Yuntion Wireless Technology (Shenzhen) Co.,Ltd.

Smart Mainboard SD5200

User Manual

Rev: V1.1

Date: 2021-11-12

History

Revision	Date	Description
V1.0	2021-06-01	● Initial
V1.1	2021-11-12	● Adjust document format

DECLARAION

CONTENT

1 Product Information

1.1. Application

SD5200 is an Android Smart Mainboard with rich control and external interfaces. It has a wide range of application scenarios in display terminals, video terminals and industrial automation terminals, such as intelligent self-service terminals, intelligent retail terminals, etc

1.2. Overview

SD5200 adopts Rockchip RK3568 processor, is equipped with Android operating system, and has rich Android Market Applications. The integrated 3G/4G function supports real-time communication of 3G/4G all Netcom;
It also has rich peripheral interfaces, supports USB master-slave communication, 100M Ethernet wired communication, LVDS HDMI dual screen different display and dual screen same display, and can be externally connected with RS232, RS485/RS422 standard communication peripherals.
SD5200 greatly simplifies the whole system design, brings simple and smooth operation experience to users, and can meet the personalized needs of customers.

1.3. Features

SD5200 adopts industrial hardware design and is equipped with android11 system. It has rich interfaces and excellent processing performance. It can be easily integrated into self-service commercial display and other systems to expand access to a variety of peripherals.

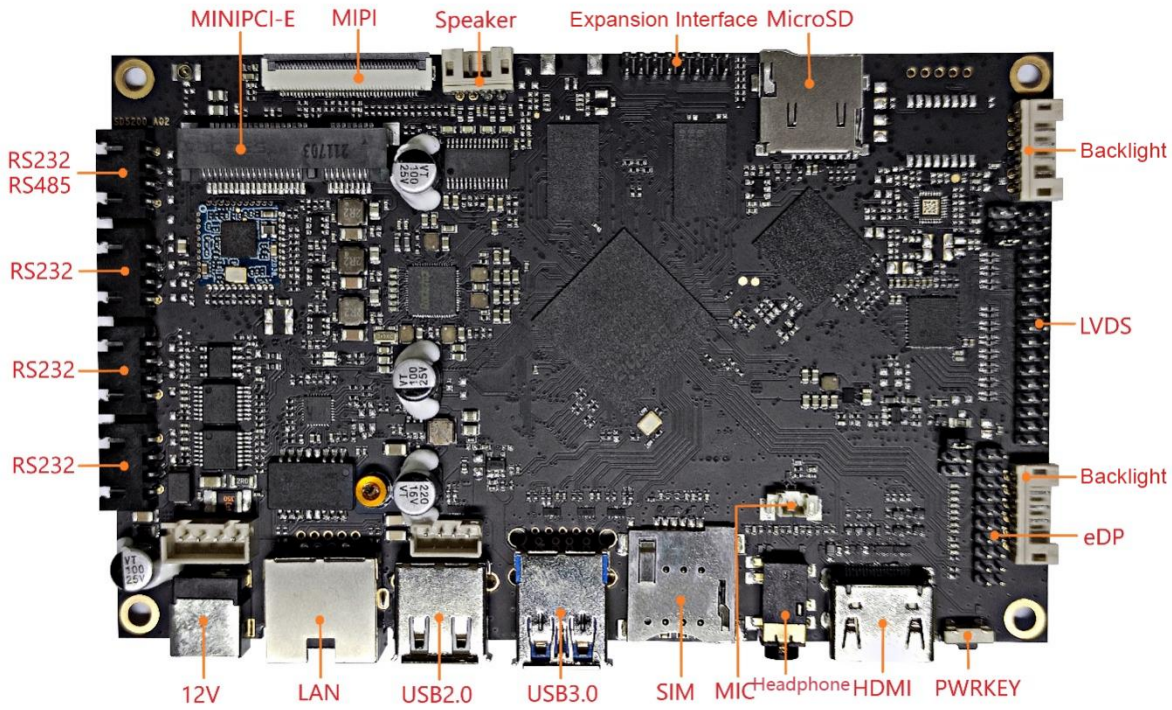
- Powerful computing capacity: The RK3568 has a 4-core Cortex-A55 processor. It adopts a new ARV V8.2-A architecture. The dominant frequency can reach up to 2.0GHz, bringing powerful computing and processing capabilities. Meanwhile, RK3568 adopts 22nm advanced technology to further reduce system power consumption and improve performance.

- Flexible display configuration: 1 channel of LVDS, 1 channel of eDP and 1 channel of HDMI display interface, and supports the dual screen differential display and dual screen simultaneous display functions of resolutions of LVDS and HDMI.

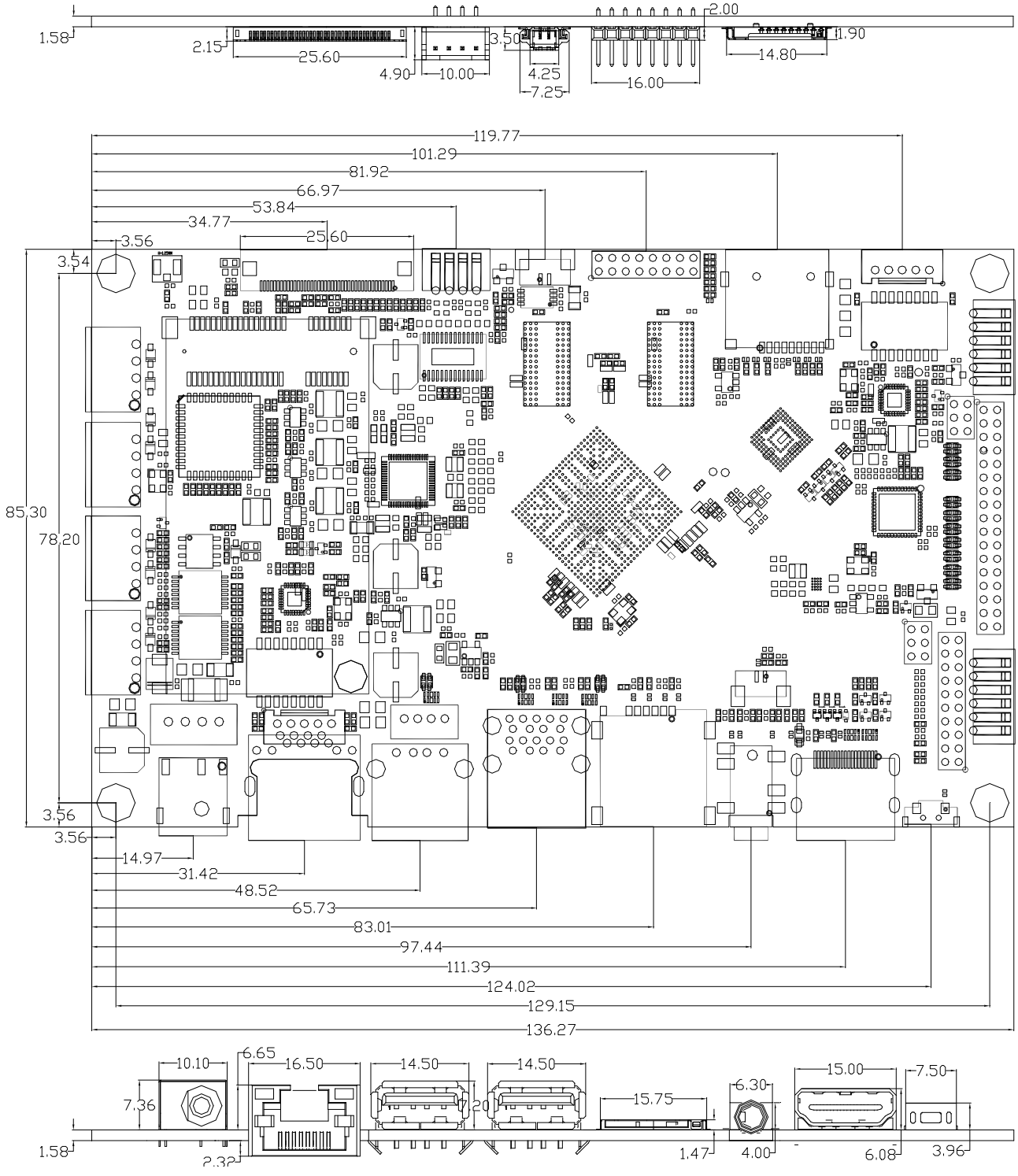
- Rich peripheral interfaces: Mainboard owned USB, RS232, RS485, RJ45, headset, HDMI, LVDS and other interfaces to support the equipment manufacturer to access a variety of peripherals to the greatest extent. It has one USB3.0 ultra-high speed communication interface, which can meet the current application of various face payment scenarios.

- Simplified management: Mainboard runs Android operating system, enjoys open Android development resources and rich Android application software, very convenient for users to manage files and software, and Human-Computer interaction is very simple.

1.4. Appearance



1.5. Dimension



Unit: mm

PCB Process: 6-layer through holes, metallization
PCBA Dimension: 136.27mm*85.3mm
Mounting hole: ∮3.5mm x 4

2 Hardware Specifications

Hardware Specification		
Platform	CPU	4-core A55　2.0GHz
	RAM	Default configuration 2GB DDR4（Optional 1GB DDR4）
	Flash	8GB eMMC
	Operation system	Android 11
Network	Mobile network	2G/3G/4G
	WIFI / BT	2.4G 802.11 b/g/n　Bluetooth 2.1
	Ethernet	One channel 10m/100m adaptive Ethernet (two channels can be configured at most)
Communication Interfaces	USB	Default： 1 USB3.0 OTG interface 1 USB2.0 HOST A interface 1 USB2.0 HOST pin connector interface
	RS232	3 RS232interface
	RS485	1RS485 interface (Optional RS232 interface)
Display Interfaces	LVDS	Dual Channel LVDS, default 1080p resolution
	HDMI	1 HDMI interface, default 1080p resolution
	eDP	1 eDP interface, default 1080p resolution
Audio Interfaces	Headphone	1 3.5mm headphone connector
	Speaker	2 8R/5W speaker driver interfaces
	MIC	1 analog MIC input interface
Standard Card Holders	SIM Card	1.8V/3/3V，Push-Push Micro-SIM Card holder
	SD Card	Push-Push Micro-SD card holder

Encode Decode	Video Encode/Decode	H.265/H.264/VP9/VP8/VC1/MPEG-4/MPEG-2/MPEG-1/H.263 video decode H.265/H.264 video encode
	Picture	BMP/JPEG/PNG/GIF
Other Interfaces	Power Source	12V DC
	Camera	1 MIPI camera interface
	Button	Power on/off (Default power-on auto start)
	Antenna	WIFI/BT IPEX interface
	Indicator	1 Red LED indicator for power 1 Blue LED indicator for network
	Coin battery	1 RTC coin battery connector
	Extension interface	4 3.3V GPIO 1 channel volume plus signal 1 channel volume reduction signal 1-way switch button signal 1 channel ADC input signal

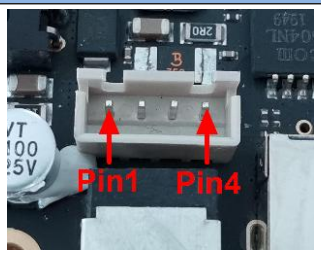
Table 1：Hardware Specifications

3 Interface Description

3.1. Power Interface

SD5200 uses DC-044B power jack and XH2.54-4P receptacle as its power input interface, the ID of DC-044B is 2.0mm, suitable for 2.0mm ID power connector plug. For the power OC protection, a 16V 3.5A PPTC is series in the power supply input. The Table below shows the definition of power input of the board.

Table 2: Power input XH2.54-4P receptacle pin definitions

Pin No.	Name	I/O	Description	
1,2	12V	PI	12V DC power input	
3,4	GND	Ground	Ground	

3.2. USB Interface

The board has three USB interfaces, two USB2.0 host interfaces and one USB3.0 OTG interface.
The interface is configured as follows：

- 1 USB2.0 A port, supporting low-speed, high-speed and full speed USB transmission, with rated output current of 500mA
- 1 USB2.0 pin (PH2.0-4A) interface, supporting low-speed, high-speed and full speed USB transmission, with rated output current of 500 mA
- 1 USB3.0 OTG interface, which can be configured to connect USB peripherals in the main mode, and can also be connected to PC for mainboard upgrade and debugging

When connecting USB peripherals, there will be a voltage drop on the cable, in order to reduce the impact of voltage drop on external USB devices, USB VBUS voltage at the mainboard end is set to 5.2V, at the same time it is recommended that USB cable should not be longer than 1m.

Table 4: USB WTB Connector Pin Definitions

Pin No.	Pin Name	I/O	Description	
1	GND	Ground	Ground	
2	DP	AI/AO	USB 2.0 differential data bus (+)	
3	DM	AI/AO	USB 2.0 differential data bus (-)	
4	VBUS	PO	5.2V power output	

3.3. RS232 & RS485 Interface

SD 5200 has three RS232 interfaces and one RRS485 interface in default, and RS485 interface can be selected as RS232 interface through BOM.
Both RS232 interface and RS485 interface adopt XH2.54-4AW receptacle, and the interface is shown in the figure below.

Table 5：RS232 Interface Pin Definitions

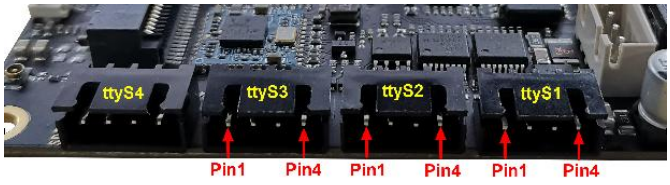
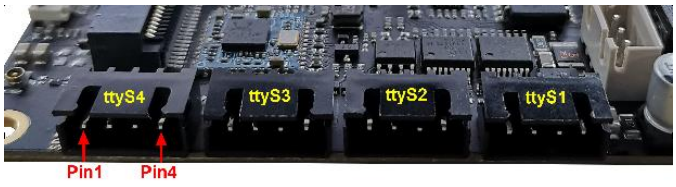
Pin No.	Pin Name	I/O	Description	
1	5V	PO	5V power output	
2	RS232-TX	DO	RS-232 driver output	
3	RS232-RX	DI	RS-232 driver input	
4	GND	Ground	Ground	

Table 6：RS485 Interface Pin Definitions

Pin No.	Pin Name	I/O	Description	
1	5V	PO	5V power output	
2	RS323_TX/ RS485_B	DI	RS232 driver output /RS485data B	
3	RS323_RX/ RS485_A	DI	RS232 driver input / RS485 data A	
4	GND	Ground	Ground	

3.4. LVDS Interface

3.4.1. LVDS Display Interface

The two-way LVDS interface of the board defaults to 1080p output. When connecting LVDS screens of different sizes externally, please pay attention to selecting the correct LVDS drive voltage by jumping cap.
NOTE: The main display port LVDS could not drive the DV320 and HV320 OC panel.

Table 9：LVDS Interface Pin Definitions

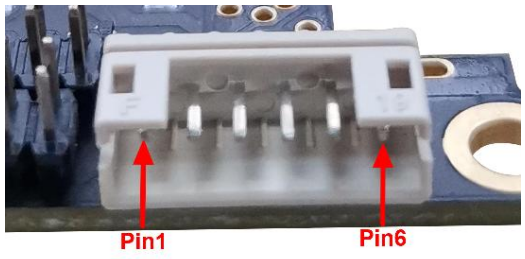
Pin No.	Pin Name	I/O	Description
1,2,3	VCC	PO	3.3V/5V/12V power output
4,5,6,13,14,25,26	GND	Ground	Ground
7	S0D0N	AO	Odd channel data0 -
8	S0D0P	AO	Odd channel data0 +
9	S0D1N	AO	Odd channel data1 -
10	S0D1P	AO	Odd channel data1 +
11	S0D2N	AO	Odd channel data2 -
12	S0D2P	AO	Odd channel data2 +
15	S0CLKN	AO	Odd channel clock -
16	S0CLKP	AO	Odd channel clock +
17	S0D3N	AO	Odd channel data3 -
18	S0D3P	AO	Odd channel data3 +
19	S1D0N	AO	Even channel data0 -
20	S1D0P	AO	Even channel data0 +
21	S1D1N	AO	Even channel data1 -
22	S1D1P	AO	Even channel data1 +
23	S1D2N	AO	Even channel data2 -
24	S1D2P	AO	Even channel data2 +
27	S1CLKN	AO	Even channel clock -
28	S1CLKP	AO	Even channel clock +
29	S1D3N	AO	Even channel data3 -
30	S1D3P	AO	Even channel data3 +
31,32,33,34	NC	NC	Float

3.4.2. LVDS Backlight Interface

The main display port LVDS backlight interface (PH2.0-6AW receptacle) can enable and adjust the brightness of the LVDS LCD.
The backlight power supply is 12V, and the backlight current cannot exceed 12v/1.5a, otherwise the board

will work abnormally or even have over-current protection.

Table 10：LVDS Backlight Interface Pin Definitions

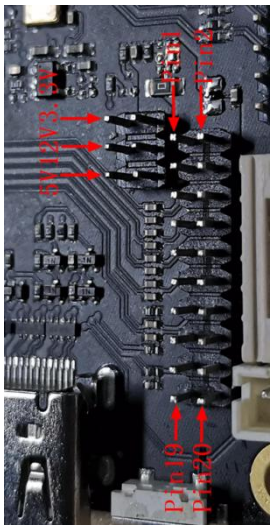
Pin No.	Pin Name	I/O	Description	
1,2	GND	Ground	Ground	
3	PWM	DO	Brightness adjustment	
4	EN	DO	Backlight enable	
5,6	12V	PO	12V power output	

3.5. eDP Interface

3.5.1. eDP Display Interface

SD5200 Support one eDP display interface, default 1080p output, the following is the pin definition of eDP display interface.

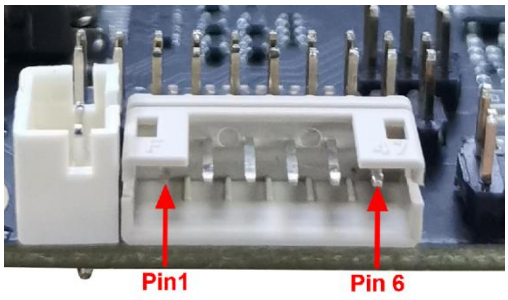
Table 11: eDP Interface Pin Definitions

Pin No.	Pin Name	I/O	Description	
1,2	VCC_eDP	Power	3.3V/5V/12V power	
3,4,13,14,17,18	GND	Ground	Ground	
5	LANE0_N	AO	MIPI CSI LANE0 Data -	
6	LANE0_P	AO	MIPI CSI LANE0 Data+	
7	LANE1_N	AO	MIPI CSI LANE1 Data -	
8	LANE1_P	AO	MIPI CSI LANE1 Data +	
9	LANE2_N	AO	MIPI CSI LANE2 Data -	
10	LANE2_P	AO	MIPI CSI LANE2 Data +	
11	LANE3_N	AO	MIPI CSI Clock 3-	
12	LANE3_P	AO	MIPI CSI Clock 3+	
15	AUX_CH_N	AO	MIPI CSI Clock -	
16	AUX_CH_P	AO	MIPI CSI Clock +	
19	NC	NC	Float	
20	HPD	AI	Insertion detection	

3.5.2. eDP Backlight Interface

SD5200 The eDP interface is equipped with a screen backlight interface. The backlight interface adopts a PH2.0-6AW receptacle, the backlight power supply is 12V, and the backlight current cannot exceed 12V/0.8A, otherwise the board will work abnormally or even over-current protection.

Table 12：eDP Backlight Interface Pin Definitions

Pin No.	Pin Name	I/O	Description	
1,2	GND	Ground	Ground	
3	PWM	AO	PWM Brightness control signal	
4	EN	AO	Backlight enable control signal	
5,6	12V	Power	12V backlight power supply	

3.6. MIPI Camera Interface

SD5200 has one MIPI camera interface, the connector Part Number is YXT-BB10-30S-02.

Table 13：Camera Interface Pin Definitions

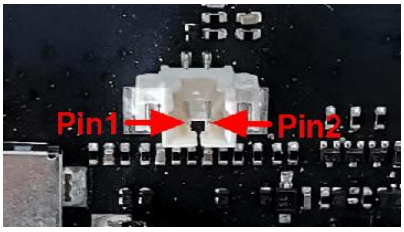
Pin No.	Pin Name	I/O	Description
1,4,7,10,13,16,18, 26,27,31,35,37,40	DGND	Ground	Ground
2	D0N	AI	Camera 0 MIPI CSI LANE0 Data-
3	D0P	AI	Camera 0 MIPI CSI LANE0 Data+
5	D1N	AI	Camera 0 MIPI CSI LANE1 Data-
6	D1P	AI	Camera 0 MIPI CSI LANE1 Data+
8	CLK0N	AI	Camera 0 MIPI CSI Clock 0-
9	CLK0P	AI	Camera 0 MIPI CSI Clock 0+
11	D2N	AI	Camera 1MIPI CSI LANE0 Data-

			Camera 0 MIPI CSI Clock 2-	
12	D2P	AI	Camera 1 MIPI CSI LANE0 Data+ Camera 0 MIPI CSI LANE2 Data+	
14	D3N	AI	Camera 1 MIPI CSI LANE1 Data- Camera 0 MIPI CSI LANE3 Data-	
15	D3P	AI	Camera 1 MIPI CSI LANE1 Data+ Camera 0 MIPI CSI LANE3 Data+	
17	MCLK0	AO	Camera 0 main clock	
19	NC	NC	Float	
20	RST0	AO	Camera 0 reset control	
21	PDN0	AO	Camera 0 Power down control	
22	PWREN0	AO	Camera 0 power enable	
23	SCL	AO	I2C clock（3.3V）	
24	SDA	AI AO	I2C data（3.3V）	
25	GPIO	AI AO	GPIO	
28,29,30	VCC5V0	Power	Power	
32	NC	NC	Float	
33	PDN1		Camera 1 power shutdown	
34	RST1	AI	Rest 1 reset control	
36	MCLK1	AI	Camera 1 main clock	
38	CLK1N	AO	Camera 1 MIPI CSI Clock 1-	
39	CLK1P	AO	Camera 1 MIPI CSI Clock 1+	

3.7. MIC Interface

SD5200 has one analog MIC input interface (MX1.25-4P receptacle).

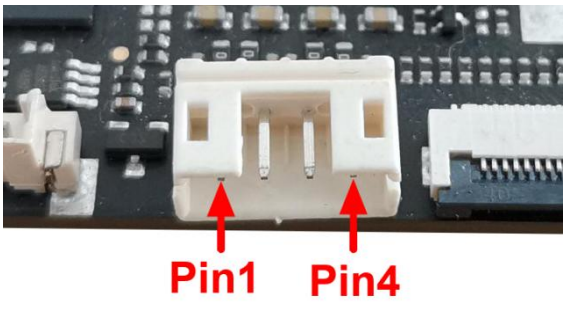
Table 14: MIC interface pin definitions

Pin No.	Pin Name	I/O	Description	
1	GND	Ground	Ground	
2	MIC+	AI	MIC input	

3.8. Speaker Interface

SD5200 has two speaker interfaces (PH2.0-4P receptacle), which can drive two 5W/8R speakers.

Table 15: Speaker Interface Pin Definitions

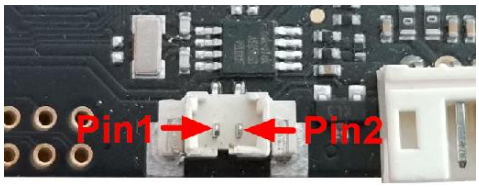
Pin No.	Pin Name	I/O	Description	
1	SPKRN	AO	Right channel output -	
2	SPKRP	AO	Right channel output +	
3	SPKLN	AO	Left channel output -	
4	SPKLP	AO	Left channel output +	

3.9. RTC Coin Battery Interface

In order to ensure the normal operation of system RTC in case of power failure, The SD5200 provides an interface for coin battery access.

Table 18: RTC Coin Batter Pin Definitions

Pin	Pin Name	I/O	Description

No.				
1	VCoin+	PI	Coin battery power input	
2	GND	Ground	Ground	

3.10. Extension Interface

SD5200 provides one GPIO expansion interface.
The following table shows the pin definitions of GPIO expansion interface.

Table 16: GPIO Extension Interface Pin Definitions

Pin No.	Pin Name	I/O	Description	
1	VCC3V3_SYS	DO	3.3V power	
2	I2C1_SCL_TP	DI/ DO	I2C clock	
3	V+	DI	Volume+	
4	I2C1_SDA_TP	DI/ DO	I2C data	
5	V-	DI	Volume-	
6	TP_INT_L_GPIO0_B5	DI/ DO	Default output 3.3V Built-in pull-up 5.1K	
7	ADC	DI		
8	TP_RST_L_GPIO0_B6	DI/ DO		
9-12 14,16	NC	NC	Float	
15	GND	GND	Ground	

3.11. Other Interfaces

Table 19: Other Interfaces

Interface	Attribute	Description
Storage	Micro-SD standard interface	Micro-SD card holder
SIM	Micro-SIM standard interface	Push-push Micro-SIM card holder, support 1.8V / 3/3V level
HDMI	HDMI standard interface	HDMI standard connector
Ethernet	RJ45 Standard network port	RJ45 100M Ethernet connector with yellow and green LED
Headphone	3.5mm American Standard Interface	3.5mm CTIA headphone connector

4 Electrical Parameters

4.1. Power Consumption And Working Environment

Table 20: Power Consumption And Working Environment

item		Min	Typ.	Max	Note
Power Supply	Voltage	10.5V	12V	13.5V	
	Ripple	--	--	--	
	Current	2A	--	--	Less than 0.3A in idle
DC output	3.3V Current	--	--	--	
	5.0V Current	--	--	--	
	12V Current	--	--	--	
USB 2.0	Rated current	--	--	--	
Environment	Humidity	--	--	--	
	Working temp	-20℃	--	+70℃	
	Storage temp	-25℃	--	+75℃	

5 Installation Precautions

Please pay attention to the following problems during assembly and use.

- The screen print at the bottom of the bare board adopts the copper leakage design, and the connector pin is 2-3mm higher than the pad. During installation, ensure that the copper leakage screen print and the connector pin contact metal objects to prevent short circuit of the board.
- During installation, the fixing holes around shall be evenly stressed to prevent deformation of the board due to uneven stress.
- When installing the LVDS screen, first determine the supply voltage of the screen, and use the jump cap to select the correct voltage configuration.
- When installing the LVDS screen, pay attention to whether the screen backlight voltage and backlight current meet the requirements. When the power of the screen backlight is above 15W, other power boards must be used for power supply.
- When installing the serial port, pay attention to the interface sequence of 232 and 485.