

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : OT-192-RWD-037
AGR No. : A191A-106
Applicant : CHIPSEN. Co., Ltd
Address : B1 C-17,15, Gyeongin-ro 53-gil, Guro-gu, Seoul, Republic of Korea
Manufacturer : CHIPSEN. Co., Ltd
Address : B1 C-17,15, Gyeongin-ro 53-gil, Guro-gu, Seoul, Republic of Korea
Type of Equipment : Bluetooth Dual Mode Serial Adapter
FCC ID. : 2APB6-BPORT-232
Model Name : BPORT-232
Serial number : N/A
Total page of Report : 8 pages (including this page)
Date of Incoming : January 14, 2019
Date of issue : February 27, 2019

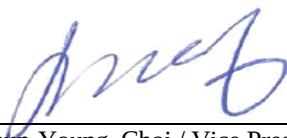
SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART C Section 15.247**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by: 
 Jae-Ho Lee / Chief Engineer
 ONETECH Corp.

Approved by: 
 Keun-Young, Choi / Vice President
 ONETECH Corp.

CONTENTS

PAGE

1. VERIFICATION OF COMPLIANCE	4
2. GENERAL INFORMATION	5
2.1 PRODUCT DESCRIPTION.....	5
2.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.....	5
3. EUT MODIFICATIONS.....	5
4. MAXIMUM PERMISSIBLE EXPOSURE	6
4.1 RF EXPOSURE CALCULATION	6
4.2 EUT DESCRIPTION.....	7
4.3 CALCULATED MPE SAFE DISTANCE.....	8

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-192-RWD-037	February 27, 2019	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

Applicant : CHIPSEN. Co., Ltd
Address : B1 C-17,15, Gyeongin-ro 53-gil, Guro-gu, Seoul, Republic of Korea
Contact Person : Choi, JongWook / Manager
Telephone No. : +82-70-8708-5990
FCC ID : 2APB6-BPORT-232
Model Name : BPORT-232
Brand Name : -
Serial Number : N/A
Date : February 27, 2019

EQUIPMENT CLASS	<i>DSS – PART 15 SPREAD SPECTRUM TRANSMITTER</i>
E.U.T. DESCRIPTION	Bluetooth Dual Mode Serial Adapter
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The CHIPSEN. Co., Ltd, Model BPORT-232 (referred to as the EUT in this report) is a Bluetooth Dual Mode Serial Adapter. The product specification described herein was obtained from product data sheet or user's manual.

Device Type	Bluetooth Dual Mode Serial Adapter		
Operating Frequency	2 402 MHz ~ 2 480 MHz		
RF Output Power	Bluetooth	1 Mbps	6.34 dBm
		2 Mbps	1.92 dBm
		3 Mbps	2.42 dBm
Number of Channel	79 Channels		
Modulation Type	GFSK for 1 Mbps, $\pi/4$ -DQPSK for 2 Mbps, 8-DPSK for 3Mbps		
Antenna Type	Mini Omni Antenna		
Antenna Gain	1.5 dBi		
List of each Osc. or crystal Freq.(Freq. $\geq$ 1 MHz)	16 MHz, 26 MHz		
Rated Supply Voltage	DC 5.0 V		

2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3. EUT MODIFICATIONS

-. None

4. MAXIMUM PERMISSIBLE EXPOSURE

4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are $f/1500 \text{ mW/cm}^2$ for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm^2 for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm^2 exposure is calculated as follows:

$$E = \sqrt{(30 * P * G) / d}, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm^2 , Z = Impedance of free space, 377Ω

E = Electric field strength in V/m , G = Numeric antenna gain, and d = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm , using $P (\text{mW}) = P (\text{W}) / 1\,000$, $d (\text{cm}) = 0.01 * d (\text{m})$

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm , P = Power in mW , G = Numeric antenna gain, and S = Power density in mW/cm^2

4.2 EUT Description

Kind of EUT	Bluetooth Dual Mode Serial Adapter	
Operating Frequency Band	☐ Wireless Microphone: 494.000 MHz ~ 501.000 MHz and 498.200 MHz ~ 505.200 MHz ☐ WLAN: 2 412 MHz ~ 2 462 MHz ☐ WLAN: 5 180 MHz ~ 5 240 MHz ☐ WLAN: 5 745 MHz ~ 5 825 MHz ☒ Bluetooth: 2 402 MHz ~ 2 480 MHz ☐ Bluetooth BLE: 2 402 MHz ~ 2 480 MHz	
MAX. RF OUTPUT POWER	1 Mbps	6.34 dBm
	2 Mbps	1.92 dBm
	3 Mbps	2.42 dBm
Antenna Gain	3.5 dBi	
Exposure Evaluation Applied	☒ MPE ☐ SAR ☐ N/A	

4.3 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear		
2 402 ~ 2 480	1 Mbps	6.34 ± 0.5	6.84	4.83	1.5	1.413	0.001 4	1.00
	2 Mbps	1.92 ± 0.5	2.42	1.75			0.000 5	1.00
	3 Mbps	2.43 ± 0.5	2.93	1.96			0.000 6	1.00



Tested by: Yu-Seog, Sim / Assistant Manager