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	IEEE. 11a/g WLAN OutDoor AP
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/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 802.11b mode: 19.75 dBm (94.41mW) IEEE 802.11g mode: 19.64 dBm (92.04mW)
Antenna gain (Max)	IEEE 802.11b/g mode: 16dBi (Numeric gain: 39.81)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:
1. *The maximum output power is <u>19.75dBm (94.41mW)</u> at <u>2437MHz</u> (with <u>39.81 numeric antenna gain</u>.)*
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*

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:

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

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

EUT output power = 94.41mW

Numeric Antenna gain = 39.81

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

→ *Power density = 0.74793 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	IEEE. 11a/g WLAN OutDoor AP
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/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: 17.86 dBm (61.09mW)
Antenna gain (Max)	IEEE 802.11a mode: 18dBi (Numeric gain: 63.10)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:
1. *The maximum output power is 17.86dBm (61.09mW) at 5745MHz (with 63.10 numeric antenna gain.)*
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*

TEST RESULTS

No non-compliance noted.

Calculation

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

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

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

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

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

$\qquad\qquad\qquad$ *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:

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

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

Yields

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

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

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

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

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

Maximum Permissible Exposure

EUT output power = 61.09mW

Numeric Antenna gain = 63.10

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

Yields

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

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

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

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

→ *Power density = 0.7671 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.)