

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

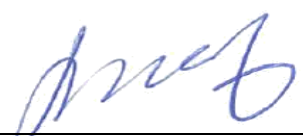
Test Report No. : W17NR-D014
AGR No. : A170A-260
Applicant : Firmtech co., Ltd
Address : 807, 555, Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea
Manufacturer : Firmtech co., Ltd
Address : 807, 555, Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea
Type of Equipment : Bluetooth Serial Adapter
FCC ID. : U8D-FB200AS-F
Model Name : FB200AS-F
Serial number : N/A
Total page of Report : 8 pages (including this page)
Date of Incoming : October 30, 2017
Date of issue : November 08, 2017

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 TEST RESULT.....	8

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W17NR-D014	November 08, 2017	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

Applicant : Firmtech co., Ltd
 Address : 807, 555, Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea
 Contact Person : jhkim@firmtech.co.kr
 Telephone No. : 82-31-719-4812
 FCC ID : U8D-FB200AS-F
 Model Name : FB200AS-F
 Serial Number : N/A
 Date : November 08, 2017

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	Bluetooth 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 Firmtech co., Ltd, Model FB200AS-F (referred to as the EUT in this report) is a Bluetooth Serial Adapter. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Bluetooth Serial Adapter
OPERATING FREQUENCY	2 402 MHz ~ 2 480 MHz
RF OUTPUT POWER	7.62 dBm
NUMBER OF CHANNEL	79 Channels
MODULATION TYPE	GFSK
ANTENNA TYPE	External Dipole Antenna
ANTENNA GAIN	4.966 dBi
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>=1 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 Serial Adapter
Operating Frequency Band	<input type="checkbox"/> Wireless Microphone: 494.000 MHz ~ 501.000 MHz and 498.200 MHz ~ 505.200 MHz <input type="checkbox"/> WLAN: 2 412 MHz ~ 2 462 MHz <input type="checkbox"/> WLAN: 5 180 MHz ~ 5 240 MHz <input type="checkbox"/> WLAN: 5 745 MHz ~ 5 825 MHz <input checked="" type="checkbox"/> Bluetooth: 2 402 MHz ~ 2 480 MHz <input type="checkbox"/> Bluetooth BLE: 2 402 MHz ~ 2 480 MHz
MAX. RF OUTPUT POWER	7.62 dBm
Antenna Gain	4.966 dBi
Exposure Evaluation Applied	<input type="checkbox"/> MPE <input type="checkbox"/> SAR <input checked="" type="checkbox"/> N/A

4.3 Test Result

According to the procedure, KDB 447498 D01, the standalone SAR test exclusion threshold is

$$[(\text{Max. Power of channel, including tune-up tolerance, mW}) / (\text{Min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] < 3$$

$$= (2.39/5) \times \sqrt{2.441} = 0.75$$

Conclusion: The SAR test exclusion threshold is less than 3, so the device meets the RF Exposure Requirement and excluded SAR Test.

	Frequency (MHz)	Target Power W/tolerance (dBm)	Max tune up power (dBm)	Max tune up power (mW)	Separation distance (mm)	RF exposure
1 Mbps	2 402	8.00 ± 0.5	8.50	7.08	5	2.19



Tested by: Ju Yun Park / Engineer