APPENDIX II
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	802.11a/b/g/n PCIExpress Minicard
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	IEEE 802.11b mode: 23.74 dBm (236.59mW) IEEE 802.11g mode: 23.63 dBm (230.67mW) draft 802.11n Standard-20 MHz Channel mode: 23.70dBm (234.42mW) draft 802.11n Wide-40 MHz Channel mode: 21.80 dBm (151.36mW)
Antenna gain (Max)	-0.6 dBi (Numeric gain: 0.87)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 23.74dBm (236.59mW) at 2437MHz (with 0.87 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 $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

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 / cm²*

Maximum Permissible Exposure

EUT output power = 236.59mW

Numeric antenna gain = 0.87

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 / cm²*

→ Power density = 0.04096 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.

EUT	802.11a/b/g/n PCIExpress Minicard
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	IEEE 802.11a mode: 20.22 dBm (105.20mW) draft 802.11n Standard-20 MHz Channel mode: 20.22 dBm (105.20mW) draft 802.11n Wide-40 MHz Channel mode: 20.20 dBm (104.71mW)
Antenna gain (Max)	-0.6 dBi (Numeric gain: 0.87)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 20.22dBm (105.20mW) at 5745MHz (with 0.87 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 $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

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 / cm²

Maximum Permissible Exposure

EUT output power = 105.20mW

Numeric antenna gain = 0.87

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 / cm²

→ Power density = 0.01821 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.