

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

Test Report No. : OT-192-RWD-013

AGR No. : A18NA-185

Applicant : OSSTEM IMPLANT Co., Ltd.

Address : 1st floor, B-dong, 135, Gasan digital 2-ro, Geumcheon-gu, Seoul, Korea

Manufacturer : OSSTEM IMPLANT Co., Ltd.

Address : 1st floor, B-dong, 135, Gasan digital 2-ro, Geumcheon-gu, Seoul, Korea

Type of Equipment : Osstem Zigbee Module

FCC ID. : 2ASB7K-WLM-01

Model Name : K-WLM-01

Serial number : N/A

Total page of Report : 8 pages (including this page)

Date of Incoming : October 15, 2018

Date of issue : February 13, 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.

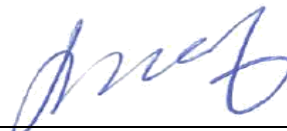
It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by:



Jae-Ho Lee / Chief Engineer
ONETECH Corp.

Approved by:



Keun-Young, Choi / Vice President
ONETECH Corp.

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
OT-192-RWD-013	February 13, 2019	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

Applicant : OSSTEM IMPLANT Co., Ltd.
 Address : 1st floor, B-dong, 135, Gasan digital 2-ro, Geumcheon-gu, Seoul, Korea
 Contact Person : Hyeri Han / Associate
 Telephone No. : +82-70-4626-0881
 FCC ID : 2ASB7K-WLM-01
 Model Name : K-WLM-01
 Serial Number : N/A
 Date : February 13, 2019

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Osstem Zigbee Module
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 OSSTEM IMPLANT Co., Ltd., Model K-WLM-01 (referred to as the EUT in this report) is an Osstem Zigbee Module. Product specification information described herein was obtained from product data sheet or user's manual.

Device Type	Osstem Zigbee Module			
Operating Frequency	2 405 MHz ~ 2 480 MHz			
RF Output Power	4.24 dBm			
Modulation Type	O-QPSK			
Antenna Type / Antenna Gain	Monopole Antenna	Antenna 1 (Basic)	GW26.0152	1.8 dBi
		Antenna 2 (Additional)	SAT-G01R	1.5 dBi
		Antenna 3 (Additional)	RN-SMA-S-RP	1.7 dBi
		Antenna 4 (Additional)	GW26.0151	1.8 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	32 MHz			
Rated Supply Voltage	DC 3.3 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	Osstem Zigbee Module
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 ☒ Zigbee : 2 405 MHz ~ 2 480 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 ☐ UWB: 7 200 MHz ~ 10 200 MHz
MAX. RF OUTPUT POWER	4.24 dBm
Antenna Gain	1.8 dBi
	1.5 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		
2 405 ~ 2 480	Zigbee	3.74 ± 0.5	4.24	2.65	1.9	1.514	0.000 8	1.00



Tested by: Min-Gu, Ji / Assistant Manager