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Certificate No.: CB10401008

Maximum Permissible Exposure

Applicant's company	COMPAL BROADBAND NETWORKS, INC.
Applicant Address	13F-1, No.1, Taiyuan 1st St., Zhubei City, Hsinchu County 30288, Taiwan, R.O.C.
FCC ID	O2U-CH6643
Manufacturer's company	COMPAL BROADBAND NETWORKS, INC.
Manufacturer Address	13F-1, No.1, Taiyuan 1st St., Zhubei City, Hsinchu County 30288, Taiwan, R.O.C.

Product Name	Cable modem
Brand Name	cbn
Model Name	CH6643E
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
EUT Freq. Range	2400 ~ 2483.5MHz / 5150 ~ 5250MHz / 5725 ~ 5850MHz
Received Date	Sep. 18, 2014
Final Test Date	Dec. 30, 2014
Submission Type	Original Equipment

Sam Chen

SPORTON INTERNATIONAL INC.



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History of This Assessment Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA491841	Rev. 01	Initial issue of report	Jan. 16, 2015

1. MAXIMUM PERMISSIBLE EXPOSURE

1.1. Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(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

1.2. MPE Calculation Method

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

E = Electric field (V/m)

P = Peak 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

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

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

1.3. Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For 5GHz UNII Band:

Antenna Type : PCB Antenna

Conducted Power for IEEE 802.11n MCS8 HT20: 23.56 dBm

Distance (m)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
			(dBm)	(mW)			
0.2	6.30	4.2658	23.5621	227.0951	0.192823	1	Complies

For 2.4GHz Band:

Antenna Type : PCB Antenna

Conducted Power for IEEE 802.11n MCS8 HT40: 20.47 dBm

Distance (m)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
			(dBm)	(mW)			
0.2	2.68	1.8535	20.4709	111.4516	0.041118	1	Complies

Conclusion:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is $0.041118 / 1 + 0.192823 / 1 = 0.233941$, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.