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 Dual Band Wireless N 4-Port Media Bridge
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: 20.67dBm (116.68mW) IEEE 802.11g mode: 26.59 dBm (456.04mW) IEEE 802.11n HT 20 MHz mode: 28.86 dBm (769.13mW) IEEE 802.11n HT 40 MHz mode: 28.70 dBm (741.31mW)
Antenna gain (Max)	Gain: 2 dBi (Numeric gain: 1.58) Total ANT= 10*LOG(((10^(ANT0/20)+10^(ANT1/20))^2) +10^(ANT2/20))^2)/3) 2412 ~ 2462 MHz: 6.77 dBi (Numeric gain: 4.75)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A
Remark: *The maximum output power is 28.86 dBm (769.13mW) at 2442MHz (with 4.75 numeric antenna gain.)*	

TEST RESULTS

No non-compliance noted.

MPE EVALUATION

No non-compliance noted.

Calculation

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

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

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

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

Maximum Permissible Exposure

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

Yields

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

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

IEEE 802.11b mode:

EUT output power = 116.68 mW

Numeric Antenna gain = 1.58

→ *Power density = 0.03669 mW / cm^2*

IEEE 802.11g mode:

EUT output power = 456.04 mW

Numeric Antenna gain = 1.58

→ *Power density = 0.14339 mW / cm^2*

IEEE 802.11n HT 20 MHz mode:

EUT output power = 769.13 mW

Numeric Antenna gain = 4.75

→ *Power density = 0.72702 mW / cm^2*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 741.13 mW

Numeric Antenna gain = 4.75

→ *Power density = 0.70055 mW / cm^2*

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)

EUT	450Mbps Dual Band Wireless N 4-Port Media Bridge
Frequency band (Operating)	☐ WLAN: 2.412GHz ~ 2.462GHz ☒ WLAN: 5.725GHz ~ 5.850GHz ☐ Others: Bluetooth: 2.402GHz ~ 2.480GHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm2) ☒ General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☒ Tx/Rx diversity
Max. output power	IEEE 802.11a mode: 18.52 dBm (71.12mW) IEEE 802.11n HT 20 MHz Channel mode: 21.57 dBm (143.55mW) IEEE 802.11n HT 40 MHz mode: 20.90 dBm (123.03mW)
Antenna gain (Max)	Gain: 1 dBi (Numeric gain: 1.26) Total ANT= 10*LOG(((10^(ANT0/20)+10^(ANT1/20))^2) +10^(ANT2/20))^2)/3) 5.725~5.850 GHz: 5.77 dBi (Numeric gain: 3.78)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A
Remark: *The maximum output power is 21.57 dBm(143.55mW)at 5825MHz (with 3.78 numeric antenna gain.*	

TEST RESULTS

No non-compliance noted.

MPE EVALUATION

No non-compliance noted.

Calculation

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

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

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

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

Maximum Permissible Exposure

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

Yields

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

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

IEEE 802.11a mode:

EUT output power = 71.12 mW

Numeric Antenna gain = 1.26

→ *Power density = 0.01783mW / cm^2*

IEEE 802.11n HT 20 MHz mode:

EUT output power = 143.55 mW

Numeric Antenna gain = 3.78

→ *Power density = 0.10799 mW / cm^2*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 123.03 mW

Numeric Antenna gain = 3.78

→ *Power density = 0.09255 mW / cm^2*

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)