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	802.11a/b/g/n access point
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☒ WLAN: 5.745GHz ~ 5.825GHz ☐ 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: 16.22dBm (41.88mW) IEEE 802.11g mode: 14.54dBm (28.44mW) draft 802.11gn Standard-20 MHz Channel mode: 18.07 dBm (64.12mW) draft 802.11gn Wide-40 MHz Channel mode: 16.85 dBm (48.42mW) IEEE 802.11a mode: 14.82dBm (30.34 mW) draft 802.11an Standard-20 MHz Channel mode:17.28 dBm(53.46mW) draft 802.11an Wide-40 MHz Channel mode: 16.54 dBm (45.08mW)
Antenna gain (Max)	Two PIFA antennas for 2.4GHz Gain 2.34 dBi and 2.89 dBi /Total gain 5.63 dBi and two PIFA antennas for 5 GHz Gain 1.63 dBi and -0.78dBi /Total gain 3.60 dBi
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:
1. *The maximum output power is 18.07dBm (64.12mW) at 2462MHz (with 3.66numeric antenna gain.); 17.82dBm (53.46mW) at 5745MHz (with 2.29numeric antenna 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/cm2 even if the calculation indicates that the power density would be larger.*
4. *Total gain (dBm) = 10*LOG(10^(Chain 0 gain / 10)+10^(Chain 1 gain /10))*

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

1)IEEE 802.11b:

EUT output power = 41.88mW

Numeric Antenna gain = 1.95

→ *Power density = 0.0163 mW / cm^2*

IEEE 802.11g:

EUT output power = 28.44mW

Numeric Antenna gain = 1.95

→ *Power density = 0.0110 mW / cm^2*

draft 802.11gn Standard-20 MHz Channel mode

EUT output power = 64.12mW

Numeric Antenna gain = 3.66

→ *Power density = 0.0467 mW / cm^2*

draft 802.11gn Wide-40 MHz Channel mode

EUT output power = 48.42mW

Numeric Antenna gain = 3.66

→ *Power density = 0.0352 mW / cm^2*

IEEE 802.11a:

EUT output power = 30.33mW

Numeric Antenna gain = 1.46

→ *Power density = 0.0088 mW / cm^2*

draft 802.11an Standard-20 MHz Channel mode

EUT output power =53.46mW

Numeric Antenna gain = 2.29

→ *Power density = 0.0244 mW / cm^2*

draft 802.11an Wide-40 MHz Channel mode

EUT output power = 45.08mW

Numeric Antenna gain = 2.29

→ *Power density = 0.0205 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.)

2)Bluetooth + WIFI

Bluetooth highest MPE:

EUT output power = 1.318mW

Numeric Antenna gain = 1.945

→ *Power density = 0.00051 mW / cm2*

WIFI highest MPE:

draft 802.11gn Standard-20 MHz Channel mode

EUT output power = 64.12mW

Numeric Antenna gain = 3.66

→ *Power density = 0.0467 mW / cm^2*

Total : → *Power density = 0.04721 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.)