APPENDIX

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	NOTEBOOK PC
Frequency band (Operating)	☐ GPRS: 850MHz / 1900 MHz
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	850 MHz: 26.03dBm (400.87mW) 1900 MHz: 27.03dBm(504.66mW)
ANTENNA GAIN (MAX)	850 MHz: -0.54 dBi (Numeric gain: 0.883) 1900 MHz: 2.31 dBi (Numeric gain: 1.702)
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 26.03dBm (504.66mW) at 824.20MHz (with 0.883 numeric antenna gain.)*
2. *The maximum output power is 27.03dBm (504.66mW) at 1850.20MHz (with 1.702 numeric antenna gain.)*
3. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
4. *For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.*

TEST RESULTS

No non-compliance noted.

Calculation

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

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:

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

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

*d (cm) =100 * d (m)*

Yields

$$d = 100 \times \sqrt{\frac{30 \times (P/1000) \times G}{3770 \times S}} = 0.282 \times \sqrt{\frac{P \times G}{S}}$$

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

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and

G (numeric) = 10 ^ (G (dBi) / 10)

Yields

$$d = 0.282 \times \frac{10^{(P+G)/20}}{\sqrt{20}}$$ ***Equation 1***

Where *d = MPE safe distance in cm*
P = Power in dBm
G = Antenna Gain in Numeric antenna gain
S = Power Density Limit in mW / cm^2

Maximum Permissible Exposure

GPRS 850MHz

EUT output power = 400.87mW

Antenna gain = 0.883 (Numeric gain)

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 = *Antenna gain in Numeric antenna gain*

S = *Power density in* mW / cm^2

→ Power density = 0.0704 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.)

GPRS 1900MHz

EUT output power = 504.66mW

Antenna gain = 1.702 (Numeric gain)

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 = *Antenna gain in Numeric antenna gain*

S = *Power density in* mW / cm^2

→ Power density = 0.171 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.)