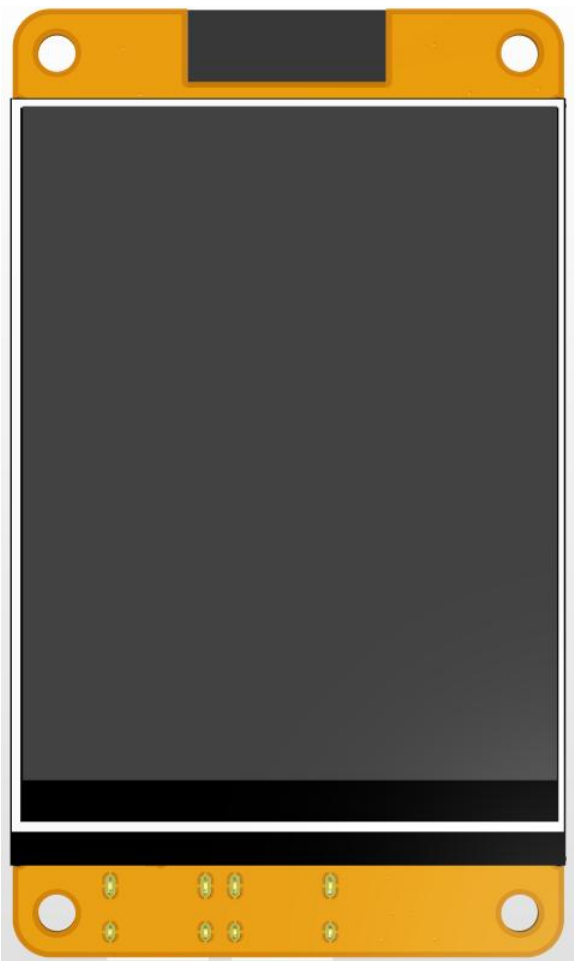


EC5R28T

2.8-Inch ESP32-C5 Display Module

Product Specification



Version	Revision	Date
V1.0	First release	2026-08-21

Table of Contents

1. Overview.....	3
1.1. Product Introduction.....	3
1.2. Product Pictures.....	3
1.3. Accessory List.....	4
2. Product Features.....	5
2.1. Feature Description.....	5
3. Product Parameters.....	5
3.1. ESP32 Main-Controller Parameters.....	5
3.2. LCD Parameters.....	6
3.3. Touch-Screen Parameters.....	6
3.4. Dimension Parameters.....	6
3.5. Electrical Parameters.....	7
3.6. Other Parameters.....	7
4. Product Interfaces.....	8
4.1. Interface Description.....	8
4.2. ESP32 Pin Assignment.....	9
5. Product Dimension Drawing.....	11
5.1. Dimension Drawing.....	11
6. Notes.....	13
6.1. Safety Instructions.....	13
6.2. FAQ.....	13

1. Overview

1.1. Product Introduction

EC5R28T is a 2.8-inch display module integrating ESP32-C5 module with resistive touch screen. It adopts ST7789P3 LCD driver IC with 240×320 resolution. It supports rich peripherals including IIC devices, motor drivers, Micro-SD card, UART and touch function. It is suitable for DIY projects, IoT applications and human-machine interaction development.

1.2. Product Pictures

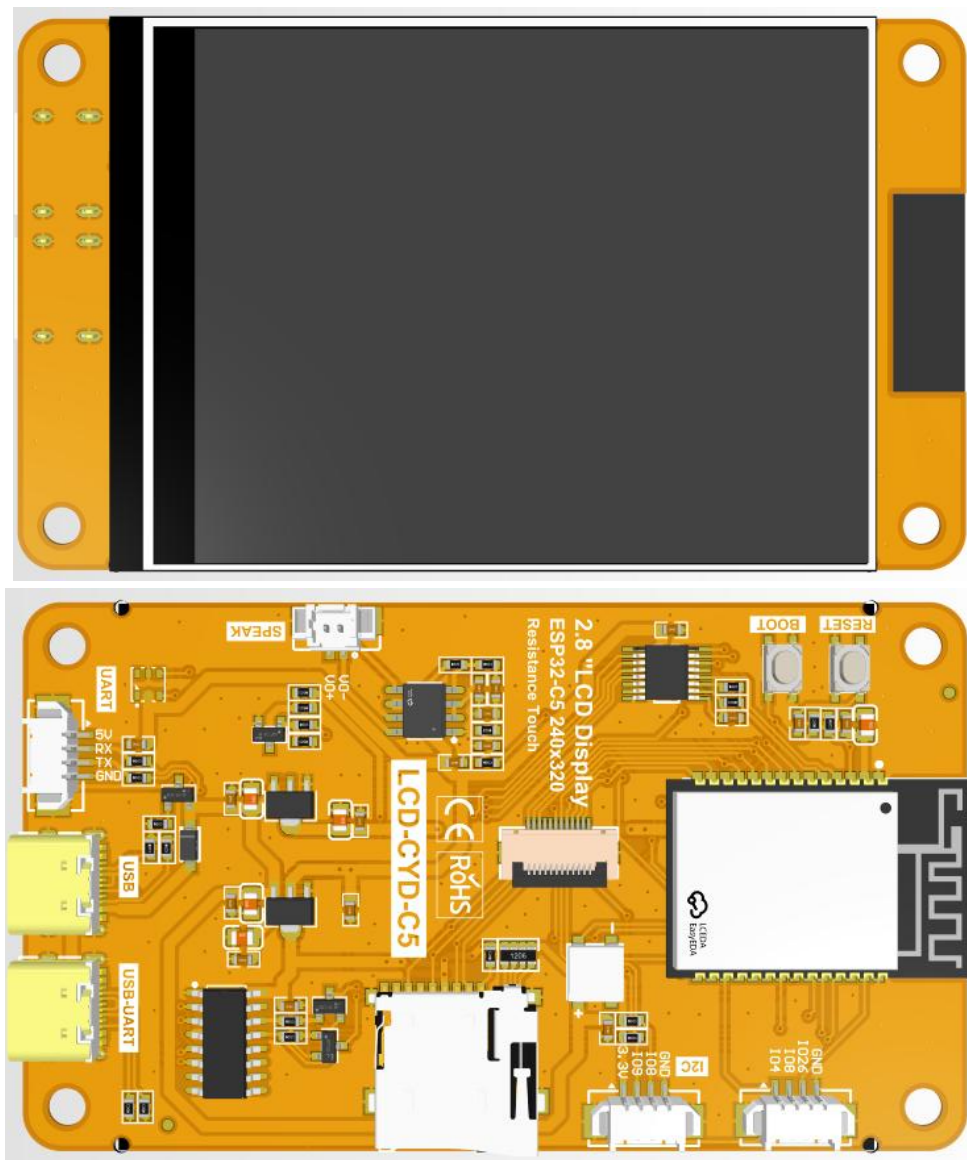


Figure 1.1 (SKU TBD) Product Images

1.3. Accessory List

EC5R28T is supplied with 1 resistive touch stylus and 1 Type-C power-data cable.



Figure 1.2 Resistive Touch Pen



Figure 1.3 Type-C Data/Power Cable

2. Product Features

2.1. Feature Description

- Built-in ESP32- C5 module for convenient development with abundant resources
- 2.8-inch color LCD, 240×320 resolution, max. 262K colors (RGB666), rich color performance
- Rich interfaces for connecting SPI, UART and other peripherals
- On-board RGB tri-color indicator LED for multi-status indication
- On-board resistive touch-screen for human-machine interaction
- Standard Type-C connector for power supply & firmware download
- On-board Micro-TF card slot for storage expansion
- Rich sample codes provided for quick evaluation
- Underlying driver technical support and continuously-updated WIKI documents
- Multi-stress aging test for stable long-term operation

3. Product Parameters

3.1. ESP32 Main-Controller Parameters

Item	Parameter	Unit
Module	ESP32-C5-WROOM-1-N16R8	—
CPU	RISC-V 32-bit single-core processor	—
Clock Frequency	240MHz (maximum)	—
Memory	320KB ROM + 384KB HP-SRAM + 16KB LP-SRAM + 16MB QSPI Flash + 8MB PSRAM	—
WiFi	2.4GHz & 5GHz dual-band Wi-Fi 6 802.11ax, backward compatible with 802.11a/b/g/n/ac	—
Bluetooth	Bluetooth 6.0 LE, supports Bluetooth Mesh 1.1; compatible with IEEE802.15.4 (Zigbee3.0 / Thread1.4)	—
Operating Voltage	3.0~3.6	V
Operating Temperature	-40~85	°C

3.2. LCD Screen Parameters

Item	Parameter	Unit
Screen Size	2.8	inch
Screen Type	TN TFT	-
Screen Resolution	240xRGBx320	pixels
Active Display Area	43.20(W) x 57.60(H)	mm
Number of Colors	Maximum: 262K (RGB666) Common: 56K (RGB565)	-
Driver IC	ST7789P3	-
Display Interface	4-Line SPI(connected to ESP32)	-
Pixel Size	0.153(H)x0.153	mm
Viewing Angle	12 O'CLOCK	deg
Backlight Brightness	400	cd/m ²
Backlight Type	White LED*4	-
Operating Temperature	-20~60	°C
Storage Temperature	-30~70	°C

3.3. Touch Screen Parameters

Item	Parameter	Unit
Active Area Size	2.8	inch
Touch Screen Type	Resistive Touch Screen	-
Driver IC	XPT2046	-
Active Touch Area	44.20(W) x 58.60(H)	mm
Viewing Window Size	45.20(W) x 59.45(H)	mm
Communication Interface	SPI	-
Structural Material	ITO Film + ITO Glass	-
Operating Temperature	-20~60	°C
Storage Temperature	-30~70	°C

3.4. Dimensional Parameters

Item	Parameter	Unit
LCD Overall Dimensions	50.00±0.2(W) x 69.20±0.2(H) x 2.3±0.1(D) (excluding FPC and back adhesive)	mm
Touch Screen Overall Dimensions	49.60±0.2(W) x 68.80±0.2(H) x 1.20±0.1(D) (excluding FPC and back adhesive)	mm
Module Overall Dimensions	50.00(W) x 86.00(H) x 5.60(D)	mm

3.5. Electrical Parameters

Item	Parameter	Unit
Operating Voltage	5.0	V
Backlight Current	80	mA
Backlight Brightness (Actual)	404	cd/m ²
Total Current		mA
Power Consumption		W

3.6. Other Parameters

Item	Parameter	Unit
SKU		-
Power Interface	TYPE-C	-
Weight (including packaging)		g

4. Product Interfaces

4.1. Interface Function Description

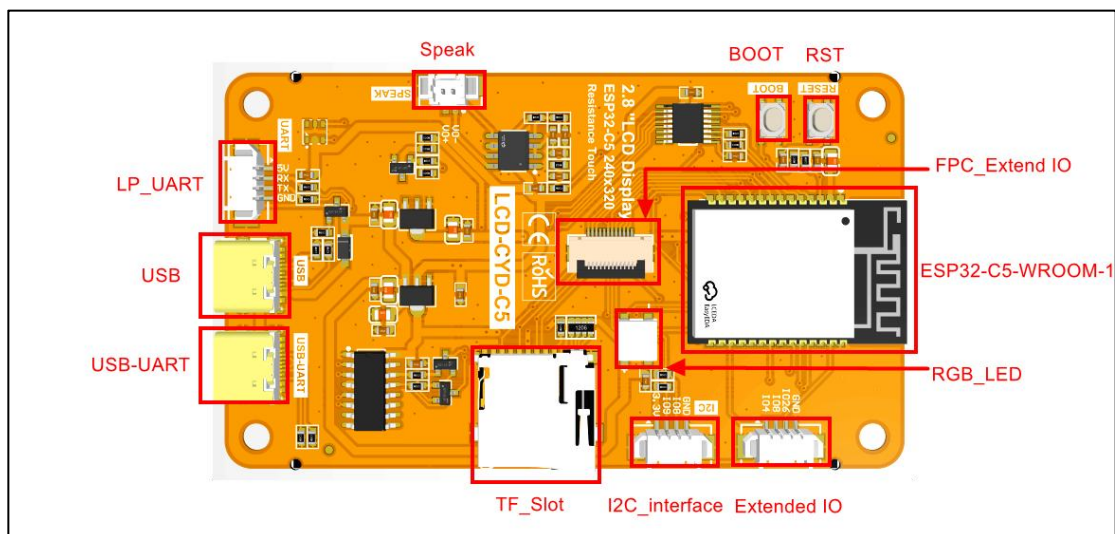


Figure 4.1 Product Interface Diagram

Interface Name	Function Description
ESP32-C5 Module	The MCU of the display module, controls onboard and external peripherals.
TF Slot	Insert a Micro SD card to expand storage space, e.g., for storing fonts, images, and other large data content.
RGB LED	Contains red, green, and blue LEDs, each controllable via I/O pins for status indication.
LP_UART	1.25mm 4P connector. Can be used for serial debugging, downloading, and communication. Requires an external USB-to-serial module.
BOOT Button	Used to enter download mode or for button testing. Hold this button during power-on and release to enter download mode. Alternatively, after power-on, hold this button, press the RESET button, release RESET first, then release this button to enter download mode. When not used for download mode, this button can serve as a regular button.
RESET Button	Used for ESP32 MCU and LCD reset. Pressing it triggers a level reset.
USB Interface	Used for module power supply and program download. This interface is connected to the ESP32-S3 internal USB bus and can create a USB virtual serial port.
USB-UART Interface	Used for module power supply and program download. This interface is connected to the one-key download circuit on the module, enabling automatic entry into download mode (no need to press the BOOT button).

Extended Pins	1.25mm 4P connector. Brings out GND, IO26, IO8, and IO4 pins.
Speaker Interface	1.25mm 2P connector. Used for connecting a speaker to play audio or for motor driving (Note: since the C5 has no DAC, audio playback quality is relatively poor).
I2C Peripheral Interface	1.25mm 4P connector. Used for connecting external I2C communication devices.
FPC Extended Pins	12P FPC connector, the detailed IO sequence can be seen in the schematic

4.2. ESP32 Pin Assignment

ESP32-C5 Chip Pin Assignment Description			
Onboard Device	Device Pin	ESP32-C5 Connection Pin	Description
LCD	TFT_CS	IO23	LCD chip select control signal, active low
	TFT_RS	IO24	LCD command/data selection control signal. High level: data; Low level: command
	TFT_SCK	IO6	LCD SPI bus clock signal
	TFT_MOSI	IO7	LCD SPI bus write data signal
	TFT_MISO	IO2	LCD SPI bus read data signal
	TFT_RST	EN	LCD reset control signal, active low reset (shared with ESP32-C5 MCU reset pin)
	TFT_BL	IO25	LCD backlight control signal (high level: backlight on; low level: backlight off)
RTP	TP_CLK	IO6	Touch screen SPI bus clock signal
	TP_CS	IO1	Touch screen chip select control signal, active low
	TP_DIN	IO7	SPI MOSI (Master Output / Write)
	TP_DOUT	IO2	SPI MISO (Master Input / Read)
	TP_INT	IO3	Touch screen interrupt control signal
SDCARD	SD_CLK	IO6	SD card SPI bus clock signal
	SD_CS	IO10	SD card chip select control signal, active low
	SD_DIN	IO7	SPI MOSI (Master Output / Write)
	SD_DOUT	IO2	SPI MISO (Master Input / Read)
LED	RGB_INT	IO27	Single-wire RGB tri-color LED; can independently control the red, green, and blue LEDs via different signals

Audio	Audio_DO	IO26	Audio output signal
KEY	BOOT_KEY	IO28	Download mode selection button (hold this button during power-on, then release to enter download mode)
	RESET_KEY	EN	ESP32-C5 reset button, active low reset (shared with LCD reset)
USB	USB_N	IO13	USB bus differential signal data line negative
	USB_P	IO14	USB bus differential signal data line positive
Serial Port	RX0	IO12	ESP32-C5 UART0 receive signal interface
	TX0	IO11	ESP32-C5 UART0 transmit signal interface
LP_Serial	LP_UART_RXD	IO4	Extended external LP_UART receive signal interface
	LP_UART_TXD	IO5	Extended external LP_UART transmit signal interface
I2C	I2C_SDA	IO8	Extended external I2C data signal interface
	I2C_SCL	IO9	Extended external I2C clock signal interface

【Tip】

LCD, XPT2046 touch, and TF card share the SCK/MOSI/MISO signal lines. Each device is selected via its independent CS chip select pin. Do not re-initialize the SPI bus in software; initialize the SPI only once for use by all peripherals.

5. Product Dimension Drawing

5.1. Product Dimension Drawing

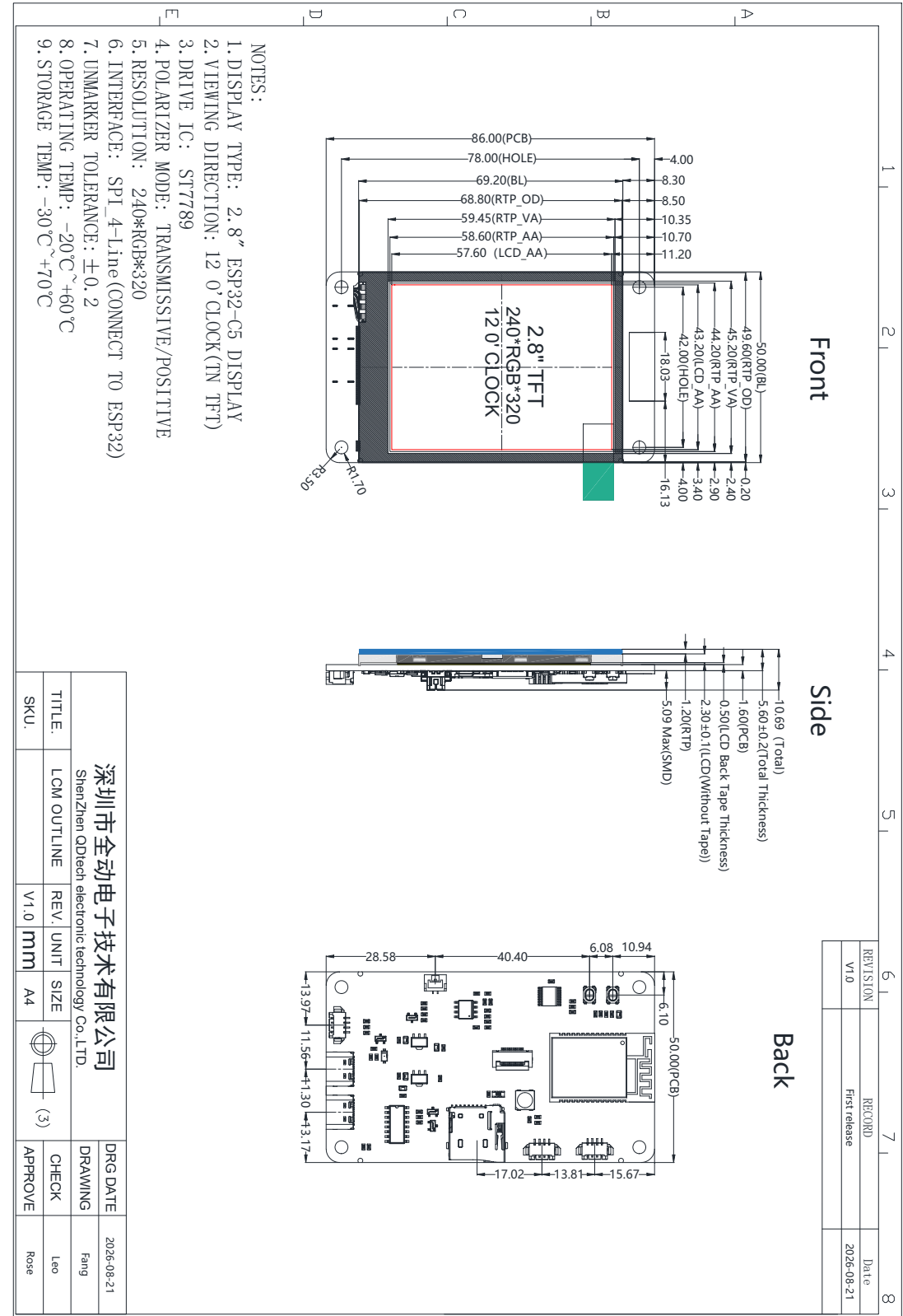


Figure 5.1 Product Dimension Drawing

6. Notes

6.1. Safe Product Usage

- Do not use excessive force to press or strike the screen to avoid damaging it
- Do not use hard objects to scratch the screen to avoid scratching it
- Do not place heavy objects on the product to avoid crushing the screen
- Keep the product clean; do not drip water or oil onto the screen
- Use a clean, soft, dry cloth to wipe the screen. Do not spray water or cleaning agents directly onto the screen
- Do not disassemble the product arbitrarily to avoid damaging the screen or FPC
- Do not place the product in high-temperature or high-humidity environments
- Place the product face-up on a stable surface to prevent damage from falling
- Use the correct voltage to power the product to avoid damage from over-voltage
- Do not touch components or pins with wet hands while the product is in use to avoid short circuits and product damage
- Unplug the power when the product will not be used for an extended period
- When charging the battery, ensure proper ventilation and heat dissipation to avoid product damage from excessive temperature
- When charging the battery, do not touch the charging management IC with bare hands to avoid burns from high temperature

6.2. FAQ

- **Q1: The product shows no response after power-on and the screen does not light up**

Analysis:

This product requires the backlight control pin to be pulled high to turn on the backlight. Therefore, ensure that the ESP32 MCU has been programmed with firmware that includes backlight control functionality. If the relevant program has been burned but the backlight still does not turn on, check the power supply interface voltage and the contact condition of the power cable. If using battery power, check whether the battery level is sufficient.

If the backlight still does not respond after the above operations, it is speculated that there may be a hardware circuit failure.

➤ **Q2: The backlight turns on after power-on, but there is no display image**

Analysis:

The backlight being on indicates the module is properly powered. However, for normal image display, SPI communication and control signals must also be fully functional. Check whether the burned program is correctly matched, including the display driver IC selection, GPIO definitions, etc.

It is recommended to use our pre-tested sample program for initial use. Compile and download the program directly without any modifications first, which can rule out factors caused by program modifications. Also, verify that the sample program compilation and download indicate success and that the display module is operating normally.

If the display still cannot work properly after multiple attempts following the above steps, use necessary tools such as a multimeter, oscilloscope, or logic analyzer to analyze and detect the signals, and contact our technical personnel for assistance.

➤ **Q3: The product can display normally but the touch has no response**

Analysis:

This situation may be caused by the following reasons:

- The burned test program does not include touch functionality
- The GPIOs related to touch screen control in the test software are not defined or defined incorrectly
- The burned test program includes touch functionality, but the resistive touch screen is not calibrated, or it is calibrated but the calibration parameters are not written into the program, or the calibration parameters written into the program are incorrect
- The resistive touch screen and display share the SPI bus for communication. If the software is not properly handled, communication

conflicts may occur, which can also cause the touch to be unresponsive

- Hardware damage, including damage to the touch control IC, broken or damaged touch screen FPC, etc

➤ **Q4: The product can display, but the backlight brightness is unstable (flickering)**

Analysis:

The backlight circuit of this product uses a field-effect transistor drive. A high level input to the backlight control pin turns on the backlight, a low level turns it off, and a PWM signal input through the backlight control pin can achieve dimming. If the voltage at the backlight control pin changes, the backlight brightness will also change, which may cause backlight instability. Additionally, unstable power supply voltage can also cause this phenomenon.