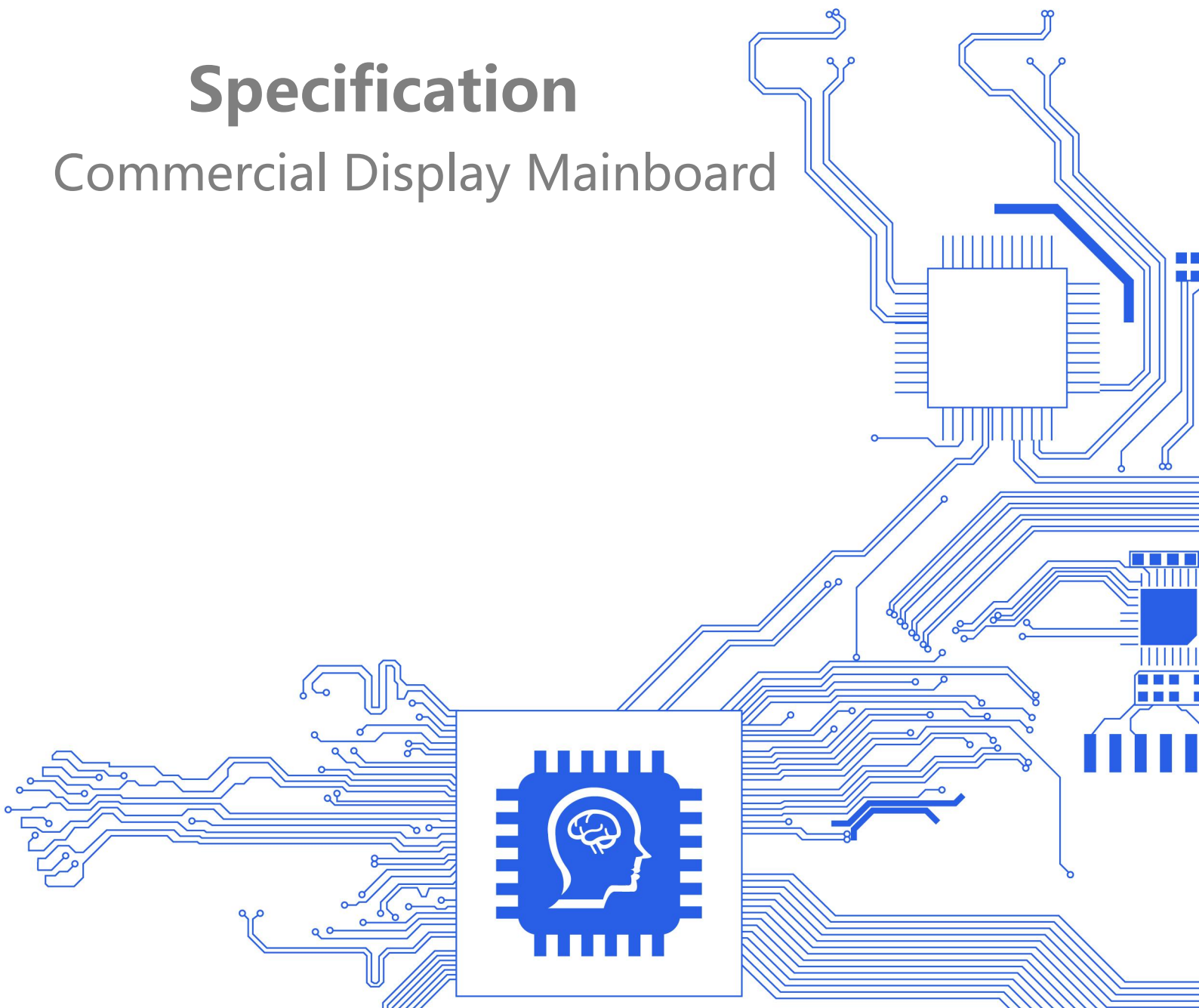
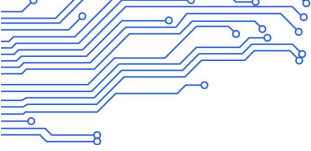


AIoT-3576E-V1.0

Specification

Commercial Display Mainboard





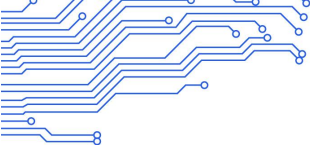
Document modification history

Version	Revision content	Revision	Audit	Date
V1.0	Initial version	Huang Chusheng	XXX	2024-7-1

Statement

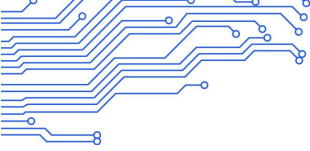
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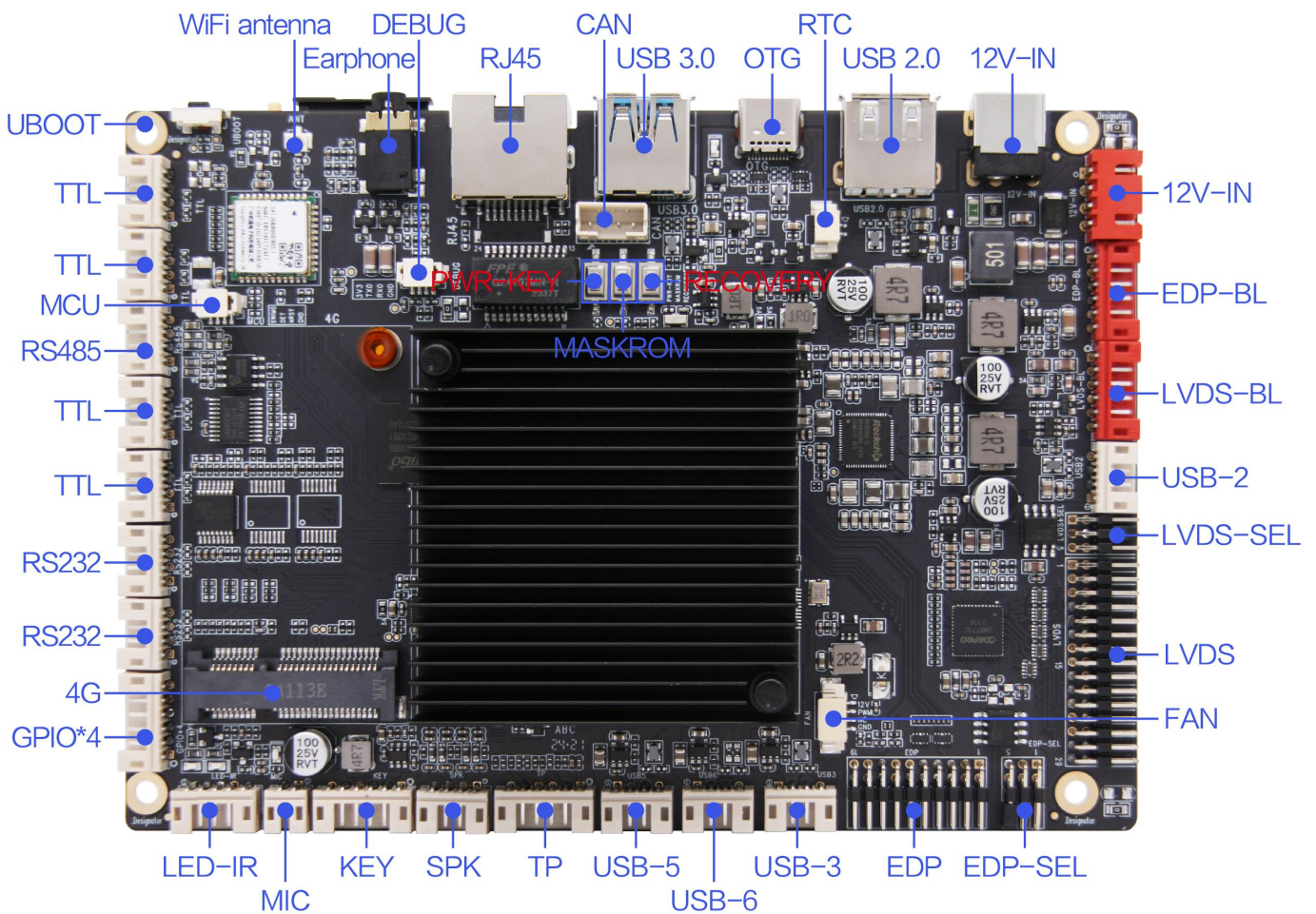
Chapter 1 Product Introduction

1.1 Scope of application

This product is an AI terminal motherboard, powered by an RK3576 octa-core processor with a maximum clock speed of up to 2.2GHz. It is equipped with a built-in AI accelerator NPU capable of delivering up to 6TOPS of computing power, supporting the latest large-model engine Transformer architecture for hardware acceleration and various deep learning frameworks. Running on Android 14.0, it also supports Linux/OpenHarmony operating systems. Featuring 4K@120Hz ultra-high-definition display capabilities and an abundance of expansion interfaces, this motherboard is primarily designed for applications in edge computing, AI robots, AI cloud servers, and various high-performance edge-side AIoT devices.

1.2 Appearance and interface diagram

Front/Back:



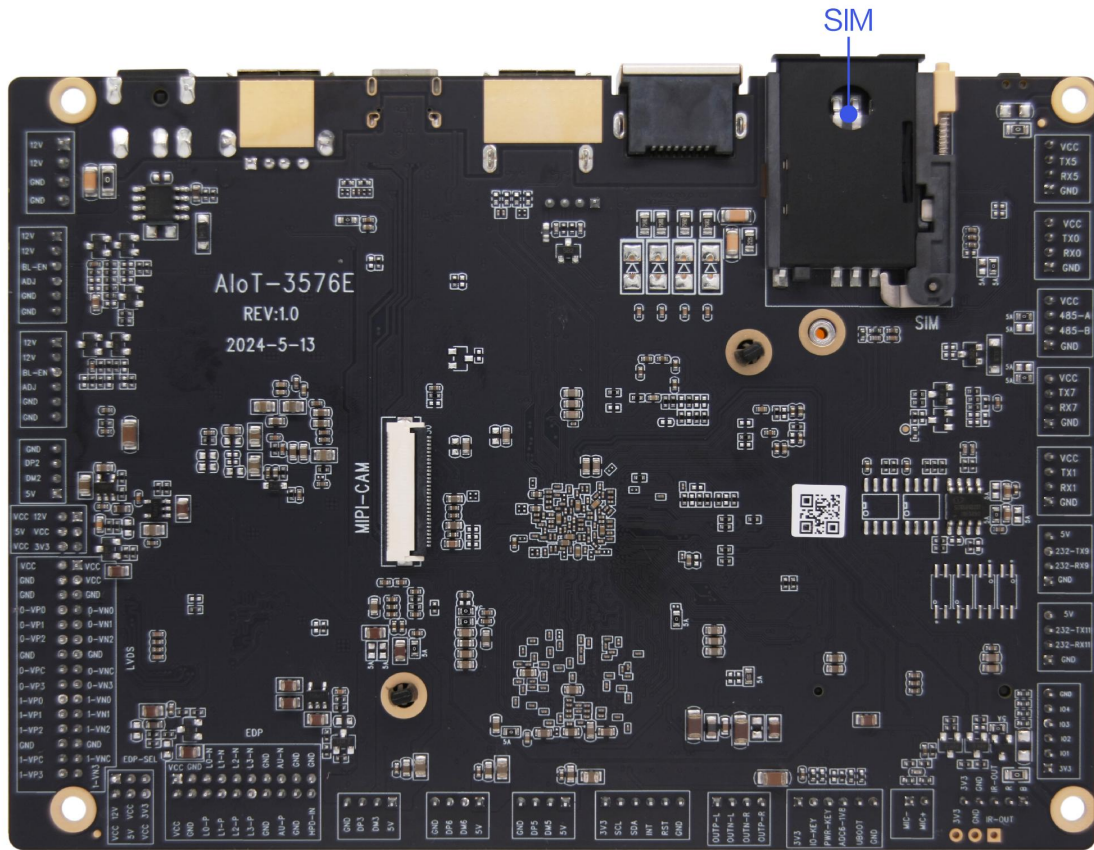
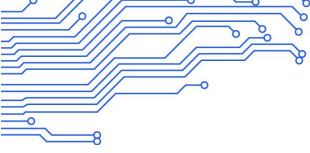
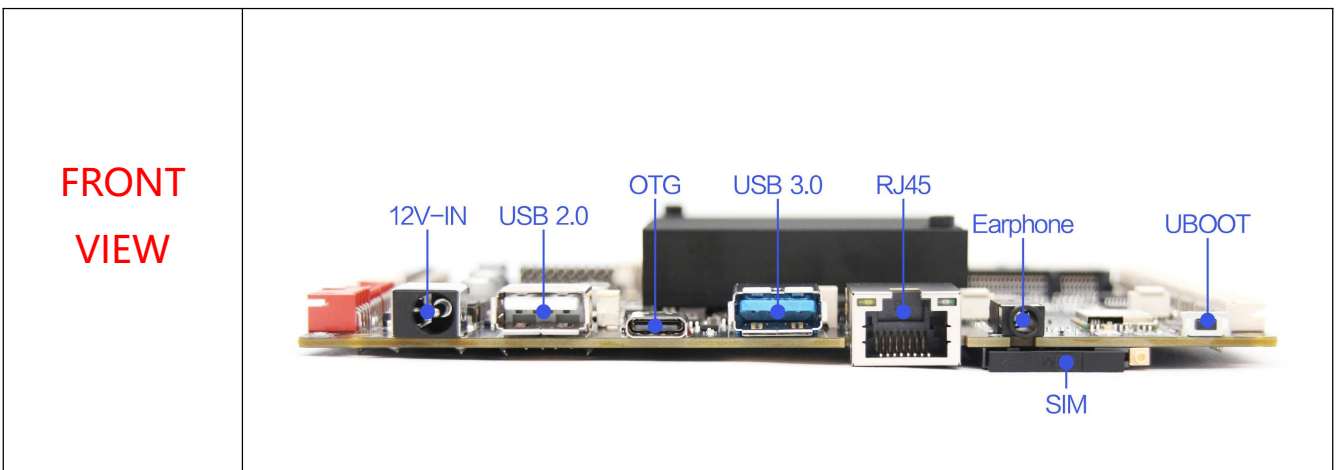
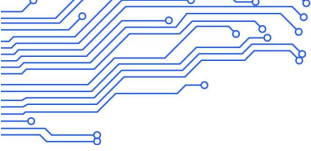


Photo Disclaimer: The above photos are taken of a specific batch of boards produced by our company. As our products are continuously under maintenance, there might be slight differences between the actual shipped boards and the photos.

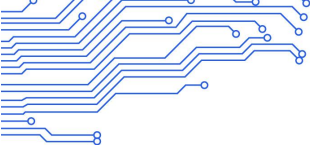
Front view:





Chapter 2 List of Basic Functions

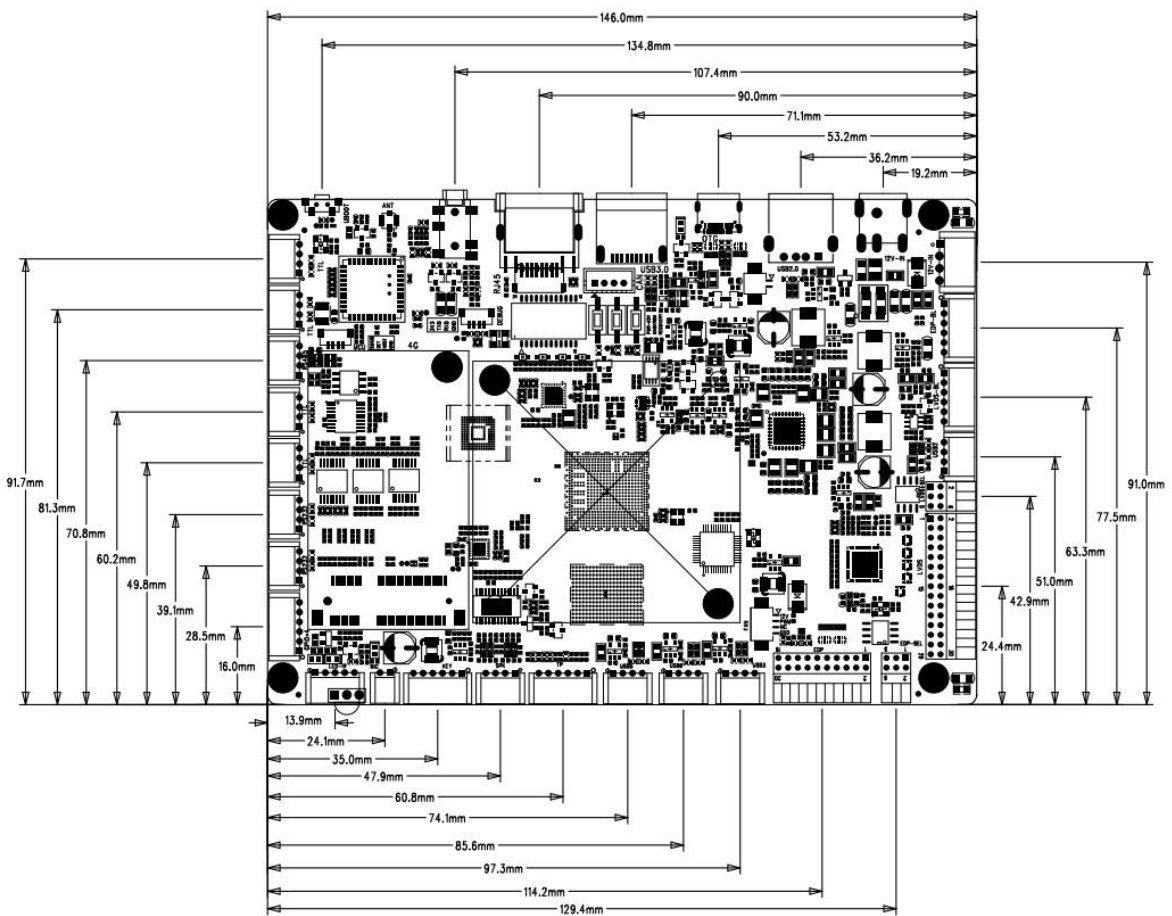
Main functional parameters	
Size	146 x104mm
CPU	RK3576, octa-core (4*Cortex-A72 + 4* Cortex-A53) , Main frequency up to 2.2GHz
GPU	ARM Mali G52 MC3
NPU	6 TOPS
Operating system	Android 14
RAM/Storage	Standard 4G (2G/8G optional)/Standard 32G (16/64/128G optional)
Built-in ROM	2KB EEPROM (without by default, optional)
DP output	One DP output through the Type-c (OTG) port for 1/2/4 lanes at rates of 1.62/2.7/5.4 and 8.1Gbps, with the highest resolution of 4kx2k@120Hz
LVDS output	1 channel, support single/double 6-8bit, can directly drive 50/60Hz LCD screen, the maximum resolution support 1920*1080@60Hz
eDP output	1 channel, can directly drive eDP interface LCD screens with multiple resolutions. Actual test supports 1920*1080, while the chip specs allow up to 4K@60Hz.
Audio input/output	Speaker output (Support left and right channel output. The default is 6W. Can be configured with 10W, need to change the resistor) , MIC IN*1
Headphone output	Support for one 3.5mm four-pole earphone interface
USB port	1 Type-c OTG 1 USB3.0 HOST 5 USB2.0 HOST
Serial port	2*RS232, (2 channels can be configured as TTL) 1*485 port, (configurable as TTL) 4*TTL port, (2 channels can be configured as RS232)
I2C port	1 channel, can be connected to I2C interface TP or peripherals
Network support	1. Support 10/100/1000M adaptive Ethernet 2. Built-in Wi-Fi, support Bluetooth 3. Built-in MINI PCI-E interface, can support 4G Internet access, do not support analog or digital calls
Storage	Support U disk, extended storage, not support TF card
RTC real-time clock	Support low power consumption
System upgrade	Support local USB upgrade



Optional function	1 CAN port 1 MIPI camera port
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Chapter 3 PCB Dimensions and Interface Layout

3.1 PCB size chart



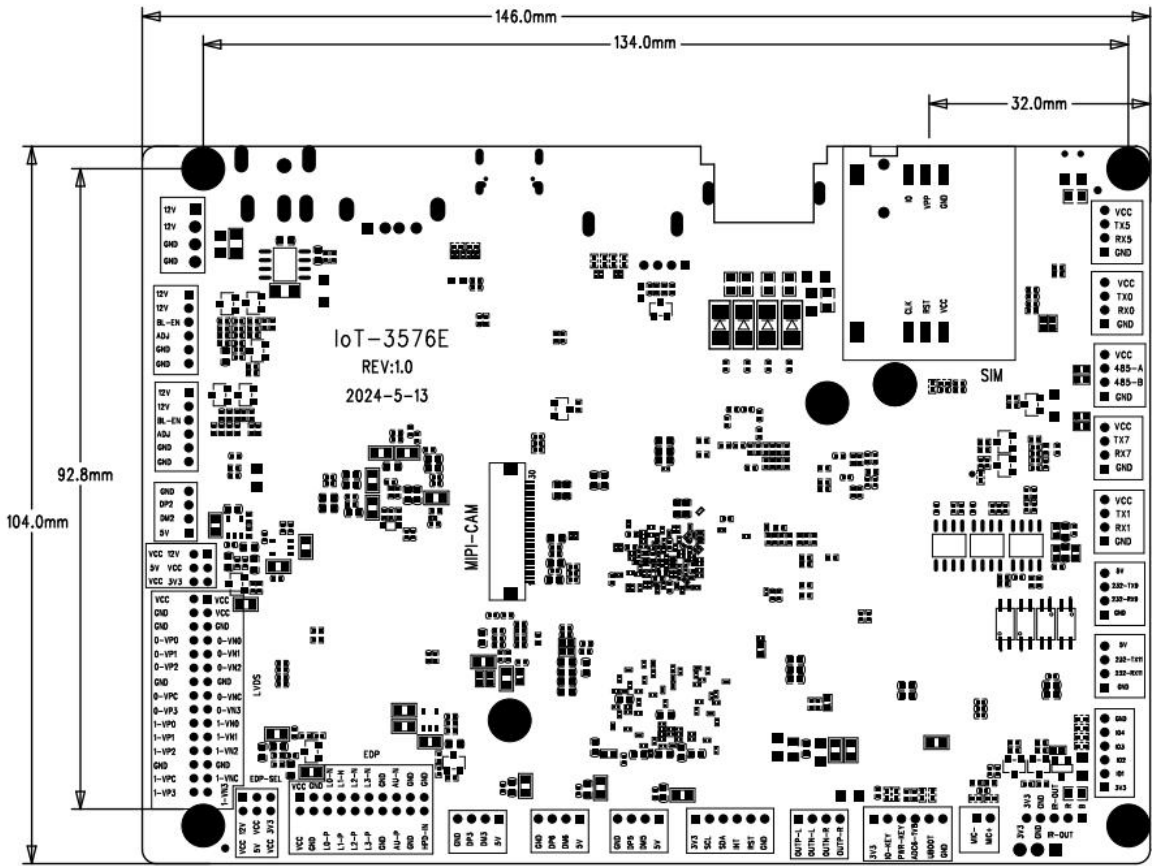
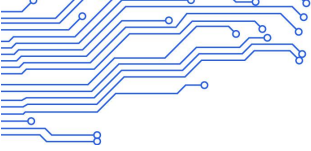


Photo Disclaimer: The above photos are taken of a specific batch of boards produced by our company. As our products are continuously under maintenance, there might be slight differences between the actual shipped boards and the photos.

PCB: 8 layers of board, board thickness 1.6mm

PCBA: L * W=146mm*104mm, MAX H=11.0+/-0.3mm (Without 4G Functionality)

Specification of screw hole: ϕ 3.2mm x 4



3.2 Interface Parameter Description

Picture Annotation Notes: The “○” in the circle on the socket interface picture indicates the first pin.

Power input interface (4pin/2.54mm)

Function Description: The board is powered by a 12V DC power supply, and power is only allowed to be supplied to the board subsystem through the DC jack and power socket. The DC IN specification for the power adapter plug is D6.0, d2.0. When there is no peripheral device connected and the load is empty, the 12V DC power supply needs to support a minimum current of 600mA.

The electrical definition of the power input socket is as follows:

Number	Definition	Attributes	Description	
1	12V	Input	12V Input	
2	12V	Input	12V Input	
3	GND	Ground wire	Ground wire	
4	GND	Ground wire	Ground wire	

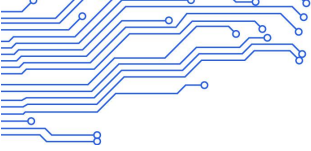
Precautions:

1. The power interface specifications must comply with the DC socket model. By default, the DC socket has a hole diameter of 6.0mm and a copper pin outer diameter of 2.0mm, which is designed to mate with a DC plug having an outer diameter of 5.5mm and an inner hole diameter of 2.1mm.
2. The voltage fluctuation range at the DC socket and 4-pin power input port should not exceed 10% of the standard input voltage of 12V. Exceeding this limit may affect the stability of the motherboard operation.
3. It is recommended to use a power supply board or adapter that meets 3C standards. The selected adapter's rated output power should be sufficient to power both the motherboard and peripherals simultaneously, with an additional 30%-50% margin. In other words, when the total current requirement reaches 1.5A, an adapter rated for 2.5A-3A should be selected.

USB interface (4pin/2.0mm*4)

Function Description: The motherboard is equipped with 3 USB standard ports (1 TYPE-C, 1 USB3.0, 1 USB 2.0) and 4 built-in USB sockets for peripheral expansion. By default, these sockets operate as HOST, with a power supply current of 1A.

The electrical specifications for the USB sockets are defined as follows:



Number	Definition	Attributes	Description	
1	VCC	power supply	5V Output	
2	DM	input/output	DM	
3	DP	input/output	DP	
4	GND	Ground wire	Ground wire	

Precautions:

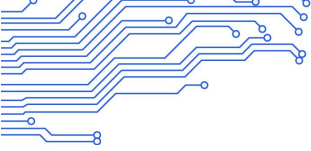
1. Verify the definition of the USB terminal wires before use to avoid reversing the power and ground connections, which could potentially damage peripherals and the motherboard.
2. Keep the length of USB peripheral cables as short as possible, just sufficient for your usage needs. Avoid using excessively long USB cables as they may cause stability issues during the use of peripherals.
3. Since the signals within USB cables are high-speed differential signals, it is recommended to use USB cables with braided shielding layers. This can significantly enhance the device's anti-interference capability and improve its stability.

USB port description:

Number	Screen print/serial number	Default supply current	Whether the power supply is controllable	Corresponding nodes
1	OTG	1A	Controllable	OTG
2	USB2.0	1A	Controllable	HUB USB7
3	USB3.0	1A	Controllable	HUB USB1
4	USB-2	1A	Controllable	HUB USB2
5	USB-3	1A	Controllable	HUB USB3
6	USB-5	1A	Controllable	HUB USB5
7	USB-6	1A	Controllable	HUB USB7


LVDS Backlight control interface (6pin/2.0mm)

Used for backlight control of LVDS screens, the 12V power supply current should not exceed 1.5A. When using screens larger than 19 inches or with backlight power exceeding 20W, it is recommended to draw power for the backlight from a separate power board to avoid system instability. **The 12V power source**



in the backlight socket should only be used as an output for backlight power and must not be used as a power input to the motherboard.

Number	Definition	Attributes	Description
1	12V	power supply	12V Output
2	12V	power supply	12V Output
3	BL-EN	Output	Backlight enable control
4	ADJ	Output	Backlight brightness ADJ control
5	GND	Ground wire	Ground wire
6	GND	Ground wire	Ground wire



Precautions:

- 1) The 12V power supply in this socket is exclusively for backlight output and must not be used as a power input to supply the system.
- 2) The LVDS dimming method defaults to ADJ. Please select the dimming method according to the specifications stated in the manual of the screen you have chosen.
- 3) Switching between ADJ and PWM can be achieved by modifying the hardware. Please consult FAE if you have a need for such a change.
- 4) Due to the limited width of the motherboard's power traces, the design typically only considers the load of the motherboard itself. **Therefore, when using screens larger than 19 inches or screens with backlight power exceeding 20W,** it is recommended to draw power for the backlight from a separate power board to avoid system instability.

LVDS screen interface (15pin*2/2.0mm)

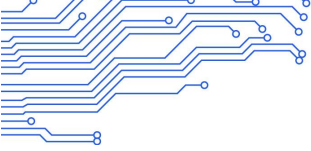
Universal LVDS Interface Definition: Supports single/dual, 6/8-bit 1080P LVDS display. The display voltage can be selected through jumper caps, supporting 3.3V/5V/12V display power supply.

To avoid damaging the board or display, please note the following:

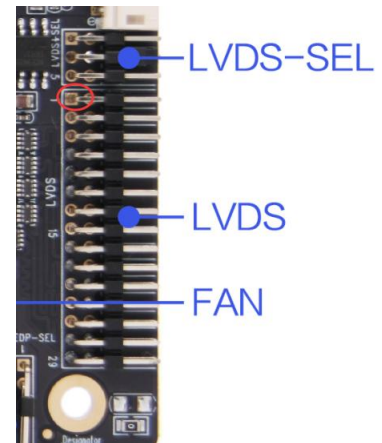
1. Please confirm if the display's specified power voltage is correct and if the board's corresponding power supply can meet the display's maximum operating current.
2. Use a multimeter to verify that the power selected by the jumper cap is correct.

In the image below, the jumper caps are used to select the display power supply, from left to right: 3.3V/5V/12V.

The electrical definition for the 15*2 pin LVDS output is as follows:

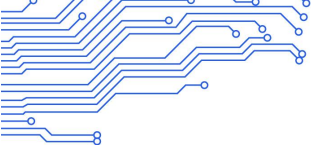


Number	Definition	Attributes	Description
1	PVCC	power output	LCD power output, +3.3v/+5V/+12V optional
2			
3			
4	GND	Ground wire	Ground wire
5			
6			
7	0-VN0	Output	Pixel0 Negative Data (Odd)
8	0-VP0	Output	Pixel0 Positive Data (Odd)
9	0-VN1	Output	Pixel1 Negative Data (Odd)
10	0-VP1	Output	Pixel1 Positive Data (Odd)
11	0-VN2	Output	Pixel2 Negative Data (Odd)
12	0-VP2	Output	Pixel2 Positive Data (Odd)
13	GND	Ground wire	Ground wire
14	GND	Ground wire	Ground wire
15	0-VNC	Output	Negative Sampling Clock (Odd)
16	0-VPC	Output	Positive Sampling Clock (Odd)
17	0-VN3	Output	Pixel3 Negative Data (Odd)
18	0-VP3	Output	Pixel3 Positive Data (Odd)
19	1-VN0	Output	Pixel0 Negative Data (Even)
20	1-VP0	Output	Pixel0 Positive Data (Even)
21	1-VN1	Output	Pixel1 Negative Data (Even)
22	1-VP1	Output	Pixel1 Positive Data (Even)
23	1-VN2	Output	Pixel2 Negative Data (Even)
24	1-VP2	Output	Pixel2 Positive Data (Even)
25	GND	Ground wire	Ground wire
26	GND	Ground wire	Ground wire
27	1-VNC	Output	Negative Sampling Clock (Even)
28	1-VPC	Output	Positive Sampling Clock (Even)
29	1-VN3	Output	Pixel3 Negative Data (Even)
30	1-VP3	Output	Pixel3 Positive Data (Even)

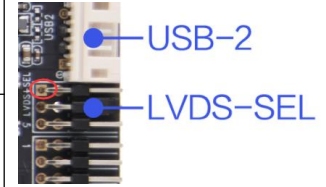


The screen power supply voltage can be adjusted through the LVDS-SEL socket and selected through the jumper cap, optionally supporting 3.3V/5V/ 12V panel power supply.

Electrical definitions are as follows:



Number	Definition	Attributes	Description
1	12V	power supply	12V screen power jumps this pin to PANELVCC_IN
2	PANELVCC_IN	power supply	Screen power input pin
3	PANELVCC_IN	power supply	Screen power input pin
4	5V	power supply	5V screen power jumps this pin to PANELVCC_IN
5	3.3V	power supply	3.3V screen power jumps this pin to PANELVCC_IN
6	PANELVCC_IN	power supply	Screen power input pin

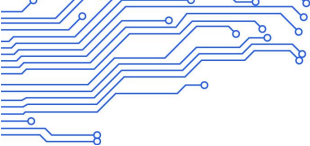


Precautions:

1. Please confirm if the screen's power supply voltage specified in the specification sheet is correct, and whether the corresponding power supply on the board can meet the maximum operating current requirement of the screen.
2. Use a multimeter to verify if the power source selected by the jumper cap is correct.
3. When connecting the cable for a 6/8-bit LVDS screen, please ensure that the cable is inserted near the pin 1 end, avoiding reverse connection or misalignment, which could damage both the screen and the motherboard.
4. Before making any connections, please check if the pinout electrical definitions match. It is crucial to connect the screen first before powering on, and it is not allowed to perform any hot-swapping or plugging/unplugging while the system is powered.

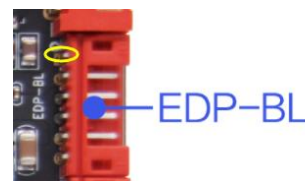
eDP backlight control interface (6pin/2.0mm)

For backlight control of eDP screens, the 12V power supply current should not exceed 1.5A. When using screens larger than 19 inches or with backlight power exceeding 20W, it is recommended to draw power for backlighting from another power board to avoid system instability. **The 12V power source in the backlight socket should only be used as backlight power output and is strictly prohibited from**



being used as power input to the mainboard.

Number	Definition	Attributes	Description
1	12V	power supply	12V Output
2	12V	power supply	12V Output
3	BL-EN	Output	Backlight enable control
4	ADJ	Output	Backlight brightness ADJ control
5	GND	Ground wire	Ground wire
6	GND	Ground wire	Ground wire



Precautions:

1. The 12V power source in this socket is strictly for backlight output only and must not be used as power input for the system.
 2. The default dimming method for eDP is PWM. Please select the dimming method according to the specifications indicated in the datasheet of the selected screen.
 3. Switching between ADJ and PWM can be achieved by modifying the hardware. If you have a need for such a change, please consult FAE.
- 1、 Due to the limited width of the motherboard power routing, the design generally only considers the load of the motherboard itself. **Therefore, when using screens larger than 19 inches or with backlight power exceeding 20W,** it is recommended to draw power for backlighting from another power board to avoid system instability.

EDP screen port (10pin*2/2.0mm)

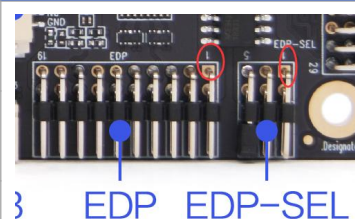
The universal eDP interface definition supports screens with a resolution of 1920x1080. The screen voltage can be selected via jumper caps, offering compatibility with 3.3V/5V/12V screen power supplies.

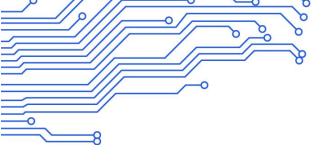
To avoid damaging the board or the screen, please note the following precautions:

1. Ensure that the screen's specification sheet lists the correct power supply voltage, and verify if the board's corresponding power source can meet the maximum operating current requirement of the screen.
2. Use a multimeter to confirm the correctness of the power supply selected by the jumper caps.

The electrical definition of the eDP screen interface is as follows:

Number	Definition	Attributes	Description
1	VCC	power supply	3V, 5V, and 12V options are available
2	VCC	power supply	3V, 5V, and 12V options are available
3	GND	power supply	power supply





4	GND	power supply	power supply
5	TX0N	Input/Output	eDP data channel 0 negative
6	TX0P	Input/Output	eDP data channel 0 positive
7	TX1N	Input/Output	eDP data channel 1 negative
8	TX1P	Input/Output	eDP data channel 1 positive
9	TX2N	Input/Output	eDP data channel 2 negative
10	TX2P	Input/Output	eDP data channel 2 positive
11	TX3N	Input/Output	eDP data channel 3 negative
12	TX3P	Input/Output	eDP data channel 3 positive
13	GND	Ground wire	Ground wire
14	GND	Ground wire	Ground wire
15	AUXN	Input/Output	eDP clock channel negative
16	AUXP	Input/Output	eDP clock channel positive
17	GND	Ground wire	Ground wire
18	GND	Ground wire	Ground wire
19	GND	Ground wire	Ground wire
20	HPD	Input	HPD signal is the output signal of the screen

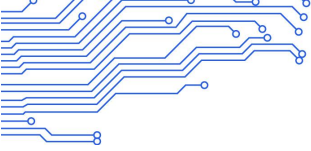
The screen power supply voltage can be adjusted through the EDP-SEL socket, and can be selected through the jumper cap, which can support 3.3V/5V/12V screen power supply.

Electrical definitions are as follows:

Number	Definition	Attributes	Description
1	12V	power supply	To use the 12V screen power supply, jump this pin to PANELVCC_IN.
2	PANELVCC_IN	power supply	Screen power input pin
3	PANELVCC_IN	power supply	Screen power input pin
4	5V	power supply	To use the 5V screen power supply, jump this pin to PANELVCC_IN.
5	3.3V	power supply	To use the 3.3V screen power supply, jump this pin to PANELVCC_IN.
6	PANELVCC_IN	power supply	Screen power input pin



Precautions:



1. Please verify if the screen's power supply voltage stated in the specification sheet is correct, and ensure that the corresponding power source on the board can satisfy the maximum operating current requirement of the screen.

2. Use a multimeter to confirm that the power source selected by the jumper cap is correct.

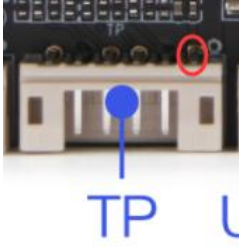
3. Avoid reverse connections and misalignments, as they may cause damage to the screen and the motherboard.

4. Before making connections, ensure that the electrical pinout definitions of the cables match. Connect the screen first before powering it on. Do not plug or unplug any components while the system is powered.

TP port (6pin/2.0mm)

Function Description: The board supports the TP screen connected to the I2C interface.

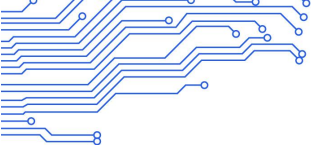
Electrical definition:

Number	Definition	Attributes	Description	
1	VCC	Power supply	3.3V Output	
2	SCL	Input/Output	I2C Clock	
3	SDA	Input/Output	I2C Data	
4	INT	Input/Output	Interrupt	
5	RST	Input/Output	Reset	
6	GND	Ground wire	Ground wire	

Precautions:

1. This connector is a 6-pin 2.0mm socket.
2. The board supports connecting to TP screens with I2C interfaces. Before connection, please confirm whether the touch screen interface is I2C or USB.
3. The I2C, RST, and INT signal levels for this connector are 3.3V. If connecting a touch screen with different signal levels, proper level conversion is required.

Before making the connection, please ensure that the pinout and electrical definitions match. Power up



the system only after the touch screen has been properly connected. Hot-swapping (plugging or unplugging while powered) is not allowed.

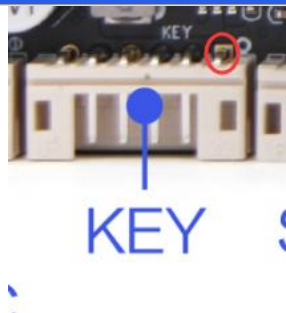
Key interface (6pin/2.0mm)

Function Description:

This socket features three buttons - a power on/off button, an IO button, and a UBOOT button - as well as an ADC interface.

Electrical definition:

Number	Definition	Attributes	Description
1	VCC	Power supply	3.3V
2	IO-KEY	Input	User-defined keys (1.8V level)
3	PWR-KEY	Input	On-off key
4	ADC6	Input	ADC6 (1.8V level)
5	UBOOT	Input	UBOOT
6	GND	Ground wire	Ground wire



Precautions:

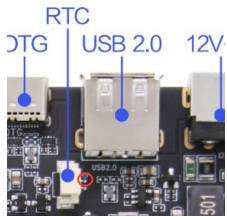
1. All buttons are activated by connecting to a low-level signal. Do not connect the other end of the button to a power source.
2. ADC6 is an ADC signal operating at 1.8V level. The output voltage from external devices should not exceed 1.8V, as it may damage the component.

RTC battery interface (2pin/1.25mm)

Function Description: The motherboard is equipped with a 2-pin 1.25mm pitch Wafer socket interface, which is used to supply power to the system clock during power outages.

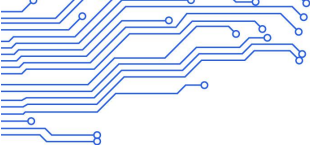
The electrical specifications for the RTC (Real-Time Clock) battery socket are as follows:

Number	Definition	Attributes	Description
1	RTC	Input	3V Input
2	GND	Ground wire	Ground wire



Precautions:

1. When using the RTC battery, pay attention to whether the positive and negative terminals are correctly connected. Reverse connection may cause a short circuit, posing a risk of fire and explosion.
2. If you notice that the RTC time is inaccurate during use, please replace the RTC battery promptly with



the correct 3V, CR2036 button battery. If you need to use a battery with wires, please contact FAE to provide the corresponding model and specifications.

TTL serial port socket port*4 (4pin/2.0mm)

Function Description: The board supports 4 sets of standard dual-line serial ports, compatible with commonly available serial devices in the market. The serial port signal levels range from 0V to 3.3V.

Electrical definition:

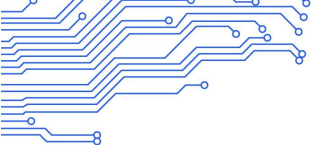
Number	Definition	Attributes	Description	
1	GND	Ground wire	Ground wire	
2	UART-RX	Input	RX	
3	UART-TX	Output	TX	
4	VCC	Power supply	3.3V Output	

Precautions:

- Whether the TTL serial port voltage matches. Can not directly connect to RS232, RS485 equipment.
- Whether the connection of TX and RX is correct.
- If the level of the connected serial port is higher than 3.3V, there must be an isolation circuit or a level conversion circuit, otherwise the main control and equipment will be burned out.
- Note the mapping between system nodes and hardware serial ports during software development. For details, see Definition of Serial Ports and System Nodes in the following section.

Serial port configurations and nodes are as follows:

No.	Serial Number	Corresponding nodes	Default setting	Configurable or not
1	serial port 5	TTY5	TTL	Can be configured as RS232
2	serial port 0	TTY0	TTL	Can be configured as RS232
3	serial port 7	TTY7	TTL	Can be configured as RS232
4	serial port 1	TTY1	TTL	Can be configured as RS232




485 port (4pin/2.0mm)

The board also supports a set of RS-485 communication interfaces, which are compatible with commonly available RS-485 interface devices in the market. The interface operates at a voltage level of 3.3V. In cases where the voltage level of the connected interface exceeds 3.3V, an isolation circuit or level conversion circuit is necessary to prevent damage to the main controller and the connected devices.

1. Verify if the voltage levels of the RS-485 interfaces match.
2. Ensure that the wiring sequence of the RS-485A and RS-485B lines is correct.

Electrical definition:

Number	Definition	Attributes	Description
1	GND	Ground wire	Ground wire
2	485-B	Input/Output	RX
3	485-A	Input/Output	TX
4	VCC	Power supply	5V Output



RS485 configurations and nodes are as follows:

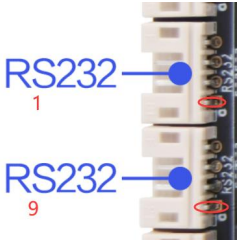
No.	Serial Number	Corresponding nodes	Default setting	Configurable or not
1	Serial Port 6	TTY6	RS485	can be configured as TTL

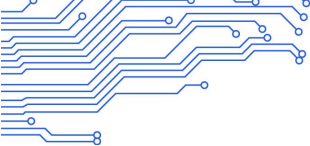
RS232 Serial port socket Port*2 (4pin/2.0mm)

The board has introduced two sets of standard RS-232 serial ports, which can support commonly used RS-232 serial devices in the market.

The board card has introduced two sets of standard RS-232 serial ports, which can support commonly used RS-232 serial devices in the market.

Number	Definition	Attributes	Description
1	GND	Ground wire	Ground wire
2	232-RX	Input	232-RX
3	232-TX	Output	232-TX
4	VCC	Power supply	5V Output





Precautions:

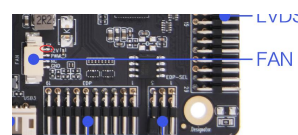
- 1 . Ensure that the serial port voltage is compatible. Do not directly connect TTL or RS-485 serial devices.
- 2 . Verify that the TX and RX connections are correctly made.

Serial port configurations and nodes are as follows:

No.	Serial Number	Corresponding nodes	Default setting	Configurable or not
1	serial port 1	TTYS1	RS232	can be configured as TTL
2	serial port 9	TTYS9	RS232	can be configured as TTL

FAN port (4pin/1.25mm)

Number	Definition	Attributes	Description
1	FAN+	power supply+	12V output
2	PWM	output	Speed pwm control
3	NC	Not connected	Not connected
4	GND	ground wire	ground wire

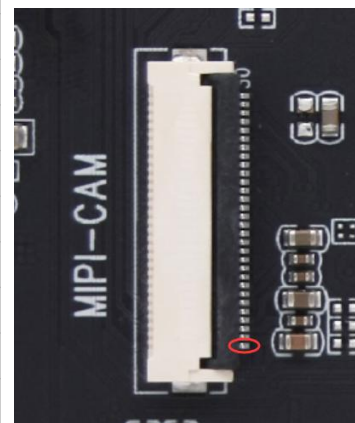


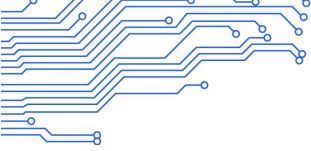
MIPI Camera port (Back, 30pin/0.5mm)

Function Description: The board supports one mipi camera input.

The electrical definition of MIPI Camera socket is as follows:

Number	Definition	Attributes	Description
1	NC	/	/
2	VDD	power supply	2.8V output
3	DVDD	power supply	1.2V output
4	DOVDD	power supply	1.8V output
5	NC	/	/
6	GND	Ground wire	Ground wire
7	VDD	power supply	2.8V output
8	GND	Ground wire	Ground wire
9	SDA	input/output	SDA signal
10	SCL	output	SCL signal
11	RST	output	reset signal
12	PWDN	output	Power down control
13	GND	Ground wire	Ground wire





14	MCLK	output	master clock
15	GND	Ground wire	Ground wire
16	D3P	input/output	mipi data channel 3 positive
17	D3N	input/output	mipi data channel 3 negative
18	GND	Ground wire	Ground wire
19	D2P	input/output	mipi data channel 2 positive
20	D2N	input/output	mipi data channel 2 negative
21	GND	Ground wire	Ground wire
22	D1P	input/output	mipi data channel 1 positive
23	D1N	input/output	mipi data channel 1 negative
24	GND	Ground wire	Ground wire
25	CLKP	input/output	mipi clock channel positive
26	CLKN	input/output	mipi clock channel negative
27	GND	Ground wire	Ground wire
28	D0P	input/output	mipi data channel 0 positive
29	D0N	input/output	mipi data channel 0 negative
30	GND	Ground wire	Ground wire

Cautions:

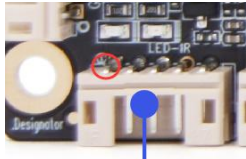
1. It does not support dual-lens MIPI camera modules.
2. The signal levels for I2C and RST interfaces are 1.8V. If connecting a module with 3.3V signal levels, ensure proper level shifting is implemented.
3. Before connecting, please check if the electrical pin definitions match. Power on only after the module is securely connected. Do not hotplug or disconnect the module while it is powered.

LED/IR port (5pin/2.0mm)

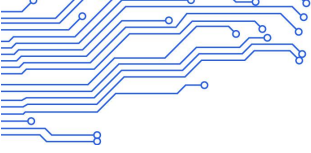
Function Description: The LED/IR interface on the motherboard is a 5-pin socket with two-color LED and IR functions.

The electrical definition of the LED/IR interface socket is as follows:

Number	Definition	Attributes	Description
1	LED_B	blue light	work indicating light
2	LED_R	red light	Standby light
3	IR	input	Remote signal input
4	GND	ground wire	ground wire
5	3V3	power supply	3.3V output



LED-IR



Precautions:

1. The indicator light interface is designed for common anode indicators, and by default, a common anode indicator is required.
2. The board has a built-in current limiting feature. The default LED driving current is 6mA at 3.3V. Therefore, no additional resistor is needed for external indicators, as this may result in excessively low brightness.

Speaker interface (4pin/2.0mm)

Function Description: This port can be connected to an external speaker.

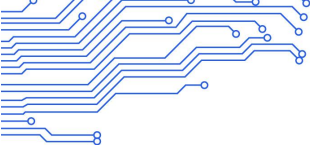
Number	Definition	Attributes	Description
1	OUTP-R	output	Audio output right +
2	OUTN-R	output	Audio output right -
3	OUTN-L	output	Audio output left -
4	OUTP-L	output	Audio output left +



Precautions:

1. This is for connecting two speakers. When using a single speaker, please connect pins 1 and 2 as one pair, and pins 3 and 4 as another pair. Do not make a mistake.
2. When using the speakers, ensure they are properly connected before powering on the device. Do not connect or disconnect the speakers while the device is powered on.
3. The default output power of the speaker interface is 8Ω/5W. If using a 4Ω speaker, please note that the power usage should be reduced by half accordingly.
4. The maximum supported power of the amplifier chip can reach 8Ω/10W, but this requires customized hardware.
5. Always ensure that the actual maximum output power during use is less than the rated power of the speaker.

MIC port (2pin/2.0mm)



Please pay attention to the connection of positive and negative MIC terminals, do not reverse connection.

Number	Definition	Attributes	Description	
1	MIC+	input	MIC+	
2	MIC-	input	MIC-	

Precautions:

1. When using the RTC battery, pay close attention to the correct orientation of the positive and negative terminals. Reverse connection may lead to a short circuit, posing a risk of fire or explosion.
2. If you notice that the RTC time is inaccurate during use, please replace the RTC battery promptly with the correct 3V, CR2036 coin cell battery. If you require a battery with wires, please contact FAE for the corresponding model and specifications.

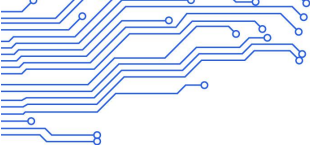
Status indicator light

Indicator color description: red on power-on, blue after power-on.



Key Instructions:

- (1) The UBOOT button is used for programming/flashing the firmware.
- (2) The RECOVERY button allows for a one-click factory reset.
- (3) The MASKROM button, when pressed when the UBOOT button is non-functional, can access the MASKROM programming mode.
- (4) The PWR-KEY button is for turning the system on and off.

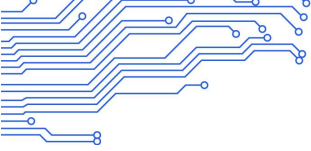


UBOOT W



Other standard interfaces and features

Interface	Standard	Parametric description
4G interface	MINI PCI-E standard interface	Supports a variety of Mini PCI-E 4G modules such as Quectel and Huawei
SIM card interface	Standard interface	Support for various standards (depending on 4G module)
Headphone jack	3.5mm	Support left and right dual channels, support MIC recording
DC port	Standard interface	The default diameter of the DC socket is 6.0, the outer diameter of the copper pin is 2.0, and the outer diameter of the DC plug is 5.5mm and the aperture is 2.1mm
Ethernet interface	RJ45 port	10/100/1000M wired network is supported
USB interface	TYPE-A port	1 USB3.0, 1 USB2.0
USB interface	TYEP-C port	OTG interface, standard USB3.2, while supporting DP output

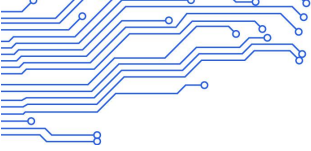


Chapter 4 Electrical performance

Items		Min	Typical	Max
Power parameter	Voltage	--	12V	--
	Ripple	--	--	120mV
	Current	2A	3A	--
Supply current(LVDS)	3.3V working current		400 mA	1A
	5V working current		550 mA	2A
	12V working current		580 mA	2A
	USB supply current	--	--	1A
Supply current(MIPI)	3.3V working current		300 mA	600 mA
	USB supply current	--	--	1A
Total output	current	3.3V		800mA
Environment	Relative humidity	--	--	80%
	Operating temperature	0℃	--	60℃
	Storage temperature	-10℃		70℃

Note 1: When connecting an LVDS display, please ensure to select the correct backlight operating voltage (3.3V, 5V, 12V). Users are advised not to apply it to peripherals that exceed the corresponding maximum current.

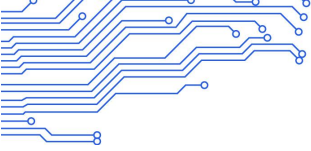
Note 2: When connecting an LVDS/MIPI display, the overall operating current and standby current of the board will depend on the specific display being connected, and may not be listed individually in the table above.



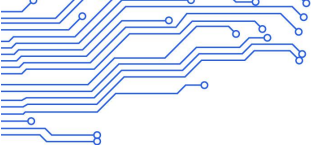
Chapter 5 Minimum test item of the whole machine

Description:

Minimum test item of stability and reliability of the whole machine		
No.	Test item	Test detail and description
1	Basic functional performance test	Test the main function performance of the whole machine, test wifi, Bluetooth, Ethernet, USB, serial port, video playback and other functions
2	Software upgrade function test	The whole product upgrade function verification, respectively test product line brush, U disk upgrade, and network remote upgrade function is normal
3	High temperature aging test	Test the high temperature resistance of the whole machine. After playing the aging work video in 60°C environment for 3 days, it can run normally and there are no bad electrical phenomena such as crash, abnormal painting and black screen
4	Low temperature power failure test	Test the anti-low temperature ability of the whole machine. After playing the aging work video in 0°C environment for 3 days, it can run normally and there are no bad electrical phenomena such as crash, abnormal painting and black screen
5	Short time timing switch at normal temperature	The test product in the ability to withstand power on and off, programming 3 minutes to shut down, seven minutes to start, work 7 days after normal operation, no crash, painting, black screen and other electrical adverse phenomena, abnormal record probability is not more than 4/10000.
6	Electrostatic (ESD) test	The simulation test evaluates the anti-static discharge capability of the product. According to the IEC 61000-4-2 test standard, the product is discharged by contact $\pm 4\text{KV}$ and air $\pm 8\text{KV}$. Product validation must meet A Grade A or B to be accepted, and C and D grades are nonconformity
7	Sweep vibration test	Test the vibration resistance of the product through simulated transport tests and the bearing capacity of the board solder and parts to avoid potential problem points. The vibration tester was used to test the product. After the test, the structure of the test product was not loose and fell off, and it could operate normally. There was no crash, abnormal painting, black screen and other electrical defects and structural appearance damage, and it was judged to be OK
8	Free drop test	Test the vibration resistance of the product through simulated transport tests and the bearing capacity of the board solder and parts to avoid potential problem points. Use a vibration tester to test the product. After the test, the structure of the test product is not loose and falling off, and it can operate normally, and there is no crash, abnormal painting, black screen and other electrical defects and structural appearance damage, then it is judged to be OK.
9	Short power failure shock at normal temperature	Through this test, the ability of the product to withstand the power supply is tested

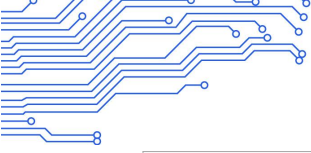


10	Long time timing switch machine at normal temperature	To verify the stability of MCU and the stability of system operation, the timing switch tool is set to start the machine at 9:30 am and shut down at 18:30 minutes, and the log records the same time interval for each startup. If the error is less than 1min, it is judged to be qualified
11	Voltage overvoltage and undervoltage test	According to the power supply specification of the Android board, the voltage bearing capacity of the board is tested through the voltage change, and the whole machine is tested for 2 hours under the rated power supply of -20% +30%. After the test is carried out and completed, the test product can run normally, and no bad electrical phenomena such as crash, abnormal painting and black screen are judged to be OK



Chapter 6 Configurable parameter table (difference point)

Type	Standard		Optional	
DDR	2G	<input type="checkbox"/>	2G	<input type="checkbox"/>
	4G	<input checked="" type="checkbox"/>	4G	<input type="checkbox"/>
	8G	<input type="checkbox"/>	8G	<input checked="" type="checkbox"/>
EMMC	16	<input type="checkbox"/>	16	<input checked="" type="checkbox"/>
	32	<input checked="" type="checkbox"/>	32	<input type="checkbox"/>
	64	<input type="checkbox"/>	64	<input checked="" type="checkbox"/>
WiFi+BT	2.4G+BT	<input type="checkbox"/>	2.4G+BT	<input checked="" type="checkbox"/>
	5G+BT	<input checked="" type="checkbox"/>	5G+BT	<input type="checkbox"/>
4G/PCIE	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
5G/M.2	<input type="checkbox"/>		<input type="checkbox"/>	
ETH/RJ45	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SATA3.0	<input type="checkbox"/>		<input type="checkbox"/>	
LVDS	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
eDP	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
HDMI	<input type="checkbox"/>		<input type="checkbox"/>	
USB*7	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
TTL*4	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
RS232*2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
RS485*1	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
CAN*1	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
Hdmi in	<input type="checkbox"/>		<input type="checkbox"/>	
TF	<input type="checkbox"/>		<input type="checkbox"/>	



MIPI CAM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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Chapter 7 Assembly and Use Precautions

In the process of assembly and use, please pay attention to the following (and not limited to) problems.

1. Please ensure that the board card is not electrified for installation and installation of peripherals, and be sure to wear electrostatic bracelet and other anti-static tools during installation.
2. When connecting peripherals through wires, please ensure that the pin definition of each peripheral is corresponding to the socket of the main board to avoid short circuit caused by wire sequence error.
3. When fixing the main board with screws, pay attention to make the board card bear the force evenly, so as to avoid the PCB opening due to the deformation of the board car.
4. When installing interfaces with optional screen voltages (such as LVDS, eDP, etc.), please note that the voltage selected is consistent with the screen specifications.
5. When installing peripherals (USB, UART, IO .etc), pay attention to the level matching and current output capability of peripherals.
6. The 12V power supply in the backlight socket can only be used as backlight power output, and is strictly prohibited to be used as power input to the motherboard.The input power should be selected according to the general peripherals to evaluate whether the input power voltage and total current can meet the requirements.
7. The input power should be selected according to the general peripherals to evaluate whether the input power voltage and total current can meet the requirements.
8. When designing the whole product, the height limit and heat dissipation of the board should be considered.