

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	850-034521
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☒ WLAN: 5.15GHz ~ 5.25GHz ☐ WLAN: 5.25GHz ~ 5.35GHz ☐ WLAN: 5.47GHz ~ 5.725GHz ☒ WLAN: 5.725GHz ~ 5.85GHz ☒ Bluetooth: 2.402GHz ~ 2.480GHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure ($S = 5\text{mW}/\text{cm}^2$) ☒ General Population/Uncontrolled exposure ($S=1\text{mW}/\text{cm}^2$)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	2.412-2.462GHz IEEE 802.11b mode: 18.34dBm IEEE 802.11g mode: 21.72 dBm IEEE 802.11n HT20 mode: 21.20dBm 5150 MHz~5250 MHz IEEE802.11a mode: 9.73dBm IEEE802.11an HT20 mode: 9.68dBm IEEE802.11an HT40 mode: 9.92dBm IEEE802.11ac VHT20 mode: 9.87dBm IEEE802.11ac VHT40 mode: 9.95dBm IEEE802.11ac VHT80 mode: 9.47dBm 5725MHz-5850MHz IEEE 802.11a: 8.86 dBm IEEE 802.11n HT20 MHz Channel Mode: 8.77 dBm IEEE 802.11n HT40 MHz Channel Mode: 9.59 dBm IEEE 802.11ac VHT20 MHz Channel Mode: 8.76 dBm IEEE 802.11ac VHT40 MHz Channel Mode: 9.07 dBm IEEE 802.11ac VHT 80 MHz Channel Mode: 8.81 dBm Bluetooth: 8.95 dBm
Antenna gain (Max)	Dipole antenna for 2.4GHz Gain 2.0dBi Dipole antenna for 5.25GHz Gain 5.0dBi Dipole antenna for 5.75GHz Gain 4.5dBi
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

- The maximum output power is 21.72dBm (148.59mW) at 2412MHz (with 1.585 numeric 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.

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:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

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

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

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 / cm²

For WLAN:

Modulation Mode	Frequency band (MHz)	Max. tune up power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm ²)	Limit (mW/cm ²)
IEEE802.11b	2412-2462	19.5	2.0	20	0.0281	1
IEEE802.11g		22.5	2.0	20	0.0561	1
IEEE802.11 n(20MHz)		22.5	2.0	20	0.0561	1
IEEE802.11a mode	5150~5250	14.5	5.0	20	0.0177	1
IEEE802.11an HT20 mode		14.5	5.0	20	0.0177	1
IEEE802.11an HT40 mode		14.5	5.0	20	0.0177	1
IEEE802.11ac VHT20 mode		14.5	5.0	20	0.0177	1
IEEE802.11ac VHT40 mode		14.5	5.0	20	0.0177	1
IEEE802.11ac VHT80 mode		14.5	5.0	20	0.0177	1
IEEE802.11a mode	5725~5850	13.5	4.5	20	0.0126	1
IEEE802.11an HT20 mode		13.5	4.5	20	0.0126	1
IEEE802.11an HT40 mode		13.5	4.5	20	0.0126	1
IEEE802.11ac VHT20 mode		13.5	4.5	20	0.0126	1
IEEE802.11ac VHT40 mode		13.5	4.5	20	0.0126	1
IEEE802.11ac VHT80 mode		13.5	4.5	20	0.0126	1

For Bluetooth:

Modulation Mode	Frequency band (MHz)	Max. tune up power(dBm)	Antenna gain (dBi)	Distance (cm)	Power density (mW/cm ²)	Limit (mW/cm ²)
1Mbps	2402-2480	9.0	2.0	20	0.0025	1
2Mbps		9.0	2.0	20	0.0025	1
3Mbps		8.0	2.0	20	0.0020	1
BLE4.0		6.0	2.0	20	0.0013	1

Note:

All of the Bluetooth& WLAN can transmit simultaneously, the formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

Bluetooth+ WLAN 2.4G=0.0025+0.0561=0.0586mW/cm²

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)