RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(i) and §15.407(f), 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) of this chapter.

EUT Specification

EUT	802.11 abgn Dual Band Dual Radio Enterprise Access point with plastic shell and internal antenna
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☒ WLAN: 5.15GHz ~ 5.25GHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
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	IEEE 802.11b mode: 18.51dBm (71.0mW) IEEE 802.11g mode: 16.60dBm (45.7mW) draft 802.11n Standard-20 MHz Channel mode: 16.42 dBm (43.9mW) draft 802.11n Wide-40 MHz Channel mode: 15.90 dBm (38.9mW) IEEE 802.11a mode: 16.14dBm (41.1 mW) draft 802.11an Standard-20 MHz Channel mode:15.45 dBm(35.1mW) draft 802.11an Wide-40 MHz Channel mode: 15.54 dBm (35.8mW)
Antenna gain (Max)	Two PIFA antennas for 2.4GHz Gain 3.0 dBi and two PIFA antennas for 5 GHz Gain 4.0 dBi
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is* <u>18.51dBm (71.0mW) at 2412MHz (with 2.00numeric antenna gain.);</u> <u>16.14dBm (41.1mW) at 5240MHz (with 2.51numeric antenna gain.)</u>
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/cm2 even if the calculation indicates that the power density would be larger.*
4. *All two antennas are completely uncorrelated with each other.*

TEST RESULTS

No non-compliance noted.

Calculation

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

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

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

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

Maximum Permissible Exposure

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

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm2)	Limit (mW/cm2)
802.11b	2412-2462	18.51	3	20	0.0283	1
802.11g	2412-2462	16.60	3	20	0.0182	1
802.11 n(20MHz)	2412-2462	16.42	3	20	0.0175	1
802.11 n(40MHz)	2412-2462	15.90	3	20	0.0155	1
802.11a	5150-5250	16.14	4	20	0.0205	1
802.11 n(20MHz)	5150-5250	15.45	4	20	0.0175	1
802.11 n(40MHz)	5150-5250	15.54	4	20	0.0179	1

Note:
Both of the WLAN 2.4G&5.0G can transmit simultaneously, the formula of calculated the MPE is:
CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

WLAN 2.4G+WLAN 5.0G=0.0283+0.0205=0.0488

(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.)