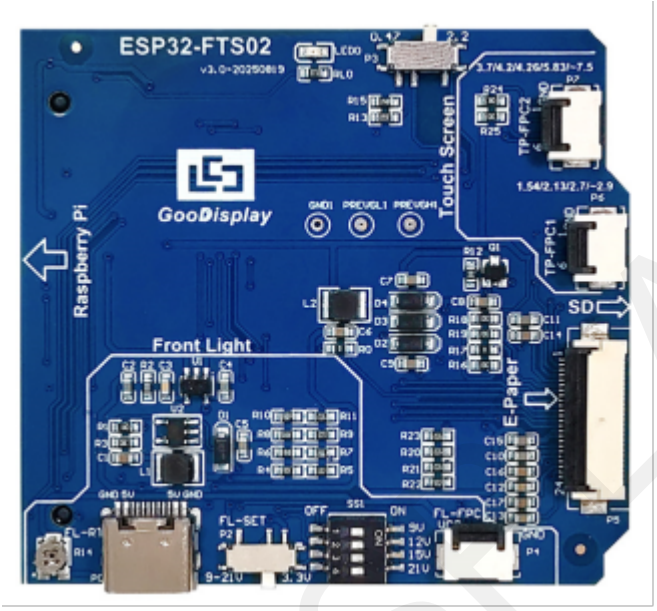
E-paper Display Adapter

ESP32-FTS02

Dalian Good Display Co., Ltd.

Product Specifications



Customer	**Standard**
Description	**E-paper Display Adapter**
Model Name	**ESP32-FTS02**
Date	2025/09/02
Revision	**1.0**

	Design Engineering		
	Approval	**Check**	**Design**
	刘玉宝印	修燕凤印	吴之良印

No.18, Zhonghua West ST,Ganjingzi DST,Dalian,CHINA
Tel: +86-411-84619565
Email: info@good-display.com
Website: www.good-display.com

Contents

1. Overview

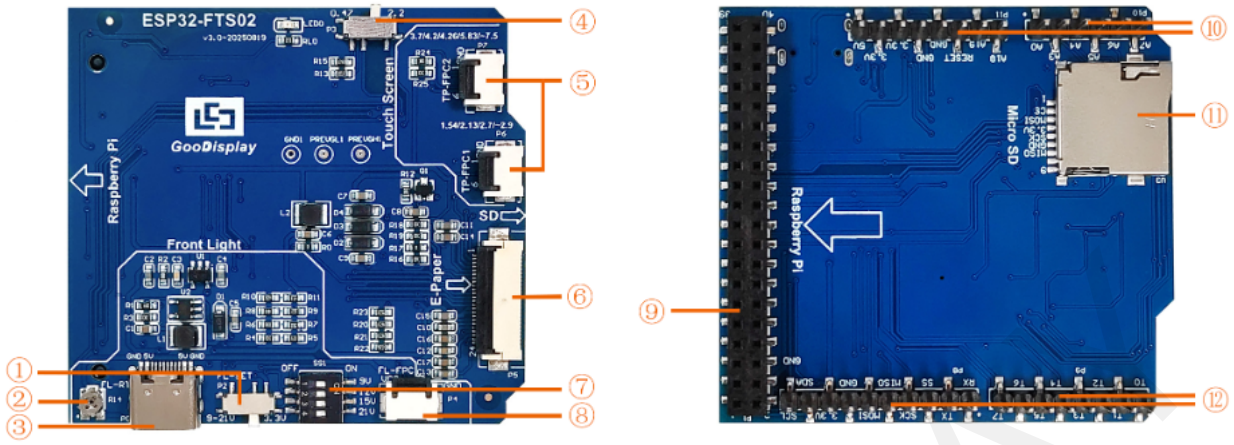
This adapter board is specially designed for SPI interface e-paper displays. It is compatible with the 24PIN connector and can drive all SPI e-paper displays up to 13.3 inches. It also supports e-paper touch screens up to 7.5 inches, front light under 21V, micro SD card image expansion, and Raspberry Pi interface. It enables the collaborative operation of the touch screen, front light, and e-paper, making early-stage project debugging more convenient and helping accelerate development progress.

This adapter board is specially designed for SPI interface e-paper displays. It is compatible with the 24PIN connector and can drive all SPI e-paper displays up to 13.3 inches. It also supports e-paper touch screens up to 7.5 inches, front light under 21V, micro SD card image expansion, and Raspberry Pi interface. It enables the collaborative operation of the touch screen, front light, and e-paper, making early-stage project debugging more convenient and helping accelerate development progress.

2. Structure Specification

Parameter	Specification
Model	ESP32-FTS02
Platform	Arduino
Dimension	58.6x 54.7mm
Power Supply	3.3V(Front light 5V)
Example Code	Available
Operating Temp.	-20 ℃ ~ 70 ℃
Main Function	Supports e-paper, touch screen, and front light interfaces; Supports micro SD card image storage function; Supports direct connection between Raspberry Pi mainboard and adapter board; Supports direct connection between ESP32-L mainboard and adapter board; Helps users quickly master the use of e-paper, touchscreen, front light, and micro SD card.
Additional Function	Front light brightness adjustment, micro SD card image storage.

3. Functions



① Front Light Voltage Setting	② Front Light Brightness Control	③ Front Light Power Supply	④ E-paper Resistance Selection
⑤ Touch Screen Interface	⑥ E-paper Interface	⑦ Front Light Voltage Selection	⑧ Front Light Interface
⑨ Raspberry Pi Interface	⑩ ESP32-L Main Board Interface	⑪ Micro SD Card Slot	⑫ ESP32-L Main Board Interface

Figure 1 Adapter ESP32-FTS02

3.1 DIP Switch P3

The DIP switch P3 is used to select the matching resistor (RESE resistor) for the current feedback in the e-paper peripheral boost circuit. Different models of e-paper require different RESE resistors, and selecting the wrong RESE resistor may result in the e-paper failing to refresh the screen.

1. Set P3 to the 0.47 position for UC (UltraChip) driver IC series e-paper.
2. Set P3 to the 2.2 position for SSD (Solomon) driver IC series e-paper.
3. Set P3 to the 2.2 position for black/white/red/yellow four-color e-paper.

3.2 E-paper FPC Interface

The e-paper is connected to the adapter board through this interface. When connecting, place the e-paper display face up and insert the FPC into the P5 connector of the adapter board. After inserting, remember to press down the black FPC latch to secure the connection.

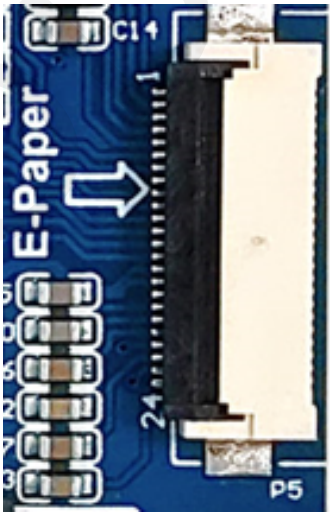


Figure 2 E-paper Interface

3.3 Touch Screen Interface

This adapter board can connect to a touchscreen, as shown in Figure 3. For touchscreens under 2.9 inches, use the P6 interface; for touchscreens above 3.7 inches , use the P7 interface.
Note: 2.9-inch and 7.5-inch touchscreens must be inserted in reverse orientation into the corresponding interface.

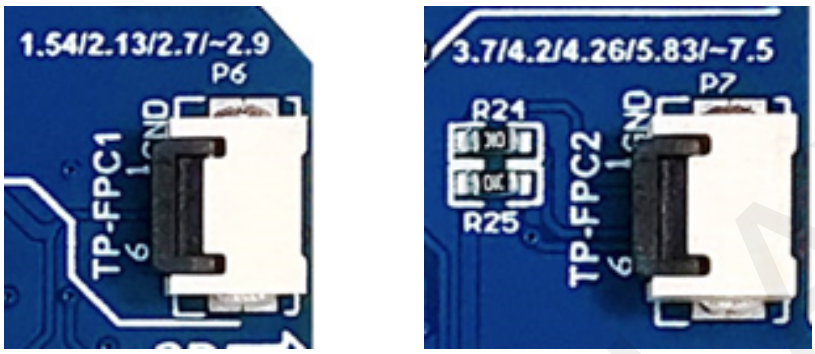


Figure 3 Touch Screen Interface

3.4 Front Light Interface

This adapter board can connect to a front light, as shown in Figure 4. P0 is the power input for the front light, connected to the Type-C power cable. R14 is a potentiometer that can be rotated to adjust the front light brightness. Use P2 to select 3.3V or a higher voltage.

1. 3.3V setting (P2 set to 3.3V): for 1.54-inch, 2.13-inch, 2.66-inch, 3.7-inch, and 2.9-inch front lights (FPC inserted in reverse)
2. 12V setting (P2 set to 9 – 21V range, SS1 set to 12V): for 2.7-inch front light
3. 21V setting (P2 set to 9 – 21V range, SS1 set to 21V): for 4.2-inch front light
4. 9V and 15V settings reserved

Note: Do not connect a touchscreen to the front light interface, as this may damage the touchscreen.

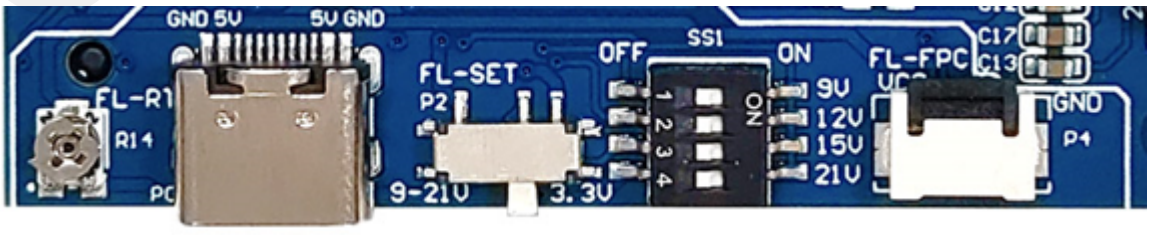


Figure 4 Front Light Interface

3.5 SD Card Interface

The adapter board's back can connect to a micro SD card, as shown in Figure 5. The micro SD card can be inserted into the U3 slot, allowing users to expand applications using the micro SD card.

Figure 5 micro SD Card Interface (on the back of the adapter board)

3.6 Raspberry Pi Interface

This adapter board can be directly connected to a Raspberry Pi, as shown in Figure 6. The corresponding Raspberry Pi interface is P1. The connection between the adapter board and Raspberry Pi is illustrated in Figure 7.

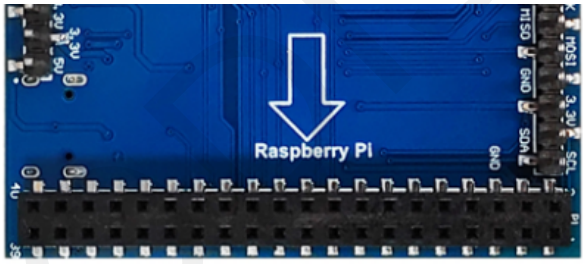


Figure 6 Raspberry Pi Interface (on the back of the adapter board)

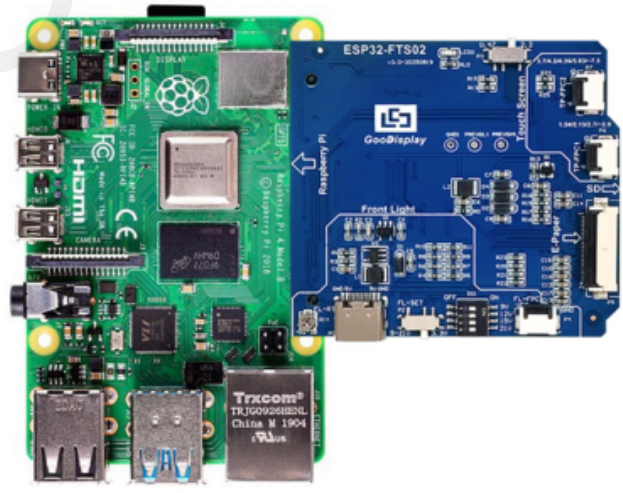


Figure 7 Raspberry Pi Connection Diagram (interface on the back of the adapter board)

3.7 ESP32-L Mainboard Interface

This adapter board can be directly connected to the ESP32-L mainboard, as shown in Figure 8. The corresponding ESP32-L interfaces are P8－P11. Users can test e-paper display, touchscreen driving, front light operation, and micro SD card image expansion functions based on the ESP32-L mainboard.

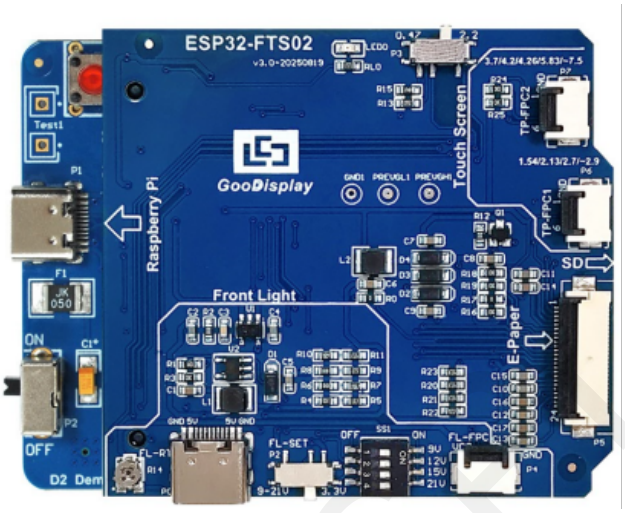


Figure 8 ESP32-L Mainboard Connection Diagram (interfaces on the back of the adapter board)

3.8 Test Points

This adapter board reserves test points for the e-paper peripheral circuit, as shown in Figure 9. The test points include PREVGH, PREVGL, and GND. The functions of each test point are as follows:

1. PREVGH: Positive high voltage test point for the boost circuit.
2. PREVGL: Negative high voltage test point for the boost circuit.
3. GND: Power ground (common voltage reference for test points).

Figure 9 Voltage Test Points

4. E-paper Driver Circuit Design Common Issues

4.1 Homemade driver boards unable to drive e-paper

First, measure the voltages of PREVGH and PREVGL to check if the boost is successful. If the boost is unsuccessful, check the boost section of the driver schematic, ensuring that the components meet the required specifications (e.g., make sure the voltage rating of the boost capacitor is adequate; if not, the capacitor will burn out during boosting). Also, check the soldering, particularly the MOSFETs, as they are the most common point of failure. If the boosting is normal, check for cold soldering on the FPC socket or similar areas, and finally, check the software part.

4.2 E-paper driver circuit inductor selection

1. UC (UltraChip) series: 10uH 1A ferrite inductor.
2. SSD (Solomon) series: 47uH 500mA ferrite inductor.

4.3 E-paper driver circuit MOSFET selection

It is recommended to use the Si1304BDL or Si1308EDL. If these are difficult to find, AO3400 can be used as an alternative.

4.4 E-paper driver circuit diode selection

Choose a Schottky diode with parameters similar to the MBR0530, ensuring the switching frequency meets the actual requirements.

4.5 E-paper FPC socket selection

Select a 24PIN FPC socket with top or top-bottom contacts, with a pin pitch of 0.5mm.

Note: The capacitor parameters in the ESP32-FTS02 adapter board may differ from those in the e-paper datasheet. Therefore, when designing based on this circuit diagram, users must strictly refer to the component parameters in the datasheet for accurate design.