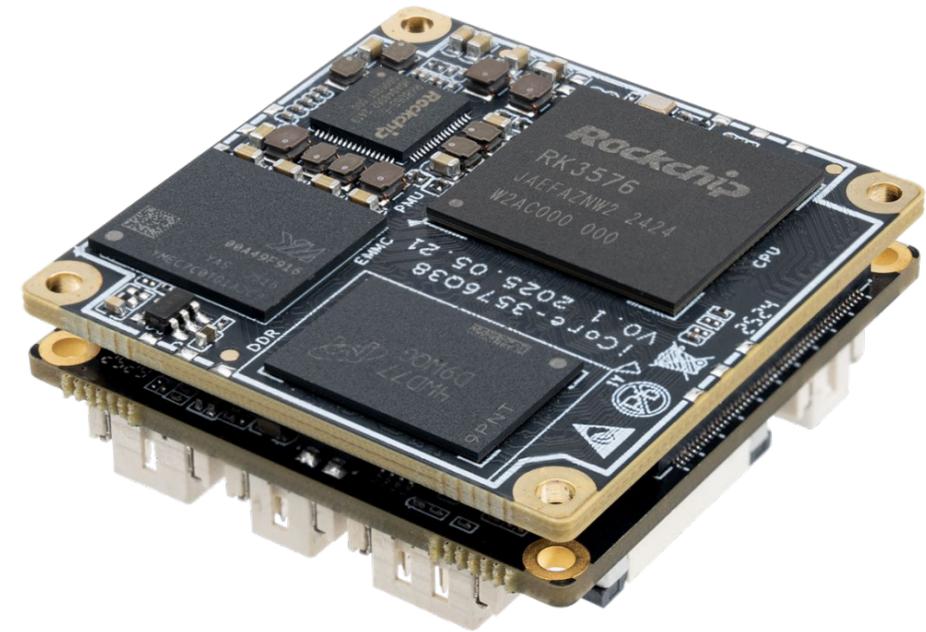# Mini AI Mainboard

CAM-3576Q38 (Commercial)

CAM-3576JQ38 (Industrial)

CAM-3576MQ38 (Automotive)

V0.2　2025-10-15

T-CHIP INTELLIGENCE TECHNOLOGY

Product features

Octa-core 64-bit AIOT processor RK3576

It adopts Rockchip's new generation of high-performance AIoT chip RK3576 series, octa-core 64-bit, large and small core architecture (4×A72 +4×A53), advanced process, and the main frequency is up to 2.2GHz.

Built-in 6TOPS computing power NPU

NPU computing power up to 6TOPS, support INT4/INT8 and other operations, support dual-core collaborative or independent work, support multi-tasking, multi-scenario parallelism; Support the privatization and deployment of YOLO and large language models.

4K@120fps high frame rate video decoding

Support 8K@30fps/4K@120fps decode (H.265/HEVC, VP9, AVS2, AV1) , 4K@60fps encode (H.265/HEVC, H.264/AVC). It supports HDMI/eDP, MIPI DSI, DP and other display interfaces, and supports three-screen different display and 4K@120Hz ultra-clear display to meet the diverse display needs of multiple scenes.

Powerful ISP image processing capabilities

Built-in 16 million pixel ISP, support low-light noise reduction, support RGB-IR sensor, support up to 120dB HDR, AI-ISP to improve low-noise image effect. Support MIPI-CSI D-PHY inputs.

Product features

Supports RTLinx and multiple operating systems

Supports RTLinx kernel with excellent real-time performance; Supports Android 14, Linux OS, and Buildroot operating systems, providing a secure and stable system environment for product development and production.

38mm × 38mm mini size

With an overall size of only 38mm×38mm×11.5mm, the motherboard can be seamlessly embedded in compact devices such as smart cameras, drones, and surveillance cameras, with the ultimate miniaturization design, reserving more valuable installation space for the core components of the device.

Abundant expansion interfaces

Equipped with MIPI-CSI, USB2.0, Type-C, RS485, ADC, I2C, UART, MIC and other expansion interfaces to meet the peripheral expansion needs of different scenarios.
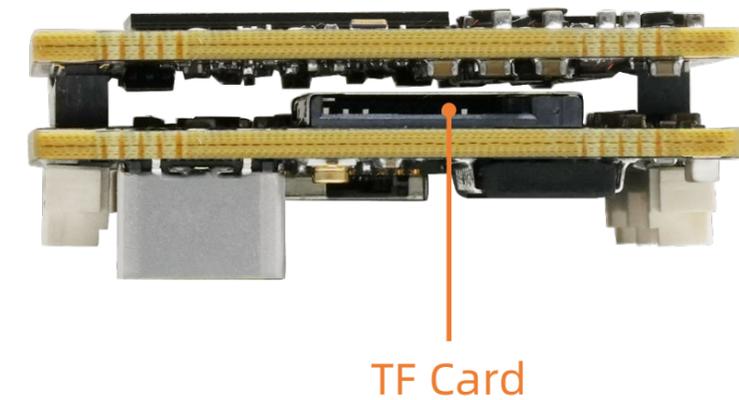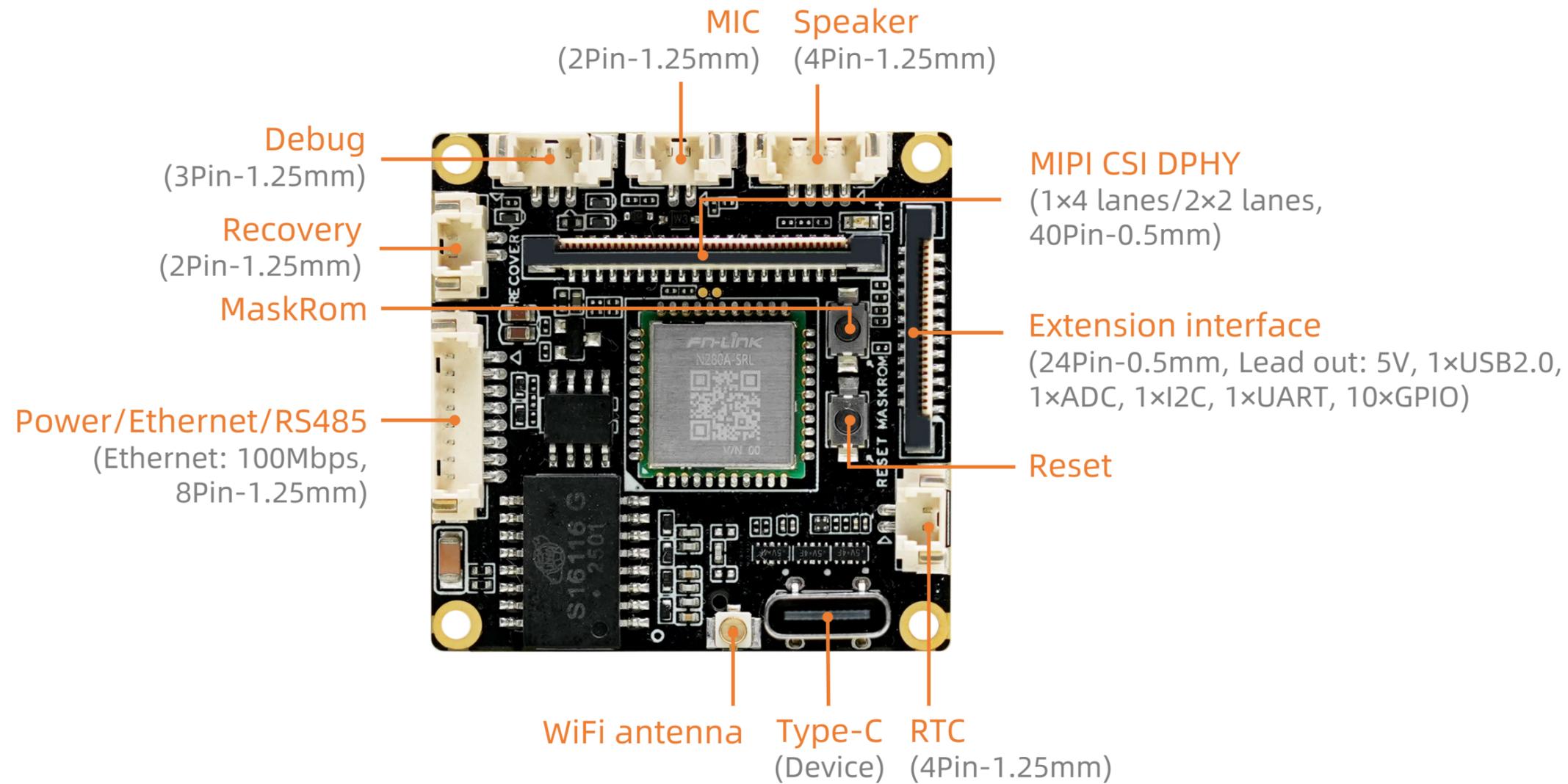
A wide range of applications

It is widely used in: edge computing, large model localization, smart cameras, surveillance cameras, intelligent security, automotive electronics and other industries.
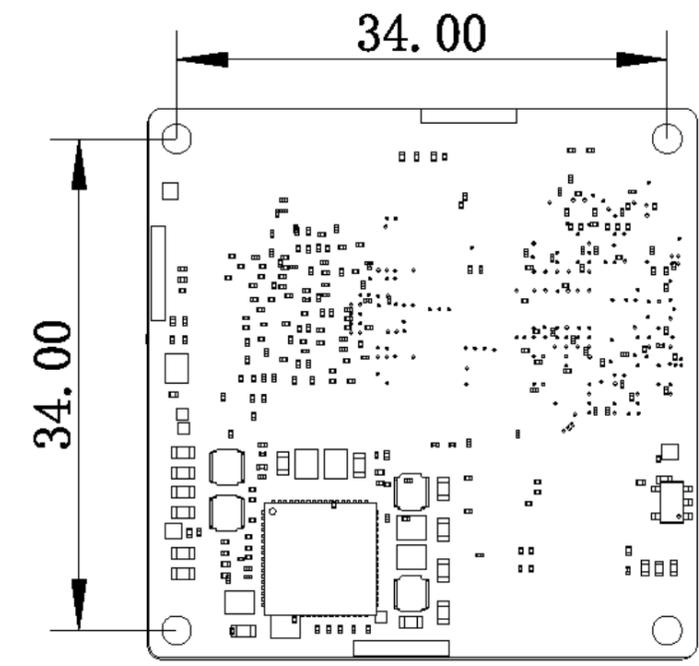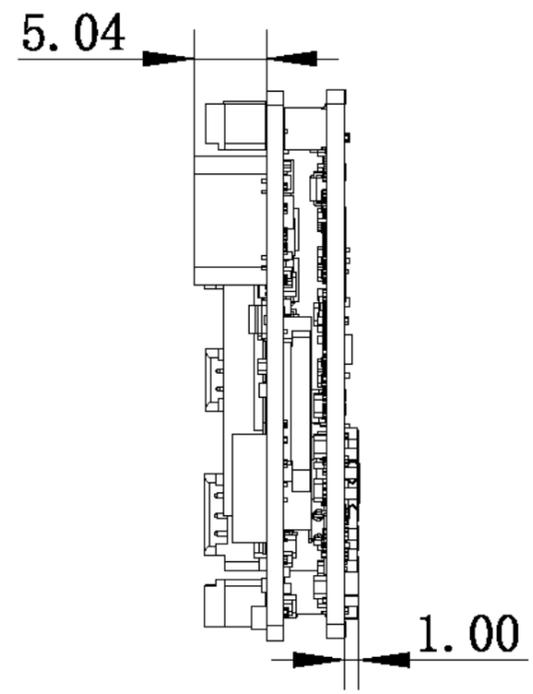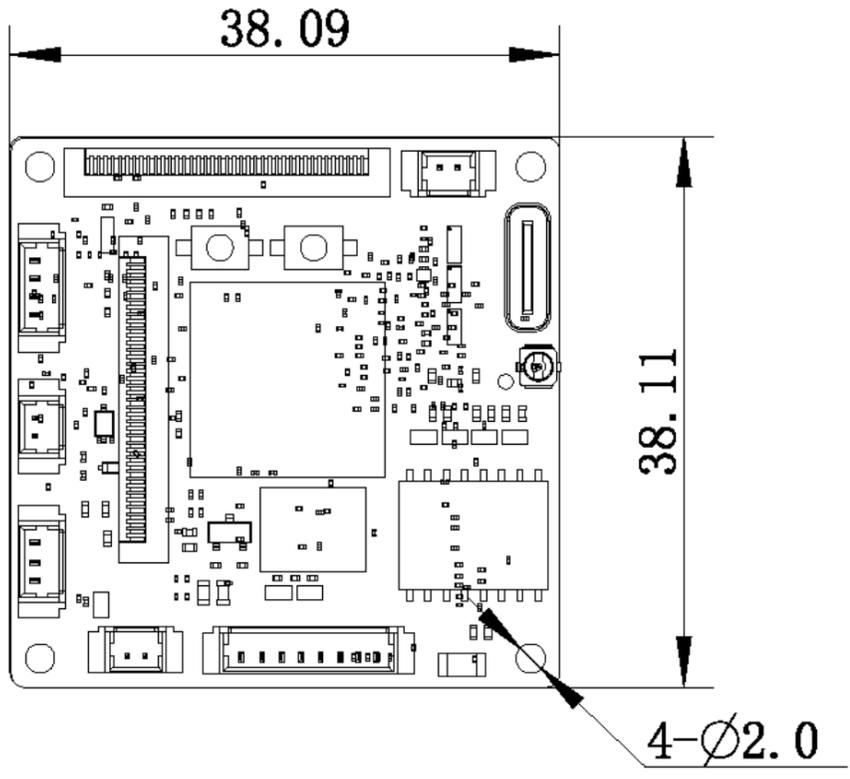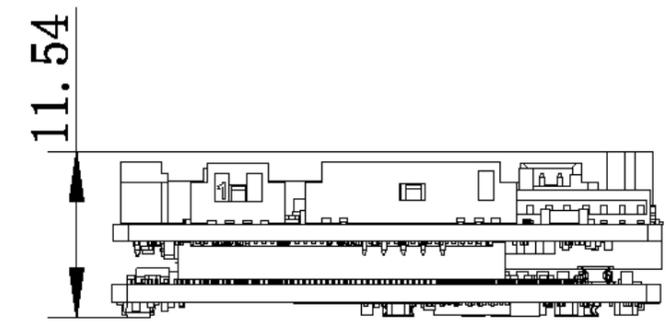
Specifications

		CAM-3576Q38 (Commercial)	CAM-3576JQ38 (Industrial)	CAM-3576MQ38 (Automotive)
Basic Specifications	SOC	Rockchip RK3576	Rockchip RK3576J	Rockchip RK3576M
	CPU	Octa-core 64-bit processor (4×A72 + 4×A53) with a maximum frequency of 2.2GHz	Octa-core 64-bit processor (4×A72 + 4×A53) with a maximum frequency of 1.6GHz	
	GPU	G52 MC3@1GHz, support OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1, embedded with high-performance 2D acceleration hardware		
	NPU	6 TOPS NPU, It supports INT4/INT8/INT16/FP16/BF16/TF32 operations, supports dual-core collaborative or independent work, and supports multi-task and multi-scene parallelism		
	ISP	Built-in 16 million pixel ISP, support low-light noise reduction, support RGB-IR sensor, support up to 120dB HDR, AI-ISP to improve low-noise image effect		
	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) Image codec: 4K@60fps MJPG		
	RAM	LPDDR4/LPDDR4x (4GB/8GB/16GB optional)		
	Storage	eMMC (16GB/32GB/64GB/128GB/256GB optional)		
	Storage expansion	1 × TF Card		
	Power	DC 12V (Connected via 8P-1.25mm Wafer connector)		
	OS	It supports RTLinux kernel and has excellent real-time performance, which is widely used in industrial application scenarios Support Android14, Linux OS, Buildroot, provide a safe and stable system environment for product research and production It has new industrial features such as real-time network, Flexbus, hardware resource isolation, and DSMC to meet the needs of different industrial applications		
	AI performance	Support the privatization deployment of ultra-large-scale parametric models under the Transformer architecture, such as Gemma 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		
		It supports the real-time object detection algorithm YOLO (You Only Look Once), which is fast and real-time compared with traditional object detection methods, and can accurately identify and locate multiple target objects in images or videos, powering AI applications		
	Size	38.09mm × 38.11mm × 11.54mm		
	Weight	≈21g		
	Environment	Operating Temperature: -20℃- 60℃ Storage Humidity: 10% ~ 90%RH (non-condensing)	Operating temperature: -40℃ ~ 85℃ Operating humidity: 10% ~ 90%RH (non-condensing)	Operating temperature: -40℃ ~ 85℃ Operating humidity: 10% ~ 90%RH (non-condensing)
Interface Specifications	Internet	1 × 100M Ethernet (Led out via 8P-1.25mm Wafer connector)		
	Video input	1 × MIPI-CSI DPHY (Supports MIPI V1.2 version; 1×4Lanes or 2×2Lanes, 40Pin-0.5mm)		
	Audio	1 × MIC (2Pin-1.25mm), 1 × Speaker (4Pin-1.25mm, 2×10W/6Ω or 2×10W/8Ω)		
	USB	1 × USB2.0 (Led out via 24Pin-0.5mm FPC connector), 1 × Type-C (Device)		
	Button	1 × Reset, 1 × MaskRom		
	Antenna	1 × WiFi antenna		
	Other interfaces	1 × Expansion Interface (24Pin-0.5mm FPC connector, led out: 5V, 1×USB2.0, 1×ADC, 1×I2C, 1×UART, 10×GPIO), 1 × RS485 (Led out via 8P-1.25mm Wafer connector), 1 × RTC Battery Holder (4Pin-1.25mm), 1 × Debug (3Pin-1.25mm), 1 × Recovery (2Pin-1.25mm)		

Interface description

MIC
(2Pin-1.25mm)

Speaker
(4Pin-1.25mm)

Debug
(3Pin-1.25mm)

MIPI CSI DPHY
(1×4 lanes/2×2 lanes,
40Pin-0.5mm)

Recovery
(2Pin-1.25mm)

MaskRom

Extension interface
(24Pin-0.5mm, Lead out: 5V, 1×USB2.0,
1×ADC, 1×I2C, 1×UART, 10×GPIO)

Power/Ethernet/RS485
(Ethernet: 100Mbps,
8Pin-1.25mm)

Reset

WiFi antenna

Type-C
(Device)

RTC
(4Pin-1.25mm)

TF Card
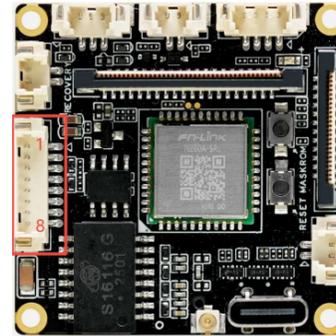
Dimension
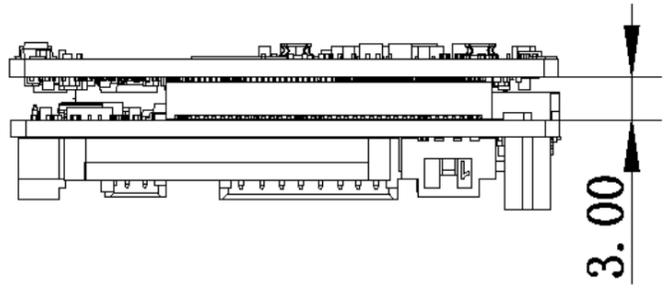
Interface definition

1. (J7) RJ45/RS485 8PIN 1.25mm pitch wafer socket

NO.	Definition	Power/V	NO.	Definition	Power/V
1	12.0V Input	12.0V	5	RX-	-
2	GND		6	RX+	-
3	485_B	3.3V	7	TX-	-
4	485_A	3.3V	8	TX+	-

2. (J13) Recovery key: 2PIN 1.25mm pitch wafer socket
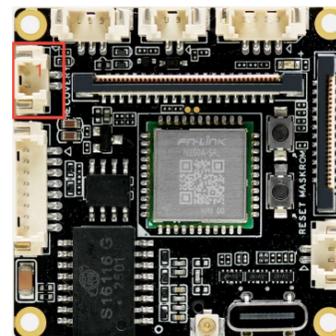
NO.	Definition	Power/V	NO.	Definition	Power/V
1	Recovery	1.8V	2	GND	

Interface definition

3. (J6) DEBUG: 3PIN 1.25mm pitch wafer socket
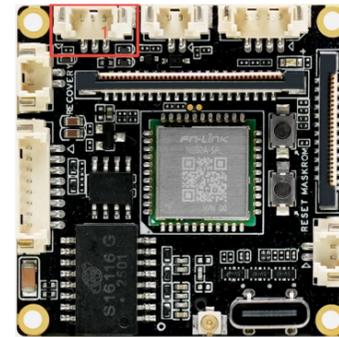
NO.	Definition	Power/V	NO.	Definition	Power/V
1	UART0_RXD	3.3V	3	GND	
2	UART0_TXD	3.3V			

4. (MIC1) MIC 2PIN 1.25mm pitch wafer socket
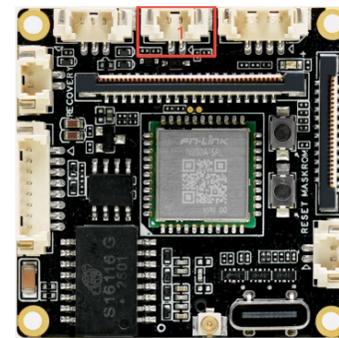
NO.	Definition	Power/V	NO.	Definition	Power/V
1	MIC-	3.3V	2	MIC+	3.3V

Interface definition

5. (J9) Audio 4PIN 1.25mm pitch wafer socket
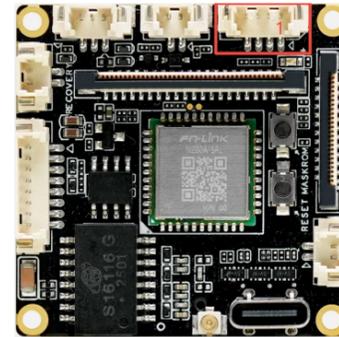
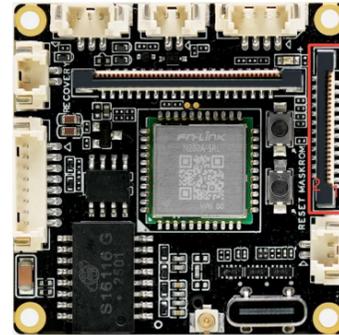| NO.	Definition	Power/V	NO.	Definition	Power/V
1	5.0V Output	5.0V	3	SPK_CTRL Output【GPIO0_c5_d】	3.3V
2	LINE_OUT（series capacitor 1uF）-14mW@32Ω	3.3V	4	GND	

6. (J8) RTC BAT: 2PIN 1.25mm pitch wafer socket
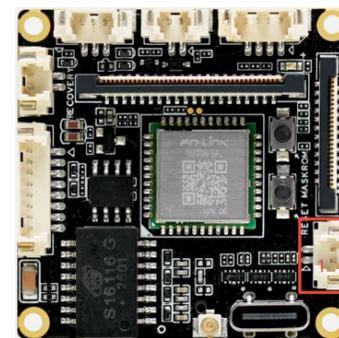
NO.	Definition	Power/V	NO.	Definition	Power/V
1	RTC_BAT+	3.3V	2	GND	

Interface definition

7. (J5) USB/I2C/UART/IO 24PIN 0.5mm pitch

NO.	Definition	Power/V	NO.	Definition	Power/V
1	5.0V Output	5.0V	13	POW_HOLD【GPIO4_C2_d】	3.3V
2	5.0V Output	5.0V	14	GPIO0_B4_d	3.3V
3	5.0V Output	5.0V	15	GPIO0_B5_d	3.3V
4	GND		16	UART8_RTSN_M0【GPIO3_C7_d】	3.3V
5	USB2_HOST1_DP	-	17	UART8_TX_M0【GPIO3_C6_d】	3.3V
6	USB2_HOST1_DM	-	18	UART8_CTSN_M0【GPIO3_D0_d】	3.3V
7	GND		19	UART8_RX_M0【GPIO3_C5_d】	3.3V
8	ADC4 Input	1.8V	20	GND	
9	GND		21	GND	
10	I2C2_SCL_M0【GPIO0_B7_d】	3.3V	22	PWR_EN Output (pull up resistor 10K)	5.0V
11	I2C2_SDA_M0【GPIO0_C0_d】	3.3V	23	5.0V Output	5.0V
12	GPIO4_A1_d	3.3V	24	5.0V Output	5.0V

Interface definition

8. (J4) MIPI CSI 30PIN 0.5mm pitch
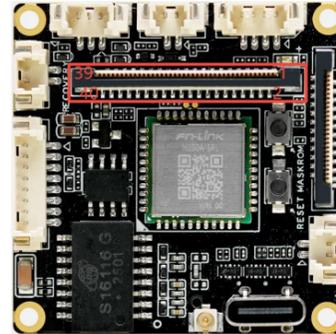
NO.	Definition	Power/V	NO.	Definition	Power/V
1	3.3V Output	3.3V	21	MIPI_DPHY_CSI1_RX_D1N	-
2	3.3V Output	3.3V	22	MIPI_DPHY_CSI1_RX_D0P	-
3	SPI0_CLK_M0【GPIO0_C7_d】	3.3V	23	MIPI_DPHY_CSI1_RX_D0N	-
4	GPIO0_C4_d	3.3V	24	GND	
5	SPI0_CSN0_M0【GPIO0_C6_d】	3.3V	25	MIPI_CSI_CLK0【GPIO3_D7】	1.8V
6	SPI0_MISO_M0【GPIO0_D1_d】	3.3V	26	GND	
7	SPI0_MOSI_M0【GPIO0_D0_d】	3.3V	27	GPIO0_D3_d	3.3V
8	I2C9_SDA_M2【GPIO2_D4_d】	1.8V	28	GPIO4_B4_d	3.3V
9	I2C9_SCL_M2【GPIO2_D5_d】	1.8V	29	GPIO4_B5_d	3.3V
10	GPIO2_D7_d	1.8V	30	GPIO4_A6_d	3.3V
11	GPIO2_C4_d	1.8V	31	GPIO4_A4_d	3.3V
12	GND		32	GPIO4_A3_d	3.3V
13	MIPI_DPHY_CSI1_RX_CLKP	-	33	GPIO4_A5_d	3.3V
14	MIPI_DPHY_CSI1_RX_CLKN	-	34	GPIO2_C5_d	1.8V
15	GND		35	GPIO2_C3_d	1.8V

Interface definition

16	MIPI_DPHY_CSI1_RX_D2P/MIPI_DPHY_CSI2_RX_D0P	-	36	ADC3_Input	1.8V
17	MIPI_DPHY_CSI1_RX_D2N/MIPI_DPHY_CSI2_RX_D0N	-	37	GND	
18	MIPI_DPHY_CSI1_RX_D3P/MIPI_DPHY_CSI2_RX_D1P	-	38	1.8V Output	1.8V
19	MIPI_DPHY_CSI1_RX_D3N/MIPI_DPHY_CSI2_RX_D1N	-	39	12.0V Output	12.0V
20	MIPI_DPHY_CSI1_RX_D1P	-	40	12.0V Output	12.0V

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