

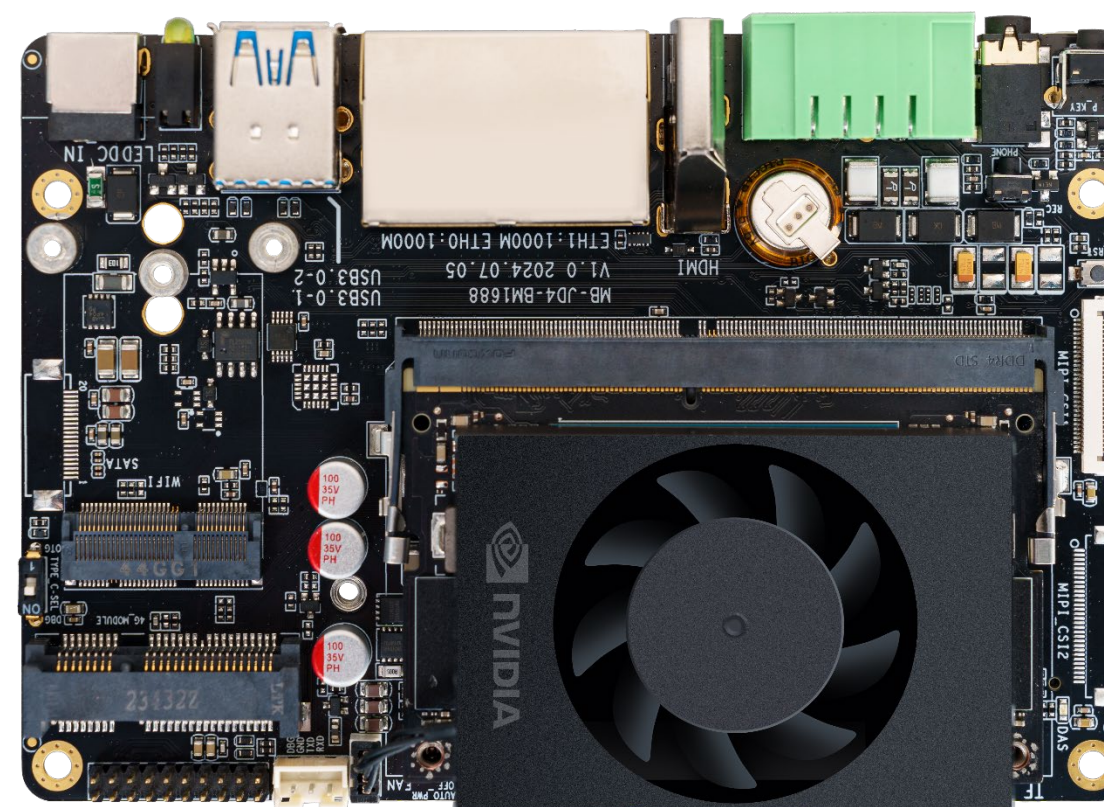


Large-model Mainboard

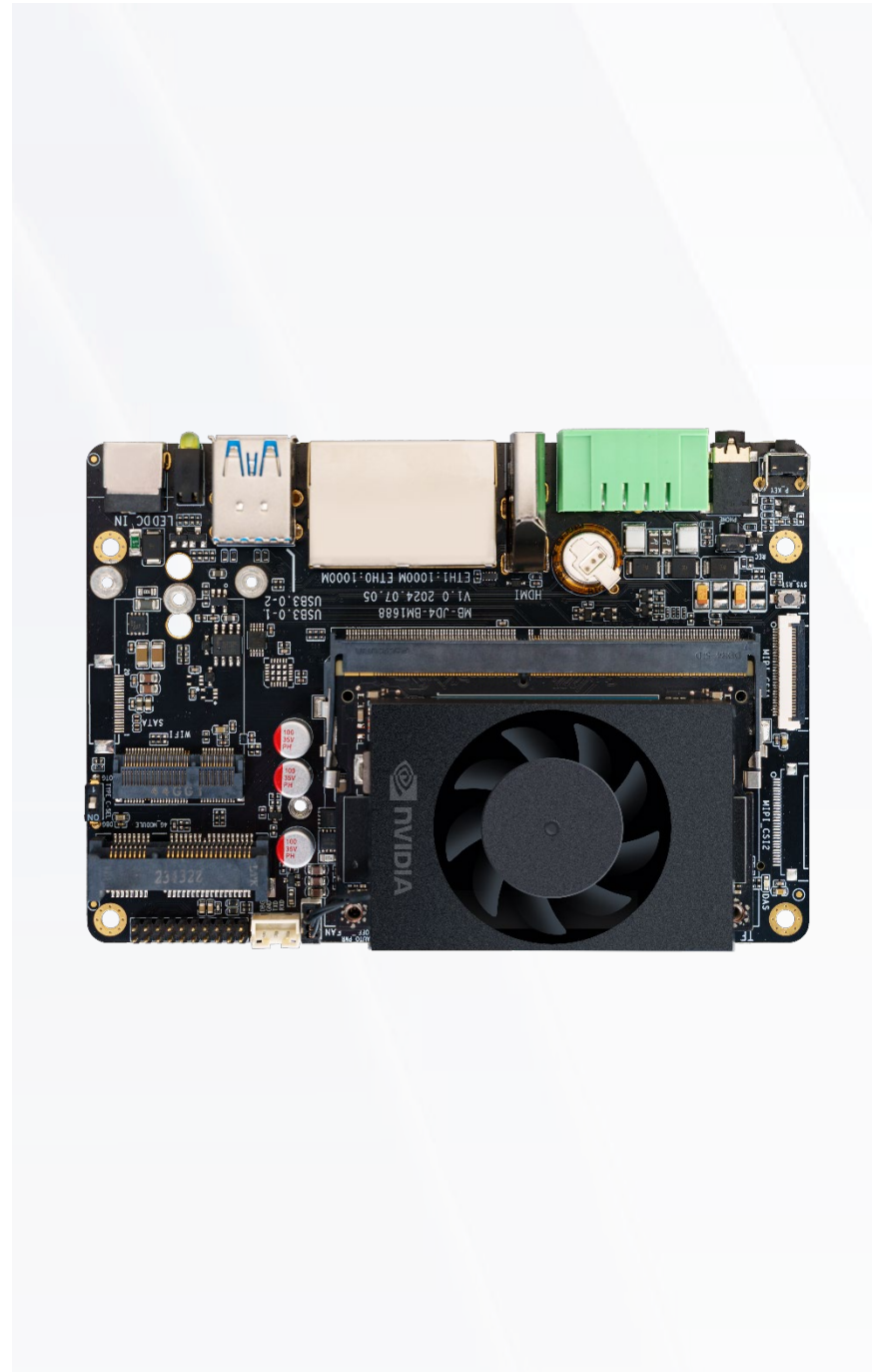
- AIO-OrinNano
- AIO-OrinNX

V1.0 2025-4-8

T-CHIP INTELLIGENCE TECHNOLOGY



Product features



NVIDIA high-performance edge computing modules

It is equipped with the NVIDIA Jetson Orin series of edge computing modules, namely OrinNX (16GB) and OrinNano (8GB), an octa-core/hexa-core CPU, and a 1024-core NVIDIA Ampere architecture GPU with 32 Tensor Cores, delivering more powerful AI performance.



157TOPS computing power empowers AI applications

All modern AI models can be run. For example, the ROS robot model realizes larger and more complex deep neural networks, and realizes functions such as object recognition, object detection and tracking, speech recognition, and other visual development.



The private deployment of large models

Large language models: Support Ollama local large model deployment framework and the private deployment of ultra-large-scale parametric models: Llama3 and Phi-3 Mini.

Vision models: Support EfficientViT, NanoOWL, NanoSAM, SAM and TAM.

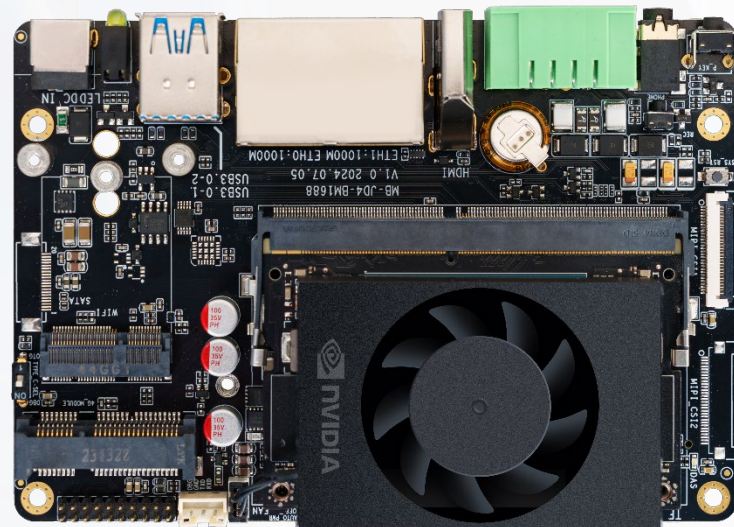
AI painting: Support ComfyUI graphical deployment framework and the private deployment of Flux, Stable Diffusion image generation model in the AIGC field.



Multiple deep learning frameworks

Supports multiple deep learning frameworks accelerated by cuDNN, including PaddlePaddle, PyTorch, TensorFlow, MATLAB, MxNet, Caffe2, Chainer and Keras, as well as custom operator development. Docker containerization technology is supported.

Product features



AI software stack and ecosystem

A comprehensive AI software stack and ecosystem to democratize edge AI and robotics development. With NVIDIA JetPac, Isaac ROS, and reference AI workflows, advanced technologies can be integrated into products.



Abundant expansion interfaces

Equipped with Gigabit Ethernet (RJ45), HDMI 2.0, USB 3.0, RS485, RS232, CAN, Mini PCIe (4G), M.2 (WiFi), M.2 (SSD) and other interfaces, convenient for connecting various external devices.



Up to 18 channels of 1080P H.265 video decoding

AIO-OrinNX supports up to 18 channels of 1080p30 or 1 channel of 8K30 video decoding, and AIO-OrinNano supports up to 11 channels of 1080p30 or 1 channel of 4K60 video decoding, meeting the needs of various AI application scenarios.



A wide range of applications

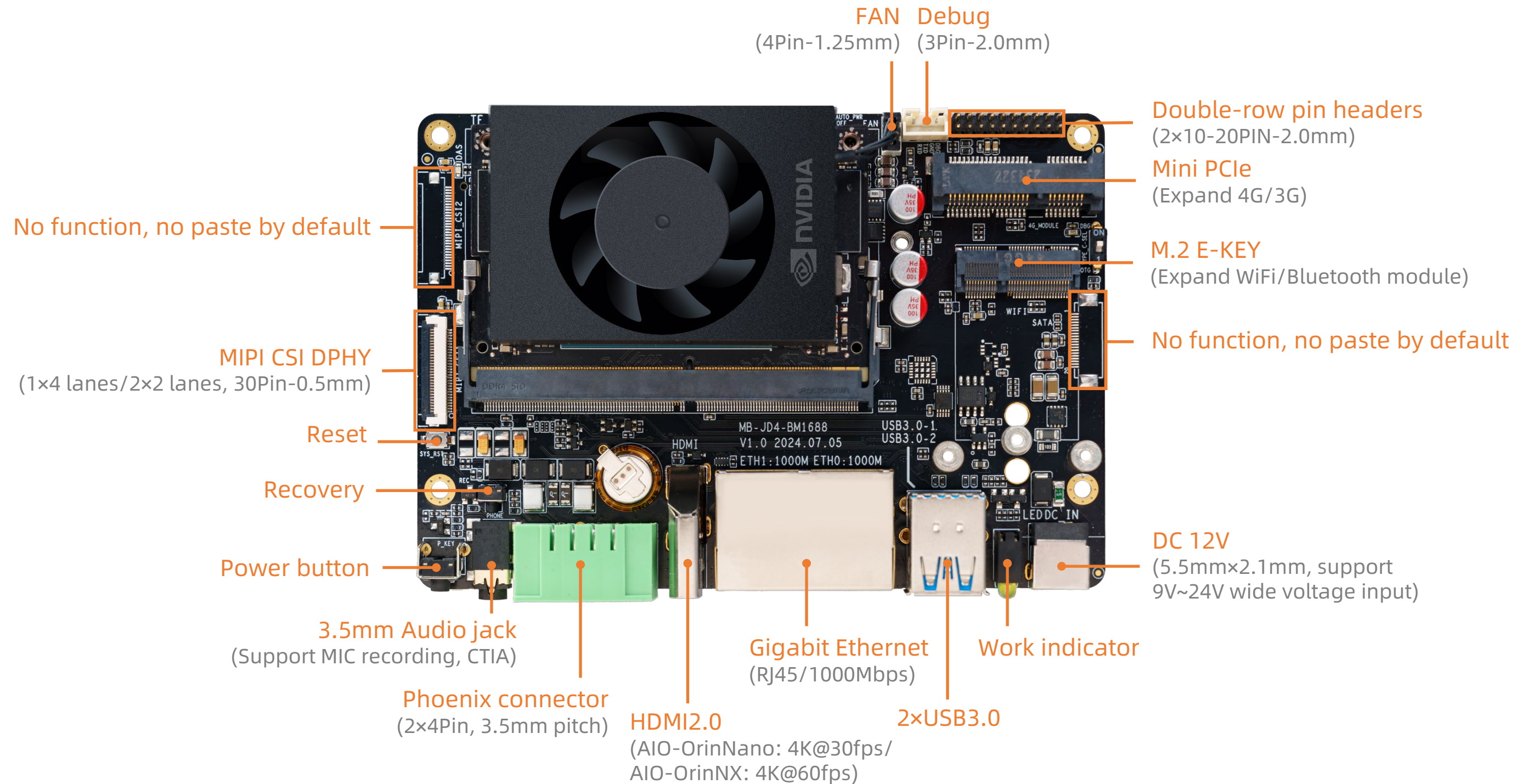
It is widely used in edge computing, robotics, large model localization, smart city, smart healthcare, smart industry and other industries.

Specifications

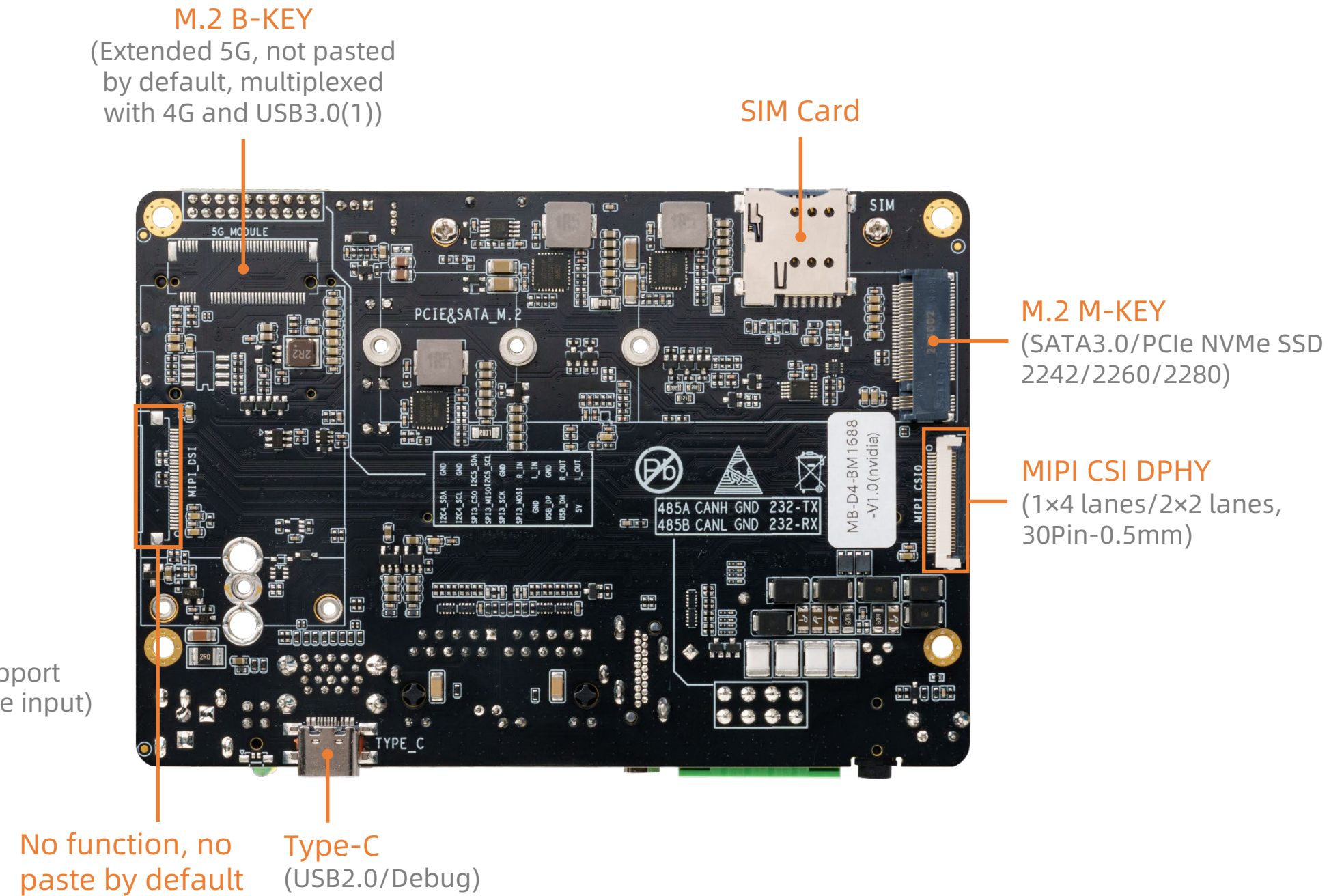
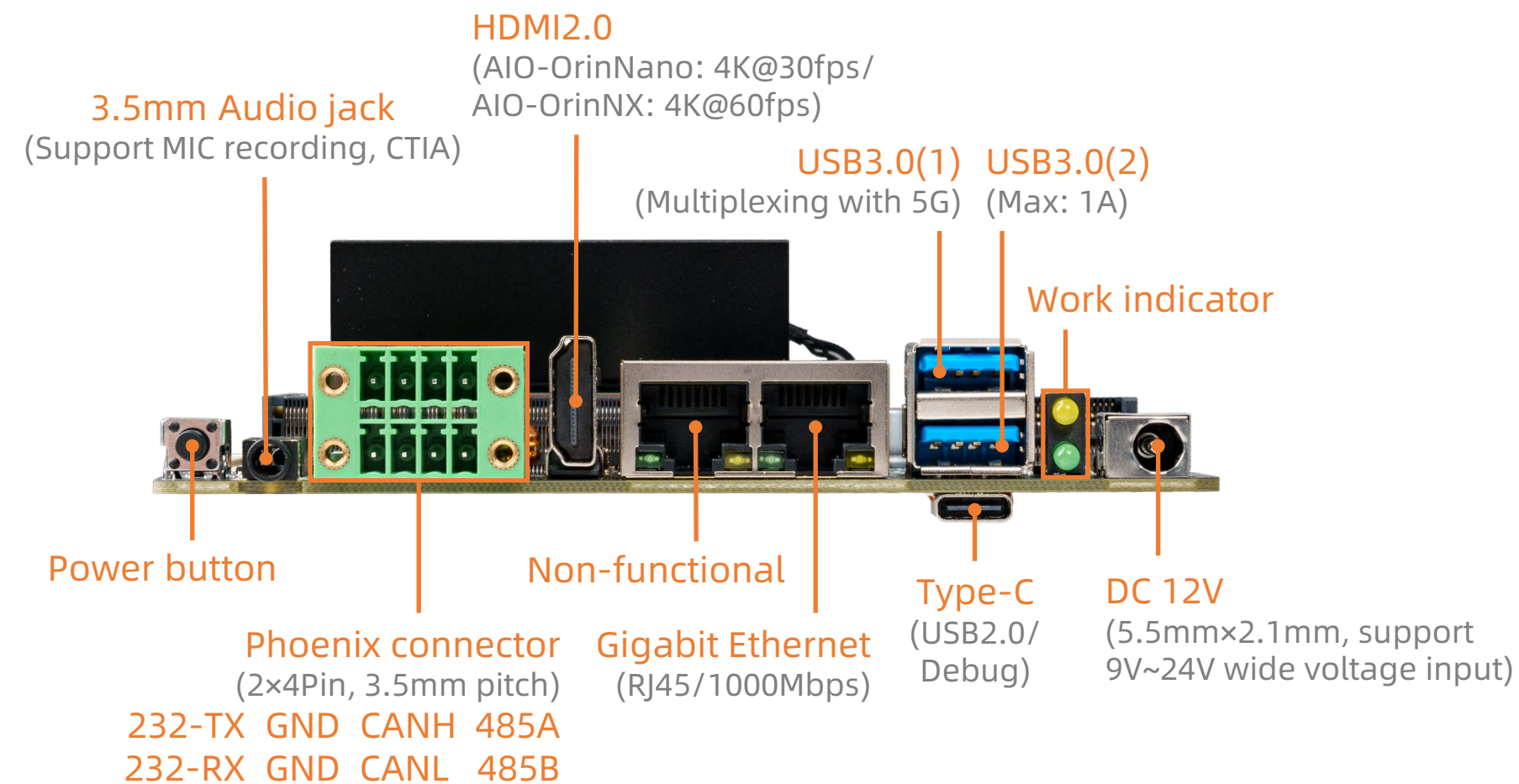


		AIO-OrinNano (8GB)	AIO-OrinNX (16GB)
Basic Specifications	Module	Original NVIDIA Jetson OrinNano (8GB) module	Original NVIDIA Jetson OrinNX (16GB) module
	CPU	Hexa-core 64-bit ARM Cortex-A78AE v8.2 processor, up to 1.7GHz	Octa-core 64-bit ARM Cortex-A78AE v8.2 processor, up to 2.0GHz
	AI performance	67 TOPS	157 TOPS
	GPU	1024 core NVIDIA Ampere architecture GPU with 32 Tensor Cores	
	Video encoding	H.265: 1080p30	H.265: 1×4K60, 3×4K30, 6×1080p60, 12×1080p30
	Video decoding	H.265: 1×4K60, 2×4K30, 5×1080p60, 11×1080p30	H.265: 1×8K30, 2×4K60, 4×4K30, 9×1080p60, 18×1080p30
	Memory	8GB LPDDR5	16GB LPDDR5
	Storage	1 × M.2 M-KEY (Expandable PCIe NVMe SSD, supports 2242/2260/2280)	
	Power	DC 12V (5.5 × 2.1mm, support 9V~24V wide voltage input)	
	Power consumption	Normal: 6W (12V/500mA), Max: 30W (12V/2500mA)	Normal: 7.2W (12V/600W), Max: 34.8W (12V/2900mA)
	Size	122.89mm × 85.04mm × 35.28mm	
	Weight	Without Fan: 129g, with fan: 180g	
	Environment	Operating Temperature: -20℃ ~ 60℃, Storage Temperature: -20℃ ~ 70℃, Storage Humidity: 10% ~ 90%RH (non-condensing)	
Software Support	OS	Jetson systems based on Ubuntu 22.04 provide a complete desktop Linux environment with graphics acceleration and support for libraries such as NVIDIA CUDA, TensorRT, CuDNN, and more.	
	Large model	Robot model: ROS robot model is supported. Large language models: Support Ollama local large model deployment framework, which can be used for natural language processing, code generation, and assistance scenarios. Support the private deployment of ultra-large-scale parametric models under the Transformer architecture, such as Llama3 and Phi-3 Mini. Large visual models: Support the privatization deployment of large visual models such as EfficientViT, NanoOWL, NanoSAM, SAM and TAM. AI Painting: Support ComfyUI graphical deployment framework, which can be used for scenarios such as image restoration, image style conversion, and image synthesis. Supports the private deployment of Flux, Stable Diffusion and Stable Diffusion XL image generation model in the AIGC field.	
	Traditional network architecture	Supports multiple deep learning frameworks accelerated by cuDNN, including PaddlePaddle, PyTorch, TensorFlow, MATLAB, MxNet, Caffe2, Chainer and Keras. Supports custom operator development. Docker containerization: Docker containerization technology is supported, which can be easily used for image deployment.	
	AI software stack	The NVIDIA Jetson Orin series delivers powerful AI compute power, massive unified memory, and a comprehensive software stack to power the latest generative AI applications. It enables fast inference on any generative AI model powered by the Transformer architecture, enabling superior edge performance on MLPerf.	
Interface Specifications	Internet	Ethernet: 1 × Gigabit Ethernet (RJ45) WiFi: Expand WiFi/Bluetooth module via M.2 E-KEY (2230), support 2.4GHz/5GHz dual-band WiFi6 (802.11a/b/g/n/ac/ax), Bluetooth 5.2 4G: Extend 4G LTE with Mini PCIe 5G: Extend 5G via M.2 B-KEY (multiplexed with 4G, USB3.0(1), not pasted by default)	
	Video input	2 × MIPI CSI DPHY (1 × 4 Lanes or 2 × 2 Lanes), Line in (Led by double row headers)	
	Video output	1 × HDMI2.0 (4K@30fps)	1 × HDMI2.0 (4K@60fps)
	Audio	1 × 3.5mm Audio jack (Support MIC recording, American Standard CTIA)	
	USB	2 × USB3.0 (Max: 1A; UP: USB3.0 (1), multiplexed with 5G; DOWN: USB3.0(2)), 1 × Type-C (USB2.0 OTG/Debug)	
	Button	1 × Reset, 1 × Recovery, 1 × Power	
	Other interfaces	1 × FAN (4Pin-1.25mm), 1 × SIM Card, 1 × Debug (3Pin-2mm), 1 × Double-row pin headers (2×10-20PIN-2.0mm): USB2.0, SPI, 2×I2C, Line in, Line out, GPIO 1 × Phoenix connector (2×4Pin, 3.5mm pitch): 1 × RS485, 1 × RS232, 1 × CAN 2.0	

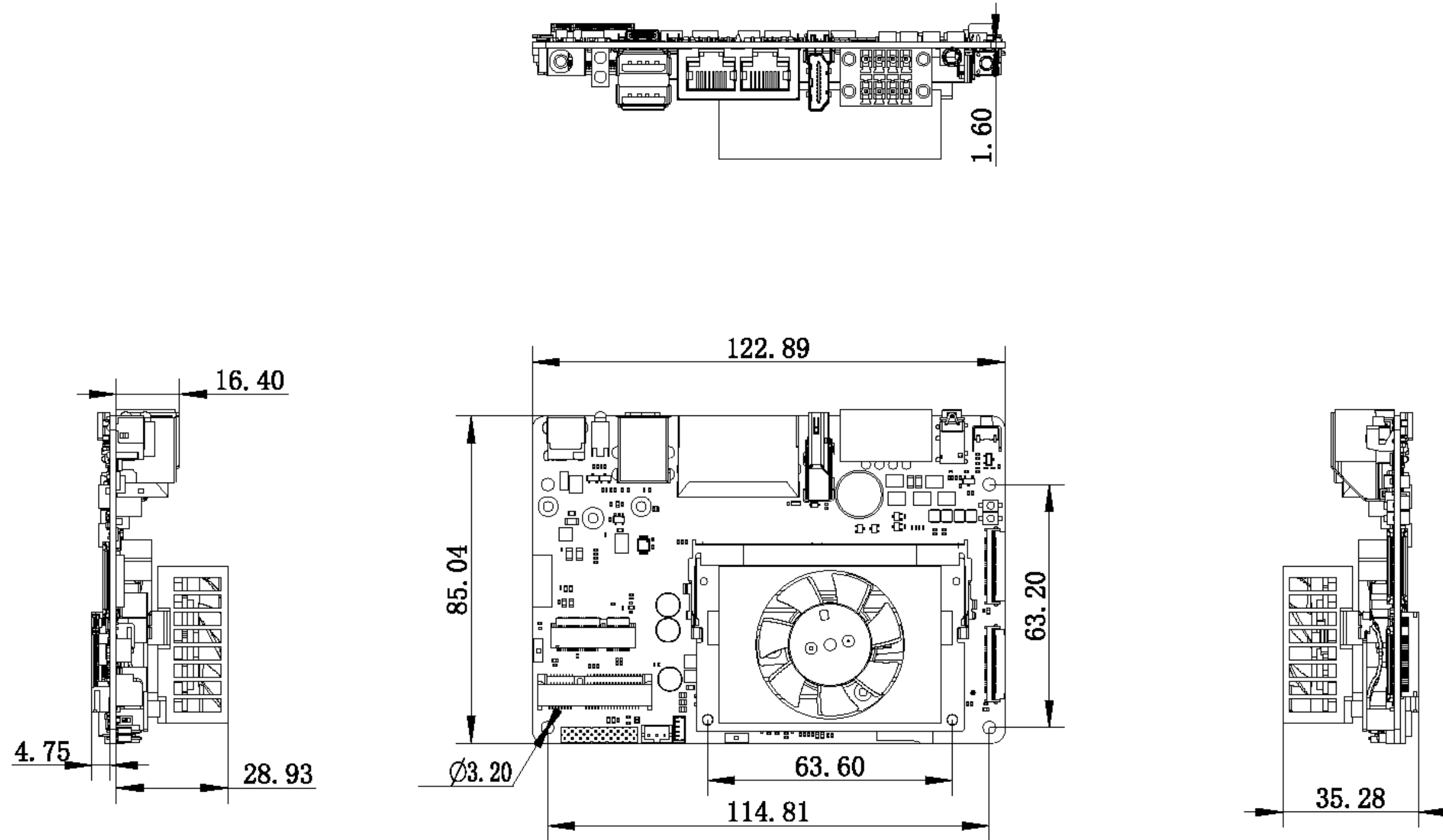
Interface description



Interface description



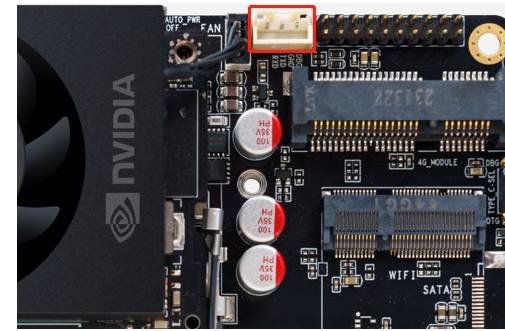
Dimension





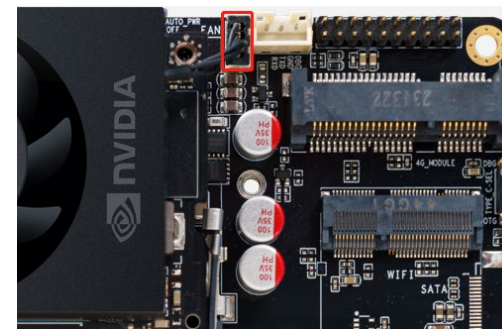
Interface definition

1. (J19) DEBUG: 3PIN 2.0mm pitch wafer connector



NO.	Definition	Power/V	NO.	Definition	Power/V
1	UART2_RXD_Debug	3.3	3	GND	
2	UART2_TXD_Debug	3.3			

2. (J6) FAN: 4PIN 1.25mm pitch wafer connector

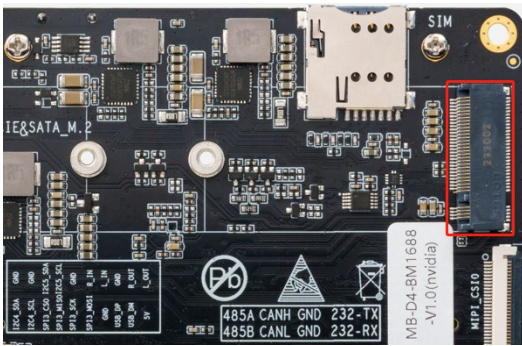


NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	FAN+ (5V Output)	5
3	FG Input 【GPIO08】	3.3	4	PWM1 Output 【GPIO14】	3.3

Interface definition



3. (U4) M.2 PCIE/SATA M-KEY



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	
29	NC		30	NC	

Interface definition

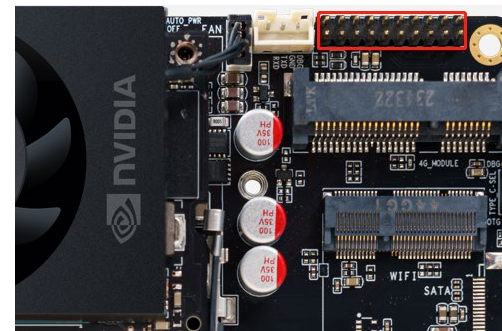


31	NC		32	NC	
33	GND		34	NC	
35	NC		36	NC	
37	NC		38	DEVSLP 【Expand IO】 [pull up resistor10K]	3.3
39	GND		40	NC	
41	PCIE1_RX0_P	-	42	NC	
43	PCIE1_RX0_N	-	44	NC	
45	GND		46	NC	
47	PCIE1_TX0_N (Series capacitor 100nF)	-	48	NC	
49	PCIE1_TX0_P (Series capacitor 100nF)	-	50	PCIE1_RST* (GPIO4_A3_d)	3.3
51	GND		52	PCIE1_CLKREQ* (GPIO3_C7_u)	3.3
53	PCIE1_CLK_N	-	54	PCIE_WAKE*	3.3
55	PCIE1_CLK_P	-	56	NC	
57	GND		58	NC	
67	NC		68	NC	
69	GND		70	VCC3V3_PCIE (3.3V Output)	3.3
71	GND		72	VCC3V3_PCIE (3.3V Output)	3.3
73	GND		74	VCC3V3_PCIE (3.3V Output)	3.3
75	GND				

Interface definition



4. (J15) Double-row needles EXTENSION INTERFACE 2*10PIN

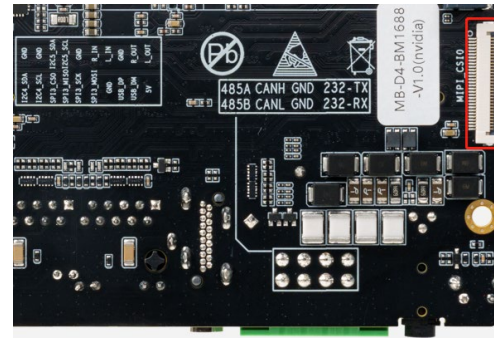


NO.	Definition	Power/V	NO.	Definition	Power/V
1	VCC5V0_SYS (5.0V OUTPUT)	5.0 (MAX:500mA)	2	Left output 2 (40mW from ES8388)	3.3
3	USB2_D_N	-	4	Right output 2 (40mW from ES8388)	3.3
5	USB2_D_P	-	6	GND	
7	GND		8	Right channel input 1 (to ES8388)	3.3
9	SPI0_MOSI	1.8	10	Left channel input 1 (to ES8388)	3.3
11	SPI0_CLK	1.8	12	GND	
13	SPI0_MISO	1.8	14	I2C1_SCL (Pull-up resistor 2.2K)	3.3
15	SPI0_CS0	1.8	16	I2C1_SDA (Pull-up resistor 2.2K)	3.3
17	I2C0_SCL (Pull-up resistor 2.2K)	3.3	18	GND	
19	I2C0_SDA (Pull-up resistor 2.2K)	3.3	20	GND	



Interface definition

5. (J7) MIPI CSIO 30PIN 0.5mm pitch

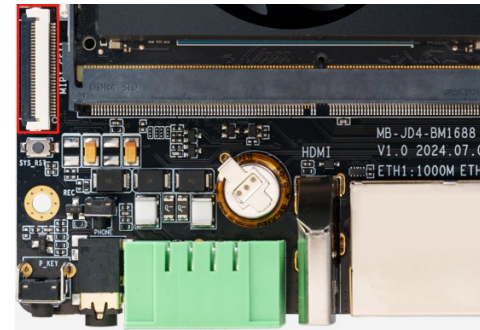


NO.	Definition	Power/V	NO.	Definition	Power/V
1	CAM_I2C_SDA (Pull-up resistor 2.2K)	1.8	16	GND	
2	CAM_I2C_SCL (Pull-up resistor 2.2K)	1.8	17	MIPI_CSIO_CLK0P	-
3	CAM0_PWDN	1.8	18	MIPI_CSIO_CLK0N	-
4	CAM0_RESET 【Expand IO】	1.8	19	GND	
5	GND		20	MIPI_CSIO_D2P	-
6	CAM0_MCLK	1.8	21	MIPI_CSIO_D2N	-
7	CAM3_PWDN	1.8	22	GND	
8	CAM0_RESET 【Expand IO】	1.8	23	MIPI_CSIO_D3P	-
9	CAM0_MCLK	1.8	24	MIPI_CSIO_D3N	-
10	GND		25	GND	
11	MIPI_CSIO_D0P	-	26	MIPI_CSIO_CLK1P	-
12	MIPI_CSIO_D0N	-	27	MIPI_CSIO_CLK1N	-
13	GND		28	GND	
14	MIPI_CSIO_D1P	-	29	VCC5V0_SYS (5.0V OUTPUT)	5.0
15	MIPI_CSIO_D1N	-	30	VCC5V0_SYS (5.0V OUTPUT)	5.0

Interface definition



6. (J13) MIPI CSI1 30PIN 0.5mm pitch

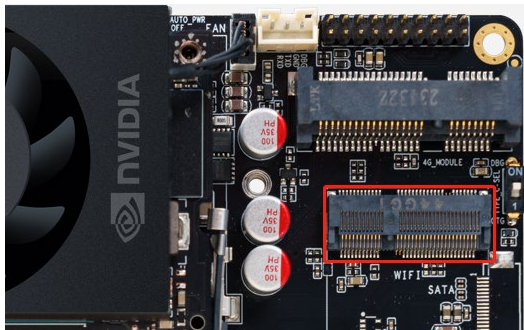


NO.	Definition	Power/V	NO.	Definition	Power/V
1	CAM_I2C_SDA (Pull-up resistor 2.2K)	1.8	16	GND	
2	CAM_I2C_SCL (Pull-up resistor 2.2K)	1.8	17	MIPI_CSI1_CLK0P	-
3	CAM1_PWDN	1.8	18	MIPI_CSI1_CLK0N	-
4	CAM1_RESET 【Expand IO】	1.8	19	GND	
5	GND		20	MIPI_CSI1_D2P	-
6	CAM1_MCLK	1.8	21	MIPI_CSI1_D2N	-
7	CAM4_PWDN	1.8	22	GND	
8	CAM1_RESET 【Expand IO】	1.8	23	MIPI_CSI1_D3P	-
9	CAM1_MCLK (GPIO4_B1_u)	1.8	24	MIPI_CSI1_D3N	-
10	GND		25	GND	
11	MIPI_CSI1_D0P	-	26	MIPI_CSI1_CLK1P	-
12	MIPI_CSI1_D0N	-	27	MIPI_CSI1_CLK1N	-
13	GND		28	GND	
14	MIPI_CSI1_D1P	-	29	VCC5V0_SYS (5.0V OUTPUT)	5.0
15	MIPI_CSI1_D1N	-	30	VCC5V0_SYS (5.0V OUTPUT)	5.0

Interface definition



7. (U16) PCIE WIFI M.2 Module E-KEY



NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	WIFI_3V3 (3.3V Output)	3.3
3	HUB_HOST20_DP3	-	4	WIFI_3V3 (3.3V Output)	3.3
5	HUB_HOST20_DM3	-	6	NC	
7	GND		8	NC	
9	NC		10	NC	
11	NC		12	NC	
13	NC		14	NC	
15	NC		16	NC	
17	NC		18	GND	
19	NC		20	BT_WAKE_AP (GPIO02)	3.3
21	NC		22	NC	
23	NC		32	NC	
33	GND		34	NC	
35	PCIE0_TX0_P (Series capacitor 100nF)	-	36	NC	
37	PCIE0_TX0_N (Series capacitor 100nF)	-	38	AP_WAKE_BT (Expand IO)	3.3



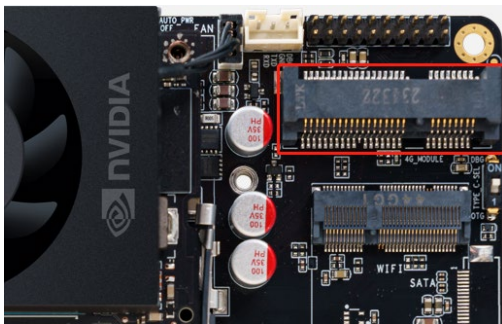
Interface definition

39	GND		40	NC	
41	PCIE0_RX0_P	-	42	NC	
43	PCIE0_RX0_N	-	44	NC	
45	GND		46	NC	
47	PCIE0_CLK_P	-	48	NC	
49	PCIE0_CLK_N	-	50	CLK_32K_OUT	1.8
51	GND		52	PCIE0_RST*	3.3
53	PCIE0_CLKREQ*	3.3	54	BT_DISABLE_L (GPIO03)	3.3
55	PCIE_WAKE*	3.3	56	WIFI_DISABLE_L (GPIO05)	3.3
57	GND		58	NC	
59	NC		60	NC	
61	NC		62	NC	
63	GND		64	NC	
65	NC		66	NC	
67	NC		68	NC	
69	GND		70	NC	
71	NC		72	WIFI_3V3 (3.3V Output)	3.3
73	NC		74	WIFI_3V3 (3.3V Output)	3.3
75	GND				

Interface definition



8. (U21) 4G MINI PCIe



NO.	Definition	Power/V	NO.	Definition	Power/V
1	NC		2	VCC3V8_4G (3.5V Output)	3.5
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	4G_RESET	3.5
23	NC		24	NC	
25	NC		26	GND	
27	GND		28	NC	
29	GND		30	NC	

Interface definition

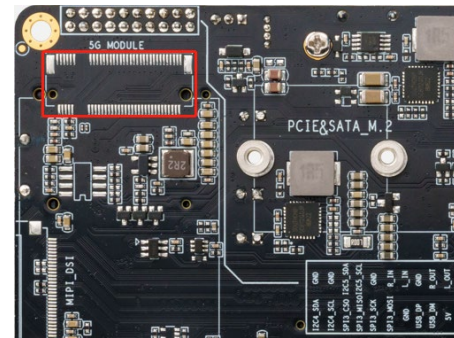


31	NC		32	NC	
33	NC		34	GND	
35	GND		36	4G_HOST20_DM3	-
37	GND		38	4G_HOST20_DP3	-
39	VCC3V8_4G (3.5V Output)	3.5	40	GND	
41	VCC3V8_4G (3.5V Output)	3.5	42	NC	
43	GND		44	SIM_DET	1.8
45	NC		46	NC	
47	NC		48	NC	
49	GND		50	GND	
51	NC		52	VCC3V8_4G (3.5V Output)	3.5

Interface definition



9. (U26) 5G NGFF-M.2-B-KEY (Default:NC)



NO.	Definition	Power/V	NO.	Definition	Power/V
1	NC		2	VCC3V8_4G (3.5V Output)	3.5
3	GND		4	VCC3V8_4G (3.5V Output)	3.5
5	GND		6	FUL_CARD_POWER_OFF#	3.5
7	5G_HOST20_DP3	-	8	NC	
9	5G_HOST20_DM3	-	10	NC	
11	GND		20	NC	
21	NC		22	NC	
23	NC		24	NC	
25	NC		26	NC	
27	GND		28	NC	
29	5G_USB30_RX_N	-	30	UIM_RST	1.8
31	5G_USB30_RX_P	-	32	UIM_CLK	1.8
33	GND		34	UIM_DAT	1.8
35	5G_USB30_TX_N (Series capacitor 100nF)	-	36	UIM_PWR	1.8
37	5G_USB30_TX_P (Series capacitor 100nF)	-	38	NC	

Interface definition

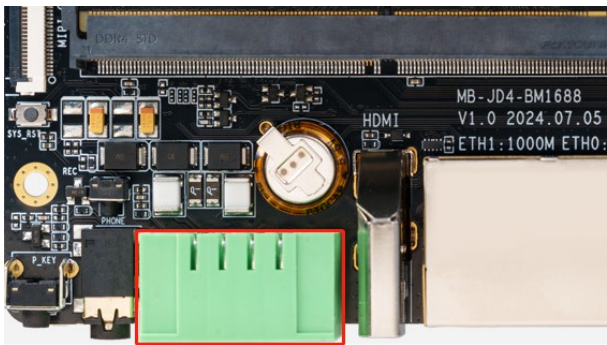


39	GND		40	NC	
41	NC		42	NC	
43	NC		44	NC	
45	GND		46	NC	
47	NC		48	NC	
49	NC		50	NC	
51	GND		52	NC	
53	NC		54	NC	
55	NC		56	NC	
57	GND		58	NC	
59	NC		60	NC	
61	NC		62	NC	
63	GND		64	NC	
65	NC		66	SIM_DET	1.8
67	4G_RESET	3.5	68	NC	
69	NC		70	VCC3V8_4G (3.5V Output)	3.5
71	GND		72	VCC3V8_4G (3.5V Output)	3.5
73	GND		74	VCC3V8_4G (3.5V Output)	3.5
75	NC				

Interface definition



10. (J3) RS485/RS232/CAN 2*4pin 3.5mm pitch connector (GREEN)



NO.	Definition	Power/V	NO.	Definition	Power/V
1	RS485_A (UART0)		2	RS485_B (UART0)	5.0
3	CAN_H	-	4	CAN_L	-
5	GND		6	GND	
7	RS232_TX (UART1)	-	8	RS232_RX (UART1)	-

Interface definition



11. (J16) USB/PCIE 30PIN 0.5mm pitch **Default: NC**



NO.	Definition	Power/V	NO.	Definition	Power/V
1	I2C0_SDA (Pull-up resistor 2.2K)	1.8	16	GND	
2	I2C0_SCL (Pull-up resistor 2.2K)	1.8	17	PCIE2_TX0_P	-
3	CAM2_PWDN (GPIO11)	1.8	18	PCIE2_TX0_N	-
4	CAM1_RESET 【Expand IO】	1.8	19	GND	
5	GND		20	USBSS2_RX_P	-
6	CAM2_MCLK (GPIO01)	1.8	21	USBSS2_RX_N	-
7	USBSS2_TX_P	1.8	22	GND	
8	CAM1_RESET 【Expand IO】	1.8	23	PCIE2_RX1_P(PCIE3_RX0_P)	-
9	CAM2_MCLK (GPIO01)	1.8	24	PCIE2_RX1_N(PCIE3_RX0_N)	-
10	GND		25	GND	
11	PCIE2_RX0_P	-	26	PCIE2_TX1_P(PCIE3_TX0_P)	-
12	PCIE2_RX0_N	-	27	PCIE2_TX1_N(PCIE3_TX0_N)	-
13	GND		28	GND	
14	PCIE2_CLK_P	-	29	VCC5V0_SYS (5.0V OUTPUT)	5.0
15	PCIE2_CLK_N	-	30	VCC5V0_SYS (5.0V OUTPUT)	5.0



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