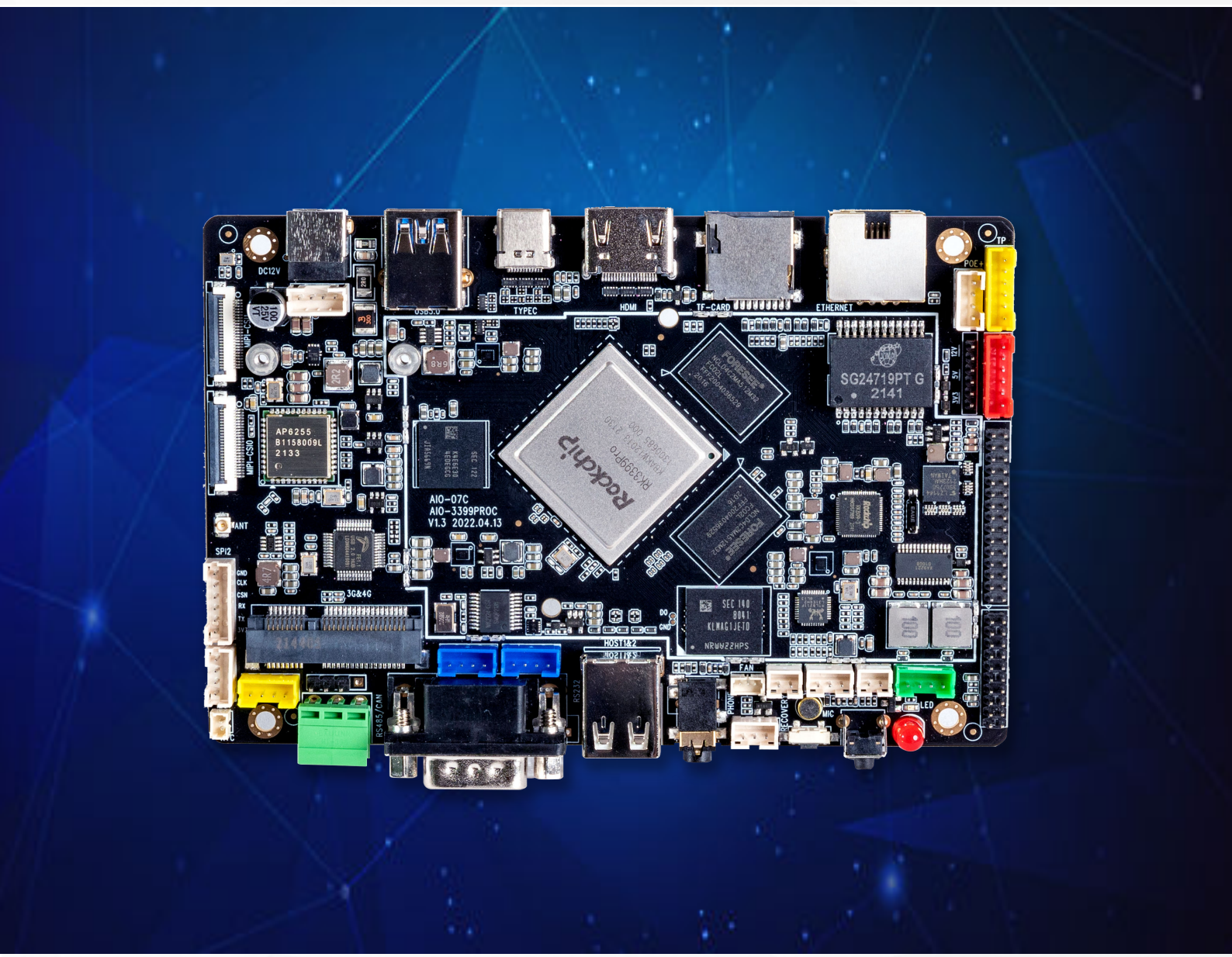
AIO-3399ProC

Six-Core High Performance AI Mainboard

V1.3



T-CHIP INTELLIGENCE TECHNOLOGY CO.,LTD.

www.t-firefly.com

Update history

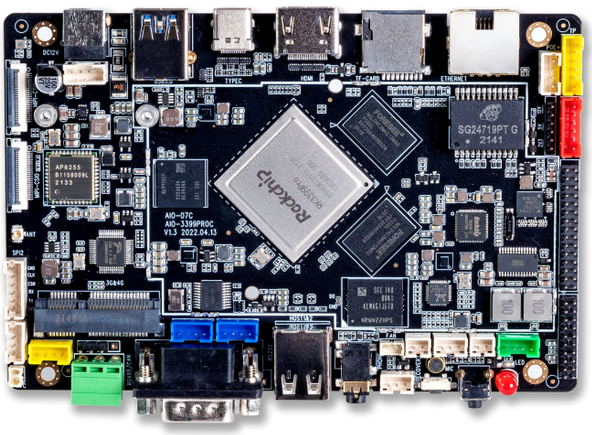
Version	Date	Details
V1.0	2021-6-2	Original version
V1.3	2022-6-9	Interface definition update

Specification

Basic	
SOC	Rockchip RK3399Pro
CPU	Dual-core Cortex-A72+ Quad-core Cortex-A53 big.LITTLE core CPU architecture, frequency up to 1.8G Hz
GPU	ARM® Mali-T860 MP4 Quad-core GPU Support OpenGL ES1.1/2.0/3.0/3.1, OpenVG1.1, OpenCL, DX11 Support AFBC（frame buffer compression）
NPU	Built-in neural network processor NPU 1. Support 8bit/16bit operation, computing performance up to **3.0TOPS**. 2. Compared with using the traditional GPU as the large chip scheme of AI computing unit, the power consumption of NPU is merely 1% of that of GPU. 3. Load Caffe / Mxnet / TensorFlow models directly. 4. Provide AI development tools: Support model fast conversion, support end-to-side API, support TensorFlow / TF Lite / Caffe / ONNX / Darknet models. 5. Provide AI application development interface: Support Android NN API, provide RKNN cross-platform API, Linux support for TensorFlow development.
VPU	Support 4K VP9 and 4K 10bits H265/H264 video decoding, up to 60fps 1080P multi-format video decoding (WMV, MPEG-1/2/4, VP8) 1080P video coding, support H.264, VP8 format Video post processor,
RAM	3GB（NPU 1GB LPDDR3 + CPU 2GB LPDDR4） 6GB（NPU 2GB LPDDR3 + CPU 4GB LPDDR4）
Storage	High-speed eMMC 5.1 （16GB / 32GB / 64GB / 128GB） Support TF card expansion
Hardware	
Ethernet	1000Mbps Ethernet Interface（RJ45）
Wireless	2.4GHz / 5GHz Dual-band WiFi，802.11a/b/g/n/ac Bluetooth 4.1（BLE）
Display	- 1 x HDMI 2.0 , Support 4K@60HZ output and HDCP 1.4/2.2 - 1 x MIPI-DSI , Support single channel 1080P@60fps output or dual-channel LVDS 1920x1200@60fps output AIO-3399ProC defaults to dual LVDS) - 1 x eDP 1.3 (4 lanes with 10.8Gbps) - Support dual-screen identical display/dual-screen differential display
Audio	1 x HDMI 2.0 Audio output 1 x Speaker Two-channel speaker（4Ω,10W / 8Ω, 5W） 1 x Headset output 1 x Mic Audio input
Camera	2x MIPI-CSI camera interfaces (built-in dual-ISP, Maximum support single 13Mpixel or dual 8Mpixel)
USB	3×USB2.0 Hub, 1 x USB3.0, 1xTYPE-C(OTG)
Interface	SPI×1, UART×2, Debug×1, RS485×1(CANx1 and RS485 share the same interface), RS232×1, ADC×1, TPx1, IRx1, I2C, PWM, GPIO
Power	9-24V DC input voltage
Software	
OS	Android 、Linux + QT、Ubuntu
Software	Provide AI development tools: Support model fast conversion, support end-to-side API, support TensorFlow / TF Lite / Caffe / ONNX / Darknet models. Provide AI application development interface: Support Android NN API, provide RKNN cross-platform API, Linux support for TensorFlow development.
General	
Dimension	138 mm × 91.3 mm
Heat Dissipation	Heat sink to hole distance 52mm (recommended C-type heat sink)
Environment	Operating Temperature ： -10℃～60℃ Storage Temperature：-20℃～70℃ Storage Humidity ： 10%～80 %

Overview

It runs on Rockchip RK3399Pro high-performance AI processor with built-in neural network unit (NPU), supports multiple AI development tools and interfaces, and has rich expansion interfaces and powerful hardware encoding and decoding abilities, which can be applied to AI industry easily.



1. RK3399Pro Six-core High-proformance Processor

Rockchip RK3399Pro processor adopts the architecture of dual-core Cortex-A72 and quad-core Cortex-A53 with its frequency up to 1.8GHz, showing an ultra-strong general-purpose computing performance. Quad-core ARM high-end GPU Mali-T860 integrates more bandwidth compression techniques and therefore has an excellent overall performance.

2. NPU With ultra-strong AI Performance

AIO-3399ProC can directly adopt TensorFlow/Caffe/Mxnet general-purpose model and provides AI development tools like model transformation and end-to-side API. It also supports the development interfaces of Android NN API, RKNN cross-platform API and TensorFlow.

3. Powerful Hardware Decoding Capability

It supports various display and output interfaces including HDMI 2.0, MIPI-DSI, eDP and dual LVDS. It also supports dual-screen identical display/dual-screen differential display, showing powerful hardware encoding and decoding abilities. Besides, and supports 4K VP9, 4K 10bits H265/H264, 1080P multi-format (VC-1, MPEG-1/2/4, VP8) video decoding and 1080P (H.264/VP8 format) video encoding.

4. Highly-efficient and Stable Hardware

It supports CAN bus data communications with highly-efficient real-time, farther transmission distance and stronger anti-electromagnetic interference ability. It configures independent external hardware watchdog and makes the device work continuously in the unmanned state which better promotes the system's stability.

5. Support Dual MIPI Cameras

With dual MIPI CSI interfaces and in-built dual ISP, supporting single 13 Mpixel or dual 8Mpixel at the maximum. It can achieve the simultaneous input of dual-camera data and supports high-level processing like gesture detection, deep detection and 3D.

6. Support Multiple OS

With stable and reliable performance, AIO-3399ProC supports multiple operating systems including Android,Linux+QT and Ubuntu.

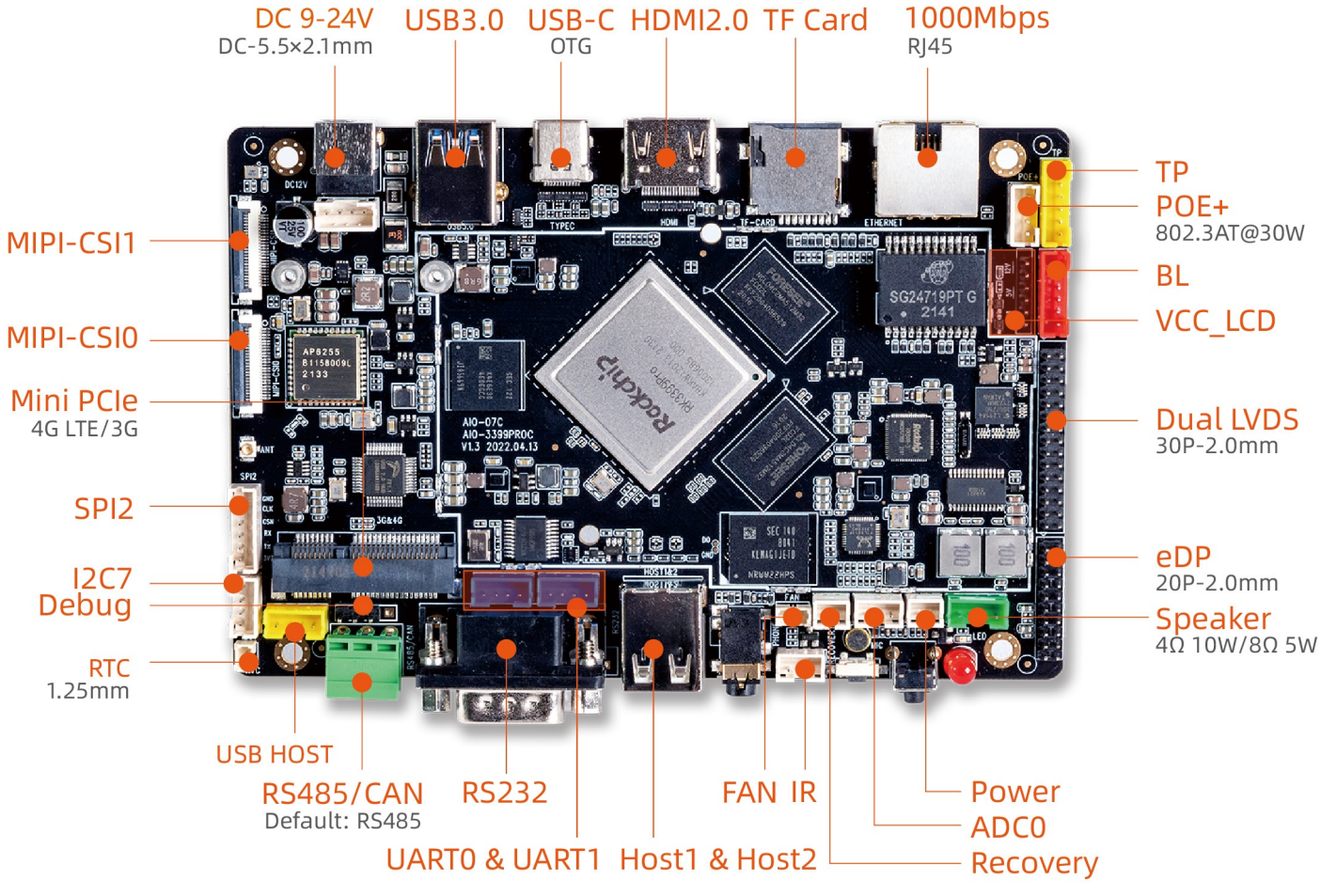
7. Rich Expansion Interfaces

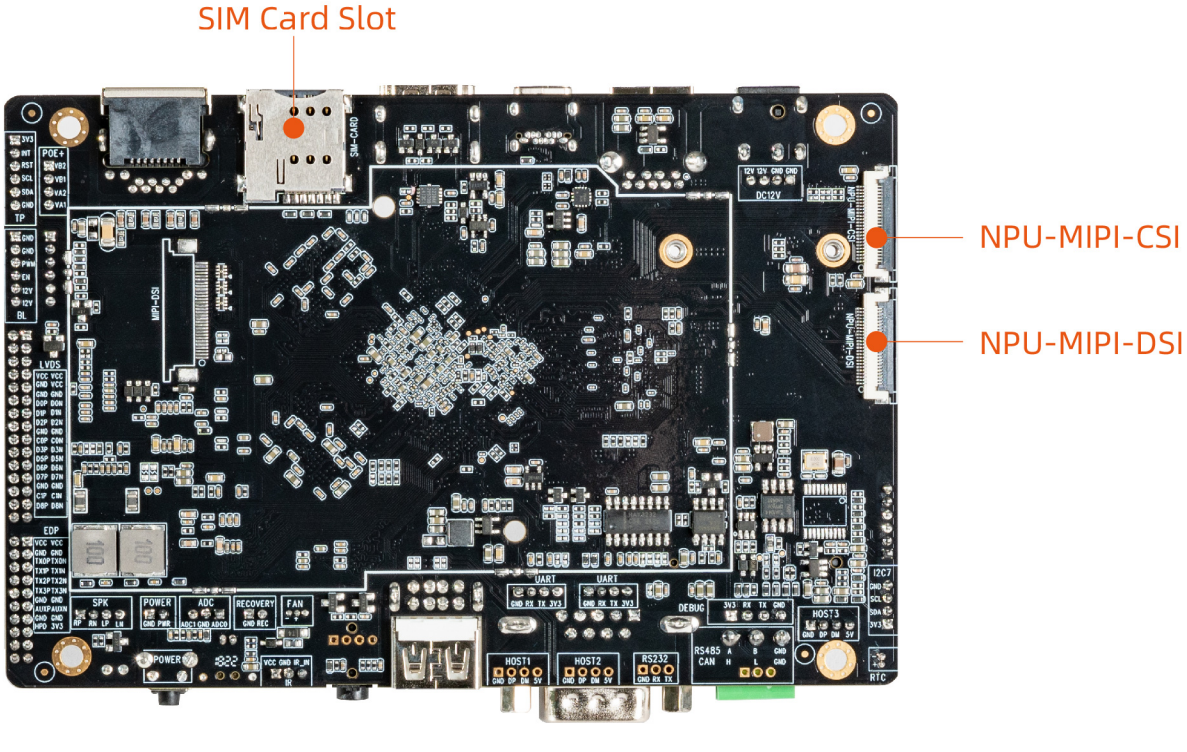
On-board I2C, SPI, UART, ADC, PWM, GPIO, PCIe, USB3.0, RS232, RS485, I2S (supporting 8-way digital microphone array input) and other interfaces. It supports the power supply mode of POE+ (802.3 AT, 30W output power).

8. Various Product Forms

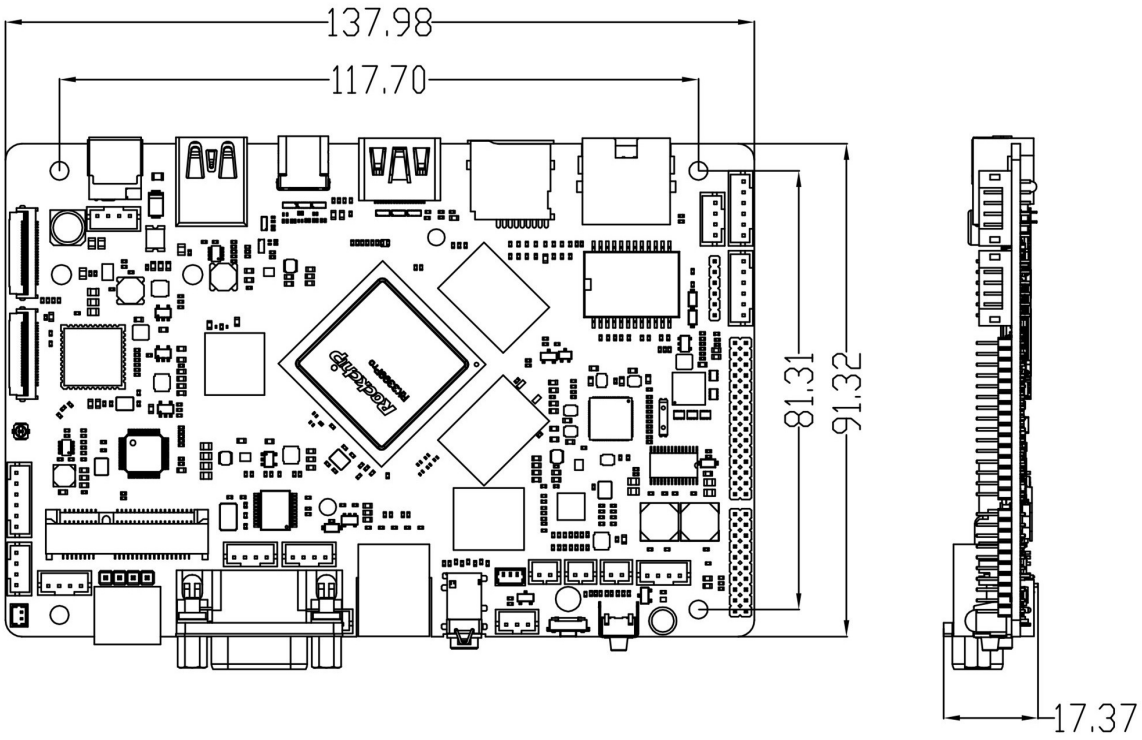
AIO-3399ProC can be equipped with an industrial metal case and 10.1-inch IPS HD multi-point touching screen which is integrated into high-performance application PC. It can also be equipped with industrial case independently and embedded into all kinds of smart devices flexibly.

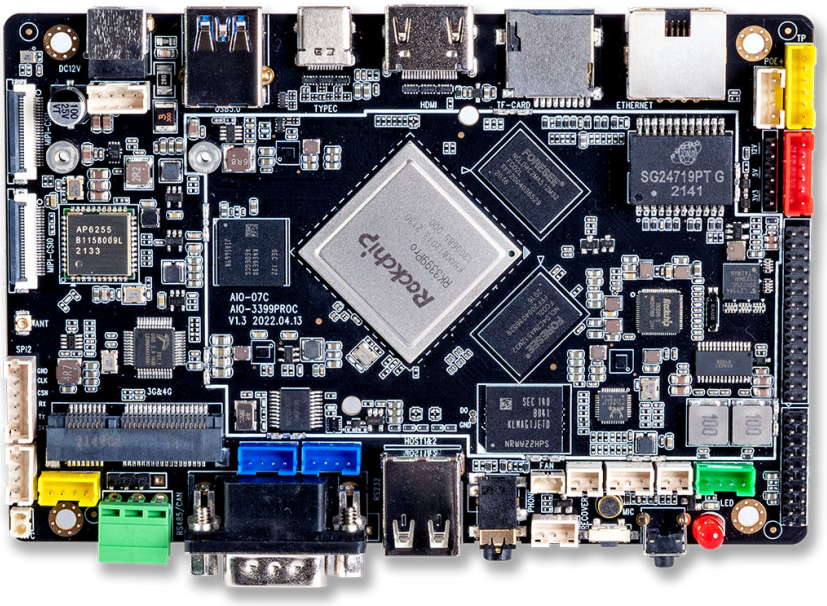
接口描述


DC 9-24V
DC-5.5×2.1mm
USB3.0
USB-C
OTG
HDMI2.0
TF Card
1000Mbps
RJ45
TP
POE+
802.3AT@30W
BL
VCC_LCD
Dual LVDS
30P-2.0mm
eDP
20P-2.0mm
Speaker
4Ω 10W/8Ω 5W
Power
ADC0
Recovery
FAN
IR
UART0 & UART1
Host1 & Host2
RS485/CAN
Default: RS485
RS232
USB HOST
RTC
1.25mm
I2C7
Debug
SPI2
Mini PCIe
4G LTE/3G
MIPI-CSI0
MIPI-CSI1


SIM Card Slot
NPU-MIPI-CSI
NPU-MIPI-DSI

Dimension


137.98
117.70
81.31
91.32
17.37


DC12V
TYPEC
HDMI
TF-CARD
ETHERNET
SG24719PT G
2141
AP6255
B1158009L
2133
AIO-07C
AIO-3399PROC
V1.3 2022.04.13
SPI2
3G&4G

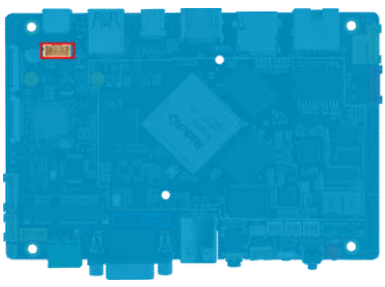
Embedded Computer

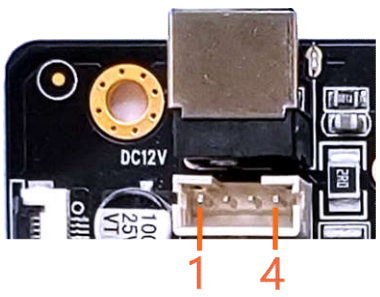
AIO-3399ProC can be equipped with an industrial metal case and 10.1-inch IPS HD multi-point touching screen which is integrated into high-performance application PC. It can also be equipped with industrial case independently and embedded into all kinds of smart devices flexibly.

(EC-A3399ProC)

Interface definition

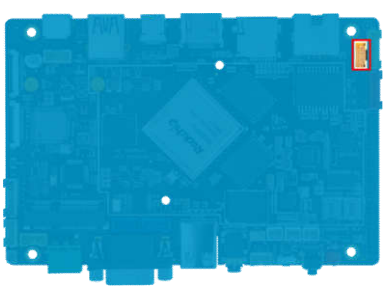
1. (J23) DC12V Single-row 4 PIN 2.0 pitch Expansion Interface

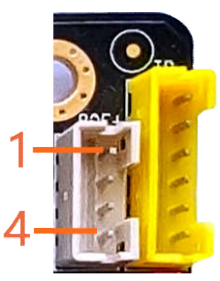




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	GND		2	GND	
3	DCIN	9-24	4	DCIN	9-24

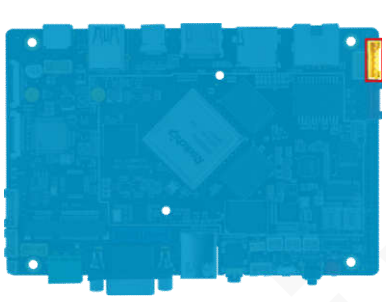
2. (J10)POE + Single-row4 PIN 2.0 pitch Expansion Interface

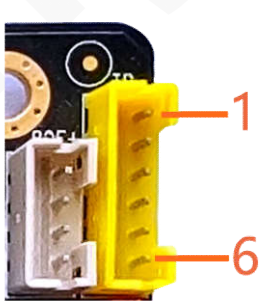




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VB2 Output	44~57V	3	VA2 Output	44~57V
2	VB1 Output	44~57V	4	VA1 Output	44~57V

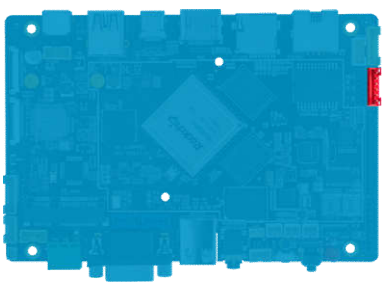
3. (J9)TP Single-row 6 PIN 2.0 pitch Expansion Interface(GPIO)

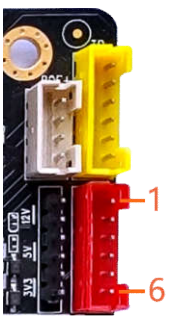




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC3V3_TOUCH	3.3	4	I2C_SCL_TP (I2C7_SCL \ GPIO2_B0_u)	3.0
2	TP_INT (GPIO4_D4_d)	3.3	5	I2C_SDA_TP (I2C7_SDA \GPIO2_A7_u)	3.0
3	TP_RST_L (GPIO4_D2_d)	3.0	6	GND	

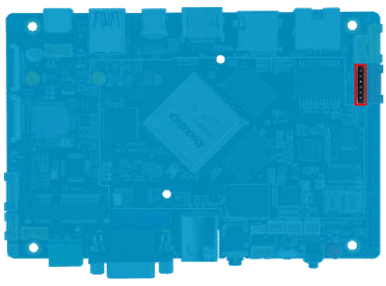
4. (J2)BL_CTL Single-row6PIN 2.0 pitch Expansion Interface(GPIO)

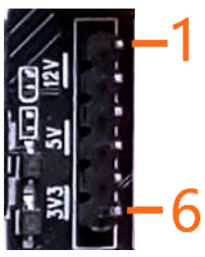




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	GND		4	BL_EN_EXT (GPIO4_D5_d)	3.0
2	GND		5	DC_12V Output	12
3	LCD_BL_PWM0_EXT (PWM0\ GPIO4_C2_d)	3.0	6	DC_12V Output	12

5. (J14) VCC_LCD Voltage selection row pin 6 PIN 2.0 pitch

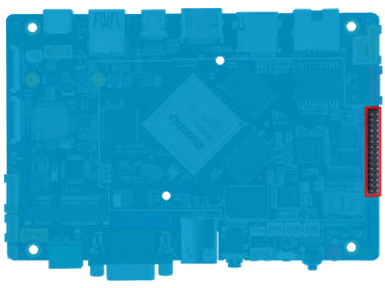




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	DC_12V	12V	4	VCC_LCD_S	3.3V/5.0V/12V 可选
2	VCC_LCD_S	3.3V/5.0V/12V 可选	5	VCC3V3_SYS_S3	3.3V
3	VCC_5V	5V	6	VCC_LCD_S	3.3V/5.0V/12V 可选

6. (CON1)LVDS Double-row 30PIN 2.0 pitch Expansion Interface(GPIO)

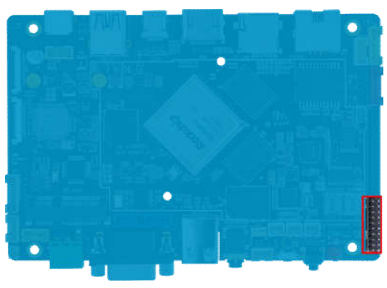
*VCC_LCD（Select by jumping cap J14）



NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC_LCD	3.3V/5V/12VOptional*	2	VCC_LCD	3.3V/5V/12 Optional*
3	VCC_LCD	3.3V/5V/12VOptional*	4	GND	
5	GND		6	GND	
7	LVDS_D0N	--	8	LVDS_D0P	--
9	LVDS_D1N	--	10	LVDS_D1P	--
11	LVDS_D2N	--	12	LVDS_D2P	--
13	GND		14	GND	
15	LVDS_CLK0N	--	16	LVDS_CLK0P	--
17	LVDS_D3N	--	18	LVDS_D3P	--
19	LVDS_D5N	--	20	LVDS_D5P	--
21	LVDS_D6N	--	22	LVDS_D6P	--
23	LVDS_D7N	--	24	LVDS_D7P	--
25	GND		26	GND	
27	LVDS_CLK1N	--	28	LVDS_CLK1P	--
29	LVDS_D8N	--	30	LVDS_D8P	--

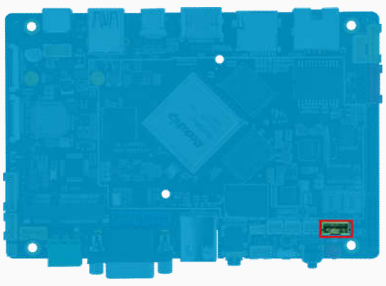
7. (JP1)EDP 双排 30PIN 2.0 pitch Expansion Interface(GPIO)

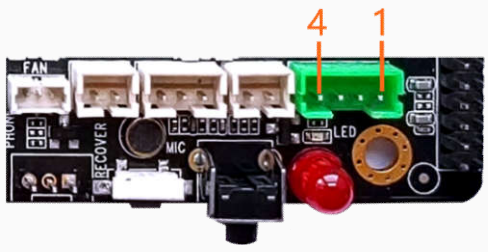
*VCC_LCD（Select by jumping cap J14）



NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC_LCD	3.3V/5.0V/12VOptional	2	VCC_LCD	3.3V/5.0V/12VOptional
3	GND		4	GND	
5	EDP_TX0N	--	6	EDP_TX0P	--
7	EDP_TX1N	--	8	EDP_TX1P	--
9	EDP_TX2N	--	10	EDP_TX2P	--
11	EDP_TX3N	--	12	EDP_TX3P	--
13	GND		14	GND	
15	EDP_AUXN	--	16	EDP_AUXP	--
17	GND		18	GND	
19	VCC3V3_SYS_S3	3.3	20	EDP_HPD	3.0

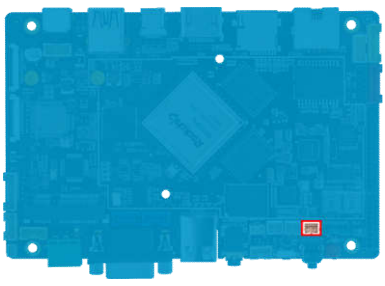
8. (J36) SPEAKER Single-row 4 PIN 2.0 pitch Expansion Interface





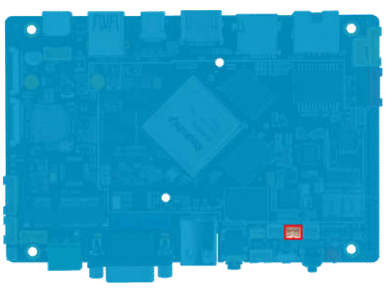
NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	SPK_RP	10W/8Ω	3	SPK_LP	10W/8Ω
2	SPK_RN	10W/8Ω	4	SPK_LN	10W/8Ω

9. (J5) POWER_KEY Single-row 2 PIN 2.0 pitch Expansion Interface



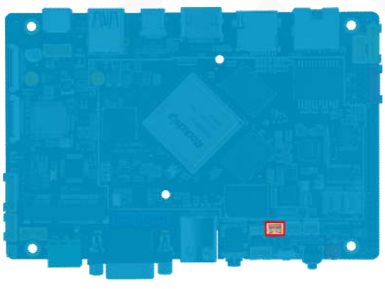
NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	POWER_ON	5.0	2	GND	

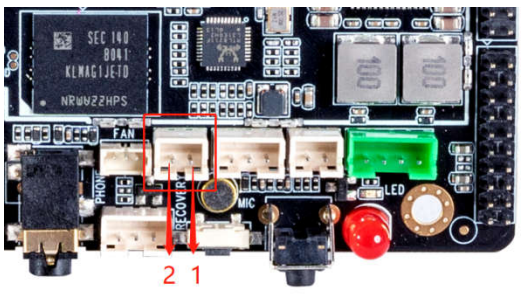
10. (J6) ADC Single-row 3 PIN 2.0 pitch Expansion Interface



NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	ADC_IN0	1.8	2	GND	
3	ADC_IN1	1.8			

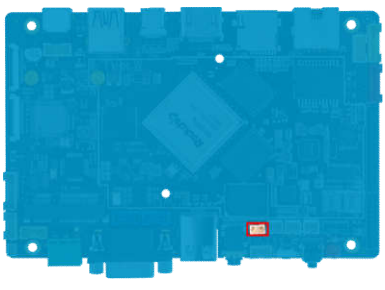
11 (J3) RECOVER Single-row 2 PIN 2.0 pitch Expansion Interface

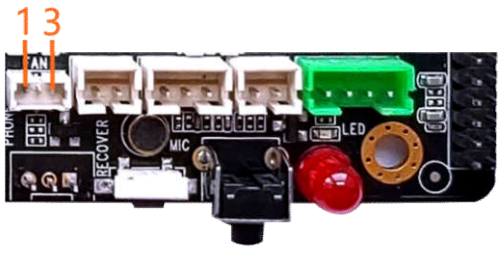




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	GND		2	RECOVER	1.8V

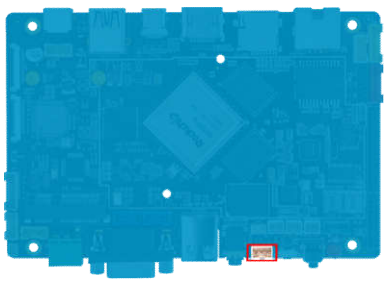
12. (J38) FAN Single-row 3 PIN 1.25 pitch Expansion Interface

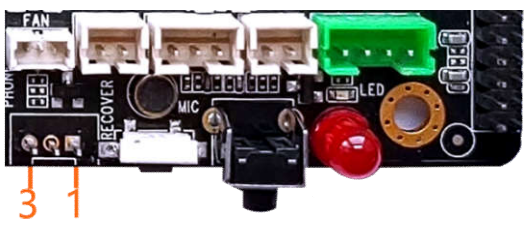




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	NC		2	FAN+	DC_12
3	FAN-	DC_12			

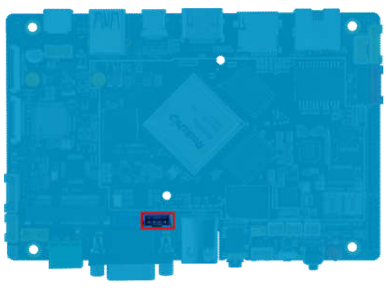
13. (J1) IR Single-row 3 PIN 2.0 pitch Expansion Interface

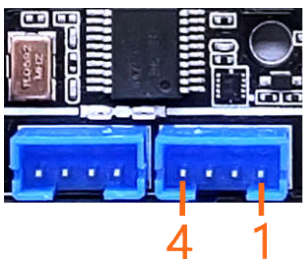




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC3V3_SYS_S3	3.3	2	GND	
3	IR_RX	1.8			

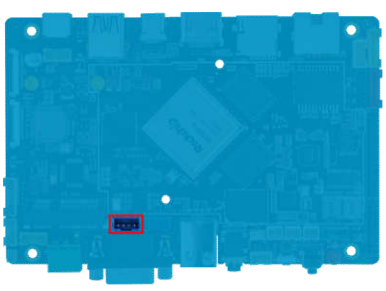
14. (J28) UART0 Single-row 4 PIN 2.0 pitch Expansion Interface

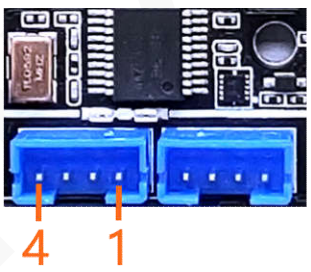




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	GND		2	RXD	3.3
3	TXD	3.3	4	VCC3V3_SYS	3.3

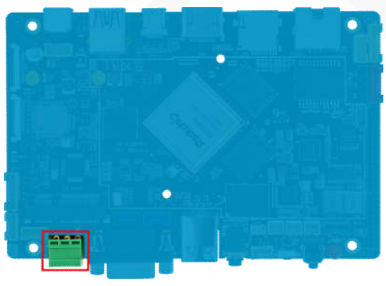
15. (J27) UART1 Single-row 4 PIN 2.0 pitch Expansion Interface

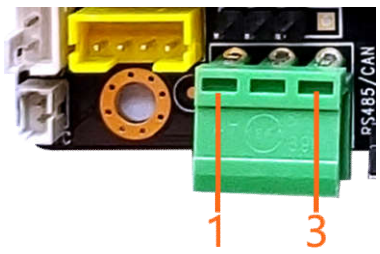




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	GND		2	RX_C	3.3
3	TX_C	3.3	4	VCC3V3_SYS	3.3

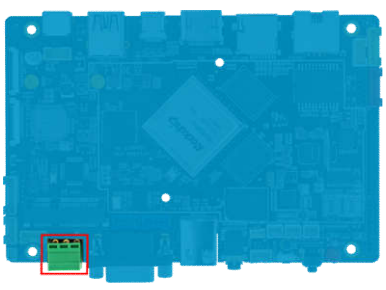
17. (J31) RS485 Single-row 3 PIN 3.96 pitch Expansion Interface

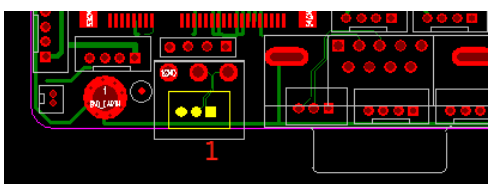




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	GND		2	RS485_B	3.3
3	RS485_A	3.3			

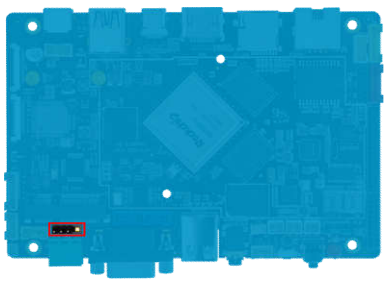
18. (J30) CAN(Reserved) Single-row 3 PIN 2.0 pitch Expansion Interface

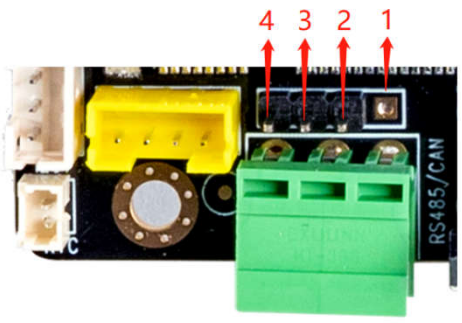




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	CANH	3.3	2	CANL	3.3
3	GND				

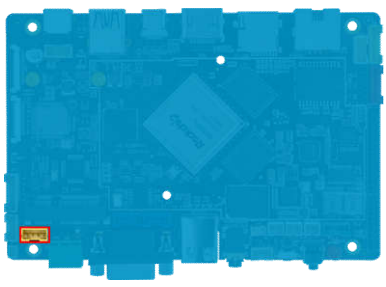
19. (J4) UART2(Debug) Single-row 3 PIN 2.0 pitch Expansion Interface

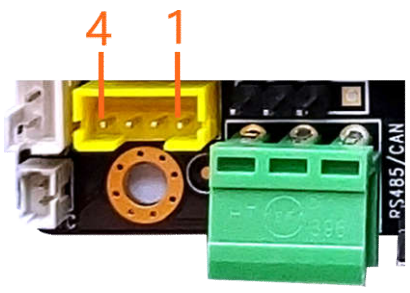




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC3V3_SYS(NC)		2	UART2_RXD	3.3
3	UART2_TXD	3.3	4	GND	

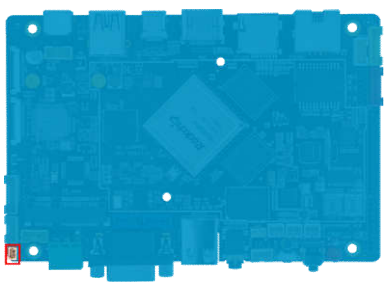
20. (J20) HOST3 Single-row 4 PIN 2.0 pitch Expansion Interface

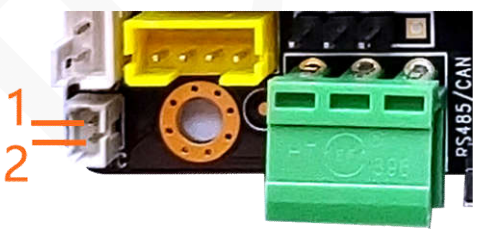




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	GND		2	HOST_DP3	--
3	HOST_DM3	--	4	VCC5V0_HOST2	5.0

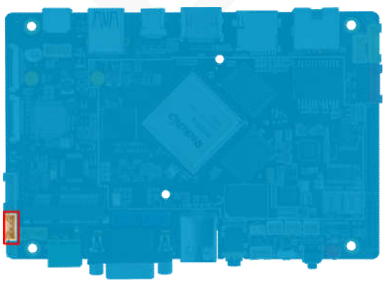
21. (J24) RTC Battery Interface Single-row 2 PIN 1.25 pitch

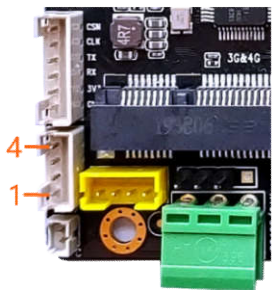




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	GND		2	VCC_RTC_S	5.0

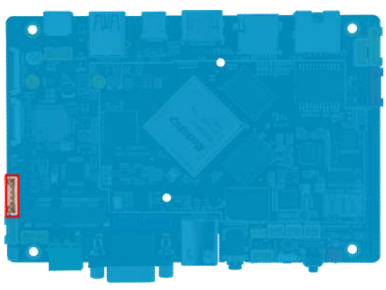
22. (J32) I2C7/GPIO Single-row 4 PIN 2.0 pitch Expansion Interface

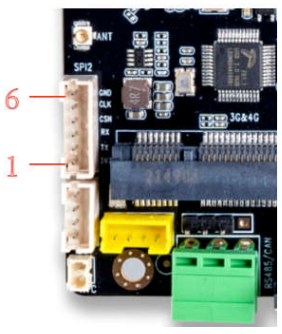




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC3V3_SYS	3.3	2	I2C7_SDA \ GPIO2_A7_u	3.0
3	I2C7_SCL \ GPIO2_B0_u	3.0	4	GND	

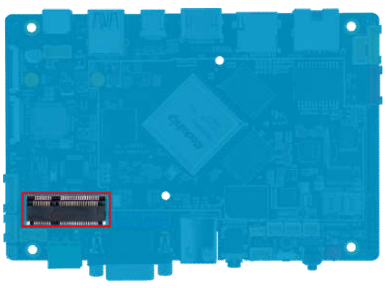
23. (J21) SPI2/GPIO Single-row 6 PIN 2.0 pitch Expansion Interface

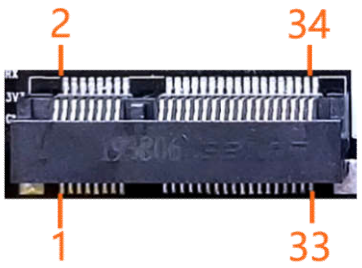




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC3V3_SYS		2	GPIO2_B2/SPI2_TXD/I2C6_SCL	
3	GPIO2_B1/SPI2_RXD/I2C6_SDA		4	GPIO2_B4/SPI2_CSN0	
5	GPIO2_B3/SPI2_CLK		6	GND	

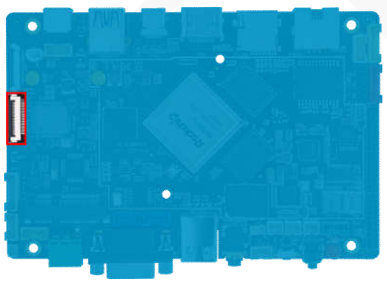
24. (J25) MINI PCIE-3G/4G

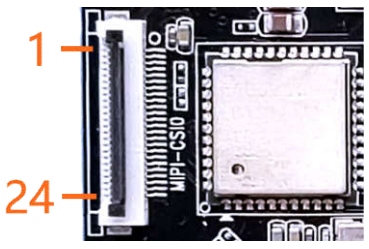




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	NC1		2	VCC3V8_3G	3.8
3	NC		4	GND	
5	NC3		6	NC6	
7	NC4		8	UIM_PWR	1.8
9	GND1		10	UIM_DAT	1.8
11	NC5		12	UIM_CLK	1.8
13	NC7		14	UIM_RST	1.8
15	GND11		16	NC18	
17	NC8		18	GND15	
19	NC9		20	NC	
21	GND20		22	VCC3V8_3G	3.8
23	NC10		24	NC19	
25	NC11		26	GND16	
27	GND4		28	NC20	
29	GND5		30	NC21	
31	NC12		32	NC22	
33	NC13		34	ND17	
35	GND12		36	HUB_HOST_DM4	--
37	GND13		38	HUB_HOST_DP4	--
39	VCC3V8_3G	3.8	40	GND18	
41	VCC3V8_3G	3.8	42	NC	
43	GND14		44	NC23	
45	NC		46	NC24	
47	NC		48	NC25	
49	NC		50	GND19	
51	NC		52	VCC3V8_3G	3.8

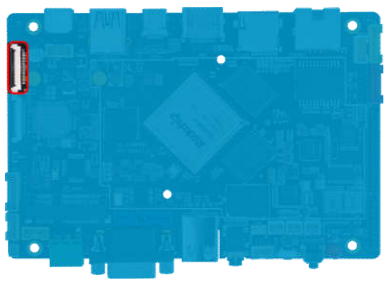
25. (J34)24 PIN MIPI CAMERA 0

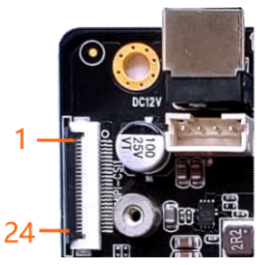




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC5V0_SYS_S3	5.0	13	GND	
2	VCC5V0_SYS_S3	5.0	14	MIPI_RX0_D2P	--
3	VCC5V0_SYS_S3	5.0	15	MIPI_RX0_D2N	--
4	I2C1_SDA_1V8	1.8	16	GND	
5	I2C1_SCL_1V8	1.8	17	MIPI_RX0_CLKP	--
6	RST_CAM_0	3.0	18	MIPI_RX0_CLKN	--
7	MIPI_PDN0_CAM	1.8	19	GND	
8	MIPI_PWR	1.8	20	MIPI_RX0_D1P	--
9	NC		21	MIPI_RX0_D1N	--
10	GND		22	GND	
11	MIPI_RX0_D3P	--	23	MIPI_RX0_D0P	--
12	MIPI_RX0_D3N	--	24	MIPI_RX0_D0N	--

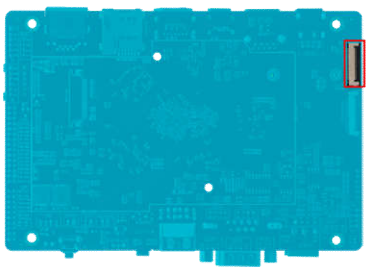
26. (J35)24 PIN MIPI CAMERA 1

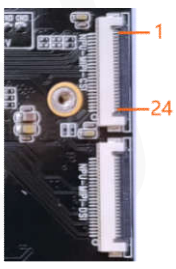




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC5V0_SYS_S3	5.0V	13	GND	
2	VCC5V0_SYS_S3	5.0V	14	MIPI_TX1/RX1_D2P	--
3	VCC5V0_SYS_S3	5.0V	15	MIPI_TX1/RX1_D2N	--
4	I2C1_SDA_1V8	1.8	16	GND	
5	I2C1_SDA_1V8	1.8	17	MIPI_TX1/RX1_CLKP	--
6	RST_CAM_1	3.0	18	MIPI_TX1/RX1_CLKN	--
7	MIPI_PDN1_CAM	1.8	19	GND	
8	MIPI_PWR	1.8	20	MIPI_TX1/RX1_D1P	--
9	NC		21	MIPI_TX1/RX1_D1N	--
10	GND		22	GND	
11	MIPI_TX1/RX1_D3P	--	23	MIPI_TX1/RX1_D0P	--
12	MIPI_TX1/RX1_D3N	--	24	MIPI_TX1/RX1_D0N	--

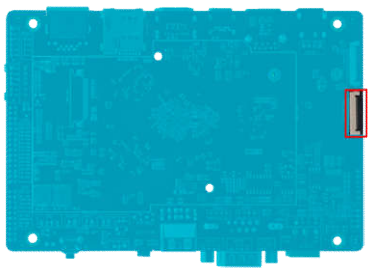
27. (J37)24 PIN NPU MIPI CSI

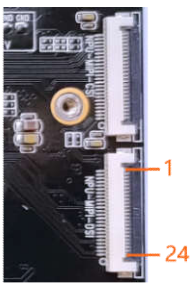




NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	VCC5V0_SYS_S3	5.0	13	GND	
2	VCC5V0_SYS_S3	5.0	14	NPU_MIPI_RX_D2P	--
3	VCC5V0_SYS_S3	5.0	15	NPU_MIPI_RX_D2N	--
4	NPU_I2C3_SDA	1.8	16	GND	
5	NPU_I2C3_SCL	1.8	17	NPU_MIPI_RX_CLKP	--
6	NPU_MIPI_RST_CAM_0	1.8	18	NPU_MIPI_RX_CLKN	--
7	NPU_MIPI_PDN0_CAM	1.8	19	GND	
8	NPU_MIPI_PWR	1.8	20	NPU_MIPI_RX_D1P	--
9	NC		21	NPU_MIPI_RX_D1N	--
10	GND		22	GND	
11	NPU_MIPI_RX_D3P	--	23	NPU_MIPI_RX_D0P	--
12	NPU_MIPI_RX_D3N	--	24	NPU_MIPI_RX_D0N	--

28. (J16)24 PIN NPU MIPI DSI





NO.	definition	Electrical Level/V	NO.	definition	Electrical Level/V
1	NPU_MIPI_TX_D0N	--	13	NPU_MIPI_TX_D3N	--
2	NPU_MIPI_TX_D0P	--	14	NPU_MIPI_TX_D3P	--
3	GND		15	GND	
4	NPU_MIPI_TX_D1N	--	16	NC	
5	NPU_MIPI_TX_D1P	--	17	NC	
6	GND		18	NC	
7	NPU_MIPI_TX_CLKN	--	19	NC	
8	NPU_MIPI_TX_CLKP	--	20	NC	
9	GND		21	NC	
10	NPU_MIPI_TX_D2N	--	22	NC	
11	NPU_MIPI_TX_D2P	--	23	NC	
12	GND		24	NC	

T-CHIP TECHNOLOGY

Create Value for Customers
Pursue Sustainable Development

About us

T-CHIP focuses on R&D, design, production and sale of open source intelligent hardware, AI, IoT and audio product, and provides the whole solution of intelligent hardware products. T-CHIP is a Independent Design House officially authorized by RockChip and its strategic partner. We have been working closely with RockChip and contributing to embedded electronic industry for over 15 years. “Create Value for Customers, Pursue Sustainable Development” is our philosophy. We hope to achieve win-win development and move together for a shared future

Our Brands

Firefly is an open source brand in 2014. “Make technology more simple, Make life more intelligent” is its philosophy. We promote intelligent upgrades in the industries of new technology, intelligent hardware, AI, AIOT, and digital audio product, and build a more open and professional platform for intelligent hardware technology

Station PC is a new brand in 2020, consisting of the core geek members. We create entertainment products for new generation of people with innovative spirit through exploration of pan-entertainment. “More Entertainment, More Free Creation” is its philosophy. We aim at making everyone enjoy themselves and awakening interesting souls with more extreme product experience

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