RADIO PERFORMANCE
TEST REPORT

Test Report No.   : OT-23O-RWD-012

Reception No.   : 2309003002

Applicant   : UNION COMMUNITY

Address   : 12F, Munjeong Daemyeong Valeon bldg, 127 Beobwon-ro Songpa-gu, Seoul, South Korea

Manufacturer   : UNION COMMUNITY

Address   : 12F, Munjeong Daemyeong Valeon bldg, 127 Beobwon-ro Songpa-gu, Seoul, South Korea

Type of Equipment   : Access controller

FCC ID   : XX2-AC1100SC

Model Name   : AC1100 SC

Multiple Model Name : N/A

Serial number   : N/A

Total page of Report   : 7 pages (including this page)

Date of Incoming   : September 14, 2023

Date of Issuing   : October 05, 2023

SUMMARY

The equipment complies with the regulation; *FCC CFR 47 § 1.1307*

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

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

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.

Tested by	Reviewed by	Approved by
Soon-Ki, Choi / Prj. Engineer	Tae-Ho, Kim / Chief Engineer	Jae-Ho, Lee / Chief Engineer
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-23O-RWD-012	October 05, 2023	Initial Release	All

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

1. VERIFICATION OF COMPLIANCE

-. APPLICANT   : UNION COMMUNITY

-. ADDRESS   : 12F, Munjeong Daemyeong Valeon bldg, 127 Beobwon-ro Songpa-gu, Seoul, South Korea

-. CONTACT PERSON   : Dong Ho, Lee

-. TELEPHONE NO   : +82-2-6488-3054

-. FCC ID   : XX2-AC1100SC

-. MODEL NO/NAME   : AC1100 SC

-. SERIAL NUMBER   : N/A

-. DATE   : October 05, 2023

DEVICE TYPE	DXX – Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Access controller
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	KDB 447498 D01 Interim General RF Exposure Guidance v06
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None

-. 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 UNION COMMUNITY, Model AC1100 SC (referred to as the EUT in this report) is an Access controller, Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Access controller
TRANSMITTING FREQUENCY	13.559 1 MHz, 2 402 MHz ~ 2 480 MHz
MODULATION	ASK
ANTENNA TYPE	Coil Antenna, Chip Antenna
LIST OF EACH OSC. or CRY. FREQ.(FREQ. >= 1 MHz)	13.559 1 MHz
USED AC/DC ADAPTER	Output: DC 12 V, 3.5 A Model No: DSA-42PFB-12 Manufacturer: Dee Van Electrionics(Longchuan) Co., Ltd..

2.2 Model Differences

-. None

3. EUT MODIFICATIONS

-. None

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4. RADIO FREQUENCY 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 $180/f^2$ mW/cm² for the frequency range between 1.34 MHz and 30 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:

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

Where

S = Power density in mW/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

4.2 EUT Description

Kind of EUT	Access controller
MAX. RF OUTPUT POWER	63.73 dBµV/m
Device Category	☐ Portable (< 20 cm separation) ■ Mobile (> 20 cm separation) ☐ Others
Exposure Evaluation Applied	■ MPE ☐ SAR ☐ N/A

4.3 Calculated MPE Safe Distance

Calculated MPE Safe Distance(13.56 MHz RFID)

Frequency (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/ cm²)
			(dBm)	(mW)	Log	Linear			
13.56	RFID	-31.47 ± 0.5	-30.97	0.0008	-	-	0.029	0.000 1	0.97

E.I.R.P[dBm] = Field strength (dBμV/m)-95.2= 63.73 dBμV/m – 95.2 = -31.47 dBm

Limit = $(180/f^2)$ =$(180/13.56^2)$ = 0.97 (mW/cm²)

According to above table, for 13.56 MHz, safe distance,

D = 0.282 * $\sqrt{(0.0008 * 1)/1.00}$ = 0.029 cm.

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 0.0008 * 1 / (4 * \pi * 20^2) = 0.000\ 1$$

Where:
S = Power Density,
P = Radiated Power (Field strength (dBμV/m)-95.2)
G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

Calculated MPE Safe Distance(Bluetooth LE)

Frequency (MHz)	Operating Mode	Max power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
		(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	Bluetooth LE	-9.91	0.10	-3.81	0.416	0.06	0.000 1	1.00

DATA for Intermodulation Transmit

According to above equation, the following result was obtained.

Simultaneous Transmission	Operating Mode	Power Density (mW/cm²)	Sum Ratios	Limit
Bluetooth LE + 13.56 MHz (RFID)	Bluetooth LE	0.000 1	0.0002	1.00
	13.56 MHz (RFID)	0.000 1		