



FCC RADIO EXPOSURE TEST REPORT

FCC ID : NKR-RAAME1
Equipment : Madesafe Gateway, Madesafe/IOT Gateway
Brand Name : Catapult TECH
Model Name : 815-00027, 815-00028, 815-00029
Applicant : Wistron NeWeb Corporation
20 Park Avenue II Hsinchu Science Park Hsinchu
Taiwan 308
Manufacturer : Wistron NeWeb Corporation
20 Park Avenue II Hsinchu Science Park Hsinchu
Taiwan 308
Standard : 47 CFR Part 2.1091

The product was received on Jan. 28, 2019, and testing was started from Jun. 01, 2019 and completed on Jun. 19, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Sandy Chuang



1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK) LE: GFSK

1.2 Table for Multiple Listing

The difference for each equipment name/model name is shown as below:

EUT	1	2	3
Equipment Name	Madesafe Gateway	Madesafe/IOT Gateway	Madesafe Gateway
Model Name	815-00027	815-00028	815-00029
Contain certified Module (Zigbee function only)	-	V (FCC ID: W7Z-WD907102)	-
Bluetooth Antenna	Internal	Internal	External
WIFI / Bluetooth Function	V	V	V

1.3 Testing Location

Testing Location		
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086B with Industry Canada.

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;D1D	1.20	22.09	23.29	0.50	23.79	0.23933	20	0.04761	1.00000
5.2G;D1D	4.02	20.78	24.80	0.50	25.30	0.33884	20	0.06741	1.00000
5.8G;D1D	4.02	20.59	24.61	0.50	25.11	0.32434	20	0.06453	1.00000
2.4G;BT-BR	1.25	3.47	4.72	0.50	5.22	0.00333	20	0.00066	1.00000
2.4G;F1D	1.25	11.87	13.12	0.50	13.62	0.02301	20	0.00458	1.00000

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz+WLAN 5GHz+Bluetooth

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;D1D	1.20	22.09	23.29	0.50	23.79	0.23933	20	0.04761	1.00000	0.04761
5.2G;D1D	4.02	20.78	24.80	0.50	25.30	0.33884	20	0.06741	1.00000	0.06741
2.4G;F1D	1.25	11.87	13.12	0.50	13.62	0.02301	20	0.00458	1.00000	0.00458
									Sum Ratio	0.1196
									Ratio Limit	1

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz+WLAN 5GHz+Bluetooth+Zigbee (FCC ID: W7Z-WD907102)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;D1D	1.20	22.09	23.29	0.50	23.79	0.23933	20	0.04761	1.00000	0.04761
5.2G;D1D	4.02	20.78	24.80	0.50	25.30	0.33884	20	0.06741	1.00000	0.06741
2.4G;F1D	1.25	11.87	13.12	0.50	13.62	0.02301	20	0.00458	1.00000	0.00458
Zigbee	1.60	19.00	20.60	0.50	21.10	0.12882	20	0.02563	1.00000	0.02563
									Sum Ratio	0.1452
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

—————THE END—————