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	802.11N Wireless ADSL Router
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	IEEE 802.11b mode: 19.90 dBm (97.72 mW) IEEE 802.11g mode: 24.02 dBm (252.34 mW) draft 802.11n Standard-20 MHz Channel mode: 23.38 dBm (217.77 mW) draft 802.11n Wide-40 MHz Channel mode: 23.95 dBm (248.31 mW)
Antenna gain (Max)	3.02dBi (Numeric gain: 2)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:
1. *The maximum output power is* <u>24.02dBm (252.34mW) at 2462MHz (with 2 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/cm2 even if the calculation indicates that the power density would be larger.*

TEST RESULTS

No non-compliance noted.

Calculation

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

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

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

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

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

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

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

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

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

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

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

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

$\quad\quad\quad\quad\quad\quad\quad$ *S = Power density in mW / cm²*

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 / cm²*

IEEE 802.11b mode:

EUT output power = 97.72mW

Numeric Antenna gain = 2

→ *Power density = 0.0388 mW / cm²*

IEEE 802.11g mode:

EUT output power = 252.34 mW

Numeric Antenna gain = 2

→ *Power density = 0.1004 mW / cm²*

draft 802.11n Standard-20 MHz Channel mode:

EUT output power = 217.77 mW

Numeric Antenna gain = 2

→ *Power density = 0.0866mW / cm²*

draft 802.11n Wide-40 MHz Channel mode:

EUT output power = 248.31 mW

Numeric Antenna gain = 2

→ *Power density = 0.0988 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.)