# SD5360
# User Manual

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# Modify record

| Version | Date | Modify the description |
|---------|------|------------------------|
| V1.0 | 2020-06-30 | ● Initial |
| V1.1 | 2020-12-04 | ● Increase the length of the motherboard by 5mm and increase the Type-C interface |

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# 1 Introduction

## 1.1. Product description

The SD5360 board adopts a self-developed hardware solution, is equipped with the android operating system, andhas a wealth of android market applications. Internally integrated 3G/4G communication function, support 3G/4G full Netcom real-time communication, at the same time support USB3.0 super high-speed communication, Fast Ethernet wired communication, LVDS HDMI and 4K dual-screen different display and dual-screen simultaneous display function, can be connected externally RS232 RS485/RS422 and other standard protocol peripherals. It greatly simplifies the system design of the whole machine, provides users with a simple and smooth operating experience and can meet the individual needs of customers.

## 1.2. Features

SD5360 industrial-grade hardware design, equipped with Android system, has rich interfaces and excellent 3G/4G wireless transmission performance. It can be easily integrated in the vending machine system and extended to connect to a variety of peripherals.

➢ Powerful processing capabilities: Qualcomm's 4-core A73 + 4-core A53 architecture processor SDM660, clocked at 2.2GHz, brings powerful computing and processing capabilities.

➢ Flexible display configuration: The board has 2 LVDS and 1 HDMI display interfaces, supporting 1080p/LVDS+720p/LVDS, 1080p/LVDS+1080p/HDMI and other resolutions.

➢ Abundant peripheral interfaces: The board has USB, RS232/485/422, RJ45, earphone,HDMI, LVDS and other interfaces, which can support the types of external devices of equipment manufacturers to the greatest extent.

➢ High functional integration: the board integrates 2G/3G/4G/LTE/WIFI wireless communication
and Ethernet wired communication; supports USB master-slave communication; supports RS232/ RS485/RS422 protocol standards and interface equipment; SD card can be inserted for external expansion storage Capacity; supports 1080p and 720p dual-screen simultaneous display and dual-screen different display functions.

➢ Simple management and use: The board runs Android operating system, enjoys open Android development resources and rich Android application software, which is convenient for users to control files and software, and the human-computer interaction is very simple.

## 1.3. Hardware specifications

Table 1    TableMain hardware specifications

| Hardware Specifications | |
|---|---|
| CPU | Qualcomm SDM660<br>4-core A73 2.2GHz/1.95GHz，4-core A53 1.8GHz |
| RAM | On-board LPDDR4 2GB/3GB（Maximum support 8GB） |
| Built-in Memory | 32GB eMMC（Maximum support 256GB） |
| Operating System | Android 9.0 |
| Network Support | 2G/3G/4G/LTE |
| GNSS | GPS/BeiDou/GLONASS/Galileo |
| WIFI,BT | Default 2.4G & 5 G  802.11 b/g/n/ac;Bluetooth 5.0 BLE |
| Video Codec | HEVC/H.264/VP8/VP9/MP4 |
| Image Format | BMP/JPEG/PNG/GIF |
| Power Input | 12V DC |
| RJ45 | 1 channel 10M/100M adaptive Ethernet |
| USB2.0 | Default allocation:<br>6 USB2.0 HOST interface<br>1 way USB2.0 Client interface |
| USB3.0 | TBD |
| RS485/RS422 | 1 channel RS422/RS485 adaptive interface (default is 232 interface, RS422/RS485 interface can be selected through BOM) |
| RS232 | 4 RS232 interfaces (one of which can be configured as RS485/422 interface by BOM) |
| HDMI | HDMI 1 channel, default 1080p output |
| LVDS | 1 dual channel LVDS, the default output resolution is 1080p<br>1 channel single channel LVDS, maximum output resolution 1366*768 |
| 4K | TBD（Extensible Support） |
| I2C | 2 channel I2C, configurable as touch screen interface |
| IO | Default 6 3.3V IO ports (internal 3.3V pull-up) |

| | |
|---|---|
| Screen backlight | 2 channel brightness adjustable backlight interface |
| Headset | 1 channel 3.5mm headphone jack |
| Speaker | 1 channel dual channel 8R/5W speaker driver interface |
| SIM Card | 1.8V/3/3V，Push-Push Micro-SIM card socket |
| MicroSD Card | Push-Push Micro-SD card socket |
| Webcam | 1 channel 1600M MIPI rear camera interface |
| Button | Switch button<br>Volume plus button<br>Volume down/reset button |
| Antenna | Main antenna IPEX interface<br>WIFI/BT IPEX interface<br>GNSS IPEX interface |
| Indicator Light | Red power indicator<br>Blue network status indicator |
| RTC Real Time Clock | Support |
| System Upgrade | Local USB upgrade |

## 1.4. Board appearance and interface
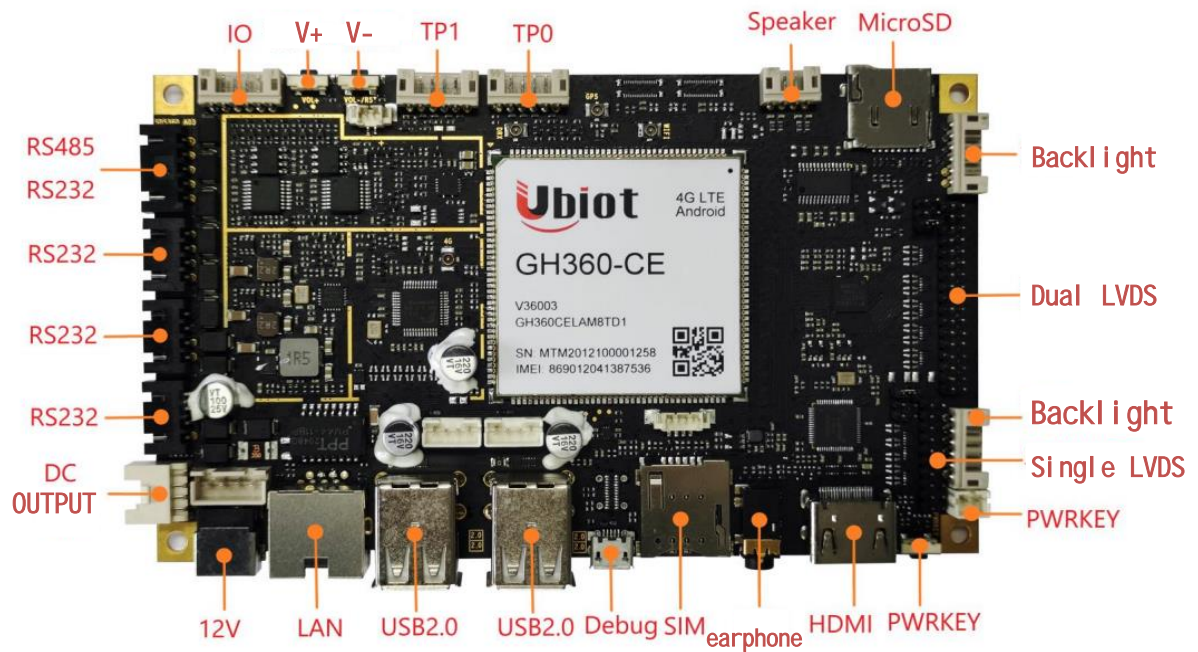


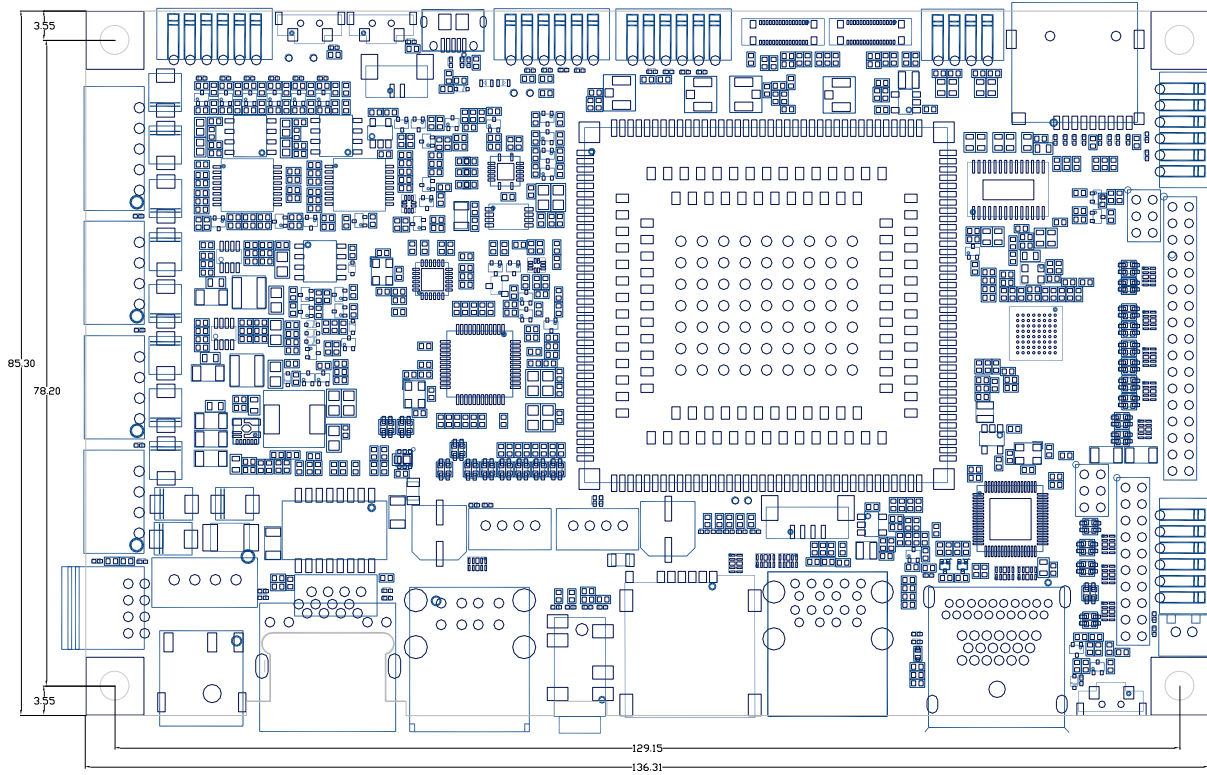**Figure 1** SD5360 Board appearance and interface

## 1.5. Board size



**Figure 2**    SD5360 Board size

**unit:** mm

**P C B process**    4 layers of through holes,
Electroless Nickel/Immersion Gold

**Board size**    144.3mm*85.3mm

**Fixing hole**    ∮3.5mm x 4

# 2 Hardware interface

## 2.1. Power interface

SD5360 adopts DC-004B DC power socket interface, DC IN inner pin φ2.1mm, suitable for commonly used 5.5x2.1mm 12V DC adapter connector, main board adopts 16V3.5A recoverable fuse for overcurrent protection, current through main board DC interface cannot Greater than 3.5A.

The following figure is the 12V DC power input interface of the board.
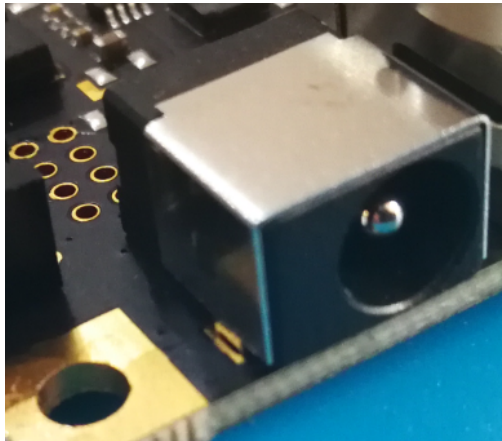


Figure 3    Main power input interface

SD5360 supports 3.3V, 5V, 12V DC output, and the output current is limited. If the external load is greater than the rate output current value, it will cause the board to work abnormally. The following table shows the board's DC output interface pin definition. If you need to use this interface, you must first discuss with our company to determine the peripheral type of this interface before you can use it.
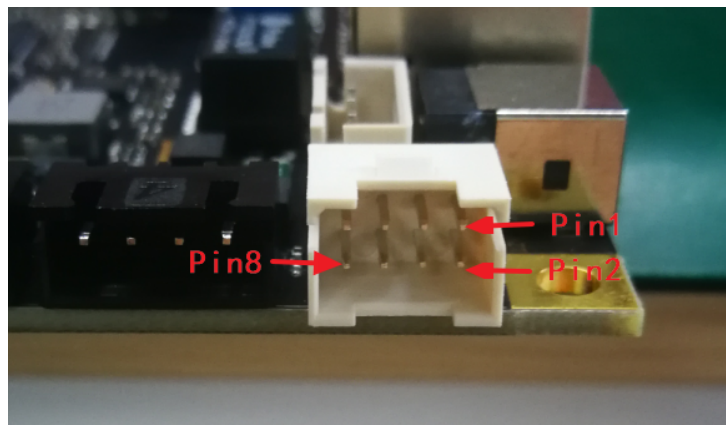


Figure 4    DC output interface

Table **2**　DC output interface

| S/N | Definition | Property | Description |
|-----|-----------|----------|-------------|
| 1,2 | 12V | output | The max rated current is to be determined according to the peripherals of the whole board |
| 4 | 5V | output | The max rated current is to be determined according to the peripherals of the whole board |
| 6 | 3.3V | output | The max rated current is to be determined according to the peripherals of the whole board |
| 7,8 | GND | GrouND | GND Ground |
| 3 | ADC_IN | input | ADC input  max1.8V |
| 5 | NC | input | Non contact |

## 2.2. **USB** interface

The board USB is divided into a Host mode interface and a Client mode interface. The USB Host interface connects to and reads and writes USB devices, and the Client interface (MicroUSB) is used to debug the board or upgrade the version. Host interface and Client interface can work at the same time.

### The following is USB Host interface configuration:

- 4-channel USB2.0A port, supports low-speed, high-speed and full-speed USB transmission, rated output current 500mA.

- 2-channel USB2.0 pin (PH2.0-4AW) interface, support low-speed, high-speed and full-speed USB transmission, rated output current 50mA.

### The following is USB Client interface configuration:

- 1-channel Micro-USB interface, when this interface is connected to a PC, the board will directly switch from Host mode to Client mode.

When the USB is connected to peripherals, there will be a voltage drop on the cable, so the voltage output value of the USB interface of the board is set to 5.2V.
In order to ensure the effective voltage drop of the control cable when high-power USB peripherals are connected, it is recommended that the length of the USB cable should not be greater than 1m.



Figure 5　USB HOST interface
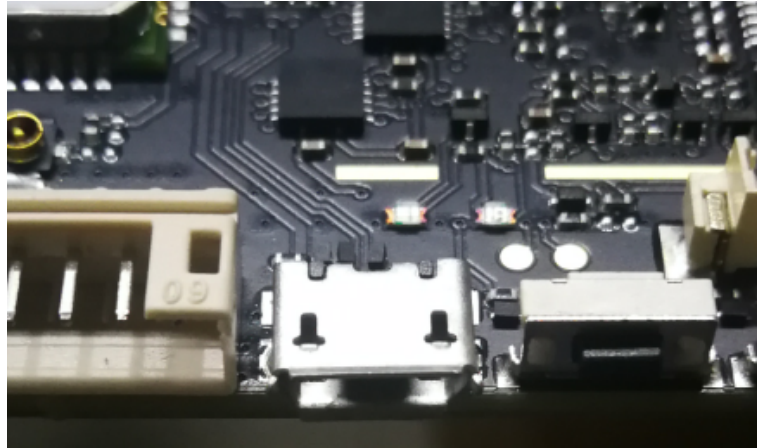
**Figure 6**　USB Client interface

## 2.3. **RS232 & RS485 interface**

The board is configured with 3 channel RS232 interfaces by default, 1 channel RS485/RS422 interface, RS485/RS422 interface can be selected as RS232 interface through BOM control.

RS232 interface uses XH2.54-4AW base, RS485/RS422 interface uses XH2.54-5AW base, the interface is shown in the figure below. ttyS1, ttyS2, and ttyS3 are RS232 interfaces; ttyS4 is RS485/RS422 interface (the BOM can be selected as RS232 interface), the board adopts RS485/RS422 compatible circuit, and it will adaptively communicate with RS485 or RS422 through peripheral signals.



**Figure 7**　RS232 & RS485 interface

Table **3**    RS232 Interface pin definition

| S/N | Definition | Property | Description |
|-----|-----------|----------|-------------|
| 1 | GND | GrouND | GND Ground |
| 2 | RS232-RX | input | 232 receive |
| 3 | RS232-TX | output | 232 transmit |
| 4 | 5V | power | 5V output |

Table **4**    RS485/422 Interface pin definition

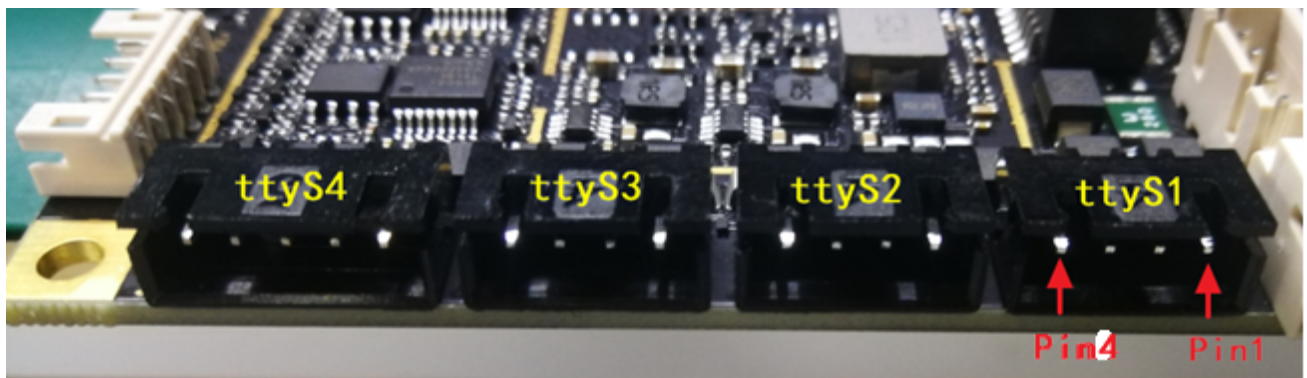| S/N | Definition | Property | Description |
|-----|-----------|----------|-------------|
| 1 | TRX+/A/RS232-RX | output/input | RS422 transmit differential positive / RS485 data A / RS232 receive |
| 2 | TRX-/B/RS232-TX | output/input | RS422 transmit differential negative / RS485 data B / RS232 transmit |
| 3 | RXD+ | input | RS422 receive differential positive |
| 4 | RXD- | input | RS422 receive differential negative |
| 5 | GND | GrouND | GND Ground |

## 2.4. **I2C Interface**

The board supports two I2C interfaces, internally uses 3.3V pull-up, the maximum communication rate is 400KHz, and the I2C interface uses PH2.0-6AW base, which can be connected to a touch screen or other I2C devices. Since these two I2C channels have been used inside the board, please note that the device address cannot be the same as the I2C device address inside the board when connecting to an I2C device, otherwise I2C cannot communicate normally.

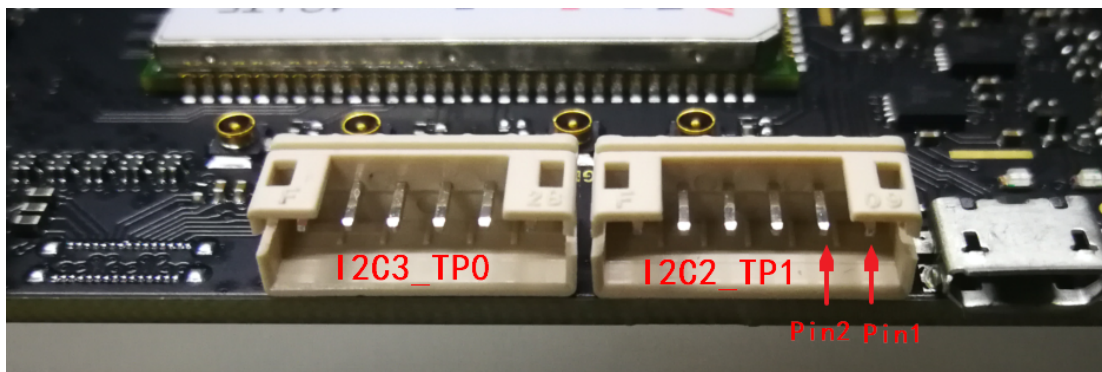The I2C address occupied by TP0 is:0X90，0X91，0X92，0X93，0X94，0X95，0XA2，0XA3



Figure **8**    I2C **interface**

Table 5    TP0(I2C3)  Interface pin definition

| S/N | Definition | Property | Description |
|---|---|---|---|
| 1 | TP0_3V3 | output | 3.3V power output |
| 2 | TP0_SCL | output | I2C clock signal / GPIO3 |
| 3 | TP0_SDA | output/input | I2C data signal / GPIO2 |
| 4 | TP0_INT_N | input | Interrupt output / GPIO67 |
| 5 | TP0_RST_N | output | Reset output / GPIO66 |
| 6 | GND | GrouND | GND Ground |

Table 6    TP1(I2C2)  Interface pin definition

| S/N | Definition | Property | Description |
|---|---|---|---|
| 1 | TP1_3V3 | output | 3.3V power output |
| 2 | TP1_SCL | output | I2C clock signal / GPIO23 |
| 3 | TP1_SDA | output/input | I2C data signal / GPIO22 |
| 4 | TP1_INT_N | input | Interrupt output / GPIO42 |
| 5 | TP1_RST_N | output | Reset output / GPIO43 |
| 6 | GND | GrouND | GND Ground |

## 2.5.  LVDS Interface

The board supports LVDS dual-screen simultaneous display or different display. The main screen LVDS (dual channel LVDS) defaults to 1080p output, and the secondary screen LVDS (single channel LVDS) defaults to 720p output.
The LVDS resolution can be set through "Settings→Customization→Main Screen Resolution→Secondary Screen Resolution" to modify the resolution of the main and secondary screens.

When connecting different sizes of LVDS screens, please pay attention to select the correct LVDS drive voltage through the jumper. According to experience, when the screen size is 18.5 inches and below, please choose 3.3V screen drive voltage; when the screen is 21.5 inches or higher, please choose 5V or higher screen drive voltage. The drive voltage of the screen is ultimately subject to the screen specifications.
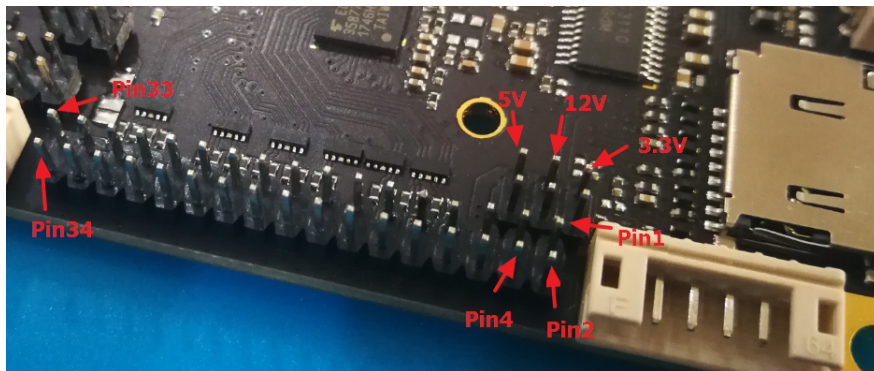


Figure 9    LVDS  Main screen interface

Table 7    LVDS Main screen interface pin definition

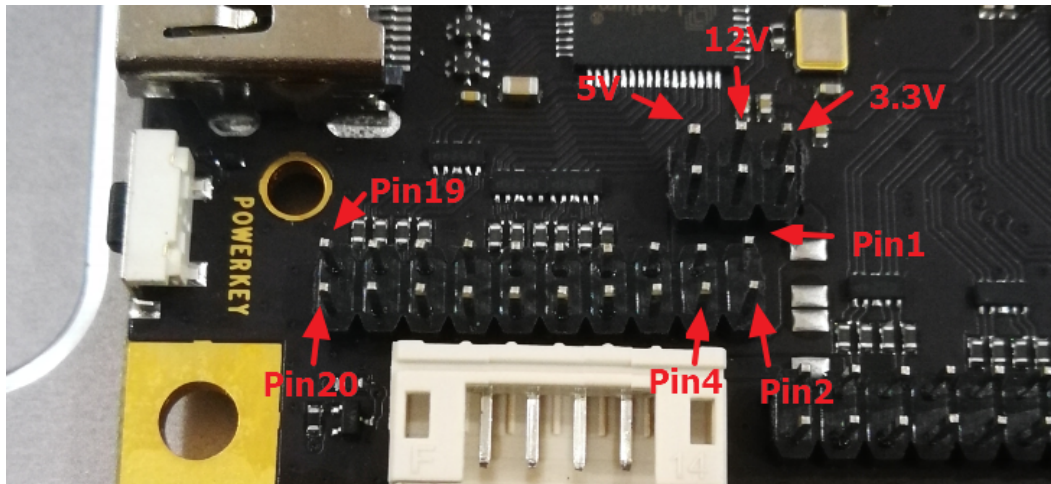| S/N | Definition | Property | Description |
|---|---|---|---|
| 1,2,3 | VCC | power | 3.3V/5V/12V power |
| 4,5,6 | GND | GrouND | GND Ground |
| 7 | S0D0N | output | Channel 0 (odd channel) differential data 0 negative |
| 8 | S0D0P | output | Channel O (odd channel) differential data O positive |
| 9 | S0D1N | output | Channel 0 (odd channel) differential data 1 negative |
| 10 | S0D1P | output | Channel O (odd channel) differential data 1 positive |
| 11 | S0D2N | output | Channel 0 (odd channel) differential data 2 negative |
| 12 | S0D2P | output | Channel O (odd channel) differential data 2 positive |
| 13,14 | GND | GrouND | GND Ground |
| 15 | S0CLKN | output | Channel 0 (odd channel) differential clock negative |
| 16 | S0CLKP | output | Channel 0 (odd channel) differential clock positive |
| 17 | S0D3N | output | Channel 0 (odd channel) differential data 3 negative |
| 18 | S0D3P | output | Channel O (odd channel) differential data 3 positive |
| 19 | S1D0N | output | Channel 1 (even channel) differential data 0 negative |
| 20 | S1D0P | output | Channel 1 (even channel) differential data 0 positive |
| 21 | S1D1N | output | Channel 1 (even channel) differential data 1 negative |
| 22 | S1D1P | output | Channel 1 (even channel) differential data 1 positive |
| 23 | S1D2N | output | Channel 1 (even channel) differential data 2 negative |
| 24 | S1D2P | output | Channel 1 (even channel) differential data 2 positive |
| 25,26 | GND | GrouND | GND Ground |
| 27 | S1CLKN | output | Channel 1 (even channel) differential clock negative |
| 27 | S1CLKP | output | Channel 1 (even channel) differential clock positive |
| 29 | S1D3N | output | Channel 1 (even channel) differential data 3 negative |
| 30 | S1D3P | output | Channel 1 (even channel) differential data 3 positive |
| 31,32,33,34 | NC | NC | Non contact |

**Figure 10** LVDS Secondary screen interface

Table 8 LVDS Secondary screen interface pin definition

| S/N | Definition | Property | Description |
|---|---|---|---|
| 1,2,3 | VCC | power | 3.3V/5V/12V 电源 |
| 4,5,6 | GND | GrouND | GND Ground |
| 7 | S0D0N | output | Differential data 0 negative |
| 8 | S0D0P | output | Differential data 0 positive |
| 9 | S0D1N | output | Differential data 1 negative |
| 10 | S0D1P | output | Differential data 1 positive |
| 11 | S0D2N | output | Differential data 2 negative |
| 12 | S0D2P | output | Differential data 2 positive |
| 13,14 | GND | GrouND | GND Ground |
| 15 | S0CLKN | output | Differential clock negative |
| 16 | S0CLKP | output | Differential clock positive |
| 17 | S0D3N | output | Differential data 3 negative |
| 18 | S0D3P | output | Differential data 3 positive |
| 19 | NC | | |
| 20 | NC | | |

## 2.6. HDMI Interface

The board has a standard Type-A HDMI female socket, which supports 720p video signal output by default. The HDMI display content is exactly the same as the LVDS secondary screen display content.
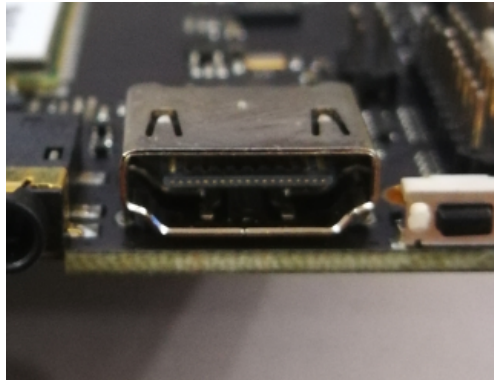


Figure 11    HDMI Interface

## LVDS Backlight interface

The LVDS interface of the main and secondary screens of the board is equipped with a screen backlight interface. The backlight interface adopts a PH2.0-6AW base. The backlight power supply is 12V. The total backlight current of the main and secondary screens cannot exceed 12V/1.5A, otherwise it will cause the board The card works abnormally or even overcurrent protection. The backlight enable control output signal is internally pulled up to 5V through a 2.7K resistor to ensure the high-level drive capability of the enable signal.
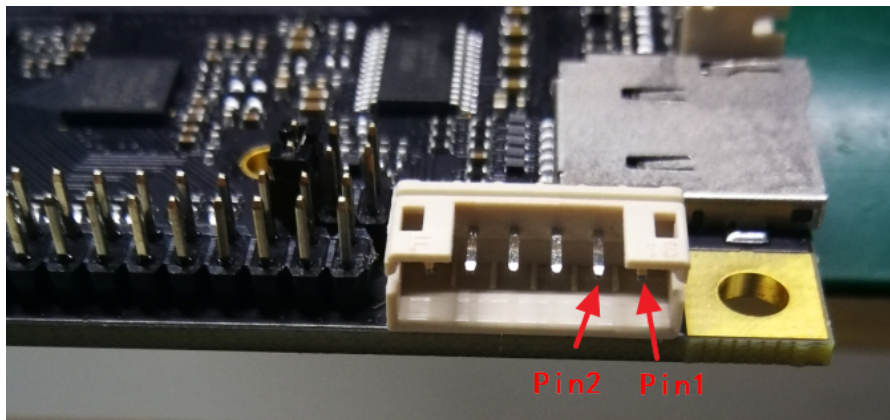


Figure 12    LVDS Main screen Backlight interface

Table 9　LVDS Main screen backlight interface pin definition

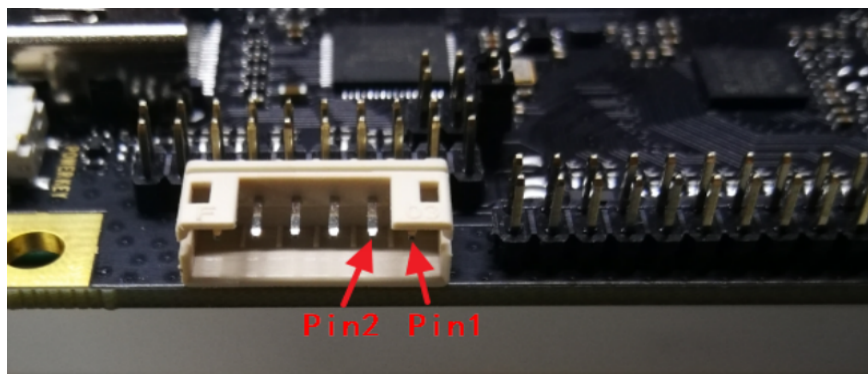| S/N | Definition | Property | Description |
|-----|-----------|----------|-------------|
| 1,2 | 12V | power | 12V Backlight power supply |
| 3 | EN | output | Backlight enable control output, internal 1K resistor pull up to 5V |
| 4 | PWM | output | Backlight brightness control output, pulse signal, internal series 200R resistor |
| 5,6 | GND | GrouND | GND Ground |



**Figure 13**　LVDS Secondary screen backlight interface

Table 10　LVDS secondary screen backlight interface pin definition

| S/N | Definition | Property | Description |
|-----|-----------|----------|-------------|
| 1,2 | 12V | power | 12V Backlight power supply |
| 3 | EN | output | Backlight enable control output, internal 1K resistor pull up to 5V |
| 4 | PWM | output | Backlight brightness control output, pulse signal, internal series 200R resistor |
| 5,6 | GND | GrouND | GND Ground |

## 2.7. **4K Type-C Interface**

The board is compatible with 1-channel vertical paste Type-C interface, which can be used with MicroUSB interface. The default configuration is MicroUSB interface. This Type-C interface can be expanded to realize 4K display function.
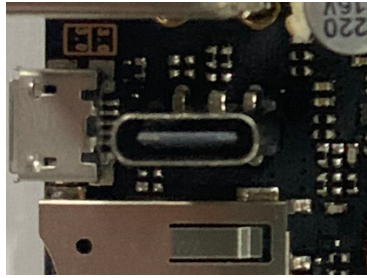
**Figure 14**  4K Type-C interface

## 2.8. Speaker interface

The board supports dual 8R/5W speaker output, and the interface model is PH2.0-4AW.
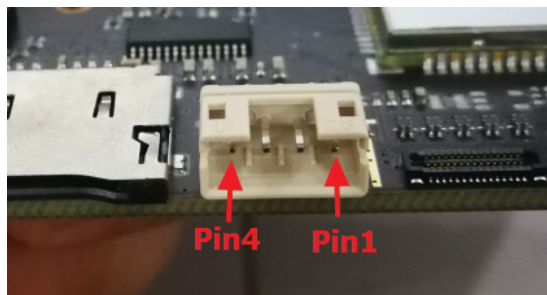


**Figure 15**  Speaker interface

Table 11  Speaker interface pin definition

| S/N | Definition | Property | Description |
|-----|-----------|----------|-------------|
| 1 | SPKR- | output | Right channel output negative |
| 2 | SPKR+ | output | Right channel output positive |
| 3 | SPKL- | output | Left channel output negative |
| 4 | SPKL+ | output | Left channel output positive |

## 2.9. Other standard interfaces

Table 12  Other standard interfaces

| Interface | Property | Description |
|-----------|----------|-------------|
| MicroSD | SD card | data storage |
| MicroSIM | SIM card | 1.8V/3/3V SIM |
| RJ45 | Ethernet interface | Fast Ethernet interface (sinking type interface) |
| Headset | 3.5mm American standard interface | 3.5mm JACK American standard headphone jack |

# 3 Electrical parameters

Table 13  Board electrical parameters

| Project | | Min | Rated | Max | Note |
|---|---|---|---|---|---|
| Main power supply | voltage | 9V | 12V | 15V | |
| | ripple wave | -- | -- | -- | |
| | current | -- | 2.5A | 3.5A | |
| DC output | 3.3V output current | -- | -- | -- | |
| | 5.0V output current | -- | -- | -- | |
| | 12V output current | -- | -- | -- | |
| USB 3.0 | output current | -- | TBD | -- | |
| USB 2.0 | output current | | 0.5A | | |
| Environment | relative humidity | -- | -- | -- | |
| | working temperature | -20 | | 70 | |
| | storage temperature | -- | -- | -- | |

# 4 Installation Precautions

In the process of assembling and using, please pay attention to the following points.

➢ The bottom silk screen of the bare board adopts a copper leakage design, and the connector pins are 2-3mm higher than the pad. During installation, ensure that the copper leakage silk screen and the connector pins contact metal objects to prevent the board from short-circuiting.

➢ When installing, ensure that the surrounding fixing holes are evenly stressed to prevent the board from deforming due to uneven force.

➢ When installing an LVDS screen, first determine the power supply voltage of the screen, and use a jumper to select the correct voltage configuration.

➢ When installing the LVDS screen, pay attention to whether the screen backlight voltage and backlight current are consistent. When the power of the screen backlight is above 15W, be sure to use other power boards to supply power.

➢ When installing the serial port, pay attention to the interface sequence of 232, 485, and 422.