

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

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

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)

Based on the above table the limits are for Part 24 device: 1 mW/cm^2 Part 22 device: 0.567 mW/cm²

Prediction for Part 24:

P	Max power input to the antenna:	30.0 dBm / 1000 mW
R	Distance:	20 cm
S	MPE limit for uncontrolled exposure:	1 mW/cm ²
G	Antenna gain:	5.0256 numerical

G	Antenna gain.	5.0250 Hur
G	Antenna gain:	7.01 dBi

EIRP peak power limit according to §24.232(b): 2 W / 33 dBm

Therefore the maximum antenna gain for part 24 shall not exceed 3 dBi

Р	Max power input to the antenna:	33.0 dBm / 2000 mW
R	Distance:	20 cm
S	MPE limit for uncontrolled exposure:	0.567 mW/cm ²
G	Antenna gain:	1.424 numerical
G	Antenna gain:	1.54 dBi or –0.6 dBd
ERP po	ower limit according to §22.913(a):	7 W

Therefore the maximum antenna gain for part 22 shall not exceed -0.6 dBd