MPE Calculation

FCC: 2AC23-WT31M2311A

Remark: Average ≤ 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 ≥ 20 cm

Power density limit for mobile devices at 2.4 GHz: S ≤ 1 mW/cm^2

Maximum measured conducted power (Peak): $P_{conducted}$ = **14.34** dBm = 27.16 mW

Antenna Gain: G = **3** dBi = 2 on the linear scale

Calculation: $P_{radiated} = P_{conducted} + G_{linear}$ = 14.34 dBm + 3 dBi = 17.34 dBm = 54.2 mW

Power density S = $(P_{radiated}) / (4\pi \times d^2)$ = 54.2 / 5026 = 0.0108 mW/cm^2 < 1 => below limit

Frequency range: **2422-2452** MHz Typical use distance: d ≥ 20 cm

Power density limit for mobile devices at 2.4 GHz: S ≤ 1 mW/cm^2

Maximum measured conducted power (Peak): $P_{conducted}$ = **13.27** dBm = 21.23 mW

Antenna Gain: G = **3** dBi = 2 on the linear scale

Calculation: $P_{radiated} = P_{conducted} + G_{linear}$ = 13.27 dBm + 3 dBi = 16.27 dBm = 42.36 mW

Power density S = $(P_{radiated}) / (4\pi \times d^2)$ = 42.36 / 5026 = 0.0084 mW/cm^2 < 1 => below limit

Frequency range: **5180-5240** MHz Typical use distance: d ≥ 20 cm

Power density limit for mobile devices at 2.4 GHz: S ≤ 1 mW/cm^2

Maximum measured conducted power (Peak): $P_{conducted}$ = **17.45** dBm = 55.59 mW

Antenna Gain: G = **3.91** dBi = 2.46 on the linear scale

Calculation: $P_{radiated} = P_{conducted} + G_{linear}$ = 17.45 dBm + 3.91 dBi = 21.36 dBm = 136.77 mW

Power density S = $(P_{radiated}) / (4\pi \times d^2)$ = 136.77 / 5026 = 0.0272 mW/cm^2 < 1 => below limit

Frequency range: **5190-5230** MHz Typical use distance: d ≥ 20 cm

Power density limit for mobile devices at 2.4 GHz: S ≤ 1 mW/cm^2

Maximum measured conducted power (Peak): $P_{conducted}$ = **14.2** dBm = 26.3 mW

Antenna Gain: G = **3.91** dBi = 2.46 on the linear scale

Calculation: $P_{radiated} = P_{conducted} + G_{linear}$ = 14.2 dBm + 3.91 dBi = 18.11 dBm = 64.71 mW

Power density S = $(P_{radiated}) / (4\pi \times d^2)$ = 64.71 / 5026 = 0.0129 mW/cm^2 < 1 => below limit

Frequency range: **5745-5825** MHz Typical use distance: d ≥ 20 cm

Power density limit for mobile devices at 2.4 GHz: S ≤ 1 mW/cm^2

Maximum measured conducted power (Peak): $P_{conducted}$ = **17.34** dBm = 54.2 mW

Antenna Gain: G = **3.91** dBi = 2.46 on the linear scale

Calculation: $P_{radiated} = P_{conducted} + G_{linear}$ = 17.34 dBm + 3.91 dBi = 21.25 dBm = 133.35 mW

Power density S = $(P_{radiated}) / (4\pi \times d^2)$ = 133.35 / 5026 = 0.0265 mW/cm^2 < 1 => below limit

Frequency range: **5755-5795** MHz Typical use distance: d ≥ 20 cm

Power density limit for mobile devices at 2.4 GHz: S ≤ 1 mW/cm^2

Maximum measured conducted power (Peak): $P_{conducted}$ = **14.85** dBm = 30.55 mW

Antenna Gain: G = **3.91** dBi = 2.46 on the linear scale

Calculation: $P_{radiated} = P_{conducted} + G_{linear}$ = 14.85 dBm + 3.91 dBi = 18.76 dBm = 75.16 mW

Power density S = $(P_{radiated}) / (4\pi \times d^2)$ = 75.16 / 5026 = 0.0150 mW/cm^2 < 1 => below limit

BLE:

Frequency range: **2402-2480** MHz Typical use distance: d ≥ 20 cm

Power density limit for mobile devices at 2.4 GHz: S ≤ 1 mW/cm^2

Maximum measured conducted power (Peak): $P_{conducted}$ = **-3.1** dBm = 0.49 mW

Antenna Gain: G = **3** dBi = 2 on the linear scale

Calculation: $P_{radiated} = P_{conducted} + G_{linear}$ = -3.1 dBm + 3 dBi = -0.1 dBm = 0.98 mW

Power density S = $(P_{radiated}) / (4\pi \times d^2)$ = 0.98 / 5026 = 0.0002 mW/cm^2 < 1 => below limit

BT:

Frequency range: **2402-2480** MHz Typical use distance: d ≥ 20 cm

Power density limit for mobile devices at 2.4 GHz: S ≤ 1 mW/cm^2

Maximum measured conducted power (Peak): $P_{conducted}$ = **4.3** dBm = 2.69 mW

Antenna Gain: G = **3** dBi = 2 on the linear scale

Calculation: $P_{radiated} = P_{conducted} + G_{linear}$ = 4.3 dBm + 3 dBi = 7.3 dBm = 5.37 mW

Power density S = $(P_{radiated}) / (4\pi \times d^2)$ = 5.37 / 5026 = 0.0011 mW/cm^2 < 1 => below limit

Note that WiFi (2.4 or 5G mode) + Bluetooth (BT or BLE mode) can transmit simultaneously, the sum WiFi and Bluetooth powers are far under the limit, whereas the sum of the worst-case power densities of WiFi and Bluetooth is 0.0272+0.0011 = 0.0283 mW/cm^2, which is also far below the limit of 1 mW/cm^2.