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Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

# RF Exposure Evaluation Report

| | |
|---|---|
| **Report No. :** | CQASZ20180100033EW-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 |
| **Factory:** | Wonders Technology Co., Ltd |
| **Address of Factory:** | 4/F, Tower A,3rd Building, Tian'an Cloud Park, Bantian Avenue, Longgang District, Shenzhen 518129, China |
| **Equipment Under Test (EUT):** | |
| **Product:** | WiFi Bluetooth Speaker |
| **Model No.:** | W1, DS-1728 |
| **Test Model No.:** | W1 |
| **Brand Name:** | N/A |
| **FCC ID:** | WC2-000W1 |
| **Standards:** | 47 CFR Part 1.1307<br>47 CFR Part 1.1310<br>KDB447498D01 General RF Exposure Guidance v06 |
| **Date of Test:** | 2018-01-20 to 2018-02-04 |
| **Date of Issue:** | 2018-03-01 |
| **Test Result :** | **PASS*** |

***Tested By:*** Aaron Ma

***(Aaron Ma)***

***Reviewed By:*** Owen Zhou

***( Owen Zhou)***

***Approved By:***

***( Jack Ai)***

SHENZHEN HUAXIA TESTING TECHNOLOGY CO., LTD. CQA 华夏准测 APPROVED

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

# 2 Version

**Revision History Of Report**

| Report No. | Version | Description | Issue Date |
|---|---|---|---|
| CQASZ20180100033EW-03 | Rev.01 | Initial report | 2018-02-04 |
| CQASZ20180100033EW-03 | Rev.02 | Updated model name | 2018-03-01 |

# 3 Contents

# 4 General Information

## 4.1 Client Information

| | |
|---|---|
| Applicant: | Wonders Technology Co., Ltd. |
| Address of Applicant: | Doss Industrial Zone, Qiping Kengdu Industrial Area,Guihua Village, Guanlan Town, Baoan District, Shenzhen, 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 |
| Factory: | Wonders Technology Co., Ltd |
| Address of Factory: | 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 Bluetooth Speaker |
| Model No.: | W1, DS-1728 |
| Trade Mark: | N/A |
| Hardware Version: | V1.0 |
| Software Version: | V1.0 |
| Power Supply: | lithium battery:DC3.7V, Charge by DC5.0V |

## 4.3 General Description of BT

| | |
|---|---|
| Operation Frequency: | 2402MHz~2480MHz |
| Bluetooth Version: | V2.1+EDR |
| Modulation Technique: | Frequency Hopping Spread Spectrum(FHSS) |
| Modulation Type: | GFSK, π/4DQPSK, 8DPSK |
| Number of Channel: | 79 |
| Hopping Channel Type: | Adaptive Frequency Hopping systems |
| Test Software of EUT: | Test V1.0 (manufacturer declare ) |
| Antenna Type: | PCB antenna |
| Antenna Gain: | -0.68dBi |

## 4.4 General Description of WIFI

| | |
|---|---|
| Operation Frequency: | IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz<br>IEEE 802.11n(HT40): 2422MHz to 2452MHz |
| Channel Numbers: | IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels<br>IEEE 802.11n HT40: 7 Channels |
| Channel Separation: | 5MHz |
| Type of Modulation: | IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK)<br>IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK,BPSK) |
| Test Software of EUT: | MT7628 QA 0.0.0.96 (manufacturer declare ) |
| Antenna Type: | internal antenna with ipex connector |
| 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: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd 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.

### 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

**Note: BT and WIFI simultaneous transmit was not supported.**

**1) For BT**

Antenna Gain: -0.68dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0.86 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

**Measurement Data**

| GFSK mode | |
|---|---|
| Test channel | Peak Output Power (dBm) |
| Lowest(2402MHz) | -1.46 |
| Middle(2441MHz) | -2.77 |
| Highest(2480MHz) | -3.26 |
| π/4DQPSK mode | |
| Test channel | Peak Output Power (dBm) |
| Lowest(2402MHz) | -2.60 |
| Middle(2441MHz) | -3.96 |
| Highest(2480MHz) | -4.46 |
| 8DPSK mode | |
| Test channel | Peak Output Power (dBm) |
| Lowest(2402MHz) | -2.50 |
| Middle(2441MHz) | -3.82 |
| Highest(2480MHz) | -4.43 |

GFSK mode(worst case)

| Channel | Frequency (MHz) | Max Conducted Peak Output Power (dBm) | Output Power to Antenna (mW) | Antenna Gain (dBi) | Power Density at R = 20 cm ($mW/cm^2$) | Limit | Result |
|---|---|---|---|---|---|---|---|
| Lowest | 2402 | -1.46 | 0.71 | -0.68 | 0.00012 | 1.0 | PASS |

Note: 1) Refer to report No. CQASZ20180100033EW-01 for EUT test Max Conducted Peak Output Power value.

2) $Pd = (Pout*G)/(4* Pi * R^2)=(0.71*0.86)/(4*3.1416*20^2)=0.00012$

**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 | Peak Output Power (dBm) |
| Lowest(2412MHz) | 13.27 |
| Middle(2437MHz) | 13.99 |
| Highest(2462MHz) | 14.43 |
| 802.11g mode | |
| Test channel | Peak Output Power (dBm) |
| Lowest(2412MHz) | 16.48 |
| Middle(2437MHz) | 16.11 |
| Highest(2462MHz) | 16.95 |
| 802.11n(HT20)mode | |
| Test channel | Peak Output Power (dBm) |
| Lowest(2412MHz) | 13.54 |
| Middle(2437MHz) | 14.29 |
| Highest(2462MHz) | 14.71 |

802.11g(worst case)

| Channel | Frequency (MHz) | Max Conducted Peak Output Power (dBm) | Output Power to Antenna (mW) | Antenna Gain (dBi) | Power Density at R = 20 cm ($mW/cm^2$) | Limit | Result |
|---|---|---|---|---|---|---|---|
| Highest | 2462 | 16.95 | 49.55 | 0 | 0.0099 | 1.0 | PASS |

Note: 1) Refer to report No. CQASZ20180100033E-02 for EUT test Max Conducted Peak Output Power value.

2) $Pd = (Pout*G)/(4* Pi * R^2)=(49.55*1.0)/(4*3.1416*20^2)=0.0099$