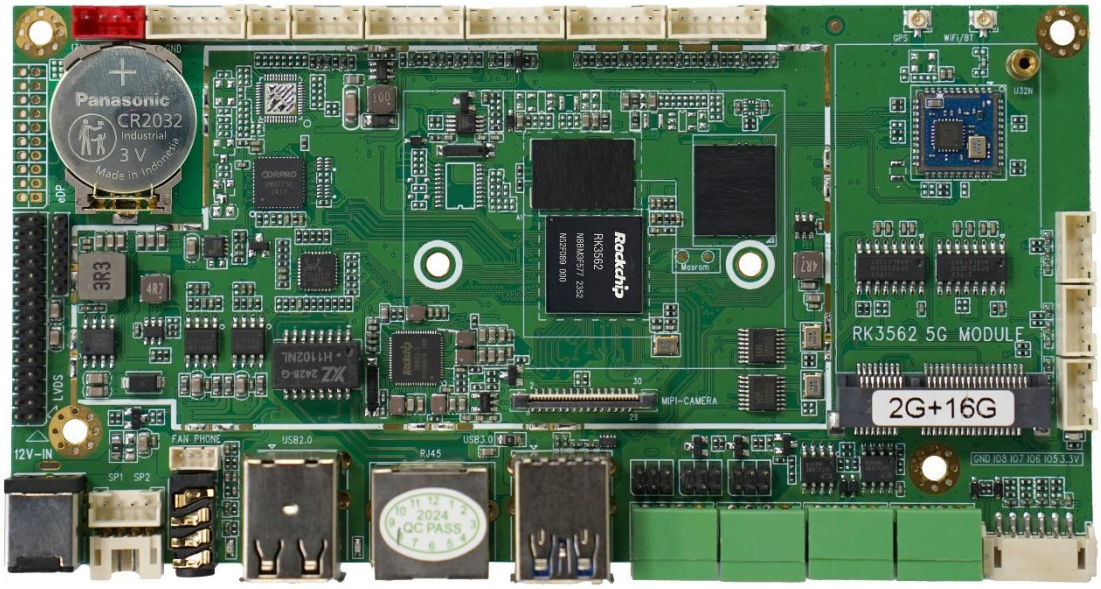
USR-EV808(RK3562)



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1. Product Overview

The USR-EV808-3562 high-performance smart motherboard features the Rockchip RK3562 processor, supporting operating systems including Android 13 and Ubuntu. Built on the ARMv8.2-A architecture, the RK3562 employs a 22nm process to deliver a quad-core 64-bit Cortex-A53 CPU with a clock speed of up to 2.0 GHz, offering exceptional general-purpose computing capabilities. It integrates an ARM G52 2EE GPU for efficient graphics processing and a built-in Neural Processing Unit (NPU) that supports INT8/INT16 mixed-precision operations, achieving 1.0 TOPS AI computing power. The motherboard is compatible with various mainstream AI development tools and interfaces. Supporting multiple display outputs including LVDS (1080P), eDP, and MIPI interfaces, it meets diverse human-machine interaction needs. For networking, it features 100Mbps Ethernet, Wi-Fi, and Bluetooth, with expansion ports covering USB, RS232, RS485, GPIO, I^2C, MIPI camera, infrared remote control, and gravity sensor, facilitating flexible integration of peripheral devices. Leveraging the synergistic advantages of hardware platformization and software intelligence, this motherboard is widely used in smart fire protection, smart construction sites, industrial quality inspection, autonomous driving, smart agriculture, intelligent sorting machines, AI robots, smart NVRs, ARM PCs, security, healthcare, transportation, finance, industrial control, education, and retail sectors. It delivers stable and efficient end-user experiences in human-machine interaction and device networking scenarios.

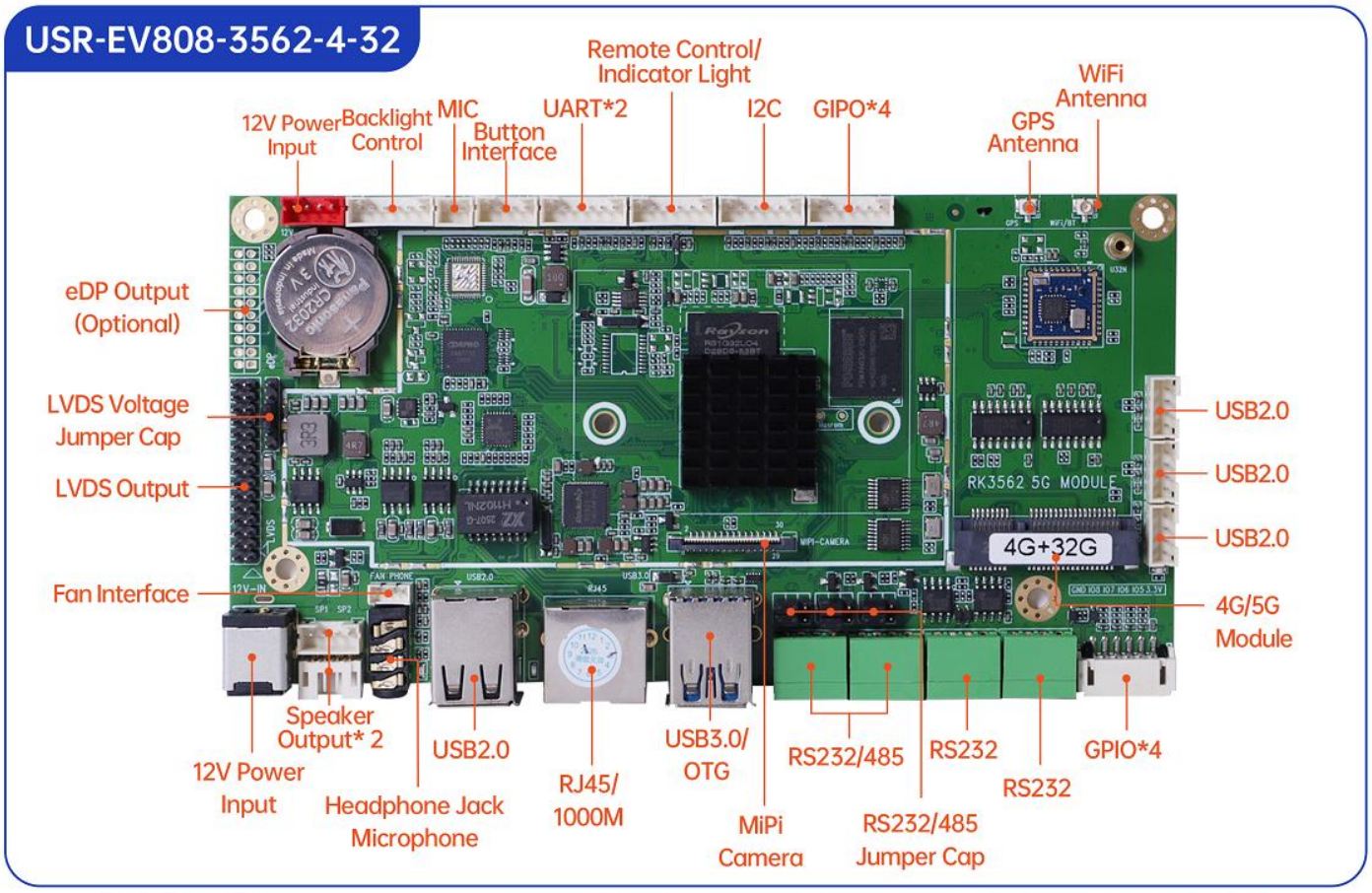
2. Characteristic

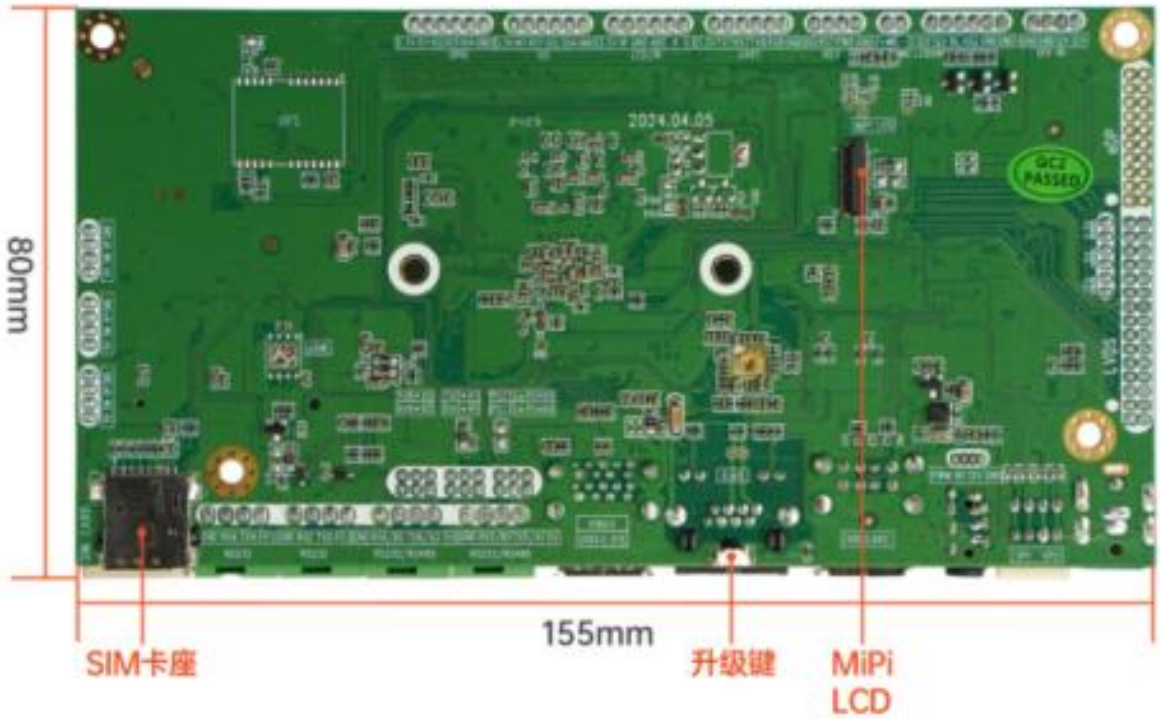
- High Performance: The RK3562 utilizes an advanced 22nm process and is based on the ARMv8.2-A architecture, featuring a quad-core 64-bit Cortex-A53 CPU with a clock speed of up to 2.0 GHz, delivering exceptional general-purpose computing performance. Its graphics processing is handled by the ARM G52 2EE GPU, which efficiently supports rendering and display tasks. The chip also integrates a dedicated AI neural network processor (NPU) with up to 1.0 TOPS computational performance, supporting mixed-precision calculations including INT8/INT16. This NPU is compatible with various mainstream AI development tools and frameworks, enabling direct conversion of general-purpose models such as TensorFlow, Caffe, and MXNet. It provides comprehensive AI development support, including the Android NN API, RKNN cross-platform API, and TensorFlow development interfaces, facilitating rapid deployment and optimization of AI applications for developers.
- High Stability: The RK3562 AI motherboard incorporates proprietary technologies in both hardware and software to ensure product stability, enabling the final product to operate 24/7 without human intervention.
- High integration: The RK3562 AI motherboard features a TG170-8-layer ultra-high-density PCB, integrating Ethernet, WiFi, 18W power amplifier, IR remote control, LVDS, eDP, MiPi, microphone, and gravity sensor functions, significantly simplifying overall design. Its ultra-thin design also enhances the aesthetic appeal of the device.

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- High expandability: 7 USB ports, 2 RS232 ports, 2 RS232/RS485 ports, 2 UART ports, 1 I2C port, 8 IO expansion ports, and 1 AD port for additional peripheral devices.

3. Product interface





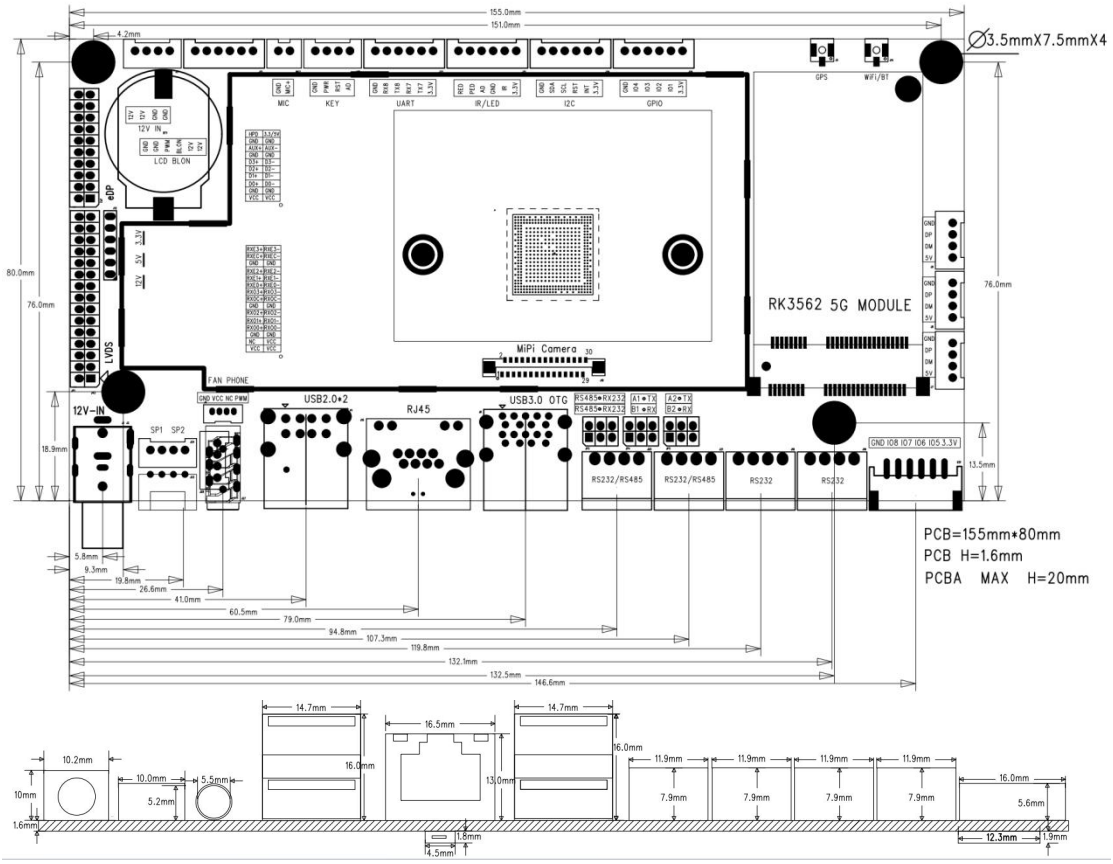
3.1.Hardware specifications

Operating system	Ubuntu22.04/ android13
Processor cpu	Rockchip rk3562 (22nm process technology) Arm quad-core 64-bit processor with a maximum clock speed of 2.0ghz
Graphics processing unit gpu	Arm g52 2ee gpu Supports opengl es 1.1/2.0/3.2, opencl 2.0, and vulkan 1.1, with built-in high-performance 2d acceleration hardware
Neural network processor (npu)	Built-in neural network processor (npu) with powerful ai computing performance: Supports in4/in8/int16/fp16 operations with a performance of up to 1.0tops. Supports models including caffe, mxnet, tensorflow, tf lite, onnx, and darknet. Provide ai development component package
Internal storage ddr	Lpddr4 4gb (4g/8g optional)
Memory	Emmc 32gb (available in 32 gb, 64 gb, 128 gb, or 256 gb options)
Network	Supports 10/100m ethernet and ethernet
	Supports 2.4ghz and wi-fi 802.11b/g/n/ac protocols (wifi 5/6 optional)
	Supports bluetooth functionality, including v2.1+edr, bluetooth 3.0, bluetooth 3.0+hs, bluetooth 4.1, and ble (optional)
	Supports 4g/5g (optional)
Gps navigation	Onboard gps/bd module (optional)
Picture orientation	Supports manual rotation at 0°,90°,180°, and 270°, and gravity-sensing auto-screen rotation (optional)
Display interface	1. Edp (edp1.3 supports 2560*1600 resolution at 60fps), 3.3v/5v power supply (optional) 1 lvds (dual-channel, 6/8-bit), 1080p 60fps output, 3.3v/5v/12v power supply 1*mipi (supports 2560*1600 resolution and 60fps output)
Board mounted backlight control	2*12v backlight power supply
Audio frequency	1*speaker output (2*18w 4r) 1*earpiece output 2*microphone input
Camera	1* mipi camera input, supports 500w/1300w resolution (optional) Supports usb camera (optional)

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RTC	Built-in real-time clock power battery with on/off timer
USB	6*usb-2.0 host , 1*usb3.0/otg
Pcie	1*mini pcie (for 4g/5g lte)
Sim	1*sim card slot for mini pcie expansion of 4g/5g lte modules
Infrared	1* infrared receiver, supports infrared remote control
Led	1* power status led (red), 1* system led (blue, default flashing)
Key	1*reset button, 1*power button, 1*upgrade button
Gorge line	2×rs232,2×rs232/rs485 (with jumper selection), 2×uart ttl
Io mouth	8* io ports, supporting input or output
I2c port	1i2c port
Ad mouth	1*ad port
Power input	Dc12v/5.5mm core, 2.1mm dc head, 2a-5a (requires surge voltage below 18v and ripple voltage below 100mv), supports automatic startup upon power-up or startup via power button
Working temperature	-10 to 70 degrees
Storage temperature	-20 to 70 degrees
Storage humidity	10%-80%
Mainboard size	155mm*80mm*20mm
Multi-media	Supports 1080p 60fps h.264 video decoding Supports 1080p 60fps h.264 video encoding Supports 13m isp and hdr
Linguistic support	Multilingual
System management	The native ubuntu system with root access for custom product development
	Real-time remote monitoring, automatic recovery after system crashes, 24/7 unattended operation
	Enable wi-fi display
System watchdog	Support software watchdog

3.2.Structure size



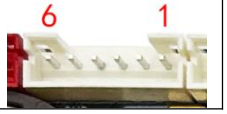
3.3.Power input

The 12V IN JACK power input interface features a 2.0mm socket spacing.

order number	definition	attribute	description	
1	GND	earth wire	earth wire	
2	GND	earth wire	earth wire	
3	12V_IN	import	12V power input	
4	12V_IN	import	12V power input	

3.4.screen backlight

The LCD backlight jack (BL JACK) has a socket spacing of 2.0mm.

order number	definition	attribute	description	
1	12V	output	12V output	
2	12V	output	12V output	
3	LCD-BLON	output	backlight control	
4	LCD-ADJ	output	backlight adjustment	
5	GND	earth wire	earth wire	
6	GND	earth wire	earth wire	

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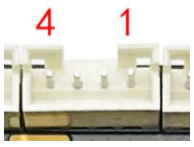
3.5.microphone

The microphone jack socket spacing is 2.0mm.

order number	definition	attribute	description	
1	MIC+	import	MIC positive input	
2	MIC-	import	MIC negative input	

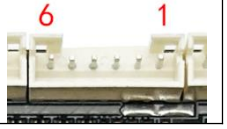
3.6.key

The key jack socket spacing is 2.0mm.

order number	definition	attribute	description	
1	AD	import	AD (Upgrade) button input	
2	RST	import	RESE reset button	
3	PWR	import	Power on key	
4	GND	earth wire	earth wire	

3.7.UART

The UART TTL JACK connector has a 2.0mm pin spacing.

order number	definition	attribute	description	
1	3.3V	output	3.3V voltage output	
2	TX7 (3.3V level)	output	Send (TX7)	
3	RX7 (3.3V level)	import	Receive (RX7)	
4	TX8 (3.3V level)	output	Send (TX8)	
5	RX8 (3.3V level)	import	Receive (RX8)	
6	GND	earth wire	earth wire	

3.8.LED/ remote control

LED/IR IN JACK socket spacing: 2.0mm

order number	definition	attribute	description

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1	3.3V	output	3.3V voltage output	
2	IR	import	receive	
3	GND	earth wire	earth wire	
4	ADC (1.8V level)	import	AD check	
5	LEDR	output	power light	
6	LEDG	output	system indicator light	

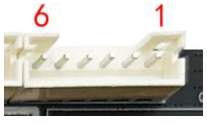
3.9.I2C

The I2C interface (I2C JACK) has a pin spacing of 2.0mm.

order number	definition	attribute	description	
1	3.3 V	output	3.3V voltage output	
2	INT (3.3V level)	import	external device interrupt	
3	RST (3.3V level)	output	External device reset	
4	SCL (3.3V level)	output	clock	
5	SDA (3.3V level)	output	data	
6	GND	earth wire	earth wire	

3.10. GPIO

The spacing between the GPIO jack sockets is 2.0mm.

order number	definition	attribute	description	
1	3.3V	output	3.3V voltage output	
2	IO1 (3.3V level)	import	Default high level	
3	IO2 (3.3V level)	import	Default high level	
4	IO3 (3.3V level)	import	Default low level	
5	IO4 (3.3V level)	import	Default low level	
6	GND	earth wire	earth wire	

The spacing between the GPIO jack sockets is 2.0mm.

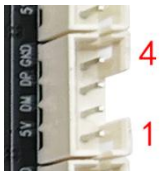
order number	definition	attribute	description

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1	3.3V	output	3.3V voltage output	
2	IO5 (3.3V level)	import	Default high level	
3	IO6 (3.3V level)	import	Default high level	
4	IO7 (3.3V level)	import	Default low level	
5	IO8 (3.3V level)	import	Default low level	
6	GND	earth wire	earth wire	

3.11. USB2.0

The USB2.0-HOST jack features a 2.0mm socket spacing.

order number	definition	attribute	description	
1	5V	output	5V voltage output	
2	DM	import	DM-	
3	DP	import	DP+	
4	GND	earth wire	earth wire	

3.12. RS232

The RS232 interface (RS232 JACK) has a socket spacing of 2.0mm.

order number	definition	attribute	description	
1	3.3V/5V	output	3.3V/5V voltage output	
2	TX4	output	Send (TX4)	
3	RX4	import	Receive (RX4)	
4	GND	earth wire	earth wire	

The RS232 interface (RS232 JACK) has a socket spacing of 2.0mm.

order number	definition	attribute	description	
1	3.3V/5V	output	3.3V/5V voltage output	
2	TX2	output	Send (TX2)	
3	RX2	import	Receive (RX2)	
4	GND	earth wire	earth wire	

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3.13. RS232/RS485

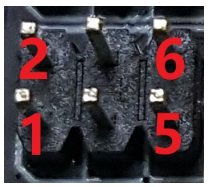
The RS232/RS485 interface jack has a 2.0mm spacing between its sockets.

order number	definition	attribute	description	
1	3.3V/5V	output	3.3V/5V voltage output	
2	TX6/A2	output	Send (TX6/A2)	
3	RX6/B2	import	Receive (RX6/B2)	
4	GND	earth wire	earth wire	

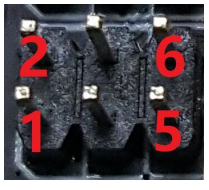
The RS232/RS485 interface jack has a 2.0mm spacing between its sockets.

order number	definition	attribute	description	
1	3.3V/5V	output	3.3V/5V voltage output	
2	TX5/A1	output	Send (TX5/A1)	
3	RX5/B1	import	Receive (TX5/B1)	
4	GND	earth wire	earth wire	

RS232/RS485 jumper cap (JACK) with 2.0mm socket spacing

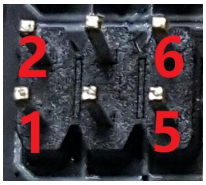
order number	definition	attribute	description	
1	RS485-RX5	data	data	
2	RS485-RX6	data	data	
3	RX5	data	data	
4	RX6	data	data	
5	RS232-RX5	data	data	
6	RS232-RX6	data	data	

RS232/RS485 jumper cap (JACK) with 2.0mm socket spacing

order number	definition	attribute	description	
1	RS485-B1	data	data	
2	RS485-A1	data	data	
3	RX5/B1-COM	data	data	
4	TX5/A1-COM	data	data	
5	RX5	data	data	
6	TX5	data	data	

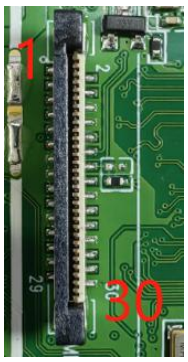
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RS232/RS485 jumper cap (JACK) with 2.0mm socket spacing

order number	definition	attribute	description	
1	RS485-B2	data	data	
2	RS485-A2	data	data	
3	RX6/B2-COM	data	data	
4	TX6/A2-COM	data	data	
5	RX6	data	data	
6	TX6	data	data	

3.14. MiPi Camera

MiPi Camera JACK interface socket spacing: 0.5mm

order number	definition	attribute	description	
1	NC	barefoot	barefoot	
2	VDD28	source	2.8V output	
3	VDD13	source	1.3V output	
4	VDD18	source	1.8V output	
5	NC	barefoot	barefoot	
6	GND	earth wire	earth wire	
7	VDD28	source	2.8V output	
8	GND	earth wire	earth wire	
9	SDA	output	data	
10	SCL	output	clock	
11	RST	output	reset	
12	PWDN	output	enable bit	
13	GND	earth wire	earth wire	
14	MLCK	output	clock	
15	GND	earth wire	earth wire	
16	DP3	output	data	
17	DN3	output	data	
18	GND	earth wire	earth wire	
19	DP2	output	data	
20	DN2	output	data	
21	GND	earth wire	earth wire	
22	DP1	output	data	
23	DN1	output	data	

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24	GND	earth wire	earth wire	
25	CLKP	output	clock	
26	CLKN	output	clock	
27	GND	earth wire	earth wire	
28	DP0	output	data	
29	DN0	output	data	
30	GND	earth wire	earth wire	

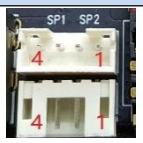
3.15. electric fan

The spacing between the fan jack sockets is 1.25mm.

order number	definition	attribute	description	
1	PWM	output	PWM	
2	NC	barefoot		
3	12V	output	12V/5V	
4	GND	earth wire	earth wire	

3.16. suona

2 speaker output jacks (SPEAKER OUT*2 JACK) with 2.0mm spacing between sockets

order number	definition	attribute	description	
1	LP	output	positive output of left channel	
2	LN	output	Left channel output negative pole	
3	RP	output	Right channel output positive	
4	RN	output	Right channel output negative pole	

3.17. LVDS

The LVDS jack has a socket spacing of 2.0mm.

order number	definition	attribute	description	
1	POWER	output	3.3V/5V/12V	

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2	POWER		power output	
3	POWER			
4	GND			
5	GND			
6	GND	earth wire	earth wire	
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			
14	GND	earth wire	earth wire	
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			
26	GND	earth wire	earth wire	
27	TCLK2-	output	clock	
28	TCLK2+	output	clock	
29	TD2-	output	data	
30	TD2+	output	data	

LVDS LCD JP JACK with 2.0mm pin spacing

order number	definition	attribute	description	
1	12V	output	12V output	
2	LCD-VDD-IN	import	LCD voltage input	
3	5V	output	5V output	
4	LCD-VDD-IN	import	LCD voltage input	
5	3.3V	output	3.3V output	
6	LCD-VDD-IN	import	LCD voltage input	

3.18. eDP

eDP LCD jack with 2.0mm socket spacing (optional)

order number	definition	attribute	description	
1	VCC	output	3.3V/5V power supply output	
2	VCC	output		
3	GND	earth wire	earth wire	
4	GND	earth wire	earth 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	earth wire	earth wire	
14	GND	earth wire	earth wire	
15	AUX-	output	data	
16	AUX+	output	data	
17	GND	earth wire	earth wire	
18	GND	earth wire	earth wire	
19	3V3	output	3.3V power supply output	
20	HPD	import	HPD test foot	

3.19. MiPi LCD

FPC MiPi LCD jack with 0.3mm spacing between sockets (bottom layer)

order number	definition	attribute	description	
1	LED+	output	backlight anode	
2	LED+			
3	LED+			
4	GND	earth wire	earth wire	
5	LED-	output	backlight anode	
6	LED-			
7	LED-			

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8	LED-			
9	GND	earth wire	earth wire	
10	GND			
11	MiPi2+	output	data	
12	MiPi 2-	output	data	
13	GND	earth wire	earth wire	
14	MiPi 1+	output	data	
15	MiPi 1-	output	data	
16	GND	earth wire	earth wire	
17	MiPi CLK+	output	clock	
18	MiPi CLK-	output	clock	
19	GND	earth wire	earth wire	
20	MiPi 0+	output	data	
21	MiPi 0-	output	data	
22	GND	earth wire	earth wire	
23	MiPi 3+	output	data	
24	MiPi 3-	output	data	
25	GND	earth wire	earth wire	
26	NC	NC	NC	
27	RESET	output	reset	
28	NC	NC	NC	
29	VDDIO1.8V	output	VDD1.8V	
30	VDD3.3V	output	VDD3.3V	
31	VDD3.3V	output	VDD3.3V	

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