

# MAXIMUM PERMISSIBLE EXPOSURE

## LIMITS

§15.247 (b) (5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

## CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E = Field Strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = distance in meters

S = Power Density in milliwatts / square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining

variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW / cm<sup>2</sup>

Substituting the logarithmic form of power and gain using:

$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)}$  and

$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$

yields

$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S}$  Equation (1)

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW / cm<sup>2</sup>

Equation (1) and the measured peak power is used to calculate the MPE distance.

#### LIMITS

S = 1.0 mW / cm<sup>2</sup> from 1.1310 Table 1

#### RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm <sup>2</sup> )	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11b	1.0	19.33	2.0	4.97
802.11g	1.0	18.67	2.0	3.06

**NOTE:** For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

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