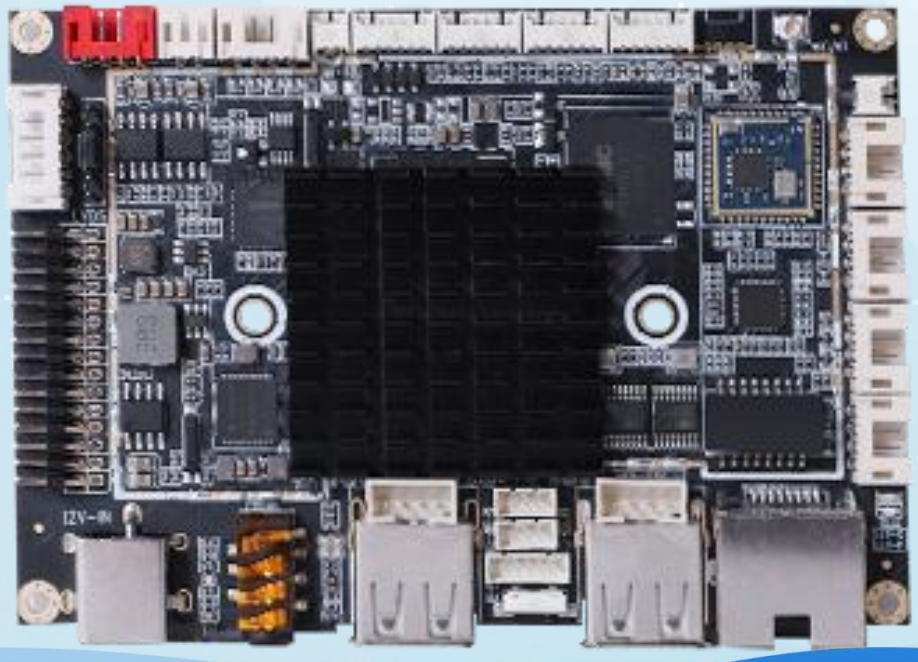
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Industrial Control Board

User Manual

USR-EV208（RK3562）



V2.0

Your Trustworthy Smart Industrial IoT Partner

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1. Product Overview

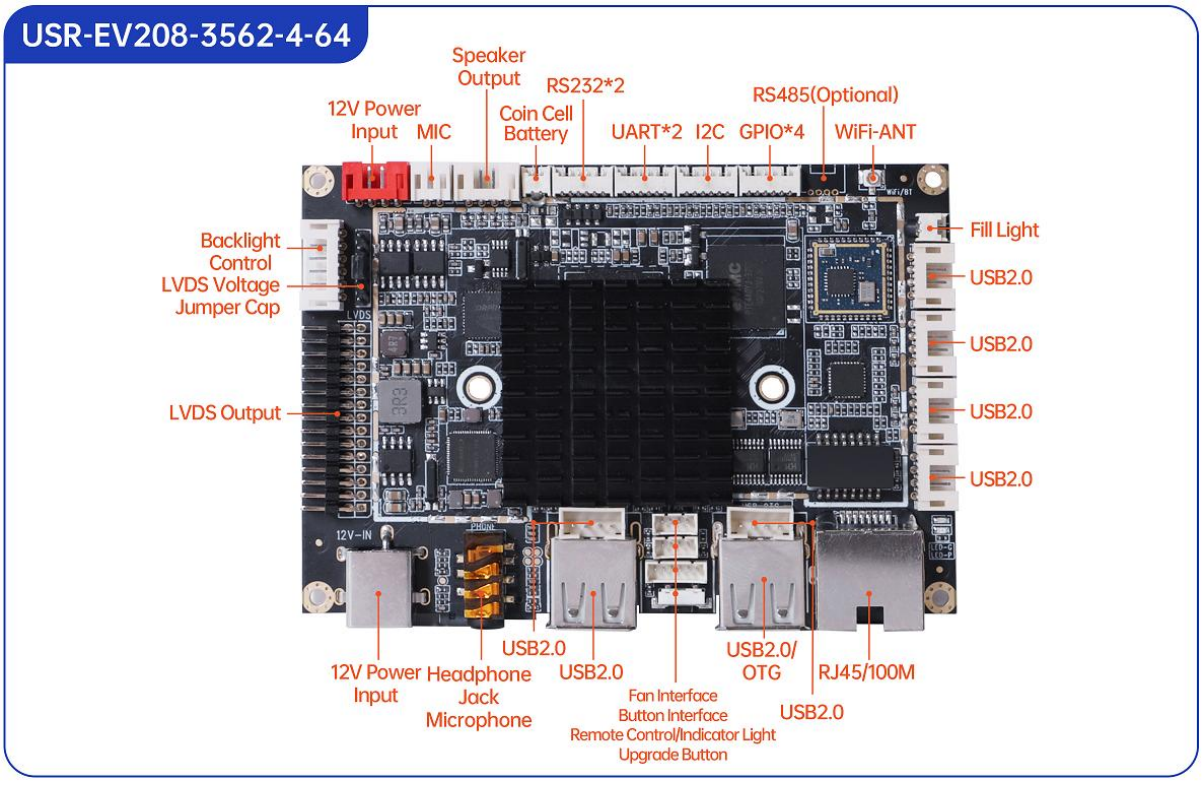
The USR-EV208-3562 high-performance motherboard is powered by Rockchip's RK3562 CPU processor. Featuring a quad-core A53 architecture and 22nm process technology, this ARM v8.2-A compliant 64-bit CPU delivers exceptional computing performance with a clock speed up to 2.0GHz. Its GPU utilizes ARM G52 2EE architecture, while the integrated AI Neural Processing Unit (NPU) achieves 1.0TOPS computational performance, supporting multiple AI development tools and interfaces. The motherboard supports LVDS 1080P output, MIPI display interfaces, Ethernet, WiFi, USB/RS232/IO expansion, I2C expansion, backlighting ports, MIPI camera, and infrared remote control. This cutting-edge quad-core AI chip enhances product capabilities, enabling widespread applications in smart firefighting, construction sites, industrial quality inspection, autonomous vehicles, smart agriculture, AI robots, cloud servers, NVR systems, metaverse, ARM PCs, security, healthcare, transportation, finance, industrial control, education, and retail. With its hardware platform and software intelligence, the motherboard ensures seamless human-machine interaction and network device connectivity in various scenarios.

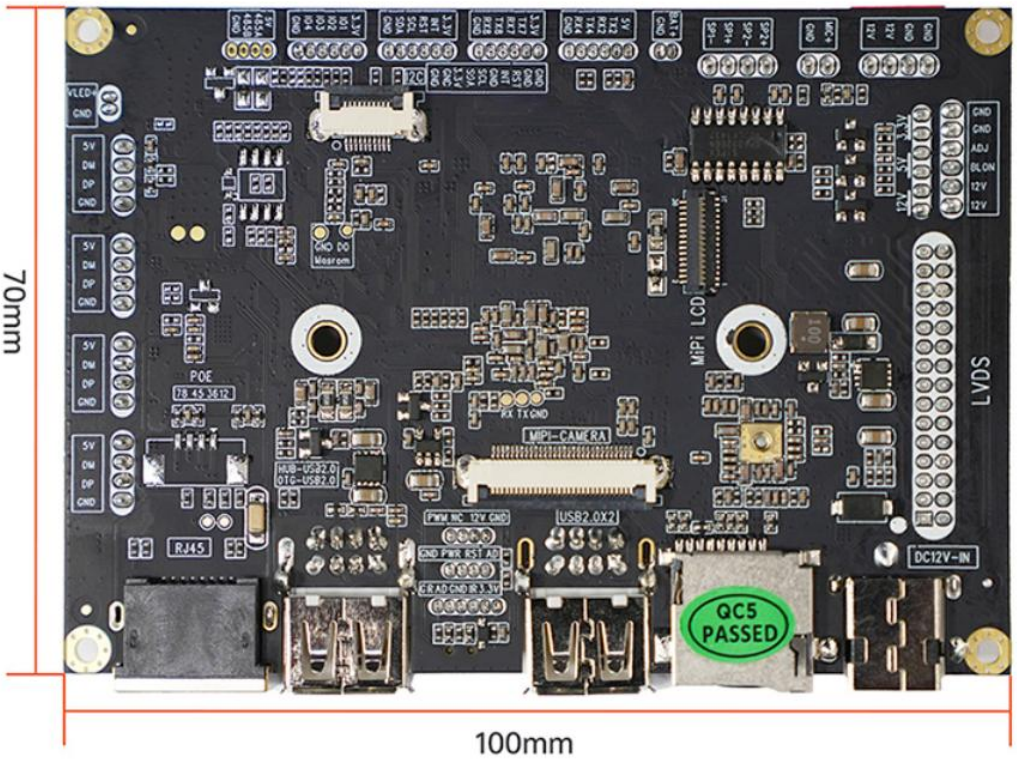
2. Characteristic

- High Performance: The RK3562 is a quad-core 64-bit CPU based on ARM v8.2-A architecture, featuring a quad-core A53 processor and a cutting-edge 22nm process. With a clock speed of up to 2.0GHz, it delivers exceptional general-purpose computing performance. The GPU utilizes ARM G52 2EE, while the CPU integrates an AI neural network processor (NPU) with a computing performance of 1.0 TOPS. It supports multiple AI development tools and interfaces, enabling direct conversion of general models like TensorFlow, Caffe, and MXNet.
- 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, 5W power amplifier, LVDS, MiPi, microphone, flash interface, and gravity sensor, significantly simplifying overall design. Its ultra-thin design also enhances the aesthetic appeal of the device.
- High expandability: Eight USB ports, two RS232 ports, two UART ports, one I2C port, four IO expansion ports, and one AD port, enabling expansion of additional peripheral devices.

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3. Product interface





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3.1.Hardware specifications

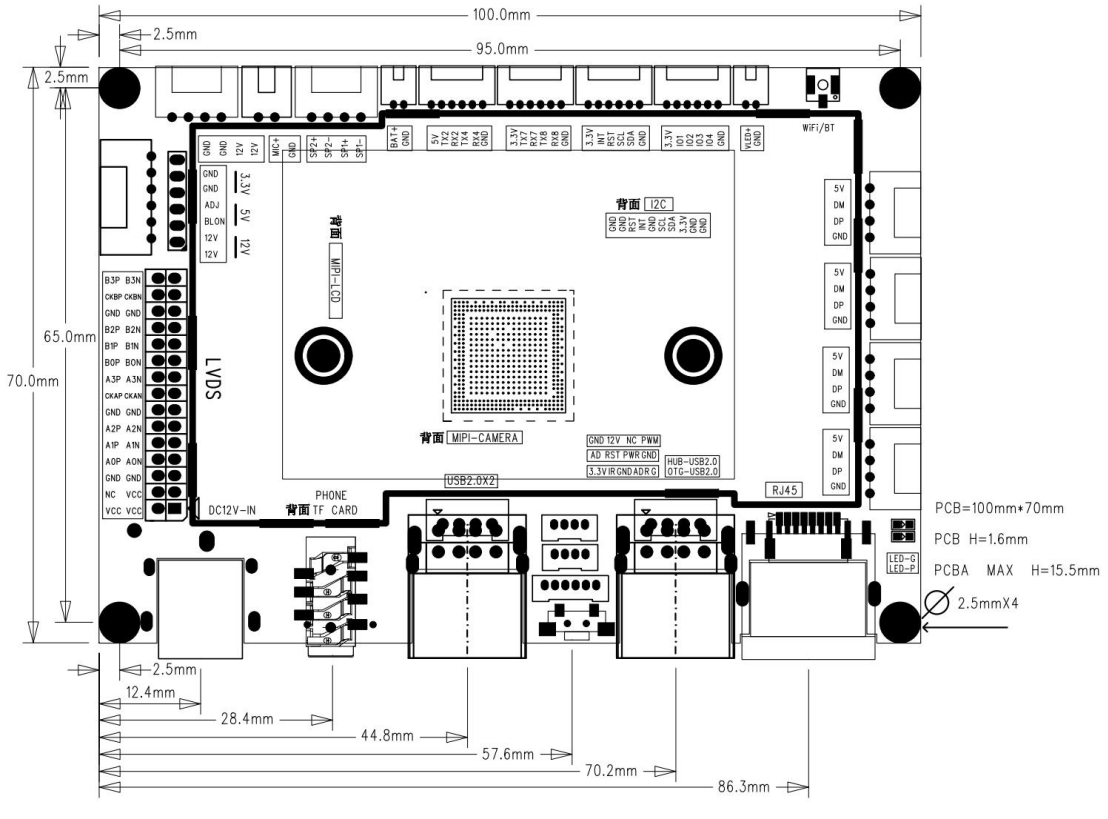
OPERATING SYSTEM	Android 13, Ubuntu 20.04, and others
PROCESSOR CPU	Rockchip RK3562 (22nm process) ARM quad-core 64-bit processor with a maximum clock speed of 2.0 GHz
GRAPHICS PROCESSING UNIT GPU	ARM G52 2EE GPU with built-in high-performance 2D acceleration hardware Supports OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, and Vulkan 1.1
NEURAL NETWORK PROCESSOR (NPU)	Built-in Neural Network Processor (NPU) with powerful AI computing performance: Supports INT4, INT8, INT16, and FP16 operations with a performance of up to 1.0 TOPS. Supports models including Caffe, MXNet, TensorFlow, TF Lite, ONNX, and Darknet. Provide AI development tools: enable rapid model conversion.
INTERNAL STORAGE DDR	2 GB LPDDR4 (4 GB/8 GB optional, up to 8 GB)
MEMORY	eMMC 16 GB (32 GB/64 GB/128 GB/256 GB available) TF Card expansion
NETWORK	Supports 10/100M Ethernet port
	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)
PICTURE ORIENTATION	Supports manual rotation at 0°,90°,180°, and 270°, and gravity-sensing auto-screen rotation (optional)
DISPLAY INTERFACE	1 LVDS interface (single/dual-channel, 6-bit/8-bit), supporting 1080P 60fps output Supports 3.3V/5V/12V power supply 1*MiPi interface (supports MiPi 2560*1600 60fps output)
BOARD MOUNTED BACKLIGHT CONTROL	12V backlight power supply
AUDIO FREQUENCY	1*Speaker output (2*5W 8R) 1*earpiece output 2*Microphone input
CAMERA	1* MIPI camera input, supports 500W/1300W resolution (optional) Supports USB camera (optional)
RTC	External real-time clock power battery with on/off timer
USB	7*USB2.0 HOST , 1*USB2.0 OTG
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

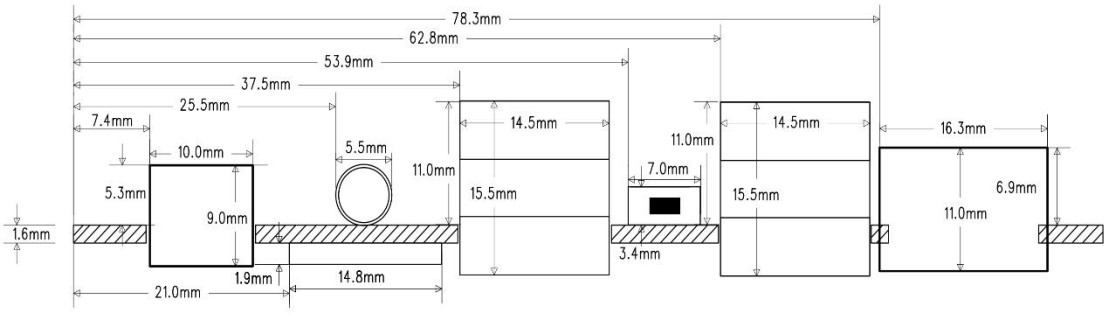
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GORGE LINE	2*RS232 ,2*UART TTL
IO MOUTH	4* IO ports, supporting input or output
I2C PORT	1*I2C 1.25mm 4-pin port/FPC 10-pin
AD MOUTH	1*AD port
FILL LIGHT INTERFACE	1*Fill light interface (5V/12V optional, for controlling high-current devices such as fill lights and cash registers), maximum current 3A
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	100mm*70mm*15.5mm
MULTI-MEDIA	Supports 1080P 60fps H.264 video decoding Supports 1080P 60fps H.264 video encoding Supports 13M ISP and HDR
LINGUISTIC SUPPORT	Multilingual
TYPEWRITING	Standard Android keyboard with optional third-party input methods (Chinese, Korean, Japanese, etc.)
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
	Supports OTA remote upgrades
	Enable Wi-Fi display
SYSTEM WATCHDOG	support software watchdog

3.2.Structure size

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3.3.Power input

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

No.	definition	attribute	description	
1	12V_IN	import	12V power input	
2	12V_IN	import	12V power input	
3	GND	earth wire	earth wire	
4	GND	earth wire	earth wire	

3.4.Screen backlight

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

No.	definition	attribute	description	
1	GND	output	earth wire	
2	GND	output	earth wire	

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3	LCD-ADJ	output	backlight adjustment	
4	LCD-BLON	output	backlight control	
5	12V	earth wire	12V output	
6	12V	earth wire	12V output	

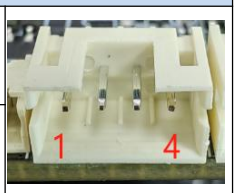
3.5.Microphone

The microphone jack socket spacing is 2.0mm.

No.	definition	attribute	description	
1	GND	earth wire	GND	
2	MIC+	import	MIC positive input	

3.6.suona

The speaker output jack socket spacing is 2.0mm.

No.	definition	attribute	description	
1	LP	output	Left channel output negative pole	
2	LN	output	positive output of left channel	
3	RP	output	Right channel output negative pole	
4	RN	output	Right channel output positive	

3.7.RTC cell

The battery jack (BAT JACK) has a socket spacing of 1.25mm.

No.	definition	attribute	description	
1	GND	earth wire	GND	
2	BAT+	import	BAT positive input	

3.8.Backlight

The distance between the two sockets of the backlight jack (BL JACK) is 1.25mm.

No.	definition	attribute	description	
1	GND	earth wire	GND	

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2	VLED	output	12V power output	

3.9.RS232

The RS232 (RS232 JACK) socket spacing is 1.25mm.

No.	definition	attribute	description	
1	GND	earth wire	earth wire	
2	RX4	import	Receive (RX4)	
3	TX4	output	Send (TX4)	
4	RX2	import	Receive (RX2)	
5	TX2	output	Send (TX2)	
6	5V	output	5V voltage output	

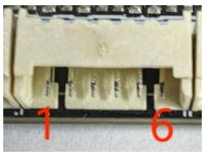
3.10. UART

UART serial port (UART-JACK) with 1.25mm pin spacing

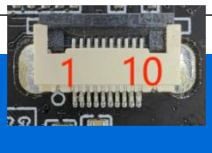
No.	definition	attribute	description	
1	GND	earth wire	earth wire	
2	RX8	import	Receive (RX8)	
3	TX8	output	Send (TX8)	
4	RX7	import	Receive (RX7)	
5	TX7	output	Send (TX7)	
6	3.3V	output	3.3V voltage output	

3.11. I2C

The I2C interface (I2C JACK) has a pin pitch of 1.25mm.

No.	definition	attribute	description	
1	GND	earth wire	earth wire	
2	SDA (3.3V level)	output	data	
3	SCL (3.3V level)	output	clock	
4	RST (3.3V level)	output	External device reset	
5	INT (3.3V level)	import	external device interrupt	
6	3.3 V	output	3.3V voltage output	

FPC I2C interface (I2C JACK) with 0.5mm spacing between sockets (bottom layer)

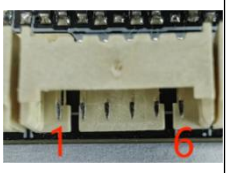
No.	definition	attribute	description	
1	GND	earth wire	earth wire	

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2	GND	earth wire	earth wire	
3	3.3V	output	3.3V voltage output	
4	SDA	output	data	
5	SCL	output	clock	
6	GND	earth wire	earth wire	
7	INT	import	external device interrupt	
8	RST	output	External device reset	
9	GND	earth wire	earth wire	
10	GND	earth wire	earth wire	

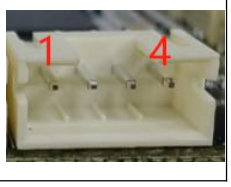
3.12. GPIO

The spacing between the GPIO jack sockets is 1.25mm.

No.	definition	attribute	description	
1	GND	earth wire	earth wire	
2	IO4 (3.3V level)	import	Default low level	
3	IO3 (3.3V level)	import	Default low level	
4	IO2 (3.3V level)	import	Default high level	
5	IO1 (3.3V level)	import	Default high level	
6	3.3V	output	3.3V voltage output	

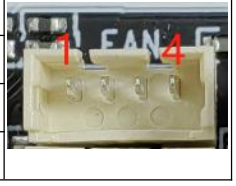
3.13. USB2.0

The USB 2.0 HOST jack features a 2.0mm socket spacing.

No.	definition	attribute	description	
1	GND	earth wire	earth wire	
2	DP	import	DP+	
3	DM	import	DM-	
4	5V	output	5V voltage output	

3.14. electric fan

Fan jack with 1.25mm spacing

No.	definition	attribute	description	
1	GND	earth wire	earth wire	
2	12V	output	12V/5V	
3	NC	barefoot		
4	PWM	output	PWM	

3.15. key

The key jack socket has a spacing of 1.25mm between its bases.

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No.	definition	attribute	description	
1	AD	import	AD (Upgrade) button input	
2	RST	import	RESET button	
3	PWR	import	Power on key	
4	GND	earth wire	earth wire	

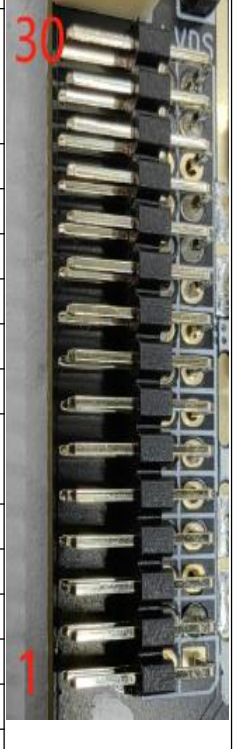
3.16. LED/ remote control

LED/IR IN JACK with 1.25mm socket spacing

No.	definition	attribute	description	
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	

3.17. LVDS

The LVDS jack has a socket spacing of 2.0mm.

No.	definition	attribute	description	
1	POWER	output	3.3V/5V/12V power output	
2	POWER			
3	POWER			
4	GND	earth wire	earth wire	
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	earth wire	earth wire	
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	

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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

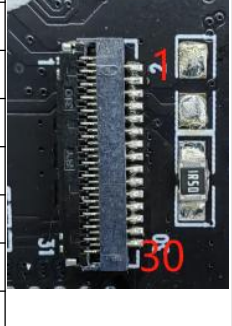
No.	definition	attribute	description	
1	12V	output	12V output	
2	LCD-VDD-IN	import	LCD voltage input	
3	5V	output	5V output	
4	LCD-VDD-IN	import	LCD voltage input	
5	3．3V	output	3．3V output	
6	LCD-VDD-IN	import	LCD voltage input	



3.18. FPC MiPi LED

FPC MiPi LED interface (FPC MiPi LCD JP JACK) with 0.3mm spacing between sockets (bottom layer)

No.	definition	attribute	description	
1	LED+	output	backlight anode	
2	LED+	output	backlight anode	
3	LED+	output	backlight anode	
4	GND	earth wire	earth wire	
5	LED-	output	backlight anode	
6	LED-	output	backlight anode	
7	LED-	output	backlight anode	
8	LED-	output	backlight anode	
9	GND	earth wire	earth wire	
10	GND	earth wire	earth wire	
11	MiPi 2+	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 LCK+	output	clock	
18	MiPi LCK-	output	clock	



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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	

3.19. MIPI Camera

MIPI Camera jack spacing: 0.5mm (bottom layer)

No.	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	

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