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RF Exposure Evaluation Report

Report No. : CQASZ20180800125EW-03

Applicant: Wonders Technology Co., Ltd

Address of Applicant: 4/F, Tower A,3rd Building, Tian'an Cloud Park, Bantian Avenue, Longgang District, Shenzhen 518129, China

Manufacturer: Wonders Technology Co., Ltd

Address of Manufacturer: 4/F, Tower A,3rd Building, Tian'an Cloud Park, Bantian Avenue, Longgang District, Shenzhen 518129, China

Equipment Under Test (EUT):

Product: Wifi Speaker

All Model No.: 7198-47, WB-135

Test Model No.: 7198-47

Brand Name: N/A

FCC ID: WC2-WB135

Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06

Date of Test: 2018-08-01 to 2018-08-10

Date of Issue: 2018-08-10

Test Result : **PASS***

Tested By:

Aaron Ma

(Aaron Ma)

Reviewed By:

Jack Ai

(Jack Ai)

Approved By:

Jack Ai

(Jack Ai)



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

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20180800125EW-03	Rev.01	Initial report	2018-08-10

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4 General Information

4.1 Client Information

Applicant:	Wonders Technology Co., Ltd
Address of Applicant:	4/F, Tower A,3rd Building, Tian'an Cloud Park, Bantian Avenue, Longgang District, Shenzhen 518129, China
Manufacturer:	Wonders Technology Co., Ltd
Address of Manufacturer:	4/F, Tower A,3rd Building, Tian'an Cloud Park, Bantian Avenue, Longgang District, Shenzhen 518129, China

4.2 General Description of EUT

Product Name:	Wifi Speaker
Model No.:	7198-47, WB-135
Trade Mark:	7198-47
Hardware Version:	V1.0
Software Version:	V1.0
Product Type:	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Power Supply:	lithium battery:DC3.7V, 2200mAh, Charge by DC5.0V

4.3 General Description of BT

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V4.2
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Test Software of EUT:	Blue test 1.0 (manufacturer declare)
Antenna Type:	Integral antenna
Antenna Gain:	0dBi

4.4 General Description of WIFI

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)
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
Test Software of EUT:	RF test (manufacturer declare)

Antenna Type:	IPEX Connector Antenna
Antenna Gain:	0dBi

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 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.

5.1.2 Test Procedure

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

5.2 1.1.3 EUT RF Exposure Evaluation

1) For BT

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.430	0±1	1.0	1.259
Middle(2441MHz)	1.160	1.0±1	2.0	1.585
Highest(2480MHz)	2.080	1.5±1	2.5	1.778
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-0.910	0±1	1.0	1.259
Middle(2441MHz)	0.460	1.0±1	2.0	1.585
Highest(2480MHz)	1.510	1.5±1	2.5	1.778
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-0.710	0±1	1.0	1.259
Middle(2441MHz)	0.570	1.0±1	2.0	1.585
Highest(2480MHz)	1.500	1.5±1	2.5	1.778

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
1.778	0	0.00035	1.0	PASS

Note: 1) Refer to report No. CQASZ20180800125EW-01 for EUT test Max Conducted Peak Output Power value.

$$2) Pd = (Pout * G) / (4 * \pi * R^2) = (1.778 * 1.0) / (4 * 3.1416 * 20^2) = 0.00035$$

2) For WIFI

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 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)	10.65	10±1	12	15.849
Middle(2437MHz)	10.74	10±1	12	15.849
Highest(2462MHz)	10.67	10±1	12	15.849
802.11g mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	12.33	12±1	13	19.953
Middle(2437MHz)	11.9	12±1	13	19.953
Highest(2462MHz)	11.55	12±1	13	19.953
802.11b mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	13.56	13±1	14	25.119
Middle(2437MHz)	13.51	13±1	14	25.119
Highest(2462MHz)	13.34	13±1	14	25.119

The worst case:

Maximum Average tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
25.119	0	0.005	1.0	PASS

Note: 1) Refer to report No. CQASZ201808000125EW-02 for EUT test Max Conducted Average Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (25.119 * 1.0) / (4 * 3.1416 * 20^2) = 0.005$$