RADIO FREQUENCY EXPOSURE

LIMIT

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 §15.247(b)(4) and §1.1307(b)(1) of this chapter.

EUT Specification

EUT	54M Wireless USB Adapter
Frequency band (Operating)	☑WLAN: 2.412GHz ~ 2.462GHz ☐WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~5.70GHz ☐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)
Max. output power	23.12 dBm (205.12mW)
Antenna gain (Max)	2 dBi (Numeric gain: 1.58)
Evaluation applied	☑MPE Evaluation ☐SAR Evaluation
Note: 1. The maximum output power is 23.12 dBm (205.12mW) at 2462MHz (with 1.58 numeric antenna gain .) 2. 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 $E = \sqrt{\frac{30 * P * G}{d}}$ & 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:

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

Changing to units of mW and cm, using:
P (mW) = P (W) / 1000 and
*d (cm) =100 * d (m)*

Yields

$$d = 100 \text{ X } \sqrt{\frac{30 * (P/1000) * G}{3770 \,\&\, S}} = 0.282 \text{ X } \sqrt{\frac{P * G}{S}}$$

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

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

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

Maximum Permissible Exposure

EUT output power = 205.12 mW
Antenna Gain = 1.58
S = 1.0 mW / cm^2 from 1.1310 Table 1
Substituting these parameters into the above Equation 1:

→ MPE = $\frac{P*G}{4\prod R^2}$ = 0.0645 mW/cm^2

(For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.)