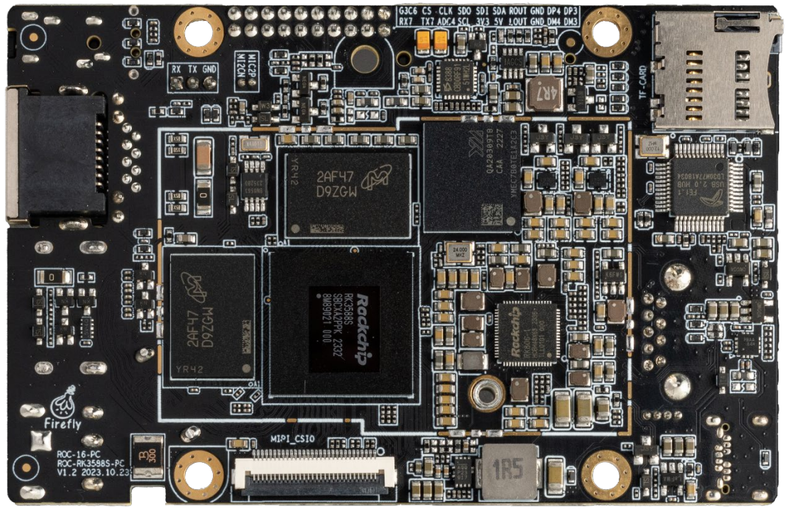
ROC-RK3588S-PC

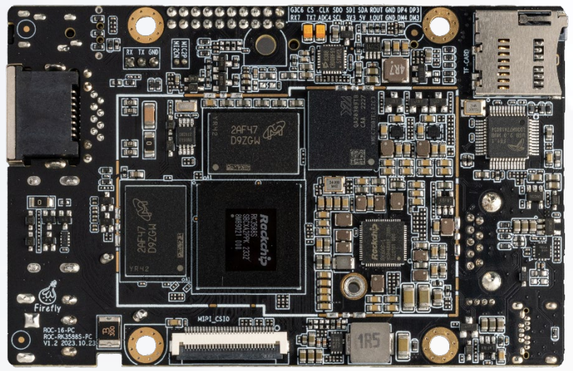
Octa-core 8K AI Open Source Mainboard



V1.2 2025-3-11

T-CHIP INTELLIGENCE TECHNOLOGY

Product features



A new generation of high-end processors RK3588S

RK3588S is Rockchip's new flagship AIoT chip, which uses an 8nm LP process. Equipped with octa core 64 bit CPU, the main frequency is up to 2.4GHz. Integrated ARM Mali-G610 MP4 quad core GPU, built-in AI accelerator NPU, can provide 6Tops computing power, supports mainstream deep learning frameworks.

32GB large memory

It can be equipped with up to 32GB of ultra-large running memory, which exceeds the capacity limit of previous memory and has a faster response speed, which can meet the needs of product applications with high memory requirements and large storage capacity.

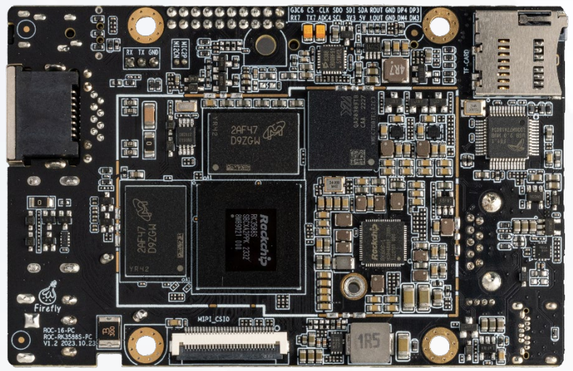
8K video codec for clearer images

Support 8K@60fps H.265/VP9 video decoding and 8K@30fps H.265/H.264 video encoding, support co-encoding and decoding, up to 32 channels of 1080P@30fps decoding and 16 channels of 1080P@30fps encoding; Powerful video encoding and decoding capabilities can make the picture appear in 8K HD with more delicate image quality.

Multi-channel video output, multi-screen different display

It supports HDMI 2.1 8K video output, USB-C (DP1.4), dual MIPI-DSI multi-channel video output, and can achieve up to four screens. Supports dual MIPI-CSI camera inputs.

Product features



Strong network communication capabilities

Onboard 1 × 1000Mbps RJ45 Ethernet, support 2.4GHz/5GHz dual-band WiFi, Bluetooth 4.2 (support BLE), data transmission is more stable and faster, which can meet the needs of a variety of network application scenarios.

Supports multiple operating systems

It supports Android 12.0, Ubuntu desktop and Server versions, RTLinux kernel with excellent real-time performance, Debian11, Buildroot, and UEFI boot, providing a safe and stable system environment for product research and production.

A variety of interfaces

With HDMI2.1, USB3.0, USB2.0, MIPI-DSI, MIPI-CSI, M.2, double-row pin headers and other interfaces, it can be directly used for external device control and expansion.

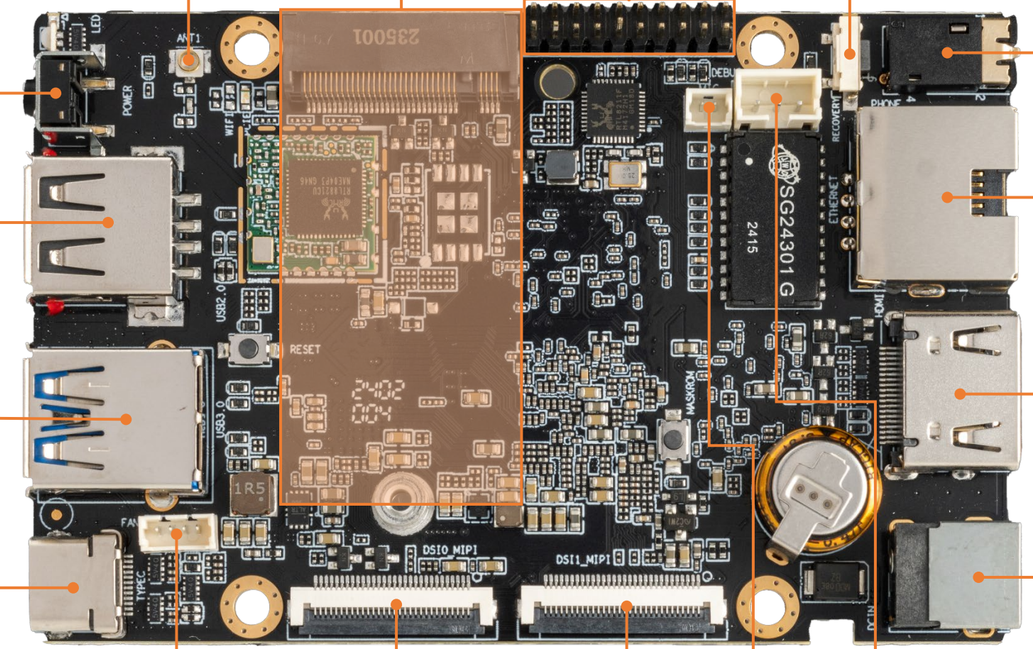
Wide range of application scenarios

It is widely used in edge computing, artificial intelligence, cloud computing, virtual/augmented reality, blockchain, smart security, smart home, smart retail, and smart industry.

Specifications

Specifications		
Basic Specifications	SOC	Rockchip RK3588S
	CPU	Octa-core 64-bit (4×Cortex-A76+4×Cortex-A55), 8nm advanced process, 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, supports INT4/INT8/INT16 mixed operations, and can achieve network model conversion based on frameworks such as TensorFlow/MXNet/PyTorch/Caffe
	ISP	Integrated 48MP ISP with HDR&3DNR
	Encoding/ Decoding	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 H.265/H.264 * Up to 32 channels 1080P@30fps decoding and 16 channels of 1080P@30fps encoding can be realized
	RAM	4GB/8GB/16GB/32GB 64-bit LPDDR4/LPDDR4x/LPDDR5
	Storage	16GB/32GB/64GB/128GB eMMC
	Storage Expansion	1 × M.2 (Scalable 2242 SATA3.0 SSD(default), compatible 2242 PCIe2.0 NVMe SSD), 1 × TF Card
	Power	DC 12V (5.5 × 2.1mm, support 9V~24V wide voltage input)
	Power consumption	Min: 0.42W(12V/35mA), Normal: 2.28W(12V/190mA), Max: 12W (12V/1000mA)
	OS	Android: Android 12.0 Linux: Ubuntu Desktop, Ubuntu Server, Debian11, Buildroot, RTLinux * Support UEFI boot mode
	Size	93.00mm × 60.15mm × 12.36mm
	Weight	≈50g
	Environment	Operating Temperature: -20℃ ~ 60℃, Storage Temperature: -20℃ ~ 70℃, Operating Humidity: 10% ~ 90%RH (non-condensing)
Interface Specifications	Ethernet	1 × 1000Mbps Ethernet (RJ45)
	Wireless network	Support 2.4GHz/5GHz dual-band WiFi (802.11a/b/g/n/ac protocol), Bluetooth 4.2 (support BLE)
	Video output	1 × HDMI2.1 (8K@60fps or 4K@120fps) 2 × MIPI-DSI (30P-0.5mm, 4K@60fps) 1 × DP1.4 (8K@30fps) * Up to four screens can be displayed
	Video input	1 × MIPI-CSI (30P-0.5mm, 2×2Lanes or 1×4Lanes)
	Audio output	1 × HDMI2.1 Audio output 1 × 3.5mm Audio jack (Support MIC recording, American Standard CTIA) 1 × DP1.4 Audio output
	Audio input	1 × Mic Audio input (2P-1.25mm)
	USB	1 × USB3.0 (Max: 1000mA) 3 × USB2.0 (Max: 500mA, two USB2.0 are led out by a 20P pin header) 1 × USB-C multi-function interface (USB3.0 OTG/DP1.4, Max: 2A)
	Extended interfaces	1 × Fan (5V/4P-1.25mm) 1 × Debug (3P-2.0mm) 1 × Recovery 1 × Double-row pin headers (20P-2.0mm, Lead out: LINE-OUT, 2×USB2.0, UART, SPI, GPIO, ADC, VCC(5V/3.3V/1.8V))

Interface description



M.2 SATA3.0 (default 2242 SATA SSD)
M.2 PCIe2.0 (support 2242 NVMe SSD)

Double-row pin headers
20P-2.0mm
Lineout, 2×USB2.0, UART, SPI,
GPIO, ADC, VCC(5V/3.3V/1.8V)

WiFi antenna

Recovery

Power button

3.5mm Audio jack
Support MIC recording, CTIA

USB2.0
Max: 500mA

Gigabit Ethernet
1000Mbps/RJ45

USB3.0
Max: 1000mA

HDMI2.1
8K@60fps/4K@60fps

USB-C multi-function interface
USB3.0 OTG(Max: 2A)/DP1.4(8K@30fps)

DC 12V
5.5×2.1mm,
Support 9V~24V wide voltage input

FAN
5V/4P-1.25mm

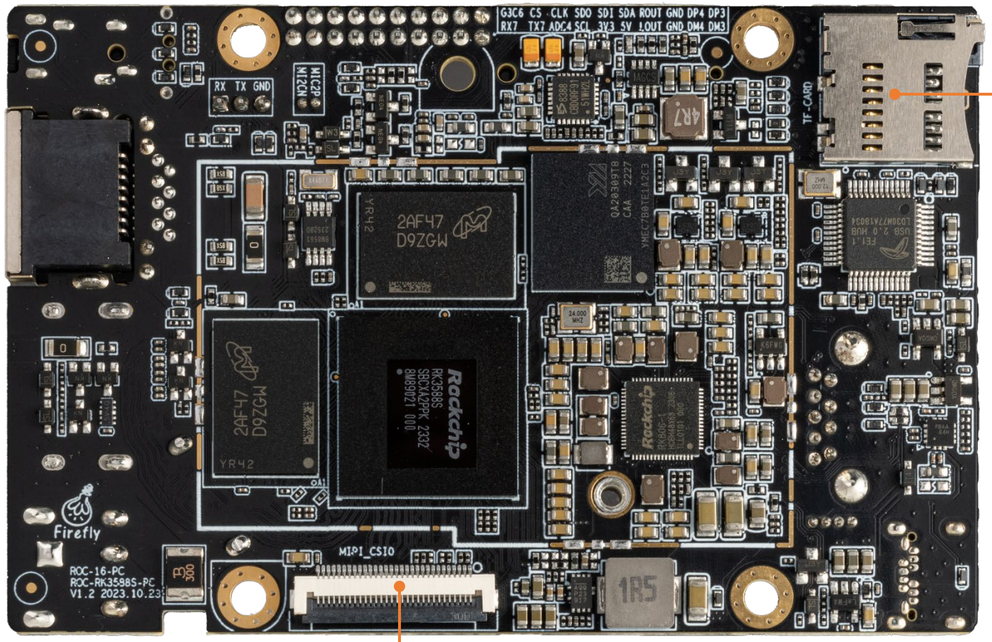
MIPI-DSI0
30P-0.5mm
4K@60fps

MIPI-DSI1
30P-0.5mm
4K@60fps

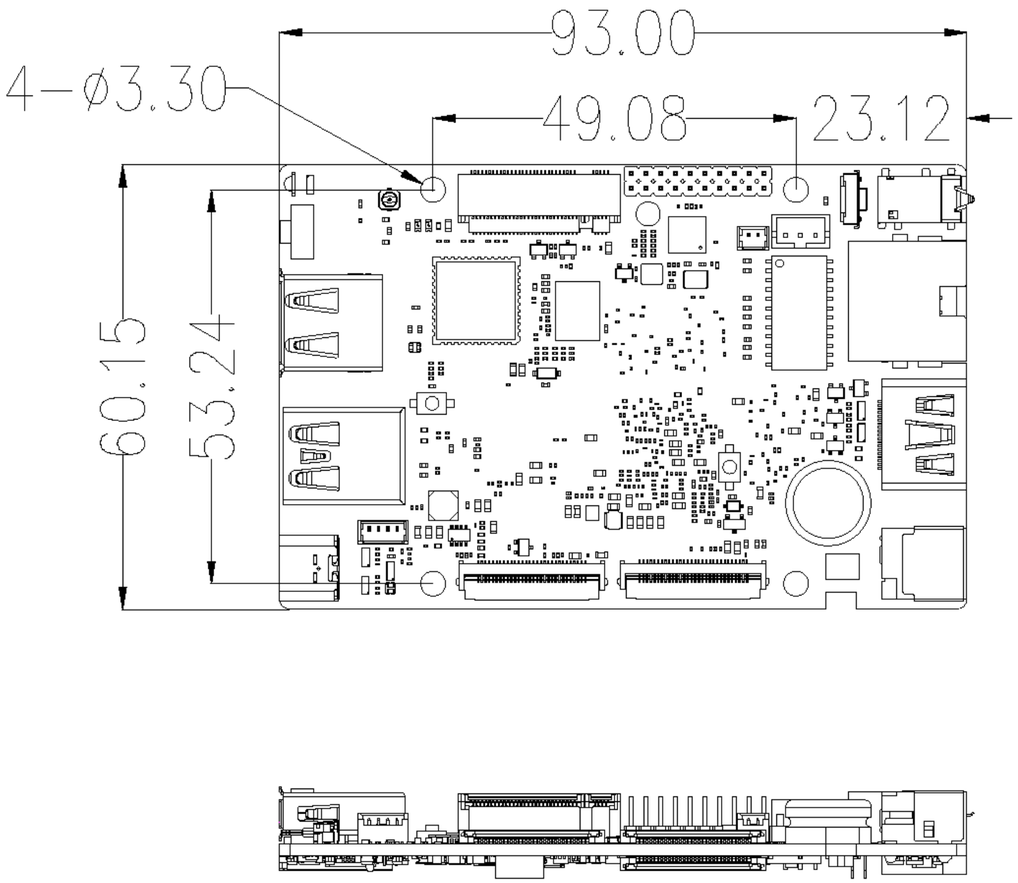
MIC
2P-1.25mm

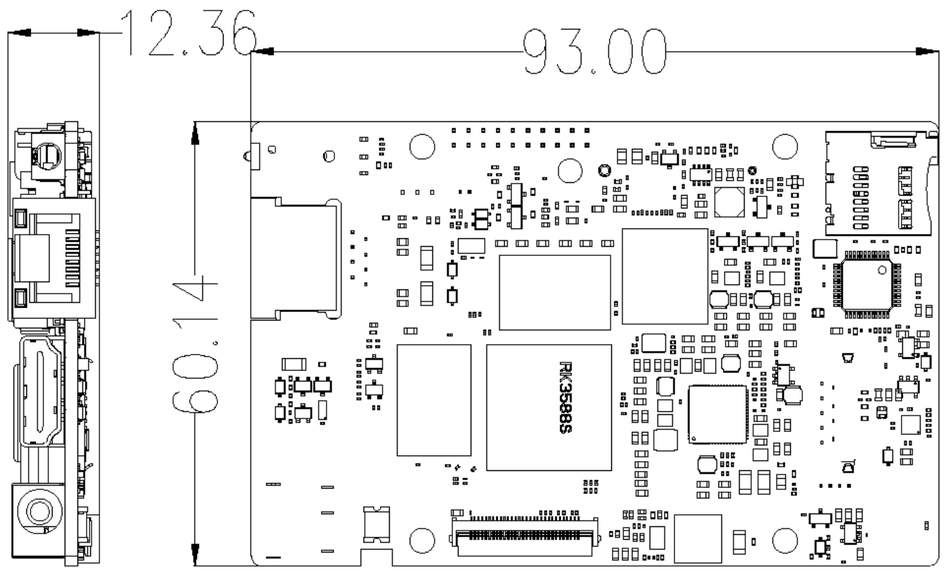
Debug
3P-2.0mm

Interface description



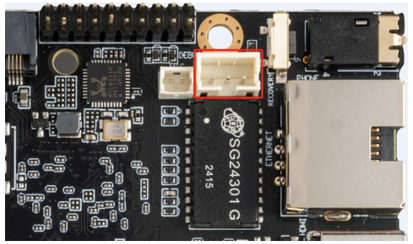
Dimension





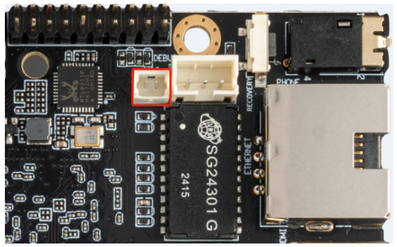
Interface definition

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



NO.	Definition	Power/V	NO.	Definition	Power/V
1	UART2_RX (System Debug)	3.3V	3	GND	
2	UART2_TX (System Debug)	3.3V			

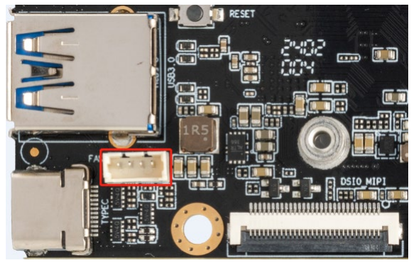
2. (J44) MIC(with bias) 2 PIN 1.25mm pitch wafer socket (white)



NO.	Definition	Power/V	NO.	Definition	Power/V
1	MIC2+ Input （series capacitor 1uF）	3.3V	2	MIC2- Input （series capacitor 1uF）	3.3V

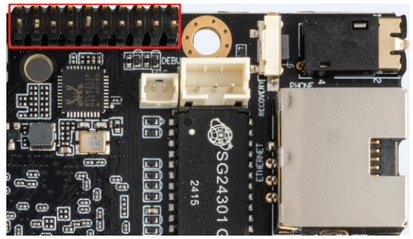
Interface definition

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



NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		3	ADC2 Input [pull up resistance 10k]	1.8V
2	VCC5V0_SYS (5.0V Output)	5.0V	4	PWM11_IR_M3 Output [GPIO3_D5]	5.0V

4. (J1) Double-row needles (15×2) 20 PIN 2.0mm pitch Extended interfaces

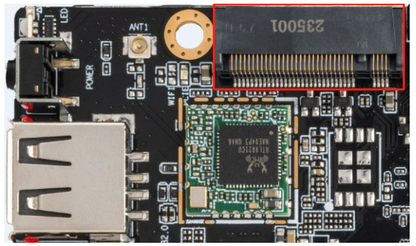


NO.	Definition	Power/V	NO.	Definition	Power/V
1	HUB_HOST_DM3	---	2	HUB_HOST_DP3	---
3	HUB_HOST_DM4	---	4	HUB_HOST_DP4	---
5	GND		6	GND	

Interface definition

7	Left output 1	3.3V	8	Right output 1	3.3V
9	VCC5V0_SYS (5.0V Output, Max : 1A)	5.0V	10	I2C3_SDA_M0 (GPIO1_C0_z)	1.8V
11	VCC_3V3_S3 (3.3V Output, Max: 0.5A)	3.3V	12	SPI1_MISO_M2 (GPIO1_D0)	1.8V
13	I2C3_SCL_M0 (GPIO1_C1_z) [pull up resistance 2.2K]	1.8V	14	SPI1_MOSI_M2 (GPIO1_D1) [pull up resistance 2.2K]	1.8V
15	ADC4 Input	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	Power/V	NO.	Definition	Power/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

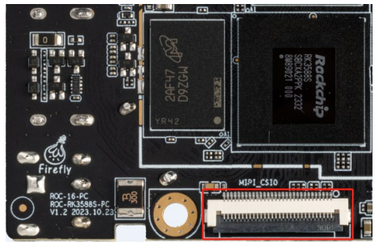
Interface definition

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	---	42	NC	
43	PCIE20_0_RXP	---	44	NC	
45	GND		46	NC	
47	PCIE20_0_TXN [series capacitor 0.1uF]	---	48	NC	
49	PCIE20_0_TXP [series capacitor 0.1uF]	---	50	PCIE20x1_2_PERSTn [pull up resistance 10k]	3.3V
51	GND		52	PCIE20x1_2_CLKREQn [pull up resistance 10k]	3.3V

Interface definition

53	PCIE20_0_REFCLKN	---	54	PCIE20x1_2_WAKEn [pull up resistance 10k]	3.3V
55	PCIE20_0_REFCLKP	---	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 0.5mm pitch

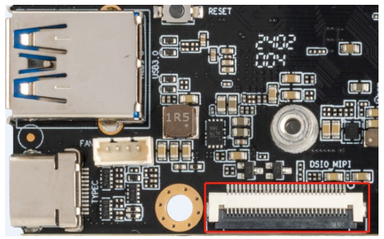


NO.	Definition	Power/V	NO.	Definition	Power/V
1	SDA7_CAM (GPIO3_D3) [pull up resistance 2.2K]	1.8V	16	GND	
2	SCL7_CAM (GPIO3_D2) [pull up resistance 2.2K]	1.8V	17	MIPI_CSI0_RX_CLK0P	---
3	MIPI_PDN0_CAM（GPIO3_C1）	1.8V	18	MIPI_CSI0_RX_CLK0N	---
4	MIPI_RESET0_CAM（GPIO3_C4）	1.8V	19	GND	

Interface definition

5	GND		20	MIPI_CSI0_RX_D2P	---
6	MIPI_MCLK1 Output (GPIO3_A6)	1.8V	21	MIPI_CSI0_RX_D2N	---
7	MIPI_PDN1_CAM Output（GPIO3_B7）	1.8V	22	GND	
8	MIPI_RESET1_CAM Output（GPIO3_C5）	1.8V	23	MIPI_CSI0_RX_D3P	---
9	MIPI_MCLK2 Output（GPIO1_B7）	1.8V	24	MIPI_CSI0_RX_D3N	---
10	GND		25	GND	
11	MIPI_CSI0_RX_D0P	---	26	MIPI_CSI0_RX_CLK1P	---
12	MIPI_CSI0_RX_D0N	---	27	MIPI_CSI0_RX_CLK1N	---
13	GND		28	GND	
14	MIPI_CSI0_RX_D1P	---	29	VCC5V0_SYS (5.0V Output)	5.0V
15	MIPI_CSI0_RX_D1N	---	30	VCC5V0_SYS (5.0V Output)	5.0V

7. (J5200) MIPI_Display_Interface 30 PIN 0.5mm pitch



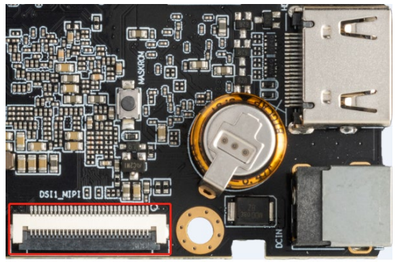
NO.	Definition	Power/V	NO.	Definition	Power/V
1	VCC5V0_SYS (5.0V Output)	5.0V	16	MIPI_DPHY0_TX_D0P	---
2	VCC5V0_SYS (5.0V Output)	5.0V	17	MIPI_DPHY0_TX_D0N	---
3	VCC5V0_SYS (5.0V Output)	5.0V	18	GND	

Interface definition

4	GND		19	MIPI_DPHY0_TX_D1P	---
5	NC		20	MIPI_DPHY0_TX_D1N	---
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	---
8	I2C_SCL_TP0 (GPIO1_A3) [pull up resistance 2.2K]	3.3V	23	MIPI_DPHY0_TX_CLKN	---
9	LCD0_Power EN Output (GPIO1_B3)	3.3V	24	GND	
10	TP0_INT_Input (GPIO1_A7) [pull up resistance 10K]	3.3V	25	MIPI_DPHY0_TX_D2P	---
11	BL0_EN Output (GPIO3_D4)	3.3V	26	MIPI_DPHY0_TX_D2N	---
12	LCD0_BL_PWM[pWM14_M2) Output (GPIO1_D6)	3.3V	27	GND	
13	LCD0_Reset Output (GPIO1_A1)	3.3V	28	MIPI_DPHY0_TX_D3P	---
14	TP0_Reset_L Output (GPIO1_B2)	3.3V	29	MIPI_DPHY0_TX_D3N	---
15	GND		30	GND	

Interface definition

8. (J5400) MIPI_Display_Interface 30 PIN 0.5mm pitch



NO.	Definition	Power/V	NO.	Definition	Power/V
1	VCC5V0_SYS (5.0V Output)	5.0V	16	MIPI_DPHY1_TX_D0P	---
2	VCC5V0_SYS (5.0V Output)	5.0V	17	MIPI_DPHY1_TX_D0N	---
3	VCC5V0_SYS (5.0V Output)	5.0V	18	GND	
4	GND		19	MIPI_DPHY1_TX_D1P	---
5	NC		20	MIPI_DPHY1_TX_D1N	---
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	---
8	I2C_SCL_TP1 (GPIO4_B1) [pull up resistance 2.2K]	3.3V	23	MIPI_DPHY1_TX_CLKN	---
9	LCD1_Power EN Output（GPIO4_A6）	3.3V	24	GND	
10	TP1_INT Input（GPIO4_A4） [pull up resistance 4.7K]	3.3V	25	MIPI_DPHY1_TX_D2P	---
11	BL1_EN Output（GPIO4_A3）	3.3V	26	MIPI_DPHY1_TX_D2N	---
12	LCD1_BL_PWM[pWM13_M1） Output [GPIO4_B6]	3.3V	27	GND	
13	LCD1_Reset Output（GPIO4_A0）	3.3V	28	MIPI_DPHY1_TX_D3P	---

Interface definition

14	TP1_Reset_L Output（GPIO4_B3） [pull up resistance 4.7K]	3.3V	29	MIPI_DPHY1_TX_D3N	---
15	GND		30	GND	

T-CHIP INTELLIGENCE TECHNOLOGY

Contact Us
(+86)18688117175

E-mail
global@t-firefly.com

Website
www.t-firefly.com

Address
Room 2101, Hongyu Building, #57 Zhongshan 4Rd, East District, Zhongshan, Guangdong, China.