

Maximum Permissible Exposure

Applicable Standard

According to §1.1307(b)(5), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

For Bluetooth

1) The maximum output power is 7.82dBm (6.05mW) at 2441MHz, (with 1.26 numeric antenna gain.)

For 2.4G WIFI

1) The maximum output power for antenna 0 is 15.92dBm (39.08mW) at 2437MHz, (with 1.58 numeric antenna gain.)

2) The maximum output power for antenna 1 is 16.13 dBm (41.02mW) at 2437MHz, (with 1.58 numeric antenna gain.)

For 5G WIFI

1) The maximum output power for antenna 0 is 13.60dBm (22.91mW) at 5300MHz, (with 1.58 numeric antenna gain.)

2) The maximum output power for antenna 1 is 13.52 dBm (22.49mW) at 5300MHz, (with 1.58 numeric antenna gain.)

Remark: For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20cm, even if the calculation indicate that the MPE distance would be lesser.

Calculation

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

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

Maximum Permissible Exposure

Bluetooth output power=6.05mW

2.4G WIFI antenna 0 output power=39.08mW

2.4G WIFI antenna 1 output power=41.02mW

Bluetooth Numeric Antenna gain=1.26

2.4G WIFI Numeric Antenna gain=1.58

Substituting the MPE safe distance using d=20cm into above equation.

Yields:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW/cm²

$$\text{Power density} = 0.000199 \times 6.05 \times 1.26 + 0.000199 \times 1.58 \times 39.08 + 0.000199 \times 1.58 \times 41.02 = 0.027 \text{ mW/cm}^2$$

Maximum Permissible Exposure

Bluetooth output power=6.05mW

5G WIFI antenna 0 output power=22.91mW

5G WIFI antenna 0 output power=22.49mW

Bluetooth Numeric Antenna gain=1.26

5G WIFI Numeric Antenna gain=1.58

Substituting the MPE safe distance using d=20cm into above equation.

Yields:

$$S=0.000199*P*G$$

Where P =Power in mW

G =Numeric antenna gain

S =Power density in mW/cm²

$$\text{Power density}=0.000199*6.05*1.26 + 0.000199*1.58*22.91 + 0.000199*1.58*22.49=0.016\text{mW/cm}^2$$

(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.)

Result: Because the result of power density is lower than the limit, so the device is exempt from SAR.