UW-M588-V1.1 Android Smart Motherboard Technical Specification

Document modification history

	Remarks	Date
1	Creation	2022-6-15

1 Overview

The UW-M588 utilizes the Rockchip RK3588 (Cortex-A76x4 + Cortex-A55 x4) octa-core 8nm process processor and is equipped with Android

12.0 system. It features a clock frequency of up to 2.4GHz, a Mali-G610 MP4 GPU, and supports 8K, 4K, and H.265 hardware decoding. Its performance in both benchmarking and decoding is top-tier.

It is generally suitable for smart display terminal products, video terminal products, industrial automation terminals, and computing

terminal products, such as advertising machines, digital signage, intelligent self-service terminals, intelligent retail terminals, O2O intelligent equipment, industrial control hosts, and robotics.

Human-machine interfaces, etc.

Key Features:

- High integration ultra-thin form factor, integrated HDMI/HDMI IN/LVDS/MIPI/eDP x2/Ethernet/WIFI/BT into a single unit.
- Built-in PCI-E 4G module interface, supporting internet access via various PCI-E 4G modules from Huawei, Quectel, Longsung, and Fibocom, among others.
- Built-in M.2 5G module interface, supporting internet access via various M.2 5G modules from Huawei, Quectel, and Fibocom, among others.
- Extensive expansion interfaces, including 9 USB interfaces (7 sockets, 2 standard USB3.0), 7 serial ports (5 TTL, 2 RS232, of which 2 TTL can also be configured as 2 RS232, or 1 CAN, or 1 RS485), GPIO/ADC, and IR&LED interfaces, satisfying the requirements of various peripherals on the market.

- Supports EDP/HDMI/MIPI/LVDS multi-screen differential display.
- Supports SATA hard drive interface to meet storage expansion requirements.
- High performance with a built-in deep neural network unit (NPU) boasting performance up to 6 T, capable of satisfying the project requirements for deep learning.
- Supports Android system customization, providing system interface API reference code to perfectly support customer upper-layer application development.
- Perfectly supports various mainstream touch screens, including infrared, capacitive, and resistive types, and supports driver-free touch screen HID configuration.
- 10-layer immersion gold PCB board with industrial-grade component selection, meeting the requirements of complex, harsh, and industrial control environments.

2 Specifications

Hardware Specifications:

CPU	Quad-core Cortex-A76 and quad-core Cortex-A55 with a clock frequency of up to 2.4GHz
NPU	Performance up to 6.0 TOPS
GPU	Mali-G610 MP4
Memory	LPDDR4 4GB/8GB/16GB optional (8GB marked)
Built-in Storage	EMMC 8GB/16GB/32GB/64GB/128GB/256GB optional (128GB marked)
Display Interface	1 x LVDS interface (supports 6 or 8-bit single/dual LVDS), supporting a maximum resolution of 1920x1200 2 x EDP interface, supporting a maximum resolution of 2560x1600 1 x HDMI OUT interface, supporting a maximum resolution of 7680*4320 1-way MIPI Interface, supporting a maximum resolution of 1920x1200. 1-way HDMI IN Interface, supporting a maximum 2K resolution.
Onboard Backlight	Supports selectable 3.3V/5V/12V.
Network	RJ45 standard Interface, Gigabit Ethernet Interface.

	Supports 4G/5G M.2 Interface and PCIe Interface modules.
	Equipped with Bluetooth+Wi-Fi module, supporting Wi-Fi 802.11a/b/g/n protocols. Supports Bluetooth 4.2 protocol.
Image Rotation	Supports manual rotation of 0, 90, 180, and 270 degrees.
Real-time Clock	Built-in real-time clock battery, supporting scheduled power on/off.
Interface Device	9 USB HOST ports, 7 4-pin sockets, 2 standard USB 3.0 ports
	5-channel TTL, 2-channel RS232 (two of which TTL can be configured as 2 RS232, or 1 CAN, or 1 RS485), for expanding sensors or 1D/2D code scanners, printers, and card reader modules, etc.
	SATA/TF card expansion enables fulfillment of storage expansion requirements.
	Supports external power on/off buttons, reset buttons, button boards, light boards, and IR boards, with multiple available interrupt IO ports.
	Supports headphone output and features a built-in power amplifier with support for two 8Ω 10W speakers.
Audio Input	Supports MIC, 1 microphone interface, and headphone microphone functionality.
Touchscreen	Supports infrared, resistive, and capacitive touchscreens.

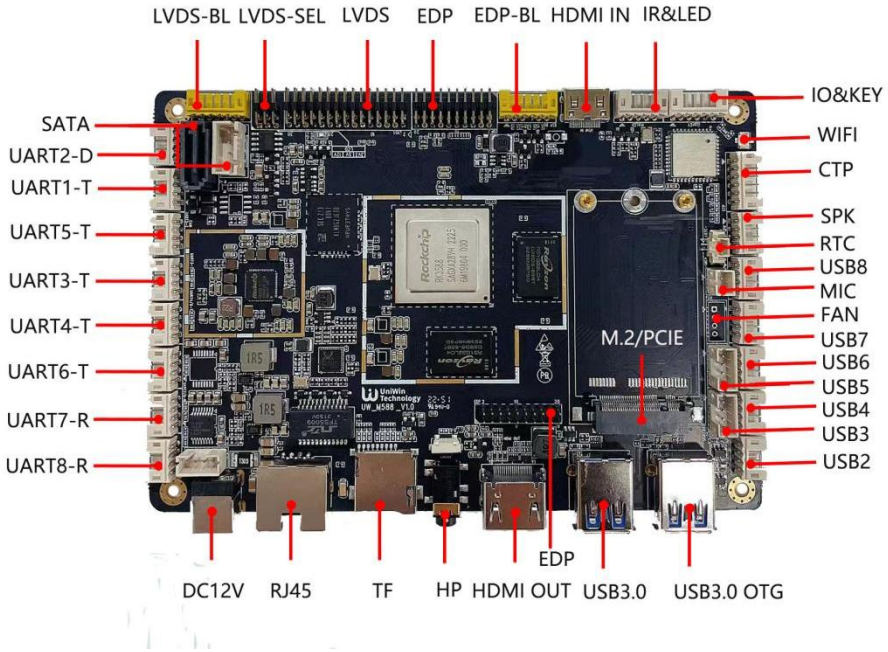
Basic Software Specifications:

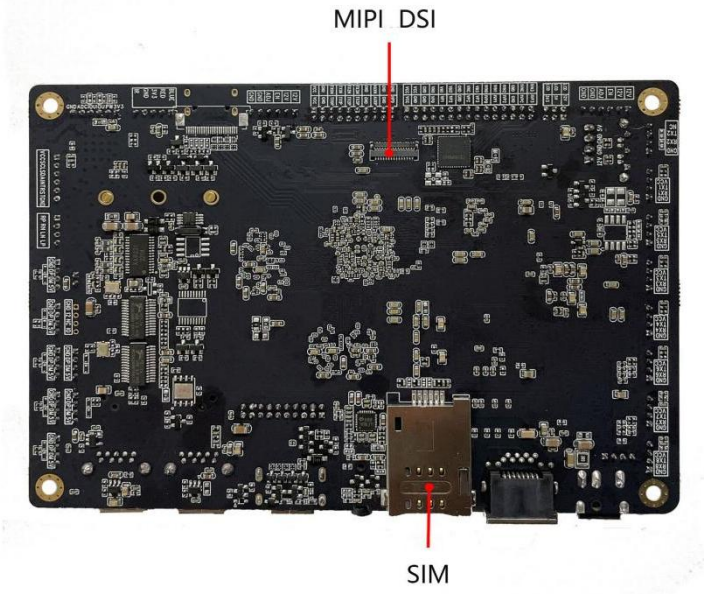
Operating System	Google Android 12 System
Language	Multi-language support
Video Format	● H.265 HEVC/MVC Main10 Profile yuv420@L5.1 up to 4096x2304@60fps ● H.264 AVC/MVC Main10 Profile yuv400/yuv420/yuv422/@L5.1 up to 4096x2304@60fps ● VP9 Profile0/2 yuv420@L5.1 up to 4096x2304@60fps ● VP8 verision2,up to 1920x1088@60fps ● VC1 Simple Profile@low, medium, high levels, Main Profile@low, medium, high levels, Advanced Profile@level0~3,up to 1920x1088@60fps ● MPEG-4 Simple Profile@L0~6,Advanced Simple Profile@L0~5,up to 1920x1088@60fps ● MPEG-2 Main Profile, low, medium and high levels, up to 1920x1088@60fps ● MPEG-1 Main Profile, low, medium and high levels, up to 1920x1088@60fps ● H.263 Profile0,levels 10-70,up to 720x576@60fps
Audio Format	Supports audio playback in MP3, WMA, MP2, OGG, AAC, M4A, MA4, FLAC, APE, 3GP, and WAV formats, including song list functionality.
Image Browsing	Supports browsing of JPG, BMP, PNG, GIF, and other image formats, with rotation and slideshow playback, up to a maximum resolution of 8176x8176.
Document Processing	EPUB, WORD, EXCEL, POWERPOINT, PDF, TXT
Input Method	Standard Android keyboard, with optional third-party input methods (e.g., Chinese, Korean, Japanese)

Basic Software	Camera, Web Browsing, Online Chat, Email, E-books, Resource Manager
System Management	File Manager
	Native Android system with open root access, enabling product customization and development
	Timed Power On/Off
	Supports OTA remote upgrades

3 Main Interfaces

3.1 Interface Layout Diagram

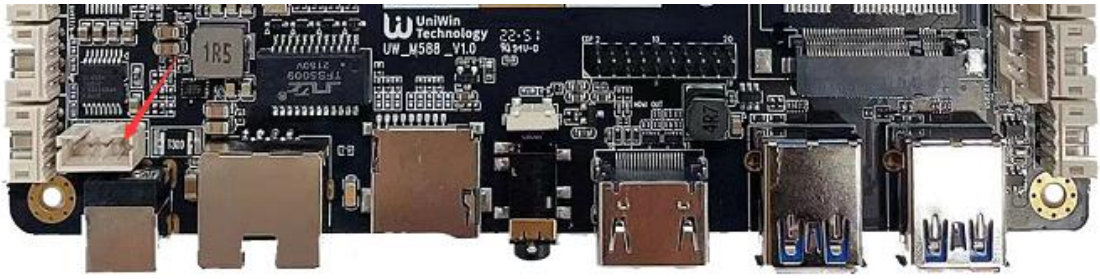




3.2 Introduction main Interfaces

◆ DC12V Power Socket (Triangle indicates Pin 1, 4PIN/2.0)

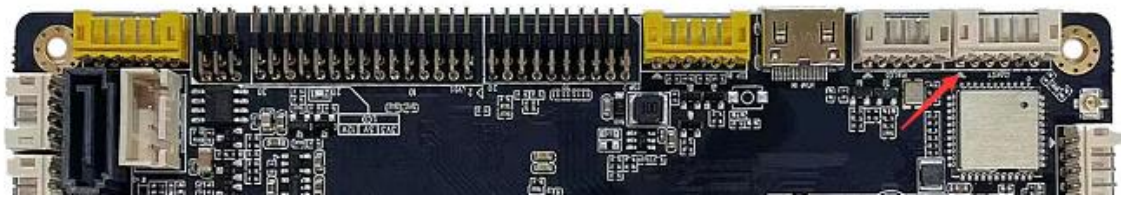
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	12V	Power Input	+12V Power Input
2	12V	Power Input	+12V Power Input
3	GND	Ground	Ground
4	GND	Ground	Ground

◆ POWER/IO/ADCKEY **(Triangle indicates Pin 1,** 6PIN/2.0 **)**

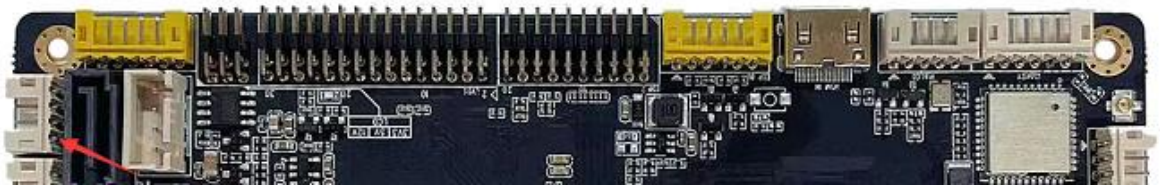
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	3.3V	Power Output	3.3V
2	PWR KEY	Input	Power On/Off Button
3	IO	Input/Output	GPIO4_B3_U
4	IO	Input/Output	GPIO4_B4_U
5	ADC	Input	Requires matched key value button
6	GND	Ground	Ground

◆ UART2 Serial Debugging Port System Print Information **(Triangle indicates Pin 1,** 4PIN/2.0 **)**

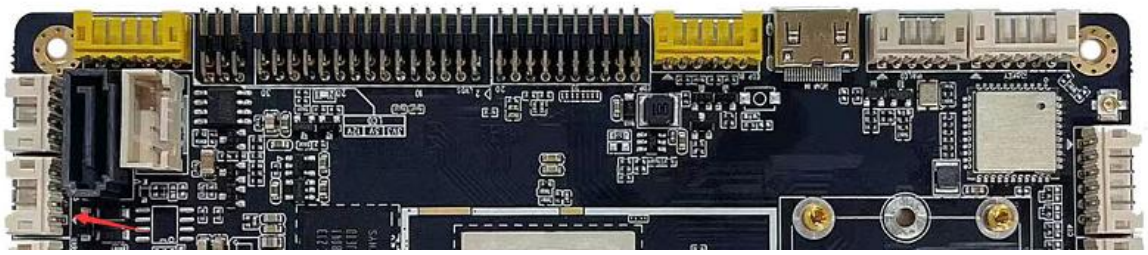
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	RX2	Input	UART Data Input
3	TX2	Output	UART Data Output
4	NC	NC	NC

◆ UART1 Serial Port TTL (Triangle indicates Pin 1, 4PIN/2.0); RS485 optional

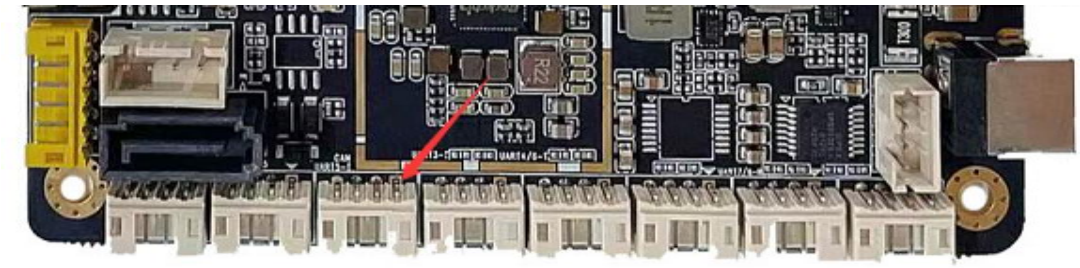
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	RX1/B	Input	UART1 Data Input
3	TX1/A	Output	UART1 Data Output
4	3.3V	3.3V Power Output	3.3V Power Output ; 5V optional

◆ UART5 Serial Port TTL (Triangle indicates Pin 1, 4PIN/2.0); CAN optional

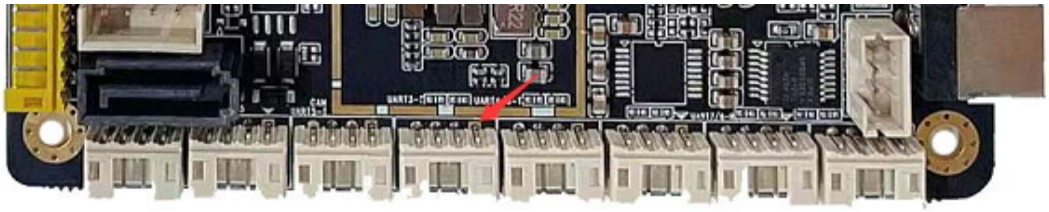
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	RX5/CAN2_TX	Input	UART5 Data input
3	TX5/CAN2_RX	Output	UART5 Data output
4	3.3V	3.3V Power Output	3.3V Power Output ; 5V optional

◆ UART3 serial port TTL(Triangle indicates Pin 1, 4PIN/2.0)

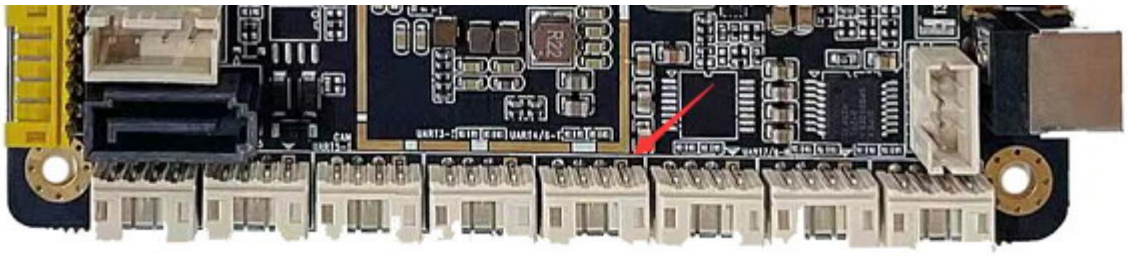
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	RX3	Input	UART3 Data input
3	TX3	Output	UART3 Data output
4	3.3V	3.3V Power Output	3.3V power output, 5V optional

◆ UART4 serial port TTL(Triangle indicates Pin 1, 4PIN/2.0)RS232 optional

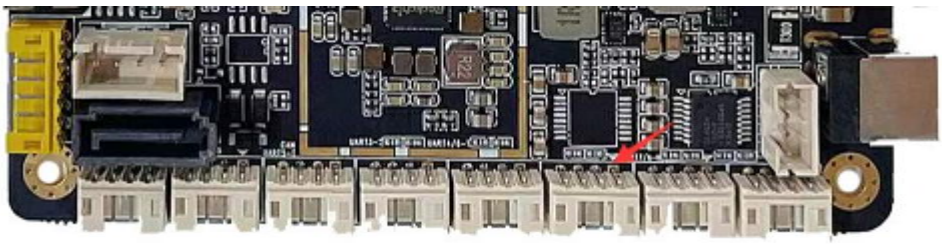
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	RX4	Input	UART4 Data input
3	TX4	Output	UART4 Data output
4	3.3V	3.3V Power Output	3.3V power output, 5V optional

◆ UART6 serial port TTL(Triangle indicates Pin 1, 4PIN/2.0)RS232 optional

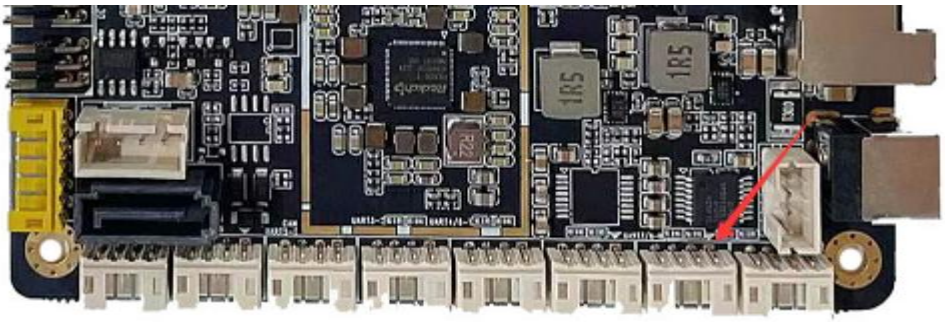
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	RX6	Input	UART5 Data input
3	TX6	Output	UART5 Data output
4	3.3V	3.3V Power Output	3.3V power output, 5V optional

◆ UART7 serial port RS232(Triangle indicates Pin 1, 4PIN/2.0)TTL optional

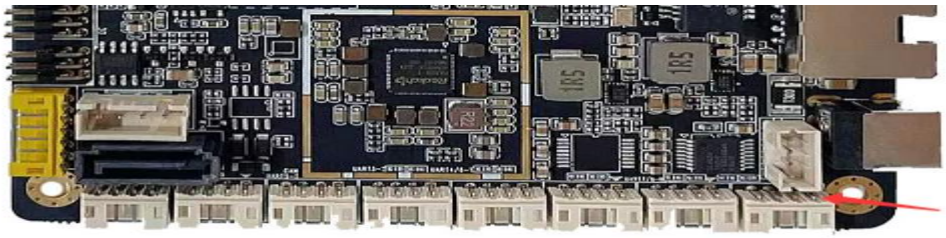
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	RX7	Input	UART7 data input
3	TX7	Output	UART7 data output
4	3.3V	3.3V Power Output	3.3V power output, 5V optional

◆ UART8 Serial Port RS232(Triangle direction indicates Pin 1, 4PIN/2.0) TTL Optional

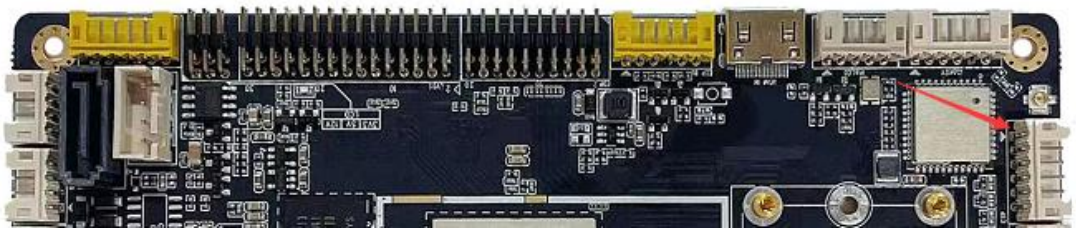
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	RX8	Input	UART8 Data Input
3	TX8	Output	UART8 Data Output
4	3.3V	3.3V Power Output	3.3V power output, 5V optional

◆ CTP Touch Screen Interface (Triangle direction indicates Pin 1, 6PIN/2.0)

As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	3.3V	Output	3.3V Output
2	SCL	Output	Clock Signal
3	SDA	Input/Output	I2C Data
4	INT	Input	Interrupt
5	REST	Output	Reset
6	GND	Ground	Ground

- LVDS LCD Interface (Triangle direction indicates Pin 1, 30PIN/2.0)

As indicated by the arrow in the figure below

No.	Definition	Attribute	Description
1	VCC_Panel	Power Output	LCD power output, 3.3V/5V/12V selectable based on LCD (selected via JP6 jumper cap)
2			
3			
4	GND	Ground	Power Ground
5			
6			
7	RXO0-	Output	Pixel0 Negative Data (Odd)
8	RXO0+	Output	Pixel0 Positive Data (Odd)
9	RXO1-	Output	Pixel1 Negative Data (Odd)
10	RXO1+	Output	Pixel1 Positive Data (Odd)
11	RXO2-	Output	Pixel2 Negative Data (Odd)
12	RXO2+	Output	Pixel2 Positive Data (Odd)
13	GND	Ground	Power Ground

14			
15	RXOC-	Output	Negative Sampling Clock (Odd)
16	RXOC+	Output	Positive Sampling Clock (Odd)
17	RXO3-	Output	Pixel3 Negative Data (Odd)
18	RXO3+	Output	Pixel3 Positive Data (Odd)
19	RXE0-	Output	Pixel0 Negative Data (Even)
20	RXE0+	Output	Pixel0 Positive Data (Even)
21	RXE1-	Output	Pixel1 Negative Data (Even)
21	RXE1+	Output	Pixel1 Positive Data (Even)
23	RXE2-	Output	Pixel2 Negative Data (Even)
24	RXE2+	Output	Pixel2 Positive Data(Even)
25 26	GND	Ground	Power Ground
27	RXEC-	Output	Negative Sampling Clock (Even)
28	RXEC+	Output	Positive Sampling Clock (Even)
29	RXE3-	Output	Pixel3 Negative Data (Even)
30	RXE3+	Output	Pixel3 Positive Data (Even)

◆ LVDS LCD Panel Voltage Selection Interface (Triangle direction indicates Pin 1, 2X3PIN/2.0)

As indicated by the arrow in the figure below

No.	Definition	Attribute	Description
1	LCD12V	Power Output	Power Output, +12V
3	LCD5V	Power Output	Power Output, +5V
5	LCD3.3V	Power Output	Power Output, +3.3V
2 4 6	LCD-POWER	Power Input	Select LVDS display voltage based on configurations 1, 3, 5

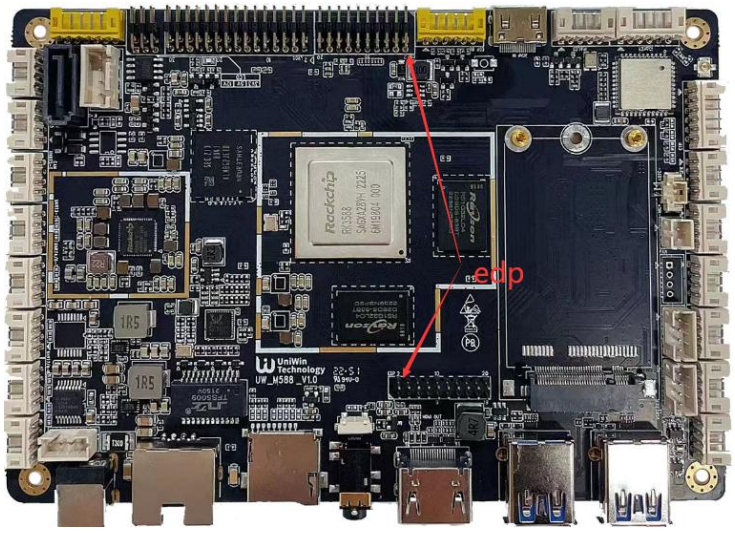
◆ LVDS Backlight Power Control (Triangle indicates Pin 1, 6PIN/2.0/Yellow)

As indicated by the arrow in the figure below

No.	Definition	Attribute	Description
1 2	12V	Power Output	Backlight Power Output
3	BL_EN0	Output	Backlight Board Switch Control Pin
4	BL_PWM	Output	Backlight Board Brightness Control Pin
5 6	GND	Ground	Ground

◆ EDP Display Interface X 2 (Triangle indicates Pin 1)

As indicated by the arrow in the figure below

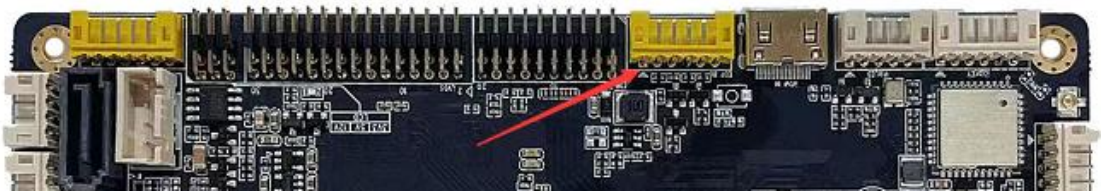


1	Output	12V Output (maximum current 1500mA)
2	Output	12V Output (maximum current 1500mA)
3	Ground	Ground

4	Ground	Ground
5	Output	EDP 0 Negative Data
6	Output	EDP 0 Positive Data
7	Output	EDP 1 Negative Data
8	Output	EDP 1 Positive Data
9	Output	EDP 2 Negative Data
10	Output	EDP 2 Positive Data
11	Output	EDP 3 Negative Data
12	Output	EDP 3 Positive Data
13	Ground	Ground
14	Ground	Ground
15	Output	Negative Sampling Clock
16	Output	Positive Sampling Clock
17	Ground	Ground
18	Ground	Ground
19	Ground	Ground
20	NC	NC

◆ EDP Backlight Power Control (Triangle indicates Pin 1, 6PIN/2.0/Yellow)

As indicated by the arrow in the figure below

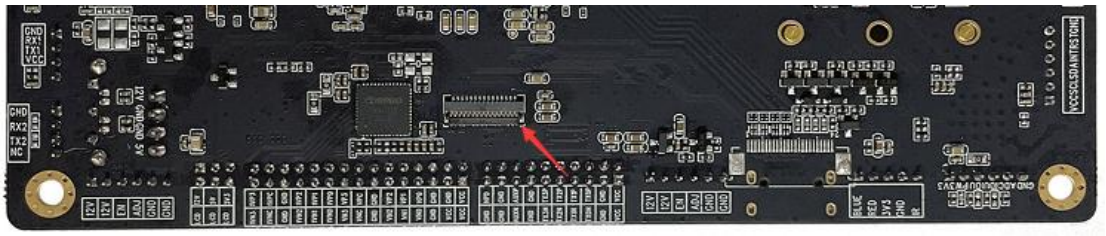


No.	Definition	Attribute	Description
1	12V	Power Output	Backlight Power Output
2			
3	BL_EN0	Output	Backlight Board Switch Control Pin
4	BL_PWM	Output	Backlight Board Brightness Control Pin

5 6	GND	Ground	Ground

◆ MIPI DSI (Triangle indicates Pin 1, 31PIN/0.3mm)

As indicated by the arrow in the figure below

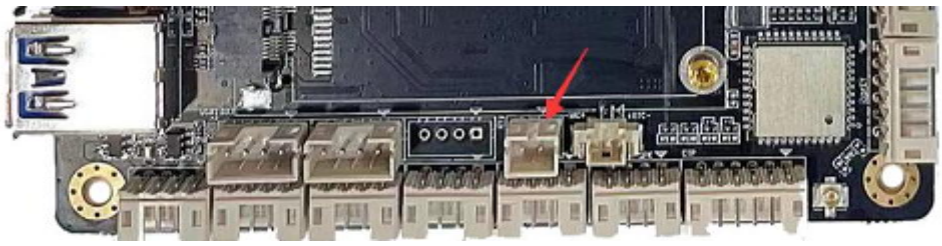


No.	Definition	Attribute	Description
1	3.3V	Power Supply	LCD_VCC
2	3.3V	Power Supply	LCD_VCC
3	1.8V	Power Supply	LCD_VDD
4	GND	Ground	Ground
5	RESET	Reset	Display Reset
6	1.8V	Power Supply	LCD_VDD
7	GND	Ground	Ground
8	D3N	Signal Input	MIPI DATA
9	D3P	Signal Input	MIPI DATA
10	GND	Ground	Ground
11	D0N	Signal Input	MIPI DATA
12	D0P	Signal Input	MIPI DATA
13	GND	Ground	Ground
14	CLKN	Signal Input	MIPI DATA
15	CLKP	Signal Input	MIPI DATA
16	GND	Ground	Ground
17	D1N	Signal Input	MIPI DATA
18	D1P	Signal Input	MIPI DATA
19	GND	Ground	Ground

20	D2N	Signal Input	MIPI DATA
21	D2P	Signal Input	MIPI DATA
22	GND	Ground	Ground
23	GND	Ground	Ground
24	LED-	Power Supply	Backlight Power Negative
25	LED-	Power Supply	Backlight Power Negative
26	LED-	Power Supply	Backlight Power Negative
27	LED-	Power Supply	Backlight Power Negative
28	NC	NC	NC
29	LED+	Power Supply	Backlight Power Positive
30	LED+	Power Supply	Backlight Power Positive
31	LED+	Power Supply	Backlight Power Positive

◆ MIC Microphone Interface (Triangle indicates Pin 1, 2PIN/2.0)

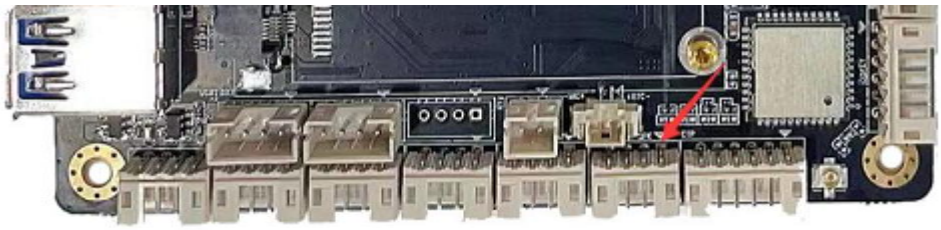
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	MIC+	Audio Input	Audio Input+
2	MIC-	Audio Input	Audio Input-

◆ Speaker Output (Triangle indicates Pin 1, 4PIN/2.0)

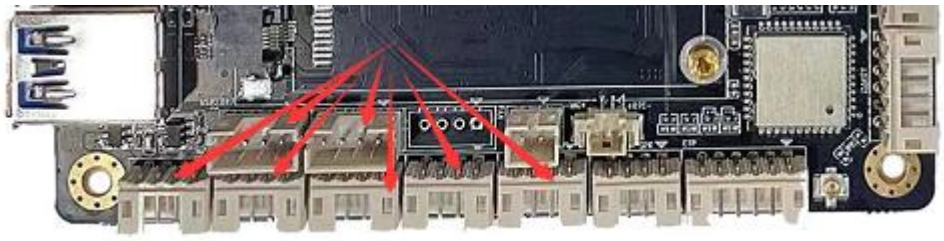
As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	OUTP-R+	Output	Right Channel Audio + Signal (Connect to Speaker +)
2	OUTN-R-	Output	Right Channel Audio - Signal (Connect to Speaker -)
3	OUTN-L-	Output	Left Channel Audio - Signal (Connect to Speaker -)
4	OUTP-L+	Output	Left Channel Audio + Signal (Connect to Speaker +)

◆ USB External Interface *7 (Triangle indicates Pin 1, 4PIN/2.0)

As indicated by the arrow in the figure below



No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	DP	Input\Output	D+ Signal Line
3	DM	Input\Output	D- Signal Line
4	5V Power Supply	Power Output	Power Output +5V

◆ Remote Control Receiver, Operation Indicator Light (Triangle direction indicates Pin 1, 6PIN/2.0)

As indicated by the arrow in the figure below

No.	Definition	Attribute	Description
1	LED_B	Blue Light	Operation Status Indicator
2	LED_R	Red Light	Standby Status Indicator
3	VCC_ 3V3	Power Supply	3.3V Power Output
4	GND	Ground	Ground
6	IR	Input	Remote Control Signal Input

◆ SATA (Triangle direction indicates Pin 1, 4PIN/2.0)

As indicated by the arrow in the figure below

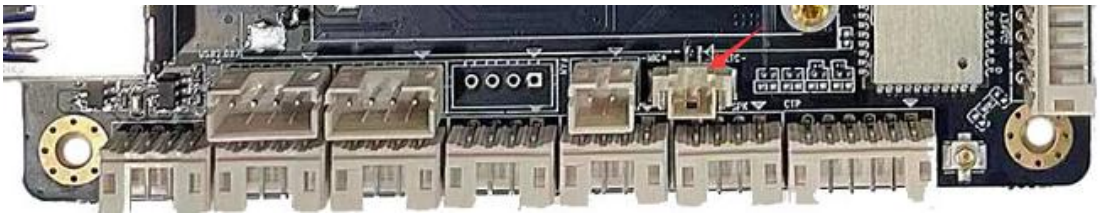
No.	Definition	Attribute	Description
1	12V	Power Output	Power Output + 12V
2	GND1	Ground	Ground
3	GND2	Ground	Ground
4	5V	Power Output	Power Output + 5V

◆ FAN (Triangle direction indicates Pin 1, 4PIN/2.0)

As indicated by the arrow in the figure below

No.	Definition	Attribute	Description
1	GND	Ground	Ground
2	12V	Power Supply	+12V Power Output
3	NC	NC	NC
4	PWM	Output	GPIO4_B5_d PWM Output

◆ RTC BAT (Triangle direction indicates Pin 1, 2PIN/1.25mm) RTC Battery Interface



No.	Definition	Attribute	Description
1	3V Battery Negative Terminal	Power Supply	3V Battery Negative Terminal
2	3V Battery Positive Terminal	Power Supply	3V Battery Positive Terminal

4 Dimensions

4.1 Board Dimensions

PCB length: 148mm; PCB width: 102mm; Total board height approximately 11mm. For more details structural diagrams Please consult our sales representatives.