



FCC RF Exposure Evaluation Report

Equipment Name : 802.11n WiFi Router
Model Number : C1100T
Product Code : BAC1100T
Filing Type : New Application
Trade Name : technicolor
FCC ID : RSE-C1100T
Standard : 47 CFR Part 2.1091
Applicant : Technicolor Delivery Technologies Belgium
Prins Boudewijnlaan 47
B-2650 Edegem
Belgium

The product sample received on Jul. 24, 2015 and completely tested on Aug. 20, 2015. 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.

Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.


Sam Chen
SPORTON INTERNATIONAL INC.





TABLE OF CONTENTS

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



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA561774	Rev. 01	Initial issue of report	Sep. 23, 2015



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)

1.2 Testing Location

Testing Location						
<input type="checkbox"/>	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
<input checked="" type="checkbox"/>	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

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:

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

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

Antenna Type: Print Antenna

<Ant. 2 connector >

Conducted Power for IEEE 802.11b (1TX): 22.09 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2412	1.92	1.5560	22.0900	161.8080	0.050113	1	Complies

Note:

- G = Antenna Gain (numeric) >> $10^{(1.92/10)} = 1.5560$
- P = dBm to mW >> $10^{(22.09/10)} = 161.8080$ mW
- D = Distance >> 0.2 m
- $E = \sqrt{(30 * P * G)} / d = \sqrt{(30 * 251.7677)} / 0.2 = 434.5409$ V/m
- PD(S) = $(E^2/377)/10000 = ((434.5409^2)/377)/10000 = 0.0501$ mW/cm²

Conducted Power for IEEE 802.11b (1TX): 22.76 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2437	1.96	1.5704	22.7600	188.7991	0.059013	1	Complies

Note:

- G = Antenna Gain (numeric) >> $10^{(1.96/10)} = 1.5704$
- P = dBm to mW >> $10^{(22.76/10)} = 188.7991$ mW
- D = Distance >> 0.2 m
- $E = \sqrt{(30 * P * G)} / d = \sqrt{(30 * 296.4831)} / 0.2 = 471.5531$ V/m
- PD(S) = $(E^2/377)/10000 = ((469.3865^2)/377)/10000 = 0.0590$ mW/cm²



Conducted Power for IEEE 802.11b (1TX): 21.09 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2462	2.04	1.5996	21.0900	128.5287	0.040921	1	Complies

Note:

1. $G = \text{Antenna Gain (numeric)} \gg 10^{(2.04/10)} = 1.5996$
2. $P = \text{dBm to mW} \gg 10^{(21.09/10)} = 128.5287 \text{ mW}$
3. $D = \text{Distance} \gg 0.2 \text{ m}$
4. $E = \sqrt{(30 * P * G) / d} = \sqrt{(30 * 205.5891) / 0.2} = 392.6726 \text{ V/m}$
5. $PD(S) = (E^2/377) / 10000 = ((392.6726^2) / 377) / 10000 = 0.0409 \text{ mW/cm}^2$



<Ant. 2 connector >

Conducted Power for IEEE 802.11n 20MHz MCS0 (1TX): 15.19 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2412	1.92	1.5560	15.1900	33.0370	0.010232	1	Complies

Note:

- G = Antenna Gain (numeric) >> 10^{^(1.92/10)} = 1.5560
- P = dBm to mW >> 10^{^(15.19/10)} = 33.0370 mW
- D = Distance >> 0.2 m
- E = $\sqrt{(30 * P * G) / d} = \sqrt{(30 * 51.4044) / 0.2} = 196.3499$ V/m
- PD(S) = (E²/377)/10000 = ((196.3499²)/377)/10000 = 0.0102 mW/cm²

Conducted Power IEEE 802.11n 20MHz MCS0 (1TX): 18.40 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2437	1.96	1.5704	18.4000	69.1831	0.021625	1	Complies

Note:

- G = Antenna Gain (numeric) >> 10^{^(1.96/10)} = 1.5704
- P = dBm to mW >> 10^{^(18.40/10)} = 69.1831 mW
- D = Distance >> 0.2 m
- E = $\sqrt{(30 * P * G) / d} = \sqrt{(30 * 108.6426) / 0.2} = 285.4504$ V/m
- PD(S) = (E²/377)/10000 = ((285.4504²)/377)/10000 = 0.0216 mW/cm²



Conducted Power for IEEE 802.11n 20MHz MCS0 (1TX): 16.07 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2462	2.04	1.5996	16.0700	40.4576	0.012881	1	Complies

Note:

1. $G = \text{Antenna Gain (numeric)} \gg 10^{(2.04/10)} = 1.5996$
2. $P = \text{dBm to mW} \gg 10^{(16.07/10)} = 40.4576 \text{ mW}$
3. $D = \text{Distance} \gg 0.2 \text{ m}$
4. $E = \sqrt{(30 * P * G) / d} = \sqrt{(30 * 64.7143) / 0.2} = 220.3082 \text{ V/m}$
5. $PD(S) = (E^2/377) / 10000 = ((220.3082^2) / 377) / 10000 = 0.0129 \text{ mW/cm}^2$



Antenna Type: Print Antenna

<MCS0 - Ant. 1 + Ant. 2 connector >

Conducted Power for IEEE 802.11n 20MHz MCS0, CDD (2TX): 21.86 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2412	2.46	1.7620	17.8645	61.1569	0.021448	1	Complies

Note:

- G = Antenna Gain (numeric) >> 10^(2.46/10) = 1.7620
- P = dBm to mW >> 10^(21.86/10) = 153.4617 mW
- D = Distance >> 0.2 m
- $E = \sqrt{(30 * P * G)} / d = \sqrt{(30 * 270.3958)} / 0.2 = 450.3297 \text{ V/m}$
- $PD(S) = (E^2/377)/10000 = ((450.3297^2)/377)/10000 = 0.0538 \text{ mW/cm}^2$

Conducted Power for IEEE 802.11n 20MHz MCS0, CDD (2TX): 23.38 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2437	2.27	1.6866	21.9520	156.7457	0.052619	1	Complies

Note:

- G = Antenna Gain (numeric) >> 10^(2.27/10) = 1.6866
- P = dBm to mW >> 10^(23.38/10) = 217.7710 mW
- D = Distance >> 0.2 m
- $E = \sqrt{(30 * P * G)} / d = \sqrt{(30 * 367.2823)} / 0.2 = 524.8445 \text{ V/m}$
- $PD(S) = (E^2/377)/10000 = ((524.8445^2)/377)/10000 = 0.0731 \text{ mW/cm}^2$



Conducted Power for IEEE 802.11n 20MHz MCS0, CDD (2TX): 22.97 dBm

Test Mode	Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4G	2462	2.61	1.8239	18.2704	67.1491	0.024378	1	Complies

Note:

1. $G = \text{Antenna Gain (numeric)} \gg 10^{(2.61/10)} = 1.8239$
2. $P = \text{dBm to mW} \gg 10^{(22.97/10)} = 198.1527 \text{ mW}$
3. $D = \text{Distance} \gg 0.2 \text{ m}$
4. $E = \sqrt{(30 * P * G)} / d = \sqrt{(30 * 361.4099)} / 0.2 = 520.6317 \text{ V/m}$
5. $PD(S) = (E^2/377)/10000 = ((520.6317^2)/377)/10000 = 0.0719 \text{ mW/cm}^2$