

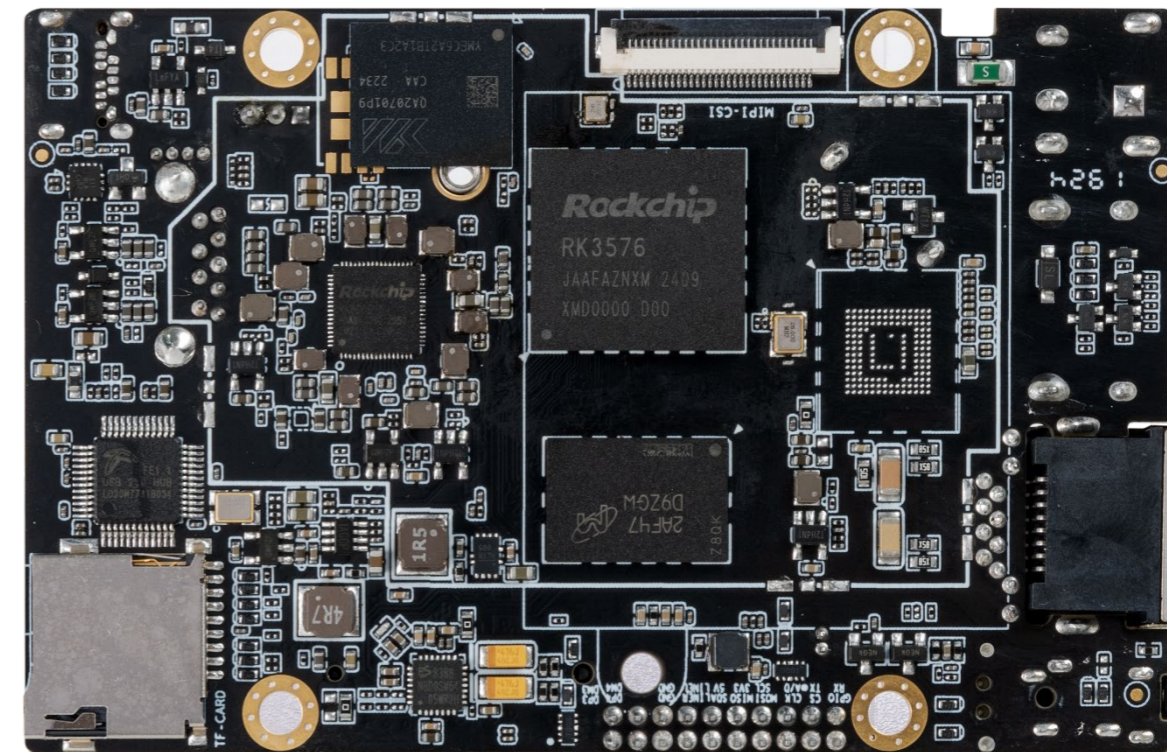


ROC-RK3576-PC

Low-power Large-model Mainboard

V0.2 2024-5-30

T-CHIP INTELLIGENCE TECHNOLOGY



Product features



Octa-core AIOT processor RK3576

RK3576, the new octa-core 64-bit AIOT processor, features a big little architecture (4×A72 +4×A53) 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.



8K@30fps Decoding/4K@60fps Encoding

It supports 8K@30fps/4K@120fps decoding(H.265/HEVC, VP9, AVS2, AV1) , 4K@60fps decoding(H.264/AVC), 4K@60fps encoding(H.265/HEVC, H.264/AVC).



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

With HDMI 2.1 (4K@120fps) / eDP 1.3 (4K@60fps), DP 1.4 (4K@120fps), and MIPI DSI (2560*1600@60fps) interfaces, the device enables three-display output.

Product features



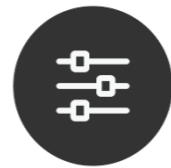
UFS 2.0 with a data read speed of up to 12Gbps

With support for UFS 2.0 / HS-G3 (12Gbps), this device ensures efficient data storage and access. With the PCIe NVMe / SATA SSD expansion, it delivers rapid data read and write speeds, enabling the device to be easily expanded to TB storage capacity.



Support various operating systems

Support Android 14, Linux OS, and Buildroot+QT. These provide safe and stable systems for product research and production.



Abundant interface options

Equipped with MIPI-CSI, MIPI DSI, USB3.0, USB2.0, I2C, SPI, SARADC, UART expansion interfaces, and more, it meets the peripheral expansion needs of various scenarios.



A wide range of applications

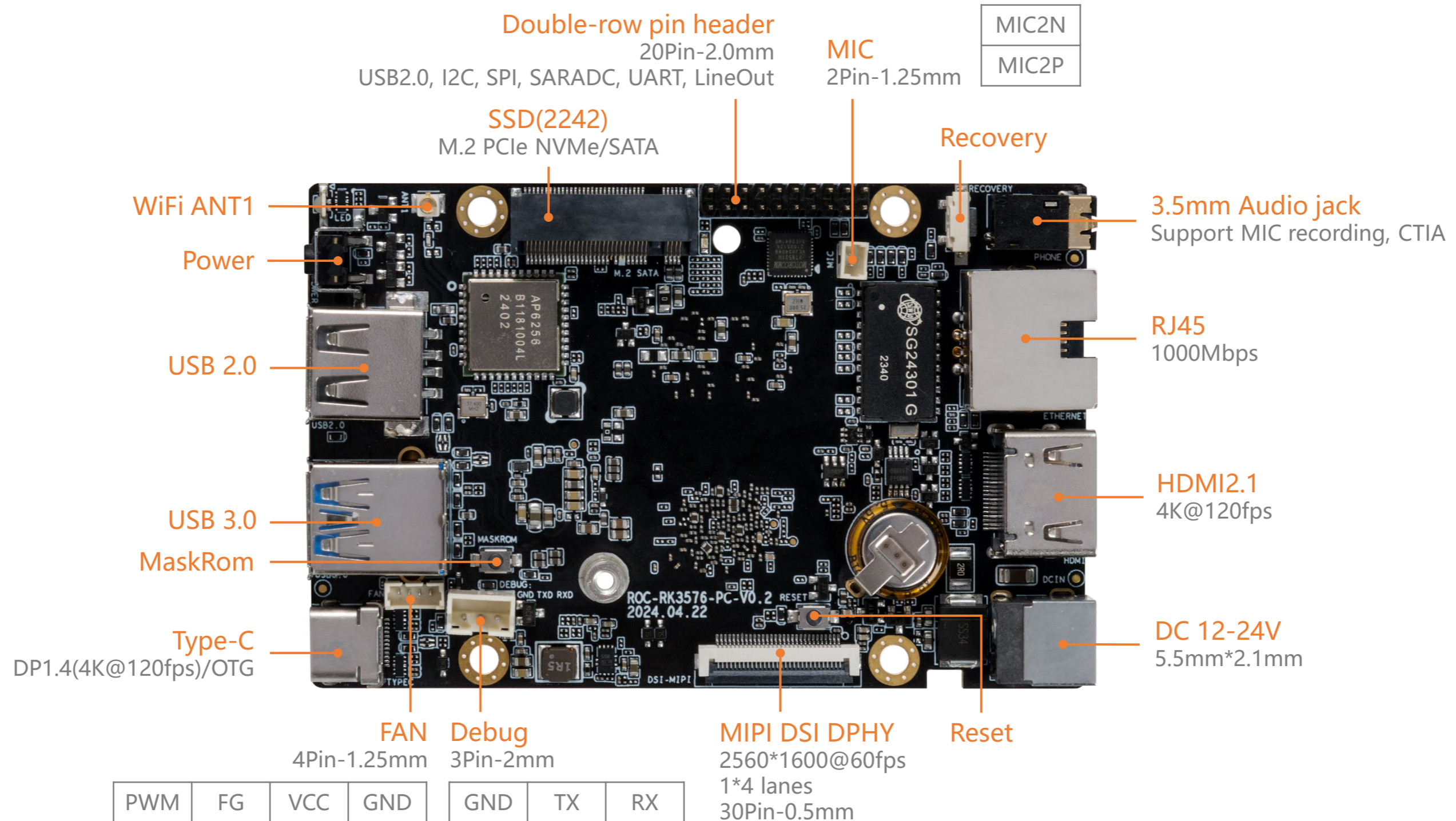
It is widely used in: edge computing, large model localization, smart commercial display, cloud terminal products, industrial control host, automotive electronics and other industries.

Specifications



Specifications		
Basic Specifications	SOC	Rockchip RK3576
	CPU	Octa-core 64-bit processor (4xA72 + 4xA53), 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/LPDDR4x (4GB/8GB optional)
	Storage	eMMC (16GB/32GB/64GB/128GB/256GB optional), UFS2.0 (Optional)
	Storage Expansion	1 * M.2 (Scalable 2242 PCIe NVMe/SATA SSD), 1 * TF Card Slot
	Power	DC 12V (5.5mm * 2.1mm, support 12V~24V wide voltage input)
	OS	Android14, Linux OS, Buildroot+QT
	Software support	<ul style="list-style-type: none"> • The private deployment of ultra-large-scale parameter models under the Transformer architecture, including large language models such as Gemma-2B, LLaMa2-7B, ChatGLM3-6B, Qwen1.5-1.8B • Traditional network architectures such as CNN, RNN, and LSTM; a variety of deep learning frameworks, including TensorFlow, PyTorch, MXNet, PaddlePaddle, and ONNX, as well as custom operator development • Docker container management technology
	Size	93.00mm * 60.15mm * 12.49mm
	Weight	≈50g
	Power consumption	Normal: 1.2W(12V/100mA), Max: 6W(12V/500mA), Min: 0.096W(12V/8mA)
Environment	Operating Temperature: -20°C- 60°C Storage Humidity: 10% ~ 90%RH (non-condensing)	
Interface Specifications	Internet	1 * Gigabit network (1000 Mbps/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*4 lanes/2*2 lanes)
	Video output	1 * HDMI2.1(4K@120fps), 1 * DP1.4 (4K@120fps), 1 * MIPI DSI DPHY (2560*1600@60fps, 30Pin-0.5mm, 1*4 lanes)
	Watch Dogs	External watchdogs
	USB	1 * USB3.0, 1 * USB2.0
	Extension interface	1 * Type-C (OTG/DP1.4), 1 * FAN (4Pin-1.25mm), 1 * Debug(3Pin-2mm), 1 * 3.5mm Audio jack (Support MIC recording , American Standard CTIA), 1 * MIC (2Pin-1.25mm), 1 * Double-row pin headers (20Pin-2.0mm) Lead-out interfaces: USB2.0, I2C, SPI, SARADC, UART, LineOut

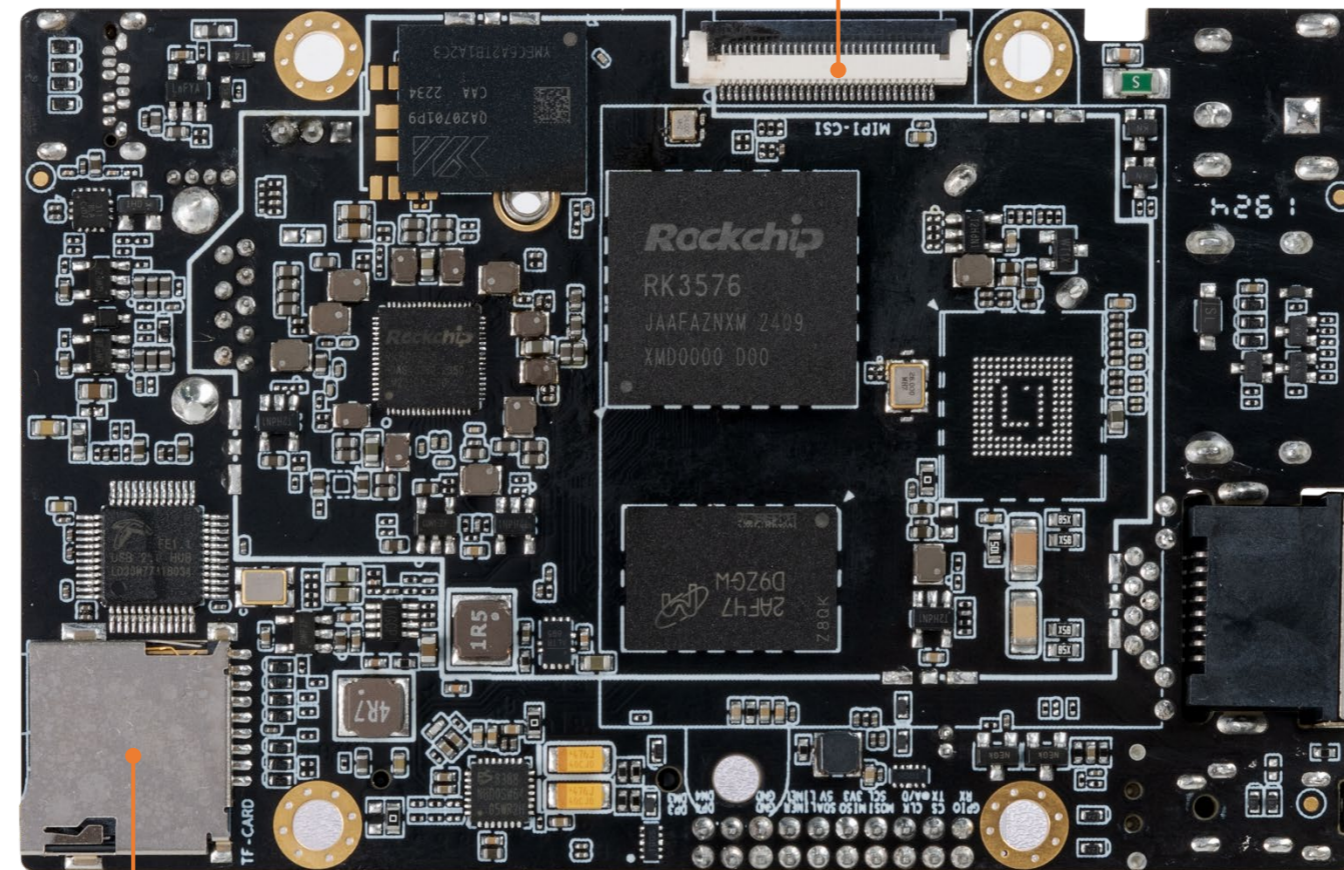
Interface description



Interface description

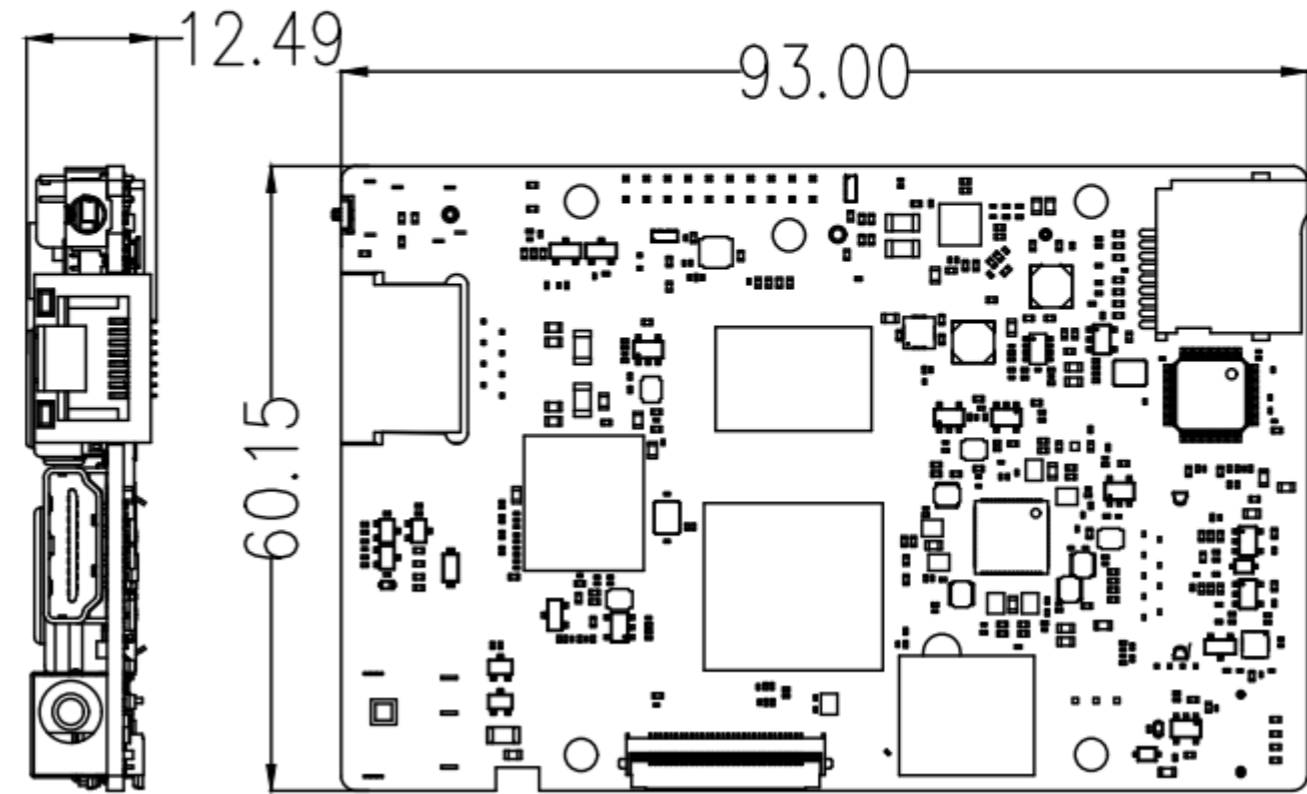
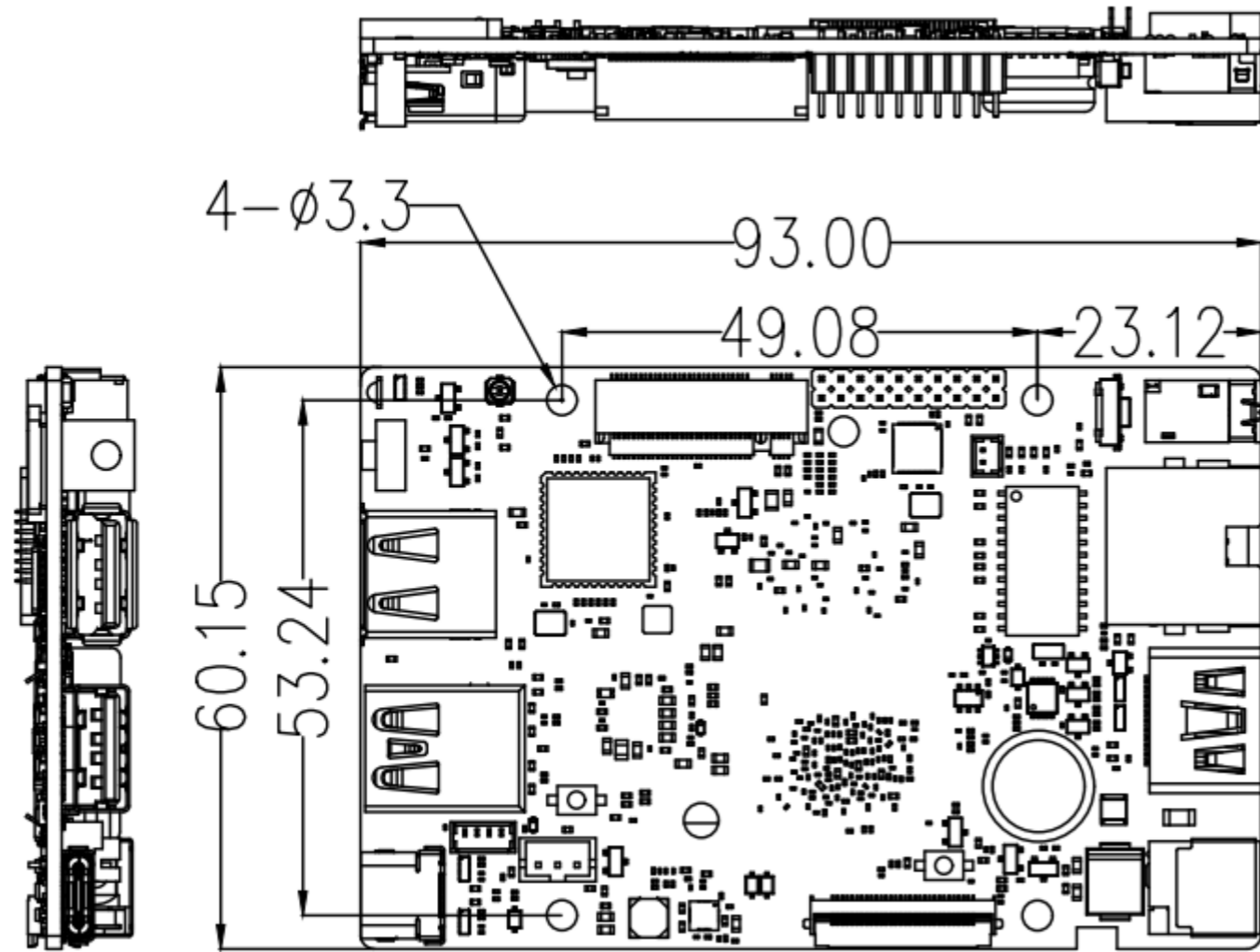


MIPI CSI DPHY
1*4 lanes/2*2 lanes, 30Pin-0.5mm



TF Card

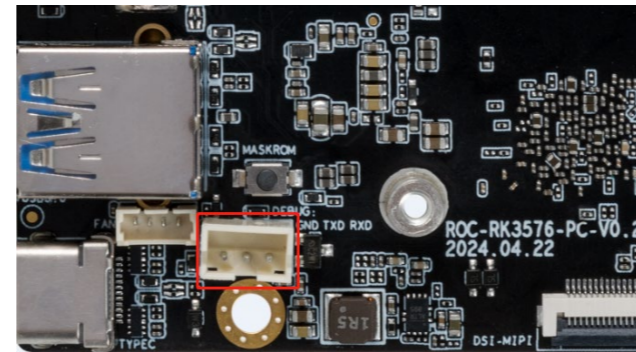
Dimension





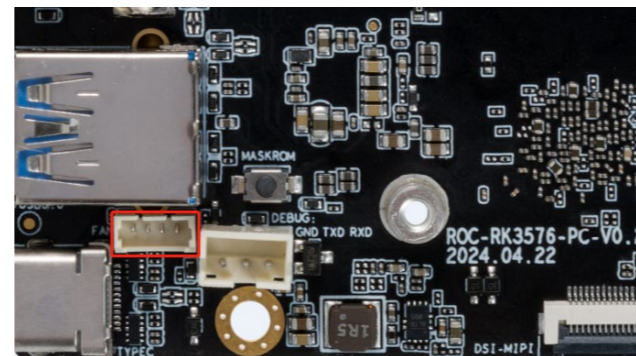
Interface definition

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)

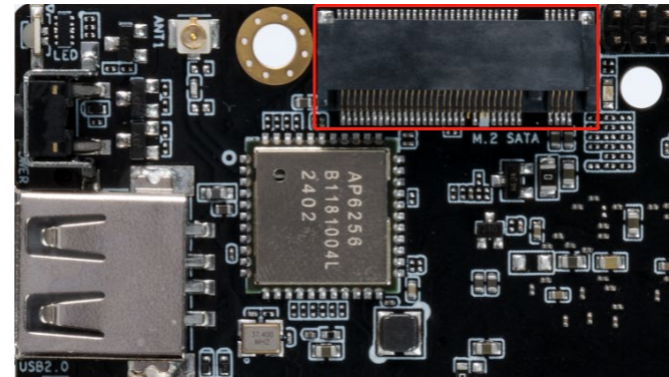


NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	VCC (5V Output)	5
3	FG Input	3.3	4	PWM Output	3.3

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

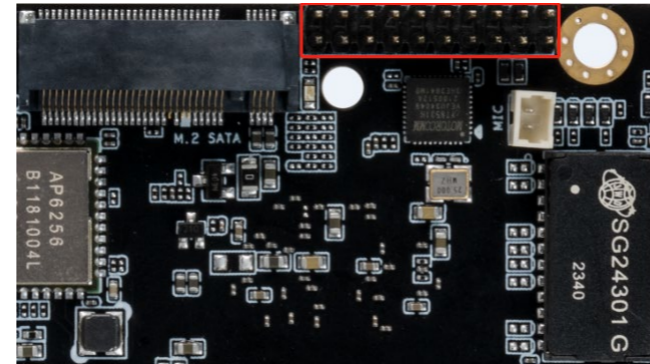


29	NC		30	NC	
31	NC		32	NC	
33	GND		34	NC	
35	NC		36	NC	
37	NC		38	DEVSLP [pull up resistor10K]	3.3
39	GND		40	NC	
41	PCIE0_RXN/SATA0_RXN	-	42	NC	
43	PCIE0_RXP/SATA0_RXP	-	44	NC	
45	GND		46	NC	
47	PCIE0_TXN/SATA0_TXN (Series capacitor 100nF)	-	48	NC	
49	PCIE0_TXP/SATA0_TXP (Series capacitor 100nF)	-	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)

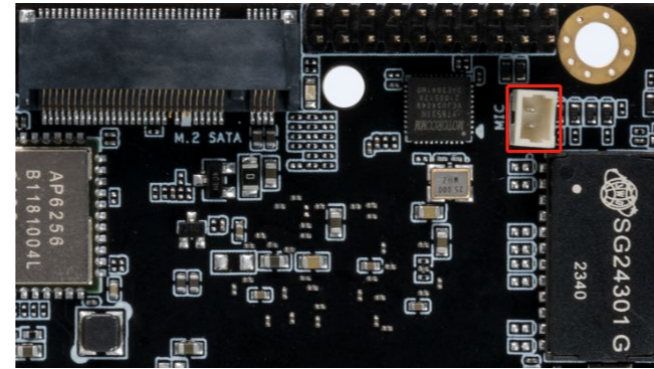


NO.	Definition	Power/V	NO.	Definition	Power/V
1	HUB_HOST_DM3	-	2	HUB_HOST_DP3	-
3	HUB_HOST_DM4	-	4	HUB_HOST_DP4	-
5	GND		6	GND	
7	LINEOUT_L (40m/32ΩW)	3.3	8	LINEOUT_R (40m/32ΩW)	3.3
9	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0V (MAX:500mA)	10	I2C3_SDA_M0 【GPIO4_B4_d】 Pull-up resistor 2.2K	3.3
11	VCC_3V3_S3 (3.3V 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	3.3	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)

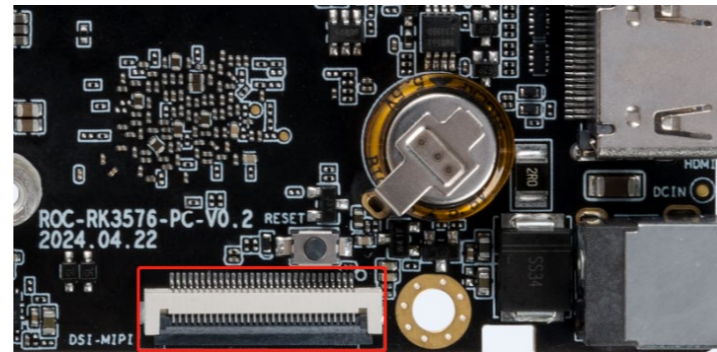


NO.	Definition	Power/V	NO.	Definition	Power/V
1	MIC2P	3.3	2	MIC2N	3.3

Interface definition



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



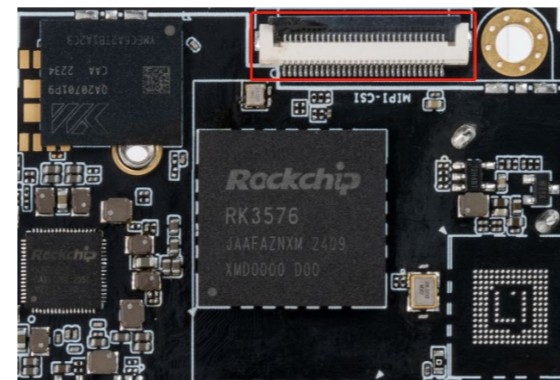
NO.	Definition	Power/V	NO.	Definition	Power/V
1	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0	16	MIPI_DPHY_DSI_TX_D0P	-
2	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0	17	MIPI_DPHY_DSI_TX_D0N	-
3	VCC5V0_DEVICE_S0 (5.0V OUTPUT)	5.0	18	GND	
4	GND		19	MIPI_DPHY_DSI_TX_D1P	-
5	NC		21	MIPI_DPHY_DSI_TX_D1N	-
6	VCC_3V3_S3 (3.3V 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	-

Interface definition



15	GND		30	GND	
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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	-

Interface definition



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



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