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

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

Where $\quad E = Field\ Strength\ in\ Volts\ /\ meter$
$P = Power\ in\ Watts$
$G = Numeric\ antenna\ gain$
$d = Distance\ in\ meters$
$S = Power\ Density\ in\ milliwatts\ /\ square\ centimeter$

Maximum Permissible Exposure

    Bluetooth output power=6.05mW

    2.4G WIFI antenna 0 output power=39.08mW

    2.4G WIFI antenna 0 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*P*G

Where   P=Power in mW

    G=Numeric antenna gain

    S=Power density in mW/cm^2

<u>*Power density*</u>*=0.000199*6.05*1.26 + 0.000199*1.58*39.08 + 0.000199*1.58*41.02=0.027mW/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/cm^2

<u>*Power density*</u>*=0.000199*6.05*1.26 + 0.000199*1.58*22.91 + 0.000199*1.58*22.49=0.016mW/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.)

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