APPENDIX I
RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(i), 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 of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

EUT Specification

EUT	3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router
Model	BiPAC 7820NZ
Data Applies To	BiPAC 7820NZL ; BiPAC 6820NZ ; BiPAC 6820NZL ; BEC 7820NZ ; BEC 7820NZL ; BEC 6820NZ ; BEC 6820NZL
Frequency band (Operating)	☒ 802.11b/g/gn HT20: 2.412GHz ~ 2.462GHz ☐ 802.11gn HT40: 2.422GHz ~ 2.452GHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna Specification	2.4GHz: Antenna 0 Gain : 2.90 dBi (Numeric gain 1.95) 2.4GHz: Antenna 1 Gain : 3.50 dBi (Numeric gain 2.24)
Maximum output power	IEEE 802.11b Mode: 19.72 dBm (93.756 mW) IEEE 802.11g Mode: 27.03 dBm (504.661 mW) IEEE 802.11gn HT 20 Mode: 27.96 dBm (625.173 mW) IEEE 802.11gn HT 40 Mode: 24.79 dBm (301.301 mW)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2014/06/25	Initial Issue	ALL	Gloria Chang

TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \dfrac{\sqrt{30 \times P \times G}}{d}$ & $S = \dfrac{E^2}{3770}$

Where   E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \textbf{Equation 1}$$

Where   d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

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Maximum Permissible Exposure

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where　P = Power in mW

*　　　　G = Numeric antenna gain*

*　　　　S = Power density in mW / cm^2*

IEEE 802.11b mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
2412~2462	93.756	1.95	20	0.0364	1

IEEE 802.11g mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
2412~2462	504.66	1.95	20	0.1958	1

IEEE 802.11gn HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
2412~2462	625.17	2.24	20	0.2787	1

IEEE 802.11gn HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
2412~2462	301.30	2.24	20	0.1343	1