# 6.3. 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

 $E = \sqrt{(30 * P * G)} / d$  $S = E^{2} / 3770$ 

where

and

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(mW) = P(W) / 1000 and

d (cm) =100 \* d (m)

yields

where

d = distance in cm P = Power in mW G = Numeric antenna gain S = Power Density in mW / cm^2



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Substituting the logarithmic form of power and gain using:

Substit	$P(mW) = 10 \wedge (P(dBm) / 10)$ and	
	$G (numeric) = 10^{\circ} (G (dBi) / 10)$	
yields		
yields	$d = 0.282 * 10^{(P+G)} / 20) / \sqrt{S}$	Equation (1)
where	$\mathbf{u} = 0.202  10  ((1 + 0) / 20) / 10$	Equation (1)
where	d = MPE distance in cm	
	P = Power in dBm	
	G = Antenna Gain in dBi	
	$S = Power Density Limit in mW / cm^2$	
	S = 10 wer Density Limit in III W / Cirr 2	

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

### <u>LIMITS</u>

 $S = 1.0 \text{ mW} / \text{cm}^2 \text{ from } 1.1310 \text{ Table } 1$ 

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.

### **RESULTS**

No non-compliance noted:

Mode	Power Density Limit	Output Power	Antenna Gain	MPE Distance
	(mW/cm^2)	(dBm)	(dBi)	(cm)
802.11a	1.0	13.77	2.00	1.73

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