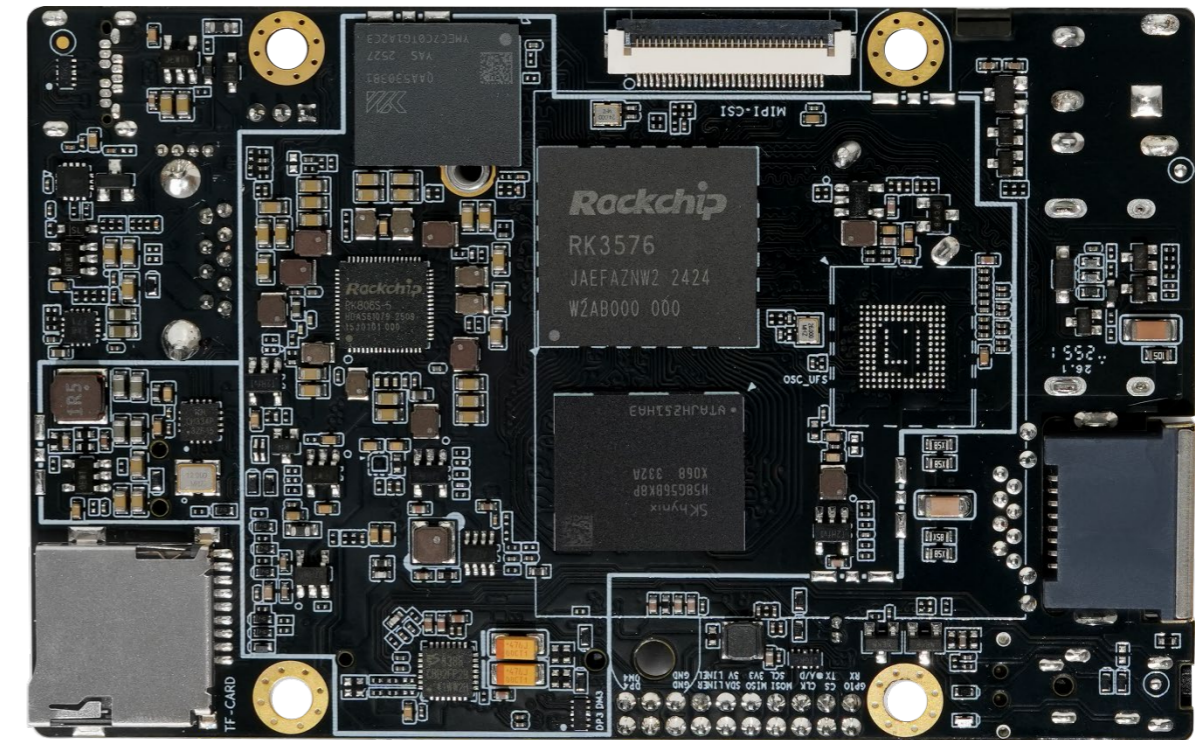




# ROC-RK3576-PC

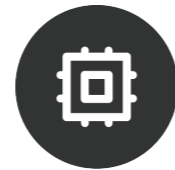
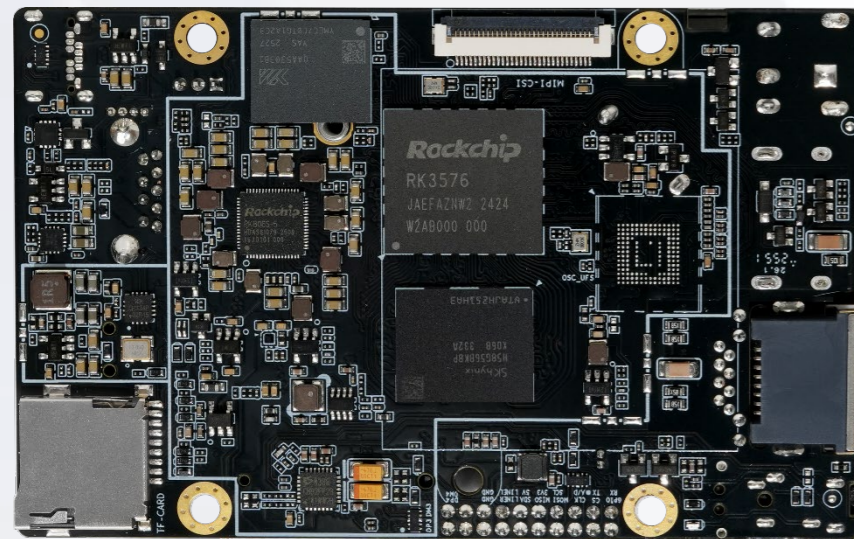
| AI Large-model Mainboard



V2.1 2026-2-3

FIREFLY TECHNOLOGY

# Product features



## Octa-core AIOT processor RK3576

RK3576, the new octa-core 64-bit AIOT processor, features a big little architecture (4xA72 +4xA53) and a frequency of up to 2.2 GHz.



## Built-in 6TOPS powerful computing NPU

It supports INT4/INT8/INT16/FP16/BF16/TF32 mixed operation and framework switching of TensorFlow/MXNet/PyTorch/Caffe. This enables enhanced data processing, speech recognition, and image analysis.



## The private deployment of large language models

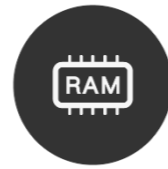
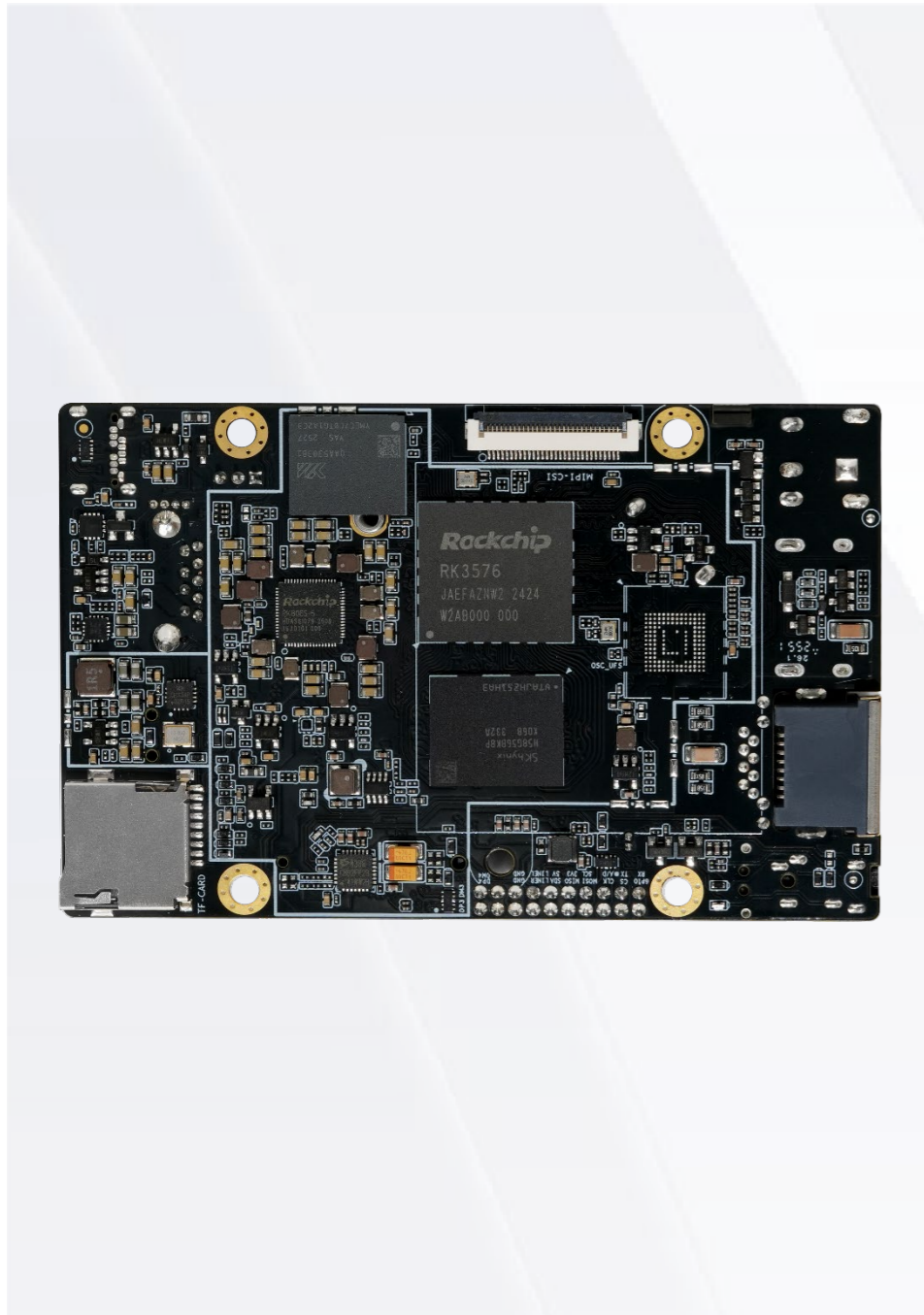
Support the privatization deployment of ultra-large-scale parametric models under the Transformer architecture, such as Deepseek-R1 series, Gemma series, Llama series, ChatGLM series, Qwen series, Phi series and other large language models.



## HD high-frame-rate display capability at 4K@120Hz

With HDMI2.1 (4K@120Hz) / eDP1.3 (4K@60Hz), DP1.4 (4K@120Hz), and MIPI DSI (2560×1600@60Hz) interfaces, the device enables three-display output.

# Product features



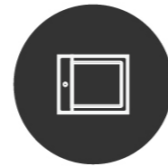
## Supports high-bandwidth LPDDR5 memory

Compared with LPDDR4, LPDDR5 has the characteristics of larger memory capacity, higher bandwidth, faster data transmission rate, and lower power consumption, which can meet the needs of memory space and response speed for the privatization of large models.



## Support various operating systems

Support Android, Linux OS, and Buildroot+QT. These provide safe and stable systems for product research and production.



## Only credit card-sized, compact structure

It adopts a refined small size design, with an overall size of 93mm×60.15mm, the size of a credit card, a compact shape, strict selection of high-specification electronic components, and a variety of circuit optimization scheme design, which greatly improves the system stability of the whole machine.



## Complete development materials

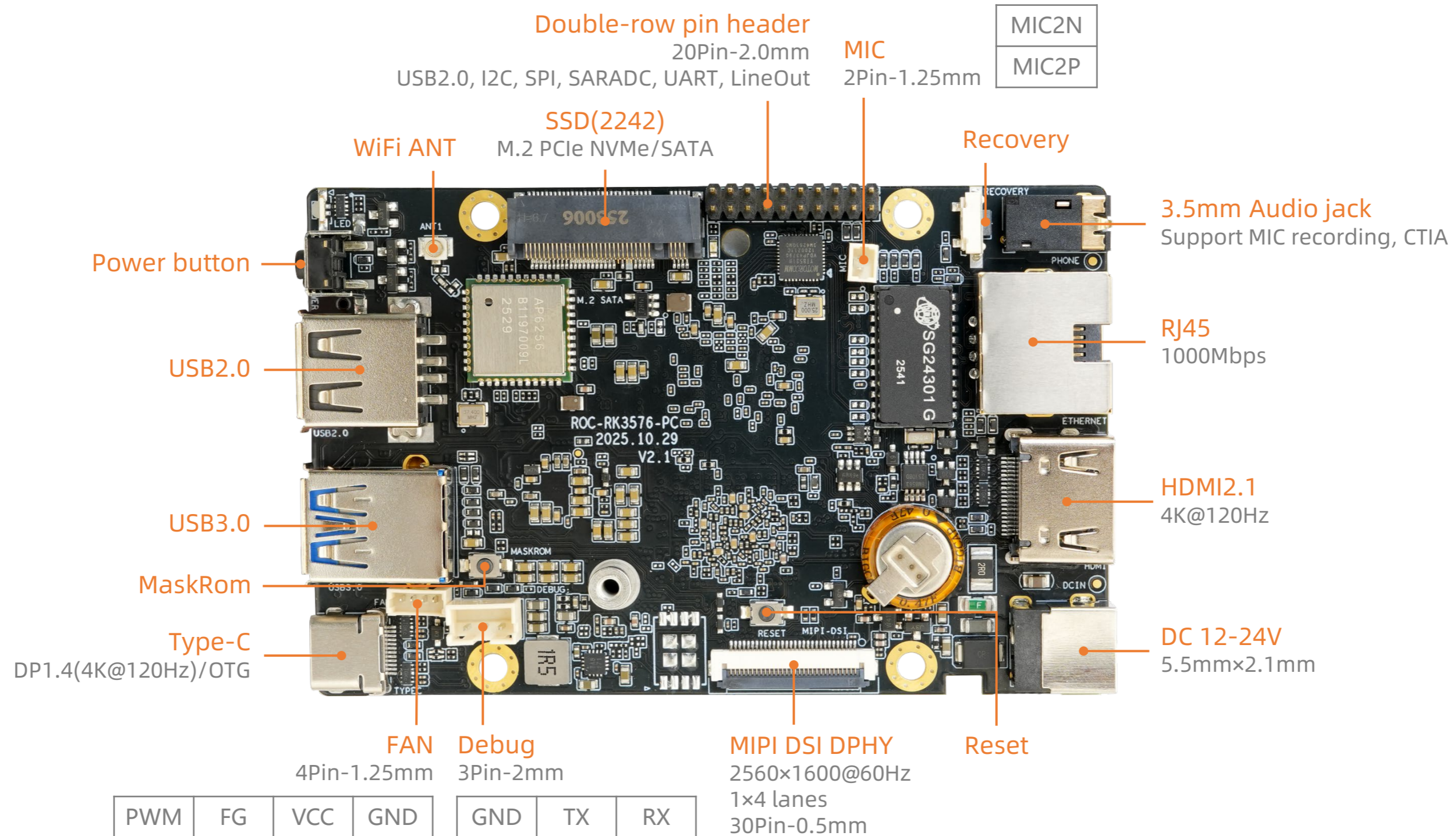
Provide supporting source code, wiki tutorials, technical materials, and development tools to reduce development difficulties and make development easier and more convenient.

# Specifications

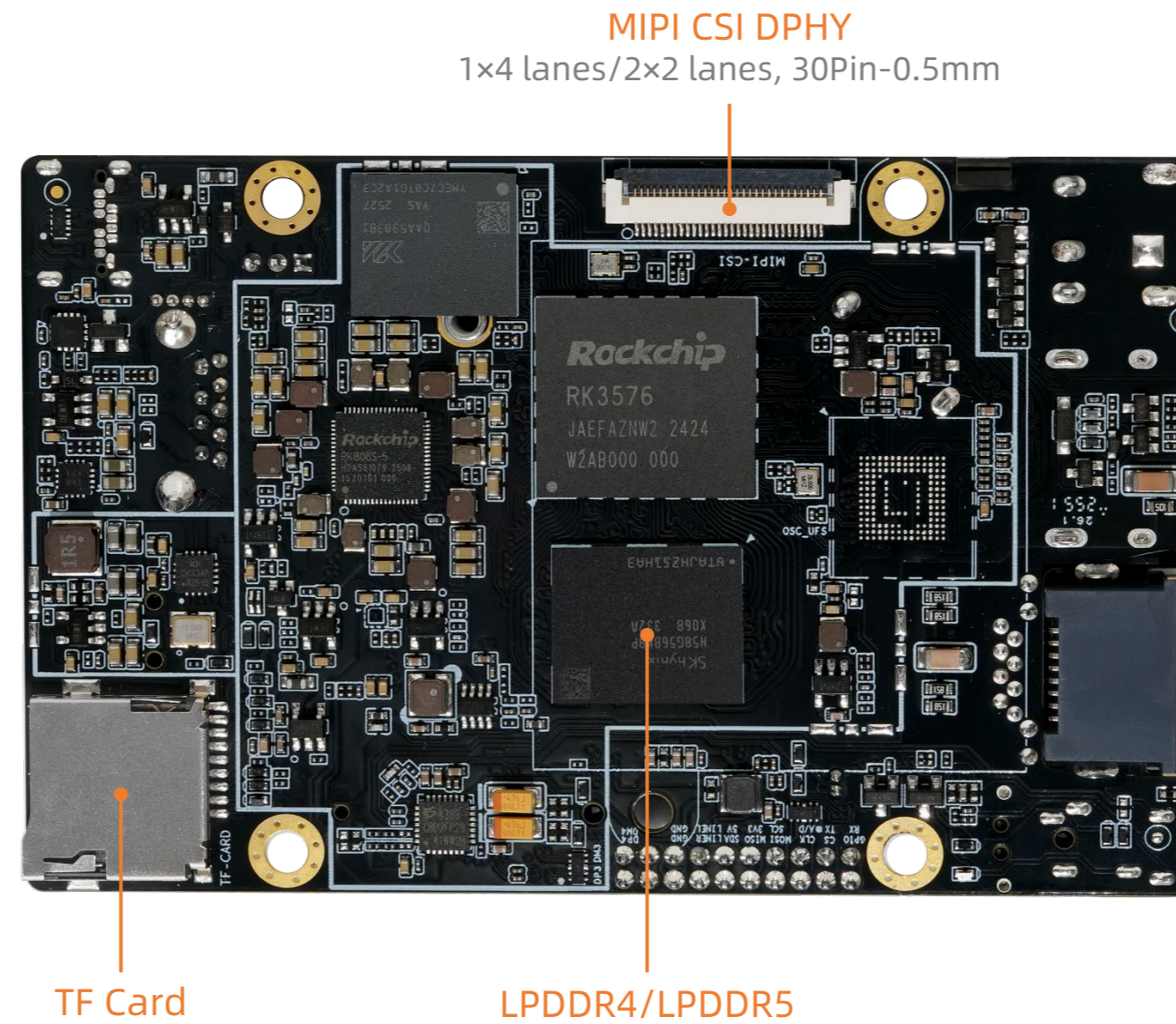


Specifications		
Basic Specifications	SOC	Rockchip RK3576
	CPU	Octa-core 64-bit processor (4×A72 + 4×A53), frequency is up to 2.2GHz
	GPU	G52 MC3@1GHz, support OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1, embedded high-performance 2D acceleration hardware
	NPU	6 TOPS NPU, support INT4/INT8/INT16/FP16/BF16/TF32 mixed operation
	Decoding/Encoding	Decoding: 8K@30fps/4K@120fps: H.265/HEVC, VP9, AVS2, AV1, 4K@60fps: H.264/AVC Encoding: 4K@60fps: H.265/HEVC, H.264/AVC
	RAM	LPDDR4/LPDDR5 (4GB/8GB/16GB optional)
	Storage	eMMC (16GB/32GB/64GB/128GB/256GB optional), UFS3.1 (Optional)
	Storage expansion	1 × M.2 (Scalable 2242 PCIe NVMe/SATA SSD), 1 × TF Card
	Power	DC 12V (5.5mm × 2.1mm, support 12V~24V wide voltage input)
	OS	Android14, Linux OS, Buildroot+QT
	Software support	Support the privatization deployment of ultra-large-scale parametric models under the Transformer architecture, such as Deepseek-R1 series, Gemma series, Llama series, ChatGLM series, Qwen series, Phi series and other large language models. It supports traditional network architectures such as CNN, RNN, and LSTM, and supports the import and export of RKNN models; Support a variety of deep learning frameworks, including TensorFlow, TensorFlow Lite, PyTorch, Caffe, ONNX and Darknet. It also supports the development of custom operators. Support Docker container management technology.
	Size	93.00mm × 60.15mm × 12.49mm
	Weight	≈ 50g
	Environment	Operating Temperature: -20°C ~ 60°C, Storage Temperature: -20°C ~ 70°C, Storage Humidity: 10% ~ 90%RH (non-condensing)
Interface Specifications	Internet	1 × Gigabit Ethernet (1000Mbps/RJ45), 2.4GHz/5GHz Dual-band WiFi (802.11a/b/g/n/ac), Bluetooth 5.0
	Video input	1 × MIPI-CSI DPHY (30Pin-0.5mm, 1×4lanes/2×2lanes)
	Video output	1 × HDMI2.1 (4K@120Hz), 1 × DP1.4 (4K@120Hz), 1 × MIPI-DSI DPHY (2560×1600@60Hz, 1×4lanes, 30Pin-0.5mm)
	Audio	1 × 3.5mm Audio jack (Support MIC recording, American Standard CTIA), 1 × MIC (2Pin-1.25mm)
	USB	1 × USB3.0, 1 × USB2.0, 1 × Type-C (OTG/DP1.4)
	Watchdogs	External watchdogs
	Extension interface	1 × FAN (4Pin-1.25mm), 1 × Debug(3Pin-2mm), 1 × Double-row pin headers (20Pin-2.0mm, Lead-out: USB2.0, I2C, SPI, SARADC, UART, LineOut)

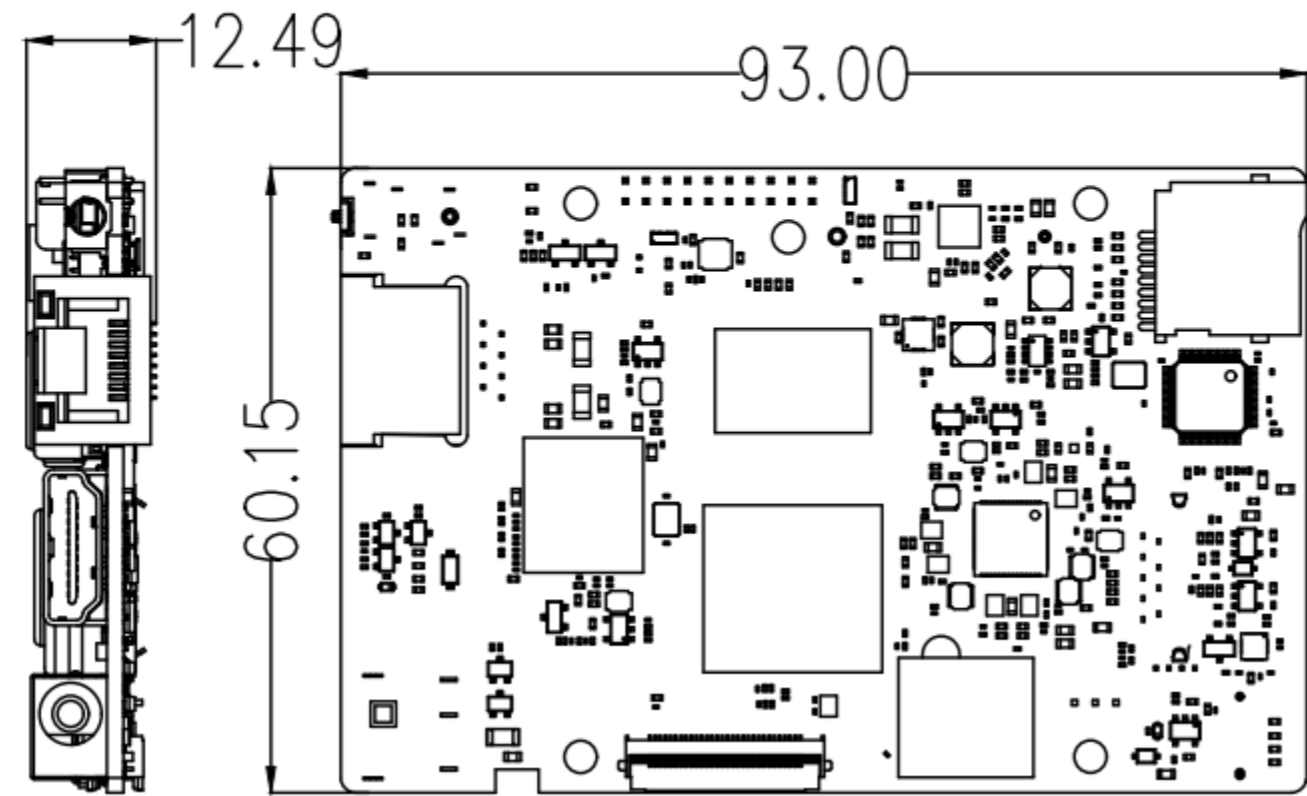
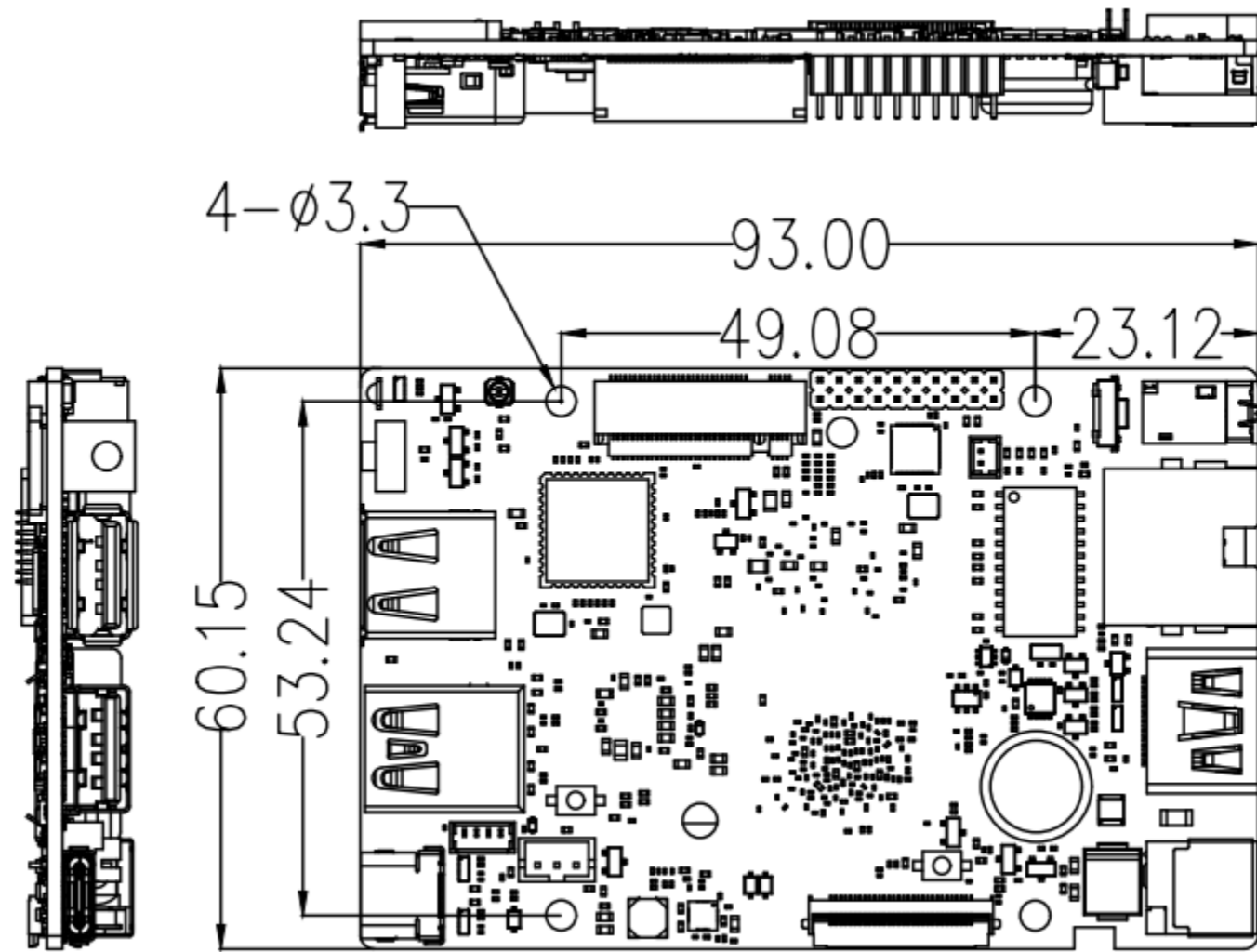
# Interface description



# Interface description

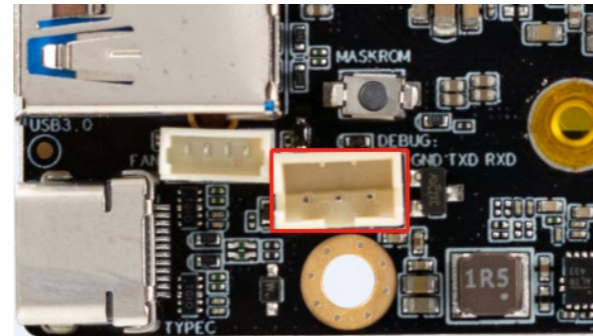


# Dimension



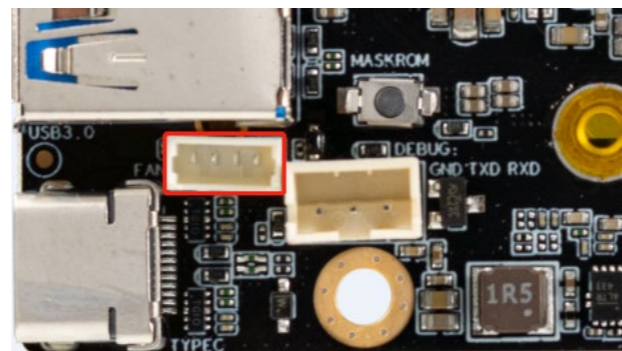
# Interface definition

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



NO.	Definition	Power/V	NO.	Definition	Power/V
1	UART0_RXD	3.3	3	GND	
2	UART0_TXD	3.3			

## 2. FAN: 4PIN 1.25mm Pitch wafer (J3)

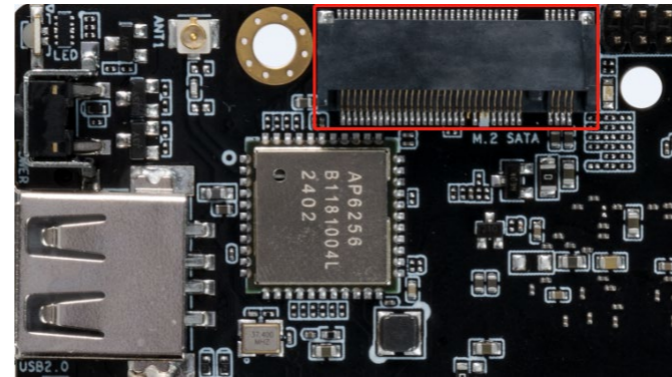


NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	VCC (5V Output)	5
3	FG Input	1.8	4	PWM Output	5

# Interface definition



## 3. M.2 PCIE/SATA M-KEY (J5405)



NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	VCC3V3_PCIE (3.3V Output)	3.3
3	GND		4	VCC3V3_PCIE (3.3V Output)	3.3
5	NC		6	NC	
7	NC		8	NC	
9	GND		10	DAS/DSS [pull up resistor10K]	3.3
11	NC		12	VCC3V3_PCIE (3.3V Output)	3.3
13	NC		14	VCC3V3_PCIE (3.3V Output)	3.3
15	NC		16	VCC3V3_PCIE (3.3V Output)	3.3
17	NC		18	VCC3V3_PCIE (3.3V Output)	3.3
19	NC		20	NC	
21	GND		22	NC	
23	NC		24	NC	
25	NC		26	NC	
27	GND		28	NC	

# Interface definition

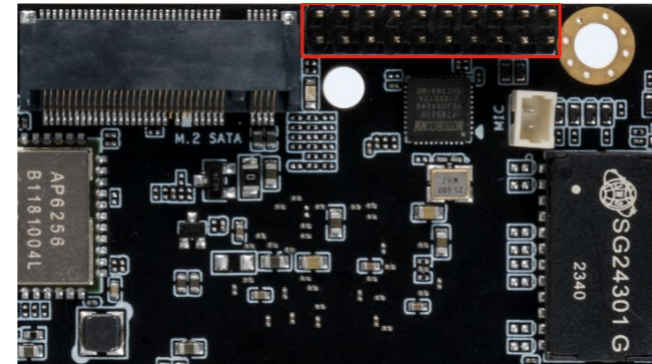


29	NC		30	NC	
31	NC		32	NC	
33	GND		34	NC	
35	NC		36	NC	
37	NC		38	DEVSLP [pull up resistor10K]	3.3
39	GND		40	NC	
41	PCIE0_RXN/SATA0_RXN	-	42	NC	
43	PCIE0_RXP/SATA0_RXP	-	44	NC	
45	GND		46	NC	
47	PCIE0_TXN/SATA0_TXN (Series capacitor 100nF)	-	48	NC	
49	PCIE0_TXP/SATA0_TXP (Series capacitor 100nF)	-	50	PCIE0_PERSTn (GPIO2_B4_d)	3.3
51	GND		52	PCIE0_CLKREQn_M0 (GPIO2_B2_d)	3.3
53	PCIE0_REFCLKN	-	54	PCIE0_WAKEn_M0 (GPIO0_D2_d)	3.3
55	PCIE0_REFCLKP	-	56	NC	
57	GND		58	NC	
59	NC		60	NC	
61	GND		62	VCC3V3_PCIE (3.3V Output)	3.3
63	GND		64	VCC3V3_PCIE (3.3V Output)	3.3
65	GND		66	VCC3V3_PCIE (3.3V Output)	3.3
67	GND				

# Interface definition



## 4. Double-row pin headers EXTENSION INTERFACE 2\*10PIN (J1)

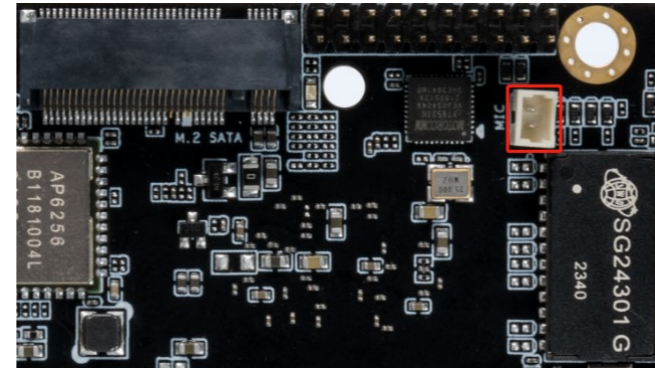


NO.	Definition	Power/V	NO.	Definition	Power/V
1	HUB_HOST_DM3	-	2	HUB_HOST_DP3	-
3	HUB_HOST_DM4	-	4	HUB_HOST_DP4	-
5	GND		6	GND	
7	LINEOUT_L (40mW/32Ω)	3.3	8	LINEOUT_R (40mW/32Ω)	3.3
9	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0V (MAX:500mA)	10	I2C3_SDA_M0 【GPIO4_B4_d】 Pull-up resistor 2.2K	1.8
11	VCC_3V3_S3 (3.3V OUTPUT)	3.3 (MAX:500mA)	12	SPI3_MISO_M1 【GPIO3_D5_d】	1.8
13	I2C3_SCL_M0 【GPIO4_B5_d】 Pull-up resistor 2.2K	1.8	14	SPI3_MOSI_M1 【GPIO3_D6_d】	1.8
15	ADC4 INPUT	1.8	16	SPI3_CLK_M1 【GPIO3_D4_d】	1.8
17	UART6_TX_M3 【GPIO4_C4_d】	3.3	18	SPI3_CSN1_M1 【GPIO3_D7_d】	1.8
19	UART6_RX_M3 【GPIO4_C5_d】	3.3	20	GPIO3_A4_d	1.8

# Interface definition



## 5. MIC 1.25mm Pitch (J44)

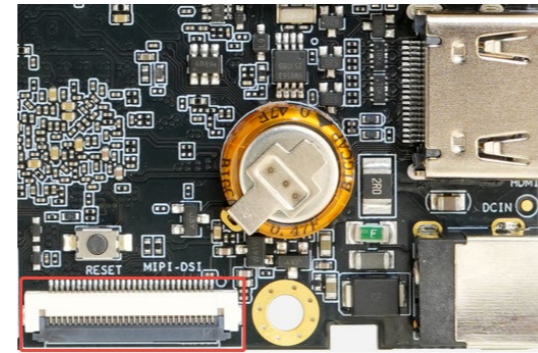


NO.	Definition	Power/V	NO.	Definition	Power/V
1	MIC2P	3.3	2	MIC2N	3.3

# Interface definition



## 6. MIPI Display 30PIN 0.5mm Pitch (J5400)

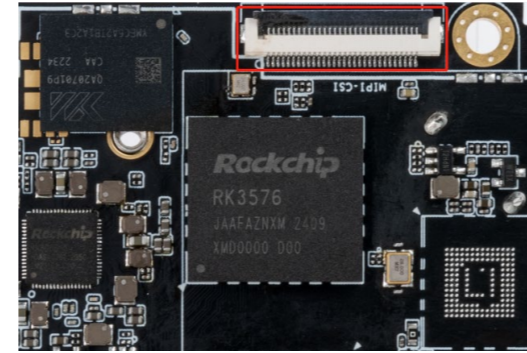


NO.	Definition	Power/V	NO.	Definition	Power/V
1	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0	16	MIPI_DPHY_DSI_TX_D0P	-
2	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0	17	MIPI_DPHY_DSI_TX_D0N	-
3	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0	18	GND	
4	GND		19	MIPI_DPHY_DSI_TX_D1P	-
5	NC		21	MIPI_DPHY_DSI_TX_D1N	-
6	VCC_3V3_S3 (3.3V OUTPUT)	3.3	21	GND	
7	I2C0_SDA_M1_TP 【GPIO0_C2_d】 Pull-up resistor 2.2K	3.3	22	MIPI_DPHY_DSI_TX_CLKP	-
8	I2C0_SCL_M1_TP 【GPIO0_C1_d】 Pull-up resistor 2.2K	3.3	23	MIPI_DPHY_DSI_TX_CLKN	-
9	LCD_PWREN_H 【GPIO0_C5_d】	3.3	24	GND	
10	TP_INT_L 【GPIO0_C6_d】	3.3	25	MIPI_DPHY_DSI_TX_D2P	-
11	MIPI_TE_M1 【GPIO3_A2_d】	3.3	26	MIPI_DPHY_DSI_TX_D2N	-
12	LCD_BL_PWM1_CH1_M0 【GPIO0_B5_d】	3.3	27	GND	
13	LCD_RESET_L 【GPIO0_B4_d】	3.3	28	MIPI_DPHY_DSI_TX_D3P	-
14	TP_RST_L 【GPIO0_D0_d】	3.3	29	MIPI_DPHY_DSI_TX_D3N	-
15	GND		30	GND	

# Interface definition



## 7. MIPI CSI 30PIN 0.5mm Pitch (J4701)





NO.	Definition	Power/V	NO.	Definition	Power/V
1	I2C4_SDA_M3 【GPIO3_B7_d】 Pull-up resistor 2.2K	1.8	16	GND	
2	I2C4_SCL_M3 【GPIO3_C0_d】 Pull-up resistor 2.2K	1.8	17	MIPI_DPHY_CSI1_RX_CLKP	-
3	MIPI_DPHY_CSI1_PDN_H 【GPIO3_D0_d】	1.8	18	MIPI_DPHY_CSI1_RX_CLKN	-
4	MIPI_DPHY_CSI1_RESET 【GPIO3_C1_d】	1.8	19	GND	
5	GND		20	MIPI_DPHY_CSI1_RX_D2P/MIPI_DPHY_CSI2_RX_D0P	-
6	MIPI_DPHY_CSI1_CAM_CLKOUT 【GPIO4_A0_d】	1.8	21	MIPI_DPHY_CSI1_RX_D2N/MIPI_DPHY_CSI2_RX_D0N	-
7	MIPI_DPHY_CSI2_PDN_H 【GPIO3_C7_d】	1.8	22	GND	
8	MIPI_DPHY_CSI2_RESET 【GPIO3_C4_d】	1.8	23	MIPI_DPHY_CSI1_RX_D3P/MIPI_DPHY_CSI2_RX_D1P	-
9	MIPI_DPHY_CSI2_CAM_CLKOUT 【GPIO2_D7_d】	1.8	24	MIPI_DPHY_CSI1_RX_D3N/MIPI_DPHY_CSI2_RX_D1N	-
10	GND		25	GND	
11	MIPI_DPHY_CSI1_RX_D0P	-	26	MIPI_DPHY_CSI2_RX_CLKP	-
12	MIPI_DPHY_CSI1_RX_D0N	-	27	MIPI_DPHY_CSI2_RX_CLKN	-
13	GND		28	GND	
14	MIPI_DPHY_CSI1_RX_D1P	-	29	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0
15	MIPI_DPHY_CSI1_RX_D1N	-	30	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0





## FIREFLY TECHNOLOGY

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