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RF Exposure Evaluation Report

Report No. :	CQASZ20190500399E-03
Applicant:	Shenzhen Mengxiang Technology Co., Ltd
Address of Applicant:	Floor 3,Building 16, Tongfucun park Dalang Street,Longhua District, Shenzhen

Equipment Under Test (EUT):

Product:	Bluetooth Speaker
All Model No.:	D-36AP-4, D-36AH-4, D-36AC-4, D-36AHW-4, D-36APW-4, D-36AHW-8, D-36APW-8, DGSB100BLK
Test Model No.:	DGSB100BLK
Brand Name:	N/A
FCC ID:	2AN3ID-36AHW-4
Standards:	47 CFR Part 1.1307 47 CFR Part 1.1310 KDB447498D01 General RF Exposure Guidance v06
Date of Receipt:	2019-05-30
Date of Test:	2019-05-30 to 2019-06-25
Date of Issue:	2019-06-26
Test Result :	**PASS***

Tested By： Daisy Qin

(Daisy Qin)

Reviewed By: Aaron Ma

(Aaron Ma)

Approved By:

(Jack Ai)

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

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

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190500399E-03	Rev.01	Initial report	2019-06-26

2 Contents

3 General Information

3.1 Client Information

Applicant:	Shenzhen Mengxiang Technology Co., Ltd
Address of Applicant:	Floor 3,Building 16, Tongfucun park Dalang Street,Longhua District, Shenzhen
Manufacturer:	Shenzhen Mengxiang Technology Co., Ltd
Address of Manufacturer:	Floor 3,Building 16, Tongfucun park Dalang Street,Longhua District, Shenzhen

3.2 General Description of EUT

Product Name:	Bluetooth Speaker
All Mode No.:	D-36AP-4, D-36AH-4, D-36AC-4, D-36AHW-4, D-36APW-4, D-36AHW-8, D-36APW-8, DGSB100BLK
Test Mode No.:	DGSB100BLK
Trade Mark:	N/A
Hardware Version:	V1.0
Software Version:	V1.0
Power Supply:	Adapter: Model No.: CW1402000US Input: 100-240V 50/60Hz Output: DC14V 2000mA
AV cable:	140cm(Unshielded)
AUX cable:	145cm(Unshielded)
Test voltage:	120V 60Hz

3.3 General Description of BT

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V4.2
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Transfer Rate:	1Mbps/2Mbps/3Mbps
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Product Type:	☒ Mobile ☐ Portable ☐ Fix Location
Test Software of EUT:	AppoTech RF Control Kit V4.2.33 (manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	0dBi

3.4 General Description of 900MHz

Operation Frequency:	905MHz~915MHz
Modulation Type:	GFSK
Number of Channel:	15
Product Type:	☒ Mobile ☐ Portable ☐ Fix Location
Test Software of EUT:	RF Test (manufacturer declare)
Antenna Type:	Internal antenna
Antenna Gain:	0dBi

Note:

All model: D-36AP-4, D-36AH-4, D-36AC-4, D-36AHW-4, D-36APW-4, D-36AHW-8, D-36APW-8, DGSB100BLK

Only the model DGSB100BLK 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.

4 RF Exposure 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: $Pd = (Pout*G)/(4* Pi * R^2)$

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.

4.1.2 Test Procedure

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

4.2 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 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)	1.050	1±1	2	1.585
Middle(2441MHz)	1.790	1±1	2	1.585
Highest(2480MHz)	5.840	5±1	6	3.981
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	2.230	2±1	2	1.585
Middle(2441MHz)	2.960	3.5±1	4.5	2.818
Highest(2480MHz)	3.690	3.5±1	4.5	2.818
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	2.580	2±1	2	1.585
Middle(2441MHz)	3.300	3.5±1	4.5	2.818
Highest(2480MHz)	4.050	3.5±1	4.5	2.818

The worst case:

Maximum tune-up Power (mW)	**Antenna Gain (dBi)**	**Power Density at R = 20 cm (mW/cm^2)**	**Limit**	**Result**
3.981	0	0.0008	1.0	PASS

Note: 1) Refer to report No. CQASZ20190500399E-01 for EUT test Max Conducted Peak Output Power value.

2) $Pd = (Pout*G)/(4* Pi * R^2)=(3.981*1)/(4*3.1416*20^2)=0.0008$

2) For 900MHz

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:

eirp = pt x gt = $(E \times d)^2/30$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, ---$10^{((dB\mu V/m)/20)}/10^6$,

d = measurement distance in meters (m)---3m,

So pt = $(E \times d)^2/30$ / gt

The worst case (refer to report CQASZ20190500399E-02) is below:

Antenna polarization: Horizontal		
Frequency (MHz)	Level (dBuV/m)	Polarization
915	88.99	Peak
915	79.83	Average

Antenna polarization: Vertical		
Frequency (MHz)	Level (dBuV/m)	Polarization
915	84.88	Peak
915	76.80	Average

For 915MHz wireless:

Field strength = 88.99dBμV/m @3m

Ant. gain 0dBi; so Ant numeric gain=1.0

So pt={[$10^{(88.99/20)}/10^6$x3]^2/30 /1.0}x1000mW =0.238mW

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
0.238	0	0.00005	0.61	PASS

Note: 1) Pd = (Pout*G)/(4* Pi * R^2)=(0.238*1)/(4*3.1416*20^2)=0.00005

2) Limit = f/1500 = 915/1500 = 0.61

3) EUT RF Exposure Evaluation simultaneous transmission operations

According to 865664D02 2.2 d) 1):
The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits :

Simultaneous transmission mode	The sum of the ratios	Result
900MHz + BT	0.00005/0.61 + 0.0008/1	=0.000882 < 1