

MPE Calculations

Below are MPE calculations for mobile use in each band of operation.

802.11b/g

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S \leq \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at the antenna terminal: 18.37 (dBm)
Maximum peak output power at the antenna terminal: 68.706844 (mW)
Antenna gain(typical): 4 (dBi)
Maximum antenna gain: 2.511886432 (numeric)
Prediction distance: 20 (cm)
Prediction frequency: 2412 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)

Power density at prediction frequency: 0.034334 (mW/cm²)

Maximum allowable antenna gain: 18.64269855 (dBi)

802.11a - (a)(1)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S \approx \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at the antenna terminal: 13.33 (dBm)
Maximum peak output power at the antenna terminal: 21.52781735 (mW)
Antenna gain(typical): 5 (dBi)
Maximum antenna gain: 3.16227766 (numeric)
Prediction distance: 20 (cm)
Prediction frequency: 5240 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)

Power density at prediction frequency: 0.013543 (mW/cm²)

Maximum allowable antenna gain: 23.68269855 (dBi)

802.11a - (a)(2)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at the antenna terminal: 20.05 (dBm)
Maximum peak output power at the antenna terminal: 101.1579454 (mW)
Antenna gain(typical): 4.7 (dBi)
Maximum antenna gain: 2.951209227 (numeric)
Prediction distance: 20 (cm)
Prediction frequency: 5280 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)

Power density at prediction frequency: 0.059392 (mW/cm²)

Maximum allowable antenna gain: 16.96269855 (dBi)

802.11a - (a)(3)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S \square \frac{PG}{4R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at the antenna terminal: 20.03 (dBm)
Maximum peak output power at the antenna terminal: 100.6931669 (mW)
Antenna gain(typical): 4.5 (dBi)
Maximum antenna gain: 2.818382931 (numeric)
Prediction distance: 20 (cm)
Prediction frequency: 5745 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)

Power density at prediction frequency: 0.056459 (mW/cm²)

Maximum allowable antenna gain: 16.98269855 (dBi)

Conclusion

The above calculations are for a single radio. Since this device can operate with two radios simultaneously, a worst case prediction as to the power density with both radios can be determined by doubling the highest power density found above.

At 5745MHz $Pd(\text{single}) = 0.06\text{mW}/\text{cm}^2 @ 20\text{cm}$

Therefore $Pd(\text{dual}) = 0.12\text{mW}/\text{cm}^2 @ 20\text{cm}$

which is well below the limit of $1\text{mW}/\text{cm}^2 @ 20\text{cm}$