



RF Exposure Evaluation Report

APPLICANT : Wistron NeWeb Corporation
EQUIPMENT : Mini board wi-fi edition
BRAND NAME : WNC
MODEL NAME : PW8Q7
FCC ID : NKR-PW8Q7A
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

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Table of Contents

1. ADMINISTRATION DATA	4
1.1. Testing Laboratory	4
1.2. Applicant	4
1.3. Manufacturer	4
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	5
3. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	6
4. CONDUCTED RF OUTPUT POWER (UNIT: DBM).....	7
5. RF EXPOSURE LIMIT INTRODUCTION	9
6. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	10
6.1. Standalone Power Density Calculations	10



Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA3D0929	Rev. 01	Initial issue of report	Jan. 03, 2014



1. Administration Data

1.1. Testing Laboratory

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

1.2. Applicant

Company Name	Wistron NeWeb Corporation
Address	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C

1.3. Manufacturer

Company Name	Wistron NeWeb Corporation
Address	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Mini board wi-fi edition
Brand Name	WNC
Model Name	PW8Q7
FCC ID	NKR-PW8Q7A
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5580 MHz and 5660 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	<ul style="list-style-type: none"> • WLAN 2.4GHz 802.11b/g/n (HT20) • WLAN 5GHz 802.11a/n (HT20/HT40) • Bluetooth v3.0 + EDR/Bluetooth v4.0
Antenna Type	WLAN: Monopole Antenna Bluetooth: Monopole Antenna
HW Version	B1
SW Version	msm8960-eng 4.3 test-keys Px8Q7_v10.00.140040_2310025.20140102.034452
EUT Stage	Production Unit

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. 5600 MHz ~ 5650 MHz is notched.



3. Maximum RF average output power among production units

Maximum Target Average Power for Production Unit (dBm)					
Mode/Band	11a	11b	11g	11n-HT20	11n-HT40
WLAN 2.4GHz Band		16.5	17.5	17.5	
WLAN 5.2GHz Band	15			15	15
WLAN 5.3GHz Band	17			17	17.5
WLAN 5.5GHz Band	17			17	17.5
WLAN 5.8GHz Band	17.5			18	17

Mode / Band	Maximum Target Average Power for Production Unit (dBm)			
	1Mbps (GFSK)	2Mbps ($\pi/4$ -DQPSK)	3Mbps (8-DPSK)	BT4.0-LE (GFSK)
Bluetooth	9	8	8	2

4. Conducted RF Output Power (Unit: dBm)

<WLAN 2.4GHz Conducted Power>

Channel	Frequency (MHz)	2.4GHz 802.11b RF Power (dBm)			
		DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412	16.00	16.06	15.98	16.10
CH 06	2437	16.31	16.30	16.26	16.30
CH 11	2462	15.89	15.86	16.18	16.07

Channel	Frequency (MHz)	2.4GHz 802.11g RF Power (dBm)							
		OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 01	2412	11.97	12.09	12.07	12.18	12.31	12.20	12.24	12.11
CH 06	2437	17.31	17.16	17.22	17.09	17.01	16.17	15.34	13.63
CH 11	2462	12.33	12.36	12.33	12.30	12.35	12.21	12.47	12.48

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 RF Power (dBm)							
		OFDM Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	12.42	11.96	12.17	12.09	12.14	12.36	12.21	12.24
CH 06	2437	17.21	17.17	16.74	16.27	15.37	15.54	14.36	13.64
CH 11	2462	12.16	12.12	12.21	12.33	12.06	12.34	12.18	12.26

<Bluetooth Conducted Power>

Channel	Frequency (MHz)	Bluetooth Average Power (dBm)								
		Data Rate								
		DH1	DH3	DH5	2DH1	2DH3	2DH5	3DH1	3DH3	3DH5
CH 00	2402	8.82	8.46	8.88	7.73	7.25	7.42	7.92	7.32	7.63
CH 39	2441	8.49	8.14	8.42	6.92	6.65	6.56	6.92	7.20	7.03
CH 78	2480	8.71	8.34	8.73	7.10	6.95	7.31	7.48	7.34	7.33

Channel	Frequency (MHz)	Average power (dBm)
		Mode
		BT v4.0 LE, GFSK
CH 00	2402	1.66
CH 19	2440	0.90
CH 39	2480	0.83



<WLAN 5GHz Conducted Power>

Channel	Frequency (MHz)	5GHz 802.11a Average Output Power (dBm)							
		Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 36	5180	14.92	14.79	14.87	14.84	14.81	14.91	14.75	14.84
CH 44	5220	14.46	14.41	14.42	14.49	14.42	14.56	14.60	14.68
CH 48	5240	14.68	14.74	14.61	14.69	14.75	14.63	14.67	14.88
CH 052	5260	16.67	16.74	16.52	16.61	16.67	15.79	15.73	16.32
CH 060	5300	16.88	16.83	16.72	16.73	16.73	15.81	15.72	16.26
CH 064	5320	15.85	15.52	15.69	15.64	15.76	15.64	15.76	15.66
CH 100	5500	16.87	16.75	16.71	16.69	16.56	15.79	15.72	16.09
CH 116	5580	16.54	16.57	16.52	16.53	16.52	15.75	15.57	15.81
CH 140	5700	15.50	15.39	15.32	15.41	15.28	15.15	15.27	15.29
CH 149	5745	17.29	17.24	17.23	16.38	16.30	16.23	16.26	14.78
CH 157	5785	16.90	16.82	16.74	16.73	16.69	15.69	15.81	15.45
CH 165	5825	16.99	17.06	17.00	16.80	16.74	15.93	16.02	15.44

Channel	Frequency (MHz)	5GHz 802.11n HT20 Average Output Power (dBm)							
		Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	14.98	14.96	14.94	14.90	14.75	14.80	14.79	14.76
CH 44	5220	14.55	14.62	14.63	14.53	14.51	14.52	14.55	14.39
CH 48	5240	14.74	14.78	14.85	14.74	14.68	14.70	14.68	14.58
CH 052	5260	16.81	16.79	16.79	16.69	16.71	16.03	16.04	14.89
CH 060	5300	16.71	16.77	16.74	16.74	16.66	15.98	15.96	14.60
CH 064	5320	15.80	15.79	15.62	15.53	15.51	15.60	15.54	15.56
CH 100	5500	16.89	16.87	16.72	16.62	16.88	16.31	15.87	14.66
CH 116	5580	16.46	16.60	16.63	16.38	16.61	16.27	15.72	14.51
CH 140	5700	14.47	14.25	14.24	13.86	14.07	14.16	14.04	14.19
CH 149	5745	17.51	17.44	17.42	16.81	16.92	16.71	16.38	14.66
CH 157	5785	16.91	17.02	17.23	17.14	17.33	16.21	15.98	15.08
CH 165	5825	17.02	17.26	17.50	17.21	17.36	16.41	16.15	15.12

Channel	Frequency (MHz)	5GHz 802.11n HT40 Average Output Power (dBm)							
		Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	11.99	11.79	11.87	11.36	11.24	11.57	11.39	11.16
CH 46	5230	14.73	14.53	14.35	14.36	14.62	14.37	14.14	14.05
CH 54	5270	17.23	17.20	17.22	16.13	16.20	16.18	15.97	14.93
CH 62	5310	12.71	12.98	12.76	12.87	12.64	12.82	12.80	12.82
CH 102	5510	13.68	13.37	13.44	13.36	13.20	13.59	13.26	13.21
CH 110	5550	17.19	17.07	17.22	16.74	16.66	15.81	15.50	14.58
CH 134	5670	17.37	17.31	17.35	17.32	17.22	15.84	15.80	14.81
CH 151	5755	16.89	16.86	16.90	16.39	16.39	15.92	15.79	14.76
CH 159	5795	16.91	16.88	16.87	16.51	16.46	16.01	15.87	14.95



5. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	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				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

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:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



6. Radio Frequency Radiation Exposure Evaluation

6.1. Standalone Power Density Calculations

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP/EIRP (W)	Maximum output power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
WLAN2.4GHz 802.11b	2412.0	0.0	16.5	0.04	1.0	44.67	0.01	1.00
WLAN2.4GHz 802.11g	2412.0	0.0	17.5	0.06	1.0	56.23	0.01	1.00
WLAN2.4GHz 802.11n-HT20	2412.0	0.0	17.5	0.06	1.0	56.23	0.01	1.00
Bluetooth	2402.0	0.0	9.0	0.01	1.0	7.94	0.00	1.00
WLAN5.2GHz 802.11a	5180.0	1.8	15.0	0.05	0.04	47.86	0.01	1.00
WLAN5.3GHz 802.11a	5260.0	1.8	17.0	0.08	1.0	75.86	0.02	1.00
WLAN5.5GHz 802.11a	5500.0	1.8	17.0	0.08	1.0	75.86	0.02	1.00
WLAN5.8GHz 802.11a	5700.0	1.8	17.5	0.09	1.0	85.11	0.02	1.00
WLAN5.2GHz 802.11n-HT20	5180.0	1.8	15.0	0.05	0.2	47.86	0.01	1.00
WLAN5.3GHz 802.11n-HT20	5260.0	1.8	17.0	0.08	1.0	75.86	0.02	1.00
WLAN5.5GHz 802.11n-HT20	5500.0	1.8	17.0	0.08	1.0	75.86	0.02	1.00
WLAN5.8GHz 802.11n-HT20	5700.0	1.8	18.0	0.10	1.0	95.50	0.02	1.00
WLAN5.2GHz 802.11n-HT40	5180.0	1.8	15.0	0.05	0.2	47.86	0.01	1.00
WLAN5.3GHz 802.11n-HT40	5260.0	1.8	17.5	0.09	0.4	85.11	0.02	1.00
WLAN5.5GHz 802.11n-HT40	5500.0	1.8	17.5	0.09	0.4	85.11	0.02	1.00
WLAN5.8GHz 802.11n-HT40	5700.0	1.8	17.0	0.08	1.0	75.86	0.02	1.00

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

Conclusion: According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.