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

Test Report No.	**: W176R-D067**
AGR No.	**: A173A-299R**
Applicant	**: Charm Engineering Co.,Ltd**
Address	**: 5, Hyeongje-ro, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17118**
Manufacturer	**: Charm Engineering Co.,Ltd**
Address	**: 5, Hyeongje-ro, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17118**
Type of Equipment	**: CAI Monitoring System**
FCC ID.	**: 2AMMLCAI001-BT33**
Model Name	**: CAI**
Serial number	**: N/A**
Total page of Report	**: 8 pages (including this page)**
Date of Incoming	**: May 11, 2017**
Date of issue	**: June 20, 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.

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W176R-D067	June 20, 2017	Initial Issue	All

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1. VERIFICATION OF COMPLIANCE

Applicant	: Charm Engineering Co.,Ltd
Address	: 5, Hyeongje-ro, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17118
Contact Person	: Choi sangwoo / Research Engineer
Telephone No.	: +82-31-330-8637
FCC ID	: 2AMMLCAI001-BT33
Model Name	: CAI
Serial Number	: N/A
Date	: June 20, 2017

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	CAI Monitoring System
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.

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2. GENERAL INFORMATION

2.1 Product Description

The Charm Engineering Co.,Ltd, Model CAI (referred to as the EUT in this report) is a CAI Monitoring System. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	CAI Monitoring System	
OPERATING FREQUENCY	2 402 MHz ~ 2 480 MHz	
RF OUTPUT POWER	1 Mbps	3.79 dBm
	2 Mbps	1.27 dBm
	3 Mbps	1.32 dBm
NUMBER OF CHANNEL	79 Channels	
MODULATION TYPE	GFSK for 1 Mbps, π/4-DQPSK for 2 Mbps, 8-DPSK for 3 Mbps	
ANTENNA TYPE	Chip Antenna	
ANTENNA GAIN	-0.97 dBi	
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>=1 MHz)	32.768 kHz, 13 MHz	
RATED SUPPLY VOLTAGE	DC 3.7 V	

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

-. None

3. EUT MODIFICATIONS

-. None

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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 mW/cm² for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm² for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$E = \sqrt{(30 * P * G)} / d$, and $S = E^2 / Z = E^2 / 377$, because 1 mW/cm² = 10 W/m²

Where

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

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

Combing 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 (mW) = P (W) / 1 000, d (cm) = 0.01 * d (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/cm²

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4.2 EUT Description

Kind of EUT	CAI Monitoring System	
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	3.79 dBm
	2 Mbps	1.27 dBm
	3 Mbps	1.32 dBm
Antenna Gain	0.97 dBi	
Exposure Evaluation Applied	■ MPE ☐ SAR ☐ N/A	

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4.3 Test Result

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

[(Max. Power of channel, including tune-up tolerance, mW)/(Mim. test separation distance, mm)] X [√ f(GHz)] < 3

= (2.39/5) X √ 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	2 441	3.29 ± 0.5	3.79	2.39	5	0.75
2 Mbps	2 441	0.77 ± 0.5	1.27	1.34	5	0.42
3 Mbps	2 441	0.82 ± 0.5	1.32	1.36	5	0.42

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