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RF Exposure Evaluation Report

Report No.: CQASZ20201200047EX-02
Applicant: Wenzhou Morning Electronics Co.,LTD
Address of Applicant: NO.238, Wei 11 Road, Yueqing Economic Development Zone, Yueqing, Zhejiang, China

Equipment Under Test (EUT):
EUT Name: Smart Switch
Model No.: WS-EU3-RF, SYT-A01, SYT-B01, SYT-C01, SYT-ZB01, WS-EU1-RF, WS-US1-RF, WS-EU1-L, WS-US1-L, WS-EUB1-WR, ZS-EUB1, ZTS-EU1, ZTS-EU1-WR, ZTS-US1, ZTS-US1-WR, WS-EUR-C, WS-USR-C, WS-EUR-2C, WS-USR-2C, WS-EUR-F, WS-USR-F, WS-EUR-FL, WS-USR-FL, WS-EUR-D, WS-USR-D, ZTS-EUR-C, ZTS-USR-C, ZTS-EUR-2C, ZTS-USR-2C, ZTS-EUR-F, ZTS-USR-F, ZTS-EUR-FL, ZTS-USR-FL, ZTS-EUR-D, ZTS-USR-D, SR-WS1, SR-ZS1, BS-EU BS-US BS-EUB

Test Model No.: WS-EU3-RF
Brand Name: N/A
FCC ID: 2AT8P-WSEUNX
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06

Date of Receipt: Dec. 18, 2020
Date of Test: Dec. 18, 2020 to Jan. 04, 2021
Date of Issue: Jan. 04, 2021
Test Result: **PASS***

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

Tested By: Jun Li
(Jun Li)

Reviewed By: Ares Liu
(Ares Liu)

Approved By: Sheek Luo
(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20201200047EX-02	Rev.01	Initial report	Jan. 04, 2021

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3 General Information

3.1 Client Information

Applicant:	Wenzhou Morning Electronics Co.,LTD
Address of Applicant:	NO.238, Wei 11 Road, Yueqing Economic Development Zone, Yueqing, Zhejiang, China
Manufacturer:	Wenzhou Morning Electronics Co.,LTD
Address of Manufacturer:	NO.238, Wei 11 Road, Yueqing Economic Development Zone, Yueqing, Zhejiang, China

3.2 General Description of EUT

Product Name:	Smart Switch
Model No.:	WS-EU3-RF
All Model No.:	WS-EU3-RF, SYT-A01, SYT-B01, SYT-C01, SYT-ZB01, WS-EU1-RF, WS-US1-RF, WS-EU1-L, WS-US1-L, WS-EUB1-WR, ZS-EUB1, ZTS-EU1, ZTS-EU1-WR, ZTS-US1, ZTS-US1-WR, WS-EUR-C, WS-USR-C, WS-EUR-2C, WS-USR-2C, WS-EUR-F, WS-USR-F, WS-EUR-FL, WS-USR-FL, WS-EUR-D, WS-USR-D, ZTS-EUR-C, ZTS-USR-C, ZTS-EUR-2C, ZTS-USR-2C, ZTS-EUR-F, ZTS-USR-F, ZTS-EUR-FL, ZTS-USR-FL, ZTS-EUR-D, ZTS-USR-D, SR-WS1, SR-ZS1, BS-EU, BS-US, BS-EUB
Trade Mark:	N/A
Hardware version:	V1.0
Software version:	V2.5.8
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422 MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n(HT40): 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11 g/n(HT20)/n(HT40) : OFDM
Product Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type	PCB Antenna
Antenna Gain	0dBi
Power Supply:	AC 120V 50/60Hz
Adapter Information:	/

Note: Please refer to the instruction manual for details.

There are many models here, but only tested: WS-EU3-RF, Their electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

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 id 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)	10.89	10.5±1	11.5	14.125
Middle(2437MHz)	9.73	9.5±1	10.5	11.220
Highest(2462MHz)	9.07	8.5±1	9.5	8.913
802.11g mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	8.35	7.5±1	8.5	7.079
Middle(2437MHz)	7.15	6.5±1	7.5	5.623
Highest(2462MHz)	4.70	4.5±1	5.5	3.548
802.11n(HT20)mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	8.11	7.5±1	8.5	7.079
Middle(2437MHz)	7.76	7.5±1	8.5	7.079
Highest(2462MHz)	6.41	5.5±1	6.5	4.467
802.11n(HT40)mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2422MHz)	7.56	7.5±1	8.5	7.079
Middle(2437MHz)	6.03	5.5±1	6.5	4.467
Highest(2452MHz)	6.08	5.5±1	6.5	4.467

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
14.125	0	0.0028	1.0	PASS

Note: 1) Refer to report No. CQASZ20201200047EX-01 for EUT test Max Conducted Average Output Power value.

2) $Pd = (Pout * G) / (4 * \pi * R^2) = (14.125 * 1.0) / (4 * 3.1416 * 20^2) = 0.0028$