

Prediction of MPE limit at a given distance

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

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

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

Bluetooth Classic Transmitter n°1

Maximum peak output power at the antenna terminal: 6.04 (dBm)
Maximum peak output power at the antenna terminal: 4,017908108 (mW)
Antenna gain(typical): 5.35 (dBi)
Maximum antenna gain: 3,427677865 (numeric)
Prediction distance: 30 (cm)
Prediction frequency: 2480 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)
Power density at prediction frequency: 0,001218 (mW/cm²)
Maximum allowable antenna gain: 34,49452373 (dBi)

Bluetooth Low Energy Transmitter n°2

Maximum peak output power at the antenna terminal: 5.31 (dBm)
Maximum peak output power at the antenna terminal: 3,396252726 (mW)
Antenna gain(typical): 5.35 (dBi)
Maximum antenna gain: 3,427677865 (numeric)
Prediction distance: 30 (cm)
Prediction frequency: 2442 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)
Power density at prediction frequency: 0,001029 (mW/cm²)
Maximum allowable antenna gain: 35,22452373 (dBi)

WIFI 2,4GHz Transmitter n°3

Maximum peak output power at the antenna terminal: 21.86 (dBm)
Maximum peak output power at the antenna terminal: 153.4616983 (mW)
Antenna gain(typical): 5.14 (dBi)
Maximum antenna gain: 3,265878322 (numeric)
Prediction distance: 30 (cm)
Prediction frequency: 2437 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)
Power density at prediction frequency: 0,044315 (mW/cm²)
Maximum allowable antenna gain: 18,67452373 (dBi)

WIFI 5GHz Transmitter n°4

Maximum peak output power at the antenna terminal: 19.60 (dBm)
Maximum peak output power at the antenna terminal: 91,20108394 (mW)
Antenna gain(typical): 7 (dBi)
Maximum antenna gain: 5,011872336 (numeric)
Prediction distance: 30 (cm)
Prediction frequency: 5580 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)
Power density at prediction frequency: 0,040415 (mW/cm²)
Maximum allowable antenna gain: 20,93452373 (dBi)

Collocation evaluation for the following cases:

Pd(n) = Power density of nth transmitter at 30cm
LPd(n) = Power density limit for the nth transmitter

Transmitter n°1 + Transmitter n°2 + Transmitter n°3 + Transmitter n°4 :

$$+ [Pd(2)/LPd(2)] + [Pd(3)/LPd(3)] + [Pd(4)/LPd(4)] = 0,08698 < 1$$