RADIO FREQUENCY EXPOSURE

LIMIT

According to 15.247(i), system 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 Name	IEEE 802.11b/g/n Long-Range USB Adapter
Frequency bank (Operating)	☑ WLAN: 2.412GHz~2.462GHz ☐ WLAN: 5.18GHz~5.32GHz/5.50GHz~5.70GHz ☐ WLAN: 5.745GHz~5.825GHz ☐Others
Device category	☐Portable (<20 cm separation) ☑Mobile (>20cm separation) ☐Other
Antenna diversity	☑Single antenna ☐Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	IEEE 802.11b mode: 26.83 dBm IEEE 802.11g mode: 25.27 dBm IEEE 802.11n Standard-20 MHz Channel: mode: 25.79 dBm IEEE 802.11n Wide-40 MHz Channel: mode: 25.96 dBm
Antenna gain	1.1 dBi
Evaluation applied	MPE Evaluation
Remark	1. The maximum output power is 26.83dBm (0.481948 W) at 2462 MHz 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 minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.

MPE evaluation

Calculation

Given

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

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

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

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW/cm^2

Channel (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm2)	Limit of Power Density (S) (mW/cm2)	Result
Operating Mode: 802.11 b						
2412	1.28825	26.77	475.3352	0.1219	1	Pass
2437	1.28825	26.57	453.9416	0.1164	1	Pass
2462	1.28825	26.83	481.9478	0.1236	1	Pass
Operating Mode: 802.11 g						
2412	1.28825	26.27	423.643	0.1086	1	Pass
2437	1.28825	26.16	413.0475	0.1059	1	Pass
2462	1.28825	26.14	411.1497	0.1054	1	Pass
Operating Mode: 802.11 n (20MHz)						
2412	1.28825	25.68	369.8282	0.0948	1	Pass
2437	1.28825	25.49	353.9973	0.0908	1	Pass
2462	1.28825	25.79	379.315	0.0972	1	Pass
Operating Mode: 802.11 n (40MHz)						
2422	1.28825	25.58	361.4099	0.0927	1	Pass
2437	1.28825	25.84	383.7072	0.0984	1	Pass
2452	1.28825	25.96	394.4573	0.1011	1	Pass

Maximum Permissible Exposure

EUT output power = 481.948 mW

Numeric Antenna gain = 1.28825

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 = 0.1236 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)