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RF Exposure Evaluation Report

Report No.: CQASZ20210400515E-02
Applicant: Shenzhen Wenhui Technology Development Co., Ltd.
Address of Applicant: 8th Floor, Building A, Lingyun Industrial Zone, Xingye 3rd Road, Fenghuang Fuyong, Bao'an District, Shenzhen, China
Equipment Under Test (EUT):
EUT Name: Smart socket
Model No.: WHDM01, WHDM02, WHDM03, WHDM04, WHDM05, WHDM06, WHDM08, WHDM09, WHDM10
Test Model No.: WHDM01
Brand Name: N/A
FCC ID: 2AR95-WHDM01
Standards: 47 CFR Part 1.1307 47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Test: 2021-04-22 to 2021-05-24
Date of Issue: 2021-05-24
Test Result: PASS*

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

Tested By:

Lewis Zhou

(Lewis Zhou)

Reviewed By:

Jun Li

(Jun Li)

Approved By:

Sheek Luo

(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210400515E-02	Rev.01	Initial report	2021-05-24

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3 General Information

3.1 Client Information

Applicant:	Shenzhen Wenhui Technology Development Co., Ltd.
Address of Applicant:	8th Floor, Building A, Lingyun Industrial Zone, Xingye 3rd Road, Fenghuang Fuyong, Bao'an District, Shenzhen, China
Manufacturer:	Shenzhen Wenhui Technology Development Co., Ltd.
Address of Manufacturer:	8th Floor, Building A, Lingyun Industrial Zone, Xingye 3rd Road, Fenghuang Fuyong, Bao'an District, Shenzhen, China
Factory:	Shenzhen Wenhui Technology Development Co., Ltd.
Address of Factory:	8th Floor, Building A, Lingyun Industrial Zone, Xingye 3rd Road, Fenghuang Fuyong, Bao'an District, Shenzhen, China

3.2 General Description of EUT

Product Name:	Smart socket
Model No.:	WHDM01, WHDM02, WHDM03, WHDM04, WHDM05, WHDM06, WHDM08, WHDM09, WHDM10
Trade Mark:	N/A
Hardware version:	V1.0
Software version:	V1.0
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
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)
Product Type:	☐ Mobile ☐ Portable ☒ Fix Location
Antenna Type	PCB Antenna
Antenna Gain	0dBi
Power Supply:	AC100-250V 50/60HZ

4 MPE Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limitst

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

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

802.11b mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	11.95	11±1	12	15.849
Middle(2437MHz)	13.89	13±1	14	25.119
Highest(2462MHz)	13.67	13±1	14	25.119
802.11g mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	16.85	16±1	17	50.119
Middle(2437MHz)	18.59	18±1	19	79.733
Highest(2462MHz)	18.43	18±1	19	79.733
802.11n(HT20)mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	17.01	17±1	18	60.096
Middle(2437MHz)	18.86	18±1	19	79.733
Highest(2462MHz)	18.58	18±1	19	79.733

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
79.733	0	0.0159	1.0	PASS

Note: 1) Refer to report No. CQASZ20210400515E-01 for EUT test Max Conducted Average Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (79.733 * 1) / (4 * 3.1416 * 20^2) = 0.00159$$