



Touch Think Intelligence Product Specification

Mainboard series

JWS3399-MAIN-N

V1.1

www.touchthink.net

Shenzhen Touch Think Intelligence Co., Ltd.

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Chapter 1 Introduction

1.1 Applicability

JWS3399 is a intelligent terminal motherboard can be applied in Advertising machine, digital signage, intelligent self-service terminal, intelligent vending machine, O2O smart equipment, industrial control computer, robot and other equipment.

1.2 Functions

JWS3399-MAIN-N uses RK3399,a 64bit supper processor with dual-core Cortex-A72 and quad-core Cortex-A53,its basic frequency is 1.8GHz,JWS3399-MAIN-L Uses Mali-T860 GPU, it has H.265 hardware decoder to supports 4K display. JWS3399-MAIN-N integrate Dual-LVDS, EDP, HDMI display output interfaces to itself, with common backlight panel interface and screen level jumper, JWS3399-MAIN-N is compatible to various types of display screen.With powerful performance and fast process speed, JWS3399-MAIN-L is your best choice for human-computer interaction, intelligent terminal and industrial control projects.

1.3 Features

- Various display interfaces: Dual-LVDS, EDP, HDMI etc
- Various expansion interfaces. JWS3399-MAIN-N has six USB interfaces(A USB 3.0 interface and a USB 2.0 interface, four internal USB2.0 PH2.0 extension interfaces), a 485 port, two TTL ports(one has hard flow control), two RS232 ports, a 8 I/O pin GPIO port,JWS3399-MAIN-N can satisfy your customization request.
- Various internet interfaces:a 100M Ethernet interface and a 1000M Ethernet interface, 5G/2.4G WIIF supported, Independent dual-antenna, built-in PCI-E 4G/M2.5G module interfaces.
- High definition.JWS3399-MAIN-L supports 4K 3840x2160 decoding, it also supports Special-shaped screen with LVDS/EDP/HDMI interfaces and it has multi-monitor extend display mode.
- Android system customization. JWS3399-MAIN-L provides system calling interface and API reference code, it supports upper-layer applications development perfectly.
- JWS3399-MAIN-L supports infrared, optical, capacitance, resistance and other mainstream touch screen, it also supports drive-free HID configuration which no need to debug before using.

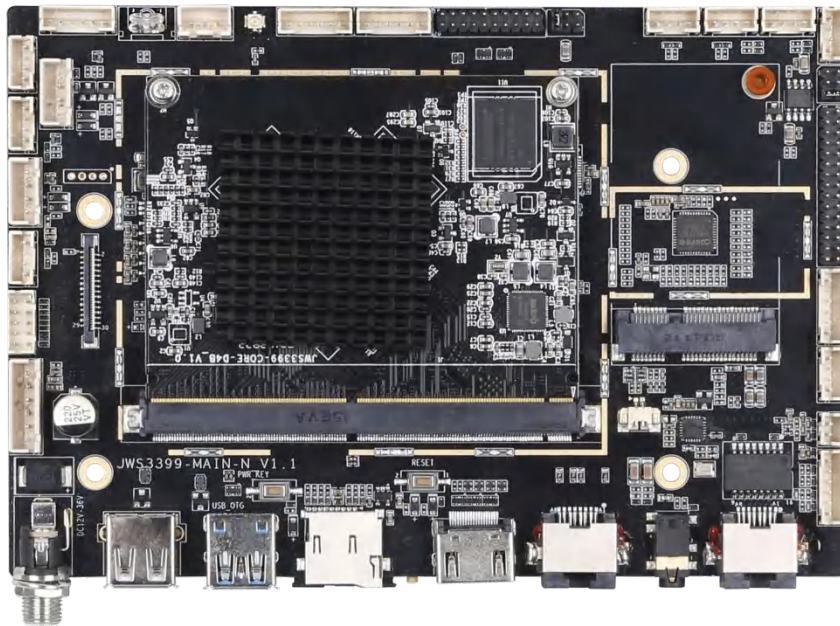
Chapter 2 Basic Informatio

| ITEM | Specifications |
|--------------------------|--|
| CPU | 64Bit processor. Dual-core Cortex-A72 up to 1.8GHz Quad-core Cortex-A53 up to 1.4GHz Built-in low power consumption MCU Cortex-M0 |
| GPU | Quad-core ARM Mali-T860MP4 GPU |
| Memory | 4G(2G optional) |
| Storage | EMMC 32G(8/16/64G optional,maximum 64G) |
| ROM | 4KB EEPROM |
| Resolution | Maximum 3840*2160 |
| OS | Android 7.1/9.0 |
| Play Mode | Supports multiple play modes such as loop,timing and interstitial. |
| Network | 4G、 5G、 Ethernet,WiFi/BT,Wireless peripheral extension |
| Video Format | Support WMV,AVI,FLV,RM,RMVB,MPEG,TS,MP4 etc |
| Photograph Format | Support BMP,JPEG,PNG,GIF |
| USB | USB 3.0 standard*1,USB 2.0 standard*1,USB 2.0 interface*4 |
| Mipi Camera | 30pin FPC interface, 1300w Camera supported |
| Serial Port | RS232*2,485*1,TTL*2,DEBUG port*1 |
| GPS | External GPS(Optional) |
| WIFI、 BT | Built-in d WIFI, BT (Optional) ,dual frequency WIFI and single-antenna supported |
| 4G/5G | Built-in MINPCIE 4G module interface, M.2 5G module interface |
| Ethernet | 100M*1,1000M*1 |

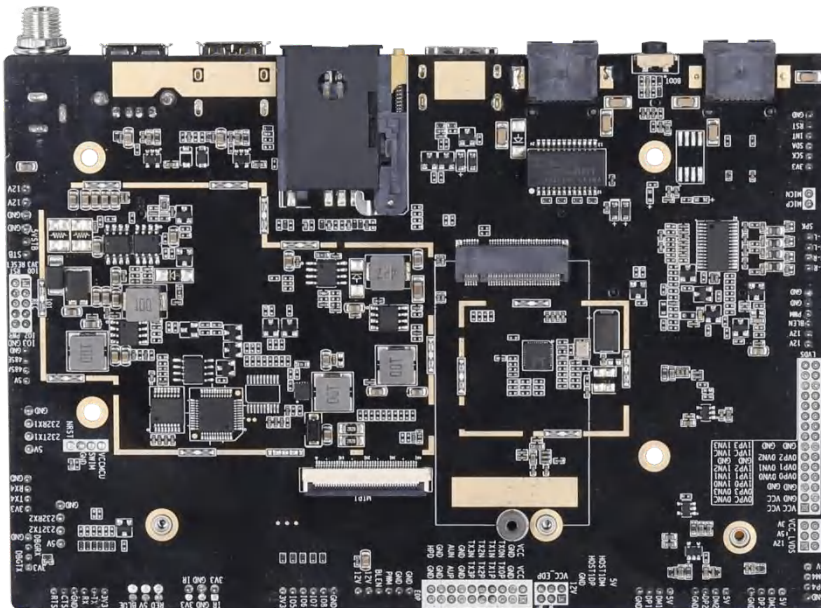
| | |
|---------------------------|--|
| TF Card | Trans flash Card supported |
| LVDS | LVDS*1(single/dual channel),support 50/60Hz LCD panel |
| EDP | Support Multi-resolution EDP interface LCD panel |
| HDMI | HDMI*1, support 1080P@60Hz, 4kx2k@60Hz output |
| AV Output | Support left and right channel output, built-in dual 4R/10W, 8R/5W amplifier |
| Real Time Clock | Supported |
| Timing turn on/off | Supported |
| OS upgrade | Support USB upgrade |

Chapter 3 PCB And Interface

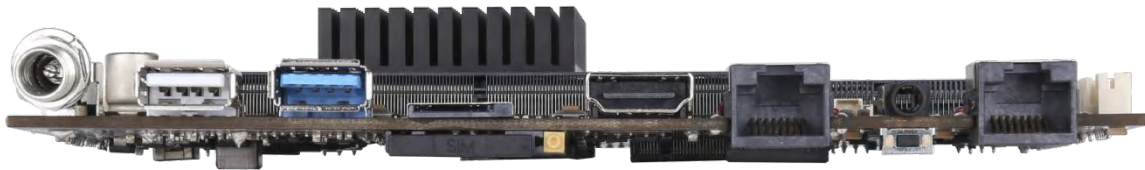
【Front】



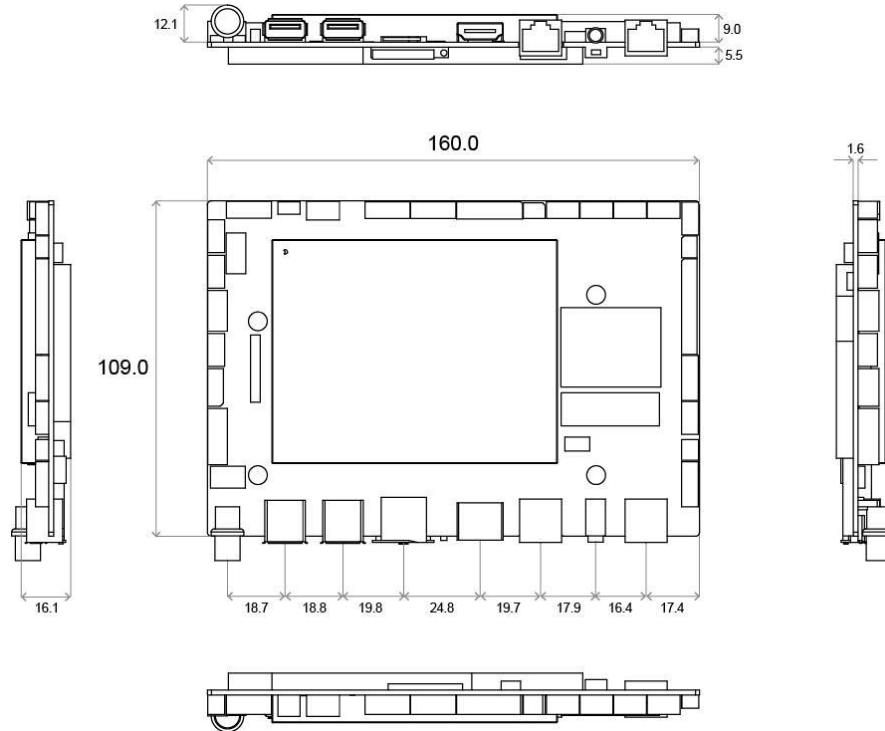
【Back】



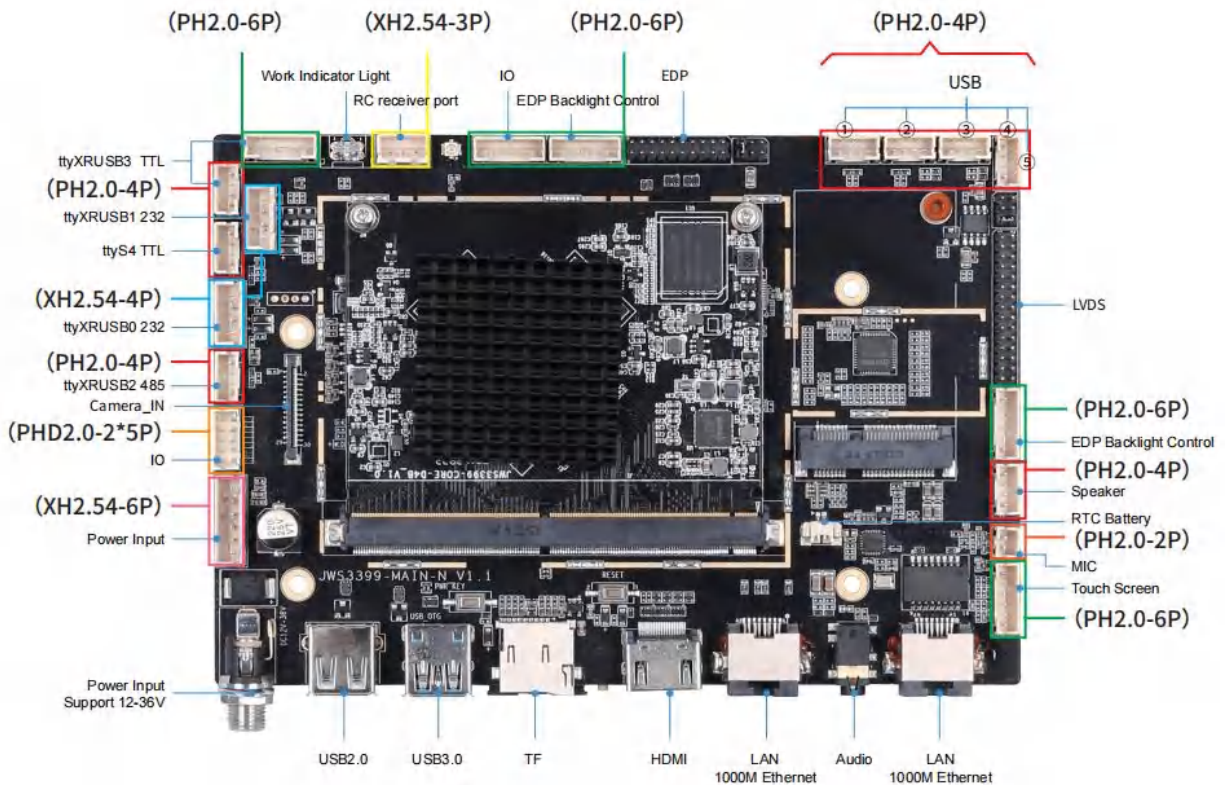
【Coastline interface】



3.1 PCB Drawing



3.2 Interface Parameter Definition



◆ 3.2.1 Power Input

12V DC power supply, motherboard can only uses power input from DC port and power port, the adaptor DC input connector SPEC is D5.5, d2.0.

When motherboard is under idling state, the minimum current 12V DC power supported is 600mA.

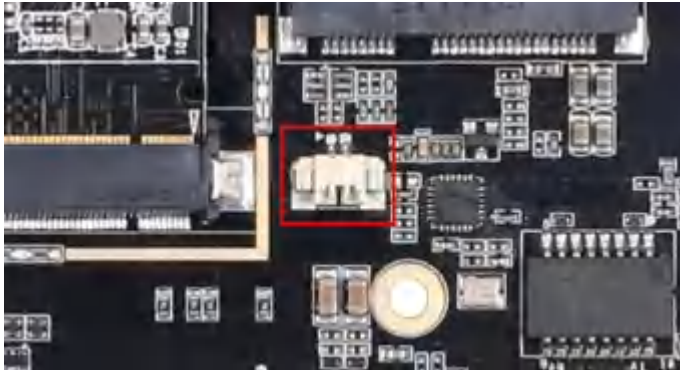


Interface definition as below list,user can apply power board input power supply, port have 6PIN and 2.54mm pin pitch.

| SN | Define | Property | Description |
|----|--------|----------|---|
| 1 | VCC | INPUT | 12V Input |
| 2 | VCC | INPUT | 12V Input |
| 3 | GND | GROUND | Ground |
| 4 | GND | GROUND | Ground |
| 5 | 5V-STB | INPUT | 5V Input(disabled by default) |
| 6 | STB | I/O | Connect to MCU pin(disabled by default) |

◆ 3.2.2 RTC Battery

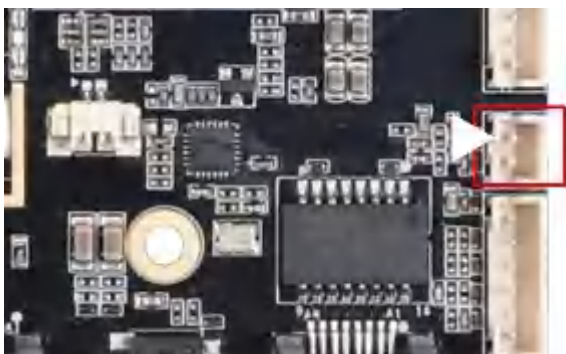
Supply power to OS clock when outside power is off.



| SN | Define | Property | Description |
|----|--------|----------|-------------|
| 1 | RTC | INPUT | 3V Input |
| 2 | GND | GROUND | Ground |

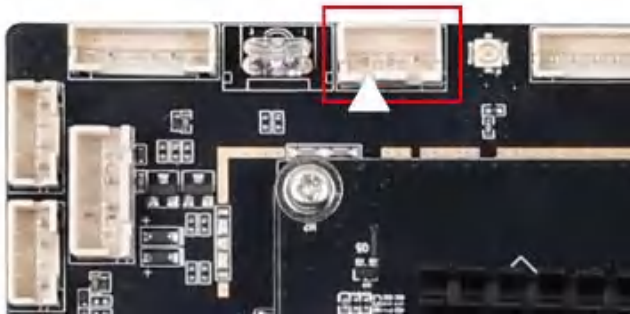
◆ 3.2.3 MIC

Please mind MIC P/N poles.



| SN | Define | Property | Description |
|----|--------|----------|-------------|
| 1 | MIC1N | INPUT | MIC- |
| 2 | MIC1P | INPUT | MIC+ |

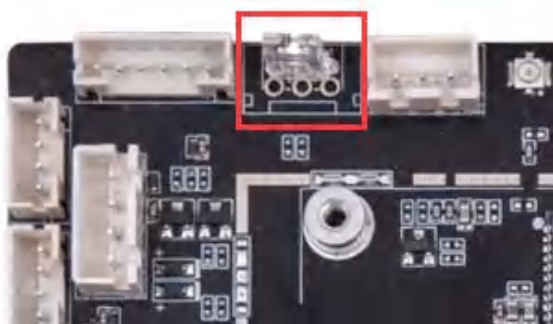
◆ 3.2.4 Telecontrol



| SN | Define | Property | Description |
|----|--------|----------|--------------------------|
| 1 | IR | INPUT | Telecontrol signal Input |
| 2 | GND | GROUND | Ground |
| 3 | 3V3 | Power | 3.3V Output |

◆ 3.2.5 Indicator

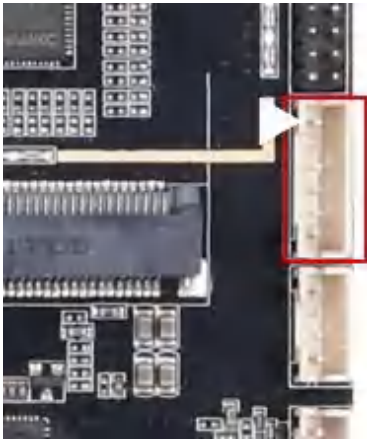
Default common anode RED/BLUE LED light.



| SN | Define | Property | Description |
|----|--------|----------|-------------------------|
| 1 | LED_B | Blue | Work state indicator |
| 2 | VCC | Power | 3.3V Output |
| 3 | LED_R | Red | Standby state indicator |

◆ 3.2.6 LVDS Backlight Control Port

This port is designed for LVDS panel's backlight control function, the current of 12V power supply is 2A, if screen backlight power beyond 24W, in order to prevent system unstable, please connect backlight cable to other power panel. This port can only be used to supply backlight power, never connect it to other device as power input.



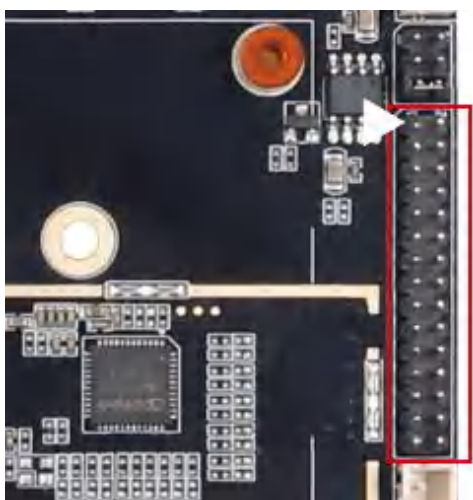
| SN | Define | Property | Description |
|----|--------|----------|------------------------------|
| 1 | VCC | Power | 12V Output |
| 2 | VCC | Power | 12V Output |
| 3 | EN | OUTPUT | Backlight dis/enable control |
| 4 | PWM | OUTPUT | Backlight brightness control |
| 5 | GND | GROUND | Ground |
| 6 | GND | GROUND | Ground |

◆ 3.2.7 LVDS Screen

Common LVDS pin definition, support single/dual, 6/8bit LVDS panel, user can change port voltage level by move jumper cap position, 3.3V/5V/12V optional.

To prevent motherboard and screen panel burning-out, please notice below:

1. Confirm LVDS screen panel's voltage in SPEC is correct and it's correspond to motherboard power supply, please also confirm that motherboard can provide maximum current which LVDS screen panel required.
2. Please use multimeter to test motherboard output voltage, make sure jumper cap mounted on the right position.

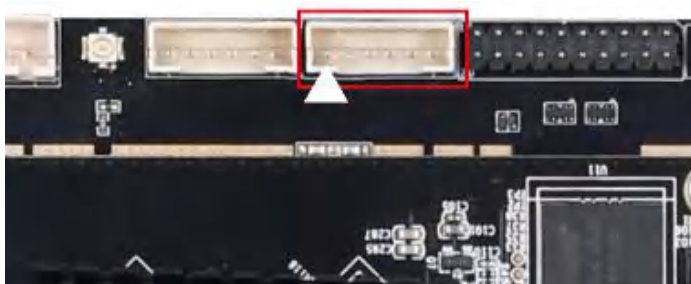


| SN | Define | Property | Description |
|----|-----------|--------------|--|
| 1 | VCC | Power OUTPUT | LCD power Output, +3.3v/+5V/+12V(Optional) |
| 2 | | | |
| 3 | | | |
| 4 | GND | GROUND | Ground |
| 5 | | | |
| 6 | LVDS_RESX | INPUT | |
| 7 | D0N | OUTPUT | Pixel0 Negative Data (Odd) |
| 8 | D0P | OUTPUT | Pixel0 Positive Data (Odd) |
| 9 | D1N | OUTPUT | Pixel1 Negative Data (Odd) |
| 10 | D1P | OUTPUT | Pixel1 Positive Data (Odd) |

| | | | |
|----|-------|--------|--------------------------------|
| 11 | D2N | OUTPUT | Pixel2 Negative Data (Odd) |
| 12 | D2P | GROUND | Pixel2 Positive Data (Odd) |
| 13 | GND | GROUND | Ground |
| 14 | GND | GROUND | Ground |
| 15 | CLK0N | OUTPUT | Negative Sampling Clock (Odd) |
| 16 | CLK0P | OUTPUT | Positive Sampling Clock (Odd) |
| 17 | D3N | OUTPUT | Pixel3 Negative Data (Odd) |
| 18 | D3P | OUTPUT | Pixel3 Positive Data (Odd) |
| 19 | D5N | OUTPUT | Pixel0 Negative Data (Even) |
| 20 | D5P | OUTPUT | Pixel0 Positive Data (Even) |
| 21 | D6N | OUTPUT | Pixel1 Negative Data (Even) |
| 22 | D6P | OUTPUT | Pixel1 Positive Data (Even) |
| 23 | D7N | OUTPUT | Pixel2 Negative Data (Even) |
| 24 | D7P | OUTPUT | Pixel2 Positive Data (Even) |
| 25 | GND | GROUND | Ground |
| 26 | GND | GROUND | Ground |
| 27 | CLK1N | OUTPUT | Negative Sampling Clock (Even) |
| 28 | CLK1P | OUTPUT | Positive Sampling Clock (Even) |
| 29 | D8N | OUTPUT | Pixel3 Negative Data (Even) |
| 30 | D8P | OUTPUT | Pixel3 Positive Data (Even) |

◆ 3.2.8 EDP Screen Backlight Port

This port is designed for EDP panel's backlight control function, the current of 12V power supply is 2A, if screen backlight power beyond 24W, in order to prevent system unstable defect, please connect backlight cable to other power panel. Backlight dis/enable control voltage is 5V, if EDP screen require other voltage, please add IO level-shift circuit. This port can only be used to supply backlight power, never connect it to other device as power input.

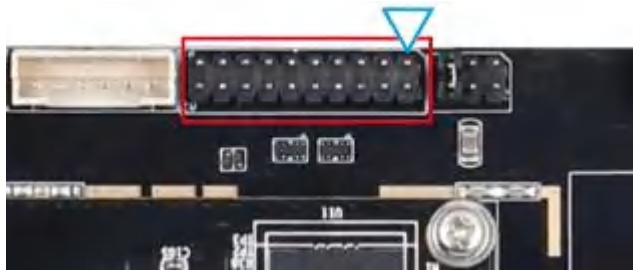


| SN | Define | Property | Description |
|----|--------|----------|------------------------------|
| 1 | VCC | Power | 12V Output |
| 2 | VCC | Power | 12V Output |
| 3 | EN | OUTPUT | Backlight dis/enable control |
| 4 | PWM | OUTPUT | Backlight brightness control |
| 5 | GND | GROUND | Ground |
| 6 | GND | GROUND | Ground |

◆ 3.2.9 EDP Screen

Jumper cap can be mounted on different position(see below picture left side) to change power output(3.3V/5V/12V), please take a look at silkscreen on PCB backside.

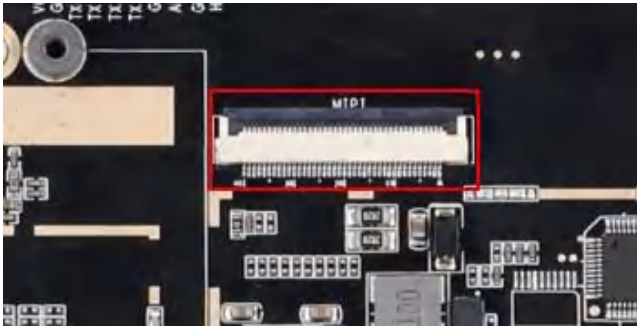
Please check the pin definition on board and cable, make sure pin on cable and board is aligned(pin1 to pin1 for example).



| SN | Define | Property | Description |
|----|--------|-----------------|--|
| 1 | VCC | Power OUTPUT | LCD Power Output, +3.3V/+5V/+12V optional |
| 2 | | | |
| 3 | GND | GROUND | Ground |
| 4 | | | |
| 5 | TX0P | OUTPUT | EDP Pixel0 Positive Data (Odd) |
| 6 | TX0N | OUTPUT | EDP Pixel0 Negative Data (Odd) |
| 7 | TX1P | OUTPUT | EDP Pixel1 Positive Data (Odd) |
| 8 | TX1N | OUTPUT | EDP Pixel1 Negative Data (Odd) |
| 9 | TX2P | OUTPUT | EDP Pixel2 Positive Data (Odd) |
| 10 | TX2N | OUTPUT | EDP Pixel2 Negative Data (Odd) |
| 11 | TX3P | OUTPUT | EDP Pixel3 Positive Data (Odd) |
| 12 | TX3N | OUTPUT | EDP Pixel3 Negative Data (Odd) |
| 13 | GND | GROUND | Ground |
| 14 | GND | GROUND | Ground |
| 15 | AUXP | OUTPUT | EDP AUX Positive Data (Odd) |
| 16 | AUXN | OUTPUT | EDP AUX Negative Data (Odd) |
| 17 | GND | GROUND | Ground |
| 18 | | | |
| 19 | | | |
| 20 | HPD | INPUT | EDP DETECT |

◆ 3.2.10 MIPI

MIPI port supports single channel MIPI LCD, it also supports four channel MIPI interface with 1920*1200@60fps display.

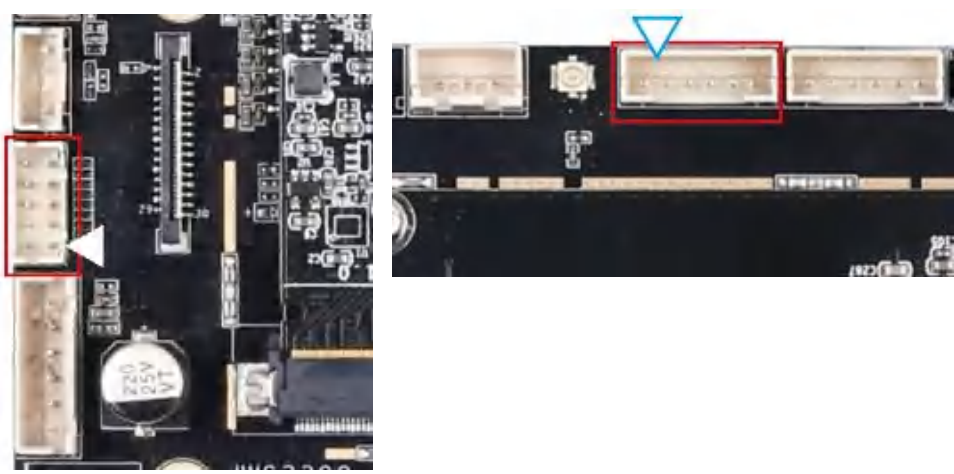


| SN | Define | Property | Description |
|----|--------|----------|--|
| 40 | NC | - | Not connect |
| 39 | VDD | OUTPUT | Digital power |
| 38 | VDD | OUTPUT | Digital power |
| 37 | GND | GROUND | Ground |
| 36 | REST | OUTPUT | Global reset pin |
| 35 | NC | - | Not connect |
| 34 | GND | GROUND | Ground |
| 33 | D0N | OUTPUT | Negative MIPI differential data output |
| 32 | D0P | OUTPUT | Positive MIPI differential data output |
| 31 | GND | GROUND | Ground |
| 30 | D1N | OUTPUT | Negative MIPI differential data output |
| 29 | D1P | OUTPUT | Positive MIPI differential data output |
| 28 | GND | GROUND | Ground |
| 27 | CLKN | OUTPUT | Negative MIPI differential data output |
| 26 | CLKP | OUTPUT | Positive MIPI differential data output |
| 25 | GND | GROUND | Ground |
| 24 | D2N | OUTPUT | Negative MIPI differential data output |
| 23 | D2P | OUTPUT | Positive MIPI differential data output |
| 22 | GND | GROUND | Ground |
| 21 | D3N | OUTPUT | Negative MIPI differential data output |
| 20 | D3P | OUTPUT | Positive MIPI differential data output |
| 19 | GND | GROUND | Ground |

| | | | |
|----|------|--------|-------------|
| 18 | NC | - | Not connect |
| 14 | NC | - | Not connect |
| 16 | GND | GROUND | Ground |
| 15 | NC | - | Not connect |
| 14 | NC | - | Not connect |
| 13 | NC | - | Not connect |
| 12 | NC | - | Not connect |
| 11 | GND | GROUND | Ground |
| 10 | LED- | OUTPUT | LED Cathode |
| 9 | LED- | OUTPUT | LED Cathode |
| 8 | NC | - | Not connect |
| 7 | NC | - | Not connect |
| 6 | NC | - | Not connect |
| 5 | NC | - | Not connect |
| 4 | NC | - | Not connect |
| 3 | NC | - | Not connect |
| 2 | LED+ | OUTPUT | LED Anode |
| 1 | LED+ | OUTPUT | LED Anode |

◆ 3.2.11 IO

This port provide I/O control signal for peripheral devices, level is 3.3V, ADC signal can be used as button control. This port also added a power on/off switch pin.



| SN | Define | Property | Description |
|----|--------|--------------|---------------------------------|
| 1 | VCC | Power | 3.3V Output |
| 2 | RST_L | INPUT | Reset 0 |
| 3 | I/O0 | INPUT/OUTPUT | IO port |
| 4 | OTP | INPUT | Overheat temperature protection |
| 5 | I/O1 | INPUT/OUTPUT | IO port |
| 6 | ADC | INPUT | RECOVER upgrade button signal |
| 7 | I/O2 | INPUT/OUTPUT | IO port |
| 8 | PWR_K | INPUT | System power on/off |
| 9 | I/O3 | INPUT/OUTPUT | IO port |
| 10 | GND | GROUND | Ground |

| SN | Define | Property | Description |
|----|--------|--------------|-------------|
| 1 | VCC | Power | 3.3V Output |
| 2 | IO5 | INPUT/OUTPUT | IO port |
| 3 | IO6 | INPUT/OUTPUT | IO port |
| 4 | IO7 | INPUT/OUTPUT | IO port |
| 5 | IO8 | INPUT/OUTPUT | IO port |
| 6 | GND | GROUND | Ground |

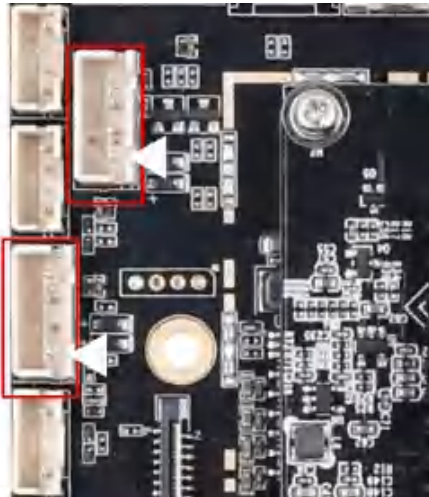
◆ 3.2.12 232 *2

Motherboard provides two 232 serial ports which can support mainstream 232 serial ports devices.

Note:

1. 232 serial port level on board must match with device' s level, those serial port don' t support TTL/485 device direct connect.

2. TX/RX pin must connect to cable TX/RX pin correctly.



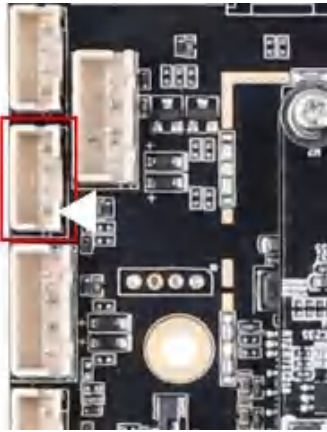
| SN | Define | Property | Description |
|----|--------|----------|-------------|
| 1 | GND | GROUND | Ground |
| 2 | PC-RX | INPUT | 232-RX |
| 3 | PC-TX | OUTPUT | 232-TX |
| 4 | VCC | Power | 5V Output |

◆ 3.2.13 TTL *2

Motherboard provides 2 TTL serial ports which can support mainstream serial ports devices. The voltage for TTL serial ports is 0V~3.3V, if device connected request higher voltage, there must be an isolate circuit or level-shift circuit, otherwise motherboard and device might get burnout.

Note:

1. TTL serial port level must match with device' s level, those port don' t support MAX232/485 device direct connect.
2. TX/RX pin must connect to cable TX/RX pin correctly (positive and negative for example) .

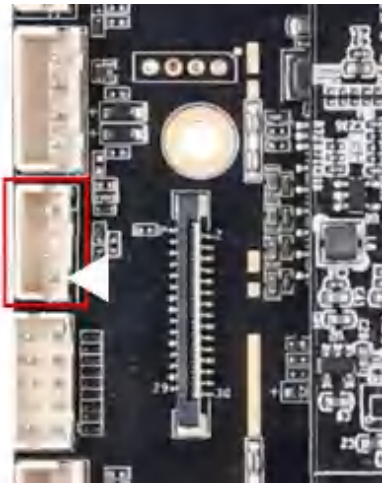


| SN | Define | Property | Description |
|----|---------|----------|-------------|
| 1 | GND | GROUND | Ground |
| 2 | UART-RX | INPUT | RX |
| 3 | UART-TX | OUTPUT | TX |
| 4 | VCC | Power | 3.3V Output |



| SN | Define | Property | Description |
|----|---------|--------------------|------------------------|
| 1 | RTX | Handshaking Signal | Request data sending |
| 2 | CTX | Handshaking Signal | Request data reception |
| 3 | GND | GROUND | Ground |
| 4 | UART-RX | INPUT | RX |
| 5 | UART-TX | OUTPUT | TX |
| 6 | VCC | Power | 3.3V Output |

◆ 3.2.14 485



Motherboard provides a 485 serial port which can support mainstream serial ports devices. The voltage for 485 serial ports is 3.3V, if device connected request higher voltage, there must be an isolate circuit or level-shift circuit, otherwise motherboard and device might get burnout.

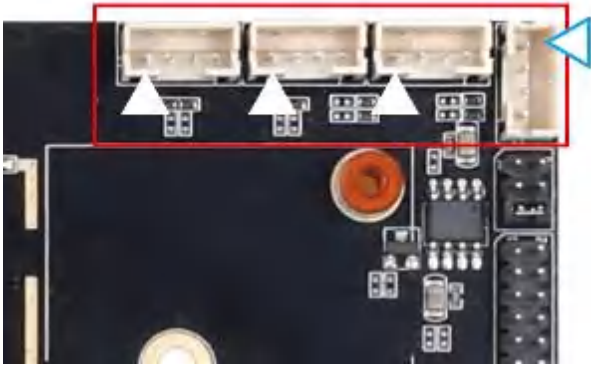
Note:

1.485 serial port level must match with device' s level.

2.485A/485B pin must connect to device correctly.

| SN | Define | Property | Description |
|----|--------|--------------|-------------|
| 1 | GND | GROUND | Ground |
| 2 | 485B | INPUT/OUTPUT | RX |
| 3 | 485A | INPUT/OUTPUT | TX |
| 4 | VCC | Power | 3.3V Output |

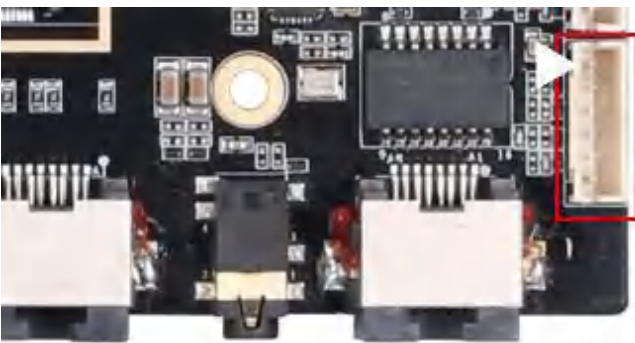
◆ 3.2.15 USB



Motherboard provides a USB3.0 standard port and a USB3.0 standard port, four internal USB2.0 ports for peripheral device expansion, USB default mode is HOST, power current must less than 500mA.

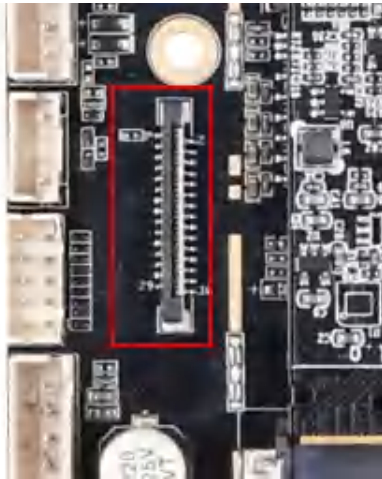
| SN | Define | Property | Description |
|----|--------|--------------|-------------|
| 1 | GND | GROUND | Ground |
| 2 | DP | INPUT/OUTPUT | DP |
| 3 | DM | INPUT/OUTPUT | DM |
| 4 | VCC | Power | 5V Output |

◆ 3.2.16 Touch Screen



| SN | Define | Property | Description |
|----|--------|--------------|-------------|
| 1 | VCC | Power | 3.3V Output |
| 2 | SCK | INPUT/OUTPUT | I2C Clock |
| 3 | SDA | INPUT/OUTPUT | I2C Data |
| 4 | INT | INPUT/OUTPUT | Interrupt |
| 5 | RST | INPUT/OUTPUT | Reset |
| 6 | GND | GROUND | Ground |

◆ 3.2.17 Camera_IN

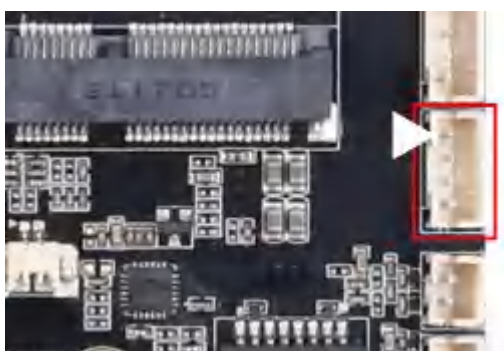


Motherboard can supports MIPI cameras with maximum 1300W pixels, the electrical definition as below:

| SN | Define | Property | Description |
|----|----------|-----------|--------------|
| 1 | NC | / | / |
| 2 | VDD | Power | 2.8V Output |
| 3 | DVDD | Power | 1.2V Output |
| 4 | DOVDD | Power | 1.8V Output |
| 5 | NC | / | / |
| 6 | GND | GROUND | Ground |
| 7 | VDD | Power | 2.8V Output |
| 8 | GND | GROUND | Ground |
| 9 | I2C3_SDA | INPUT/OUT | SDA Signal |
| 10 | I2C3_SCL | OUTPUT | SCL Signal |
| 11 | RST | OUTPUT | Reset Signal |

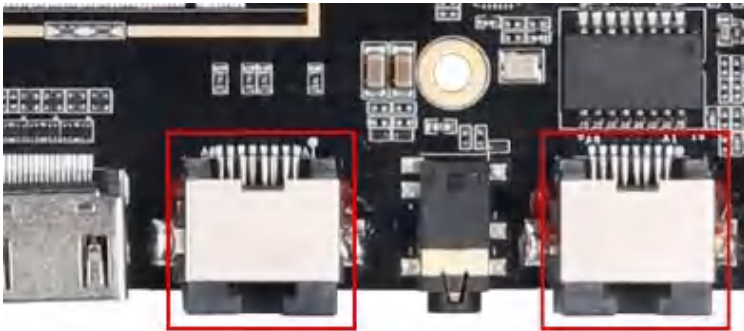
| | | | |
|----|------|-----------|------------------------------|
| 12 | PWDN | OUTPUT | Power Down |
| 13 | GND | GROUND | Ground |
| 14 | MCLK | OUTPUT | Main Clock |
| 15 | GND | GROUND | Ground |
| 16 | D3P | INPUT/OUT | MIPI Data Channel 3 Positive |
| 17 | D3N | INPUT/OUT | MIPI Data Channel 3 Negative |
| 18 | GND | GROUND | Ground |
| 19 | D2P | INPUT/OUT | MIPI Data Channel 2 Positive |
| 20 | D2N | INPUT/OUT | MIPI Data Channel 2 Negative |
| 21 | GND | GROUND | Ground |
| 22 | D1P | INPUT/OUT | MIPI Data Channel 1 Positive |
| 23 | D1N | INPUT/OUT | MIPI Data Channel 1 Negative |
| 24 | GND | GROUND | Ground |
| 25 | CLKP | INPUT/OUT | MIPI Clock Channel Positive |
| 26 | CLKN | INPUT/OUT | MIPI Clock Channel Negative |
| 27 | GND | GROUND | Ground |
| 28 | D0P | INPUT/OUT | MIPI Data Channel 0 Positive |
| 29 | D0N | INPUT/OUT | MIPI Data Channel 0 Negative |
| 30 | GND | GROUND | Ground |

◆ 3.2.18 Speaker



| SN | Define | Property | Description |
|----|--------|----------|---------------------|
| 1 | OUP-R | OUTPUT | Audio Output Right+ |
| 2 | OUN-R | OUTPUT | Audio Output Right- |
| 3 | OUN-L | OUTPUT | Audio Output Right- |
| 4 | OUP-L | OUTPUT | Audio Output Left+ |

◆ 3.2.19 Ethernet



Motherboard provides two connectors, a 100M port and a 1000M port.

◆ 3.2.20 UBOOT

Press UBOOT button before power on to enter upgrade mode.

◆ 3.2.21 Other Standard Interfaces And Functions

| | | |
|----------|----------------|--|
| Storage | TF card | Data storage, maximum 1T |
| | USB | HOST interface, support data storage/input, USB mouse/key board, camera, touch screen etc. |
| Ethernet | RJ45 | Support double 1000M/100M wired internet |
| HDMI | Standard | Support HDMI data output, maximum definition 1080P |
| Audio | Standard | 3.55mm standard interface |
| 3G | PCI-E Standard | Support HUAWEI,ZTE or other brand's PCI-E 3G/4G module |
| SIM | Standard | Support all standard(depend on 3G module) |

Chapter 4 Electrical Parameter

| ITEM | | MIN | NORMAL | MAX |
|-------------------------------------|-----------------------|-------|--------|--------|
| Power | Voltage | -- | 12V | 36V |
| | Ripple | -- | -- | 50mV |
| | Current | 3A | | |
| Working parameter(HDMI screen only) | Work | -- | 200mA | 600mA |
| | Standby | -- | 17mA | 20mA |
| | USB Supply | -- | -- | 500mA |
| LVDS | 3.3V | | 400 mA | 500 mA |
| | 5V | | 550 mA | 1A |
| | 12V | | 580 mA | 1A |
| | USB Supply | -- | -- | 500mA |
| EDP | 3.3V | | 400 mA | 500 mA |
| | 5V | -- | -- | -- |
| | 12V | -- | -- | -- |
| | USB Supply | -- | -- | 500mA |
| Total output | Current | 3.3V | | 800mA |
| Static | Contact discharge | | | 8KV |
| | Air discharge | | | 16KV |
| Environment | Relative humidity | -- | -- | 80% |
| | Operating temperature | -20°C | -- | 70°C |
| | Storage temperature | -40°C | | 80°C |

Remark 1:

Please chose the right backlight working voltage(3.3V,5V) for LVDS screen. To prevent device burnout, please confirm LVDS screen' s maximum working current before connect it to our motherboard.

Remark 2:

When connect motherboard to EDP/LVDS screen, motherboard' s working voltage and current is depend on EDP/LVDS screen, therefore we didn' t list those parameter on above list.

Chapter 5 Assembling Cautions

During assembling, please pay attention to notes below.

1. No short circuit between board and device;
2. Avoid motherboard bend or twist when mounted on user's device frame;
3. Confirm LVDS/EDP screen's requested voltage and current is correspond to motherboard output, mind the connector's pin definition and connect the pin correctly;
4. If backlight power requested is beyond 20W, please connect backlight to another power board;
5. When user mounting peripheral device(USB,IO etc), please mind the IO level and current output ;
6. When mounting serial port,pleas mind whether 232/485 device is connected and TX/RX pin connected correctly;
7. Check whether power input connected to input interface, make sure total input voltage and total input current suit user's request, please don't use backlight interface to supply power to other device.