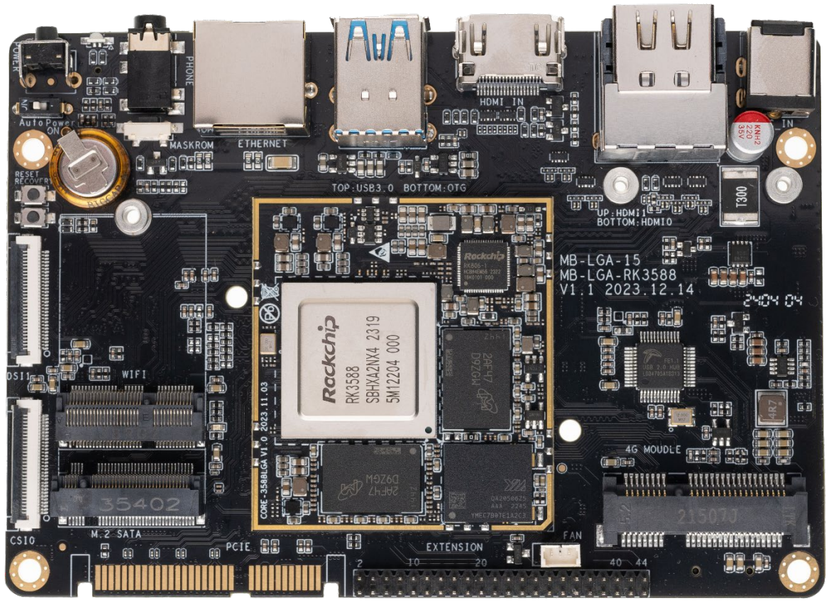
8K AI Mainboard

- AIO-3588L(Commercial)
- AIO-3588JL(Industrial)
- AIO-3588ML(Automotive)



V1.1 2025-1-8

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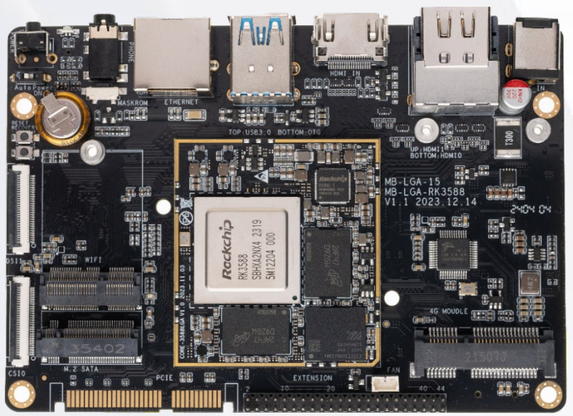
Product features



A new generation of AIoT chips: RK3588 series

The RK3588 chip series is a new generation of Rockchip's flagship AIoT products, using 8nm LP process, equipped with an octa-core 64-bit CPU with a frequency of up to 2.4GHz.

6 TOPS powerful computing power

Built-in powerful NPU, comprehensive computing power up to 6TOPS. It supports INT4/INT8/INT16 hybrid computing, and can realize network model conversion based on TensorFlow, MXNet, PyTorch, Caffe and other series frameworks, with strong compatibility, to meet the edge computing needs of most terminal devices.

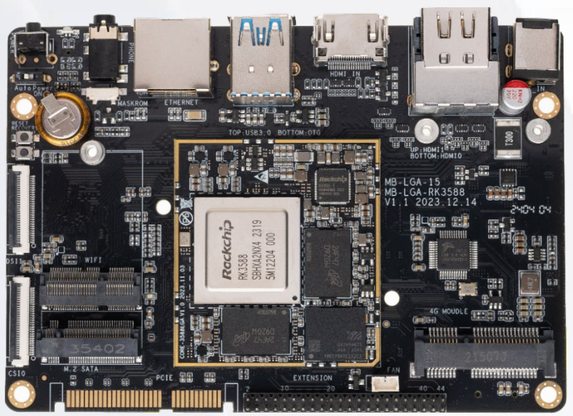
8K HD video decoding

It supports 8K@60fps H.265/VP9 video decoding and 8K@30fps H.265/H.264 video encoding, supporting simultaneous encoding and decoding, up to 32 channels of 1080P@30fps decoding and 16 channels of 1080P@30fps encoding.

Strong network communication capabilities

Onboard Gigabit Ethernet, 2.4GHz/5GHz dual-band WiFi6 (M.2), Bluetooth5.0, support 5G/4G LTE expansion, so that network communication has higher speeds.

Product features



Supports 5-screen different displays

It has HDMI2.1, MIPI-DSI, DP1.4 multi-channel video output, supports multi-channel 8K video output, and can achieve up to 5 screens of different displays, meeting the needs of various multi-screen display scenarios.

A variety of product forms

It provides three different specifications of commercial grade, industrial grade and automotive grade to meet the needs of industrial-grade applications. The automotive-grade core board supports ADAS/DMS/BSD/APA multi-camera assisted driving, supports 4-, 6-, and 8-channel camera wide-angle seamless splicing, and can realize "one screen and one system" display.

Abundant expansion interfaces

It has PCIe3.0, PCIe2.0, SATA3.0, I2C, UART, MIPI-CSI, MIPI-DSI, USB3.0, USB2.0, DP, Type-C, SPI, ADC and other rich expansion interfaces.

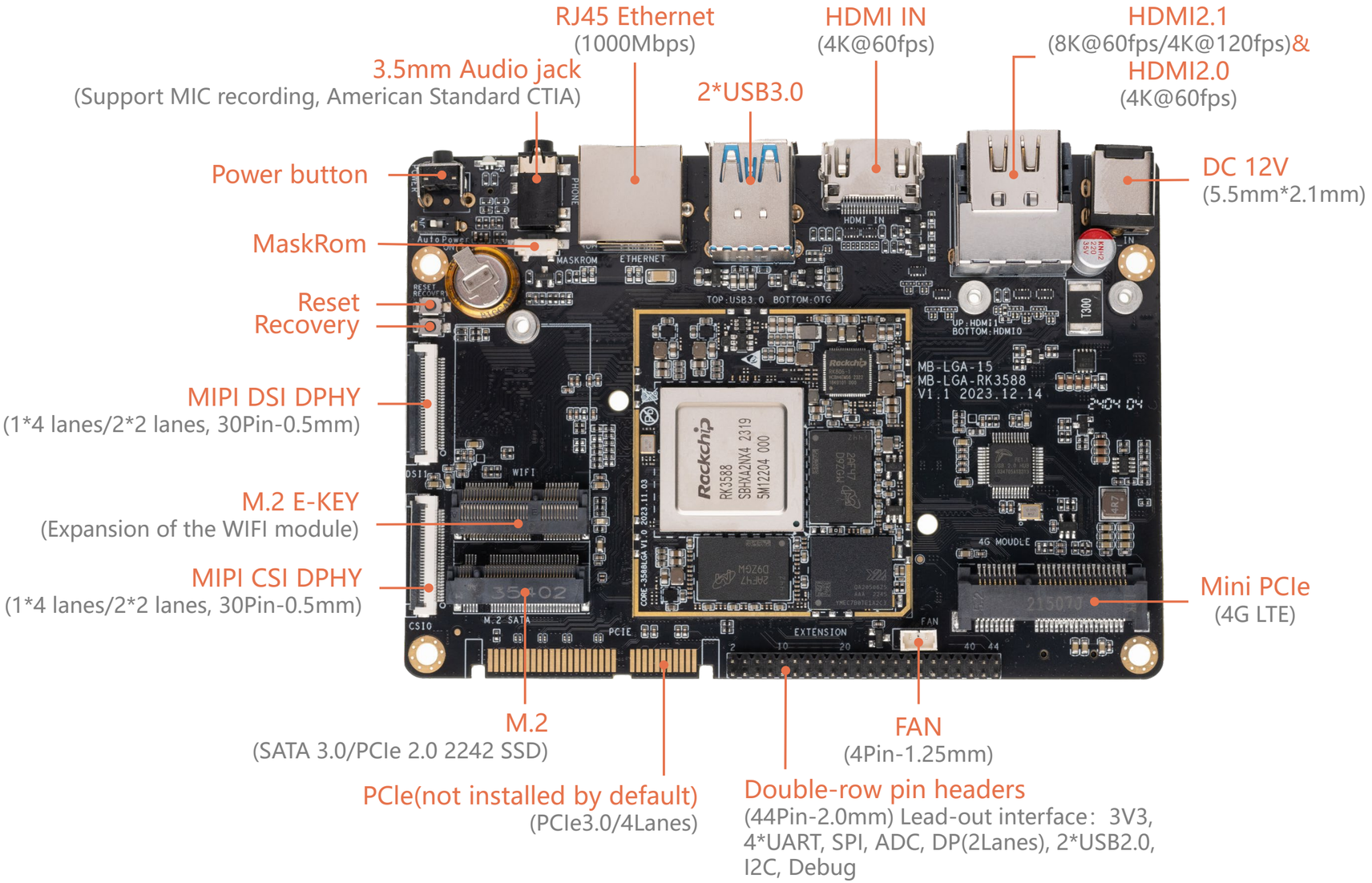
Wide range of application scenarios

It is widely used in ARM PC, edge computing, cloud terminals, cloud servers, industrial control, smart cars and other fields.

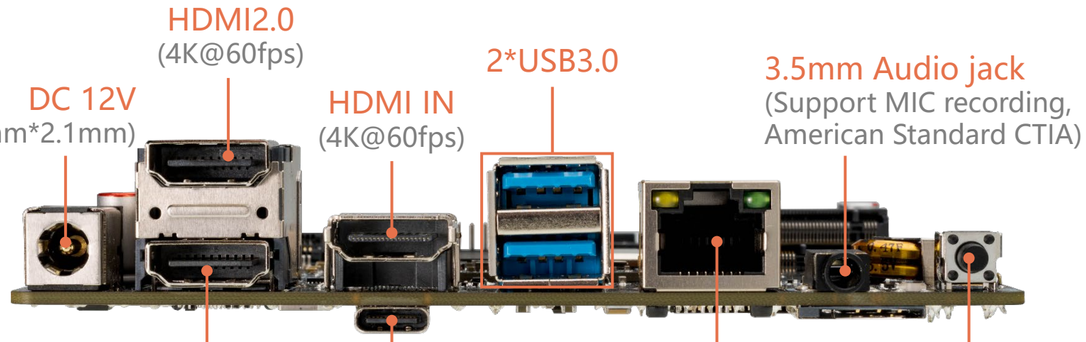
Specifications

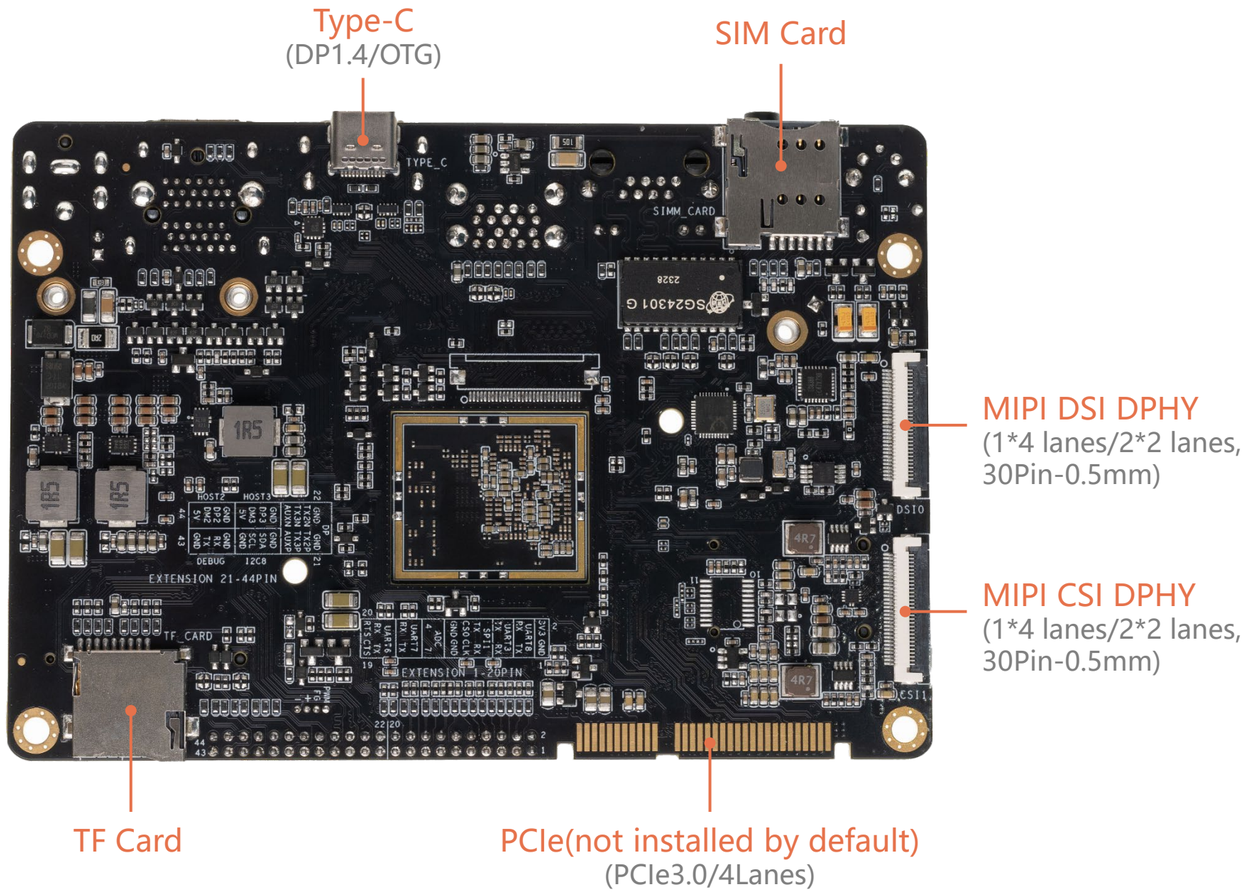
		AIO-3588L (Commercial)	AIO-3588JL (Industrial)	AIO-3588ML (Automotive)
Basic Specifications	CPU	RK3588 Octa-core 64-bit(4×Cortex-A76+ 4×Cortex-A55), up to 2.4GHz	RK3588J Octa-core 64-bit(4×Cortex-A76+ 4×Cortex-A55), up to 1.6GHz	RK3588M Octa-core 64-bit(4×Cortex-A76+ 4×Cortex-A55), up to 2.0GHz
	GPU	ARM Mali-G610 MP4 quad-core GPU, support OpenGL ES3.2/OpenCL 2.2/Vulkan1.1, 450 GFLOPS		
	NPU	Up to 6TOPS(INT8) Support INT4/INT8/INT16 mixed operations, support framework switching of TensorFlow/MXNet/PyTorch/Caffe		
	ISP	48MP ISP with HDR & 3DNR		
	VPU	Hardware decoding: 8K@60fps H.265/VP9/AVS2, 8K@30fps H.264 AVC/MVC, 4K@60fps AV1, 1080P@60fps MPEG-2/-1/ VC-1/VP8 Hardware encoding: 8K@30fps H.265/H.264		
	RAM	LPDDR4/LPDDR4x (4GB/8GB/16GB optional, up to 32GB)	LPDDR4/LPDDR4x(Industrial) (4GB/8GB/16GB optional, up to 32GB)	LPDDR4/LPDDR4x(Industrial) (4GB/8GB/16GB optional, up to 32GB)
	Storage	eMMC (32GB/64GB/128GB/256GB optional)		
	Storage Expansion	Expandable SATA 3.0 / PCIe 2.0 2242 SSD (M.2 port) 1 × TF Card		
	Power	DC 12V (5.5mm × 2.1mm, voltage tolerance ± 5%)		
	Power consumption	Max: 14.4W(12V/1200mA) Normal: 1.44W(12V/120mA) Min: 0.42W(12V/35mA)	Max: 10.8W(12V/900mA) Normal: 1.44W(12V/120mA) Min: 0.42W(12V/35mA)	Max: 13.2W(12V/1100mA) Normal: 1.44W(12V/120mA) Min: 0.42W(12V/35mA)
	OS	Android and Linux OS		
	Size	122.89mm × 85.04mm × 22.99mm		
	Environment	Operating temperature: -20℃ ~ 60℃ Storage humidity: 10% ~ 90%RH(non-condensing)	Operating temperature: -40℃ ~ 85℃ Storage humidity: 10% ~ 90%RH(non-condensing)	Operating temperature: -40℃ ~ 85℃ Storage humidity: 10% ~ 90%RH(non-condensing)
Interface Specifications	Network	1 × 1000Mbps Ethernet (RJ45) The WiFi/Bluetooth module can be expanded through M.2 E-KEY (2230) , supporting WiFi6, Bluetooth5.0 Expandable 4G LTE (Mini PCIe), 5G (USB3.0)		
	Video Input	2 × MIPI CSI DPHY (1×4 lanes or 2×2 lanes, 30Pin-0.5mm) 1 × HDMI-IN (4K@60fps), support HDCP 2.3		
	Video Output	1 × HDMI2.1 (8K@60fps or 4K@120fps) 1 × HDMI2.0 (4K@60fps) 2 × MIPI DSI DPHY (1×4 lanes or 2×2 lanes, 30Pin-0.5mm) 1 × DP1.4 (maximum 8K@30fps, output via Type-C)		
	Audio	1 × 3.5mm Audio jack (Support MIC recording, American Standard CTIA)		
	M.2	1 × M.2 (expandable M.2 SATA3.0/PCIe2.0 2242 SSD)		
	PCIe	PCIe not installed by default (Customizable 1×PCIe3.0 (4 lanes))		
	USB	2 × USB3.0 (Max: 1A) 2 × USB2.0 (lead by pin header)		
	Other	1 × Fan (4Pin-1.25mm) 1 × Type-C (DP1.4/OTG) 1 × Double-row pin header (44Pin-2.0mm) lead out interface: 3V3, 4×UART, SPI, ADC, DP (2Lanes), 2×USB2.0, I2C, Debug		

Interface description

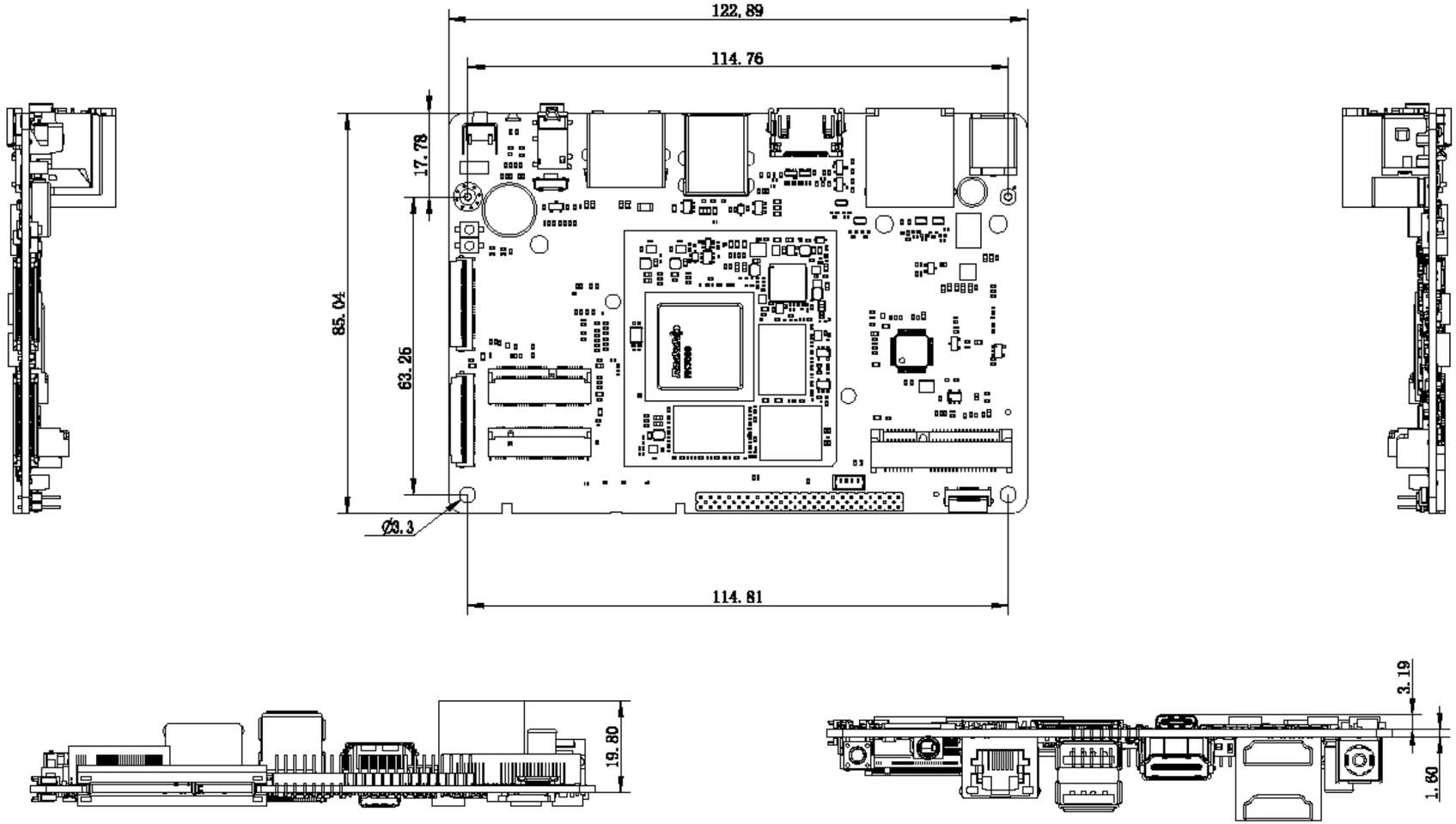


Interface description



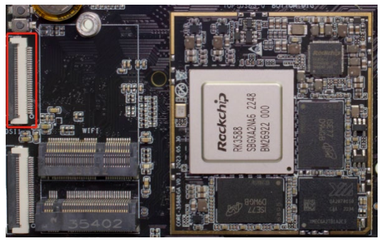


Dimension



Interface definition

1. MIPI_Display_Interface 30PIN 0.5mm Pitch (J14: DS1)

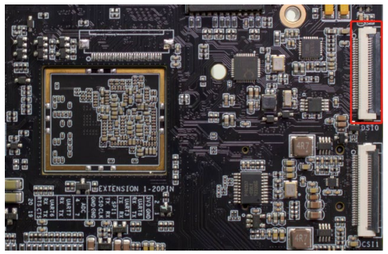


NO.	Definition	Power/V	NO.	Definition	Power/V
1	VCC5V0_SYS (5.5V Output)	5.0V	16	MIPI_DPHY1_TX_D0P	-
2	VCC5V0_SYS (5.5V Output)	5.0V	17	MIPI_DPHY1_TX_D0N	-
3	VCC5V0_SYS (5.5V Output)	5.0V	18	GND	
4	GND		19	MIPI_DPHY1_TX_D1P	-
5	I2C_ID2 Input 【M Board pull up resistance 10K】	3.3V	20	MIPI_DPHY1_TX_D1N	-
6	VCC3V3_SYS (3.3V Output)	3.3V	21	GND	
7	I2C6_SDA_M0 【GPIO0_C7_d】 【M Board pull up resistance 2.2K】	3.3V	22	MIPI_DPHY1_TX_CLKP	-
8	I2C6_SCL_M0 【GPIO0_D0_d】 【M Board pull up resistance 2.2K】	3.3V	23	MIPI_DPHY1_TX_CLKN	-
9	LCD1_PWR_EN 【GPIO3_A0_u】	3.3V	24	GND	
10	TP1_INT【GPIO3_A1_u】 【M Board pull up resistance 10K】	3.3V	25	MIPI_DPHY1_TX_D2P	-
11	LCD1_BL_EN【GPIO1_A4_d】	3.3V	26	MIPI_DPHY1_TX_D2N	-
12	PWM9_M0【GPIO3_B0_u】	3.3V	27	GND	

Interface definition

13	LCD1_RESET 【GPIO3_A4_d】 【M Board pull up resistance 10K】	3.3V	28	MIPI_DPHY1_TX_D3P	-
14	TP1_RESET【GPIO3_A5_d】 【M Board pull up resistance 10K】	3.3V	29	MIPI_DPHY1_TX_D3N	-
15	GND		30	GND	

2. MIPI_Display_Interface 30PIN 0.5mm Pitch (J12: DS0)

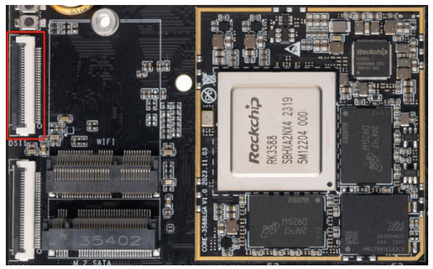


NO.	Definition	Power/V	NO.	Definition	Power/V
1	VCC5V0_SYS (5.5V Output)	5.0V	16	MIPI_DPHY0_TX_D0P	-
2	VCC5V0_SYS (5.5V Output)	5.0V	17	MIPI_DPHY0_TX_D0N	-
3	VCC5V0_SYS (5.5V Output)	5.0V	18	GND	
4	GND		19	MIPI_DPHY0_TX_D1P	-
5	I2C_ID Input 【M Board pull down resistance 10K】	3.3V	20	MIPI_DPHY0_TX_D1N	-
6	VCC3V3_SYS (3.3V Output)	3.3V	21	GND	
7	I2C8_SDA_M4 【GPIO3_C3_d】 【M Board pull up resistance 2.2K】	3.3V	22	MIPI_DPHY0_TX_CLKP	-
8	I2C8_SCL_M4 【GPIO3_C2_d】 【M Board pull up resistance 2.2K】	3.3V	23	MIPI_DPHY0_TX_CLKN	-

Interface definition

9	LCD0_PWR_EN 【GPIO3_B7_d】	3.3V	24	GND	
10	TP0_INT【GPIO3_B1_d】	3.3V	25	MIPI_DPHY0_TX_D2P	-
11	LCD0_BL_EN【GPIO1_B1_d】	3.3V	26	MIPI_DPHY0_TX_D2N	-
12	PWM8_M0【GPIO3_A7_u】	3.3V	27	GND	
13	LCD_RESET 【GPIO3_B3_u】 【M Board pull up resistance 10K】	3.3V	28	MIPI_DPHY0_TX_D3P	-
14	TP0_RESET【GPIO3_B4_u】	3.3V	29	MIPI_DPHY0_TX_D3N	-
15	GND		30	GND	

3. MIPI_Camera_Interface 30PIN 0.5mm Pitch (J18: CS0)

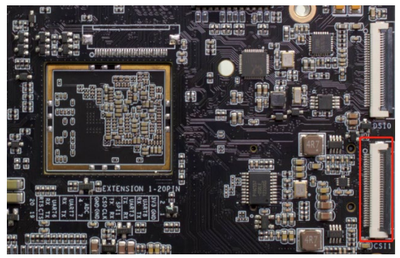


序号	定义	电平/V	序号	定义	电平/V
1	I2C3_SDA_M0【GPIO1_C0_z】 【M Board pull up resistance 2.2K】	1.8V	16	GND	
2	I2C3_SCL_M0【GPIO1_C1_z】 【M Board pull up resistance 2.2K】	1.8V	17	MIPI_CSI0_RX_CLK0P	-
3	MIPI_PDN0【GPIO2_B4_u】	1.8V	18	MIPI_CSI0_RX_CLK0N	-
4	MIPI_RESET0【GPIO2_B5_u】	1.8V	19	GND	
5	GND		20	MIPI_CSI0_RX_D2P	-
6	MIPI_CAM0_CLK【GPIO2_B6_u】	1.8V	21	MIPI_CSI0_RX_D2N	-

Interface definition

7	MIPI_PDN1【GPIO2_C4_d】	1.8V	22	GND	
8	MIPI_RESET0【GPIO2_B5_u】	1.8V	23	MIPI_CSI0_RX_D3P	-
9	MIPI_CAM1_CLK【GPIO1_B7_u】	1.8V	24	MIPI_CSI0_RX_D3N	-
10	GND		25	GND	
11	MIPI_CSI0_RX_D0P	-	26	MIPI_CSI0_RX_CLK1P	-
12	MIPI_CSI0_RX_D0N	-	27	MIPI_CSI0_RX_CLK1N	-
13	GND		28	GND	
14	MIPI_CSI0_RX_D1P	-	29	VCC5V0_SYS (5.5V Output)	5.0V
15	MIPI_CSI0_RX_D1N	-	30	VCC5V0_SYS (5.5V Output)	15

4. MIPI_Camera_Interface 30PIN 0.5mm Pitch (J17: CS1)

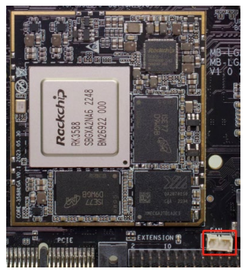


NO.	Definition	Power/V	NO.	Definition	Power/V
1	I2C8_SDA_M4【GPIO3_C3_d】 【M Board pull up resistance 2.2K】	1.8V	16	GND	
2	I2C8_SCL_M4【GPIO3_C2_d】 【M Board pull up resistance 2.2K】	1.8V	17	MIPI_CSI1_RX_CLK0P	-
3	MIPI_CAM2_PDN【GPIO1_B5_u】	1.8V	18	MIPI_CSI1_RX_CLK0N	-
4	MIPI_RESET2【GPIO2_C5_d】	1.8V	19	GND	

Interface definition

5	GND		20	MIPI_CSI1_RX_D2P	-
6	MIPI_CAM2_CLK【GPIO1_D6_u】	1.8V	21	MIPI_CSI1_RX_D2N	-
7	MIPI_CAM3_PDN【GPIO1_B2_d】	1.8V	22	GND	
8	MIPI_RESET2【GPIO2_C5_d】	1.8V	23	MIPI_CSI1_RX_D3P	-
9	MIPI_CAM3_CLK【GPIO1_D7_u】	1.8V	24	MIPI_CSI1_RX_D3N	-
10	GND		25	GND	
11	MIPI_CSI1_RX_D0P	-	26	MIPI_CSI1_RX_CLK1P	-
12	MIPI_CSI1_RX_D0N	-	27	MIPI_CSI1_RX_CLK1N	-
13	GND		28	GND	
14	MIPI_CSI1_RX_D1P	-	29	VCC5V0_SYS (5.5V Output)	5.0V
15	MIPI_CSI1_RX_D1N	-	30	VCC5V0_SYS (5.5V Output)	5.0V

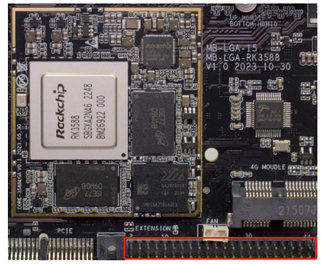
5. FAN 3PIN 1.25mm Pitch Wafer Holder (WHITE) (J13)



NO.	Definition	Power/V	NO.	Definition	Power/V
1	FAN-		3	FG	3.3V
2	FAN+	12V			

Interface definition

6. 22PIN*2 2.0mm Pitch Double Row Needles (J10)



NO.	Definition	Power/V	NO.	Definition	Power/V
1	GND		2	VCC3V3_SYS (3.3V Output)	3.3V
3	UART8_TX_M1【GPIO3_A2_u】	3.3V	4	UART8_RX_M1【GPIO3_A3_u】	3.3V
5	UART3_RX_M1/CAN1_TX_M0 【GPIO3_B6_d】	3.3V	6	UART3_TX_M1/CAN1_RX_M0 【GPIO3_B5_u】	3.3V
7	SPI1_MISO_M2【GPIO1_D0_d】	1.8V	8	SPI1_MOSI_M2【GPIO1_D1_d】	1.8V
9	SPI1_CLK_M2【GPIO1_D2_d】	1.8V	10	SPI1_CS0_M2【GPIO1_D3_d】	1.8V
11	GND		12	GND	
13	ADC7 【M Board pull up resistance 10K】	1.8V	14	ADC4 【M Board pull up resistance 10K】	1.8V
15	UART7_TX_M1【GPIO3_C0_d】	3.3V	16	UART7_RX_M1【GPIO3_C1_d】	3.3V
17	UART6_TX_M1【GPIO1_A1_d】	3.3V	18	UART6_RX_M1【GPIO1_A0_d】	3.3V
19	UART6_CTSn_M1【GPIO1_A3_d】	3.3V	20	UART6_RTSn_M1【GPIO1_A2_d】	3.3V
21	GND		22	GND	
23	DP1_TX2P	-	24	DP1_TX2N	-
25	DP1_TX3P	-	26	DP1_TX3N	-

Interface definition

27	DP1_AUXP	-	28	DP1_AUXN	-
29	GND		30	GND	
31	I2C8_SDA_M4【GPIO3_C3_d】 【M Board pull up resistance 2.2K】		32	HOST_DP3	
33	I2C8_SCL_M4【GPIO3_C2_d】 【M Board pull up resistance 2.2K】		34	HOST_DM3	
35	GND		36	VCC5V0_SYS (5.0V Output)	5.0V
37	GND		38	GND	
39	DEBUG_RXD	3.3V	40	HOST_DP2	
41	DEBUG_TXD	3.3V	42	HOST_DM2	
43	GND		44	VCC5V0_SYS (5.0V Output)	5.0V

T-CHIP INTELLIGENCE TECHNOLOGY

Contact Us
(+86)18688117175

E-mail
global@t-firefly.com

Website
www.t-firefly.com

Address
Room 2101, Hongyu Building, #57 Zhongshan 4Rd, East District, Zhongshan, Guangdong, China.