RF Exposure Evaluation Report

Equipment	: DHUR-AZ68 11a/b/g/n/ac 2x2 module
Brand Name	: WNC
Model No.	: DHUR-AZ68
FCC ID	: NKR-DHURAZ68
Standard	: 47 CFR Part 2.1091
Applicant	: Wistron NeWeb Corporation 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan
Manufacturer	: Wistron NeWeb Corporation 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan

The product sample received on Oct. 20, 2017 and completely tested on Feb. 07, 2018. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091 and pass the limit.

Cliff Chang
SPORTON INTERNATIONAL INC.

Testing Laboratory
1190

TABLE OF CONTENTS

1 GENERAL DESCRIPTION 4
1.1 EUT General Information 4
1.2 Antenna Information 4
1.3 Testing Location 5
2 MAXIMUM PERMISSIBLE EXPOSURE 6
2.1 Limit of Maximum Permissible Exposure 6
2.2 MPE Calculation Method 6
2.3 Calculated Result and Limit 7
PHOTOGRAPHS OF EUT V01

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA7D1249	Rev. 01	Initial issue of report	Feb. 12, 2018

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 / π/4-DQPSK / 8DPSK) LE: DSSS (GFSK)

1.2 Antenna Information

Set	Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		
							WLAN 2.4GHz	WLAN 5GHz	Bluetooth
1	1	1	WNC	-	Printed Antenna	N/A	5.31	5.92	-
	2	2	WNC	-	Printed Antenna	N/A	5.26	5.91	-
2	3	1	WNC	-	PIFA Antenna	I-PEX	1.54	3.52	-
	4	2	WNC	-	PIFA Antenna	I-PEX	0.15	2.83	-
3	5	1	WNC	-	PIFA Antenna	I-PEX	3.56	5.59	-
	6	2	WNC	-	PIFA Antenna	I-PEX	2.14	5.08	-
4	7	1	WNC	-	PIFA Antenna	I-PEX	-	-	3.90
5	8	1	WNC	-	PIFA Antenna	I-PEX	-	-	1.18
6	9	1	WNC	-	PIFA Antenna	I-PEX	-	-	0.01

Note: The EUT has six set antennas, and they have total of nine antennas.

For 2.4GHz / 5GHz WLAN function (2TX/2RX):

Antenna set 1~3 support 2.4GHz / 5GHz WLAN function.

Port 1 and Port 2 could transmit/receive simultaneously.

For Bluetooth function (1TX/1RX):

Antenna set 4~6 support Bluetooth function.

Antenna set 4~6 are the same type antennas, only the higher gain antenna “Set 4” was tested.

Only Port 1 can be used as transmitting/receiving.

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 4086D 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/ cm²)	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/ cm²)	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 (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

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

For EUT with Set 1 antennas:

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	5.31	23.43	28.74	0.50	29.24	0.83946	20	0.16708	1.00000
5.2G;D1D	5.92	23.82	29.74	0.50	30.24	1.05682	20	0.21025	1.00000
5.8G;D1D	5.92	25.73	31.65	0.50	32.15	1.64059	20	0.32655	1.00000

For EUT with Set 2 antennas:

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	1.54	24.88	26.42	0.50	26.92	0.49204	20	0.09793	1.00000
5.2G;D1D	3.52	23.82	27.34	0.50	27.84	0.60814	20	0.12099	1.00000
5.8G;D1D	3.52	25.93	29.45	0.50	29.95	0.98855	20	0.19676	1.00000

For EUT with Set 3 antennas:

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;G1D	3.56	25.32	28.88	0.50	29.38	0.86696	20	0.17256	1.00000
5.2G;D1D	5.59	23.82	29.41	0.50	29.91	0.97949	20	0.19486	1.00000
5.8G;D1D	5.59	25.93	31.52	0.50	32.02	1.59221	20	0.31692	1.00000

For EUT with Set 4 antennas:

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;BT-LE	3.90	6.63	10.53	0.50	11.03	0.01268	20	0.00252	1.00000
2.4G;BT-BR	3.90	6.84	10.74	0.50	11.24	0.01330	20	0.00265	1.00000
2.4G;BT-EDR	3.90	6.92	10.82	0.50	11.32	0.01355	20	0.00269	1.00000

Simultaneous Transmission Analysis Mode:

1. EUT with Set 1 and Set 4 antennas (2.4GHz WLAN + Bluetooth function)

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	5.31	23.43	28.74	0.74817	20	0.5	29.24	0.83946	0.16708	1
2.4G;BT-EDR	3.90	6.92	10.82	0.01208	20	0.5	11.32	0.01355	0.00269	1
									Sum Ratio	0.16977
									Ratio Limit	1

2. EUT with Set 1 and Set 4 antennas (5GHz WLAN + Bluetooth function)

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)
5.8G;D1D	5.92	25.73	31.65	1.46218	20	0.5	32.15	1.64059	0.32655	1
2.4G;BT-EDR	3.90	6.92	10.82	0.01208	20	0.5	11.32	0.01355	0.00269	1
									Sum Ratio	0.32924
									Ratio Limit	1

3. EUT with Set 2 and Set 4 antennas (2.4GHz WLAN + Bluetooth function)

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	1.54	24.88	26.42	0.43853	20	0.5	26.92	0.49204	0.09793	1
2.4G;BT-EDR	3.90	6.92	10.82	0.01208	20	0.5	11.32	0.01355	0.00269	1
									Sum Ratio	0.10062
									Ratio Limit	1

4. EUT with Set 2 and Set 4 antennas (5GHz WLAN + Bluetooth function)

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)
5.8G;D1D	3.52	25.93	29.45	0.88105	20	0.5	29.95	0.98855	0.19676	1
2.4G;BT-EDR	3.90	6.92	10.82	0.01208	20	0.5	11.32	0.01355	0.00269	1
									Sum Ratio	0.19945
									Ratio Limit	1

5. EUT with Set 3 and Set 4 antennas (2.4GHz WLAN + Bluetooth function)

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;G1D	3.56	25.32	28.88	0.77268	20	0.5	29.38	0.86696	0.17256	1
2.4G;BT-EDR	3.90	6.92	10.82	0.01208	20	0.5	11.32	0.01355	0.00269	1
									Sum Ratio	0.17525
									Ratio Limit	1

6. EUT with Set 3 and Set 4 antennas (5GHz WLAN + Bluetooth function)

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)
5.8G;D1D	5.59	25.93	31.52	1.41906	20	0.5	32.02	1.59221	0.31692	1
2.4G;BT-EDR	3.90	6.92	10.82	0.01208	20	0.5	11.32	0.01355	0.00269	1
									Sum Ratio	0.31961
									Ratio Limit	1