

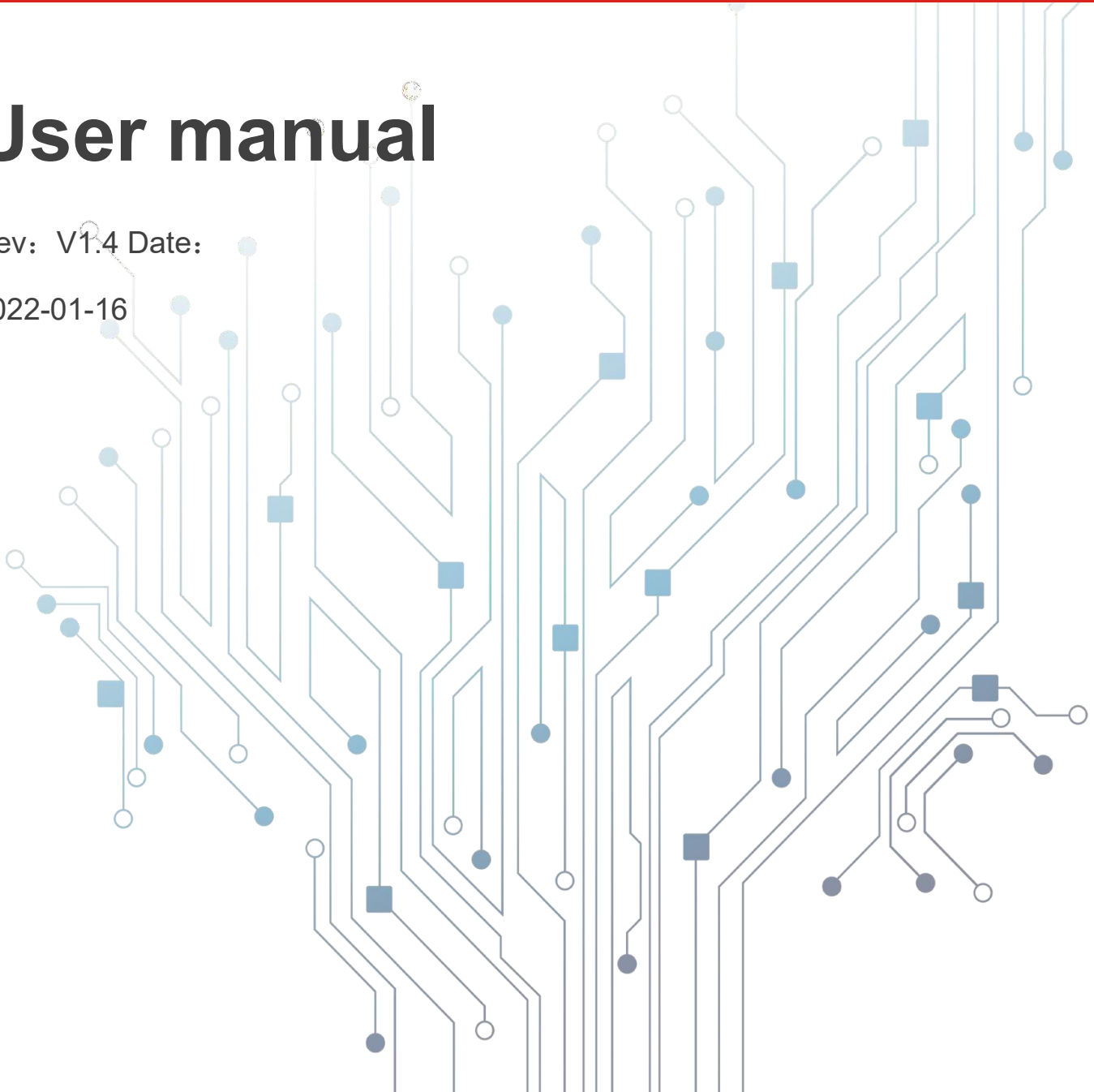
yuntion wireless technology (Shenzhen) Co.,Ltd.

AIoT Smart Mainboard SD5580

User manual

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History

Revision	Date	Description
V1.0	2021-09-07	● Initial
V1.1	2021-10-09	● Adjust document format
V1.2	2021-10-13	● Update the CPU information page 6
V1.3	2021-11-10	● Update the pictures ● Update the hardware specification page7 ● Add the TTL UART information page 13
V1.4	2022-01-11	● Update the storage information page 6

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1 Product information

1.1. Application

SD5580 is an Android Smart Mainboard with rich control interfaces and external interfaces. It has a wide range of application scenarios in intelligent display terminals, video terminals and industrial automation terminals, such as high-end business display, intelligent self-service terminals, intelligent retail terminals, edge computing, industrial control hosts, robot devices, etc.

1.2. Overview

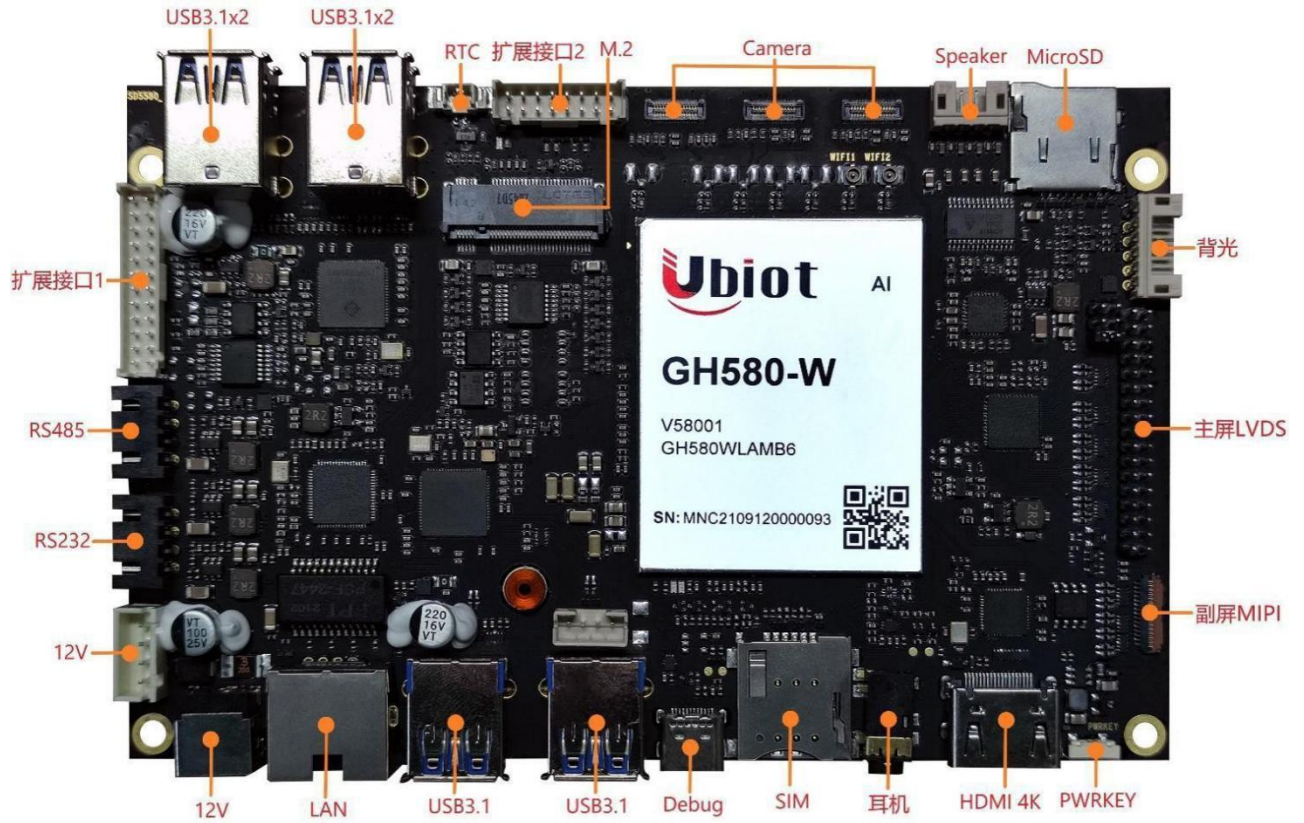
SD5580 adopts Qualcomm Snapdragon 865 processor, which excellent processing and AI computing capability. It provides users with high-quality AI audio and video processing services in real time. The ultra-high-speed wired and wireless communication of the board greatly improves the data throughput of the system. At the same time, the board has rich HD display interfaces, which brings extraordinary visual experience to customers.

1.3. Features

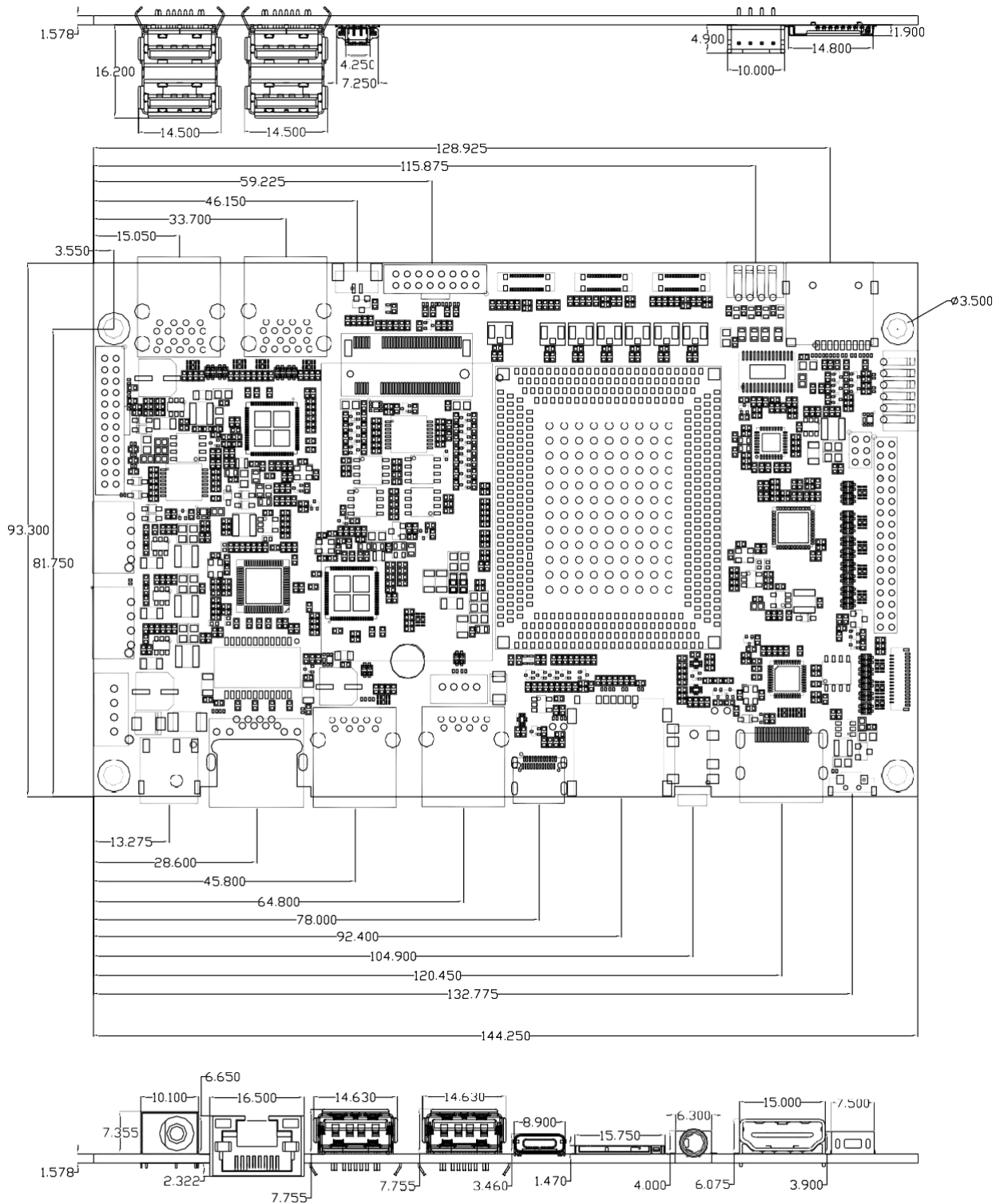
SD5580 is very suitable for AI edge computing scenarios with its powerful processing ability.

- Powerful processing capacity: Qualcomm octa-core Kryo™ 585 application processor QCS8250, with a dominant frequency of 2.8GHz, brings powerful computing and processing capability.
- Efficient AI computing performance: AI computing capability of up to 15Tops and video processing capability of 24 channel FHD
- Rich peripheral interfaces: USB3 1 Super Speed communication, HDMI 4K Ultra HD display, RS232 RS485 industrial communication, RJ45 Gigabit Ethernet communication, etc.
- Excellent wireless communication: 5G wireless module can be connected externally and support wifi-6 wireless link.
- 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



PCB Process: 6-layer through holes, metallization
 PCBA Dimension: 144.3mm * 93.3mm
 Mounting hole: ϕ 3.5mm x 4

2 Hardware specifications

Table 1: Hardware specifications

Hardware		
Platform	CPU	Qualcomm QCS8250 Three Kryo Gold Cores 2.419GHz One Kryo Gold Prime Core 2.842GHz Quad Low-Power Kryo Silver cores 1.805GHz
	Storage	128GB UFS+8GB LPDDR5 (default) 256GB UFS+8GB LPDDR5 (maximum) 64GB UFS+4GB LPDDR4X (option)
	Operation system	Android 10.0 Ubuntu 18.04
Network Interfaces	Mobile Network	1 M.2-B Key connector
	WIFI,BT	2.4G 5G WIFI 802.11a/b/g/n/ac/ax 2x2 MIMO Bluetooth v5.1
	Ethernet	1 10M/100M/1000M Ethernet
Communication Interfaces	USB	Default: 6 USB3.1 HOST A interfaces 1 Type-C(for debug and upgrade)
	RS232	3 RS232(one can be selected as TTL interface) interfaces
	RS485	1 RS485(can be configured as RS232 interface by hardware) interfaces
Display Interfaces	HDMI	1 HDMI interface, up to 3840x2160 resolution
	LVDS	Dual Channel LVDS, default 1080p resolution
	MIPI	1 MIPI DSI interface, default 1080p resolution
Audio Interfaces	Headphone	1 3.5mm headphone connector
	Speaker	2 8R/5W speaker driver interfaces
Card Holder	Micro-SIM Card	1.8V/3/3V, Push-Push Micro-SIM Card holder
	Micro-SD Card	Push-Push Micro-SD card holder
Encode/Decode	Video Encode/Decode	H.264/H.265/VP8/VP9
	Picture	BMP/JPEG/PNG/GIF

Other Interfaces	Power Source	12V DC connector
	Camera	3 MIPI Camera interfaces
	Antenna	2 WIFI/BT antenna IPEX connector
	Coin battery	1 coin battery connector
	Extension	1 1.8V I2C 1 1.8V SP 2 1.8V ADC Volume up Volume down Power on/off

3 Interface description

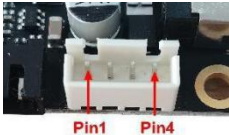
3.1. Power interface

SD5580 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 pin definitions of power input interface of the board.

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

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



3.2. USB Interface

SD5500 has two USB3.1 controllers, both of them expand the number of USB interfaces through external hub.

USB3.1 controller 0 hub:

- 2 USB3.1 Host A connectors, rated current supply up to 1.5A, one of them can use WTB connector.
- 1 Type-C connector, for debugging and upgrading, when connecting this port to PC, SD5580 will directly switch from host to client mode, this Type-C only has USB2.0 differential signal.

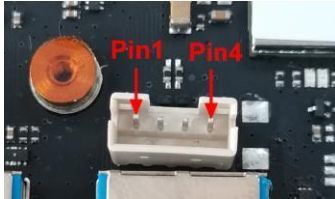
USB3.1 controller 1 hub:

- 4 USB3.1 Host A connectors, rated current supply up to 0.7A.

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 3: 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. LVDS interface

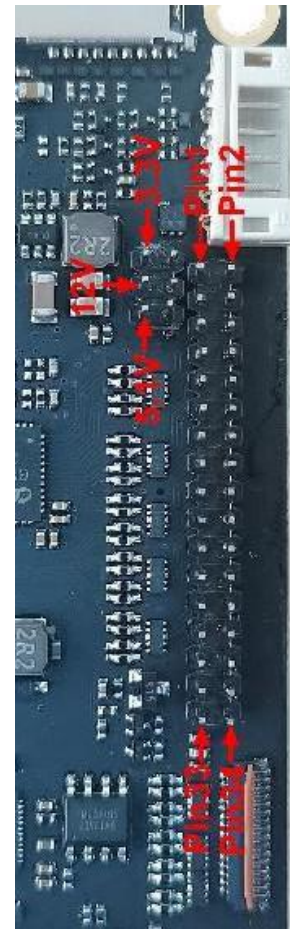
3.3.1. Main display port LVDS interface

SD5580 main display port supports dual channel LVDS panel, the display resolution up to 1920x1080, the table below shows the LVDS interface pin definitions.

NOTE: The main display port LVDS could not drive the DV320 and HV320 OC panel.

Table 4: Main display port 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



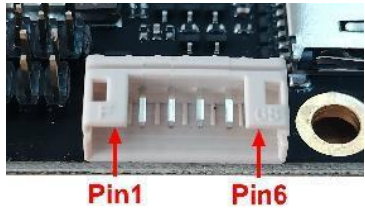
3.3.2. Main display port LVDS backlight interface

The main display port LVDS backlight interface (PH2.0-6AW receptacle) can enable and adjust the brightness of the LVDS LCD.

Due to the high power of LCD backlight (the 21.5-inch LVDS LCD is more than 10W), client must pay attention to the OVC protection of the backlight booster board.

Table 5: Main display port LVDS backlight interface pin definitions

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

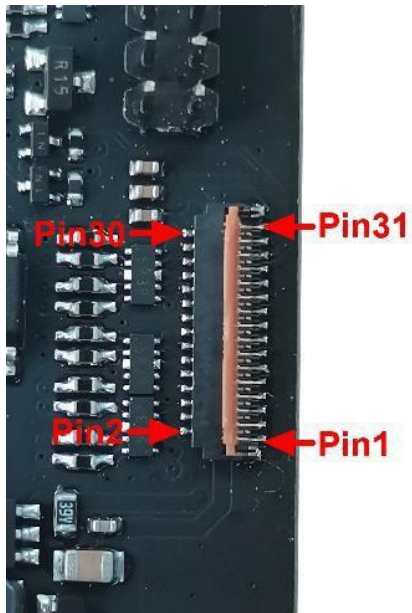


3.4. MIPI DSI Interface

SD5580 has one MIPI DSI interface, the connector part number is FH26-31S-0.3SHW.

Table 6: Auxiliary display port MIPI DSI interface pin definitions

Pin No.	Pin Name	I/O	Description
1,2,3	LEDA	PO	Backlight anode
4	NC	NC	Float
5,6,7,8	LEDK	PO	Backlight cathode
9,10	GND	Ground	Ground
11	MIPI_D2+	AO	MIPI DSI1 Lane2 data +
12	MIPI_D2-	AO	MIPI DSI1 Lane2 data -
13	GND	Ground	Ground
14	MIPI_D1+	AO	MIPI DSI1 Lane1 data +
15	MIPI_D1-	AO	MIPI DSI1 Lane1 data -
16	GND	Ground	Ground
17	MIPI_CLK+	AO	MIPI DSI1 Clock +
18	MIPI_CLK-	AO	MIPI DSI1 Clock -
19	GND	Ground	Ground
20	MIPI_D0+	AO	MIPI DSI1 Lane0 data +
21	MIPI_D0-	AO	MIPI DSI1 Lane0 data -
22	GND	Ground	Ground
23	MIPI_D3+	AO	MIPI DSI1 Lane3 data +
24	MIPI_D3-	AO	MIPI DSI1 Lane3 data -
25	GND	Ground	Ground
26	NC	NC	Float
27	RESET	DO	LCD reset
28	NC	NC	Float
29	VDD_1V8	PO	LCD IO Power
30,31	VCC_3V3	PO	LCD Power

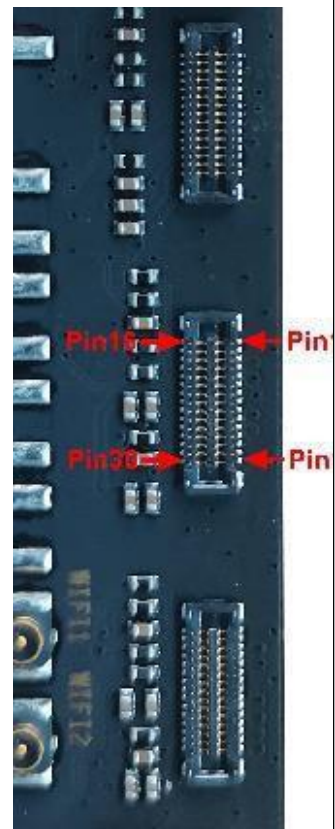


3.5. MIPI CSI Camera interface

SD5580 has three MIPI CSI camera connectors, the connector part number is YXT-BB10-30S-02.

Table 7: Camera interface pin definitions

Pin No.	Pin Name	I/O	Description
1	DGND	Ground	Ground
2	MCP	AO	MIPI CSI Clock +
3	MCN	AO	MIPI CSI Clock -
4	DGND	Ground	Ground
5	MDP2	AO	MIPI CSI Lane2 data +
6	MDN2	AO	MIPI CSI Lane2 data -
7	DGND	Ground	Ground
8	MDP0	AO	MIPI CSI Lane0 data +
9	MDN0	AO	MIPI CSI Lane0 data -
10	DGND	Ground	Ground
11	MDP3	AO	MIPI CSI Lane3 data +
12	MDN3	AO	MIPI CSI Lane3 data -
13	DGND	Ground	Ground
14	MDP1	AO	MIPI CSI Lane1 data +
15	MDN1	AO	MIPI CSI Lane1 data -
16	DGND	Ground	Ground
17	ID	DI	Camera ID input
18	DGND	Ground	Ground
19	PWDN	DO	Camera shutdown
20	RESET	DO	Camera reset
21	SDA	DI/DO	Camera I2C data
22	SCL	DO	Camera I2C clock
23	DVDD_1V2	PO	Camera core power 1.2V
24	DGND	Ground	Ground
25	MCLK	DO	Camera main clock
26	DGND	Ground	Ground
27	DVDD_1V8	PO	Camera IO Power
28	AGND	Ground	Ground
29	AVDD_2V8	PO	Camera Analog power 2.8V
30	AF_AVDD_2V8	PO	Actuator power 2.85V



3.6. RS232 & RS485 Interface

SD5580 has three (two are in the extension interface connectors, see table12) RS232 interfaces and one RS485 interface in default, all of them use the XH-4AW receptacles. RS232 interfaces are named ttyS1, ttyS3 and ttyS4 in software, RS485 interface is named ttyS2 in software, and RS485 interface can be configured as RS232 by hardware, all the RS232 and RS485 baud rates can up to 115200bps.

Table 8: RS232(ttyS1) interface pin definitions

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

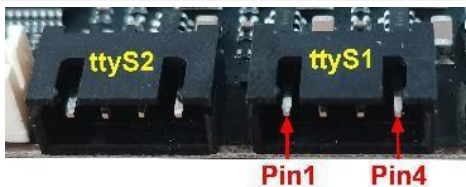
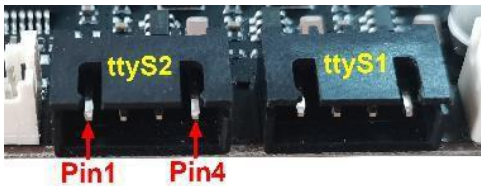


Table 9: RS485(ttyS2) interface pin definitions

Pin No.	Pin Name	I/O	Description
1	5V	PO	5V power output
2	B RS232-TX	DI/DO DO	RS485 data B RS232 driver output
3	A RS232-RX	DI/DO DI	RS485 data A RS232 receiver input
4	GND	Ground	Ground

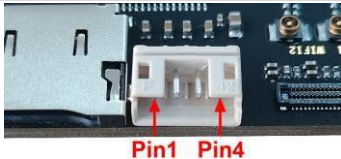


3.7. Speaker interface

SD5580 has two speaker interfaces (PH2.0-4P receptacle), which can drive two 5W/8R speakers.

Table 10: Speaker interface pin definitions

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




3.8. RTC interface

In order to ensure the normal operation of system RTC in case of power failure, The SD5580 provides an interface for coin battery access.

Table 11: RTC coin batter pin definitions

Pin No.	Pin Name	I/O	Description
1	VCOIN	PI	Coin battery power input
2	GND	Ground	Ground




3.9. Expansion interface

In order to enrich peripheral interfaces, the mainboard has two expansion interfaces. The following table is the pin definitions of expansion interface 1 and expansion interface 2.

Table 12: Expansion interface 1 pin definitions

Pin No.	Pin Name	I/O	Description
1	3V3	PO	3.3V output
2	5V0	PO	5V output
3	GPIO170 I2C_SDA	DI/DO	1.8V GPIO I2C4 data
4	RS232_TX4	DO	RS232(ttyS4) driver output
5	GPIO171 I2C_SCL	DI/DO	1.8V GPIO I2C4 clock
6	RS232_RX4	DI	RS232(ttyS4) receiver input
7	GPIO164 SPI2_MISO	DI/DO	1.8V GPIO SPI2 master input/slave output
8	RS232_TX3	DO	RS232(ttyS3) driver output
9	GPIO165 SPI2_MOSI	DI/DO	1.8V GPIO SPI2 master output/slave input
10	RS232_RX3	DI	RS232(ttyS3) receiver input
11	GPIO166 SPI2_CLK	DI/DO	1.8V GPIO SPI2 clock output
13	GPIO167 SPI2_CS	DI/DO	1.8V GPIO SPI2 chip select
12,14-16 19-24	NC	Float	Float
17,18	GND	Ground	Ground



The RS232(only ttyS4) level can be changed to TTL 3.3V level by modifying the resistor position of the main board. The modification scheme is shown in the figure below. Remove the four 0 ohm resistors in Figure 1, and then weld two 0 ohm resistors in Figure 2.

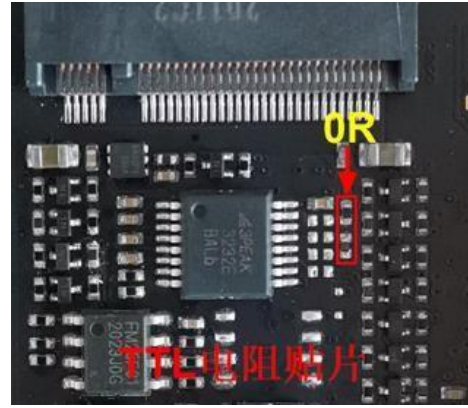
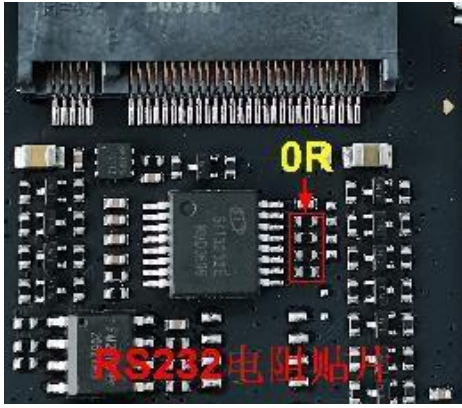
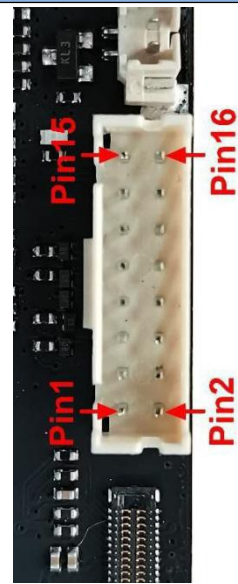


Table 13: Expansion interface 2 pin definitions

Pin No.	Pin Name	I/O	Description
1	WSA_SWR_CLK	DO	WSA audio PA clock
2,7,14	GND	Ground	Ground
3	WSA_SWR_DATA	DO	WSA audio PA data
4	VOL_UP	DI	Volume up
5	WSA_EN	DO	WSA audio PA enable
6	VOL_DOWN	DI	Volume down
8	PWRKEY	DI	Power on/Power off
9	DMIC23_CLK	DO	DMIC Clock
10	ADC0	AI	ADC Input, up to 1.8V
11	DMIC23_DATA	DI	DMIC Data
12	ADC1	AI	ADC Input, up to 1.8V
13	DMIC01_CLK	DO	DMIC Clock
15	DMIC01_DATA	DI	DMIC Data
16	S4A_1P8	PO	1.8V Power output



3.10. Others

Table 14: Other interfaces

Interface	Description
Storage	Micro-SD card holder
M.2	M.2-B, for accessing the wireless 4G/5G Module
SIM	Push-push Micro-SIM card holder, support 1.8V / 3/3V level
HDMI	HDMI standard connector
Ethernet	RJ45 010M/100M/1000M Ethernet connector with yellow and green LED
Headphone	3.5mm CTIA headphone connector

4 Electrical parameters

Table 15: Power and environment

Item		Min	Typ.	Max	Note
Power Supply	Voltage	--	--	--	
	Ripple	--	--	--	
	Current	--	--	--	
DC output	3.3V Current	--	--	--	
	5.0V Current	--	--	--	
	12V Current	--	--	--	
USB 3.1	Rated current		--		
Environment	Humidity	--	--	--	
	Working temp	--		--	
	Storage temp	--	--	--	