RF EXPOSURE REPORT

Report No.: 17070973-FCC-H

Applicant	DASAN ELECTRON CO., LTD.
Product Name	Wireless Headset
Model No.	DW-779UB
Serial No.	DW-779U; DW-779;X400P-U;X400;FSPW2015MU;FSPW2015M; X400P-UB, FSPW2016MUB, HSW100U, HSW100UB
Test Standard	FCC 2.1091:2016
Test Date	March 05 to April 03, 2015 & April 01 to April 13, 2017
Issue Date	October 18, 2017
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Loren Luo	David Huang	
Loren Luo Test Engineer	David Huang Checked By	

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Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070973-FCC-H	NONE	Original	October 18, 2017

2. Customer information

Applicant Name	DASAN ELECTRON CO., LTD.
Applicant Add	#307, P-1 dong, Gyunggi Techno Park, 1271-11, Sa-dong, Sangnok-Gu, Ansan-si, Gyunggi-Do, 426-901, KOREA
Manufacturer	DASAN ELECTRON CO., LTD.
Manufacturer Add	#307, P-1 dong, Gyunggi Techno Park, 1271-11, Sa-dong, Sangnok-Gu, Ansan-si, Gyunggi-Do, 426-901, KOREA

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao’ an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Labview of SIEMIC version 2.0

4. Equipment under Test (EUT) Information

Description of EUT:	Wireless Headset
Main Model:	DW-779UB
Serial Model:	HSW100, HSW100UB
Date EUT received:	March 02, 2015 & March 31, 2017
Test Date(s):	March 05 to April 03,2015 & April 01 to April 13, 2017
Antenna Gain:	FP:-0.04dBi PP:0.80dBi Bluetooth: -0.22dBi
Antenna Type:	DECT: Monopole antenna Bluetooth: Patch antenna
Type of Modulation:	DECT:GFSK Bluetooth: GFSK, π /4DQPSK, 8DPSK
Number of Channels:	DECT: 5CH Bluetooth: 79CH
Input Power:	AC Adapter 1: Model: WCF0900050A 1BA Input: AC100 ~ 240V, 50/60Hz,0.15A Output: DC 9.0V, 0.5A Adapter 2: Model: SK01G-0900050U Input: AC100 ~ 240V, 50/60Hz,0.2A Output: DC 9.0V, 0.5A
Trade Name :	Freemate

RF Operating Frequency (ies):	DECT:1921.536 MHz~1928.448 MHz (Tx/Rx) Bluetooth: 2402-2480 MHz
Port:	Power port, USB port, Handset port, Telephone port, RJ45 port
FCC ID:	WF2DW-779UB

Note: In this report, we have chosen the main model DW-779U for testing. The difference among models was explained in the declaration letter.

Revision Number	Model	Report Number	Description of Revision	Date of Revision
0	DW-779UB	15070077-FCC-H	Original Report	July 01, 2015
1	DW-779U; DW-779;X400P-U;X400;FSPW2015MU;FSPW2015M;X400P-UB, FSPW2016MUB, HSW100U, HSW100UB	17070973-FCC-H	Amended Report	October 18, 2017

Note: This is the amended report application (17070973-FCC-H) of the device, the original submission (15070077-FCC-H) was granted on July 01, 2015. The difference between the original device and the current one was as following the detail information:

The differences between the original report s EUT and the amended reports EUT are adding a BT modular, adapter.

Based on the letter the difference between them will not affect any test items, so in this report we didn’ t revise any test data except the test data of BT output power, and the following test data please refer to report 15070077-FCC-H.

5. FCC §2.1091 - Maximum Permissible exposure (MPE)

6.1 Applicable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission' s guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
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

* = Plane-wave equivalent power density

6.2 Test Result

FP:

Type	Frequency (MHz)	Duty Cycle	Conducted power	Frame power	Turn Up Power(dBm)	Antenna Gain (dBi)	E-field Strength (V/m) @ 20 cm	E-field Strength Limit (V/m)	Result
Power	1921.536	8.33%	16.511	5.719	6±1	-0.04	0.001	1	Pass
	1924.992	8.33%	16.312	5.520	6±1	-0.04	0.001	1	Pass
	1928.448	8.33%	16.384	5.592	6±1	-0.04	0.001	1	Pass

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

Where: S = power density (in appropriate units, e.g. mW/cm^2)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For the antenna manufacturer provide only used limited to ERP/EIRP or radiated spurious emission test. The MPE evaluation as below:

Maximum output power at antenna input terminal: 7 dBm)

Maximum output power at antenna input terminal: 5.01(mW)

Prediction distance: >20 (cm)

Predication frequency: 1921.536 (MHz) High frequency

Antenna Gain (typical): -0.04 (dBi)

Antenna Gain (typical): 0.991 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.001(mW/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mW/cm^2)

$0.001(mW/cm^2) < 1 (mW/cm^2)$

Result: Pass

Bluetooth:

Type	Test mode	CH	Freq (MHz)	Conducted Power (dBm)	Tune Up Power (dBm)
Output power	GFSK	Low	2402	4.639	4.5±1
		Mid	2441	3.840	3.5±1
		High	2480	1.640	1.5±1
	π /4 DQPSK	Low	2402	2.984	2.5±1
		Mid	2441	1.800	1.5±1
		High	2480	2.864	2.5±1
	8DPSK	Low	2402	3.198	3±1
		Mid	2441	2.282	2±1
		High	2480	3.267	3±1

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

Where: S = power density (in appropriate units, e.g. mW/cm^2)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For the antenna manufacturer provide only used limited to ERP/EIRP or radiated spurious emission test. The MPE evaluation as below:

Maximum output power at antenna input terminal:5.5(dBm)

Maximum output power at antenna input terminal: 3.548(mW)

Prediction distance: >20 (cm)

Predication frequency: 2402 (MHz) Low frequency

Antenna Gain (typical): -0.22 (dBi)

The worst case is power density at predication frequency at 20 cm: 0.951(mW/cm^2)

MPE limit for general population exposure at prediction frequency: 0.0007 (mW/cm^2)

0.0007 (mW/cm^2) < 1.0 (mW/cm^2)

Result: Pass