EMF TEST REPORT

Report number		RAPA21-O-026
Applicant	Name	IOT WARE Co., Ltd
	Logo	N/A
	Address	#1303-1, Gasan Hansin IT Tower 2cha, 47, Digital-ro 9-gil, Geumcheno-gu, Seoul, Korea
Manufacturer	Name	IOT WARE Co., Ltd
	Address	#1303-1, Gasan Hansin IT Tower 2cha, 47, Digital-ro 9-gil, Geumcheno-gu, Seoul, Korea
Type of equipment		RFID reader
Basic model name		I9-2000N
Multi model name		U9-2000N
Serial number		N/A
FCC ID		2A2RE-I9-2000N
Test duration		September 3, 2021 to September 10, 2021
Date of issue		September 10, 2021
Total page		9 Pages (including this page)

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 general valid assessment of the features of the respective products of the mass-production.

September 10, 2021

Tested by MinGu Ji
Tester

September 10, 2021

Reviewed by Hyun Soo Lee
Executive Managing Director

Test Report Version History

Version	Date	Reason for revision
1.0	September 10, 2021	Original Document

CONTENTS

1. Description of EUT

1.1 Applicant

- Company name : IOT WARE Co., Ltd
- Address : #1303-1, Gasan Hansin IT Tower 2cha, 47, Digital-ro 9-gil, Geumcheno-gu, Seoul, Korea
- Contact person : Rack Eon Koo / Header of research center / rekoo@iotware.net
- Phone/Fax : +82-2-866-1150 / +82-2-866-0512

1.2 Manufacturer

- Company name : IOT WARE Co., Ltd
- Address : 76, Hanam-daero, Hanam-si, Gyeonggi-do, Republic of Korea
- Phone/Fax : +82-2-866-1150 / +82-2-866-0512

1.3 Basic description

- Product name : RFID reader
- Basic model name : I9-2000N
- Alternative model name : U9-2000N

1.4 General description

- Frequency Range : 911.3 MHz ~ 925.7 MHz
- Output Power : 29.8 dBm
- Modulation Type : ASK
- Number of Channel : 73
- Antenna Type : Pacth Antenna
- Antenna Gain : 2.45 dBi
- Power Supply : DC 12.0 V

Channel List

Number	Freq(MHz)	Number	Freq(MHz)	Number	Freq(MHz)
1	911.3	26	916.3	51	921.3
2	911.5	27	916.5	52	921.5
3	911.7	28	916.7	53	921.7
4	911.9	29	916.9	54	921.9
5	912.1	30	917.1	55	922.1
6	912.3	31	917.3	56	922.3
7	912.5	32	917.5	57	922.5
8	912.7	33	917.7	58	922.7
9	912.9	34	917.9	59	922.9
10	913.1	35	918.1	60	923.1
11	913.3	36	918.3	61	923.3
12	913.5	37	918.5	62	923.5
13	913.7	38	918.7	63	923.7
14	913.9	39	918.9	64	923.9
15	914.1	40	919.1	65	924.1
16	914.3	41	919.3	66	924.3
17	914.5	42	919.5	67	924.5
18	914.7	43	919.7	68	924.7
19	914.9	44	919.9	69	924.9
20	915.1	45	920.1	70	925.1
21	915.3	46	920.3	71	925.3
22	915.5	47	920.5	72	925.5
23	915.7	48	920.7	73	925.7
24	915.9	49	920.9		
25	916.1	50	921.1		

1.5 Alternative type(s)/model(s)

The Following Lists Consist to of the added model and their differences.

Model name	Differences	Tested
I9-2000N	Basic Model	▣
U9-2000N	It is the same as the I9-2000N model, only the model name is added.	□

2. General information of test

2.1 Test standards and results

Applied Standards : FCC Part 15 Subpart C		
Section	**Description of Test**	**Result**
15.247 (a) (1)	Carrier Frequency Separation	Pass
15.247 (a) (1) (iii)	Minimum Number of Hopping Channels	Pass
	Average Time of Occupancy	Pass
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Pass
	Radiated Emission which fall in the Restricted Band	Pass
15.247 (b) (1)	Maximum Peak Conducted Output Power	Pass
15.207	Conducted Limits	N/A
15.209	Radiated Emission Limits, General Requirement	Pass
15.203	Antenna Requirement	Pass

2.2 Description of EUT during the test

During the test, keep the EUT in continuously transmitting mode.
There was no mechanical or circuitry modification to improve RF and spurious characteristic, and any RF and spurious suppression device(s) was not added against the device tested.
The EUT was moved throughout the X, Y, and Z axis and worst case data was recorded in this report.

2.3 Test configuration

• Type of peripheral equipment used

Model	Manufacturer	Description	Connected to
I9-2000N	IOT WARE Co., Ltd	USB	EUT
6560b	HP	Notebook	EUT
PPP12D-S	Delta Electronics Ltd.	Power Adapter	Notebook
B05-24-12	Daygreen	DC IN	EUT

2.4 Test Facility

• FCC Registration No: 931589
• IC Company address code: 9355B
• RRA Designation Number: KR0027

• Place of Test
Anyang Test Site(RF Test Room)
#101 & B104 Anyang Megavalley, 268, Hagui-ro, Dongan-gu, Anyang-si, Gyeonggi-do, 14056, Korea

3. MAXIMUM PERMISSIBLE EXPOSURE

3.1 RF Exposure Calculation

KDB 447498 was used as the guidance.

3.2 EUT Description

Kind of EUT	RFID Reader
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 ■ Other : 902 MHz ~ 928 MHz
MAX. RF OUTPUT POWER	29.8 dBm
Antenna Gain	2.45 dBi
Exposure Evaluation Applied	■ MPE ☐ SAR Exclusion ☐ N/A

3.3 Calculated MPE Safe Distance

Operating Mode	Operating Freq. (MHz)	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
		(dBm)	(dBm)	(mW)	Log	Linear			
RFID	911.30	29.80 ± 0.5	30.5	1071.52	2.45	1.758	12.24	0.3747	1.00

According to above table, for 902 MHz ~ 908 MHz Band, safe distance,

$D = 0.282 * \sqrt{(1071.52 * 1.758)} / 1.00 = 12.24$ cm

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

$S = P * G / (4\pi * R^2) = 1071.52 * 1.758 / (4 * 3.14 * 20^2) = 0.374\ 7$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

지민구

Tested by MinGu Ji
/ Tester