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RF Exposure Evaluation Report

Report No.: CQASZ20220200255E-02
Applicant: Shenzhen Haimengxiang Technology Co., Ltd
Address of Applicant: Room 908, Building B, Kaihaoda Plaza, Dalang Street, Longhua District, Shenzhen
Equipment Under Test (EUT):
EUT Name: VIDEO DOORBELL
Model No.: R9, R10
Test Model No.: R9
Brand Name: N/A
FCC ID: 2A4YQ-R09
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2022-02-23
Date of Test: 2022-02-23 to 2022-03-11
Date of Issue: 2022-03-11
Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above

Tested By: Lewis Zhou
(Lewis Zhou)

Reviewed By: Rock Huang
(Rock Huang)

Approved By: Jack Ai
(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20220200255E-02	Rev.01	Initial report	2022-03-11

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3 General Information

3.1 Client Information

Applicant:	Shenzhen Haimengxiang Technology Co., Ltd
Address of Applicant:	Room 908, Building B, Kaihaoda Plaza, Dalang Street, Longhua District, Shenzhen
Manufacturer:	Shenzhen Haimengxiang Technology Co., Ltd
Address of Manufacturer:	Room 908, Building B, Kaihaoda Plaza, Dalang Street, Longhua District, Shenzhen
Factory:	Shenzhen Haimengxiang Technology Co., Ltd
Address of Factory:	Room 908, Building B, Kaihaoda Plaza, Dalang Street, Longhua District, Shenzhen

3.2 General Description of EUT

Product Name:	VIDEO DOORBELL
Model No.:	R9, R10
Test Model No.:	R9
Trade Mark:	N/A
Software Version:	110.3.5.12
Hardware Version:	R9-T31-MAIN-V1.1-20211111, R9-T31-SENSOR-V1.1-20211111
EUT Power Supply:	Li-ion battery: DC 3.7V 5000mAh, Charge by DC 5V for adapter

Note:

Model No.: R9, R10

Only the model R9 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

3.3 General Description of 2.4G WIFI Classic	
Operation Frequency:	2412MHz~2462MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channel:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Transfer Rate:	IEEE for 802.11b: 1Mbps/2Mbps/5.5Mbps/11Mbps IEEE for 802.11g : 6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps IEEE for 802.11n(HT20) : 6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps
Sample Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Antenna Type:	FPC Antenna
Antenna Gain:	3.8dBi

Note:

The above parameters will directly affect the test results. The information is provided by the applicant.

4 MPE Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	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

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

1) For 2.4G WIFI Classic

Antenna Gain: 3.8dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.399 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

11B mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	7.92	8.0±1	9.0	7.943
Middle(2437MHz)	8.15	8.0±1	9.0	7.943
Highest(2462MHz)	6.17	6.0±1	7.0	5.012
11G mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	2.94	3.0±1	4.0	2.512
Middle(2437MHz)	2.07	2.0±1	3.0	1.995
Highest(2462MHz)	1.19	1.0±1	2.0	1.585
11N20 mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	2.91	3.0±1	4.0	2.512
Middle(2437MHz)	3.64	3.5±1	4.5	2.818
Highest(2462MHz)	1.91	2.0±1	3.0	1.995

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
7.943	3.8	0.0037907848	1.0	PASS

Note: 1) Refer to report No. CQASZ20220200255E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (7.943 * 2.4) / (4 * 3.1416 * 20^2) = 0.0037907848$

3) EUT's module is more than 20cm away from the human body.

*** END OF REPORT ***