Shanghai Panelmate Electronics Co.,Ltd

RK3576 High-Performance AI Motherboard Datasheet

(Model: ZYSJ-2476K**)**

Photo disclaimer: Due to the continuous maintenance and updates of the product, the photos are for reference only.

Company Profile:

Shanghai PanelMate Electronics Co., LTD., is an innovative company in the field of industrial IT solutions. Panelmate is a technology enterprise focusing on the integration of industrial monitor, industrial panel PC, arm-mounted operation panel and panel PC, Raspberry panel PC, CNC control panel,Hand-held Pendant Station, industrial keyboards and automatic control systems.

We offer OEM and ODM.We provide key parts selection, circuit design, appearance design, production, sales, after-sales packaging solutions servers.

Our company has professional software and hardware development capabilities, and the control panel can support EtherCAT, Modbus-TCP, CANBUS, PROFINET, ADS and other bus protocols.

With the research and summary of the integrated service experience of the founder and the team in various industries, the products are widely used in printing and packaging, textile machinery, testing equipment, construction machinery, high-speed rail, currency machinery, tobacco machinery, advanced numerical control system, Industry 4.0 and other related fields.

Catalog

1 Product Images 1
2 Company Profile 2
3 Catalog 3
4 Chapter 1: Product Overview 4
5 Chapter 2 Product Specifications 5
6 Basic Hardware Specifications: 6
7 PCBA Structure 8
8 Electrical 9
9 Appendix 18
10 Copyright Notice 18

Chapter 1 Product Overview

Overview:

ZYSJ-2476K High-Performance Smart Motherboard, equipped with the powerful AI processor RK3576 and the neural network processor NPU from Rockchip. It runs on the Android 14.0/debian11/ubuntu 20.04 operating system. RK3576 is based on four-core Cortex-A72 + four-core Cortex-A53, with a clock speed of up to 2.2GHz, using 8nm technology, featuring extremely strong general computing capabilities. The GPU adopts four-core Mali-G52 MC3, and the CPU integrates the AI neural network processor NPU, with an arithmetic performance of up to 6.0TOPS. It supports various AI development tools and interfaces. It supports dual-screen independent display function, supports LVDS interface for 1080P output, eDP and MiPi display interfaces for output, HDMI-4K output, supports dual gigabit Ethernet, 4G/5G networks, WiFi, USB expansion/gravitational sensing/CAN/RS232/RS485/I/O expansion/I2C expansion/MIPI camera/infrared remote control functions. It has abundant interfaces. A brand-new eight-core artificial intelligence chip with extremely strong performance makes the product more perfect and is widely applied in AI intelligent fields such as AI servers, face payment devices, security, medical care, transportation, finance, industrial control, smart education, intelligent retail, etc. Due to its platform-based hardware and Android intelligent characteristics, it can be used on the intelligent terminal motherboard for human-computer interaction and network device interaction when needed.

Features:

- **High Performance:** RK3576 is based on four-core Cortex-A72 and four-core Cortex-A53, with a main frequency of up to 2.2GHz. It boasts extremely powerful general computing capabilities. The GPU adopts four-core Mali-G52 MC3, and the CPU integrates an AI neural network processor NPU with an operational performance of up to 6.0 TOPS. It supports a variety of AI development tools and interfaces, and can directly apply TensorFlow/Caffe/Mxnet's general model conversion. It provides AI development tools and supports Android NN API, RKNN cross -platform API, and TensorFlow's development interface.

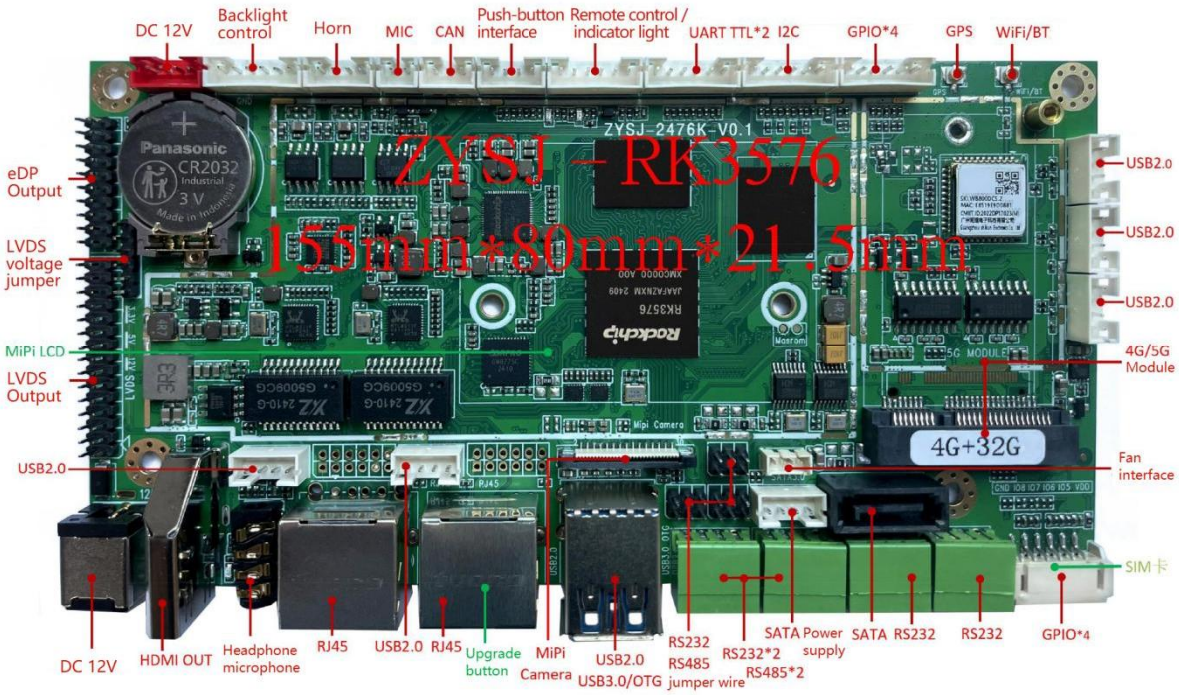
- **High Stability:** The RK3576 AI motherboard incorporates proprietary hardware and software technologies to ensure product stability, enabling 24/7 unattended operation for end products.

- **High Integration:** The RK3576 artificial intelligence motherboard adopts a military-grade TG170-8 layer ultra-high-density PCB board, integrating functions such as Ethernet, WiFi, 18W power amplifier, IR remote control, HDMI, LVDS, eDP, MiPi, microphone, gravity sensing, etc., which greatly simplifies the overall design. The ultra-thin motherboard design enables the overall design to be more aesthetically pleasing.

- **High Expandability:** Seven USB interfaces, one CAN interface, two UART interfaces, one I2C interface, eight IO expansion ports, one AD interface, two RS232 interfaces, two RS232/RS485 interfaces. It can support the expansion of more peripheral devices.

Chapter 2: Product Specifications

Product Images

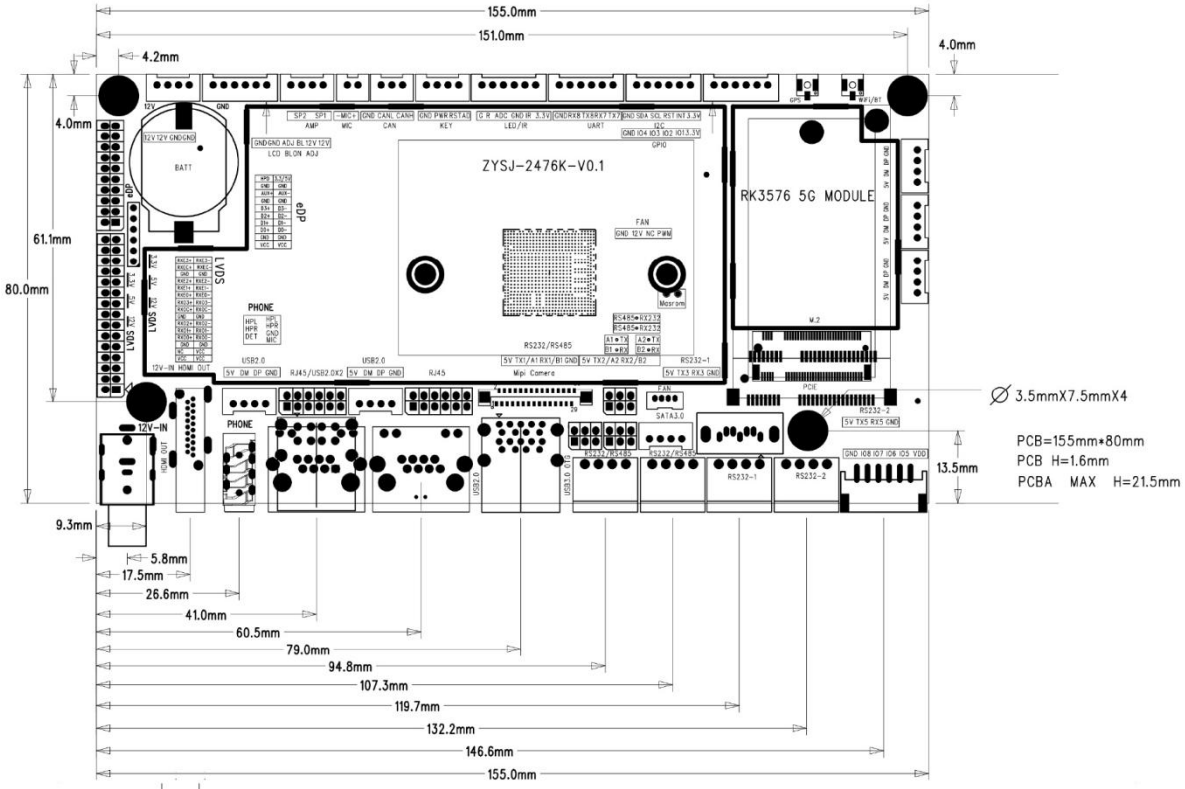


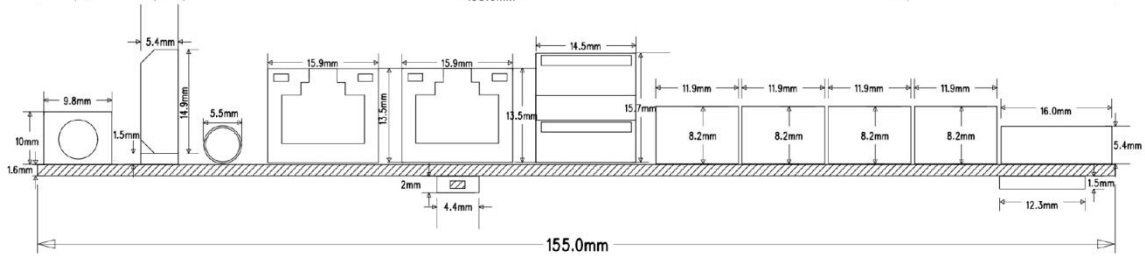
Basic Hardware Specifications:

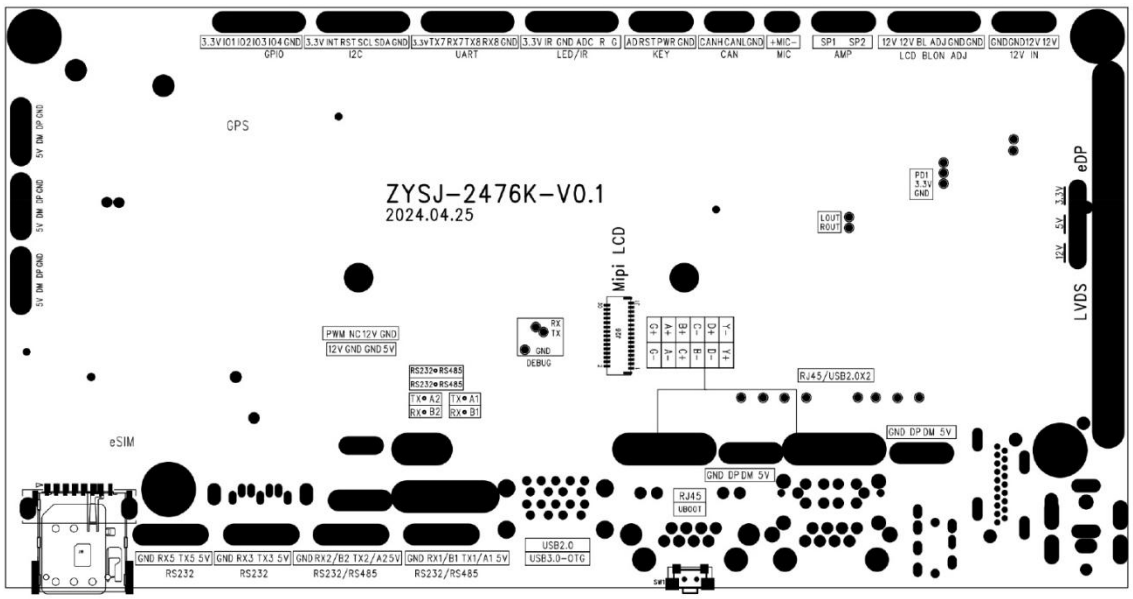
Operating System	Android14.0/debian11/ubuntu20.04
CPU	RK3576, featuring four-core Cortex-A72 and four-core Cortex-A53, with the maximum operating frequency reaching 2.2GHz.
GPU	Quad-core Mali-G52 MC3 Supports OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1, and has embedded high-performance 2D acceleration hardware
NPU	Built-in neural network processor NPU, with 6.0 TOPS @INT8 performance. Supports models such as Caffe/Mxnet/TensorFlow/PyTorch/TF Lite/ONNX/Darknet. Provides AI development tools: supports rapid model conversion.
DDR	LPDDR4 4GB (8G/16G available options, up to 16G supported)
Storage	eMMC 32GB (64G/128G/256G/optional) 1*SATA 3.0 (for SSD/HDD hard drive expansion)
LAN	Supports 2 Ethernet networks, 10/100/1000M
	Supports 2.4GHz and WiFi6 (802.11b/g/n/ac protocols). 5GHz dual-band WiFi (optional)
	Supports Bluetooth function, V2.1 + EDR/Bluetooth 3.0/3.0 + HS/4.1/BLE
	Supports 4G/5G functions. 5G-NR-NSA/5G-NR-SA/LTE-TDD/LTE-FDD/TD-SCDMA/EDGE/GPRS/GSM (optional)
GPS	Built-in GPS/BD module, sensitivity: -162dBm, receiving frequency: 1575.42MHz, satellite channels: 20 channels, positioning accuracy: <10m (optional)
Image Rotation	Supports manual rotation of 0°, 90°, 180°, and 270°. Also supports the automatic screen rotation function based on gravity sensing (optional).
I/O	1 * eDP interface (eDP1.3, 5.4Gbps support 4K@60Hz output), supports 3.3V/5V power supply 1 * LVDS interface (single/double, 6 bits/8 bits), supports 1080P@60Hz output. supports 3.3V/5V/12V power supply 1 * HDMI OUT 2.0 supports up to 4K @60Hz output 1 * MiPi interface (supports MiPi 2560*1600@60Hz output) Supports dual-screen separate display function Choose either eDP or HDMI, and choose either MiPi or LVDS
Backlight Control	12V backlight power supply and control
Audio	1* Speaker output (2*18W 4R) 1* Headphone output (with headphones), 1* Microphone input
Touch screen	1* I²C interface (supporting multi-point resistive touch, multi-point capacitive touch). Supports USB multi-point infrared touch, multi-point capacitive touch, multi-point nano-film touch, multi-point sound wave touch, multi-point optical touch, and so on.

Camera	1* MIPI 4-Lane camera input function, supporting 500W/1300W pixel resolution (optional).Supports USB interface camera (optional)
RTC	Built-in real-time clock power supply battery, supporting timed power-on/off operation
USB	5*USB-2.0 HUB , 1*USB3.0 OTG& 1*USB2.0 HUB
PCIe	1* Mini PCIe (for 4G/5G LTE) (choose one from M.2)
SIM	1* SIM card slot, used in conjunction with Mini PCIe to expand 4G/5G LTE module
Infrared	1* Infrared receiving socket, supporting infrared remote control function
LED	1* Power status LED (red), 1* System LED (blue, default flashing)
Button	1* Reset, 1* Power, 1* Upgrade button
COM	2*RS232, 2*RS232/2*RS485 (jumper selection), 2*UART TTL
GPIO	8*IO ports, supporting both input and output
CAN	1*CAN
AD	1*AD
Fan outlet	Supports 5V/12V fan interface
Power input	DC 12V / 5.5mm core, 2.1mm DC connector, 2A - 5A (requiring surge voltage less than 18V and ripple voltage less than 100mV), supports power-on self-start or power-on by pressing the power button
Working temperature	-10~70
Storage temperature	-20~70
Storage humidity	10%~80%
Motherboard size	155mm*80mm*21.5mm
Multimedia	Supports 4K@60fps H.265/H.264/AV1/VP9/AVS2 video decoding Supports 1080P 60fps H.265/H.264 video encoding Supports 8M ISP, supports HDR
Language	Multiple languages
Input method	Standard Android keyboard, with the option to choose third-party input methods (Chinese, Korean, Japanese, etc.)
System Management	Original Android system, with open root access, allowing for product customization and development
	Real-time remote monitoring, system crashes can be automatically recovered, 7*24 hours unmanned operation
	Supports OTA remote upgrade
	Supports Wi-Fi display
System watchdog	Support hardware/software watchdog

PCBA Structure:







Electrical

- Power input interface (12V IN JACK) socket spacing: 2.0MM

Serial Number	Definition	Property	Description	
1	12V_IN	Input	12V Power Input	
2	12V_IN	Input	12V Power Input	
3	GND	Ground	Ground	
4	GND	Ground wire	Ground wire	

- The spacing between the screen backlight interface (LCD BL JACK) sockets is 2.0MM.

Serial No.	Definition	Attribute	Description	
1	GND	Ground	Ground	
2	GND	Ground wire	Ground wire	
3	LCD-ADJ	Output	Backlight Adjustment	
4	LCD-BLON	Output	Backlight Control	
5	12V	Output	12V Output	
6	12V	Output	12V Output	

- The spacing between the speaker output jack (SPEAKER OUT JACK) is 2.0MM.

Serial Number	Definition	Property	Description	
1	RP	Output	Right channel output positive terminal	
2	RN	Output	Right Channel Output Negative Terminal	
3	LP	Output	Left channel output positive pole	
4	LP	Output	Left channel outputs negative pole	

- The spacing between the microphone interface (MIC JACK) sockets is 2.0MM.

Serial Number	Definition	Property	Description	
1	MIC-	Input	MIC negative input	
2	MIC+	Input	MIC positive input	

- The spacing between CAN interface (CAN JACK) sockets is 2.0MM.

Serial Number	Definition	Property	Description	
1	GND	Ground	Ground wire	
2	CANL	Data	Data	
3	CANH	Data	Data	

- The spacing of the key jack socket is 2.0MM.

Serial Number	Definition	Attributes	Description	
2	GND	Ground	Ground	
2	PWR	Output	POWER Power Button	
3	RST	Output	RESET Reset Button	
4	AD	Output	AD (Upgrade) Button Output	

- The spacing between the LED/remote control receiving interface (LED/IR IN JACK) sockets is 2.0MM.

Serial Number	Definition	Property	Description	
1	LEDG	Output	System Indicator	
2	LEDR	Output	Power Indicator	
3	ADC	Input	AD Detection	
4	GND	Ground	Ground	
5	IR	Input	Receive	
6	3.3V	Output	3.3V voltage output	

- UART serial port (TTL level) interface (UART-TTL JACK) socUket spacing 2.0MM.

Serial Number	Definition	Property	Description	
1	GND	Ground	Ground	
2	RX8	Input	Receive (RX8)	
3	TX8	Output	Transmit (TX8)	
4	RX7	Input	Receive (RX7)	
5	TX7	Output	Transmit (TX7)	
6	3.3V/5V	Output	3.3V/5V Voltage Output	

- The spacing of the I2C interface (I2C JACK) socket is 2.0MM.

Serial Number	Definition	Property	Description	
1	GND	Ground	Ground	
2	SDA (3.3V level)	Output	Data	
3	SCL (3.3V level)	Output	Clock	
4	RST (3.3V level)	Output	Reset External Devices	
5	INT (3.3V level)	Input	External Device Interrupt	
6	3.3V	Output	3.3V Voltage Output	

- The spacing of the GPIO detection interface (IO DET JACK) socket is 2.0MM.

Serial Number	Definition	Property	Description	
1	GND	Ground	Ground	
2	IO4 (3.3V Level)	Input	Default Low Level	
3	IO3 (3.3V level)	Input	Default Low Level	
4	IO2 (3.3V level)	Input	Default High Level	
5	IO1 (3.3V level)	Input	Default High Level	
6	3.3V	Output	3.3V Voltage Output	

- USB 2.0-HUB interface (USB 2.0-HOST JACK) socket spacing 2.0MM.

Serial Number	Definition	Attributes	Description	
1	5V	Output	5V Voltage Output	
2	DM	Input	DM-	
3	DP	Input	DP+	
4	GND	Ground	Ground	

- USB 2.0-HUB interface (USB 2.0-HOST JACK) socket spacing 2.0MM.

Serial Number	Definition	Attributes	Description	
1	5V	Output	5V Voltage Output	
2	DM	Input	DM-	
3	DP	Input	DP+	
4	GND	Ground	Ground	

- USB 2.0-HUB interface (USB 2.0-HOST JACK) socket spacing 2.0MM.

Serial Number	Definition	Attributes	Description

1	5V	Output	5V Voltage Output	
2	DM	Input	DM-	
3	DP	Input	DP+	
4	GND	Ground	Ground	

- The spacing of the IO detection interface (IO DET JACK) socket is 2.0MM.

Serial Number	Definition	Property	Description	
1	GND	Ground	Ground	
2	IO8 (3.3V Level)	Input	Default Low Level	
3	IO7 (3.3V level)	Input	Default Low Level	
4	IO6 (3.3V level)	Input	Default High Level	
5	IO5 (3.3V level)	Input	Default High Level	
6	3.3V	Output	3.3V Voltage Output	

- RS232 interface (RS232 JACK) socket spacing: 2.0MM.

Serial Number	Definition	Property	Description	
1	3.3V/5V	Output	3.3V/5V Voltage Output	
2	TX5	Output	Transmit (TX5)	
3	RX5	Input	Receive (RX5)	
4	GND	Ground	Ground	

- RS232 interface (RS232 JACK) socket spacing: 2.0MM.

Serial Number	Definition	Property	Description	
1	3.3V/5V	Output	3.3V/5V Voltage Output	
2	TX5	Output	Transmit (TX3)	
3	RX5	Input	Receive (RX3)	
4	GND	Ground	Ground	

- RS232 interface (RS232 JACK) socket spacing: 2.0MM.

Serial Number	Definition	Property	Description

1	3.3V/5V	Output	3.3V/5V Voltage Output	
2	TX5	Output	Transmit (TX2/A2)	
3	RX5	Input	Receive (RX2/B2)	
4	GND	Ground	Ground	

- RS232 interface (RS232 JACK) socket spacing: 2.0MM.

Serial Number	Definition	Property	Description	
1	3.3V/5V	Output	3.3V/5V Voltage Output	
2	TX5	Output	Transmit (TX1/A1)	
3	RX5	Input	Receive (TX1/B1)	
4	GND	Ground	Ground	

- SATA power interface (SATA DC JACK) seat spacing: 2.0MM.

Serial Number	Definition	Attribute	Description	
1	5V	Output	5V Voltage Output	
2	GND	Ground	Ground	
3	GND	Ground wire	Ground wire	
4	12V	Output	12V Voltage Output	

- Fan interface (FAN JACK) socket spacing: 1.25MM.

Serial Number	Definition	Property	Description	
1	GND	Ground	Ground	
2	12V/5V	Output	12V/5V	
3	NC	Unused Pin	Empty Pin	
4	PWM	Output	PWM	

- RS232/485 interface (WEIGAND JACK) socket spacing 2.0MM.

Serial Number	Definition	Property	Description
1	RS485-B1	Data	Data
2	RS485-A1	Data	Data
3	RX1/B1-COM	Data	Data
4	TX1/A1-COM	Data	Data

5	RS232-RX1	Data	Data	
6	RS232-TX1	Data	Data	
7	RS485-B2	Data	Data	
8	RS485-A2	Data	Data	
9	RX1/B2-COM	Data	Data	
10	TX1/A2-COM	Data	Data	
11	RS232-RX2	Data	Data	
12	RS232-TX2	Data	Data	
13	RS485-RX3	Data	Data	
14	RS485-RX3	Data	Data	
15	RX3-COM	Data	Data	
16	TX3-COM	Data	Data	
17	RS232-RX5	Data	Data	
18	RS232-TX5	Data	Data	

- USB 2.0-HUB interface (USB 2.0-HOST JACK) socket spacing 2.0MM.

Serial Number	Definition	Property	Description	
1	5V	Output	5V Voltage Output	
2	DM	Input	DM-	
3	DP	Input	DP+	
4	GND	Ground	Ground	

- USB 2.0-HUB interface (USB 2.0-HOST JACK) socket spacing 2.0MM.

Serial Number	Definition	Property	Description	
1	5V	Output	5V Voltage Output	
2	DM	Input	DM-	
3	DP	Input	DP+	
4	GND	Ground	Ground	

- The spacing of the MiPi CAMER interface (MiPi CAMER JACK) socket is 0.5MM.

Serial Number	Definition	Property	Description
1	NC	Empty Foot	Empty Foot
2	VDD28	Power Supply	2.8V Output
3	VDD13	Power Supply	1.3V Output
4	VDD18	Power Supply	1.8V Output

5	NC	Unused Pin	Unused Pin	
6	GND	Ground	Ground	
7	VDD28	Power Supply	2.8V Output	
8	GND	Ground	Ground	
9	SDA	Output	Data	
10	SCL	Output	Clock	
11	RST	Output	Reset	
12	PWDN	Ground	Enable Pin	
13	GND	Ground	Ground	
14	MLCK	Output	Clock	
15	GND	Ground	Ground	
16	DP3	Output	Data	
17	DN3	Output	Data	
18	GND	Ground	Ground	
19	DP2	Output	Data	
20	DN2	Output	Data	
21	GN1	Ground	Ground wire	
22	DP2	Output	Data	
23	DN1	Output	Data	
24	GND	Ground	Ground	
25	CLKP	Output	Clock	
26	CLKN	Output	Clock	
27	GND	Ground	Ground	
28	DP0	Output	Data	
29	DN0	Output	Data	
30	GND	Ground	Ground	

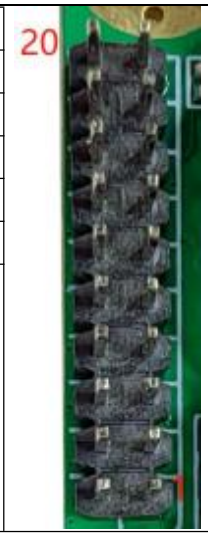
- The spacing of the LVDS interface (LVDS JACK) socket is 2.0MM.

Serial Number	Definition	Property	Description
1	POWER	Output	3.3V/5V/12V Power Output
2	POWER		
3	POWER		
4	GND	Ground	Ground
5	GND		
6	GND		
7	TA1-	Output	Data
8	TA1+	Output	Data
9	TB1-	Output	Data
10	TB1+	Output	Data
11	TC1-	Output	Data

12	TC1+	Output	Data	
13	GND	Ground	Ground	
14	GND			
15	TCLK1-	Output	Clock	
16	TCLK1+	Output	Clock	
17	TD1-	Output	Data	
18	TD1+	Output	Data	
19	TA2-	Output	Data	
20	TA2+	Output	Data	
21	TB2-	Output	Data	
22	TB2+	Output	Data	
23	TC2-	Output	Data	
24	TC2+	Output	Data	
25	GND	Ground	Ground	
26	GND			
27	TCLK2-	Output	Clock	
28	TCLK2+	Output	Clock	
29	TD2-	Output	Data	
30	TD2+	Output	Data	

- The spacing between the eDP LCD interface (eDP LCD JACK) sockets is 2.0MM.

Serial Number	Definition	Property	Description
1	VCC	Output	3.3V/5V Power Output
2	VCC	Output	
3	GND	Ground	Ground
4	GND	Ground wire	Ground wire
5	D0-	Output	Data
6	D0+	Output	Data
7	D1-	Output	Data
8	D1+	Output	Data
9	D2-	Output	Data
10	D2+	Output	Data
11	D3-	Output	Data
12	D3+	Output	Data
13	GND	Ground	Ground

14	GND	Ground wire	Ground wire	
15	AUX-	Output	Data	
16	AUX+	Output	Data	
17	GND	Ground	Ground	
18	GND	Ground wire	Ground wire	
19	3.3V	Output	3.3V Power Output	
20	HPD	Input	HPD Detection Pin	

- The pitch of the FPC MiPi LCD interface (FPC MiPi LCD JACK) is 0.3MM.

Serial Number	Definition	Property	Description	
1	LED+	Output	Backlight Positive Terminal	
2	LED+			
3	LED+			
4	GND	Ground	Ground	
5	LED-	Output	Backlight Negative Terminal	
6	LED-			
7	LED-			
8	LED-			
9	GND	Ground	Ground	
10	GND			
11	MiPi2+	Output	Data	
12	MiPi 2-	Output	Data	
13	GND	Ground	Ground	
14	MiPi 1+	Output	Data	
15	MiPi 1-	Output	Data	
16	GND	Ground	Ground	
17	MiPi CLK+	Output	Clock	
18	MiPi CLK-	Output	Clock	
19	GND	Ground	Ground	
20	MiPi 0+	Output	Data	
21	MiPi 0-	Output	Data	
22	GND	Ground	Ground	
23	MiPi 3+	Output	Data	
24	MiPi 3-	Output	Data	
25	GND	Ground	Ground	
26	NC	NC	NC	

27	RESET	Output	Reset	
28	NC	NC	NC	
29	VDDIO 1.8V	Output	VDD1.8V	
30	VDD3.3V	Output	VDD3.3V	
31	VDD3.3V	Output	VDD3.3V	

- The spacing of the LVDS screen voltage jumper interface (LVDS LCD JP JACK) is 2.0MM.

Serial Number	Definition	Property	Description	
1	LCD-VDD-IN	Input	LCD Voltage Input	
2	3.3V	Output	3.3V Output	
3	LCD-VDD-IN	Input	LCD Voltage Input	
4	5V	Output	5V Output	
5	LCD-VDD-IN	Input	LCD Voltage Input	
6	12V	Output	12V Output	

Appendix

◆ Product Images

- Front

- Rear