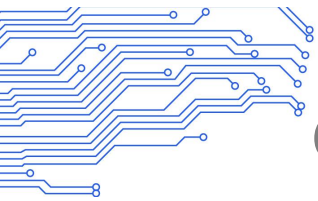


AIoT-3588A V1.3



Specification

Commercial display mainboard



APPROVAL SHEET

PRODEUCT: _____

PRODEUCT SPEC: _____

PRODEUCT CODE: _____

SAMPLE DATE: _____

MADE	CHECK	APPROVED BY	PUBLISH SEAL

CUSTOMER: _____

PART CODE: _____

CUSTOMER APPROVER: _____

CHECKED BY	APPROVED BY	APPROVAL SEAL



Document modification history

Version	Revision content	Revision	Check	Date
V1.0	Initial version	Teng Yiping	Qiu Shunfeng	2023-03-15

Statement

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Chapter 1 Product Introduction

1.1 Scope of application

AloT-3588A belongs to the commercial display self-service terminal motherboard, using the RK3588 chip is the 8nm process of low-power, high-performance processor. Generally applicable to smart display terminal products, video terminal products, industrial automation terminal products and computing end product, such as advertising machine, digital signage, smart self-service terminal, smart retail terminal, O2O smart device, Industrial control PC, robot device etc.

1.2 Product overview

AloT-3588A adopts Rockchip RK3588 (Cortex-A76x4+ Cortex-A55 x4) octa-core CPU, equipped with Android 12.0 system, main frequency up to 2.4GHz, with super performance, rich interface. With Mali-G610 MP4 GPU, supporting 8K, 4K, H.265 hard decoding, both benchmark and decoding are top-notch, which is your new choice for HCI and industrial control projects.

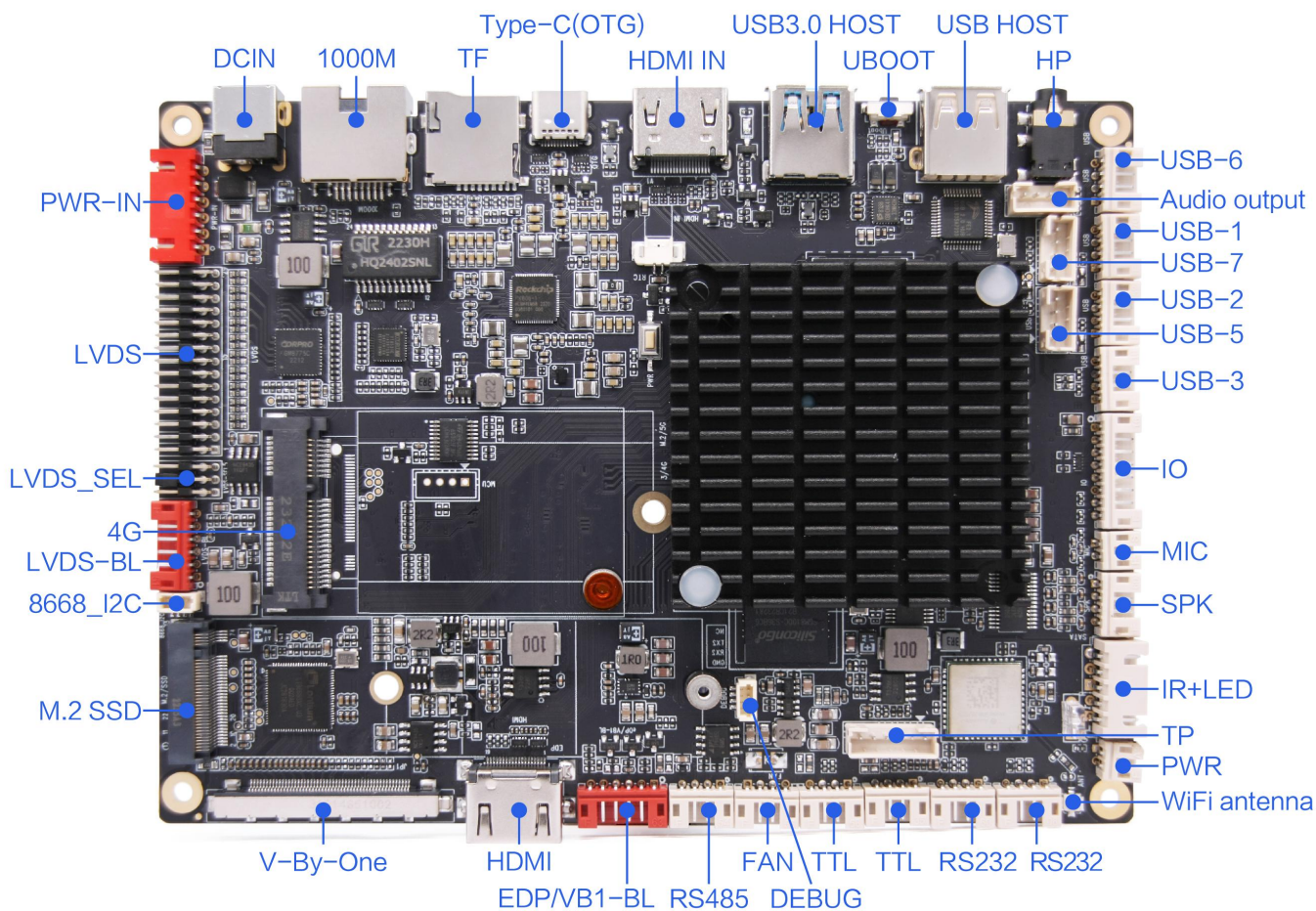
1.3 Product feature

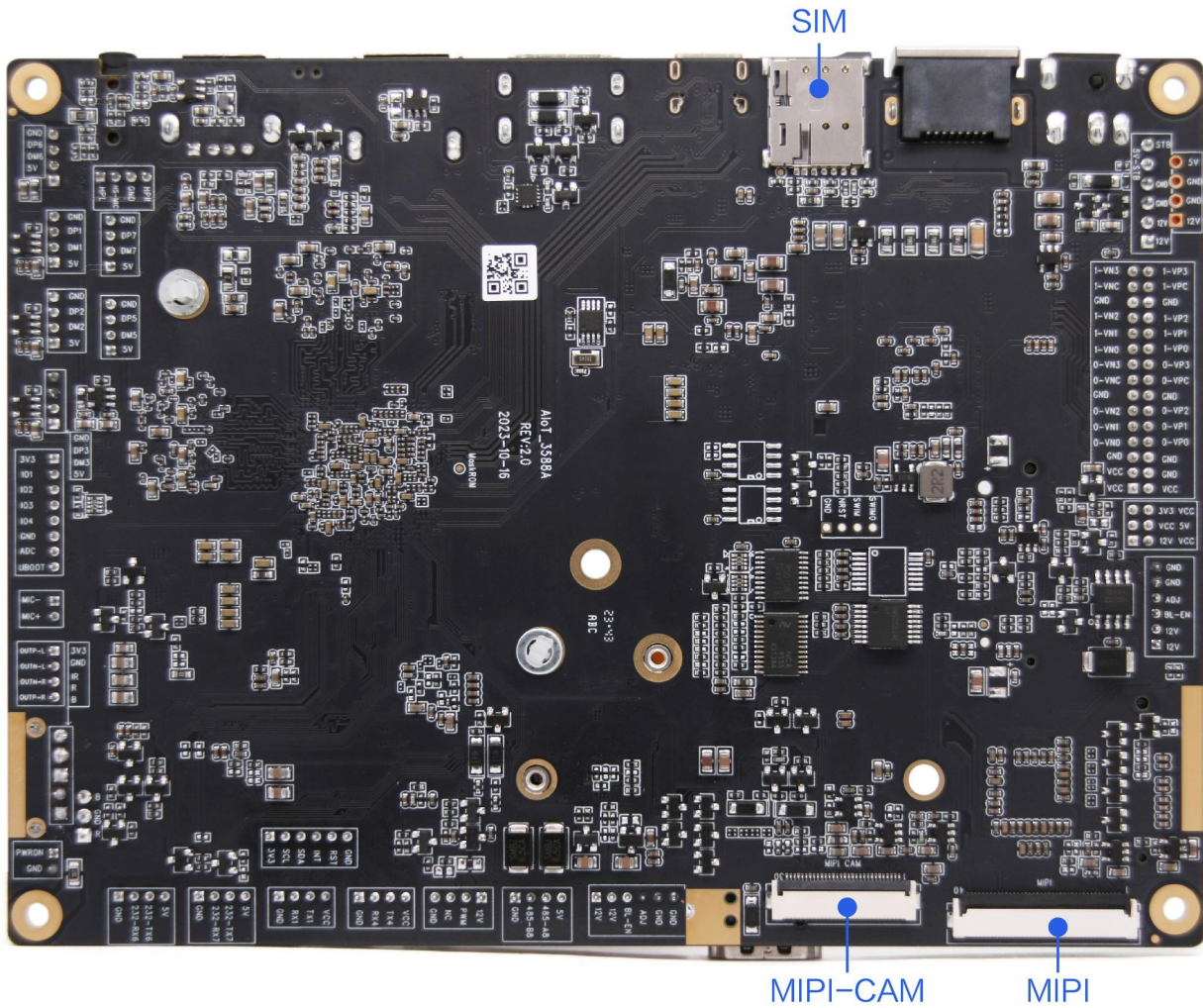
- ◆ High integration. Integrated HDMI/HDMI IN/LVDS/MIPI/eDP/eDPx(customizable) /Ethernet/WIFI/BT, simple and ultra-thin, extraordinary.
- ◆ Built-in PCI-E 3/4G module interface. Support Huawei, Long Shang and other PCI-E 3G/4G modules for Internet access.
- ◆ Built-in M.2 (customizable) 5G module interface. Support Huawei, Gosuncn, Fibocom and other M.2 5G modules to access the Internet.
- ◆ Rich expansion interface. 9 USB ports (6 pins, 2 standard USB-A ports, 1 type-C), 5 serial ports (2 TTL, 2 RS232, 1 RS485), GPIO/ADC interface, can meet the requirements of various peripherals in the market.
- ◆ Support four screen display, different screen different display. The LVDS screen supports up to 1920*1200 resolution, the HDMI screen supports up to 7680*4320 resolution, eDP screen supports a maximum resolution of 3840*2160, and the mipi screen supports a maximum resolution of 1920*1200.

- ◆ Support SATA hard drive interface, can meet the needs of storage expansion.
- ◆ High Performance. Equipped with a deep neural network unit (NPU) with performance up to 6.0 TOPS, capable of meeting the needs of deep learning projects.
- ◆ Support Android system customization, provide system call interface API reference code, and perfectly support the development of upper-layer applications for customers.
- ◆ It perfectly supports various mainstream touch screens such as infrared, optical, capacitive, resistive, touch film, etc., and supports HID configuration of drive-free touch screens without debugging.
- ◆ Rich display interface, in addition to LVDS, eDP and mipi display interface, but also support HDMI 2.0/2.1 display output, with wide up to 18Gbps, can support up to 7680*4320@60Hz, the interface TYPE is HDMI Type-A, to meet the market more than 99% application scenario.
- ◆ Support USB single-binocular camera, and MIPI camera, MIPI interface can support 1x2-lane/2x2-lane@2.5Gbps/lane, support up to 5M pixels (1x2-lane design limit)

1.4 Appearance and interface diagram

Front/Back:





FRONT VIEW

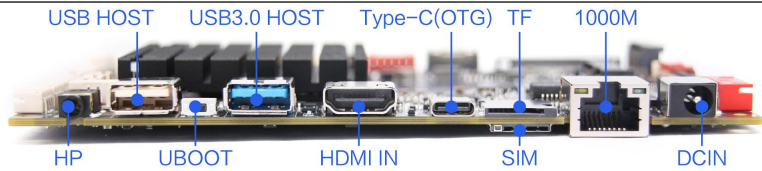


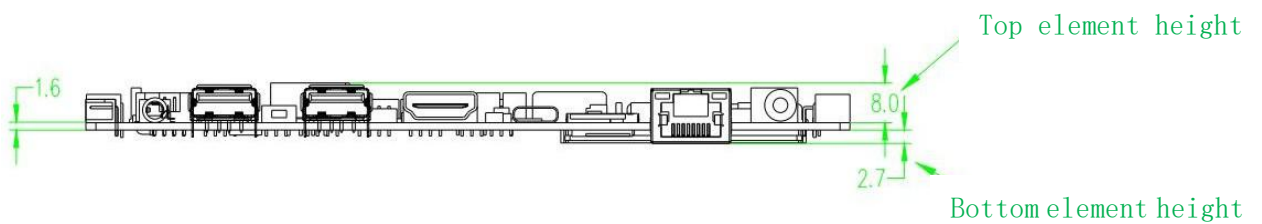
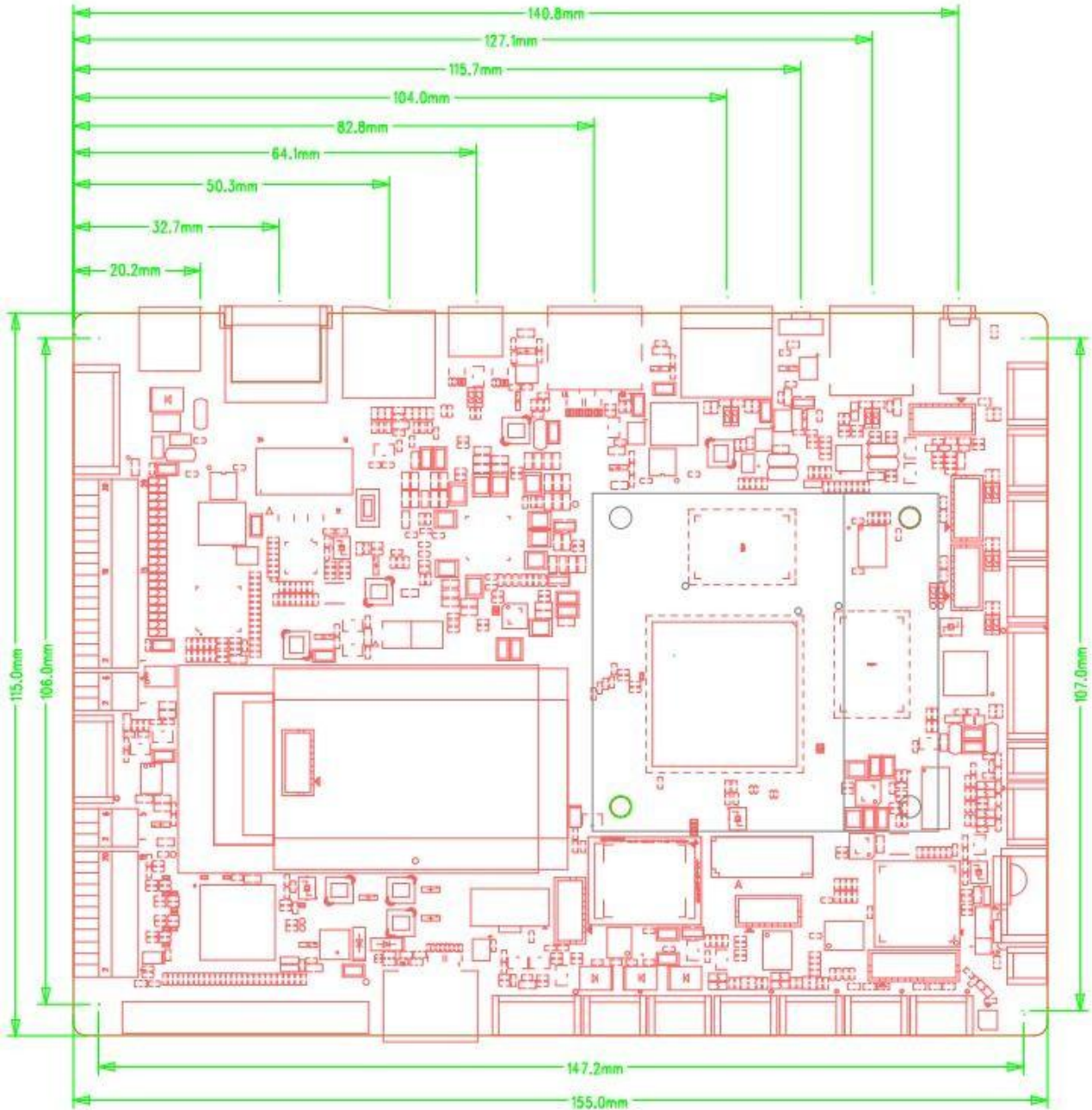
Photo statement: The above photos are taken from a certain batch of boards produced by our company. Due to the continuous maintenance of the product, the actual board cards shipped may not be consistent with the photos.

Chapter 2 List of Basic Functions

Main functional parameters	
Size	155*115mm
CPU	Rockchip RK3588, large and small core architectures: quad-core 2.4GHz Cortex-A75+quad-core 1.8GHz Cortex-A55
Operating system	Android 12.0
RAM/Storage	Standard configuration 4G/ Standard configuration 32G
Built-in ROM	2KB EEPROM (Not included by default, optional)
HDMI output	1, standard Type-A female socket, up to 7680x4320@60Hz resolution
LVDS output	1, support single/dual 8bit, can directly drive 50/60Hz LCD screen
MIPI output	1, can directly drive a variety of resolution MIPI interface LCD screen
eDP output	Can directly drive a variety of resolution eDP interface LCD screen(to be customized)
eDPx output	Can directly drive the eDPx interface 4Kx2K LCD screen
HDMI input	1, standard Type-A female socket, the maximum support for 4K@60Hz resolution input
Video format	Support mp4, mkv, wmv, mov, flv, etc.
Picture format	Support BMP, JPEG, PNG, GIF
Audio input/output	Speaker output (support left and right channel output, maximum support dual 20W / 4R, 10W / 8R), MIC IN*1
Headphone output	Support one channel three/four band earphone plug in
USB port	1 USB OTG(Type-C), 8 USB HOST
Serial port	5: 2*232, 2*TTL, 1*485
TP port	1, TP screen with I2C interface can be connected

Chapter 3 PCB Dimensions and Interface Layout

3.1 PCB size chart



PCB: 1.6mm thickness

PCBA: L * W=155mm*115mm



Specification of screw hole: ϕ 3.2mm x 4

Note:

1. Heat dissipation design
2. Subject to the actual size of the product



3.2 Interface parameter description

Picture Annotation Notes: The “” in the circle on the socket interface picture indicates the first pin. (The “” of the red socket indicates the first pin)


3.2.1 Power input interface (6pin/2.54mm)

Functional description:

The board is powered by a 12V DC power supply, and it is only allowed to supply power to the board subsystem from the DC socket and power socket. The DC IN specifications of the power adapter plug are D6.0, d2.0. In the case of no peripherals and no load, the 12V DC power supply needs to support a minimum current of 800mA.

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
5	5V-STB	input	standby 5V input
6	STB	output	standby signal output



Note:

1. The specifications of the power socket must comply with the DC socket model. The default diameter of the DC socket is 6.0, the outer diameter of the copper pin is 2.0, the outer diameter of the DC plug is 5.5mm, and the aperture is 2.1 mm.
2. The voltage fluctuation range of DC socket and 6pin power input port should not exceed 10% of the standard input voltage of 12V, which may affect the stability of the motherboard operation.
3. It is recommended to use a power supply motherboard or adapter that meets the 3C standard, and the rated output power of the selected adapter can meet the motherboard and peripherals running at the same time and leave a margin of 30% -50%. That is, when the total current reaches 1.5A, the specification of 2.5A-3A should be selected.


3.2.2 RTC Battery Port (2pin/1.25mm)

Functional description:

The Wafer socket interface with 2pin 1.25mm spacing is used to supply power to the system clock when the power is off.

Electrical definitions are as follows:

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



Note:

1. When the RTC battery is used, pay attention to whether the positive and negative poles are correct, and the reverse connection may lead to short circuit, resulting in the risk of fire and explosion.
2. If you find that the RTC time is not accurate during use, please replace the RTC battery in time, choose the correct 3V, CR2032 cable battery, please contact FAE to provide the corresponding model specifications.

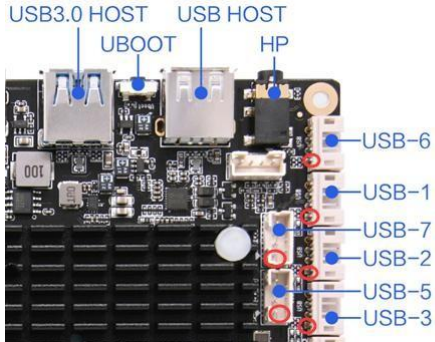
3.2.3 USB port (4pin/2.0mm*6)

Functional description:

The motherboard has 2 USB standard ports, 6 built-in USB sockets for peripheral expansion, default to HOST, and supply current 1A.

Electrical definitions are 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



Note:

1. Check the definition of the USB terminal cable before use to prevent the power supply from being reversed from the ground, which may burn peripherals and motherboards.
2. The length of USB peripheral cable should be as short as possible to meet the needs of use. Do not use too long a USB cable, otherwise it may cause stability problems during the use of peripherals.
3. The signal in the USB cable is a high-speed differential signal. USB wire as far as possible to use the

wire with braided shielding layer, can greatly enhance the anti-interference force of the device and increase the stability of the device.

USB port description:


Number	Screen print/serial number	Default supply current	Whether the power supply is controllable	Corresponding nodes
1	USB HOST2.0	1.4A	Controllable	HOST1
2	USB HOST3.0	1.4A	Controllable	TYPEC1_OTG
3	USB-1	1.4A	Controllable	HUB-1
4	USB-2	1.4A	Controllable	HUB-2
5	USB-3	1.4A	Controllable	HUB-3
6	USB-5	1.4A	Controllable	HUB-5
7	USB-6	Unlimited/share 3A	Uncontrollable	HUB-6
8	USB-7	Unlimited/share 3A	Uncontrollable	HUB-7

3.2.4 MIC Interface (2pin/2.0mm)

Functional description:

Pay attention to the connection method of the positive and negative poles of MIC, do not connect them in reverse.

Electrical definitions are as follows:

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

Note:

1. Pay attention to the positive and negative MIC connections, do not reverse.
2. MIC line length should not be too long, MIC line inside the device as far as possible to avoid high-speed signal line and power line layout, to avoid interference with the sound.


3.2.5 LED/IR port (5pin/2.54mm)

Functional description:

The mainboard has a socket shared by the IR remote control interface and the indicator light, in which pin3-5 can choose to weld the IR receiving tube or connect the external remote control receiving header.

Electrical definitions are as follows:

Number	Definition	Attributes	Description
1	LED_B	Output	Work indicator light
2	LED_R	Output	Standby indicator light
3	IR	input	Remote signal input
4	GND	Ground wire	Ground wire
5	3.3V	power supply	3.3V Output



Note:

1. The indicator port is a common anode indicator port. By default, a common anode indicator is required.
2. The board default limited current, LED light drive current 6mA, voltage 3.3V, the external indicator does not need to increase resistance, otherwise the brightness may be too low.
3. Pay attention to the pin definition and positive and negative terminals of the remote control receiving header, do not reverse connection, reverse connection may cause damage to the remote control receiving header, and the remote control cannot be used.


3.2.6 Work indicator light

Functional description:

Default support for common cathode red and blue dual LED lights.

Electrical definitions are as follows:

Number	Definition	Attributes	Description
1	LED_B	blue light	Work indicator light
2	VCC	power supply	3.3V Output
3	LED_R	red light	Standby indicator light




3.2.7 FAN port (4pin/2.0mm)

Functional description:

The motherboard has 1 fan connector, supports 12V fan, and supports PWM to adjust the speed (default this function is not supported).

Electrical definitions are as follows:

Number	Definition	Attributes	Description
1	12V	power supply	12V power supply
2	PWM	output	fan speed adjustment control
3	NC	--	--
4	GND	Ground wire	Ground wire



Note:

1. When installing fans, check whether the pin is the same.

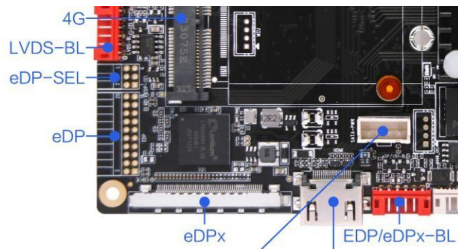
3.2.8 Backlight control interface (6pin/2.0mm*2)

Functional description:

By default, the board has two backlight adjustment/control ports. One is the LVDS backlight adjustment/control port by default, and the other is the eDP/eDPx backlight adjustment/control port by default.

Electrical definitions are as follows:

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



Note:


1. The 12V power supply in this socket can only be used as backlight power output, prohibited as power input to the system.
2. LVDS dimming mode is ADJ by default, and eDP backlight socket is PWM dimming by default, please choose the dimming mode according to the specification of the selected screen.
3. ADJ and PWM can be switched by changing the hardware, please consult FAE if you need to change.
4. Due to the limited width of the motherboard power supply alignment, only the load of the motherboard itself is taken into consideration during the design, so when using a large screen over 19 inches or the power consumption of the screen is more than 15W, the backlight power supply should be taken from other power supply boards, so as not to cause system instability.

3.2.9 PWR key Interface (2pin/2.0mm)

Function description:

The mainboard has one on-off button interface for connecting to the external PWR button.

Electrical definitions are as follows:

Number	Definition	Attributes	Description	
1	PWR_KEY	input	PWR key input	
2	GND	Ground wire	Ground wire	

Note:


1. Note that the key should not be short-connected with other power sources.

3.2.10 IO/KEY port (8pin/2.0mm)

Functional description:

IO is used to provide input/output of control signals to peripherals, and the level is 3.3V. The socket also leads to the interface of the switch button and the upgrade button.

Electrical definitions are as follows:

Number	Definition	Attributes	Description	
1	VCC	power supply	3.3V Output	
2	I/O	Input	GPIO-1	
3	I/O	Input	GPIO-2	
4	I/O	Output	GPIO-3	
5	I/O	Input	GPIO-4	
6	GND	Ground wire	Ground wire	
7	ADC	Input	ADC signal	
8	Uboot	Input	External upgrade button	

Note:

1. The peripheral IO level cannot be higher than 3.3V. If the IO level of the docking device is higher than 3.3V, there should be an isolation circuit or level switching circuit, otherwise the main control and device will be burned out.
2. When using an I/O port, note whether the I/O port is an input or output port.
3. ADC level is up to 1.8V.
4. The peripheral is powered on through this IO port (When the device is powered off, the IO measured by a multimeter should be 0V).

3.2.11 LVDS screen port (15*2pin/2.0mm)

Functional description:

Generic LVDS interface definition, support single/dual, 6/8-bit 1080P LVDS screen.

Electrical definitions are 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	

In order to avoid burning the board and screen, please pay attention to the following:

1. Please confirm whether the power supply voltage of the screen is correct in the screen specification and whether the corresponding power supply of the board can meet the maximum current of the screen.
2. Please use a multimeter to confirm whether the power supply selected by the jumper cap is correct.
3. When receiving a single screen line of a 6/8-bit LVDS screen, plug it in and install it close to the pin1 end. Do not reverse and dislocation, so as to avoid damage to the screen and motherboard.
4. Before connecting, check whether the electrical definition of the cable sequence matches. Connect the screen before powering on the device. Do not plug or plug the device when it is live.

3.2.12 eDP screen interface (10*2pin/2.0mm)

Functional description:

This interface is a common eDP screen interface in the form of 10*2 double-row pins.

Electrical definitions are as follows:

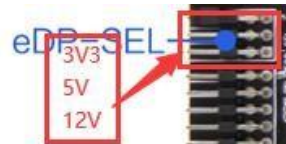
Number	Definition	Attributes	Description	
1	PVCC	power supply	eDP screen power output, +3.3v/+5V/ +12V optional	
2		supply		
3	GND	Ground wire	Ground wire	
4		wire		
5	D0-	Output	Display Port Lane 0 negative output	
6	D0+	Output	Display Port Lane 0 positive output	
7	D1-	Output	Display Port Lane 1 negative output	
8	D1+	Output	Display Port Lane 1 positive output	
9	D2-	Output	Display Port Lane 2 negative output	
10	D2+	Output	Display Port Lane 2 positive output	

11	D3-	Output	Display Port Lane 3 negative output
12	D3+	Output	Display Port Lane 3 positive output
13	GND	Ground wire	Ground wire
14	GND	Ground wire	Ground wire
15	AUX-	Output	Display Port AUX- chanenl negative singal
16	AUX+	Output	Display Port AUX+ chanenl positive singal
17	GND	Ground wire	Ground wire
18	GND	Ground wire	Ground wire
19	GND	Ground wire	Ground wire
20	eDP_HPDP	Input	Screen hot plug detection signal, screen output

The screen power supply voltage can be adjusted through the eDP-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



Note:


1. Please confirm whether the power supply voltage of the screen is correct in the specifications of the screen, and whether the corresponding power supply of the board can meet the maximum current of the screen.
2. Please use a multimeter to confirm whether the power supply selected by the jumper cap is correct.
3. Before connecting, check whether the electrical definition of the cable sequence matches. Connect the screen before powering on the device. Do not plug or unplug the device when it is live.

3.2.13 RS232 serial socket interface (4pin/2.0mm*2)

Functional description:

The board has 2 sets of common 232 serial ports by default, which can support common 232 serial devices on the market.

Electrical definitions are as follows:

Number	Definition	Attributes	Description	
1	GND	Ground wire	Ground wire	
2	PC232-RX	Input	232-RX	
3	PC232-TX	Output	232-TX	
4	VCC	Power supply	5V Output	

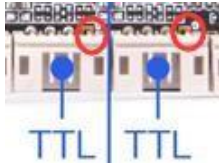
Precautions:

1. Whether the serial port voltage matches. Can not directly connect to TTL, RS485 serial devices.
2. Whether the connection of TX and RX is correct.

3.2.14 TTL serial socket interface*2 (4pin/2.0mm*2)

Functional description:

The board supports 2 sets of common dual-wire serial ports, which can support common serial port devices in the market, and the level of serial ports is 0V to 3.3V. Electrical definitions are as follows:

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:

1. Whether the TTL serial port voltage matches. Can not directly connect to RS232, RS485 equipment.
2. Whether the connection of TX and RX is correct.
3. 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.
4. 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.


3.2.15 485 serial socket interface (4pin/2.0mm)

Functional description:

The board also leads to a group of ordinary 485 serial ports, which can support the 485 serial devices on the market.

Electrical definitions are as follows:

Number	Definition	Attributes	Description
1	GND	Ground wire	Ground wire
2	485-B8	Input/Output	485-B8
3	485-A8	Input/Output	485-A8
4	VCC	Power supply	5V Output



Precautions:

1. Whether the serial port type matches, it cannot be directly connected to RS232, TTL serial port equipment.
2. Whether the connection of A and B is correct.

Serial port configurations and nodes are as follows:

Number	Serial Number	Corresponding nodes	Default setting	Configurable or not
1	TTL port-1	TTYS1	TTL	NOT
2	TTL port-2	TTYS4	TTL	NOT
3	RS485-3	TTYS8	RS485	NOT
4	RS232-4	TTYS6	RS232	NOT
5	RS232-5	TTYS7	RS232	NOT

Notes :

Modifying the configuration requires a professional operation


3.2.16 I2C interface (6pin/2.0mm)

Functional description:

The board supports the TP screen connected to the I2C interface.

Electrical definitions are as follows:

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	

Notes:


1. The board supports the TP screen connected to the I2C interface. Before connecting the board, check whether the interface of the touch screen is I2C or USB.
2. The level of I2C, RST, and INT in the interface is 3.3V. If a 1.8V touch screen is connected, the level must be converted.

Please note that the electrical definition of the wire sequence matches before connecting. Connect the touch screen before powering it on. Do not plug it in when it is live.

3.2.17 MIPI Camera port (40pin/0.5mm)

Functional description:

The board supports 2 mipi camera input, and the socket electrical definition is as follows:

Number	Definition	Attributes	Description	
1	VDD2V8	power supply	2.8V output	
2	VDD3V3	power supply	3.3V output	
3	IR-PWDN	output	IR_Camera power down control signal	
4	IR-RST	output	IR_Camera reset signal	
5	SCL	output	SCL signal	
6	SDA	input output	SDA signal	
7	GND	Ground wire	Ground wire	
8	IR-XCLK	output	IR_Camera master clock	
9	GND	Ground wire	Ground wire	
10	IR-MCP	input output	IR_Camera's mipi clock channel positive	
11	IR-MCN	input output	IR_Camera's mipi clock channel negative	
12	GND	Ground wire	Ground wire	
13	IR-D0P	input output	IR_Camera MIPI data channel 0 positive	
14	IR-D0N	input output	IR_Camera MIPI data channel 0 negative	
15	GND	Ground wire	Ground wire	
16	IR-D1P	input output	IR_Camera mipi data channel 1 positive	

17	IR-D1N	input output	IR_Camera mipi data channel 1 negative
18	GND	Ground wire	Ground wire
19	DOVDD1V8	power supply	1.8V output
20	FSYC-IN	/	NC
21	LED-GPIO	/	NC
22	IR-DVDD1V2	power supply	1.2V output
23	RGB-DVDD1V2	power supply	1.2V output
24	RGB-PWDN	output	RGB_Camera power down control signal
25	RGB-RST	output	RGB_Camera reset signal
26	GND	Ground wire	Ground wire
27	RGB-XCLK	output	RGB_Camera master clock
28	GND	Ground wire	Ground wire
29	RGB-MCP	input output	RGB_Camera mipi clock channel positive
30	RGB-MCN	input output	RGB_Camera mipi clock channel negative
31	GND	Ground wire	Ground wire
32	RGB-D0P	input output	RGB_Camera mipi clock channel positive
33	RGB-D0N	input output	RGB_Camera mipi data channel 0 negative
34	GND	Ground wire	Ground wire
35	RGB-D1P	input output	RGB_Camera mipi data channel 1 positive
36	RGB-D1N	input output	RGB_Camera mipi data channel 1 negative
37	GND	Ground wire	Ground wire
38	5V	power supply	5V output
39	5V	power supply	5V output
40	5V	power supply	5V output

Notes:

1. The maximum supported resolution is 500W (currently measured).
2. Can support monocular mipi camera module, only need to match one of the 2lane data.
3. The signal level of I2C and RST in the interface is 1.8V. If the module with 3.3V level is connected, the level conversion should be done.
4. Before connection, please pay attention to whether the electrical definition of the wire sequence matches. It is necessary to connect the module before power on.

3.2.18 MIPI screen interface (back, 40pin/0.5mm)

Function description:

The mainboard supports one mipi screen display interface in the form of a 40pin 0.5mm spacing FPC socket.

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

Number	Definition	Attributes	Description
1	VDD_1.8V	power supply	power output, 1.8V
2	VDD	power supply	Screen power output, 3.3V
3	VDD	power supply	
4	NC	--	---
5	Reset	output	Screen reset signal, high level 3.3V
6	NC	--	---
7	GND	Ground wire	Ground wire
8	MIPI_D0N	output	MIPI Port Lane 0 negative output
9	MIPI_D0P	output	MIPI Port Lane 0 positive output
10	GND	Ground wire	Ground wire
11	MIPI_D1N	output	MIPI Port Lane 1 negative output
12	MIPI_D1P	output	MIPI Port Lane 1 positive output
13	GND	Ground wire	Ground wire
14	MIPI_CKN	output	MIPI Port clock negative output
15	MIPI_CKP	output	MIPI Port clock positive output
16	GND	Ground wire	Ground wire
17	MIPI_D2N	output	MIPI Port Lane 2 negative output
18	MIPI_D2P	output	MIPI Port Lane 2 positive output
19	GND	Ground wire	Ground wire
20	MIPI_D3N	output	MIPI Port Lane 3 negative output
21	MIPI_D3P	output	MIPI Port Lane 3 positive output
22	GND	Ground wire	Ground wire
23	NC	--	---
24	NC	--	---
25	GND	Ground wire	Ground wire
26	NC	--	---
27	NC	--	
28	NC	--	
29	NC	--	
30	GND	Ground wire	Ground wire
31	LED-	power supply	LCD backlight power -
32	LED-	power supply	
33	NC	--	---



MIPI



34	NC	--		
35	NC	--		
36	NC	--		
37	NC	--		
38	NC	--		
39	LED+	power supply	LCD backlight power +	
40	LED+	power supply		

Note:

1. Please confirm whether the screen power supply voltage and current parameters in the screen specification match with the board, **the default backlight drive current of the board is 90mA. If the current parameters of the selected screen do not match, you can seek support from our FAE, or adjust the output current by adjusting the resistance value of R9431, formula is : $I(\text{led})=200\text{mV}/R9431$.**
2. Ensure that the circuit electrical definitions of the screen interface and the board interface are consistent, and that the FPC screen cable is correctly selected.

3.2.19 Speaker port (4pin/2.0mm)

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

Electrical definition:

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

Note:

1. This is a dual horn connection. When using a single horn is pin1 and pin2 group, pin3 and pin4 group, make no mistake.
2. The use of the horn, you need to connect the horn before starting. Do not allow live plug.
3. The default output power of the horn interface is 6R/8W. If a 4R horn is used, the power should be reduced by half accordingly.
4. The maximum power amplifier chip can support power up to 8R/ 10W, requiring custom hardware implementation.

5. When using, be sure to measure the actual maximum output power should be less than the actual horn rated power.

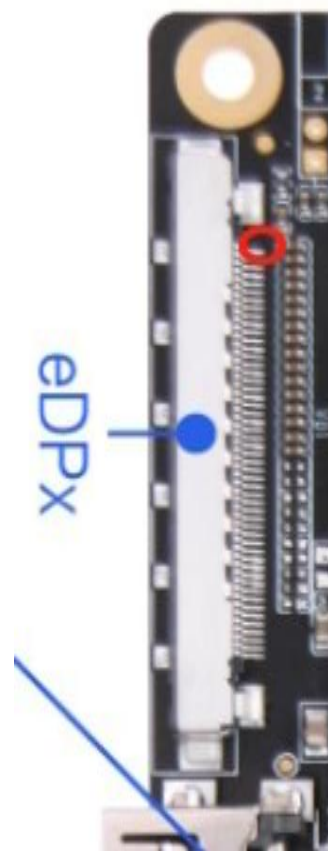
3.2.20 eDPx interface (51pin/0.5mm)

Functional description:

The interface is defined as the 51pin standard eDPx screen interface, the screen power supply is 12V, and the 4Kx2K screen is supported. This feature cannot be supported at the same time as the eDP screen.

Electrical definitions are as follows:

序号	定义	属性	描述
1	GND	地线	地线
2	Rx7p	输出	eDPx_TX_D7+
3	Rx7n	输出	eDPx_TX_D7-
4	GND	地线	地线
5	Rx6p	输出	eDPx_TX_D6+
6	Rx6n	输出	eDPx_TX_D6-
7	GND	地线	地线
8	Rx5p	输出	eDPx_TX_D5+
9	Rx5n	输出	eDPx_TX_D5-
10	GND	地线	地线
11	Rx4p	输出	eDPx_TX_D4+
12	Rx4n	输出	eDPx_TX_D4-
13	GND	地线	地线
14	Rx3p	输出	eDPx_TX_D3+
15	Rx3n	输出	eDPx_TX_D3-
16	GND	地线	地线
17	Rx2p	输出	eDPx_TX_D2+
18	Rx2n	输出	eDPx_TX_D2-
19	GND	地线	地线
20	Rx1p	输出	eDPx_TX_D1+
21	Rx1n	输出	eDPx_TX_D1-
22	GND	地线	地线
23	Rx0p	输出	eDPx_TX_D0+
24	Rx0n	输出	eDPx_TX_D0-
25	GND	地线	地线
26	LOCKN	输入	Lock 检测
27	HTPDN	输入	热插拔检测
28	NC	--	---
29	NC	--	---
30	LD_EN	输入	三星屏同步信号输出
31	NC	--	---
32	NC	--	---



Note:

1. Please confirm whether the power supply voltage of the screen specification book is correct and whether the corresponding power supply of the board can meet the maximum working current of the screen.
2. Use a multimeter to check whether the screen power supply voltage is correct.

3.3 Other standard interfaces and features

Interface	Standard	Parameter Description
Memory interface	TF card	Using the SD3.0 interface specification, the maximum support is Class10, the minimum write/read speed is 10MB/s, and the maximum capacity is 128GB
	USB TYPE-A	USB 2.0, up to 480Mbps/s transfer rate (60MB/s) USB 3.0, up to 5.0Gbps/s transfer rate (500MB/s)
Ethernet interface	RJ45 interface	Support 10/100/1000M wired network
HDMI port	HDMI TYPE-A	HDMI 1.4, 2.0 Supports multiple resolutions, 1920x1080, 1280x720, 720x576, 720x480 etc
Headphone jack	3.5mm	Support left and right dual channels, support MIC recording
4G interface	Mini PCI-E	Support Cat1, Cat4 4G module for network communication Cat1: The downstream peak is about 10Mbps and the upstream peak is 5Mbps Cat4: Downstream peak 150Mbps, upstream 50Mbps The default interface voltage is 3.8V and the power supply current is 3A
5G interface (Optional)	M.2 B-KEY	Supports a variety of 5G module interfaces with M.2 interfaces The default voltage is 3.8V and the supply current is 3A
SIM card interface	Nano SIM	Nano SIM card size: 12mmx9mm Implementation standard: ETSI TS 102 221 V11.0.0
SATA (Optional)	Standard interface	SATA3.0 interface specification, supports multiple SATA drives up to 6Gbps/s transfer rate (750MB/s) SATA power supply supports 12V/5V input, not 3.3V power supply

Chapter 4 Electrical performance

Items		Min	Typical	Max
Power parameter	Voltage	--	12V	--
	Ripple	--	--	50mV
	Current	3A		
Supply current(HDMI output, no other peripherals are connected)	working current		250mA	380mA
	standby current		22mA	30mA
Supply current(LVDS)	3.3V working current		400 mA	1.5A
	5V working current		550 mA	2A
	12V working current		580 mA	2A
Supply current (eDP)	3.3V working current		350 mA	2A
	5V working current		550mA	2A
	12V working current		600mA	2A
Total output	current	--	--	3A
Environment	Relative humidity	--	--	80%
	Operating temperature	0°C	--	60°C
	Storage temperature	-40°C		80°C

Remark 1: When connecting the LVDS/eDP/MIPI screen, please pay attention to selecting the correct screen working voltage 3.3V, 5V, 12V to avoid burning the screen.

Remark 2: When connecting to LVDS/eDP/MIPI screen, the overall working current and standby current of the board depend on the connected screen, which are not listed in the above table.

Chapter 5 Minimum test item of the whole machine

Description:

Minimum test item of stability and reliability of the whole machine		
Number	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	Low temperature power failure test	Test the product in the ability to withstand power on and off, programming 3 minutes to shut down, 7 minutes to start, after 7 days of normal operation, no crash, abnormal, 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. Turn on and off on time. 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		Full function		High configuration	
DDR	2G	<input type="checkbox"/>	2G	<input type="checkbox"/>	2G	<input type="checkbox"/>
	4G	<input checked="" type="checkbox"/>	4G	<input checked="" type="checkbox"/>	4G	<input type="checkbox"/>
	8G	<input type="checkbox"/>	8G	<input type="checkbox"/>	8G	<input checked="" type="checkbox"/>
EMMC	16	<input type="checkbox"/>	16	<input type="checkbox"/>	128	<input checked="" type="checkbox"/>
	32	<input checked="" type="checkbox"/>	32	<input type="checkbox"/>	32	<input type="checkbox"/>
	64	<input type="checkbox"/>	64	<input checked="" type="checkbox"/>	64	<input type="checkbox"/>
WiFi+BT	2.4G+BT	<input checked="" type="checkbox"/>	2.4G+BT	<input checked="" type="checkbox"/>	2.4G+BT	<input checked="" type="checkbox"/>
	5G+BT	<input checked="" type="checkbox"/>	5G+BT	<input checked="" type="checkbox"/>	5G+BT	<input checked="" type="checkbox"/>
4G/PCIE	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
5G/M.2	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
ETH/RJ45	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SATA3.0	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
LVDS	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
eDP	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
HDMI	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
USB*6	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
TTL*2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
RS232*2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
RS485*1	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
CAN*1	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Hdmi in	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
TF	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
eDPx	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	



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.