

MPE Calculation

FCC ID: 2AC23-WT39M2011

Remark: Average \leq Peak, which means that calculating the power density applying Peak power is worst case. The worst case operation mode generating the highest power is taken for calculation:

WIFI:

Frequency range: **2412-2462** MHz Typical use distance: $d \geq 20$ cm

Power density limit for mobile devices at 2.4 GHz: $S \leq 1$ mW/cm²

Maximum measured conducted power (Peak): $P_{\text{conducted}} = 20.44$ dBm = 110.66 mW

Antenna Gain: $G = 1.45$ dBi = 1.4 on the linear scale

Calculation: $P_{\text{radiated}} = P_{\text{conducted}} + G_{\text{linear}} = 20.44$ dBm + 1.45 dBi = 21.89 dBm = 154.53 mW

Power density $S = (P_{\text{radiated}}) / (4\pi \times d^2) = 154.53 / 5026 = 0.0307$ mW/cm² $< 1 \Rightarrow$ below limit

Frequency range: **2422-2452** MHz Typical use distance: $d \geq 20$ cm

Power density limit for mobile devices at 2.4 GHz: $S \leq 1$ mW/cm²

Maximum measured conducted power (Peak): $P_{\text{conducted}} = 22.02$ dBm = 159.22 mW

Antenna Gain: $G = 1.45$ dBi = 1.4 on the linear scale

Calculation: $P_{\text{radiated}} = P_{\text{conducted}} + G_{\text{linear}} = 22.02$ dBm + 1.45 dBi = 23.47 dBm = 222.33 mW

Power density $S = (P_{\text{radiated}}) / (4\pi \times d^2) = 222.33 / 5026 = 0.0442$ mW/cm² $< 1 \Rightarrow$ below limit

Frequency range: **5180-5240** MHz Typical use distance: $d \geq 20$ cm

Power density limit for mobile devices at 2.4 GHz: $S \leq 1$ mW/cm²

Maximum measured conducted power (Peak): $P_{\text{conducted}} = 15.65$ dBm = 36.73 mW

Antenna Gain: $G = 2.78$ dBi = 1.9 on the linear scale

Calculation: $P_{\text{radiated}} = P_{\text{conducted}} + G_{\text{linear}} = 15.65$ dBm + 2.78 dBi = 18.43 dBm = 69.66 mW

Power density $S = (P_{\text{radiated}}) / (4\pi \times d^2) = 69.66 / 5026 = 0.0139$ mW/cm² $< 1 \Rightarrow$ below limit

Frequency range: **5190-5230** MHz Typical use distance: $d \geq 20$ cm

Power density limit for mobile devices at 2.4 GHz: $S \leq 1$ mW/cm²

Maximum measured conducted power (Peak): $P_{\text{conducted}} = 15.23$ dBm = 33.34 mW

Antenna Gain: $G = 2.78$ dBi = 1.9 on the linear scale

Calculation: $P_{\text{radiated}} = P_{\text{conducted}} + G_{\text{linear}} = 15.23$ dBm + 2.78 dBi = 18.01 dBm = 63.24 mW

Power density $S = (P_{\text{radiated}}) / (4\pi \times d^2) = 63.24 / 5026 = 0.0126$ mW/cm² $< 1 \Rightarrow$ below limit

Frequency range: **5745-5825** MHz Typical use distance: $d \geq 20$ cm

Power density limit for mobile devices at 2.4 GHz: $S \leq 1$ mW/cm²

Maximum measured conducted power (Peak): $P_{\text{conducted}} = 15.42$ dBm = 34.83 mW

Antenna Gain: $G = 2.02$ dBi = 1.59 on the linear scale

Calculation: $P_{\text{radiated}} = P_{\text{conducted}} + G_{\text{linear}} = 15.42$ dBm + 2.02 dBi = 17.44 dBm = 55.46 mW

Power density $S = (P_{\text{radiated}}) / (4\pi \times d^2) = 55.46 / 5026 = 0.0110$ mW/cm² $< 1 \Rightarrow$ below limit

Frequency range: **5755-5795** MHz Typical use distance: $d \geq 20$ cm

Power density limit for mobile devices at 2.4 GHz: $S \leq 1$ mW/cm²

Maximum measured conducted power (Peak): $P_{\text{conducted}} = 14.21$ dBm = 26.36 mW

Antenna Gain: $G = 2.02$ dBi = 1.59 on the linear scale

Calculation: $P_{\text{radiated}} = P_{\text{conducted}} + G_{\text{linear}} = 14.21$ dBm + 2.02 dBi = 16.23 dBm = 41.98 mW

Power density $S = (P_{\text{radiated}}) / (4\pi \times d^2) = 41.98 / 5026 = 0.0084$ mW/cm² $< 1 \Rightarrow$ below limit

BLE:Frequency range: **2402-2480** MHzTypical use distance: $d \geq 20$ cmPower density limit for mobile devices at 2.4 GHz: $S \leq 1$ mW/cm²Maximum measured conducted power (Peak): $P_{\text{conducted}} = 2.15$ dBm = 1.64 mWAntenna Gain: $G = 3.96$ dBi = 2.49 on the linear scaleCalculation: $P_{\text{radiated}} = P_{\text{conducted}} + G_{\text{linear}} = 2.15$ dBm + 3.96 dBi = 6.11 dBm = 4.08 mWPower density $S = (P_{\text{radiated}}) / (4\pi \times d^2) = 4.08 / 5026 = 0.0008$ mW/cm² < 1 => below limit**BT:**Frequency range: **2402-2480** MHzTypical use distance: $d \geq 20$ cmPower density limit for mobile devices at 2.4 GHz: $S \leq 1$ mW/cm²Maximum measured conducted power (Peak): $P_{\text{conducted}} = 3.8$ dBm = 2.4 mWAntenna Gain: $G = 3.96$ dBi = 2.49 on the linear scaleCalculation: $P_{\text{radiated}} = P_{\text{conducted}} + G_{\text{linear}} = 3.8$ dBm + 3.96 dBi = 7.76 dBm = 5.97 mWPower density $S = (P_{\text{radiated}}) / (4\pi \times d^2) = 5.97 / 5026 = 0.0012$ mW/cm² < 1 => below limit

Note that WiFi (2.4 or 5G mode) + Bluetooth (BT or BLE mode) can transmit simultaneously, the sum of both worst-case power densities is $0.0442 + 0.0012 = 0.0454$ mW/cm² = 0.454 W/m²