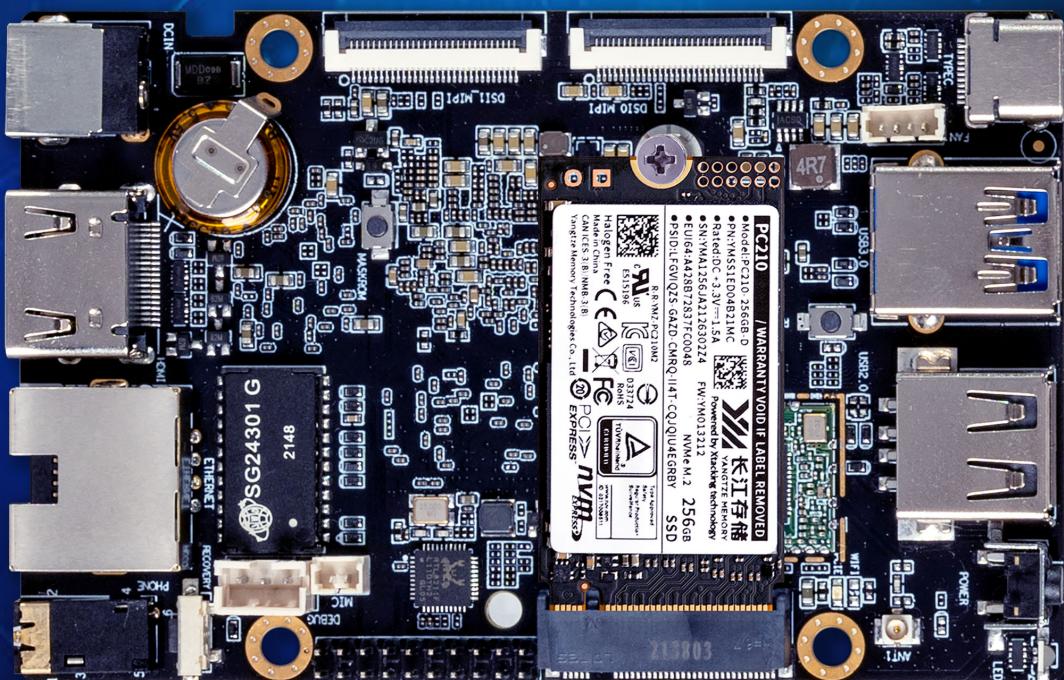




ROC-RK3588S-PC

V1.0

8-Core 8K AI Mainboard



T-CHIP INTELLIGENCE TECHNOLOGY CO., LTD.

www.t-firefly.com

| Update history

Version	Date	Details
V0.1	2022-5-20	initial version
V1.0	2022-6-15	Interface Updates

Overview

Powered by Rockchip RK3588S new-gen 8-core 64-bit processor, the main board can be configured with up to 32GB RAM. Capable of 8K video encoding and decoding, it provides abundant interfaces, supporting NVMe SSD expansion; It supports various operating systems. This mainboard can be used in edge computing, Artificial Intelligence, cloud computing, VR and AR.

RK3588S a new generation of high-end processor

RK3588S is Rockchip's new-gen flagship AIoT SoC with 8nm lithography process. Equipped with 8-core 64-bit CPU, it has frequency up to 2.4GHz. Integrated with ARM Mali-G610 MP4 quad-core GPU and built-in AI accelerator NPU, it provides 6Tops computing power and supports mainstream deep learning frameworks. The powerful RK3588S can deliver more optimized performance in various AI application scenarios.

8nm
Lithography Process 8-Core
big.LITTLE Architecture 2.4GHz
Frequency 6Tops
Computing Power

8K video encoding and decoding

The mainboard supports 8K@60fps H.265/VP9 video decoding and 8K@30fps H.265/H.264 video encoding, and also supports encoding and decoding simultaneously — up to 32-channel 1080P@30fps decoding and 16-channel 1080P@30fps encoding can be achieved. The strong video encoding and decoding capability makes 8K HD display and delicate picture quality available.

Super-large 32GB RAM

Up to 32GB of super-large RAM can be configured, which exceeds the limit of the previous RAM and delivers a faster response speed. It can meet the application requirements of products with large RAM and large storage.

RK3588S	32GB
RK3568	8GB
RK3399	4GB

Multi-channel input and output

It supports HDMI 2.1 8K video output, USB-C (DP1.4) and dual MIPI-DSI multi-channel video output — up to four-screen output with different displays can be achieved. Dual MIPI-CSI camera input is also supported.

Strong network communication capability

On-board 1000Mbps RJ45 Ethernet, 2.4GHz/5GHz dual-band WiFi and Bluetooth 4.2 are supported. This powerful network communication capability makes data transmission more stable and faster.



NVMe SSD, Massive capacity

The on-board M.2 PCIe2.0 (1Lane) interface can be connected with 2242 NVMe SSD mass storage devices, which makes it a reality that the device can be easily expanded with TB storage capacity.



Support various operating systems

Android 12.0, Ubuntu Desktop version and Server version, Debian11, Buildroot, Kylin and UOS are supported. It supports RTLinux, delivering excellent real-time performance. UEFI Boot is also available. The reliable operation provides a safe and stable system environment for product research and production.



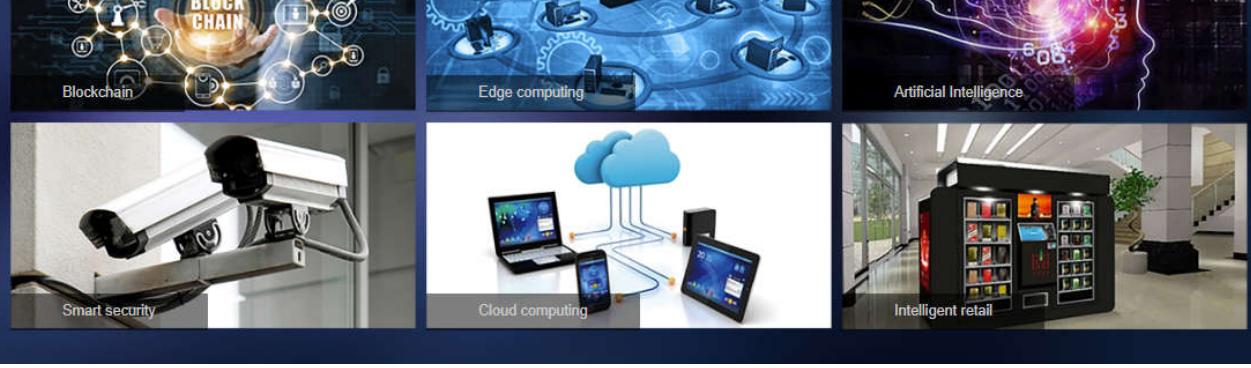
Abundant resources

SDK, tutorials, tech docs and dev tools are provided, making development simpler and more convenient.



A wide range of applications

The mainboard can be widely used in edge computing, Artificial Intelligence, cloud computing, VR/AR, blockchain, smart security, smart home, intelligent retail and smart industry.



Specification

Basic Specifications

SOC	RockChip RK3588S
CPU	8-core 64-bit (4×Cortex-A76+4×Cortex-A55), 8nm lithography process, frequency up to 2.4GHz
GPU	ARM Mali-G610 MP4 quad-core GPU Support OpenGL ES3.2 / OpenCL 2.2 / Vulkan1.1, 450 GFLOPS
NPU	NPU computing power up to 6 TOPS, Support INT4/INT8/INT16 mixed operation, Support framework switching of TensorFlow / MXNet / PyTorch / Caffe
ISP	Integrated 48MP ISP with HDR&3DNR
VPU	Video decoding: 8K@60fps H.265/VP9/AVS2 8K@30fps H.264 AVC/MVC 4K@60fps AV1 1080P@60fps MPEG-2/-1/VC-1/VP8 Video encoding: 8K@30fps encoding, support H.265 / H.264 *Achieve up to 32-channel 1080P@30fps decoding and 16-channel 1080P@30fps encoding
RAM	4GB/8GB/16GB 64bit LPDDR4/LPDDR4x/LPDDR5 (Up to 32GB optional)
Storage	16GB/32GB/64GB/128GB eMMC
Storage Expansion	1 × M.2 (PCIe2.0), can expand with 2242 NVMe SSD, 1 × TF Card

Hardware Specifications

Wireless	Support 2.4GHz, 5GHz dual-band WiFi, 802.11 a/b/g/n/ac protocol Support Bluetooth 4.2 (BLE)
Ethernet	1 × 1000Mbps Ethernet (RJ45)
Display	1 × HDMI2.1 (8K@60fps or 4K@120fps) 2 × MIPI-DSI (4K@60fps) 1 × DP1.4 (8K@30fps) *Achieve up to four-screen output with different displays
Camera	2 × 2 lane MIPI-CSI input or 1×4 lane MIPI-CSI
Audio	Audio output: 1 × 3.5mm audio jack 1 × HDMI2.1 audio output 1 × DP1.4 audio output Audio input: 1 × Line-In input 1 × Mic input (2P-1.25mm)
PCIE	1 × M.2 (PCIe2.0), can expand with 2242 PCIe2.0 NVMe SSD
USB	1 × USB3.0 (Limit 1A) 3 × USB2.0 (Limit 500mA) (2 of them are connected to 20 pin header) 1 × USB-C multi-function interface (USB3.0 OTG / DP1.4) (Limit 2A)
Other Interfaces	1 × Fan (5V/4P-1.25mm) 1 × Debug (3P-2.0mm) 1 × 20P-2.0mm pin header (LINE-OUT, 2×USB2.0, UART, SPI, GPIO, ADC, VCC (5V/3.3V/1.8V))
Power	DC12V voltage input (DC5.5×2.1mm)

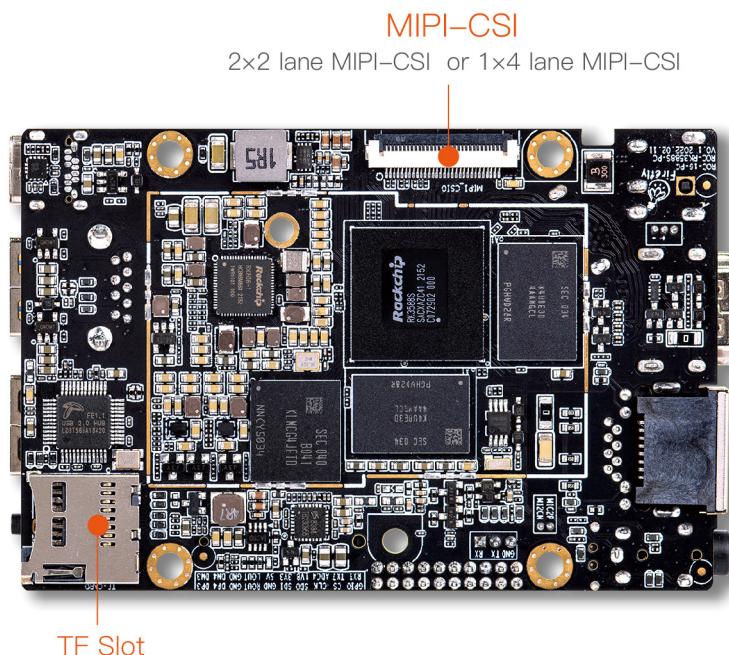
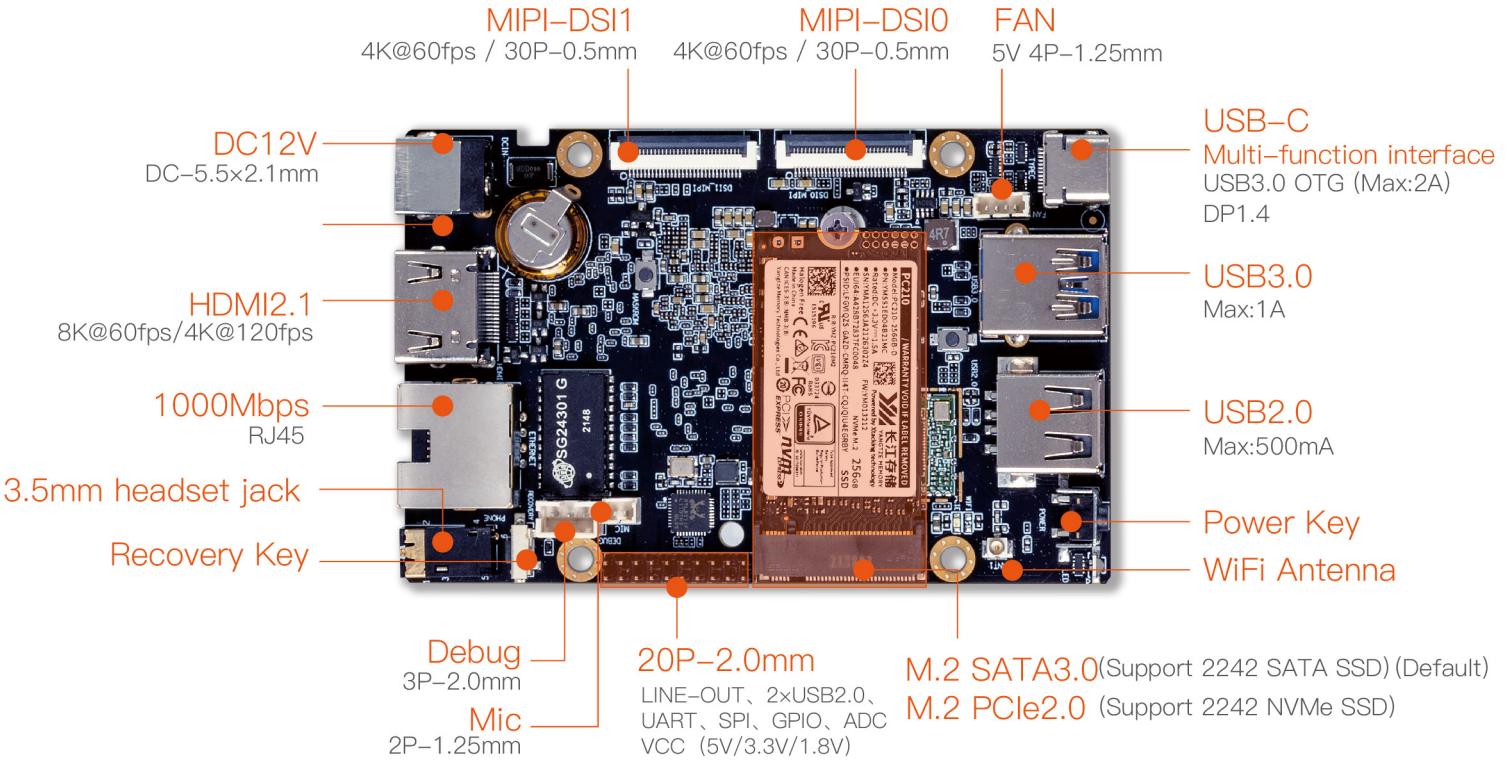
OS/Software

OS	Android: Android 12.0 Linux: Ubuntu Desktop, Ubuntu Server, Debian11, Buildroot, RTLinux Kylin Linux, UOS, etc. *Supports UEFI Boot
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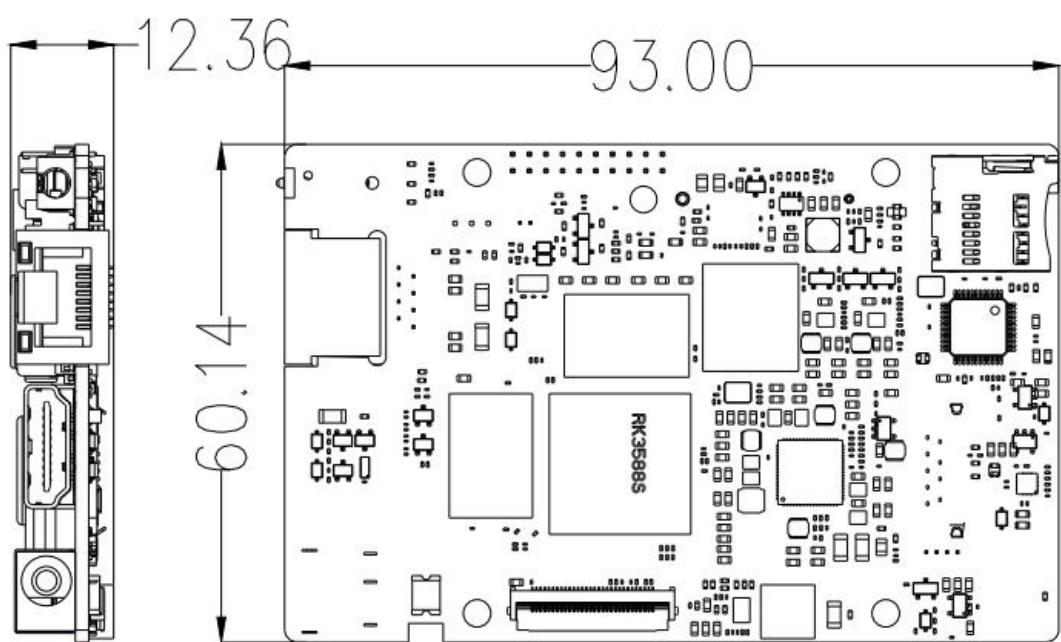
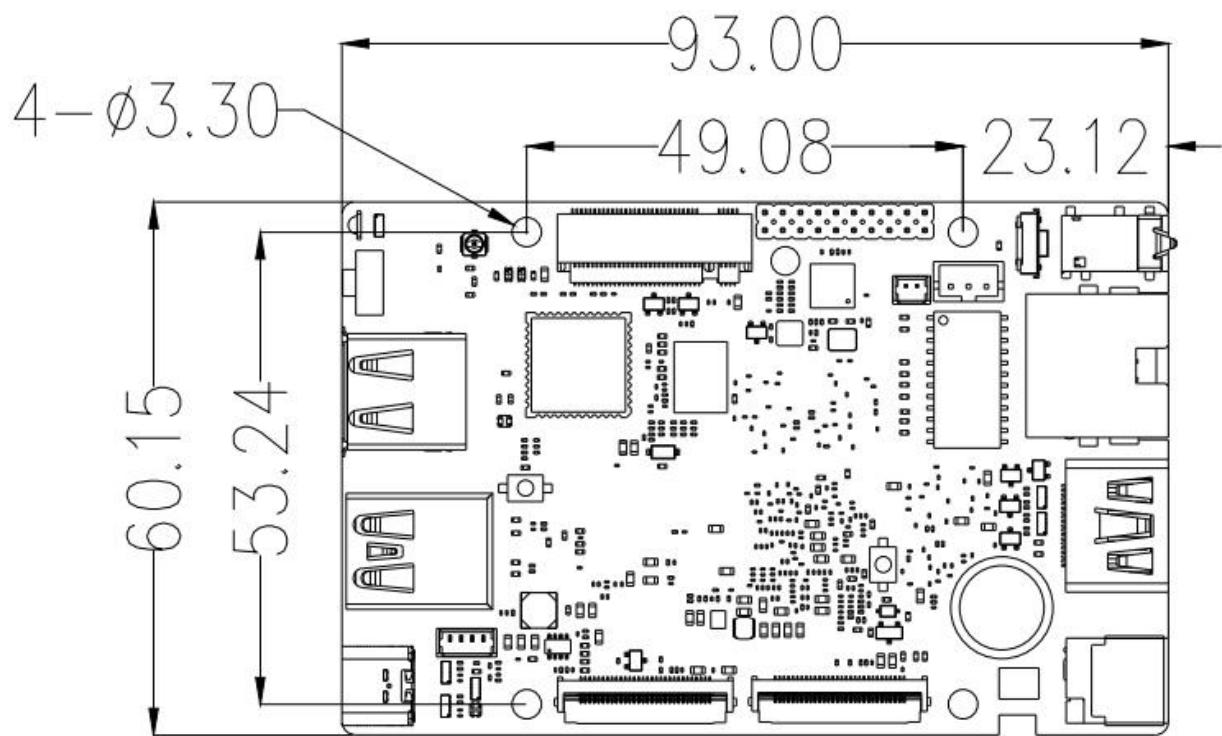
General

Size	90mm × 60mm
Weight	≈50g (no peripheral devices)
Power Consumption	Idle: ≈0.42W (12V/35mA) Typical: ≈2.25W (12V/190mA) Max: ≈12W (12V/1000mA)
Environment	Operating Temperature: -20°C ~ 60°C Storage Temperature: -20°C ~ 70°C Storage Humidity: -40% ~ 70 %

Interface



Dimension



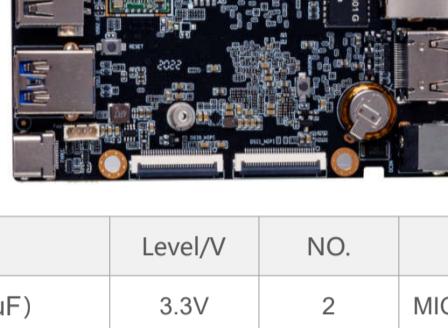
Interface Definition

1. (J27) DEBUG 3 PIN 2.0mm Pitch wafer Pitch (white)



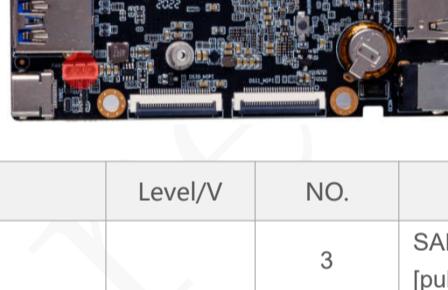
NO.	Definition	Level/V	NO.	Definition	Level/V
1	UART2_RXD (System Debug)	3.3V	3	GND	
2	UART2_TXD (System Debug)	3.3v			

2. (J44) MIC(with bias) 2 PIN 1.25mm Pitch wafer Pitch (white)



NO.	Definition	Level/V	NO.	Definition	Level/V
1	MIC2P (series capacitor 1uF)	3.3V	2	MIC2N (series capacitor 1uF)	3.3V

3. (J3) FAN 4 PIN 1.25mm Pitch wafer Pitch (white)



NO.	Definition	Level/V	NO.	Definition	Level/V
1	GND		3	SARADC_VIN2 [pull up resistance 10k]	1.8V
2	VCC5V0_SYS (5.0V Output)	5.0V	4	PWM1_CONN (PWM11_IR_M3) [GPIO3_D5]	5.0V

4. (J1) (15X2) 20 PIN 2.0 Pitch Extended Interface



NO.	Definition	Level/V	NO.	Definition	Level/V
1	HUB_HOST_DM3	3.3V	2	HUB_HOST_DP3	3.3V
3	HUB_HOST_DM4	3.3V	4	HUB_HOST_DP4	3.3V
5	GND		6	GND	
7	LOUT1	3.3V	8	ROUT1	3.3V
9	VCC5V0_SYS (5.0V Output)	5.0V	10	I2C3_SDA_M0 / GND	3.3V
11	VCC_3V3_S3 (3.3V Output)	3.3V	12	SPI1_MISO_M2 (GPIO1_D0)	1.8V
13	I2C3_SCL_M0 /VCC_1V8_S3	3.3V/1.8V	14	SPI1_MOSI_M2 (GPIO1_D1)	1.8V
15	SARADC_VIN4	1.8V	16	SPI1_CLK_M2 (GPIO1_D2)	1.8V
17	UART7_TX_M2 (GPIO1_B5)	3.3V	18	SPI1_CS0_M2 (GPIO1_D3)	1.8V
19	UART7_RX_M2 (GPIO1_B4)	3.3V	20	GPIO3_C6_u	1.8V

5、(J5405) M-KEY PCIE Interface



NO.	Definition	Level/V	NO.	Definition	Level/V
1	GND		2	VCC3V3_PCIE (3.3V Output)	3.3V
3	GND		4	VCC3V3_PCIE (3.3V Output)	3.3V
5	NC		6	NC	
7	NC		8	NC	
9	GND		10	DAS/DSS	3.3V
11	NC		12	VCC3V3_PCIE (3.3V Output)	3.3V
13	NC		14	VCC3V3_PCIE (3.3V Output)	3.3V
15	GND		16	VCC3V3_PCIE (3.3V Output)	3.3V
17	NC		18	VCC3V3_PCIE (3.3V Output)	3.3V
19	NC		20	NC	
21	GND		22	NC	
23	NC		24	NC	
25	NC		26	NC	
27	GND		28	NC	
29	NC		30	NC	
31	NC		32	NC	
33	GND		34	NC	
35	NC		36	NC	
37	NC		38	DEVSLP [pull up resistance 10k]	3.3V
39	GND		40	NC	
41	PCIE20_0_RXN	1.8V	42	NC	
43	PCIE20_0_RXP	1.8V	44	NC	
45	GND		46	NC	
47	PCIE20_0_TXN (series capacitor 0.1uF)	1.8V	48	NC	
49	PCIE20_0_TXP (series capacitor 0.1uF)	1.8V	50	PCIE20x1_2_PERSTn [pull up resistance 10k]	3.3V
51	GND		52	PCIE20x1_2_CLKREQn [pull up resistance 10k]	3.3V
53	PCIE20_0_REFCLKN	1.8V	54	PCIE20x1_2_WAKEn [pull up resistance 10k]	3.3V
55	PCIE20_0_REFCLKP	1.8V	56	NC	
57	GND		58	NC	
59	NC		60	NC	
61	NC		62	VCC3V3_PCIE (3.3V Output)	3.3V
63	GND		64	VCC3V3_PCIE (3.3V Output)	3.3V
65	GND		66	VCC3V3_PCIE (3.3V Output)	3.3V
67	GND				

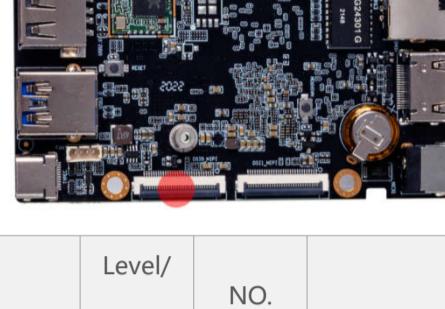
6、(J4701) MIPI CAMERA 30 PIN 0.5 Pitch



NO.	Definition	Level/V	NO.	Definition	Level/V
1	SDA7_CAM (pull up resistance 2.2K) (GPIO3_D3)	1.8V	16	GND	
2	SCL7_CAM (pull up resistance 2.2K) (GPIO3_D2)	1.8V	17	MIPI_CSI0_RX_CLK0P	1.8V
3	MIPI_PDN0_CAM (GPIO3_C1)	1.8V	18	MIPI_CSI0_RX_CLK0N	1.8V
4	MIPI_RESET0_CAM (GPIO3_C4)	1.8V	19	GND	
5	GND		20	MIPI_CSI0_RX_D2P	1.8V
6	MIPI_MCLK1(GPIO3_A6)	1.8V	21	MIPI_CSI0_RX_D2N	1.8V
7	MIPI_PDN1_CAM (GPIO3_B7)	1.8V	22	GND	

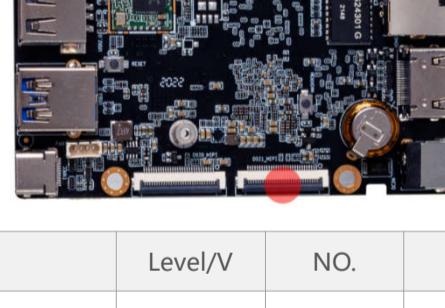
8	MIPI_RESET1_CAM (GPIO3_C5)	1.8V	23	MIPI_CSIO_RX_D3P	1.8V
9	MIPI_MCLK2 (GPIO1_B7)	1.8V	24	MIPI_CSIO_RX_D3N	1.8V
10	GND		25	GND	
11	MIPI_CSIO_RX_D0P	1.8V	26	MIPI_CSIO_RX_CLK1P	1.8V
12	MIPI_CSIO_RX_D0N	1.8	27	MIPI_CSIO_RX_CLK1N	1.8V
13	GND		28	GND	
14	MIPI_CSIO_RX_D1P	1.8	29	VCC5V0_SYS (5.0V Output)	5.0V
15	MIPI_CSIO_RX_D1N	1.8	30	VCC5V0_SYS (5.0V Output)	5.0V

7. (J5200) MIPI_Display_Interface 30 PIN 0.5 Pitch



NO.	Definition	Level/ V	NO.	Definition	Level/V
1	VCC5V0_SYS (5.0V Output)	5.0V	16	MIPI_DPHY0_TX_D0P	1.8V
2	VCC5V0_SYS (5.0V Output)	5.0V	17	MIPI_DPHY0_TX_D0N	1.8V
3	VCC5V0_SYS (5.0V Output)	5.0V	18	GND	
4	GND		19	MIPI_DPHY0_TX_D1P	1.8V
5	NC		20	MIPI_DPHY0_TX_D1N	1.8V
6	VCC_3V3_S3 (3.3V Output)	3.3V	21	GND	
7	I2C_SDA_TP0 (GPIO1_A2) (pull up resistance 2.2K)	3.3V	22	MIPI_DPHY0_TX_CLKP	1.8V
8	I2C_SCL_TP0 (GPIO1_A3) (pull up resistance 2.2K)	3.3V	23	MIPI_DPHY0_TX_CLKN	1.8V
9	LCD0_PWREN_H (GPIO1_B3)	3.3V	24	GND	
10	TP0_INT_L (GPIO1_A7) (pull up resistance 10K)	3.3V	25	MIPI_DPHY0_TX_D2P	1.8V
11	BL0_EN (GPIO3_D4)	3.3V	26	MIPI_DPHY0_TX_D2N	1.8V
12	LCD0_BL_PWM (PWM14_M2) (GPIO1_D6)	3.3V	27	GND	
13	LCD0_RST (GPIO1_A1)	3.3V	28	MIPI_DPHY0_TX_D3P	1.8V
14	TP0_RST_L (GPIO1_B2)	3.3V	29	MIPI_DPHY0_TX_D3N	1.8V
15	GND		30	GND	

8. (J5400) MIPI_Display_Interface 30 PIN 0.5 Pitch



NO.	Definition	Level/V	NO.	Definition	Level/V
1	VCC5V0_SYS (5.0V Output)	5.0V	16	MIPI_DPHY1_TX_D0P	1.8V
2	VCC5V0_SYS (5.0V Output)	5.0V	17	MIPI_DPHY1_TX_D0N	1.8V
3	VCC5V0_SYS (5.0V Output)	5.0V	18	GND	
4	GND		19	MIPI_DPHY1_TX_D1P	1.8V
5	NC		20	MIPI_DPHY1_TX_D1N	1.8V
6	VCC_3V3_S3 (3.3V Output)	3.3V	21	GND	
7	I2C_SDA_TP1 (GPIO4_B0) (pull up resistance 2.2K)	3.3V	22	MIPI_DPHY1_TX_CLKP	1.8V
8	I2C_SCL_TP1 (GPIO4_B1) (pull up resistance 2.2K)	3.3V	23	MIPI_DPHY1_TX_CLKN	1.8V
9	LCD1_PWREN_H (GPIO4_A6)	3.3V	24	GND	
10	TP1_INT (GPIO4_A4) (pull up resistance 4.7K)	3.3V	25	MIPI_DPHY1_TX_D2P	1.8V
11	BL1_EN (GPIO4_A3)	3.3V	26	MIPI_DPHY1_TX_D2N	1.8V
12	LCD1_BL_PWM (PWM13_M1) [GPIO4_B6]	3.3V	27	GND	
13	LCD1_RST (GPIO4_A0)	3.3V	28	MIPI_DPHY1_TX_D3P	1.8V
14	TP1_RST_L (GPIO4_B3) (pull up resistance 4.7K)	3.3V	29	MIPI_DPHY1_TX_D3N	1.8V
15	GND		30	GND	

T-CHIP TECHNOLOGY

Create Value for Customers
Pursue Sustainable Development

About us

T-CHIP focuses on R&D, design, production and sale of open source intelligent hardware, AI, IoT and audio product, and provides the whole solution of intelligent hardware products. T-CHIP is a Independent Design House officially authorized by RockChip and its strategic partner. We have been working closely with RockChip and contributing to embedded electronic industry for over 15 years. “Create Value for Customers, Pursue Sustainable Development” is our philosophy. We hope to achieve win-win development and move together for a shared future



Our Brands



Firefly is an open source brand in 2014. “Make technology more simple, Make life more intelligent” is its philosophy. We promote intelligent upgrades in the industries of new technology, intelligent hardware, AI, AIOT, and digital audio product, and build a more open and professional platform for intelligent hardware technology



Station PC is a new brand in 2020, consisting of the core geek members. We create entertainment products for new generation of people with innovative spirit through exploration of pan-entertainment. “More Entertainment, More Free Creation” is its philosophy. We aim at making everyone enjoy themselves and awakening interesting souls with more extreme product experience



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