FCC Maximum Permissible Exposure (MPE) Estimation Report

Report Number	:	**68.950.24.0449.01**	Date of Issue:	2024-05-20

Model : **EAV-BAS50**

Product Type : "Super Link" Communication Station

Applicant : SUZHOU EAVISION ROBOTIC TECHNOLOGIES CO., LTD

Address : Unit 1-A, No.3 Workshop, 28 Xiasheng Road, SIP, Suzhou, China

Manufacturer : SUZHOU EAVISION ROBOTIC TECHNOLOGIES CO., LTD

Address : Unit 1-A, No.3 Workshop, 28 Xiasheng Road, SIP, Suzhou, China

Factory : SUZHOU EAVISION ROBOTIC TECHNOLOGIES CO., LTD

Address : Unit 1-A, No.3 Workshop, 28 Xiasheng Road, SIP, Suzhou, China

Test Result : ■ **Positive**   ☐ **Negative**

Total pages including
Appendices : **9**

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TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
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2   Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
	Building 12 & 13, Zhiheng Wisdomland Business Park, Guankou Erlu, Nantou, Nanshan District Shenzhen 518052 P.R. China
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3   Description of the Equipment Under Test

Product:	"Super Link" Communication Station
Model no.:	EAV-BAS50
Brand name:	EAVISION
FCC ID:	2AXLB-EAV-BAS50
Rating:	Input: DC20V ⎓ 3.25A Battery Capacity:7.4V, 12000mAh Battery model: 18650-2S4P Max Charge Voltage:8.4V Nominal Voltage:7.4V Rated Capacity:12000mAh/88.8Wh
RF Transmission Frequency:	2405-2465MHz for 2.4G
Antenna Type:	2.4G: External antenna
Antenna Gain:	2.4GHz: 2.2dBi Max for Ant1 2.2dBi Max for Ant2
Description of the EUT:	The Device under Test (EUT) is an "Super Link" Communication Station that supports custom 2.4G and GPS positioning capabilities.

NOTE 1: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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4   Test Specifications

Test Standards	
ANSI Std C95.1-1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991)
KDB 447498 D01	General RF Exposure Guidance v06
KDB 662911 D01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)
FCC Subpart I	§ 1.1310 Radiofrequency radiation exposure limits

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5   General Information

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Project Engineer	Date	Name	Signature

Approved by	2024-05-20	John Zhi	
Section Manager	Date	Name	Signature

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6　RF Exposure Requirements

An estimation of MPE in this application for product is used to ensure if it complies with the rules of the standard in the regulation list above.

Maximum permissible exposure (MPE) refers to the RF energy that is acceptable for human exposure. It is broken down into two categories, Occupational/controlled and General population/uncontrolled.

Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

A rough estimation of the expected exposure in power flux density on a given point can be made with the following equation:

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R= distance to the centre of radiation of the antenna

EIRP = P*G

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the user's manual. Therefore, the S of the device is calculated with R=20cm, and if it is below the limit S, then we can conclude the device complies with the rules.

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7 FCC MPE Limits

We analysis if it comply with the limits for General population/uncontrolled exposure. The FCC MPE limits for field strength and power density are given in 47CFR 1.1310(Table below). These limits are generally based on recommended exposure guidelines published by the National Council on Radiation Protection and Measurements (NCRP), and also partly based on guidelines recommended by the American National Standards Institute (ANSI) in Section 4.1 of ANSI/IEEE C95.1.

(A) Limits for Occupational/controlled Exposure				
Frequency Range(MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength(H)(A/m)	Power Density (S)(mW/cm^2)	Averaging Time (minute)$|E|^2,|H|^2$ or S
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f^2)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/uncontrolled Exposure				
Frequency Range(MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength(H)(A/m)	Power Density (S)(mW/cm^2)	Averaging Time (minute)$|E|^2,|H|^2$ or S
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30
f=frequency in MHz			*Plane-wave equivalent power density	

8 RF Exposure Evaluation (FCC)
8.1 Calculation of Power Density for Single Chain Transmitters
2.4G
BR:

Mode	Output Power(dBm)	Gain (dBi)	R (m)	S (mW/cm^2)	Limit (mW/cm^2)
BR-5M	25.00	2.2	0.2	0.104460	1.0

Slot:
Ant1:

Mode	Output Power(dBm)	Gain (dBi)	R (m)	S (mW/cm^2)	Limit (mW/cm^2)
Slot-5M	22.45	2.2	0.2	0.058070	1.0
Slot-10M	21.83	2.2	0.2	0.050344	1.0
Slot-20M	21.87	2.2	0.2	0.050810	1.0
Slot-40M	22.04	2.2	0.2	0.052838	1.0

Ant2:

Mode	Output Power(dBm)	Gain (dBi)	R (m)	S (mW/cm^2)	Limit (mW/cm^2)
Slot-5M	22.13	2.2	0.2	0.053945	1.0
Slot-10M	21.41	2.2	0.2	0.045704	1.0
Slot-20M	22.05	2.2	0.2	0.052960	1.0
Slot-40M	21.67	2.2	0.2	0.048523	1.0

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MIMO:

Mode	Output Power(dBm)	Gain (dBi)	R (m)	S (mW/cm^2)	Limit (mW/cm^2)
Slot-5M	25.30	5.21	0.2	0.223847	1.0
Slot-10M	24.55	5.21	0.2	0.188343	1.0
Slot-20M	24.97	5.21	0.2	0.207468	1.0
Slot-40M	24.63	5.21	0.2	0.191845	1.0

Note: Directional gain = GANT + 10 log(NANT) dBi, NANT=2

8.2 Calculation of Simultaneous Transmission

In order to ensure compliance with the EMF for a controlled environment, the sum of the ratios of the power density to the corresponding EMF should not exceed unity. That is

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

The product only has one transmitter. So there's no need to consider synchronous emission.

8.3 Conclusion

According to the table above, we can conclude that the limit percentage of above supporting frequency bands

calculation results are less than 1, therefore, the product meets the requirements.

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