

MAXIMUM PERMISSIBLE EXPOSURE

RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment is 1mW/cm².

The electric field generated for a 1mW/cm² exposure is calculated as follows:

$$E = \sqrt{(30 * P * G)} / d, \text{ and } S = E^2 / Z = E^2 / 3770, \text{ because } 1\text{mW/cm}^2 = 10\text{W/m}^2$$

Where

E = Electric field strength in Volts/m, P = Power in watts, G = Numeric antenna gain,
and d = distance in meter

S = Power density in mW/cm², Z = Impedance of free space, 377Ω

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

$$S = (30 * P * G) / 3770d^2$$

Changing to units of mW and cm, using P (mW) = P (W) / 1000, d (cm) = d (m)/100,

$$S = 30 * (P/1000) * G / (3770 * (d/100)^2) = 0.0796 * P * G / d^2$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm²

10.2 Calculated Power Density at 20cm

According to above equation, the following result was obtained and the limit for maximum value of power density,

S is 1.0 mW/cm² according to the rule 1.1310 Table 1 B.

Operating Mode	Peak Output Power		Antenna Gain		Minimum Separation Distance	Power Density @ 20 cm	Power Density Limit
	(dBm)	(mW)	dBi	Numeric	(cm)	(mW/cm ²)	(mW/cm ²)
802.11b	16.2	41.687	14.0	9.12	20.0	0.076	1.0
802.11g	14.2	26.303	14.0	6.48		0.034	
802.11a	12.0	16.069	22.0	14.23		0.046	

According to the User's guide, the separation between the EUT and a person shall be at least 20cm, so the EUT meets the MPE requirement.