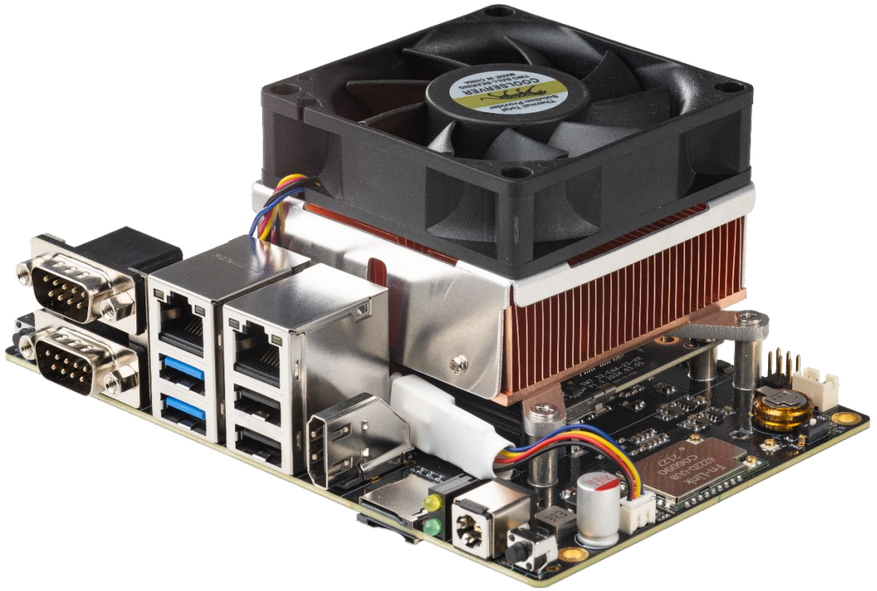
AIO-1684XJD4

32T High Computing Power AI MainBoard



V1.2 2024-12-2

T-CHIP INTELLIGENCE TECHNOLOGY

Product features

New-gen octa-core AI processor BM1684X

Adopt SOPHON AI processor BM1684X, which features octa-core ARM Cortex-A53, main frequency is up to 2.3GHz and 12nm lithography process. With up to 32TOPS (INT8) computing power, 16TFLOPS (FP16/BF16) computing power, 2Tops (FP32) high-precision computing power.

Powerful multi-channel video AI performance

Support 32-channel H.265/H.264 1080P@25fps video decoding, 32-channel H.265/H.264 1080P@25fps HD video full process processing (decoding+AI analysis) and 12-channel H.265/H.264 1080P@25fps video encoding.

Abundant algorithms

It supports multiple algorithms porting such as "person/vehicle/object" recognition, video structuring, and trajectory behavior, with high security and reliability. It can be flexibly applied to various product development.

Product features

One-stop toolkit, convenient and efficient

The BMNNSDK2 one-stop deep learning development toolkit provides a series of software tools, including the underlying driver environment, compiler and inference deployment tool. Support deep learning frameworks such as Caffe/Pytorch/PaddlePaddle, mainstream network models, custom operator development and Docker containerization.

A variety of interfaces

With HDMI1.4, M.2, Mini PCIe, USB3.0, USB2.0, RS485, RS232 and other expansion interfaces, it is convenient to connect various peripherals and can be directly applied to AI edge computing products.

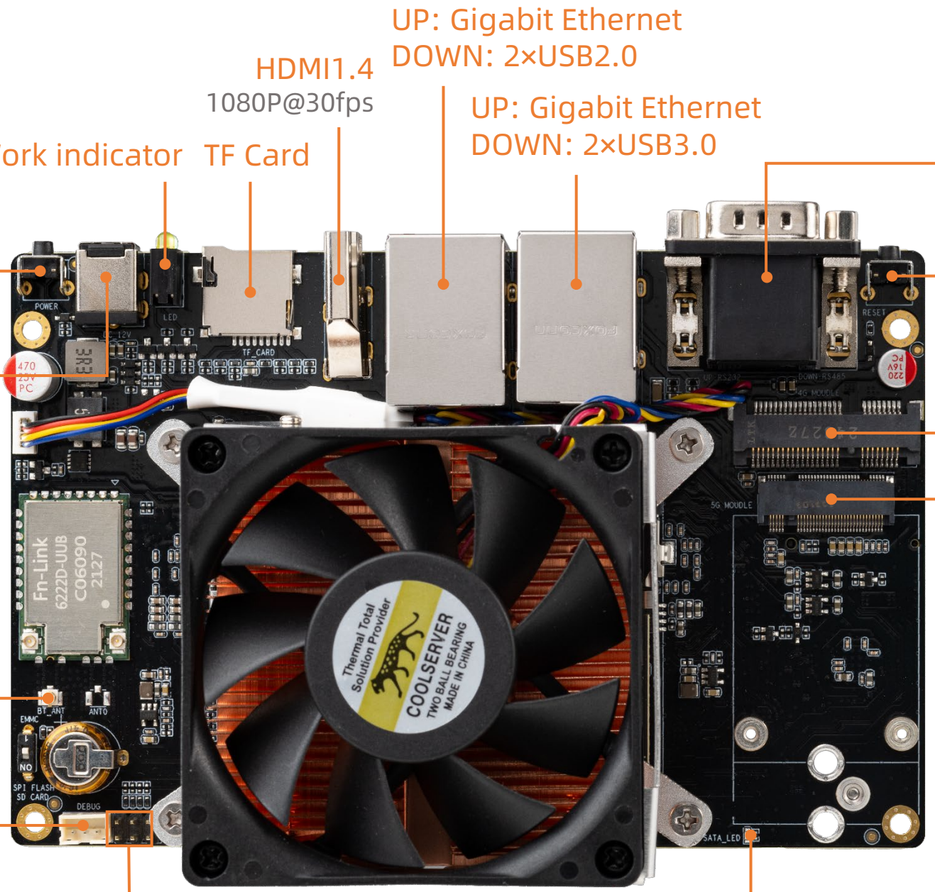
A wide range of applications

Widely applicable to Visual computing, edge computing, general computing power services, Artificial Intelligen-ce, intelligent construction site, transportation, security surveillance, etc.

Specifications

Specification		
Basic Specifications	SOC	SOPHON BM1684X
	CPU	Integrated high-performance octa-core ARM A53, 12nm lithography process, main frequency up to 2.3GHz
	TPU	Built-in tensor computing module TPU, computing power up to: 32TOPS (INT8), 16TFLOPS (FP16/BF16), 2TFLOPS (FP32) Support deep learning frameworks, such as TensorFlow/Caffe/PyTorch/PaddlePaddle/ONNX/MXNet/DarkNet
	Encoding/ Decoding	32-channel H.265/H.264 1080P@25fps video decoding, 32-channel 1080P@25fps HD video full process processing (decoding + AI analysis) 12-channel H.265/H.264 1080P@25fps video encoding JPEG codec: 1080P@600fps, maximum resolution 32768×32768 Video preprocessing: supports image CSC, Resize, Crop, Padding, Border, Font, Contrast, Brightness Adjustment
	RAM	6GB/12GB/16GB LPDDR4/LPDDR4X
	Storage	32GB/64GB/128GB eMMC, 128MB SPI Flash, 1 × M.2 SATA3.0 SSD (2242), 1 × TF Card
	OS	Linux
	Power	DC 12V/5A (5.5 × 2.5mm, support 9V~16V wide voltage input)
	Power consumption	Normal: 24W(12V/2000mA), Max: 42W(12V/3500mA)
	Dimension	149.0mm × 97.0mm × 67.1mm
	Weight	≈ 509g
	Environment	Operating Temperature: -20℃ ~ 60℃, Storage Temperature: -20℃ ~ 70℃, Storage humidity: 10% ~ 90%RH (non-condensing)
Interface Specifications	Ethernet	2 × Gigabit Ethernet (1000Mbps/RJ45)
	Wireless	2.4GHz/5GHz dual-band WiFi (802.11a/b/g/n/ac), extended to 4G LTE (Mini PCIe), 5G (M.2)
	Video Output	1 × HDMI1.4 (1080P@30fps)
	USB	2 × USB3.0 (Max: 1A), 2 × USB2.0 (Max: 500mA)
	Other interfaces	1 × RS232 (Console port), 1 × RS485, 1 × Debug (3P-2.0mm), 1 × Double-row pin headers (6P-2.54mm), 1 × FAN(12V, 4P-1.25mm, this interface has been connected to a fan)

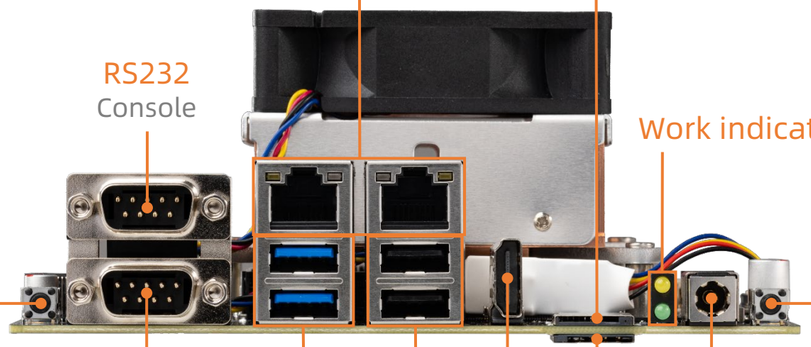
Interface description

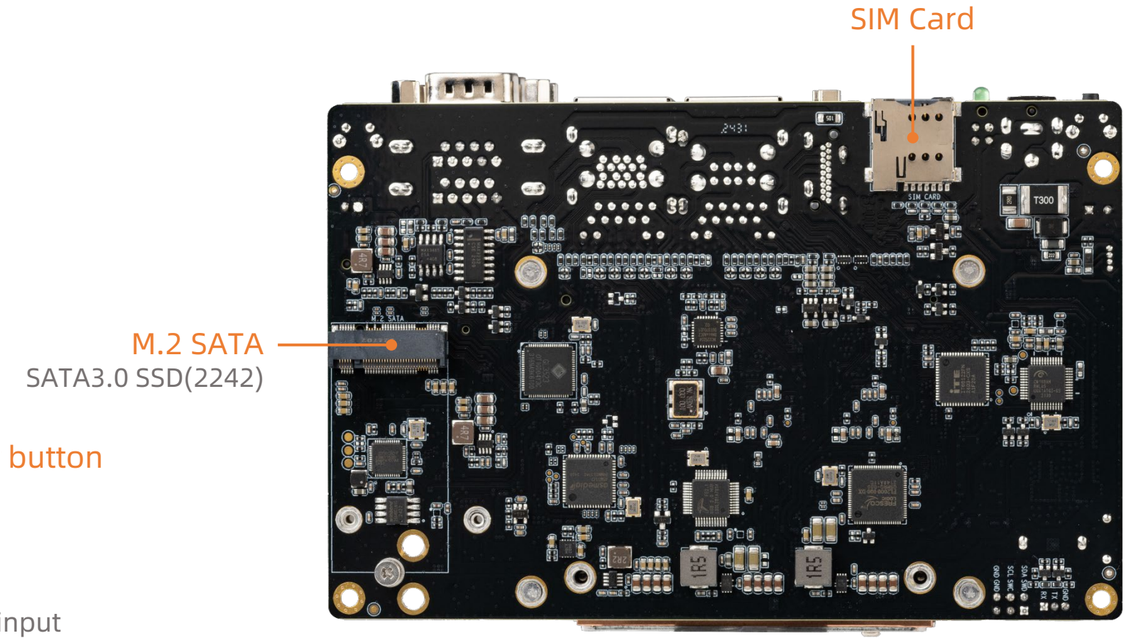


GND	TX	RX

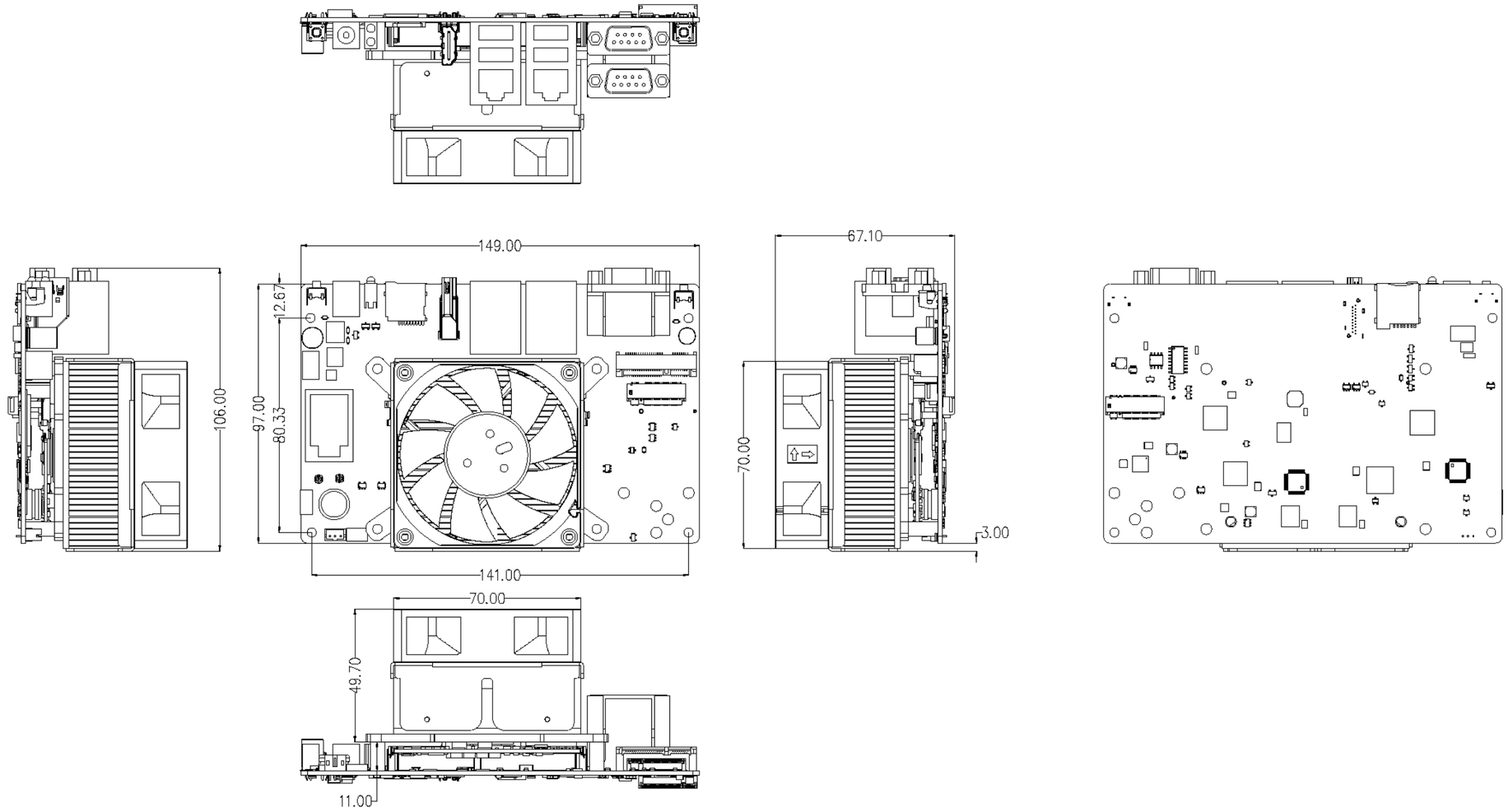
SDA	SCL	GND
SWD	SWC	GND

Interface description





Dimension

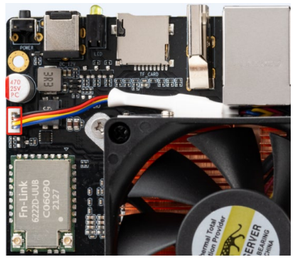

149.00
67.10
106.00
97.00
80.33
12.67
70.00
3.00
141.00
70.00
49.70
11.00

Interface definition

1. (J12) DEBUG: 3PIN 2.0mm pitch wafer

NO.	Definition	Power/V	NO.	Definition	Power/V
1	UART0_RXD	3.3	3	GND	
2	UART0_TXD	3.3			

2. (J11) FAN: 4PIN 1.25mm pitch wafer



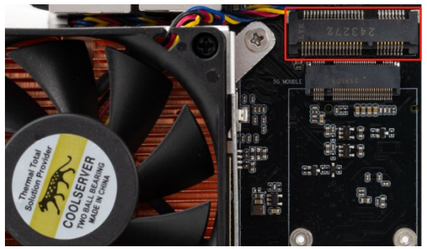
NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	FAN+ (12V Output)	12
3	FG Input 【PWR_GPIO1】	1.8	4	PWM11 Output 【GPIO114】	12

Interface definition

3. (J8) MCU/ISL68224 I2C 3*2PIN 2.54mm pitch Pin header (Black)

NO.	Definition	Power/V	NO.	Definition	Power/V
1	MCU_SWDIO	3.3	2	I2C0_SDA (Core board Pull-up resistor 2.2K)	3.3
3	MCU_SWCLK	3.3	4	I2C0_SCL (Core board Pull-up resistor 2.2K)	3.3
5	GND		6	GND	

4. (U35) MINI PCIe 4G



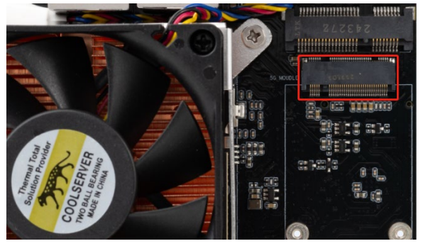
NO.	Definition	Power/V	NO.	Definition	Power/V
1	NC		2	VCC3V8_4G (3.8V Output)	3.8
3	NC		4	GND	
5	NC		6	NC	

Interface definition

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	3.8
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	HUB_USB3_DM	-
37	GND		38	HUB_USB3_DP	-
39	VCC3V8_4G (3.8V Output)	3.8	40	GND	
41	VCC3V8_4G (3.8V Output)	3.8	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 (3.8V Output)	3.8

Interface definition

5. (U34)5G NGFF-M.2-B-KEY



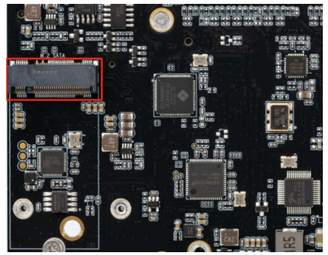
NO.	Definition	Power/V	NO.	Definition	Power/V
1	NC		2	VCC3V8_4G (3.8V Output)	3.8
3	GND		4	VCC3V8_4G (3.8V Output)	3.8
5	GND		6	FUL_CARD_POWER_OFF#	3.8
7	HUB_USB3_DP	-	8	NC	
9	HUB_USB3_DM	-	10	NC	
11	GND		20	NC	
21	NC		22	NC	
23	NC		24	NC	
25	NC		26	NC	
27	GND		28	NC	
29	HUB_USB3_SSRXN	-	30	UIM_RST	1.8
31	HUB_USB3_SSRXP	-	32	UIM_CLK	1.8
33	GND		34	UIM_DAT	1.8
35	HUB_USB3_SSTXN (Series capacitor 100nF)	-	36	UIM_PWR	1.8
37	HUB_USB3_SSTXP (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	3.8	68	NC	
69	NC		70	VCC3V8_4G (3.8V Output)	3.8
71	GND		72	VCC3V8_4G (3.8V Output)	3.8
73	GND		74	VCC3V8_4G (3.8V Output)	3.8
75	NC				

Interface definition

6. (U16)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
21	GND		22	NC	
23	NC		24	NC	
25	NC		26	NC	
27	GND		28	NC	
29	NC		30	NC	
31	NC		32	NC	
33	GND		34	NC	
35	NC		36	NC	

Interface definition

37	NC		38	DEVSLP [pull up resistor10K]	3.3
39	GND		40	NC	
41	SATA_RX_P (Series capacitor 100nF)	-	42	NC	
43	SATA_RX_N (Series capacitor 100nF)	-	44	NC	
45	GND		46	NC	
47	SATA_TX_N (Series capacitor 100nF)	-	48	NC	
49	SATA_TX_P (Series capacitor 100nF)	-	50	PCIE0_RST* (GPIO40)	3.3
51	GND		52	PCIE0_CLKREQ* (GPIO42)	3.3
53	NC		54	PCIE_WAKE*(GPIO41)	3.3
55	NC		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				

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