# 7.3. 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

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

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 (mW) = P (W) / 1000 andd (cm) = 100 \* d (m)yields $d = 100 * \sqrt{ ((30 * (P / 1000) * G) / (3770 * S))}$  $d = 0.282 * \sqrt{ (P * G / S)}$ 

where

d = distance in cmP = 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:

Substituting the logarithmic form of power and gain using.					
	$P(mW) = 10^{(H)} (P(dBm) / 10)$ and				
	$G (numeric) = 10^{(G)} (G (dBi) / 10)$				
yields					
yleius					
	$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$	Equation (1)			
where		-			
	d = MPE distance in cm				
	P = Power in dBm				
	G = Antenna Gain in dBi				
	$S = Power Density Limit in mW / cm^2$				

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

### **LIMITS**

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

## **RESULTS**

No non-compliance noted:

Mode	Power Density Limit	Output Power	Antenna Gain	MPE Distance
	(mW/cm^2)	(dBm)	(dBi)	(cm)
Normal	1.0	18.61	2.98	3.39

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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