

Prediction of MPE limit at given distance

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

$$S = PG / 4\pi R^2$$

where: S = Power density
P = Power input to the antenna
G = Antenna gain
R = Distance to the center of radiation of the antenna

Solving this equation for G

$$G = S (4\pi R^2) / P$$

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled "Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure"

Frequency Range (MHz)	Power Density (mW/cm ²)	Averaging Time (minutes)
300 -1500	f/1500	30
1500 - 100000	1.0	30

where f = Frequency (MHz)

Prediction:

P	Max power input to the antenna:	29.9 dBm / 977 mW
R	Distance:	20 cm
S	MPE limit for uncontrolled exposure:	1 mW/cm ²
G	Antenna gain:	5.14 numerical
G	Antenna gain:	7.11 dBi

This prediction demonstrates the following:

- 1) The antenna gain where 1 mW/cm² would be reached at 20 cm distance is 7.11 dBi
- 2) The power density levels at a distance of 20 cm with typical antennas of 0 – 7 dBi are below the maximum levels allowed by FCC regulations