

FCC RF Exposure

Applicant : Ningbo Sharkward Electronics Co Ltd
Address : No 88 Gongmao Road No 3 Jishigang Industrial Zone
Haishu District Ningbo, Zhejiang Sheng 315000 China
Product Name : Bluetooth Microwave Fixture Sensor
Brand Mark : Sharkward
Model : ANT-9-BLE-GE
Series model : See contents 1.2
FCC ID : 2AVMOANT
Report Number : BLA-EMC-202412-A4102
Date of Receipt : Dec. 16, 2024
Date of Test : Dec. 16, 2024 to Dec. 31, 2024
47 CFR Part 15, Part1.1307
Test Standard : 47 CFR Part 15, Part2.1093
KDB447498D04 General RF Exposure Guidance v01
Test Result : Pass

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Review by: Sweels

Approved by: Blue Zheng

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Revise Record

Version No.	Date	Description
01	Dec. 31, 2024	Original

1 General information

1.1 General information

Applicant	Ningbo Sharkward Electronics Co Ltd
Address	No 88 Gongmao Road No 3 Jishigang Industrial Zone Haishu District Ningbo, Zhejiang Sheng 315000 China
Manufacturer	Ningbo Sharkward Electronics Co Ltd
Address	No 88 Gongmao Road No 3 Jishigang Industrial Zone Haishu District Ningbo, Zhejiang Sheng 315000 China
Factory	Ningbo Sharkward Electronics Co Ltd
Address	No 88 Gongmao Road No 3 Jishigang Industrial Zone Haishu District Ningbo, Zhejiang Sheng 315000 China

1.2 General description of EUT

Product name	Bluetooth Microwave Fixture Sensor
Model no.	ANT-9-BLE-GE
Series model	ANT-1M-4T-BLE-GE, ANT-1M-4T-BLE-SR, ANT-1M-4T-BLE, ANT-3-BLE-GE, ANT-3-BLE-SR, ANT-3-BLE, ANT-3D-BLE-GE, ANT-3D-BLE-SR, ANT-3D-BLE, ANT-7-BLE-GE, ANT-7-BLE-SR, ANT-7-BLE, ANT-7D-BLE-GE, ANT-7D-BLE-SR, ANT-7D-BLE, ANT-9-BLE-GE, ANT-9-BLE-SR, ANT-9-BLE, ANT-9C-BLE-GE, ANT-9C-BLE-SR, ANT-9C-BLE
Differences of Series model	The above models are identical in PCB layout, internal structure and components ,only Item number and color is different.
Operation Frequency:	BLE:2402MHz-2480MHz 5.8G:5725MHz-5875MHz
Modulation Type:	BLE:GFSK 5.8G:CW
Number of Channels:	BLE:40 5.8G:1
Antenna Type:	BLE:monopole antenna 5.8G:microstrip antenna
Antenna Gain:	BLE:2.26dBi(Provided by the customer) 5.8G:3.4dBi(Provided by the customer)

Power supply:	DC 12V
Hardware Version	V1
Software Version	V1

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2 RF Exposure Compliance Requirement

2.1 Standard Requirement

According to 447498 D04 Interim General RF Exposure Guidance v01

Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

2.2 Limits

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B. 2})$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1).

Example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
	5	10	15	20	25	30	35	40	45	50	
	300	39	65	88	110	129	148	166	184	201	217
	450	22	44	67	89	112	135	158	180	203	226
	835	9	25	44	66	90	116	145	175	207	240
	1900	3	12	26	44	66	92	122	157	195	236
	2450	3	10	22	38	59	83	111	143	179	219
	3600	2	8	18	32	49	71	96	125	158	195
	5800	1	6	14	25	40	58	80	106	136	169

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B. 1})$$

2.3 Result

$$\text{EIRP} = \text{pt} \times \text{gt} = (\text{E} \times \text{d})^{2/30}$$

Where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m,

d = measurement distance in meters (m)

$$\text{Spot} = (\text{E} \times \text{d})^{2/30} \times \text{gt}$$

Separation distance= 20cm

BLE: Ant gain = 2.26dBi 5.8GHz: Ant gain = 3.4dBi

For BLE 2M(Worst):

Max Output power = -2.694dBm @ 2402MHz

$$\text{ERP} = -2.694\text{dBm} + 2.26\text{dBi} - 2.15 = -2.584\text{dBm} = 0.552\text{mW} < 3060\text{ mW}$$

$$\text{MPE ratio(BLE)} = 0.552/3060 = 0.00018$$

For 5.8G:

Max. Field Strength: 81.03dBuV/m@3m

Note:

The maximum Equivalent Isotropic Radiated Power(EIRP) : 81.03dBuV/m-95.2=-14.17dBm
(refer to C63.10, section 10.3.9)@5.8GHz

$$\text{ERP} = -14.17\text{dBm} - 2.15 = -16.32\text{dBm} = 0.023\text{mW} < 3060\text{ mW}$$

$$\text{MPE ratio(5.8GHz)} = 0.023/3060 = 0.000008$$

For Simultaneous Transmission:

$$\text{As MPE ratio (BLE+5.8GHz)} = 0.00018 + 0.000008 = 0.000188 < 1,$$

it's deemed to fulfil the RF exposure requirement.

----END OF REPORT----

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