

# SS23-QE-VA (Jupiter AI Kit)

## operation instruction

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## I. Product overview

### 1.1 product background

In recent years, the Internet of Things and artificial intelligence have accelerated the empowerment of thousands of industries, which has greatly promoted the rapid development of the economy and society. In the field of smart retail, based on the Internet of Things, new technologies such as AI algorithm and image recognition are combined to realize users' easy shopping and quick settlement, which opens up a new direction for smart container usage scenarios.

This product is a new industrial control box customized for the company under the Android 11 system based on Qualcomm 6490 high AI computing intelligent module and SLM750 4G module. This product adopts the camera scheme of auto-driving on the vehicle, and the MIPI camera installed on it adopts the mode of adding serial at the module end and deserializing serial at the host end to realize data transmission through the coaxial line, which has the characteristics of long transmission distance, high speed, no image delay and no jamming. SONY starlight sensor is used in the module, which can clearly capture information in dark environment. At the same time, the product also has 19 interfaces such as HDMI, USB, SIM card, lock, power supply and RS485, which fully meets the expansion needs of various peripherals of container retail products.

### 1.2. Model description

Product name: Jupiter AI Kit

Model model: SS23-QE-VA

*SS-Sandstar, QE-Qualcomm Edge, model differences are mainly distinguished by 4G module versions.*

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### 1.3. Product appearance



Host renderings



Camera renderings

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## 1.4. Notes on the whole machine interface

Antenna information is provided by applicant. An intentional radiator is designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

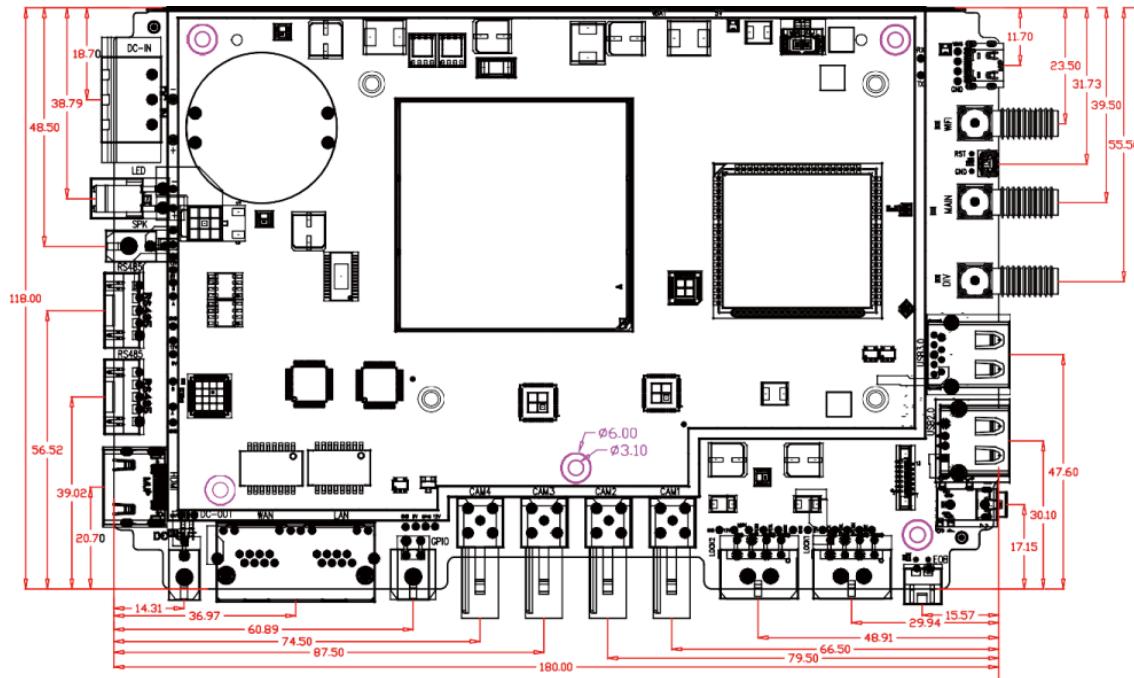
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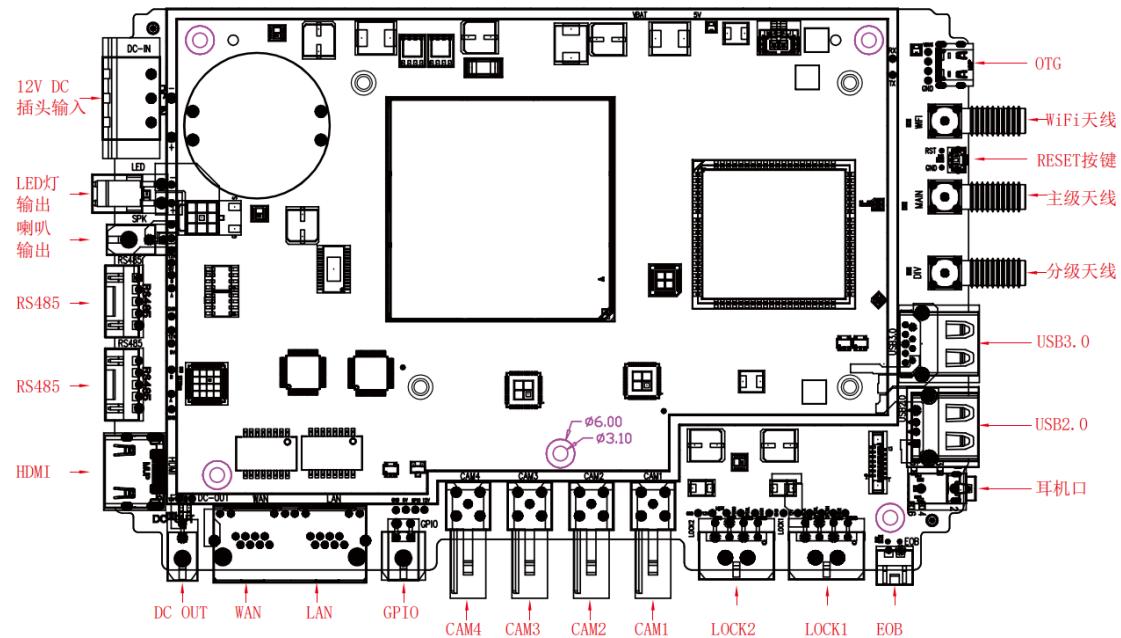
## II. Hardware introduction

### 2.1. External Block Diagram of Main Board

#### 2.11. Dimension drawing of motherboard PCB interface



#### 2.12. Function identification of motherboard PCB interface

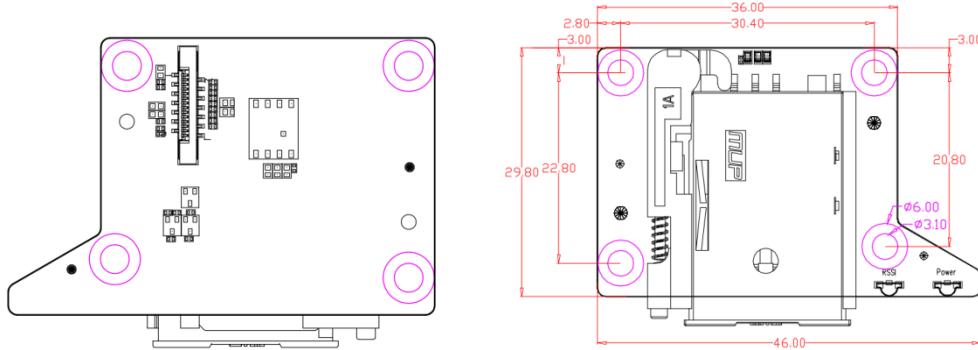


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## 2.2. Block diagram outside the auxiliary board

### 2.2.1. PCB block diagram and dimensions of auxiliary board



## 2.3. PCB manufacturing process

### 2.3.1. Motherboard

Main board PCB: 6-layer through-hole plate with single-sided cloth;

Size: 180.0mm\*118.0mm\*1.2mm;

Surface technology: Ni/Au+OSP

Green oil color: black

### 2.3.2. Deputy Board

Auxiliary PCB: 2-layer through-hole plate with double-sided cloth;

Size: 46.0mm\*29.8.0mm;

Surface technology: Ni/Au

Green oil color: green

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## 2.4. Description of Host Configuration List

project	describe	specifications	remarks
SOC main chip	Architecture/number of cores/frequency	Qualcomm Kryo™ 670	
		8-core	
		1* A78 2.7GHz + 3*A78 2.4GHz + 4* A55 1.9GHz	
save	GPU model/frequency	Adreno™ GPU 635	
	EMMC	128GB	
button	DDR4X	8GB	
	Reset button		Press the system software to restart.
communication module	SS23-QE-VA	FDD:B2/4/5/12/13/17/26 TDD:B41 WCDMA:B2/4/5	North America: USA/Canada/Guam, etc.
audio frequency	SPK		8 euro 5W
	earphone	3.5mm earphone	
Power Supply	Main power input	3PIN main power input	12V/10A
	Power on	Power-on automatically triggers startup.	
Peripheral interface	CAM1	Purple FARKA interface	MIPI CSI0
	CAM2	Blue FARKA interface	MIPI CSI1
	CAM3	White FARKA interface	MIPI CSI2
	CAM4	Black FARKA interface	MIPI CSI2
	USB white interface	USB2.0 HOST Type-A interface	5V/0.5A
	USB blue interface	US3.0 HOST Type-A interface	5V/1A
	RS485	5V level signal; Support 5V and 12V power supply.	12V1A/5V1A
	RS485	5V level signal; Support 5V and 12V power supply.	12V1A/5V1A
	WAN	10/100M Ethernet	
	LAN		
	HDMI	Support hot plug, not audio.	HDMI Ver1.4, 5V/100mA

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Type-c	OTG interface	
LED	PWM dimming	12V@4A (OCP)
DC OUT		12V/2.1A
GPIO	DS18B20 temperature probe	12V/100mA,5V/100mA
LOCK1	8pin	12V/1A
LOCK2	8pin	12V/1A
Indicator light	<p>Power indicator: Orange-green double color, when the power supply is not connected, the light goes out, when the power supply system does not enter the orange light, the power supply system enters the green light.</p> <p>Network indicator: Red, orange and green, 4G is not turned on, RGB lights go off, weak signal red light, medium signal orange light, good signal green light.</p>	

## 2.5. Description of camera configuration list

Image sensor	model	IMX307	
	pixel	2M	
	optical format	1/2.8-inch	
	Pixel Size	2.9µm x 2.9µm	
	effective pixels	FULL HD 1920(H)X1080(V)	
	AEB	support	
	AEC	support	

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	AGC	support	
	Support frame rate	30/60FPS	One-way 954 only supports one-way camera 60FPS.
camera lens	FOV	D=164°/H = 142°/V = 81°	
	CRA	21°	
	MAX IMAGE HEIGHT	Φ6.3	
	FOCAL LENGTH (EFL)	2.2mm	
	FLANGE BACK LENGTH	3.0mm	
	Element	6G+IR	
	Waterproof and dustproof	IP67	
operating voltage	operating voltage		
	operational current	Demisting mode	
		Non-defogging mode	
	Heat patch specification	10Ω	
the protection grades	Dustproof and waterproof	IP65	IP67 can be achieved.
joggle/inteface	mounted on a vehicle	FARKA	

### III. Electrical parameters

project	minimum	typical	maximum
Power adapter	voltage	--	12V
	ripple	--	50mV
	electric current	10A	

### IV. Thermal design

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- The shielding covers COU and FLASH are pasted with graphite sheets to increase the heat dissipation effect.
- Thermal conductive silica gel pads are attached to the core module and 4G module on the front of the motherboard to increase the heat dissipation effect.

Core module heat conductive silicon pad	Thermal conductive silica gel pad, with thermal conductivity of 5W, with release film on both sides when supplied separately, 46*46*1mm.
4G module heat-conducting silica gel pad	Thermal conductive silica gel pad, with thermal conductivity of 5W, requires release film on both sides when supplied separately, 27 * 27*27*1.5mm

- The exposed copper area near the center on the reverse side of the main board is provided with a heat-conducting silica gel pad attached to the metal bottom shell component to increase the heat dissipation effect.

Thermal conductive silica gel pad on the back of motherboard	Thermal conductive silica gel pad, with thermal conductivity of 5W, requires double-sided release film, 16*16*8mm when supplied separately.
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- Aluminum alloy radiators and fans are installed on the core module and 4G module to enhance the heat conduction of the module and the convection of cold and hot air outside, and enhance the cooling effect.

radiator	The cutting size of radiator is 112.5*74*16mm, and fixing holes are opened.
fan	6010 fan, voltage: 5V, current: 0.2A,IP5X.

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#### 4.1. The key parameters of the fan are as follows

No.	项目 Item	规格 Specification	条件 Condition
1.1	产品型号 Product Model	FD6010B1H-AP00	
1.2	外形尺寸 Outline Dimension	55x10.0 mm	
1.3	额定电压 Rated Voltage	5 VDC	
1.4	工作电压 Operating Voltage	3.5 VDC - 5.5 VDC	
1.5	启动电压 Starting Voltage	3.5 VDC	a.额定电压 Rated Voltage
1.6	额定电流 Rated Current	0.17 A ± 0.02 A	b. 25°C 65%RH
1.7	额定功率 Rated Power	0.85 W ± 0.24 W	c. 5分钟后测量
1.8	额定转速 Rated Speed	4000 RPM ± 10%	Measure after 5 minutes
1.9	最大风量 Max. Air Flow	14.74 CFM min 13.27	a.额定电压 Rated Voltage
		25.04 M³/hrs min 22.54	b.依据标准 Standard: AMCA
1.10	最大静压 Max. Static Pressure	2.28 mm-H₂O min 2.05	c.额定电流 Rated Current
		0.09 Inch-H₂O min 0.08	
1.11	噪音标准 Noise Level	32.3 dB(A) max 35.5	a.额定电压 Rated Voltage
			b.无音室 Non-Echo Chamber
			c.标准 Standard: ISO 7779
			d.测试距离 Distance: 1M
1.12	预期寿命 Life Expectancy	70000 小时 hrs at 40 °C	a.额定电压 Rated Voltage
			b.MTTF at Conf. Level 90%
1.13	极 数 No. of Pole	4 极 Pole	
1.14	运转方向 Rotational Direction	逆时针 Counter-Clockwise	扇叶正面观察 On blade side
1.15	净 重 Net Weight	13 克 g	

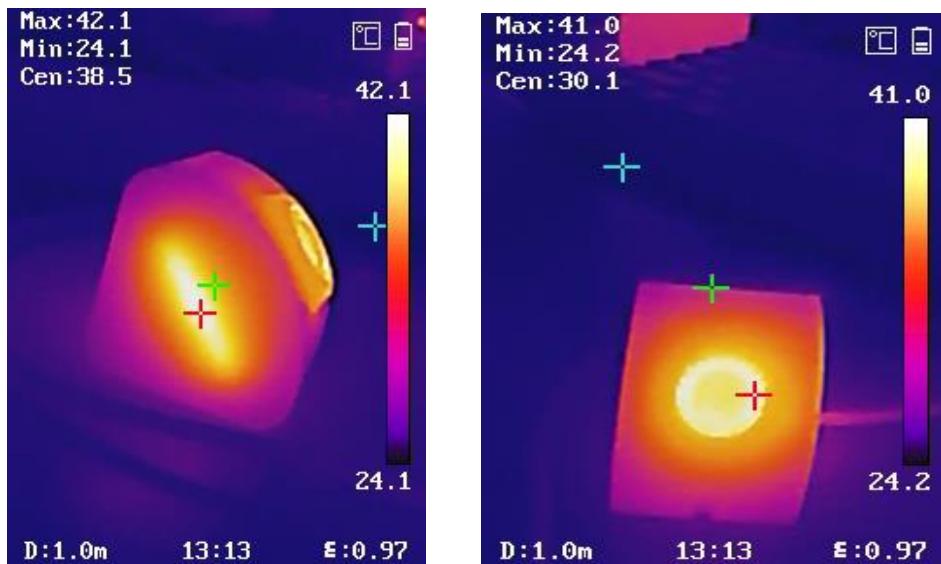
#### 4.2. Temperature rise test

Test requirements	test method
Ambient temperature: 30°C	When the camera is mounted for 1.5 hours, record the highest temperature point of the camera with a temperature gun, and record the abnormal hot spot of the device with a temperature gun.
Ambient temperature: 55°C	The equipment brush is an overclocking software version, full of CPU and GPU, and tested after startup until it reaches thermal balance (1-2 hours).
testing nominative	test result
1. The highest temperature of the motherboard, record data. 2. Record the data at the	Camera: 42.1 CPU: 64.3

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highest temperature of the camera.	
1.CPU does not reduce frequency.	CPU data acquisition constant temperature: 39.8
2. Temperature difference	CPU instruction core temperature: 92



Camera heating module is not turned on.

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Core plate temperature rise

## V. Environment and reliability

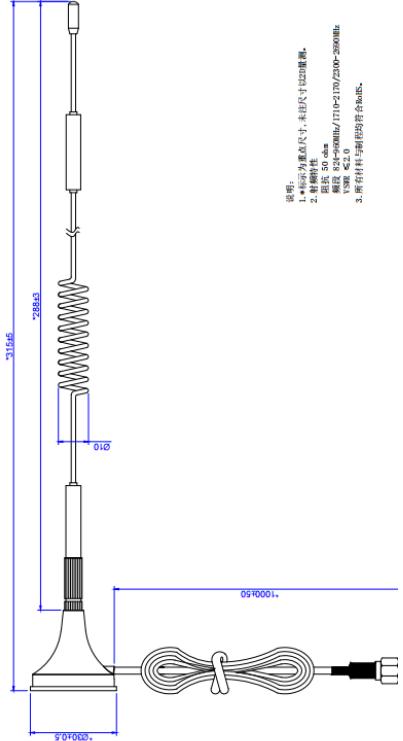
project	specifications		remarks
working environment	temperature	-20°C ~ 65°C	
	humidity	15%~90%, no condensation	
Storage environment	temperature	-20°C ~ 80°C	
	humidity	5%~93%, no condensation	
the protection grades	/		
Environmental certification	Guotui Rohs		

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## VI. Radio frequency antenna information

### 6.1. 4G antenna performance parameters

Working frequency	824-960/1710-2170/2300-2690MHz	
input impedance	50 ohm	
standing-wave ratio	$\leq 2.0$	
Maximum gain	$\leq 3.78\text{dBi}$	
direction	omnidirection	
Polarization mode	vertical polarization	
structural style	monopole	
Product length	315 mm	
connector	SMA-J	
Connector tension	5kg min	
feeder line	RG- 174LL coaxial line	
Feeder length	one meter	
Installation mode	Magnet adsorption	
Working temperature	-30°C ~ 65°C	
storage temperature	-30°C ~ 75°C	

### 6.1. 2. 4G WIFI antenna performance parameters

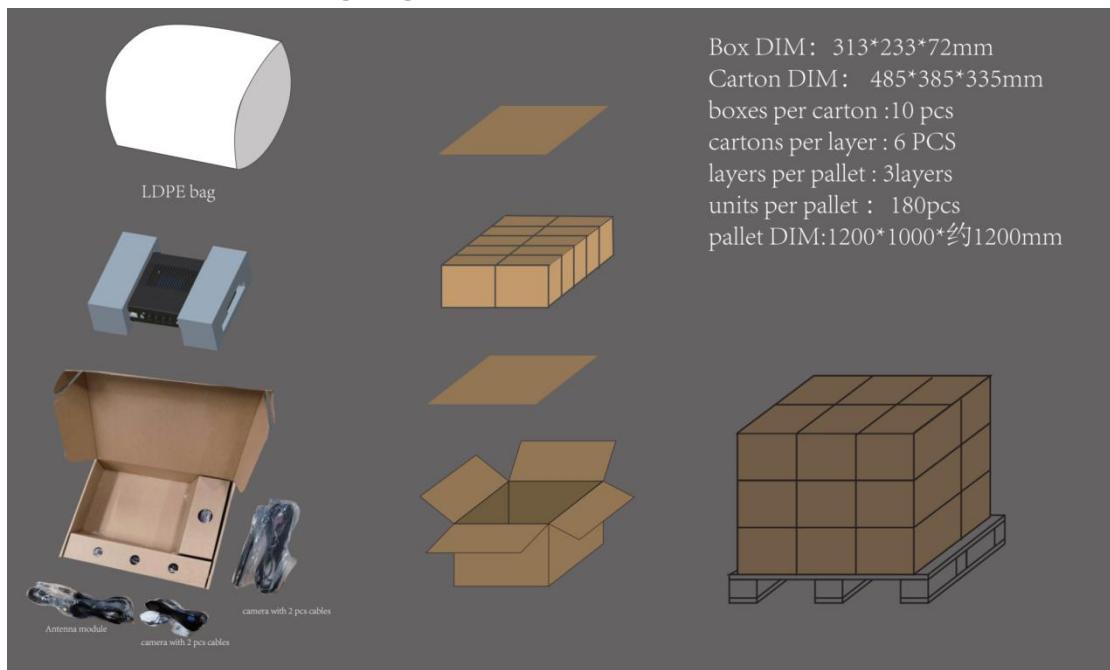
Working frequency	2.4G	
input impedance	50 ohm	
standing-wave ratio	$\leq 2.0$	
Maximum gain	$\leq 2.93\text{ dBi}$	
direction	omnidirection	
Polarization mode	vertical polarization	
structural style	dipole	

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Product length	180 mm
connector	SMA-J
Connector tension	5kg min
feeder line	RG- 174LL coaxial line
Feeder length	one meter
Installation mode	Magnet adsorption
Working temperature	-30°C ~65°C
storage temperature	-30°C ~75°C

## VII. Product packaging



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**FCC Warning:**

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

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.

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 Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

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