

Specification

CX3576-Z

V1.0

Catalogue

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Chapter 1 Product Introduction

1.1 Summary

The RK3576 is a high-performance, low-power application processor chip fabricated using an advanced 8nm process. It features an 8-core, 64-bit architecture with four A72 heavy cores operating up to 2.2 GHz and four A53 light cores reaching 1.8 GHz. The chip incorporates an NPU delivering 6 TOPS of AI computing power and utilizes the ARM Mali G52 MC3 GPU.

1.2 Function Introduction

The CX3576-Z features the RK3576 chipset running on Android 14, Linux 6.1, Debian 12, or Ubuntu 22.04. It incorporates LVDS, eDP, MIPI, and HDMI display output interfaces, along with a built-in universal backlight board interface and screen voltage jumpers, ensuring compatibility with a wider range of displays. With enhanced performance, faster speeds, and richer interfaces, it is the optimal choice for human-computer interaction, smart terminals, and industrial control applications.

1.3 Characteristic

- Multiple display interfaces: dual LVDS, eDP, MIPI, HDMI, and other display output interfaces.
- Extensive expansion interfaces: 7 USB ports (including one dual-layer USB 3.0 socket – the upper one as USB 3.0 HOST and the lower one as USB 3.0 OTG – plus one dual-layer USB 2.0 HOST socket and three built-in USB 2.0 HOST PH2.0 sockets); 6 serial ports, including one built-in RS232/RS485 port (switchable via a jumper cap), two 6-pin Phoenix terminals for RS232/RS485 (also switchable via jumper cap), and one DB9 socket for RS232/TTL (switchable via jumper cap); along with 10 GPIO and 3 ADC interfaces, meeting various peripheral requirements in the market.
- Multiple network interfaces: one 1000M Ethernet port, supporting 5G and 2.4G Wi-Fi, along with a built-in 4G module interface compliant with the Mini PCIe standard for internet connectivity and voice calls.
- High Resolution: HDMI supports a maximum output resolution of 4096x2160@120Hz, compatible with LCD displays and cropped screens supporting interfaces such as LVDS, eDP,

MIPI, and HDMI, enabling multi-screen synchronized display.

- Customized for the Android system, it provides reference code for system call interfaces (APIs), offering perfect support for customers' upper-layer application development.

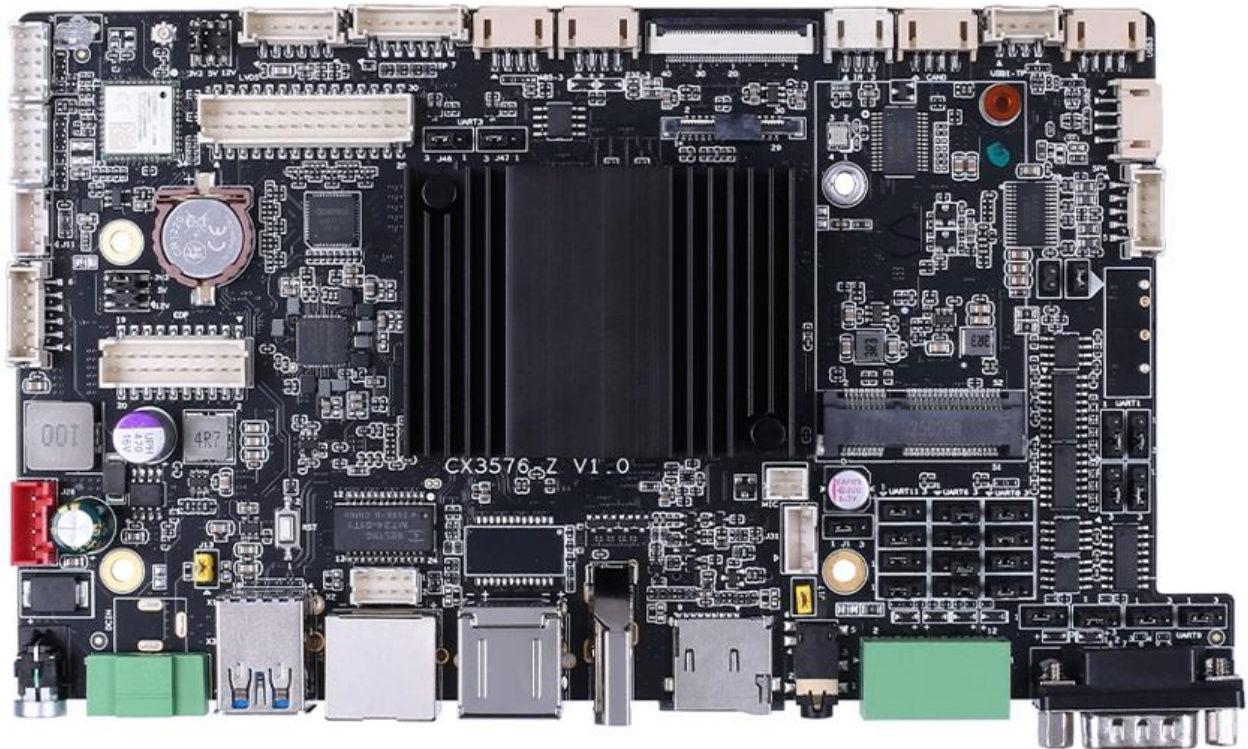
Chapter 2 Product Specifications and Parameters

Type	Specification Parameters
CPU	A 64-bit CPU featuring four Cortex-A72 cores and four Cortex-A53 cores, with a maximum clock speed of 2.2 GHz
GPU	ARM Mali G52 MC3 high-performance GPU
Internal storage	Available in 4GB, 8GB, or 16GB options
Built-in memory	32GB/64GB/128GB/256 optional
Built-in ROM	4KB EEPROM
Decoding	Maximum support: 4096x2160@120Hz
Operating	Android14, Linux6.1, Debian12, ubuntu22.04
Play Mode	Supports various playback modes such as loop, timer, and insert playback
Network	4G, Ethernet, supports 2.4G/5G dual-band WiFi, and Bluetooth 5.3
Video playback	Supports WMV, AVI, FLV, RM, RMVB, MPEG, TS, MP4, and others.
Picture format	Supports BMP, JPEG, PNG, and GIF
USB interface	1 USB 3.0 OTG external port 1 USB 3.0 external port 2 USB 2.0 external ports
Mipi Camera	30-pin FPC interface, supports a 13 MP camera
Mipi LCD	The 24-pin FPC interface supports MIPI displays with a maximum resolution of 2560x1600 at 60Hz.
Serial Port	6 serial ports (with 5-channel RS232/RS485 switchable jacks and 1-channel RS232/TTL switchable port)
GPS	External GPS (optional)
WIFI、 BT	Built-in Wi-Fi; supports dual-band Wi-Fi via Bluetooth 5.3 with a single antenna
4G	A 4G module holder with a built-in Mini PCIe interface, supporting voice calls
Ethernet	Route 1: 1000M Ethernet interface

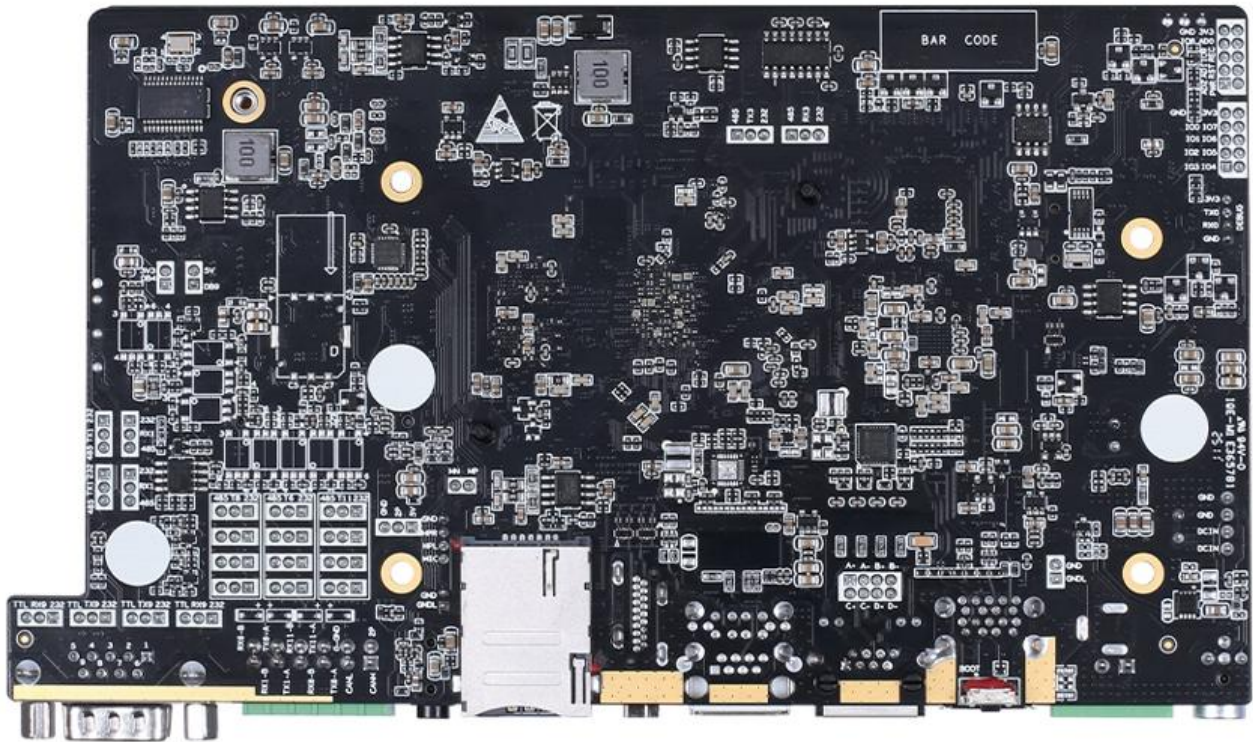
TF Card	Supports TF card
LVDS output	1 single/dual-channel LVDS output
eDP output	It can directly drive eDP interface LCD screens with various resolutions.
HDMI output	1, supports up to 4096x2160@120HZ
Audio and	Supports left and right channel output, with built-in dual 4R/10W and 8R/5W amplifiers
RTC real-time	support
Timed power	support
System upgrade	Supports local USB upgrade

Chapter 3 Product Interface Definition

front



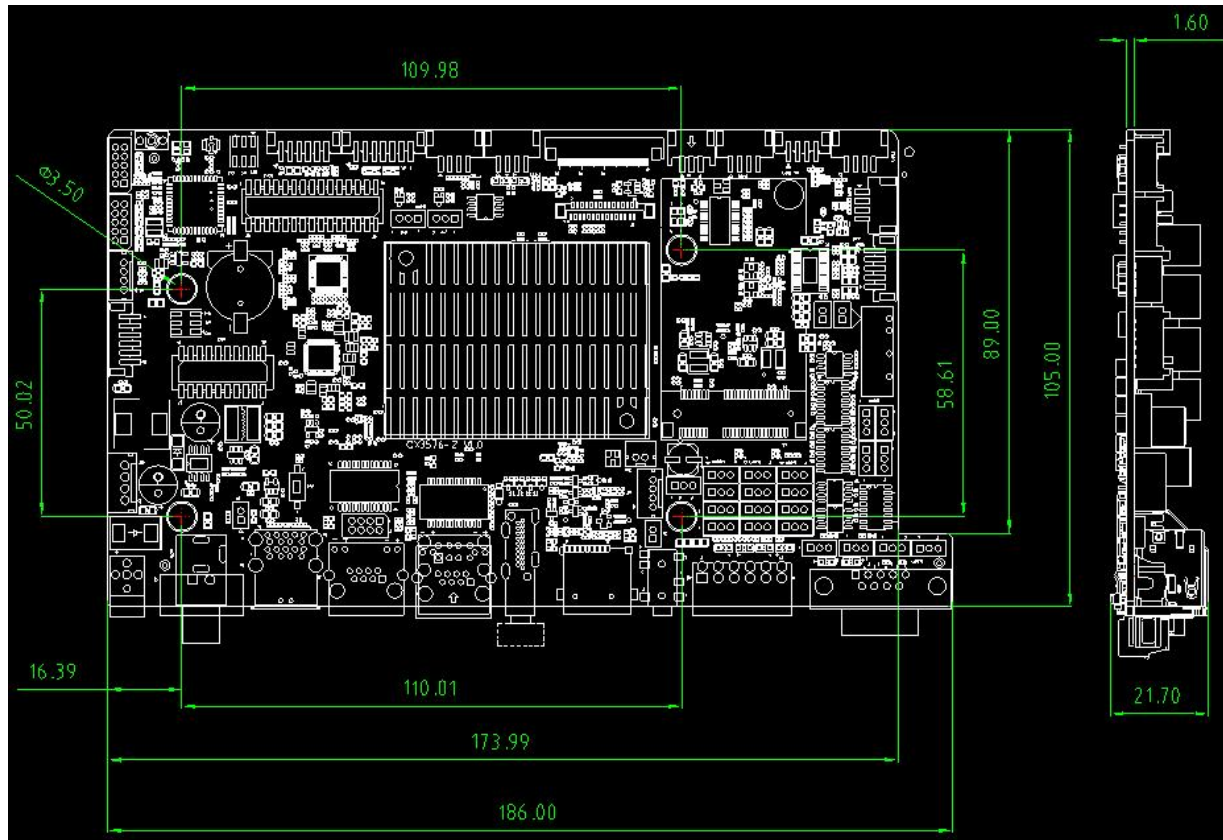
the back



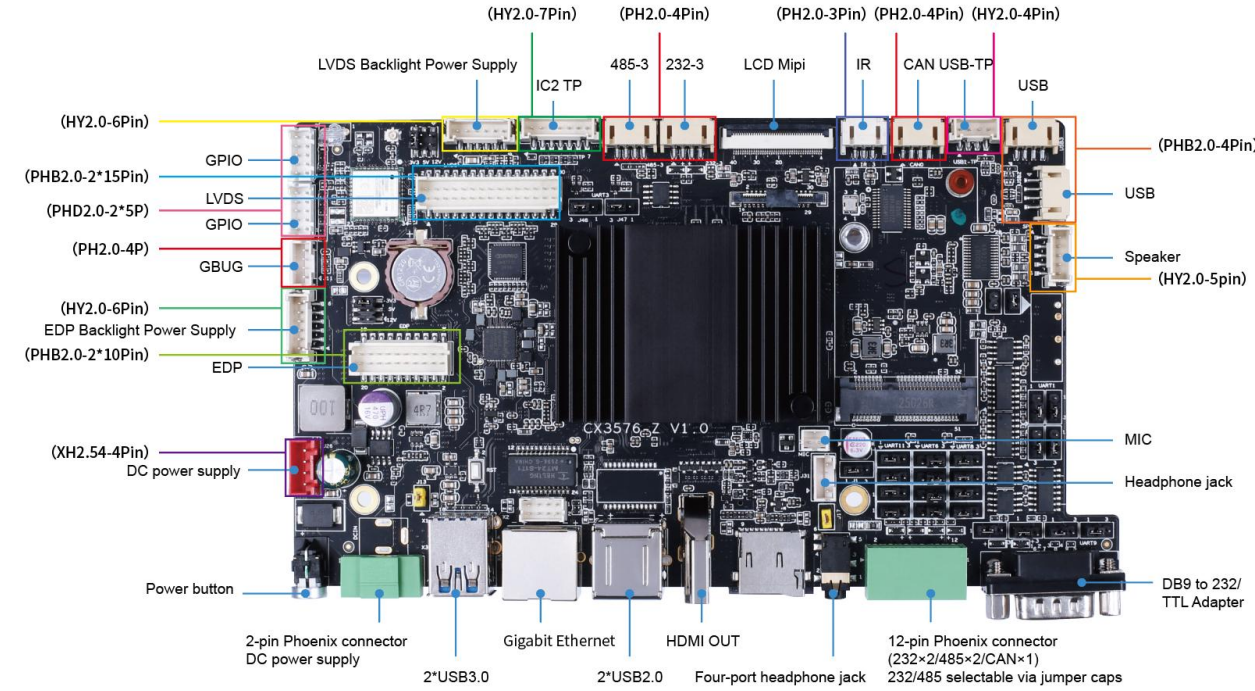
Coastline Interface



◆ 3.1 PCB Dimension Diagram

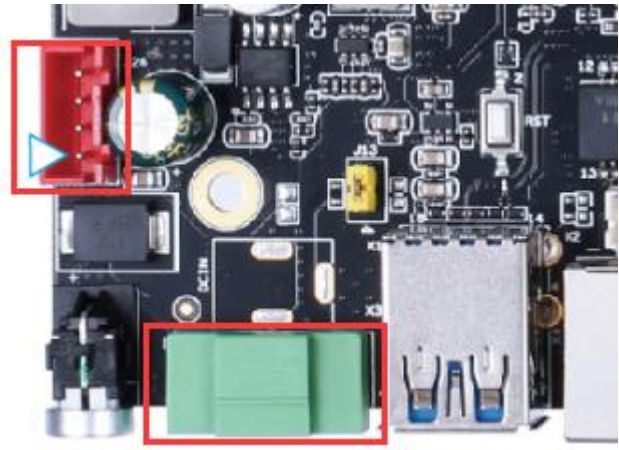


◆ 3.2 Interface Functions



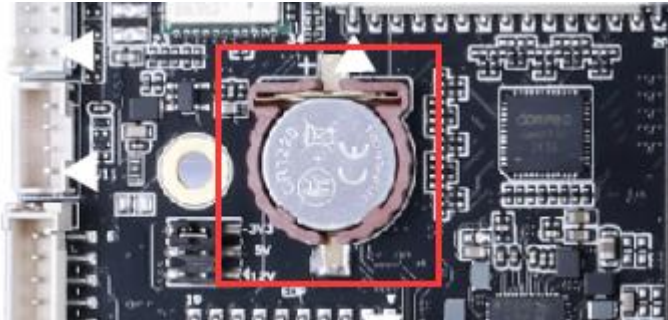
◆ 3.2.1 Power Input Interface

The device operates on a 12V–36V DC power supply, featuring a 3.81 mm pitch 2-pin Phoenix terminal interface and an XH2.54-4PIN socket. Under no-load conditions without connected peripherals, the 12V DC power supply must support a minimum current of 2 A. The power socket interface specifications are as follows:



order number	definition	attribute	description
1	VCC	import	12V-36V input
2	VCC	import	12V-36V input
3	GND	earth wire	earth wire
4	GND	earth wire	earth wire

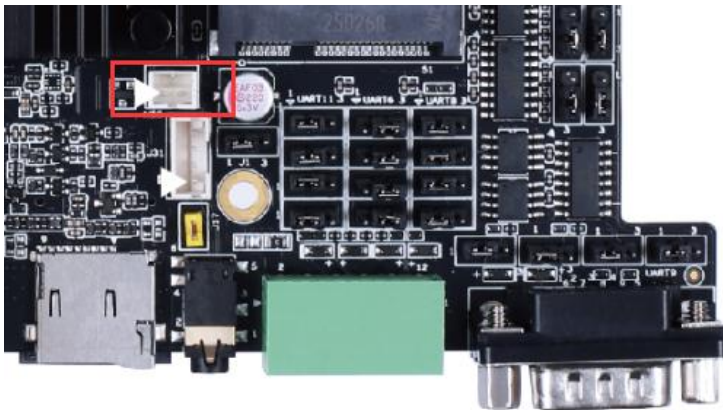
◆ 3.2.2 RTC Battery Holder



Button battery CR1220

Used to power the system clock during power outages.

◆ 3.2.3 MIC Interface



Pay attention to the polarity connection of the MIC; do not reverse it.

order	definition	attribute	description
1	MICP	import	MIC+
2	MICN	import	MIC-

◆ 3.2.4 Remote Control Reception Port



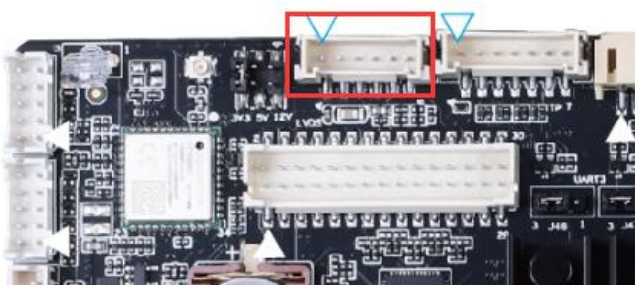
order number	definition	attribute	description
1	IR	import	Remote control signal input
2	GND	earth wire	earth wire
3	3V3	source	3.3V output

◆ **3.2.5 Work indicator light:** By default, it supports dual LED lights with common anode for red and blue illumination.



order number	definition	attribute	description
1	LED_B	blue light	Work Indicator Light
2	VCC	source	3.3V output
3	LED_R	red lantern	Standby indicator light

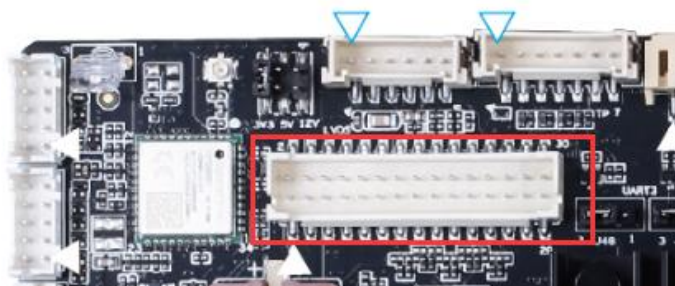
◆ **3.2.6 LVDS backlight control interface**



For backlight control in LVDS displays, the 12V power supply current should not exceed 2A. When using screens larger than 21 inches or when the screen backlight power exceeds 24W, derive the backlight power from an alternative power board to prevent system instability. The backlight enable control level is set at 5V; if a different level is required, incorporate a voltage conversion circuit. This 12V power supply is exclusively intended for backlight output and must not be used as a general power supply for other devices. The socket employs an HY2.0 stand-mounted 6-pin socket with snap-fit connectors.

order number	definition	attribute	description
1	VCC	source	12V output
2	VCC	source	12V output
3	EN	output	Backlight enabled control
4	PWM	output	Backlight brightness control
5	GND	earth wire	earth wire
6	GND	earth wire	earth wire

◆ 3.2.7 LVDS Interface



The universal LVDS interface specification supports single/dual, 6/8-bit 1080P LVDS displays. Display voltage can be selected via a jumper cap, with options for 3.3V, 5V, or 12V power supplies. The LVDS interface employs PHB2.0 surface-mount 2×15 pin sockets featuring snap-fit connectors.

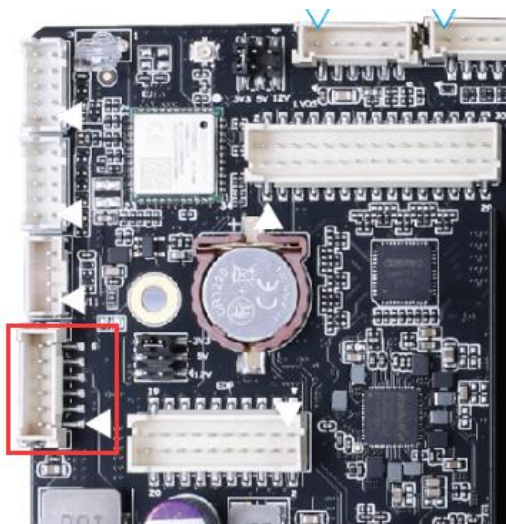
To avoid burning the board and screen, please follow these precautions:

1. Please verify whether the screen specification sheet specifies the correct power supply voltage and whether the board's corresponding power supply can handle the maximum operating current.
2. Use a multimeter to verify whether the power supply selected for the jumper cap is correct.

order number	definition	attribute	description
1	VCC	power output	Liquid crystal power output: +3.3V, +5V, or +12V available
2			
3			
4	GND	earth wire	earth wire
5			
6	GND	earth wire	earth wire
7	D0N	output	Pixel0 Negative Data (Odd)
8	D0P	output	Pixel0 Positive Data (Odd)
9	D1N	output	Pixel1 Negative Data (Odd)
10	D1P	output	Pixel1 Positive Data (Odd)
11	D2N	output	Pixel2 Negative Data (Odd)
12	D2P	output	Pixel2 Positive Data (Odd)
13	GND	earth wire	earth wire
14	GND	earth wire	earth wire
15	CLK0N	output	Negative Sampling Clock (Odd)
16	CLK0P	output	Positive Sampling Clock (Odd)
17	D3N	output	Pixel3 Negative Data (Odd)
18	D3P	output	Pixel3 Positive Data (Odd)
19	D5N	output	Pixel0 Negative Data (Even)

20	D5P	output	Pixel0 Positive Data (Even)
21	D6N	output	Pixel1 Negative Data (Even)
22	D6P	output	Pixel1 Positive Data (Even)
23	D7N	output	Pixel2 Negative Data (Even)
24	D7P	output	Pixel2 Positive Data (Even)
25	GND	earth wire	earth wire
26	GND	earth wire	earth wire
27	CLK1N	output	Negative Sampling Clock (Even)
28	CLK1P	output	Positive Sampling Clock (Even)
29	D8N	output	Pixel3 Negative Data (Even)
30	D8P	output	Pixel3 Positive Data (Even)

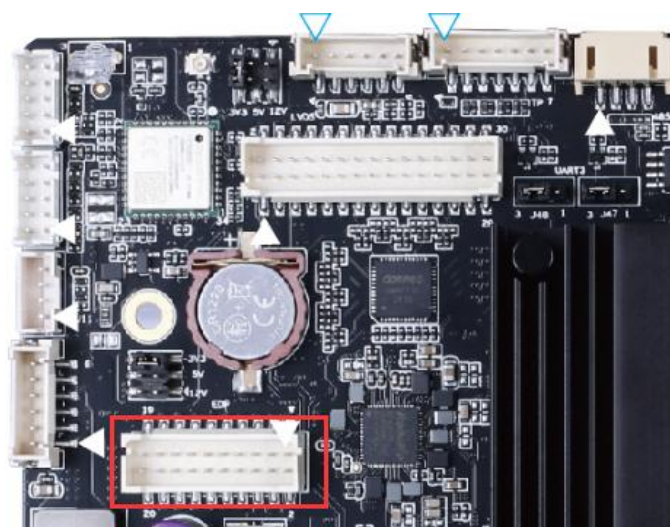
◆ 3.2.8 EDP backlight control interface



For backlight control of EDP screens, the 12V power supply current must not exceed 2A. When using screens larger than 21 inches or screens with a backlight power rating above 24W, the backlight power should be drawn from an alternative power board to prevent system instability. The backlight enable control level is set at 5V; if a different level is required, a level conversion circuit must be added. This 12V power supply is exclusively intended for backlight power output and cannot be used as a general power supply for other devices. The socket employs an HY2.0 stand-mounted 6-pin socket with a snap-fit mechanism.

order number	definition	attribute	description
1	VCC	source	12V output
2	VCC	source	12V output
3	EN	output	Backlight enabled control
4	PWM	output	Backlight brightness control
5	GND	earth wire	earth wire
6	GND	earth wire	earth wire

◆ 3.2.9 EDP Interface

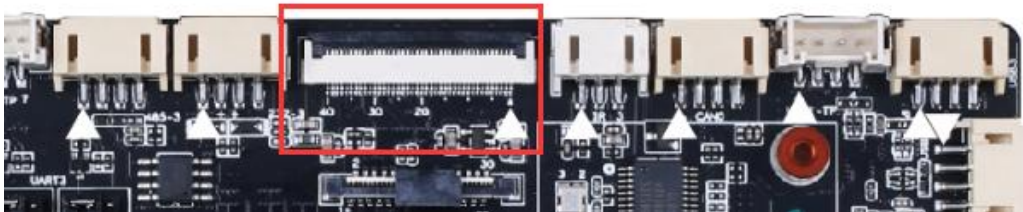


The screen power supply can be selected using the jumper cap, offering options of 12V/5V/3.3V; the EDP interface employs PHB2.0 vertical mounting with a 2×10 pin terminal featuring snap-fit connectors.

order number	definition	attribute	description
1	VCC	power output	Liquid crystal power output: +3.3V, +5V, or +12V available
2			
3	GND	earth wire	earth wire
4			
5	TX0P	output	EDP Pixel0 Positive Data (Odd)
6	TX0N	output	EDP Pixel0 Negative Data (Odd)
7	TX1P	output	EDP Pixel1 Positive Data (Odd)
8	TX1N	output	EDP Pixel1 Negative Data (Odd)
9	TX2P	output	EDP Pixel2 Positive Data (Odd)
10	TX2N	output	EDP Pixel2 Negative Data (Odd)
11	TX3P	output	EDP Pixel3 Positive Data (Odd)

12	TX3N	output	EDP Pixel3 Negative Data (Odd)
13	GND	earth wire	earth wire
14	GND	earth wire	earth wire
15	AUXP	output	EDP AUX Positive Data (Odd)
16	AUXN	output	EDP AUX Negative Data (Odd)
17	GND	earth wire	earth wire
18			
19			
20	HPD	import	EDP DETECT

◆ 3.3.0 MIPI Screen Interface

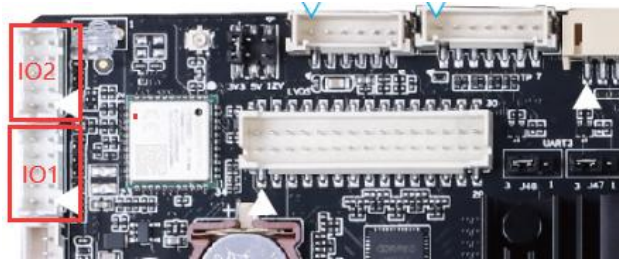


The MIPI interface supports single-channel MIPI LCD displays and a 4-wire MIPI interface.

order number	definition	attribute	description
40	NC	-	Not connect
39	VDD	source	Digital power
38	VDD	source	Digital power
37	GND	the earth	Ground
36	REST	output	Global reset pin
35	NC	-	Not connect
34	GND	the earth	Ground
33	D0N	output	Negative MIPI differential data output
32	D0P	output	Positive MIPI differential data output
31	GND	the earth	Ground
30	D1N	output	Negative MIPI differential data output
29	D1P	output	Positive MIPI differential data output
28	GND	the earth	Ground
27	CLKN	output	Negative MIPI differential data output
26	CLKP	output	Positive MIPI differential data output
25	GND	the earth	Ground

24	D2N	output	Negative MIPI differential data output
23	D2P	output	Positive MIPI differential data output
22	GND	the earth	Ground
21	D3N	output	Negative MIPI differential data output
20	D3P	output	Positive MIPI differential data output
19	GND	the earth	Ground
18	NC	-	Not connect
14	NC	-	Not connect
16	GND	the earth	Ground
15	NC	-	Not connect
14	NC	-	Not connect
13	NC	-	Not connect
12	NC	-	Not connect
11	GND	the earth	Ground
10	LED-	source	LED Cathode
9	LED-	source	LED Cathode
8	NC	-	Not connect
7	NC	-	Not connect
6	NC	-	Not connect
5	NC	-	Not connect
4	NC	-	Not connect
3	NC	-	Not connect
2	LED+	source	LED Anode
1	LED+	source	LED Anode

◆ 3.3.1 IO Interface



IO1 Interface

An input/output for providing control signals to peripherals, operating at 3.3V level.

order number	definition	attribute	description
1	IO3	source	I/O 3
2	IO4	import	I/O 4
3	IO2	Input/Output	I/O 2
4	IO 5	Output/Input	I/O 5
5	IO 1	Input/Output	I/O 1
6	IO 6	Input/Output	I/O 6
7	IO 0	Input/Output	I/O 0
8	IO 7	Input/Output	I/O 7
9	GND	earth wire	earth wire
10	3V3	source	3V3 power output

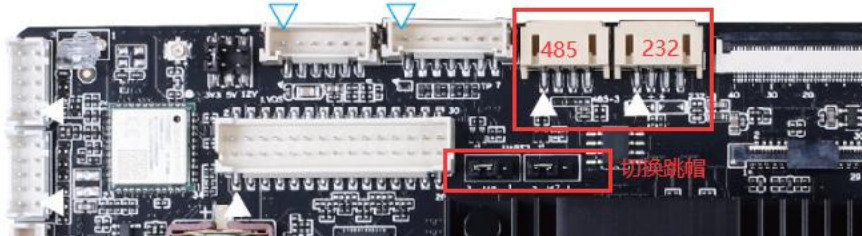
IO2 Interface

In addition to the standard 3.3V IO port, it features a 12-bit AD analog signal input requiring a voltage level below 1.8V; the socket also includes power-on/off and reset signal pins.

order number	definition	attribute	description
1	AD2	analog input	Analog signal input pin: level below 1.8V
2	PWR	import	Switching signal input
3	AD1	analog input	Analog signal input pin: level below 1.8V
4	RST	import	Reduction signal input
5	IO9	Input/Output	I/O 9
6	RECOVERY	import	Upgrade signal input
7	IO8	Input/Output	I/O 8

8	AD0	analog input	Analog signal input pin: level below 1.8V
9	GND	earth wire	earth wire
10	3V3	source	3V3 power output

◆ 3.3.2 3.3.2 Single RS232/RS485 Switchable Interface



The board features RS232 and RS485 interfaces (Interface 1: 232; Interface 1: 485), which can be switched between RS232 and RS485 using a jumper cap.

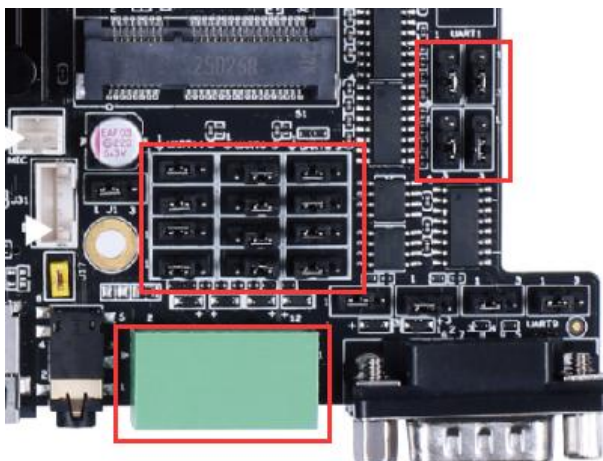
RS232 Interface Definition

order number	definition	attribute	description
1	GND	earth wire	earth wire
2	232-RX	import	RX-3
3	232-TX	output	TX-3
4	VCC	source	5V output

RS485 Interface Definition

order number	definition	attribute	description
1	GND	earth wire	earth wire
2	485B	Input/Output	485B-3
3	485A	Input/Output	485A-3
4	VCC	source	3V3 output

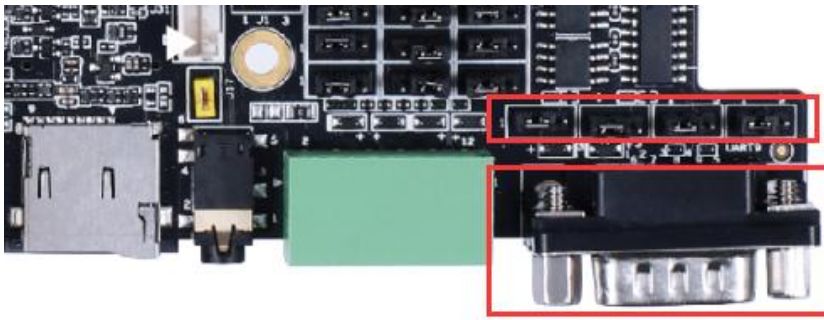
◆ 3.3.3 2×6-pin Phoenix terminal with 3.5 mm spacing



The coastline features a 2×6 pin phoenix terminal with 3.5 mm spacing, equipped with four RS232/RS485 interfaces (switchable via a jumper cap) and one CAN interface.

order number	definition	attribute	description
1	CANH	signal	CAN-H
2	VCC/GND	Power Output/Digital Ground	Without isolation: 5V output / With isolation: digital ground
3	CANL	signal	CAN-L
4	GL-GND	Isolation Zone	Isolation zone (without isolation is a digital zone)
5	RS232TX/RS485A	Ttys8 signal	232-TX/485-A (default RS232)
6	RS232TX/RS485A	Ttys11 signal	232-TX/485-A (default RS232)
7	RS232RX/RS485B	Ttys8 signal	232-RX/485-B (default RS232)
8	RS232RX/RS485B	Ttys11 signal	232-RX/485-B (default RS232)
9	RS232TX/RS485A	Ttys1 signal	232-TX/485-A (default RS485)
10	RS232TX/RS485A	Ttys6 signal	232-TX/485-A (default RS485)
11	RS232RX/RS485B	Ttys1 signal	232-RX/485-B (default RS485)
12	RS232RX/RS485B	Ttys6 signal	232-RX/485-B (default RS485)

◆ 3.3.4 DB9 Interface

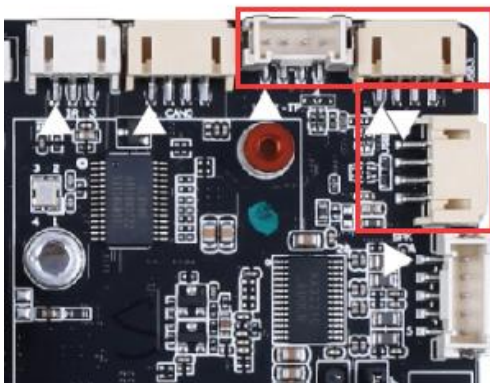


DB9 is a set of RS232 and TTL signals that can be switched via a jump cap; in Figure 4 below, when all jump caps are inserted on the left, they represent RS232 signals, while when all are inserted on the right, they represent TTL signals.

Serial port mapping port number:

order number	definition	attribute	description
1	NC	NC	NC
2	232-RX/TTL -RX	import	RS232-RX/TTL-RX (default RS232)
3	232-TX/TTL -TX	output	RS232-TX/TTL-TX (default RS232)
4	3V3	source	By default, skip the cap selection
5	GND	the earth	the earth
6	NC	NC	NC
7	NC	NC	NC
8	NC	NC	NC
9	5V	source	By default, the skip cap is selected

◆ 3.3.5 USB 2.0 socket

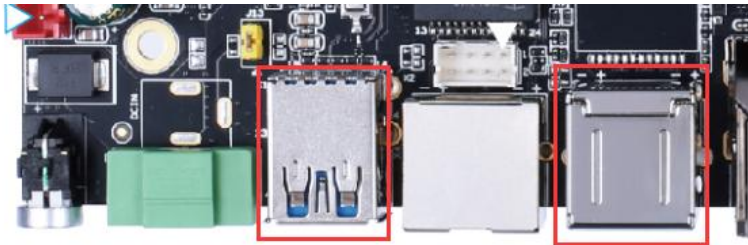


The board features three USB 2.0 sockets for peripheral expansion, with HOST as the default setting and

each power supply current not exceeding 500 mA. Among them, USB 1-TP is a snap-fit socket specifically designed for USB TP interfaces.

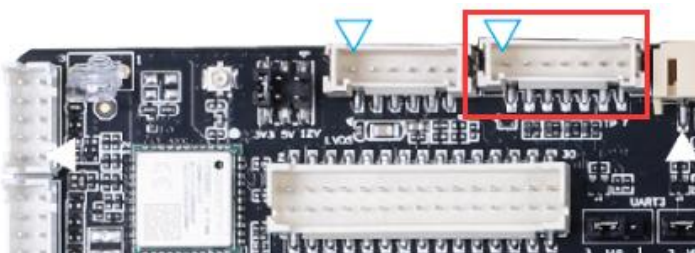
order number	definition	attribute	description
1	GND	earth wire	earth wire
2	DP	Input/Output	DP
3	DM	Input/Output	DM
4	VCC	source	5V output

◆ 3.3.6 USB 3.0 and USB 2.0 Coastline Standard dual-layer Type-A ports



The board features two dual-layer Type-A USB 3.0 ports—one designated for HOST and the other for OTG; two dual-layer Type-A USB 2.0 HOST ports; the USB 3.0 ports support backward compatibility with USB 2.0 and enable data storage, data import, USB mouse and keyboard connectivity, camera integration, and touchscreen functionality.

◆ 3.3.7 Touchscreen Interface

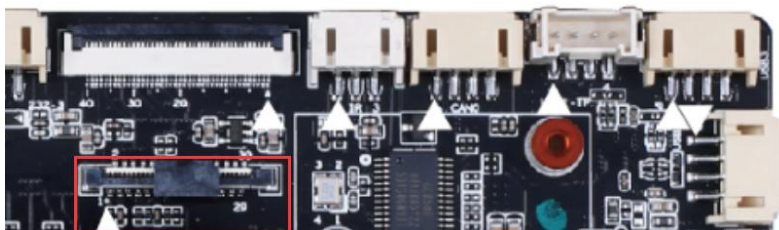


The touchscreen features a 7-pin socket with a snap-fit mechanism.

order number	definition	attribute	description
1	VCC	source	3.3V output
2	SCK	Input/Output	I2C clock
3	SDA	Input/Output	I2C data
4	INT	Input/Output	suspend
5	RST	Input/Output	reset

6	GND	earth wire	earth wire
7	NC	NC	NC

◆ 3.3.8 Camera_IN interface

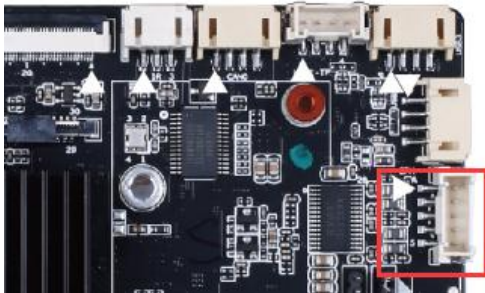


The board supports a 13-megapixel MIPI camera. The electrical specifications of the socket are as follows:

order number	definition	attribute	description
1	NC	/	/
2	VDD	source	2.8V output
3	DVDD	source	1.2V output
4	DOVDD	source	1.8V output
5	NC	/	/
6	GND	earth wire	earth wire
7	VDD	source	2.8V output
8	GND	earth wire	earth wire
9	I2C3_SDA	Input/Output	SDA signal
10	I2C3_SCL	output	SCL signal
11	RST	output	reset signal
12	PWDN	output	Power outage control
13	GND	earth wire	earth wire
14	MCLK	output	master clock
15	GND	earth wire	earth wire
16	D3P	Input/Output	MIPI Data Channel 3 Positive
17	D3N	Input/Output	MIPI Data Channel 3 Negative
18	GND	earth wire	earth wire
19	D2P	Input/Output	MIPI Data Channel 2 Positive
20	D2N	Input/Output	MIPI Data Channel 2 Negative
21	GND	earth wire	earth wire
22	D1P	Input/Output	MIPI Data Channel 1 Positive
23	D1N	Input/Output	MIPI Data Channel 1 Negative

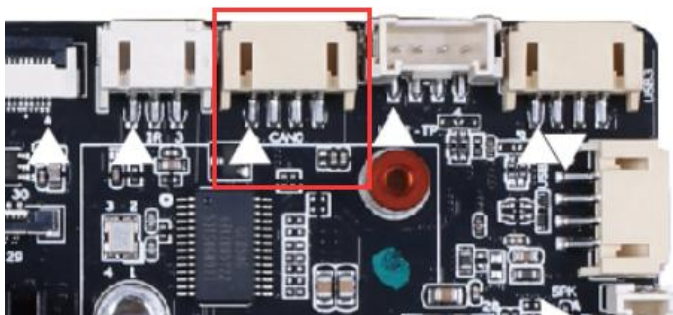
24	GND	earth wire	earth wire
25	CLKP	Input/Output	MIPI clock channel positive
26	CLKN	Input/Output	MIPI clock channel negative
27	GND	earth wire	earth wire
28	D0P	Input/Output	MIPI Data Channel 0 Positive
29	D0N	Input/Output	MIPI Data Channel 0 Negative
30	GND	earth wire	earth wire

◆ 3.3.9 Speaker Interface



order number	definition	attribute	description
1	NC	NC	NC
2	OUP-L	output	Left audio output +
3	OUP-L	output	Left audio output-
4	OUP-R	output	Right audio output-
5	OUP-R	output	Right audio output +

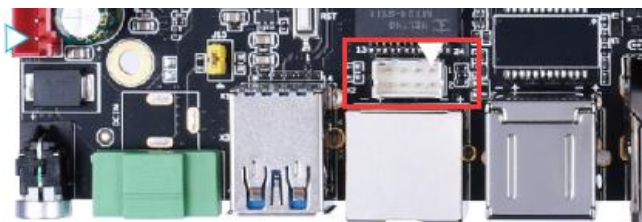
◆ 3.4.0 Board Internal CAN Port



order	definition	attribute	description
1	GND	the earth	the earth
2	CANH	High-end signal	CAN Gao
3	CANL	Low-end signal	CAN low
4	VCC5V	source	5V power supply output

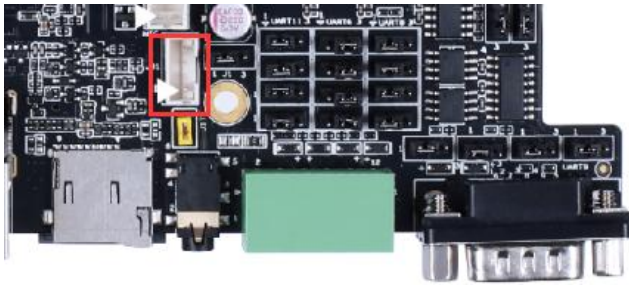
◆ 3.4.1 Ethernet and Expansion Ports

The board supports one Gigabit Ethernet port and an expansion interface for our POE module, with the interfaces defined as follows:



order number	definition	attribute	description
1	DA+	RJ45 signal	DA+ signal
2	DC+	RJ45 signal	DC+ signal
3	DA-	RJ45 signal	DA- signal
4	DC-	RJ45 signal	DC- signal
5	DB+	RJ45 signal	DB+ signal
6	DD+	RJ45 signal	DD+ signal
7	DB-	RJ45 signal	DB- signal
8	DD-	RJ45 signal	DD- signal

◆ 3.4.2 Headphone expansion interface



order number	definition	attribute	description
1	MIC	speech input	Microphone Input
2	HPR	audio frequency	Right channel output
3	HPL	audio frequency	Left channel output
4	GND	Digital Space	the earth

◆ 3.4.3 Debug Interface



The TTL interface is used for debugging.

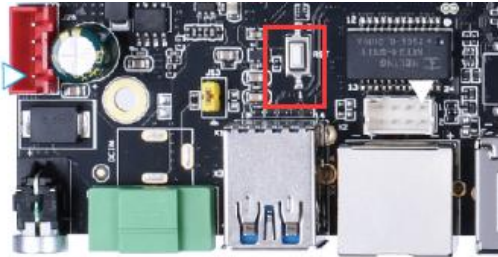
order	definition	attribute	description
1	GND	earth wire	earth wire
2	UART-RX	import	RX
3	UART-TX	output	TX
4	VCC	source	3.3V output

◆ 3.4.4 Key Description

Power switch button



Reduction button



Upgrade using the side button

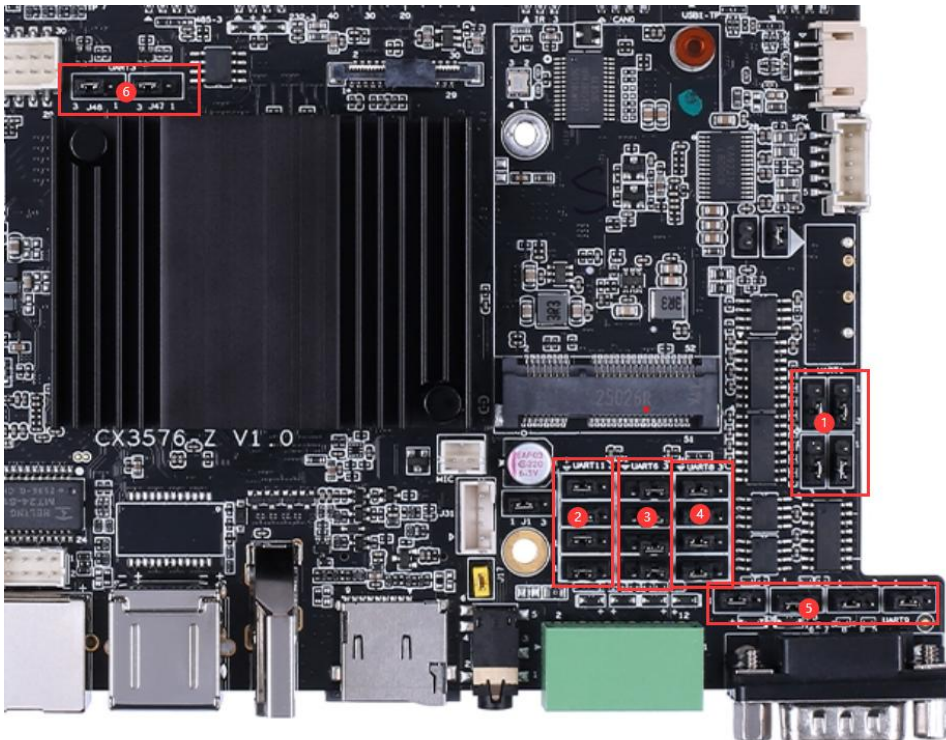


◆ 3.4.5 Other Standard Interfaces and Functions

memory interface	TF Card	Data storage: Currently tested up to 128 GB.
	USB standard port	The USB Type-A interface is described on the front.
HDMI port	standard interface	Supports HDMI data output, with maximum resolution of 4K/120Hz
Headphone interface	standard interface	3.5mm standard interface
4G interface	PCI-E standard interface	Supports standard 4G modules such as Quectel
SIM card slot	standard interface	Supports various formats (depending on the 4G module)



3.4.6 Instructions for Using the Serial Port Jump Cap



The labels 1, 2, 3, 4, 5, and 6 in the figure correspond to jumping to serial ports ttyS1, ttyS11, ttyS6, ttyS8, ttyS9, and ttyS3.

A jump of 1–2 steps corresponds to RS232, while a jump of 2–3 steps corresponds to RS485 or TTL.

Default jump method: Identifier 1 and 3 jump 2–3 pins (default RS485); Identifier 2 and 4 jump 1–2 pins (default RS232).

The jump caps labeled 1, 2, 3, and 4 in the figure above correspond to the pins of the Phoenix terminal as shown below.

The right leg of each identification box is RX/B, and the left leg is TX/A.



Charpter 4 behaviour of electricity

project		minimum	typical case	maximum
Power Parameter	voltage	--	12V	36V
	ripple wave	--	--	100mV
	Current			
Power supply current (HDMI output, no other peripherals connected)	12V operating current	--	500mA	1000mA
	Standby current	--		
	USB supply current	--	--	500mA
Power supply current (LVDS)	3.3V operating current			
	5V operating current			
	12V operating current			
	USB supply current	--	--	
Power supply current (eDP)	3.3V operating current			
	5V operating current	--		
	12V operating current	--		
	USB supply	--	--	

	current			
static electricity	Contact Discharge			8KV
	Air discharge			15KV
environment	relative humidity	--	--	80%
	working temperature	-20°C	--	70°C
	Storage temperature	-30°C		80°C

Note 1: When connecting to an LVDS display, ensure you select the correct backlight operating voltage (3.3V, 5V, or 12V). Do not use this device with peripherals exceeding their respective maximum current ratings.

Note 2: When connecting to an eDP/LVDS display, the board's total operating current and standby current depend on the specific display model; these values are not listed in detail in the table above.

Chapter 5 Assembly and Usage Precautions

During assembly and use, please pay attention to the following (but not limited to) issues.

1. The issue of short circuits between the bare board and peripheral devices;
2. During installation and fixation, prevent deformation of the bare plate caused by securing forces.
3. When installing the eDP/LVDS panel, verify that the panel voltage and current specifications are met, and ensure the orientation of pin 1 on the panel base is correct.
4. When installing the eDP/LVDS display, verify that the backlight voltage and current meet the specified requirements. If the backlight power exceeds 24W, ensure an alternative power supply board is used for power delivery.
5. When installing peripherals (USB, IO, etc.), pay attention to their IO voltage levels and current output specifications.
6. During serial port installation, verify that the 232 and 485 devices are connected directly and that the TX and RX connections are correct.

Check whether the input power is connected to the power input interface and verify that the input voltage and current meet the specified requirements based on the overall peripheral assessment. Avoid connecting the power supply to the backlight socket for operational convenience.