pad with a spacing of 0.8mm. Used to weld the LCD so that it can receive signals from the main control.

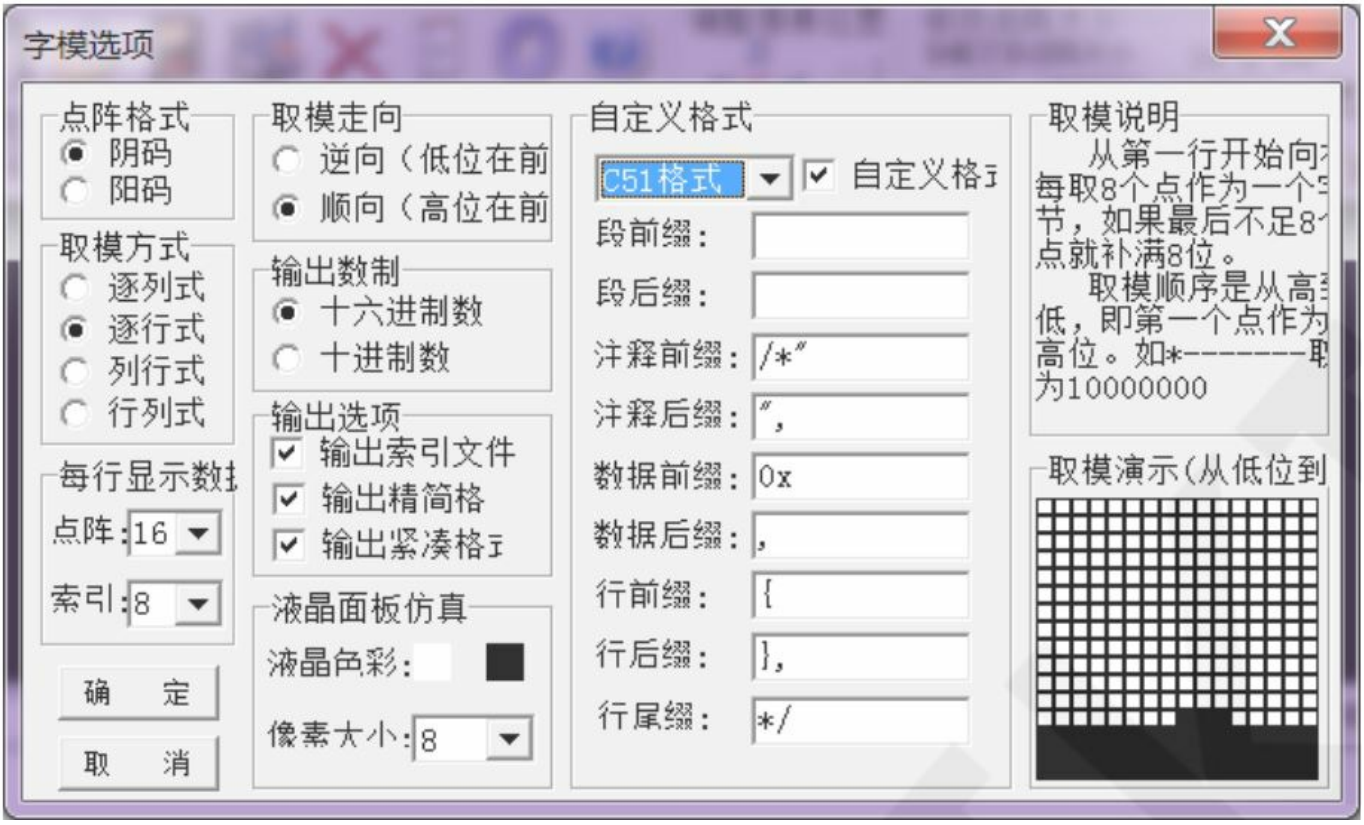
Example program usage instructions

For specific instructions, please refer to the example program usage instructions document in the example program directory.

- **A.** Connect the display module to the main control board (directly plugin, use DuPont cable or FPC cable connection);
- **B.** Connect the main control board to the PC (it needs to be connected according to the download method) and power on the main control board;
- **C.** Modify, compile, and download sample programs;
- **D.** Check the display of the module and check if the program runs successfully;

Common tool software

The example program needs to display both Chinese and English, symbols, and images, so it requires the use of mold-taking software. There are two types of mold-taking software: Image2Lcd and PCtoLCD2002. Image2Lcd is used for color image extraction, while PCtoLCD2002 is used for text or monochrome image extraction. The PCtoLCD2002 mold-taking software is set as follows: Dot Matrix Format Selection Yin Code Select row-by-row mode for mold-taking Select the direction of the mold taking direction in the clockwise direction (with the higher position in front) Output Number System Selection Hexadecimal Number Custom Format Selection C51 Format



The specific setting method can be found on the following webpage:

http://www.lcdwiki.com/Chinese_and_English_display_modulo_settings

The Image2Lcd mold taking software settings are shown in the following figure:

The Image2Lcd software needs to be set to scan horizontally, from left to right, from top to bottom, and with low bits in front.

- www.lcdwiki.com

Documents / Resources

	LCDWIKI MSP2833 2.8inch IPS SPI Module [pdf] User Manual MSP2833 2.8inch IPS SPI Module, MSP2833, 2.8inch IPS SPI Module, IPS SPI Module, SPI Module, Module

References

- User Manual