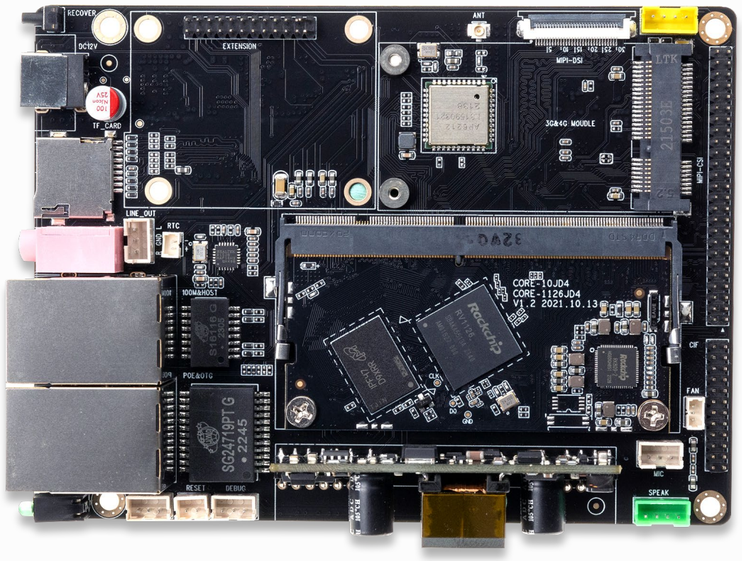
High-performance AI Smart Vision Mainboard

- AIO-1126JD4(Commercial)
- AIO-1126KJD4(Industrial)



V1.0 2024-3-18

T-CHIP INTELLIGENCE TECHNOLOGY

Product features

Quad-core AI vision processor RV1126

It adopts the 14nm low-power AI vision processor RV1126 series, has a quad-core 32-bit ARM Cortex-A7 architecture, integrates NEON and FPU, and the main frequency is up to 1.5GHz, w hich can achieve fast boot of FastBoot, and supports TrustZone technology and multiple cryp tographic engines.

4K H.265/H.264 multiplexing

It supports 4K H.264/H.265@30FPS and multi-channel video encoding and decoding, which c an meet the requirements of low bit rate, low latency encoding, and perception coding, and occupies a small space area.

High performance and high computing power NPU/2.0 TOPS

Built-in 2.0Tops neural network processor NPU, supporting conversion deployment of Tensor Flow, PyTorch, Caffe, MxNet, DarkNet, ONNX, etc.

14 million ISP 2.0 / 3 frames HDR

It has multi-level noise reduction, 3-frame HDR and other technologies, and black light full-c olor technical characteristics to meet the industry needs of security products and AIoT

Product features

Support 3 cameras input at the same time

At the same time, it supports 2 sets of MIPI CSI, can be adapted to RGB &IR binocular cameras , a set of 16-bit parallel port (DVP) input, and supports 3 cameras input at the same time.

Open data, independent customization

Provide a complete software development SDK, including cross-compilation chain, BSP sourc e code, development environment, documentation, examples, face recognition algorithms, e tc., which can be deeply customized.

Abundant expansion interfaces

Support MIPI-DSI, MIPI-CSI, CIF/DVP, Gigabit Ethernet, POE+, Mini PCIe(4G/3G), USB2.0, UART, I2C and other expansion interfaces.

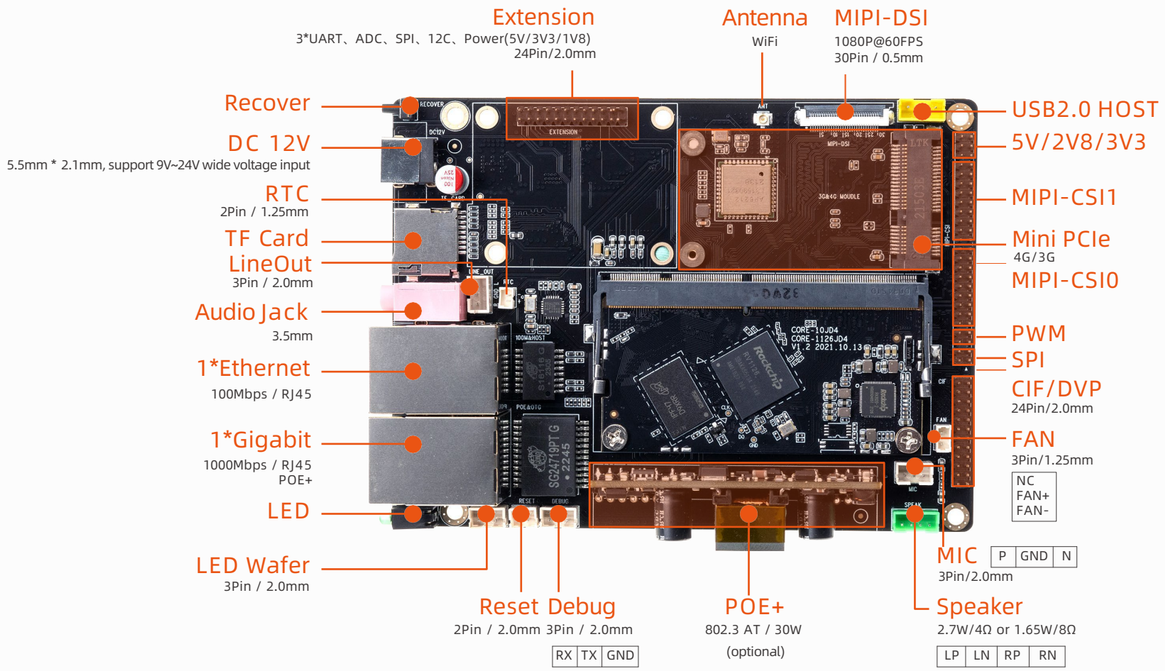
Wide range of application scenarios

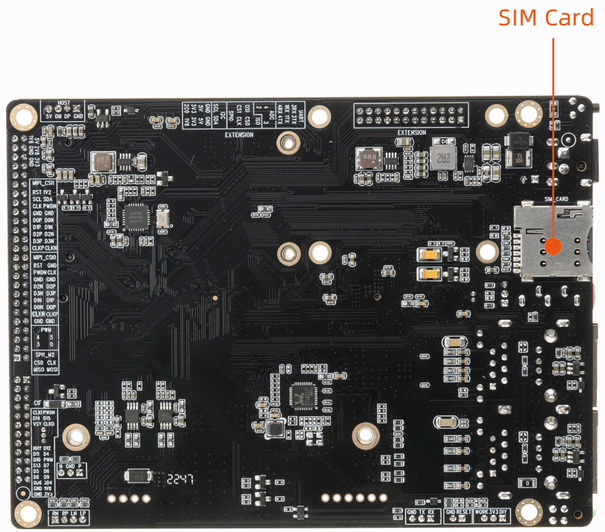
It is widely used in face recognition, gesture recognition, turnstile access control, intelligent s ecurity, IPC smart webcam, smart doorbell, smart finance/construction site, smart travel and other scenarios.

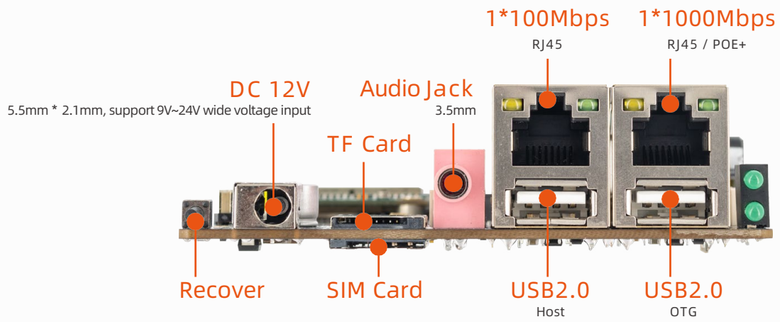
Specifications

		AIO-1126JD4(Commercial)	AIO-1126KJD4(Industrial)
Basic Specifications	SOC	RV1126 Quad-core 32-bit ARM Cortex-A7, RISC-V MCU, up to 1.5GHz	RV1126K Quad-core 32-bit ARM Cortex-A7, RISC-V MCU, up to 1.5GHz
	NPU	2.0TOPs, support 8bit/16bit operation and TensorFlow, TensorFlow lite, Pytorch, Caffe, Mxnet, Darknet, Onnx	
	ISP	14-million-pixel ISP, 3-frame HDR	
	VPU	4K H.264/H.265 30fps video encoding(3840 x 2160@30 fps+720p@30 fps encoding) 4K H.264/H.265 30fps video decoding(3840 x 2160@30 encoding + 3840 x 2160@30 fps decoding)	
	RAM	LPDDR4(1GB/2GB/4GB optional)	
	Storage	eMMC(8GB/16GB/32GB optional), 1 * TF Card Slot	
	Power	DC 12V/2A(5.5mm * 2.1mm, support 9V~24V wide voltage input)	
	OS	Buildroot+QT, Debian	
	Size	128mm * 94.5mm	
	Environment	Operating Temperature:-20℃ ~ 60℃ Storage Humidity:10% ~ 90%RH(non-condensing)	Operating Temperature:-20℃ ~ 70℃ Storage Humidity:10% ~ 90%RH(non-condensing)
Interface Specifications	Ethernet	1 * 1000M bps Ethernet(RJ45), support POE+ (802.3 AT / 30W) (Optional),1 * 100M bps Ethernet(RJ45)	
	WiFi	2.4GHz WiFi, 802.11 b/g/n, support Bluetooth 4.2 and extended 4G/3G network (via Mini PCIe)	
	Video input	2 * MIPI-CSI(Led by 2.0mm pin header), 1 * CIF/DVP(24Pin/2.0mm)	
	Video output	1 * MIPI-DSI(1080P@60FPS, 30Pin/0.5mm)	
	Audio output	1 * 3.5mm Audio Jack, 1 * LineOut(3Pin / 2.0mm)	
	USB	2 * USB2.0 Host(Max：500mA) (One of the routes is led by the Wafer seat), 1 * USB2.0 OTG (Max：500mA)	
	Extended interfaces	1 * Extension(24Pin/2.0mm): 3*UART, ADC, SPI, 12C, Power(5V/3V3/1V8) 1 * RTC(2Pin/1.25mm) 1 * LED Wafer(3Pin/2.0mm) 1 * Reset(2Pin/2.0mm) 1 * Debug(3Pin/2.0mm) 1 * PWM(2.0mm pin header) 1 * SPI(2.0mm pin header) 1 * FAN(3Pin/1.25mm) 1 * Mic(3Pin/2.0mm) 1 * Speaker(2.7W/4Ω or 1.65W/8Ω)	

Interface description







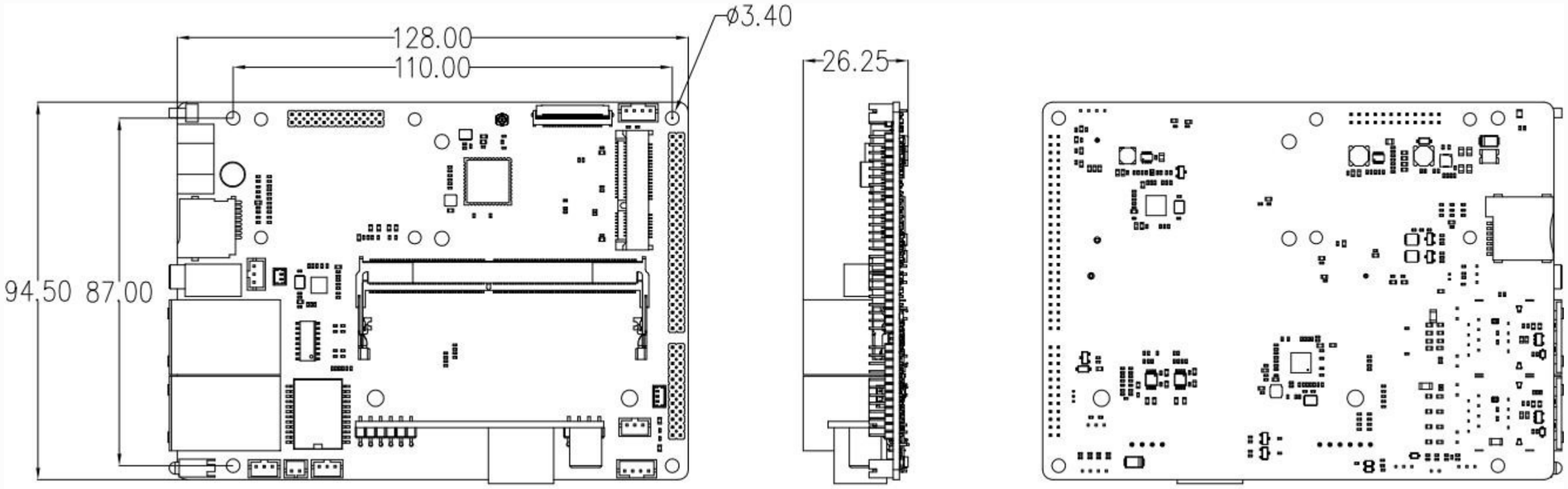
The backplane has a hardware foundation such as Gigabit Ethernet interface and POE, which can realize AI smart webcam AI recognition and RTSP streaming. The motherboard reserves two sets of MIPI-CSI, which can be adapted to RGB&IR binocular cameras, which can be applied to face recognition, gate access control, IPC network cameras and other fields.

The baseplate is compatible with the following core boards:

1.Core-1109-JD4

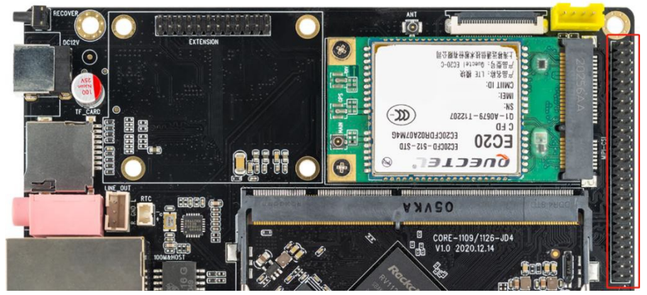
2.Core-1126-JD4/Core-1126K-JD4

Dimension



Interface definition

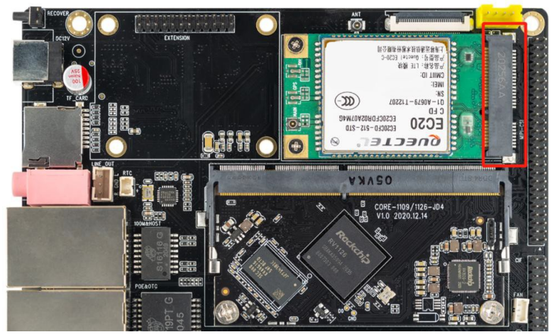
1. (J13) Dual PIN (25X2) 50 PIN 2.0 Pitch Expansion Port



NO.	Definition	Power/V	NO.	Definition	Power/V
1	PWM8_M1/SPI1_MISO_M2	3.3	2	PWM9_M1/SPI1_MOSI_M2	3.3
3	PWM6_M1/SPI1_CS0_M2	3.3	4	PWM10_M1/SPI1_CLK_M2	3.3
5	PWM3_M1	3.3	6	CIFD3/PWM0_M1	3.3
7	PWM4_M0	3.3	8	PWM5_M0	
9	GND		10	GND	
11	MIPI_CSI_RX0_CLKN	1.8	12	MIPI_CSI_RX0_CLKP	1.8
13	MIPI_CSI_RX0_D0N	1.8	14	MIPI_CSI_RX0_D0P	1.8
15	MIPI_CSI_RX0_D1N	1.8	16	MIPI_CSI_RX0_D1P	1.8
17	MIPI_CSI_RX0_D3N	1.8	18	MIPI_CSI_RX0_D3P	1.8
19	MIPI_CSI_RX0_D2N	1.8	20	MIPI_CSI_RX0_D2P	1.8
21	GND		22	GND	
23	MIPI_CSI_PWDN0	1.8	24	MIPI_CSI_CLK0	1.8
25	MIPI_CSI_RST0	1.8	26	GND	
27	MIPI_CSI_RX1_CLKP	1.8	28	MIPI_CSI_RX1_CLKN	1.8
29	MIPI_CSI_RX1_D3P	1.8	30	MIPI_CSI_RX1_D3N	1.8
31	MIPI_CSI_RX1_D2P	1.8	32	MIPI_CSI_RX1_D2N	1.8
33	MIPI_CSI_RX1_D1P	1.8	34	MIPI_CSI_RX1_D1N	1.8
35	MIPI_CSI_RX1_D0P	1.8	36	MIPI_CSI_RX1_D0N	1.8
37	GND		38	GND	
39	MIPI_CSI_CLK1	1.8	40	MIPI_CSI_PWDN1	3.3
41	I2C1_SCL(On-board pull-up resistor (2.2K))	1.8	42	I2C1_SDA (On-board pull-up resistor (2.2K))	1.8
43	MIPI_CSI_RST1	1.8	44	VCC1V2_DVDD	1.2

45	GND		46	VCC_3V3	3.3
47	GND		48	VCC2V8_AVDD	2.8
49	VCC1V8_DOVDD	1.8	50	VCC_5V	5.0

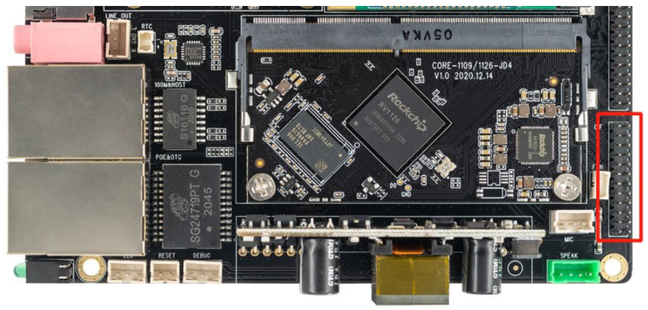
2. (J4) Mini PCIE interface 52pin (for 4G modules)



NO.	Definition	Power/V	NO.	Definition	Power/V
1	NC		2	VCC3V8_4G	3.8
3	NC		4	GND	
5	NC		6	NC	
7	NC		8	UIM_PWR	1.8
9	GND		10	UIM_DAT	1.8
11	NC		12	UIM_CLK	1.8
13	NC		14	UIM_RST	1.8
15	GND		16	NC	
17	NC		18	GND	
19	NC		20	NC	
21	GND		22	Reset	3.8
23	NC		24	NC	
25	NC		26	GND	
27	GND		28	NC	
29	GND		30	NC	
31	NC		32	NC	
33	NC		34	GND	
35	GND		36	HUB1_HOST_DM3	3.3
37	GND		38	HUB1_HOST_DP3	3.3
39	VCC3V8_4G	3.8	40	GND	

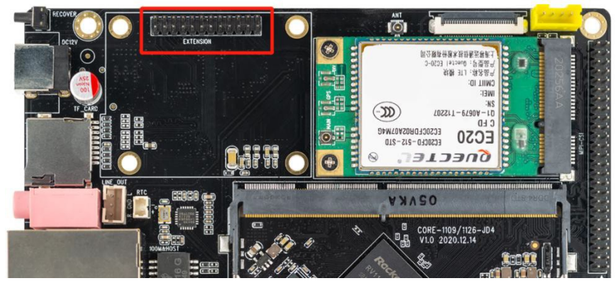
41	VCC3V8_4G	3.8	42	NC	
43	GND		44	NC	
45	NC		46	NC	
47	NC		48	NC	
49	NC		50	GND	
51	NC		52	VCC3V8_4G	3.8

3. (J18) Double PIN (12X2) 24 PIN 2.0 Pitch Expansion Interface



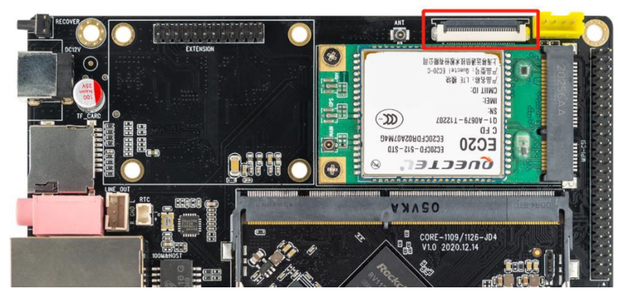
NO.	Definition	Power/V	NO.	Definition	Power/V
1	CIF_PWDN	3.3	2	CIF_CLKIN_M0	3.3
3	GMAC_MDIO_M0/D15	3.3	4	CIF_D14	3.3
5	GMAC_TXCLK_M0/CLKOUT	3.3	6	GMAC_MDC_M0/VSYNC	3.3
7	GMAC_CLK_M0/D12	3.3	8	GMAC_RXCLK_M0/NHYNC	3.3
9	GMAC_RXD3_M0/D4	3.3	10	GMAC_RXD1_M0/D11	3.3
11	GMAC_RXD2_M0/PWM11_M0	3.3	12	GMAC_RXD0_M0/D10	3.3
13	GMAC_TXD0_M0/D7	3.3	14	GMAC_RXDV_M0/D13	3.3
15	GMAC_TXD3_M0/D6	3.3	16	GMAC_TXD2_M0/D5	3.3
17	GMAC_TXEN_M0/D9	3.3	18	GMAC_TXD1_M0/D8	3.3
19	GPIO3_D4	1.8	20	GPIO0_D6	3.3
21	VCC_1V8	1.8	22	GND	
23	VCC_3V3	3.3	24	GND	

4. (J19) Double PIN (12X2) 24 PIN 2.0 Pitch Expansion Interface



NO.	Definition	Power/V	NO.	Definition	Power/V
1	UART3_TX	3.3	2	UART3_RX	3.3
3	UART1_TX	3.3	4	UART1_RX	3.3
5	UART4_TX	3.3	6	PWM4_M1/UART4_RX	3.3
7	ADCIN2	1.8	8	ADCIN4	1.8
9	SPI0_MISO_M1	1.8	10	ADCIN3	1.8
11	SPI0_CS0N_M1	1.8	12	SPI0_MOSI_M1	1.8
13	SPI0_CLK_M1	1.8	14	SPI0_CS1N_M1	1.8
15	I2C1_SDA(On-board pull-up resistor (2.2K))	1.8	16	I2C1_SCL(On-board pull-up resistor (2.2K))	1.8
17	GND		18	GND	
19	VCC_5V	5.0	20	VCC_5V	5.0
21	VCC_3V3	3.3	22	VCC_3V3	3.3
23	VCC_1V8	1.8	24	GPIO_2C0	

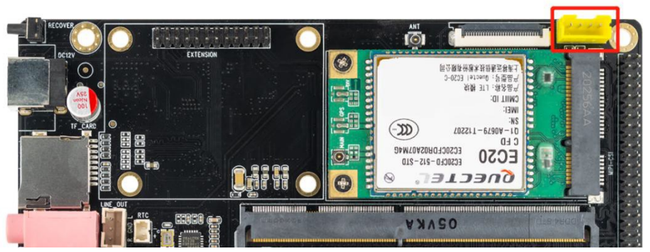
5. (J15) MIPI_Display_Interface 30 PIN 0.5 Pitch



NO.	Definition	Power/V	NO.	Definition	Power/V
1	VCC_SYS	5.0V	16	MIPI_DSI _D0P	1.8V

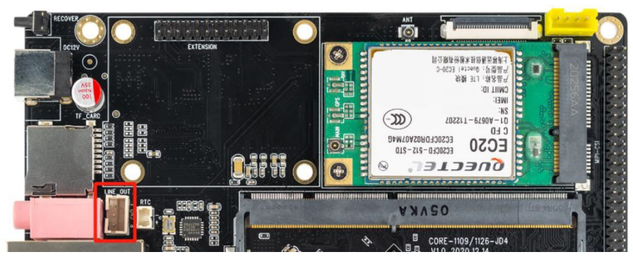
2	VCC_SYS	5.0V	17	MIPI_DSI _D0N	1.8V
3	VCC_SYS	5.0V	18	GND	
4	GND		19	MIPI_DSI _D1P	1.8V
5	NC		20	MIPI_DSI _D1N	1.8V
6	VCC_3V3	3.3V	21	GND	
7	I2C1_SDA_3V3(On-board pull-up resistor (2.2K))	3.3V	22	MIPI_DSI _CLKP	1.8V
8	I2C1_SCL_3V3(On-board pull-up resistor (2.2K))	3.3V	23	MIPI_DSI _CLKN	1.8V
9	LCD_PWREN(GPIO0_D6_d)	1.8V	24	GND	
10	TP_INT(GPIO1_A0_u)	3.3V	25	MIPI_DSI _D2P	1.8V
11	BL_EN(GPIO1_A3_u)	3.3V	26	MIPI_DSI _D2N	1.8V
12	LCD_BL_PWM(GPIO3_A6_d)	3.3V	27	GND	
13	LCD_RST_3V3(GPIO1_A2_u)	3.3V	28	MIPI_DSI _D3P	1.8V
14	TP_RST(GPIO0_D4_u)	3.3V	29	MIPI_DSI _D3N	1.8V
15	GND		30	GND	

6. (J23) USB_HOST 4 PIN 2.0mm Pitch Wafer



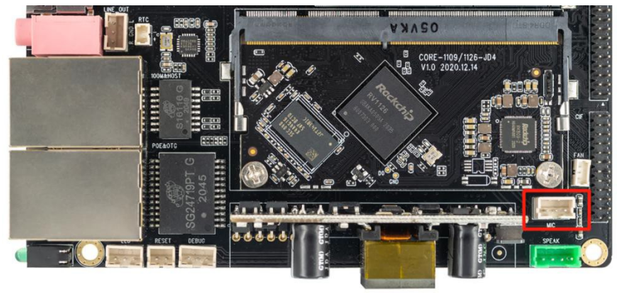
NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	HUB1_HOST_DP4	3.3
3	HUB1_HOST_DM4	3.3	4	VCC5V0_HOST	5.0

7. (J16) Line-Out 3 PIN 2.0mm Pitch Wafer



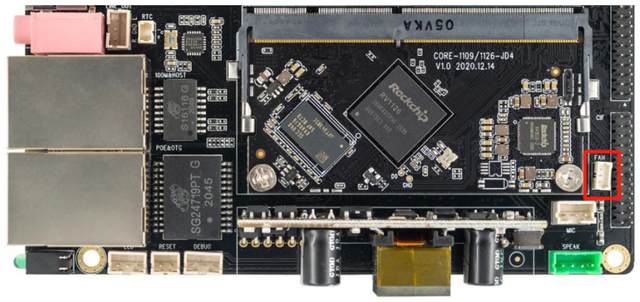
NO.	Definition	Power/V	NO.	Definition	Power/V
1	LINE_OUT_R		2	HP_AGND	
3	LINE_OUT_L	3.3			

8. (J1) MIC-IN3 PIN 2.0mm Pitch Wafer



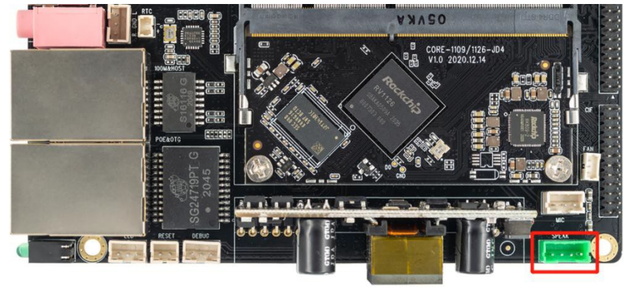
NO.	Definition	Power/V	NO.	Definition	Power/V
1	MIC1_INP	1.8	2	GND	
3	MIC1_INN	1.8			

9. (J12) FAN 3 PIN 2.0mm Pitch Wafer



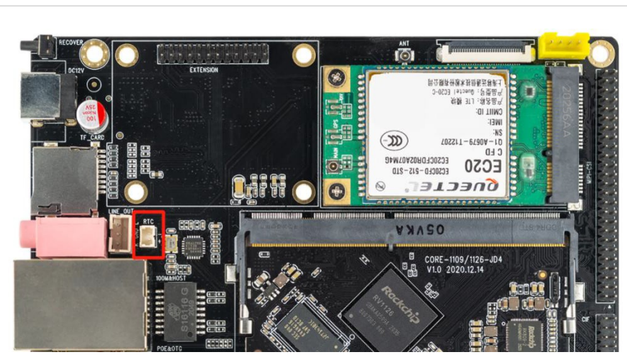
NO.	Definition	Power/V	NO.	Definition	Power/V
1	NC		2	FAN+	12
3	FAN-	12			

10. (J14) Speaker-Out 4 PIN 2.0mm Pitch Wafer



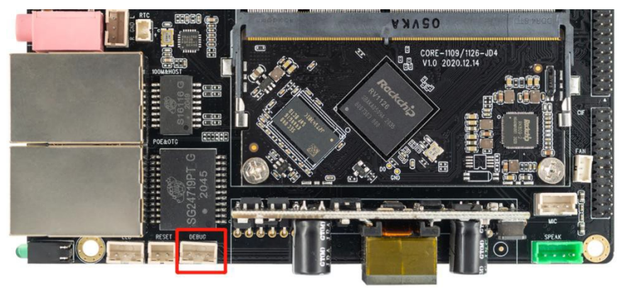
NO.	Definition	Power/V	NO.	Definition	Power/V
1	SPK_R_N	5.0	2	SPK_R_P	5.0
3	SPK_L_N	5.0	4	SPK_L_P	5.0

11. (J9) RTC_BAT 2 PIN 2.0mm Pitch Wafer



NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	VCC_RTC	3.3

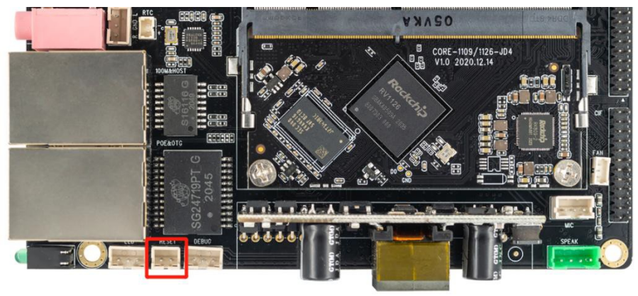
12. (J10) DEBUG 3 PIN 2.0mm Pitch Wafer



NO.	Definition	Power/V	NO.	Definition	Power/V

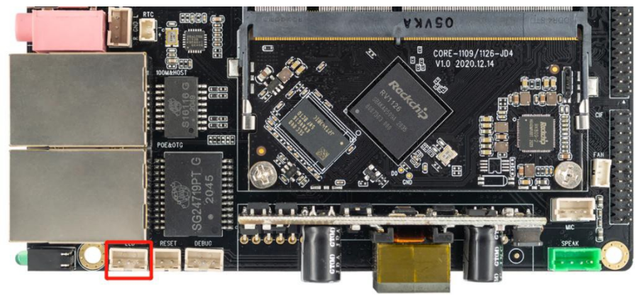
1	UART2_RXD	3.3	2	UART2_TXD	3.3
3	GND				

13. (J11) POWER-KEY 2 PIN 2.0mm Pitch Wafer



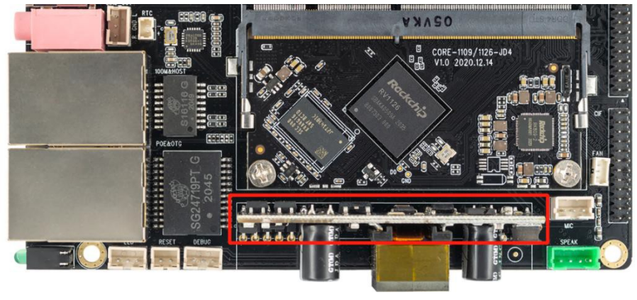
NO.	Definition	Power/V	NO.	Definition	Power/V
1	POWER_ON	5.0	2	GND	

14. (J20) LED 3 PIN 2.0mm Pitch Wafer



NO.	Definition	Power/V	NO.	Definition	Power/V
1	DIY_LED	3.3	2	VCC_3V3	3.3
3	WORK_LED	3.3			

15. (U10) POE module interface



NO.	Definition	Power/V	NO.	Definition	Power/V
1	NC		2	NC	
3	POW_VA1	48	4	POW_VA2	48
5	POW_VB1	48	6	POW_VB2	48
7	GND		8	GND	
9	DC_12V	12.0	10	DC_12V	12.0

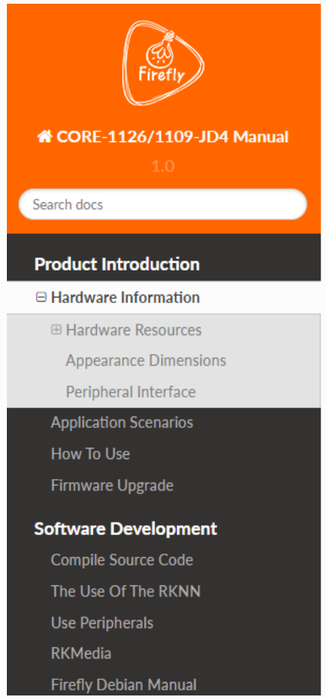
How to use

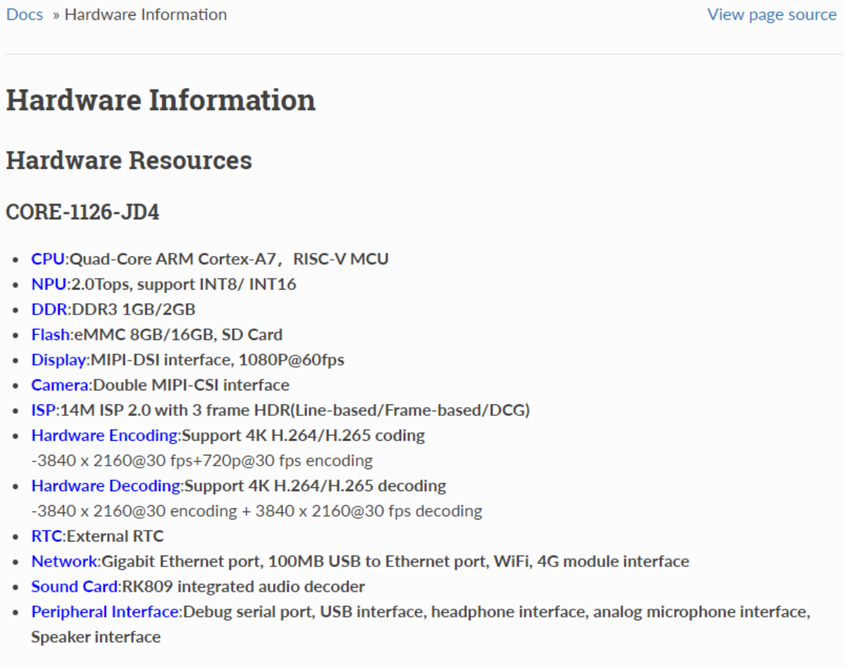
High-performance AI Smart Vision Mainboard

- AIO-1126JD4(Commercial)
- AIO-1126KJD4(Industrial)

- Application scenarios (webcams, face turnstiles, cluster edge computing)
- Firmware upgrade
- Source code compilation
- RKNN use
- Peripheral connection (MIPI display, camera, POE, 4G module)

For more details, please refer to the official website WiKi Wiki Tutorial (Click to view)





T-CHIP INTELLIGENCE TECHNOLOGY

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