RF Exposure evaluation

Product Name	:	SMART VISUAL DOORBELL
Brand Name	:	N/A
Model	:	M01
Series Model	:	M02, M03, M04, M05, M06, M07, M08, M09
FCCID	:	2BNU8-M01
Applicant	:	**Dongguan Baolicheng Electronics Technology Co.,Ltd**
Address	:	3rd Floor, Building 2, Yutang Industrial Park, No.38 Tangling Road, Datang Distict, Dalingshan Town Dongguan City, Guangdong Province, China
Manufacturer	:	**Dongguan Baolicheng Electronics Technology Co.,Ltd**
Address	:	3rd Floor, Building 2, Yutang Industrial Park, No.38 Tangling Road, Datang Distict, Dalingshan Town Dongguan City, Guangdong Province, China
Standard(s)	:	47CFR §1.1310,47CFR §2.1091 KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt	:	Mar. 06, 2025
Date of Test	:	Mar. 06, 2025~Mar. 18, 2025
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Issued By: **Dongguan Yaxu (AiT) Technology Limited**
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Report Revise Record

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Contents

1 GENERAL INFORMATION 4

1.1 ENVIRONMENTAL CONDITIONS 4
1.2 GENERAL DESCRIPTIONOF EUT 4
1.3 TEST FACILITY 6
1.4 MEASUREMENT UNCERTAINTY 7

2 METHOD OF MEASUREMENT 8

2.1 APPLICABLE STANDARD 8
2.2 LIMIT 8
2.3 MPE CALCULATION METHOD 9
2.4 MANUFACTURING TOLERANCE 9
2.5 STANDALONE MPE RESULT 10
2.6 CONCLUSION 11

1 GENERAL INFORMATION

1.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

1.2 General Descriptionof EUT

Product Name:	SMART VISUAL DOORBELL
Model/Type reference:	M01
Serial Model:	M02, M03, M04, M05, M06, M07, M08, M09
Power Supply:	DC 5V from adapter and DC 3.7V from battery
Battery:	DC 3.7V 1500mAh
Hardware version.:	N/A
Software version.:	N/A
Test sample(s) ID:	AiTDG-250306015-1
BT:	
Operation frequency:	2402MHz-2480MHz
Channel Number:	79 Channels
Channel separation:	1MHz
Modulation Technology:	GFSK, π/4-DQPSK, 8-DPSK
Antenna Type:	PCB Antenna
Antenna gain:	-0.58dBi
BLE:	
Operation frequency:	2402MHz-2480MHz
Channel Number:	40 channels
Channel separation:	2MHz
Modulation Technology:	GFSK
Antenna Type:	PCB Antenna
Antenna gain:	-0.58dBi
2.4G WIFI:	
Operation frequency:	802.11b/802.11g /802.11n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz~2452MHz
Channel Number:	802.11b/802.11g /802.11n(HT20): 11 802.11n(HT40):7
Channel separation:	5MHz
Modulation	802.11b: Direct Sequence Spread Spectrum (DSSS)

Technology:	802.11g/802.11n(HT20)/802.11n(HT40): Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	PCB Antenna
Antenna gain:	-0.58dBi
SRD 433.92:	
Operation frequency:	433.92MHz
Modulation Technology:	OOK
Antenna Type:	Spring antenna
Antenna Gain:	0dBi
Remark: The above DUT's information was declared by manufacturer. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.	

1.3 Test Facility

TestLaboratory:
Dongguan Yaxu (AiT) Technology Limited
No.22, Jinqianling 3rd Street, Jitigang, Huangjiang, Dongguan, Guangdong, China

The test facility is recognized, certified or accredited by the following organizations:

CNAS- Registration No: L6177
Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on April 18, 2022

FCC-Registration No.: 703111 Designation Number: CN1313
Dongguan Yaxu (AiT) Technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 6819A CAB identifier: CN0122
The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01
Dongguan Yaxu (AiT) Technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

1.4 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4“Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the Dongguan Yaxu (AiT) Technology Limited’squality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Yaxu (AiT) laboratory is reported:

Test	Measurement Uncertainty	Notes
Power Line Conducted Emission	150KHz~30MHz ±1.20dB	(1)
Radiated Emission	9KHz~30Hz±3.10dB	(1)
Radiated Emission	9KHz~1GHz ±3.75dB	(1)
Radiated Emission	1GHz~18GHz ±3.88dB	(1)
Radiated Emission	18GHz-40GHz ±3.88dB	(1)

The report uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

2 Method of measurement

2.1 Applicable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

FCC KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device, RF Exposure, Equipment Authorization Procedures

2.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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

2.3 MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S=power density
P=power input to antenna
G=power gain of the antenna in the direction of interest relative to an isotropic radiator
R=distance to the center of radiation of the antenna

2.4 Manufacturing Tolerance

BR_EDR (Conducted)

Frequency (MHz)	BR_EDR_GFSK		
	2402	2441	2480
Target (dBm)	1.0	2.0	1.0
Tolerance ± (dB)	1.0	1.0	1.0
Frequency (MHz)	BR_EDR_π/4-DQPSK		
	2402	2441	2480
Target (dBm)	2.0	3.0	2.0
Tolerance ± (dB)	1.0	1.0	1.0
Frequency (MHz)	BR_EDR_8-DPSK		
	2402	2441	2480
Target (dBm)	2.0	2.0	2.0
Tolerance ± (dB)	1.0	1.0	1.0

BLE (Conducted)

Frequency (MHz)	GFSK 1Mbps		
	2402	2440	2480
Target (dBm)	2.0	3.0	2.0
Tolerance ± (dB)	1.0	1.0	1.0
Frequency (MHz)	GFSK 2Mbps		
	2402	2440	2480
Target (dBm)	2.0	3.0	2.0
Tolerance ± (dB)	1.0	1.0	1.0

2.4GWIFI (Conducted)

Frequency (MHz)	11b(Peak)		
	2412	2437	2462
Target (dBm)	15.0	14.0	14.0
Tolerance ± (dB)	1.0	1.0	1.0
Frequency (MHz)	11g(Peak)		
	2412	2437	2462
Target (dBm)	14.0	14.0	14.0
Tolerance ± (dB)	1.0	1.0	1.0
Frequency (MHz)	11n(HT20) (Peak)		
	2412	2437	2462
Target (dBm)	14.0	14.0	14.0
Tolerance ± (dB)	1.0	1.0	1.0
Frequency (MHz)	11n(HT40) (Peak)		
	2422	2437	2452
Target (dBm)	14.0	14.0	14.0
Tolerance ± (dB)	1.0	1.0	1.0

433.92MHz

Frequency (MHz)	OOK
	433.92MHz
Target (dBm)	-8.0
Tolerance ± (dB)	1.0

2.5 Standalone MPE Result

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, r =20cm, as well as the gain of the used antenna is refer to section 4, the RF power density can be obtained.

Modulation Type	Output power with tune_up		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
BR_EDR	4	2.512	-0.58	0.875	0.00044	1.0000
BLE	4	2.512	-0.58	0.875	0.00044	1.0000
2.4G WIFI	16	39.811	-0.58	0.875	0.00693	1.0000
433.92MHz	-7	0.200	0.00	1.000	0.00004	1.0000

According to the follow transmitter output power（P_t）formula：
P_t=（E x d）^{2}/（30 x g_t）
P_t=transmitter output power in watts
g_t=numeric gain of the transmitting antenna (unitess)
E=electric field strength in V/m
d=measurement distance in meters (m)

According to the formula described above:

Emax=**87.00**dBuv/m=**0.0224**V/m, d=3m, g_t=1.0

P_t=（E x d）^{2}/（30 x g_t）=(**0.0224**x3)^2 / (30x1.0)=**0.00015**W=**0.150**mW=**-8.229**dBm

Remark:
1. Output power (Peak) including turn-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer.
3. WIFI and BT/BLE do not support simultaneous transmission .
4. Max simultaneous transmission = 0.00693 + 0.00004 = 0.00697 < 1.0000 mW/cm^2

2.6 Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

**************************End of Report**************************