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	WIRELESS-AN 25DBM 3X3 NETWORK MINI PCIE ADAPTER
Frequency band (Operating)	☐ WLAN: 2.412GHz ~ 2.462GHz ☒ WLAN: 5.725GHz ~ 5.850GHz ☐ Bluetooth: 2.402GHz ~ 2.480 GHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation)
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	802.11a: 16.76 dBm (47.42 mW) 802.11n HT20:Chain 0: 7.41dBm (5.51 mW) Chain 1: 7.52dBm (5.65 mW) Chain 2: 7.48dBm (5.60 mW) 802.11n HT40:Chain 0: 7.43dBm (5.53 mW) Chain 1: 7.36dBm (5.45 mW) Chain 2: 7.43dBm (5.53 mW)
Antenna gain (Max)	Antenna 1(chain 0):19 dBi (Numeric gain:79.43) Antenna 2(chain 1):19 dBi (Numeric gain:79.43) Antenna 3(chain 2):19 dBi (Numeric gain:79.43)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A
Remark:	
1. The maximum output power is 16.76 dBm (47.42 mW) at 5745 MHz (withnumeric 79.43antenna 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 / cm^2

Maximum Permissible Exposure

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm2)	Limit (mW/cm2)
802.11a	5725-5850	16.76	19	20	0.750	1
802.11 n(20MHz) chain 0	5725-5850	7.41	19	20	0.087	1
802.11 n(20MHz) chain 1	5725-5850	7.52	19	20	0.089	1
802.11 n(20MHz) chain 2	5725-5850	7.48	19	20	0.089	1
802.11 n(20MHz) chain 0+chain 1+chain 2	5725-5850	/	/	20	0.265	1
802.11 n(40MHz) chain 0	5725-5850	5.53	19	20	0.087	1
802.11 n(40MHz) chain 0	5725-5850	5.45	19	20	0.086	1
802.11 n(40MHz) chain 0	5725-5850	5.53	19	20	0.087	1
802.11 n(40MHz) chain 0+chain 1+chain 2	5725-5850	/	/	20	0.260	1

NOTE:

Total(Chain0+Chain1) , the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density