

APPENDIX A: RF EXPOSURE INFORMATION

15.407 (f) is needed

From FCC 1.1310 table 1A, the maximum permissible RF exposure for an uncontrolled environment is $1\text{mW}/\text{cm}^2$. The Electric field generated for a $1\text{mW}/\text{cm}^2$ exposure (S) is calculated as follows:

$$S = E^2/Z$$

where:

S = Power density

E = Electric field

Z = Impedance.

$$E = \sqrt{S \times Z}$$

$$1\text{mW}/\text{cm}^2 = 10\text{ W}/\text{m}^2$$

The impedance of free space is 337 ohms, where E and H fields are perpendicular.
Thus:

$$E = \sqrt{10 \times 337} = 61.4\text{ V/m which is equivalent to } 1\text{mW}/\text{cm}^2$$

Using the relationship between Electric field E, Power in watts P, and distance in meters d, the corresponding Antenna numeric gain G and the transmitter output power and solving for d,

$$d = \sqrt{\frac{P_{\text{peak}} \times 30 \times G}{E}}$$

Example using the Stub Omni-directional antenna

- The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1}(\text{dB gain}/10)$$

$$G = \text{Log}^{-1} 0.215 = 1.64$$

The table below identifies the distances where the $1\text{mW}/\text{cm}^2$ exposure limits may be exceeded during continuous transmission using the external antenna

TABLE 12-1: RF EXPOSURE SEPARATION DISTANCE

ANTENNA TYPE	EIRP (dBm)	ANTENNA GAIN dBi	CALCULATED RF EXPOSURE SEPARATION DISTANCE (cm)	MINIMUM RF EXPOSURE SEPARATION DISTANCE (cm)
Patch	18.7	6.0	2.4	20.0
Dipole	19.6	6.0	2.7	20.0