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	450Mbps Wireless N Dual Band USB Adapter
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☐ 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 diversity	☐ Single antenna
	☒ Multiple antennas
	  ☐ Tx diversity
	  ☐ Rx diversity
	  ☒ Tx/Rx diversity

Max. output power	EEE 802.11b mode: 18.03 dBm (63.5331mW) IEEE 802.11g mode: 15.09 dBm (32.2849mW) IEEE 802.11n HT 20 MHz mode: 14.89 dBm (30.8319mW) IEEE 802.11n HT 40 MHz mode: 14.76 dBm (29.9226mW)
Antenna gain (Max)	2 dBi (Numeric gain: 1.58)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A
Remark: *The maximum output power is <u>18.03dBm (63.5331mW) at 2412MHz (with 1.58 numeric antenna gain</u>.)*	

TEST RESULTS

No non-compliance noted.

MPE EVALUATION

No non-compliance noted

Calculation

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

$\quad\quad\quad$ *Where* $\quad$ *E = Field strength in Volts / meter*

$\quad\quad\quad\quad\quad\quad$ *P = Power in Watts*

$\quad\quad\quad\quad\quad\quad$ *G = Numeric antenna gain*

$\quad\quad\quad\quad\quad\quad$ *d = Distance in meters*

$\quad\quad\quad\quad\quad\quad$ *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:

$\quad\quad\quad$ *P (mW) = P (W) / 1000 and*

$\quad\quad\quad$ *d (cm) = d(m) / 100*

Yields

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

$\quad\quad\quad$ *Where* $\quad$ *d = Distance in cm*

$\quad\quad\quad\quad\quad\quad$ *P = Power in mW*

$\quad\quad\quad\quad\quad\quad$ *G = Numeric antenna gain*

$\quad\quad\quad\quad\quad\quad$ *S = Power density in mW / cm^2*

Maximum Permissible Exposure

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

Yields

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

Where $\quad$ *P = Power in mW*

$\quad\quad\quad\quad$ *G = Numeric antenna gain*

$\quad\quad\quad\quad$ *S = Power density in mW / cm^2*

IEEE 802.11b mode:

EUT output power = 63.5331 mW

Numeric Antenna gain = 1.58

→ *Power density = 0.1117 mW / cm²*

IEEE 802.11g mode:

EUT output power = 32.2849 mW

Numeric Antenna gain = 1.58

→ *Power density = 0.0871 mW / cm²*

IEEE 802.11n HT 20 MHz mode:

EUT output power = 30.8319 mW

Numeric Antenna gain = 1.58

→ *Power density = 0.0886 mW / cm²*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 29.9226 mW

Numeric Antenna gain = 1.58

→ *Power density = 0.0199 mW / cm²*

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)