APPENDIX I
RADIO FREQUENCY EXPOSURE

LIMIT

According to RSS-Gen §5.5, before equipment certification is granted, the applicable requirements of RSS-102 shall be met.

EUT Specification

EUT	Wireless-N Selectable-Band Access Point with PoE
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☐ 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	**Mode 1:** 2.4GHz: IEEE 802.11n HT 20 MHz mode: 25.04 dBm(319.15mW) IEEE 802.11n HT 40 MHz mode: 25.57 dBm(360.57mW) **Mode 2:** 2.4GHz: IEEE 802.11n HT 20 MHz mode: 24.91 dBm(309.74mW) IEEE 802.11n HT 40 MHz mode: 25.50 dBm(354.81mW) **Mode 3:** IEEE 802.11b mode: 21.76 dBm(149.96mW) IEEE 802.11g mode: 24.15 dBm(260.01mW) IEEE 802.11n HT 20 MHz mode: 25.10 dBm(323.59mW) IEEE 802.11n HT 40 MHz mode: 25.36 dBm(343.55mW)
Antenna Specification	Antenna Type: PIFA Antenna IEEE 802.11b/g mode: Antenna 1: 4.32 dBi Antenna 2: 4.67 dBi Antenna 3: 3.96 dBi MIMO: $10 \times LOG(((10^{(4.32/20)}+10^{(4.67/20)})^2)/2) = 7.51$ dBi (Numeric gain: 5.63)

Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:
The maximum output power is 25.57dBm (360.571mW) at 2442MHz (with 5.63 numeric antenna gain.)

TEST RESULTS

No non-compliance noted.

MPE EVALUATION

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

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

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

Mode 1

IEEE 802.11n HT 20 MHz mode:

EUT output power = 319.15 mW

Numeric Antenna gain = 5.63

→ *Power density = 0.3575 mW / cm2*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 360.57mW

Numeric Antenna gain = 5.63

→ *Power density = 0.4039 mW / cm2*

Mode 2

IEEE 802.11n HT 20 MHz mode:

EUT output power = 309.74 mW

Numeric Antenna gain = 5.63

→ *Power density = 0.3470 mW / cm2*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 354.81mW

Numeric Antenna gain = 5.63

→ *Power density = 0.3975 mW / cm2*

Mode 3

IEEE 802.11b mode:

EUT output power = 149.96 mW

Numeric Antenna gain = 2.93

→ *Power density = 0.0874 mW / cm2*

IEEE 802.11g mode:

EUT output power = 260.01 mW

Numeric Antenna gain = 2.93

→ *Power density = 0.1516 mW / cm2*

IEEE 802.11n HT 20 MHz mode:

EUT output power = 323.59 mW

Numeric Antenna gain = 5.63

→ *Power density = 0.362541 mW / cm2*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 343.55mW

Numeric Antenna gain = 5.63

→ *Power density = 0.3849 mW / cm2*

(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	Wireless-N Selectable-Band Access Point with PoE
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	**Mode 1:** 5GHz: IEEE 802.11n HT 20 MHz mode: 23.68 dBm(233.34mW) IEEE 802.11n HT 40 MHz mode: 24.34 dBm(271.64mW) **Mode 2:** 5GHz: IEEE 802.11n HT 20 MHz mode: 23.97 dBm(249.45mW) IEEE 802.11n HT 40 MHz mode: 23.79 dBm(239.33mW) **Mode 3:** IEEE 802.11a mode: 22.45 dBm(175.7mW) IEEE 802.11n HT 20 MHz mode: 24.14 dBm(259.41mW) IEEE 802.11n HT 40 MHz mode: 24.48 dBm (280.54mW)
Antenna gain (Max)	Antenna Type: PIFA Antenna Antenna Gain: IEEE 802.11a: Antenna 1: 4.88 dBi Antenna 2: 4.97 dBi Antenna 3: 4.74 dBi MIMO: $10*LOG(((10^{(4.88/20)}+10^{(4.74/20)})^2)/2) = 7.94$ dBi (Numeric gain: 6.22)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A
Remark: *The maximum output power is 24.34dBm (271.64mW) at 5795MHz (with 6.22 numeric antenna gain.)*	

TEST RESULTS

No non-compliance noted.

MPE EVALUATION

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

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

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

Mode 1

IEEE 802.11n HT 20 MHz mode:

EUT output power = 233.34 mW
Numeric Antenna gain = 6.22

→ *Power density =0.2888 mW / cm2*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 271.64mW
Numeric Antenna gain = 6.22

→ *Power density =0.3362 mW / cm2*

Mode 2

IEEE 802.11n HT 20 MHz mode:

EUT output power = 249.45 mW
Numeric Antenna gain = 6.22

→ *Power density = 0.3087 mW / cm2*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 239.33mW
Numeric Antenna gain = 6.22

→ *Power density = 0.2962 mW / cm2*

Mode 3

IEEE 802.11a mode:

EUT output power = 175.7 mW
Numeric Antenna gain = 3.14

→ *Power density = 0.1097 mW / cm2*

IEEE 802.11n HT 20 MHz mode:

EUT output power = 259.41 mW
Numeric Antenna gain = 6.22

→ *Power density = 0.3210 mW / cm2*

IEEE 802.11n HT 40 MHz mode:

EUT output power = 280.54mW
Numeric Antenna gain = 6.22

→ *Power density = 0.3472 mW / cm2*

(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.)