Specification of RK3588 Edge Computing Device

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01	First edition new release		15-11-2022	

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I. Product-related and physical pictures

Name: RK3588 Edge Computing Device

Model: AD-0160

Overview.

Intelligent industrial all-in-one large board, using Rockchip RK3588 octa-core chip solution. Support Android 12 system. Enhanced power management circuit, support common external devices, rich interface, stable performance. Suitable for intelligent remote network control: class industrial, medical, large advertising machines, educational video terminals and other equipment.

Features

Support multiplexed display (single-port maximum support 7680*4320 60HZ)

Multiple interaction mode interface: capacitive touch, infrared remote control, USB keyboard and mouse, multi-point optical touch.

Multiple network interfaces: Ethernet, wireless Wifi, Bluetooth.

Multiple USB interfaces, RS3232, RS485 serial ports.

Strong resistance to electromagnetic interference and electromagnetic compatibility.

Physical picture of the product.

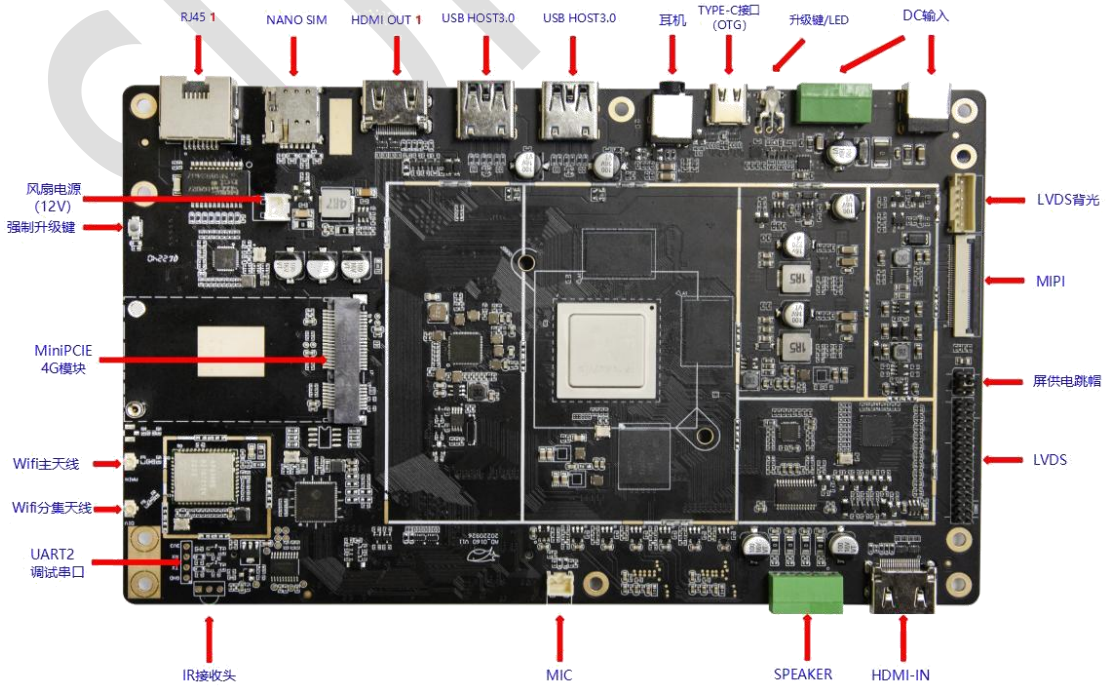
II. Product parameters and functions

System	CPU	RK3588 8-core CPU 8nm process 4 Cortex-A76 and 4 Cortex-A55
	GPU	ARM Mali G610 MP4 GPU
	NPU	**INT4/INT8/INT16/FP16 mixed computing capability with up to 6TOPs of computing power (INT8)**
	RAM	8GB/16G (optional)
	Memory	32GB/64GB/128GB/256GB (optional)
	Operating System	Android 12
Network	WiFi	IEEE 802.11 a/b/g/n/ac
	Dual wired network	Support 1000M wired network network*2
	Mobile Network	Support wireless 4G network
	Bluetooth	BT5.0
Motherboard Interface	TYPE_C	Standard Type_c*1
	DC holder*1	Front 5.5/2.5mm
	DC terminal input interface*1	4PIN pitch 3.81 terminal power input port*1
	Headphones	3.5MM support stereo with MIC headphone output port
	USB 3.0	USB 3.0_A port*2
	HDMI_OUT 1	Support HDMI 2.1 _OUT*1 **(maximum support 7680*4320 60HZ output for single HDMI display)**
	SIM card	SIM card port*1
	Ethernet port	Support 10/100/1000M Ethernet*1
	Horn	Dual channel 4 Europe 5W speaker interface 4PIN spacing 3.81mm green terminals * 1
	HDMI_IN	Support HDMI 2.0_4K input*1
Sub-board interface	RS232 COM port	RS232 output port DB9*2
	USB 3.0	USB 3.0_A port*2
	HDMI_OUT 2	**HDMI 4K 60HZ output*1 (this interface does not work**

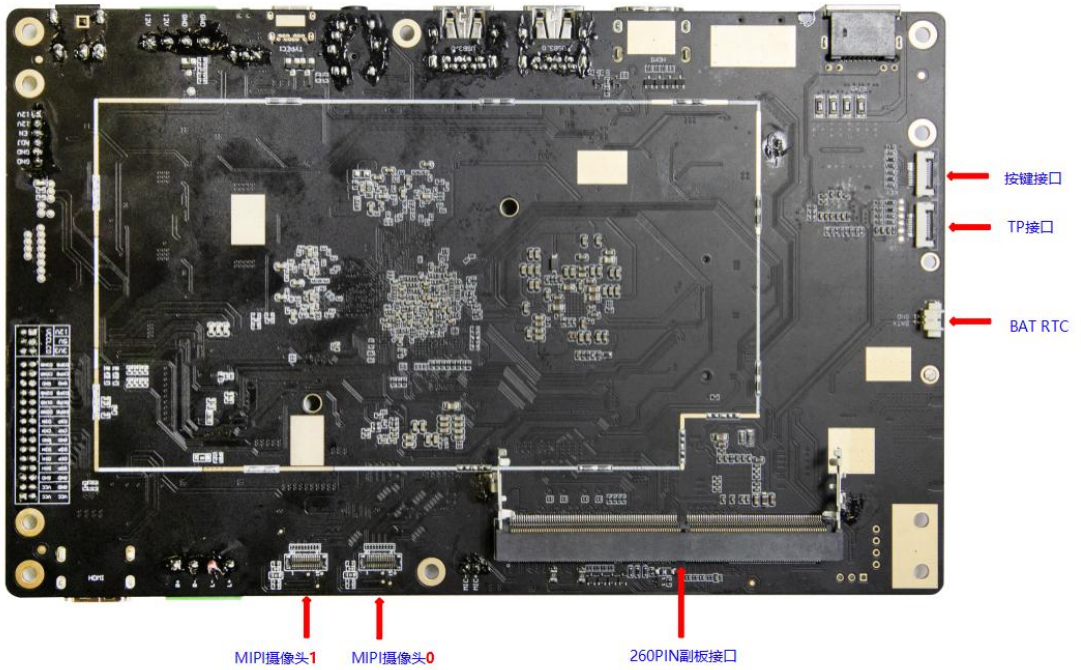
		when HDMI_OUT 1 is selected to output 8K)
	DP display interface	DP display output interface*1 7680x4320@30Hz output*1
	Ethernet port	Support 10/100/1000M Ethernet*1
	M.2 internal SSD interface	M.2 built-in SSD expansion interface*1
	RS485	RS485 3PIN pitch 3.81 green terminal block*1
Environmental parameters	General working temperature/humidity	**Temperature:-20-60℃ Humidity 5%-85%RH(non-condensing)**
	General storage temperature/humidity	**Temperature:-20-70℃ Humidity 5%-85%RH(non-condensing)**
Housing	Color	Black
	Material	Aluminum alloy + metal profile
Size	Motherboard Size	200*125mm
	Sub-board size	200*125mm
	Whole machine size	244*128*49.5mm
Other	Indicator light	Red and blue 2 colors
	Button	Upgrade key*1
	Power adapter	DC:12V/3A

III. Function description

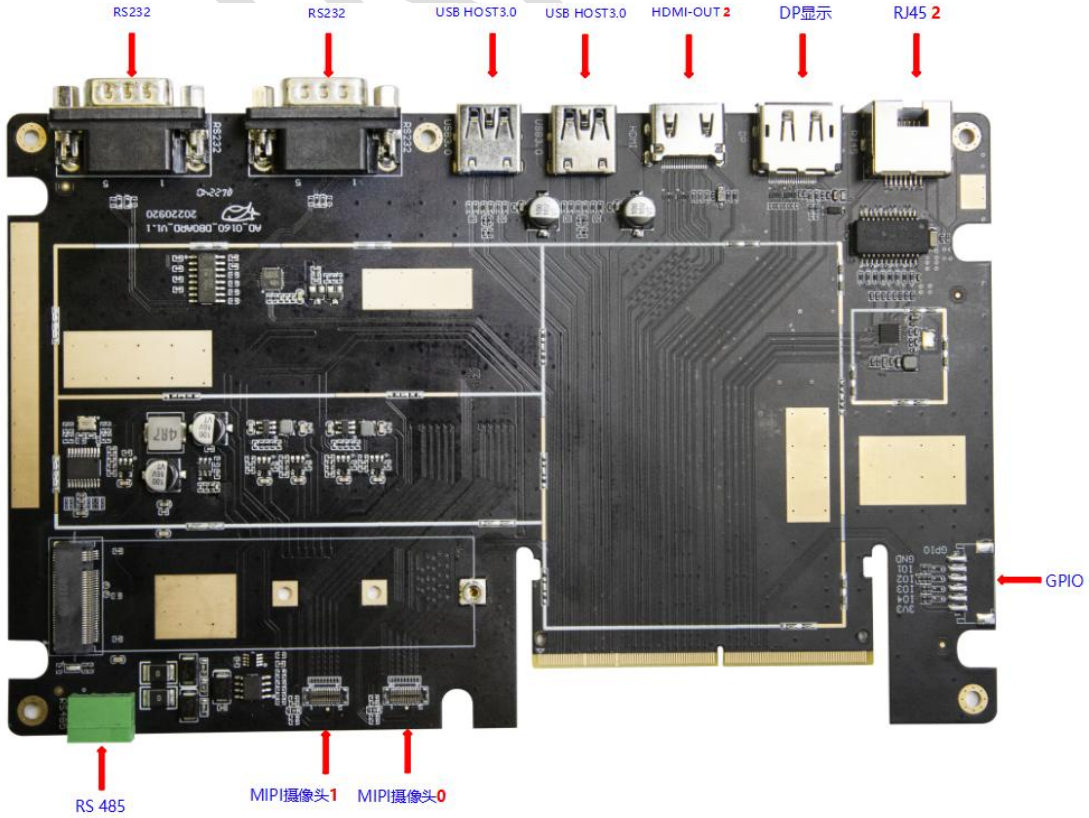
Front of the motherboard



Back of the motherboard

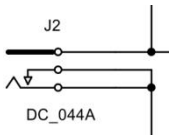
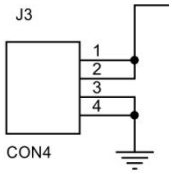
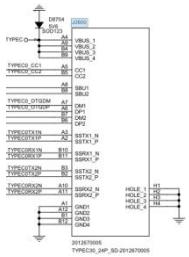


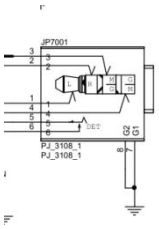
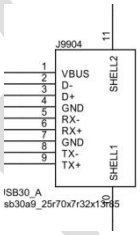
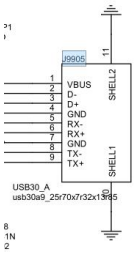
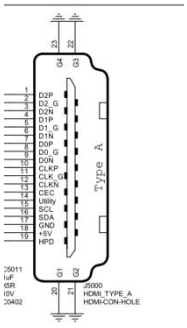
Sub-board front

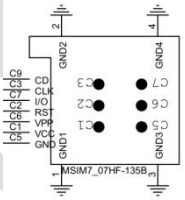
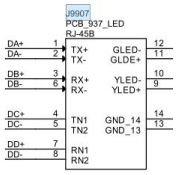


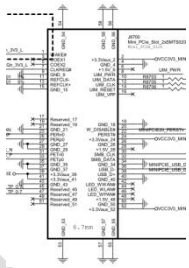
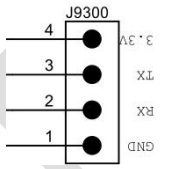
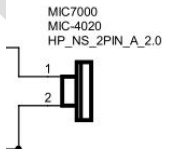
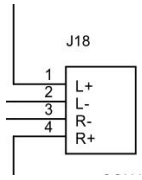
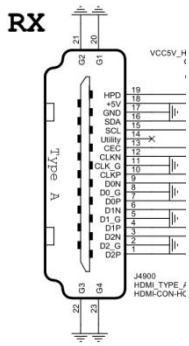
Appendix 1:

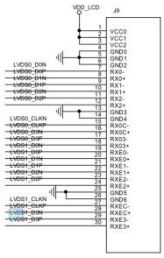
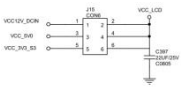
Interface Description.

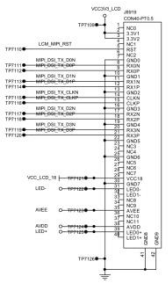
Interface Name	Bit Number	Interface Definition	Connector Model	Definition of each PIN
Power connector	J2	Connect +12V Connect GND	DC_044A	
Power connector	J3	Connect +12V Connect +12V Connect GND Connect GND	4PIN	
OTG interface	J2600	Connect OTG's +5V Connect OTG's +5V Connect OTG's +5V Connect OTG's +5V Connecting to OTG's CC1 data Connected to OTG's CC2 data AUXP data connected to OTG AUXM data connected to OTG DM1 data connected to OTG Connects to OTG's DP1 data DM2 data connected to OTG Connects to OTG's DP2 data TX1N data for OTG connection TX1P data for OTG connection RX1N data connected to OTG RX1P data connected to OTG TX2N data for OTG connection TX2P data connected to OTG RX2N data connected to OTG RX2P data connected to OTG Connect GND Connect GND	TYPEC30_24P	

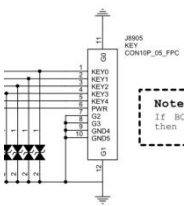
		Connect GND Connect GND		
Headphone jack	JP7001	Connect L channel Connect R channel Connect GND Connect MIC Connect DET Connect GND	PJ_3108	
USB3.0 interface	J9904	Connected to +5V power supply DM data connected to HOST DP data to HOST Connect GND RX-Data connected to HOST RX+ data to HOST Connect GND TX-Data to HOST TX+ data for HOST connection	USB30_A	
USB3.0 interface	J9905	Connected to +5V power supply DM data connected to HOST DP data to HOST Connect GND RX-Data connected to HOST RX+ data to HOST Connect GND TX-Data to HOST TX+ data for HOST connection	USB30_A	
HDMI interface	J5000	Connect HDMI0_TX2P data Connect GND Connect HDMI0_TX2N data Connect HDMI0_TX1P data Connect GND Connect HDMI0_TX1N_Data Connect HDMI0_TX0P_Data Connect GND Connect HDMI0_TX0N_Data Connect HDMI0_TX3P_Data Connect GND Connect HDMI0_TX3N_Data Connect HDMI0_TX_CEC data	HDMI-A	

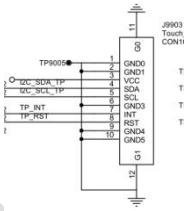
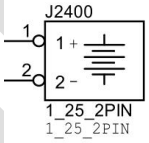
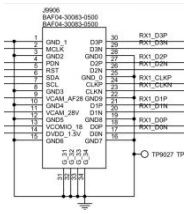
		Connect HDMI0_TX_SBDP data Connect HDMI0_TX_SCL data Connect HDMI0_TX_SDA data Connect GND Connect the +5V power supply for HDMI Connect HDMI0_TX_SBDN data		
SIM card interface	J8701	CD data connected to SIM card Connect CLK data of SIM card I/O (DATA) data to SIM card RST data connected to SIM card Connect VPP Connect to VCC power supply Connect GND	NANO SIM PUSH1.37	
Ethernet Interface 1	J9907	TX+ data for Ethernet connection TX-Data to Ethernet RX+ data to Ethernet RX-Data to Ethernet Connecting Ethernet to TN1 data Connected to Ethernet for TN2 data RN1 data connected to Ethernet RN2 data connected to Ethernet Connects to the negative side of the green light of the Ethernet port Connects to the positive green light of the Ethernet port Connects to the negative side of the yellow light of the Ethernet port Connects to the positive	RJ-45B PCB_937_LED	

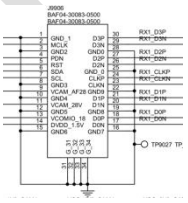
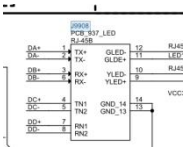
		yellow light of the Ethernet port Connect GND Connect GND		
4G & PCIE interface	J8700	summary	MIN-PCIE	
Debugging the serial port interface	J9300	Connect GND RX data to UART2 TX data to UART2 Connected to 3.3V power supply	/	
MIC interface	MIC7000	Connect to the positive terminal of MIC Connect the negative terminal of MIC	/	
Speaker Interface	J18	Connect to the positive terminal of the left channel Connect the negative terminal of the left channel Connect to the positive terminal of the right channel Connect the negative terminal of the right channel	/	
HDMI-IN connector	J4900	Connect HDMI_RX_D2P data Connect GND Connect HDMI_RX_D2N data Connect HDMI_RX_D1P data Connect GND Connect HDMI_RX_D1N_data Connect HDMI_RX_D0P_Data Connect GND Connect HDMI_RX_D0N_Data Connect HDMI_RX_CLKP_data Connect GND Connect HDMI_RX_CLKN_data	HDMI-A	

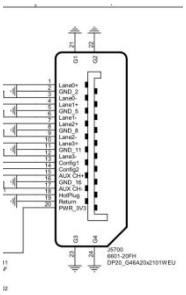
		Connect HDMI_RX_CEC data NC Connect HDMI_RXDDC_SCL data Connect HDMI_RXDDC_SDA data Connect GND Connect the +5V power supply for HDMI Connect HDMI_RX_HPD data		
LVDS interface	J9	Connect LCD power Connect LCD power Connect LCD power Connect GND Connect GND Connect GND Connect LVDS0_D0N data Connect LVDS0_D0P data Connect LVDS0_D1N data Connect LVDS0_D1P data Connect LVDS0_D2N data Connect LVDS0_D2P data Connect GND Connect GND Connect LVDS0_CLKN data Connect LVDS0_CLKP data Connect LVDS0_D3N data Connect LVDS0_D3P data Connect LVDS1_D0N data Connect LVDS1_D0P data Connect LVDS1_D1N data Connect LVDS1_D1P data Connect LVDS1_D2N data Connect LVDS1_D2P data Connect GND Connect GND Connect LVDS1_CLKN data Connect LVDS1_CLKP data Connect LVDS1_D3N data Connect LVDS1_D3P data	Double row male pin-30	
LVDS power switching	J15	Connected to 12V power supply Connect LCD power	Double row male pins-6PIN	

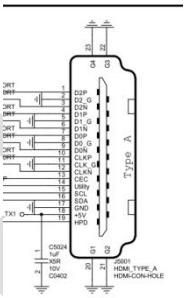
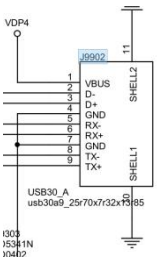
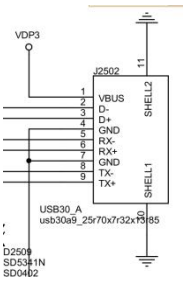
interface		Connect 5V power supply Connect LCD power Connected to 3.3V power supply Connect LCD power		
Mipi screen interface	J8919	NC Connect LCD-3.3V power supply Connect LCD-3.3V power supply Connect NC Connect LCD-RST data Connect NC Connect GND Connect MIPI_DSI_TX_D0N data Connect MIPI_DSI_TX_D0P data Connect GND Connect MIPI_DSI_TX_D1N data Connect MIPI_DSI_TX_D1P data Connect GND Connect MIPI_DSI_TX_CLKN data Connect MIPI_DSI_TX_CLKP data Connect GND Connect MIPI_DSI_TX_D2N data Connect MIPI_DSI_TX_D2P data Connect GND Connect MIPI_DSI_TX_D3N data Connect MIPI_DSI_TX_D3P data Connect GND NC NC Connect GND NC	FPC-40	

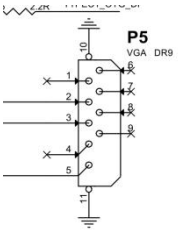
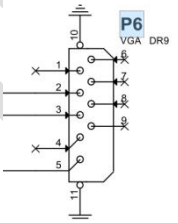
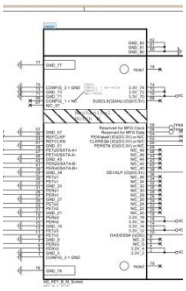
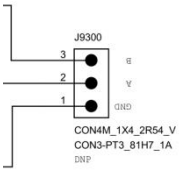
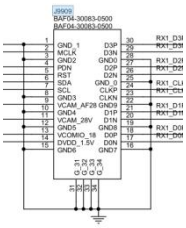
		NC NC Connect VCC-IO power supply (3.3V or 1.8V) Connect GND Connect GND LED- connected to the backlight LED- connected to the backlight NC NC Connect AVEE negative pressure NC NC Connect AVDD positive pressure LED+ connected to backlight LED+ connected to backlight Connect GND Connect GND		
LVDS backlight holders	J9902	Connected to 12V power supply Connected to 12V power supply EN (switch) data of the connection screen PWM data for connecting screen backlight Connect GND Connect GND	6PIN	
Pushbutton Interface	J8905	Connect volume up/up button Pick up the volume- Pick up MENU Connect ESC Connect KEY5 (custom) Connect PORON_L (sleep key) Connect GND Connect GND Connect GND	FPC-10	

		Connect GND Connect GND Connect GND		
TP Interface	J9903	Connect GND Connect GND 3.3V power supply to TP Connect I2C_SDA_TP data Connect I2C_SCL_TP data Connect GND Receive TP_INT data Receive TP_RST data Connect GND Connect GND	FPC-10	
Battery Interface	J2400	Connect the positive terminal of the battery Connect the negative terminal of the battery	2PIN	
Sub-board data interface	J9901	summary		
Mipi camera interface1	J4602	Connect GND Connect CAM_MCLK data Connect GND Receive CAM_PDN data Connect CAM_RST_L data Connect CAM_I2C_SDA data Connect CAM_I2C_SCL data Connect GND Connected to 2.8V power supply Connect GND Connected to 1.8V power supply Connected to 1.2V power supply Connect GND Connect GND Connect RX0_D0N data Connect RX0_D0P data Connect GND Connect RX0_D1N data Connect RX0_D1P data		

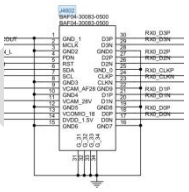
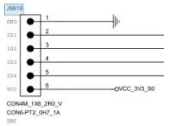
		Connect GND Connect RX0_D2N data Receive RX0_D2P data Connect GND Connect RX0_D3N data Connect RX0_D3P data		
Mipi camera interface 2	J9906	Connect GND Connect CAM_MCLK data Connect GND Receive CAM_PDN data Connect CAM_RST_L data Connect CAM_I2C_SDA data Connect CAM_I2C_SCL data Connect GND Connected to 2.8V power supply Connect GND Connected to 1.8V power supply Connected to 1.2V power supply Connect GND Connect GND Connect RX1_D0N data Connect RX1_D0P data Connect GND Connect RX1_D1N data Connect RX1_D1P data Connect GND Connect RX1_D2N data Connect RX1_D2P data Connect GND Connect RX1_D3N data Connect RX1_D3P data		
Ethernet Interface 2	J9908	TX+ data for Ethernet connection TX-Data to Ethernet RX+ data to Ethernet RX-Data to Ethernet Connecting Ethernet to TN1 data Connected to Ethernet for TN2 data	8PIN countersink plate	

		RN1 data connected to Ethernet RN2 data connected to Ethernet Connects to the negative side of the green light of the Ethernet port Connects to the positive green light of the Ethernet port Connects to the negative side of the yellow light of the Ethernet port Connects to the positive yellow light of the Ethernet port Connect GND Connect GND		
DP interface	J5700	Connect DP1_TX0P data Connect GND Connect DP1_TX0N data Connect DP1_TX1P data Connect GND Connect DP1_TX1N data Connect DP1_TX2P data Connect GND Connect DP1_TX2N data Connect DP1_TX3P data Connect GND Connect DP1_TX3N data Connect to Config0 data Connect to Config1 data Connect DP_TX_AUXP data Connect GND Connect DP_TX_AUXN data Connect DP_TX_HPD data Connect GND Connected to 3.3V power supply	DP-A	

HDMI1 interface	J5001	Connect HDMI0_TX2P data Connect GND Connect HDMI0_TX2N data Connect HDMI0_TX1P data Connect GND Connect HDMI0_TX1N_Data Connect HDMI0_TX0P_Data Connect GND Connect HDMI0_TX0N_Data Connect HDMI0_TX3P_Data Connect GND Connect HDMI0_TX3N_Data Connect HDMI0_TX_CEC data Connect HDMI0_TX_SBDP data Connect HDMI0_TX_SCL data Connect HDMI0_TX_SDA data Connect GND Connect the +5V power supply for HDMI Connect HDMI0_TX_SBDN data	HDMI-A	
USB3.0 interface4	J9902	Connected to +5V power supply DM data connected to HOST DP data to HOST Connect GND RX-Data connected to HOST RX+ data to HOST Connect GND TX-Data to HOST TX+ data for HOST connection	USB3.0-A	
USB3.0 interface3	J2502	Connected to +5V power supply DM data connected to HOST DP data to HOST Connect GND RX-Data connected to HOST RX+ data to HOST Connect GND TX-Data to HOST	USB3.0-A	

		TX+ data for HOST connection		
2323 serial port 1	P5	NC Connect RS232_RX data Connect RS232_TX data NC Connect GND NC NC NC NC	VGA male pin	
2323 serial port 2	P6	NC Connect RS232_RX data Connect RS232_TX data NC Connect GND NC NC NC NC	VGA male pin	
Solid State Drive PCIE Dock	J8900	82PIN (omitted)	Mini-PCIE	
RS485 serial port	J9300	Connect GND Connects to 485-A data Connects to 485-B data	3PIN-3.81mm	
Mipi Camera 3	J9909	Connect GND Connect CAM_MCLK data Connect GND Receive CAM_PDN data Connect CAM_RST_L data Connect CAM_I2C_SDA data Connect CAM_I2C_SCL data	30PIN	

		Connect GND Connected to 2.8V power supply Connect GND Connected to 1.8V power supply Connected to 1.2V power supply Connect GND Connect GND Connect RX1_D0N data Connect RX1_D0P data Connect GND Connect RX1_D1N data Connect RX1_D1P data Connect GND Connect RX1_D2N data Receive RX0_D2P data Connect GND Connect RX1_D3N data Connect RX1_D3P data		

Mipi Camera 4	J4602	Connect GND Connect CAM_MCLK data Connect GND Receive CAM_PDN data Connect CAM_RST_L data Connect CAM_I2C_SDA data Connect CAM_I2C_SCL data Connect GND Connected to 2.8V power supply Connect GND Connected to 1.8V power supply Connected to 1.2V power supply Connect GND Connect GND Connect RX0_D0N data Connect RX0_D0P data Connect GND Connect RX0_D1N data Connect RX0_D1P data Connect GND Connect RX0_D2N data Receive RX0_D2P data Connect GND Connect RX0_D3N data Connect RX0_D3P data	30PIN	
GPIO interface	J9918	Connect GND Connect IO1 Connect IO2 Connect IO3 Connect IO4 Connect VCC-3.3V	6PIN	

Appendix 2:

Electrical description.

1、Power supply interface 1

Sequence	Definition	Properties	Description

1	+12V	Input	Power supply positive terminal
2	GND	ground	Power supply negative terminal

2、Power supply interface 2

Serial number	Definition	Properties	Description
1	+12V	Input	Power supply positive terminal
2	+12V	Input	Power supply positive terminal
3	GND	ground	ground
4	GND	ground	ground

3、USB OTG

Serial number	Definition	Properties	Description
1-4	+5V +5V +5V +5V	Output	5V power supply (upgrade port)
5-6	CC1 CC2	Output	Charging protocol data communication cable
7-8	AUXP AUXM		
7-20	DM1 DP1 DM2 DP2 TX1N TX1P RX1N RX1P TX2N TX2P RX2N RX2P	Output/output	Data & Upgrade Port
21-24	GND GND GND GND	ground	ground

4、Headphone jack

Sequence	Definition	Properties	Description
1	L	Output	left channel
2	R	Output	Right channel
3	GND	ground	ground
4	MIC	Input	Microphone
5	DET	Input	Detection foot
6	GND	ground	ground

5、USB3.0 interface*4

Sequence	Definition	Properties	Description
1	+5V	Input	Power supply
2	DM(D-)	Input	Receiving
3	DP(D+)	Output	Send
4	GND	ground	ground
5	RX-	Input	Read
6	RX+	Input	Read
7	GND	ground	ground
8	TX-	Output	Write to
9	TX+	Output	Write to

6、HMDI output*2

Sequence	Definition	Properties	Description
1, 3	HDMI_RX_D2P/N	Output	Video Signal Output
4, 6	HDMI_RX_D1P/N	Output	Video Signal Output
7, 9	HDMI_RX_D0P/N	Output	Video Signal Output
10, 12	HDMI_RX_CLKP/N_	Output	Clock signals
15, 16	HDMI_RXDDC_SCL/SDA	Output	
2, 5, 8, 11, 14	GND	ground	ground
17	Utility	Output	Data and audio return channels
18	+5V	Power supply	Power supply for HDMI-IN
19	HDMI_RX_HPD	Input	HDMI detection pin
1, 3	HDMI_RX_D2P/N	Output	Video Signal Output

7、SIM card interface

Sequence	Definition	Properties	Description
1	CD	Input	Detection (default overhang)
2	CLK	Input	SIM card clock communication
3	I/O (DATA)	Output	SIM card data

			communication
4	RST	Output	SIM card reset
5	VPP	NC	NC
6	VCC	Power supply	Power supply from the module to the SIM card
7	GND	ground	ground

8、Ethernet interface*2

Sequence	Definition	Properties	Description
1	TX+	Output	Ethernet data reading and writing
2	TX-	Output	Ethernet data reading and writing
3	RX+	Input	Ethernet data reading and writing
4	RX-	Input	Ethernet data reading and writing
5	TN1	Output	Ethernet data reading and writing
6	TN2	Output	Ethernet data reading and writing
7	RN1	Input	Ethernet data reading and writing
8	RN2	Input	Ethernet data reading and writing
9	Green-LED-	ground	ground
10	Green-LED+	Power supply	Green light power
11	Yellow-LED-	ground	ground
12	Yellow-LED+	Power supply	Yellow light power
13	GND	ground	ground

9、DP interface

Sequence	Definition	Properties	Description
1, 3	Lan0	Output	Video Signal Output
4, 6	Lan1	Output	Video Signal Output
7, 9	Lan2	Output	Video Signal Output
10, 11	Lan3	Output	Video Signal Output
2, 5, 8, 11, 16, 19	GND	ground	ground
13, 14	Config	Input	

20	3.3V	Power supply	DP power supply

10、RS232 interface

Sequence	Definition	Properties	Description
1, 4, 6, 7, 8, 9	NC	Output	Video Signal Output
2	RS232_RX	Output	Video Signal Output
3	RS232_TX	Output	Video Signal Output
5	GND	ground	ground

11、HDMI-IN connector

Sequence	Definition	Properties	Description
1, 3	HDMI_RX_D2P/N	Output	Video Signal Output
4, 6	HDMI_RX_D1P/N	Output	Video Signal Output
7, 9	HDMI_RX_D0P/N	Output	Video Signal Output
10, 12	HDMI_RX_CLKP/N_	Output	Clock signals
15, 16	HDMI_RXDDC_SCL/SDA	Output	
2, 5, 8, 11, 14, 17	GND	ground	ground
18	+5V	Power supply	Power supply for HDMI-IN
19	HDMI_RX_HPD	Input	HDMI detection pin

12、Speaker Interface

Sequence	Definition	Properties	Description
1	L+	Output	Left channel positive
2	L-	Output	Left channel negative
3	R+	Output	Right channel positive
4	R-	Output	Right channel negative

13、RS485 interface

Sequence	Definition	Properties	Description
1	B	Output	485 serial port B-pole
2	A	Output	485 serial port A-pole
3	GND	ground	ground

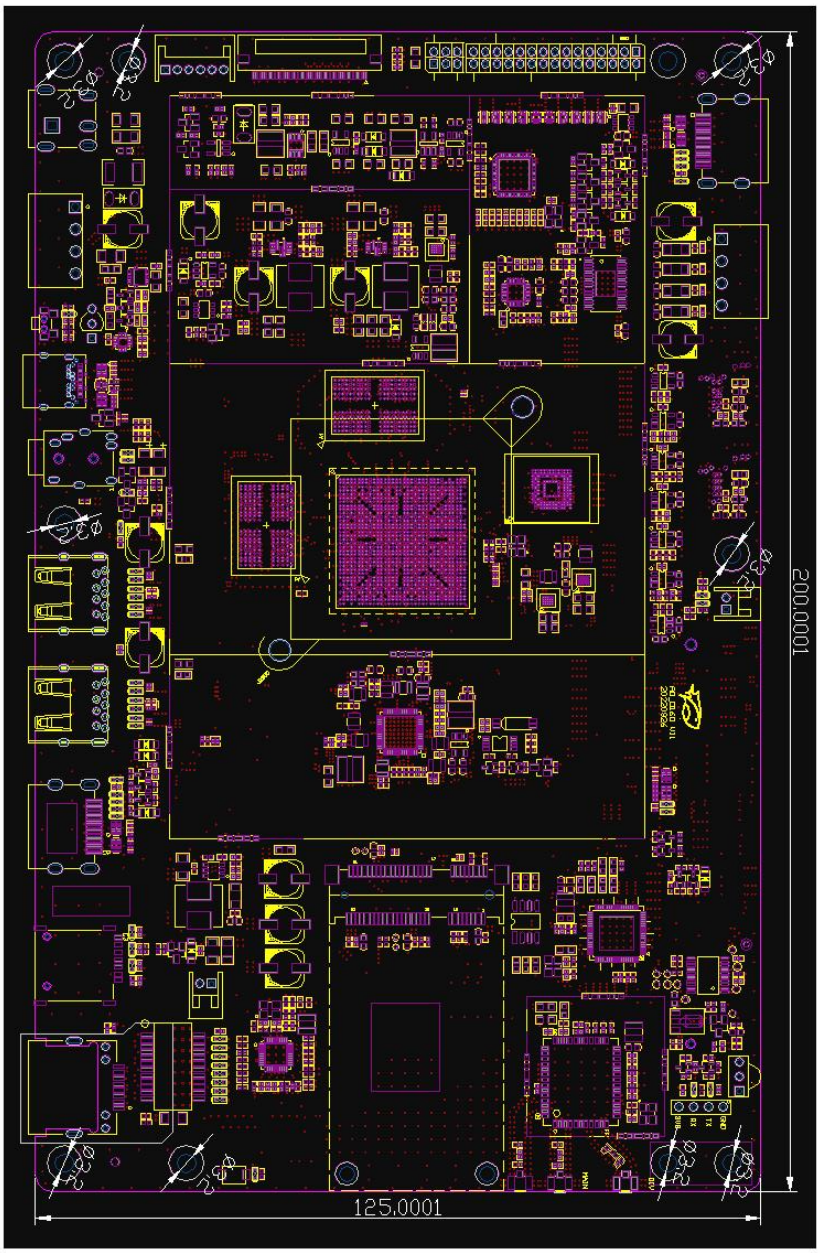
14、Antenna Interface

Sequence	Definition	Properties	Description
1	4G	Output	4G full-band antenna interface
2	MAIN	Output	Wifi main antenna interface
3	DIV	Output	Wifi Diversity Antenna Interface

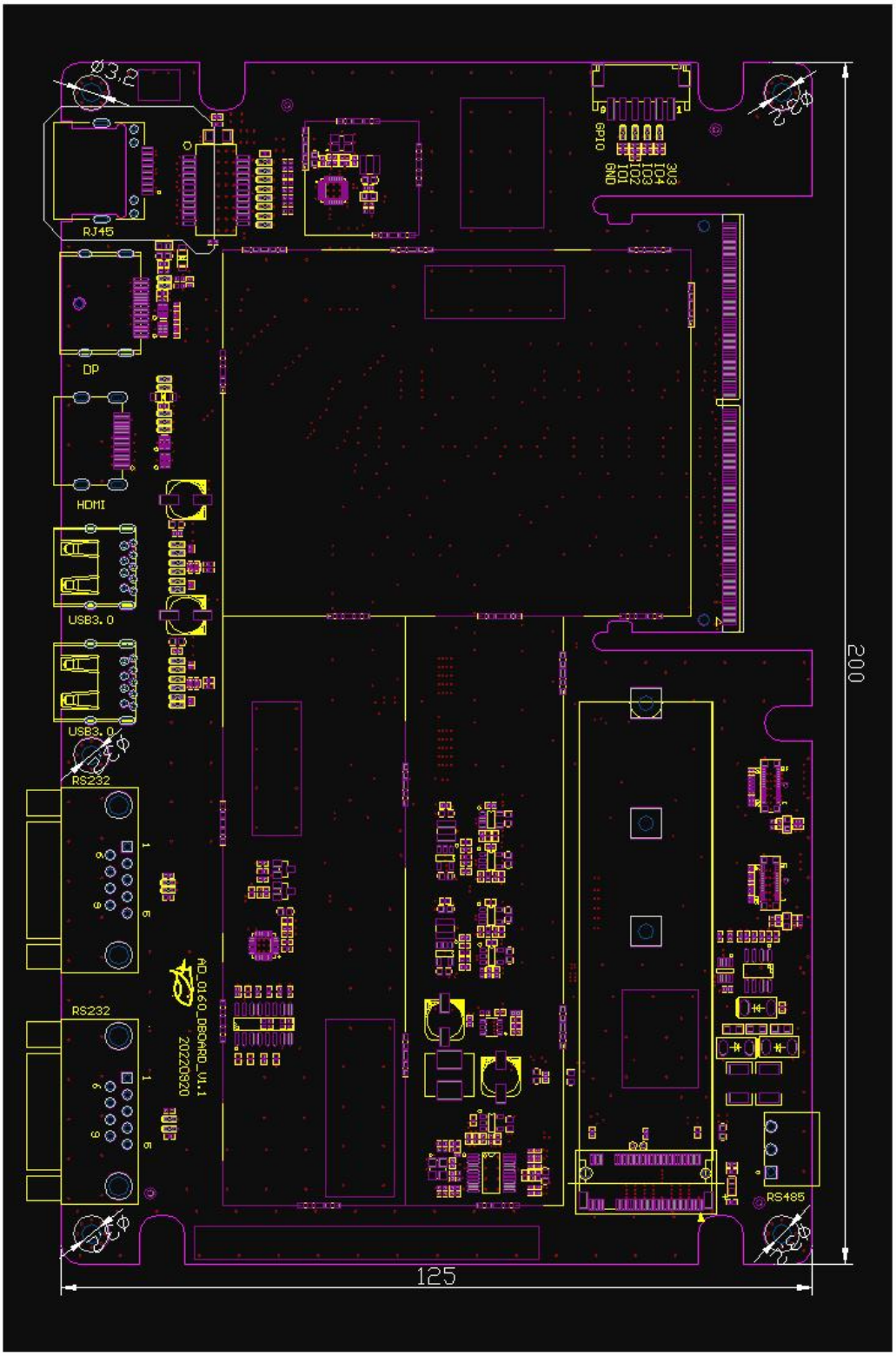
Appendix 3:

PCBA structure.

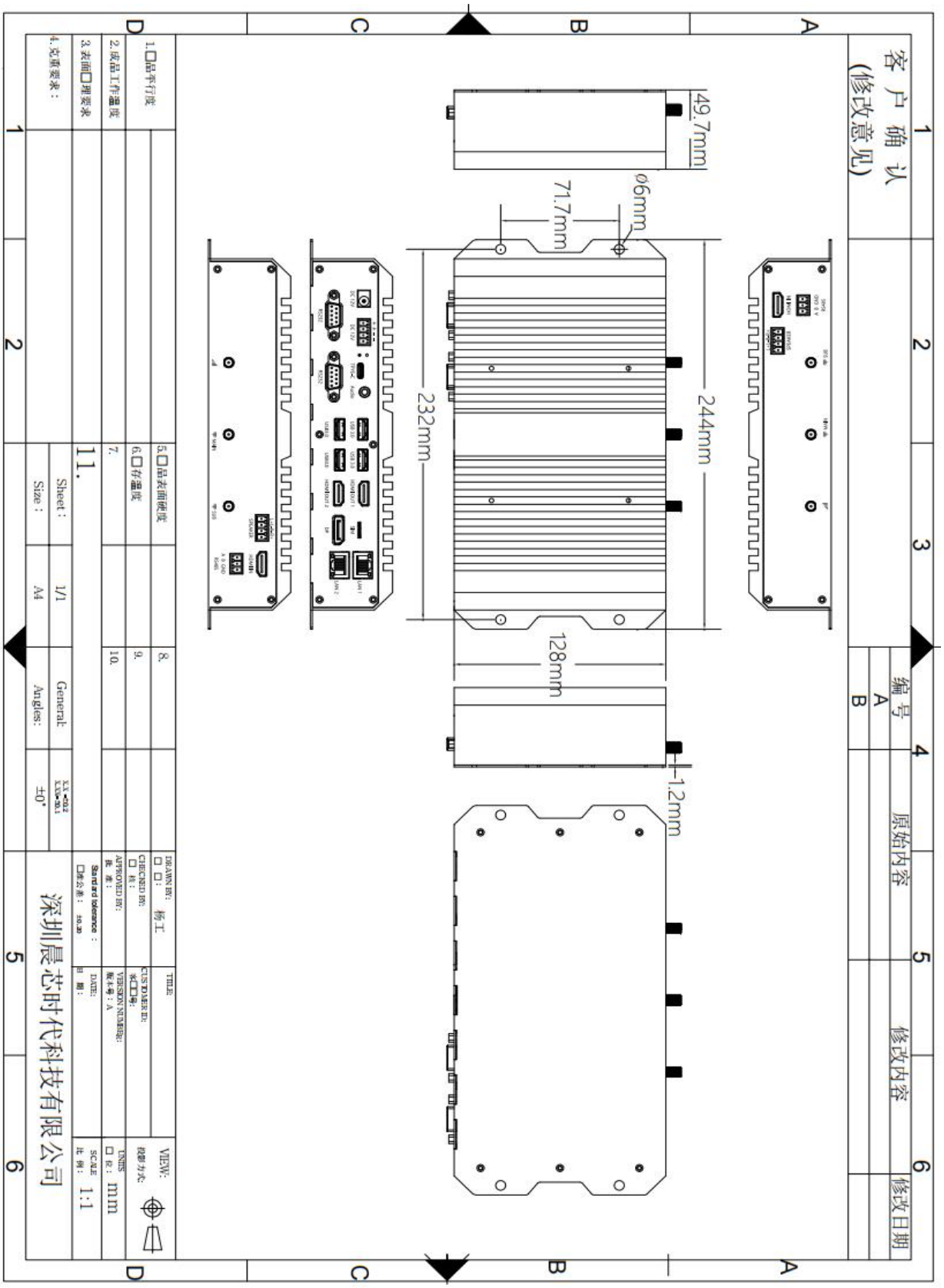
Motherboard.



Sub-board.


Ø3.2
RJ45
DP
HDMI
USB3.0
USB3.0
RS232
RS232
RS485
GPIO
3V3
IO04
IO03
IO02
IO01
GND
200
125
AO_0160_DBOARD_V1.1
20220920

Appendix 4:2D structure diagram of the whole machine



FCC Warning

15.19 Labeling requirements.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

15.21 Information to user.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.105 Information to the user.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

FCC RF Radiation Exposure Statement:

1.This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2.This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.
This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

CE Warning

1. Adapter shall be installed near the equipment and shall be easily accessible.
2. The plug considered as disconnect device of adapter.
3. The device complies with RF specifications when the device used at 20cm from your body.
4. The product shall be connected to a USB interface of version USB3.0 or higher.
5. The band 5150-5350MHz indoor use only.

Hereby, Shenzhen Sunchip Technology Co.,Ltd declares that this product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU. This product is allowed to be used in all EU member states.

Frequency band	Max. output power(dBm)
BLE	9.07 (EIRP)
EDR	5.26 (EIRP)
2.4GWiFi	19.86(EIRP)
5G WiFi	20.86(EIRP)