MAXIMUM PERMISSIBLE EXPOSURE

Standard Applicable

Section 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.

Section 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency radiation as specified in 1.1307(b) LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (nW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	1	30

F = Frequency in MHz

Calculations

Friis transmission formula: $\mathbf{P_d = (P_{out} * G) / (4 * pi * r^2)}$

Where
$\mathbf{P_d}$ = power density in mW/cm^2
$\mathbf{P_{out}}$ = output power to antenna in mW
G = gain of antenna in linear scale
pi = 3.1416
r = distance between observation point and center of the radiator in cm

The limit of $\mathbf{P_d}$ is 1 mW/cm^2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the $\mathbf{P_d}$ at 20 cm is meet the limit of MPE.

Result：Worse case mode

Operation Frequency (GHz)	Distance (cm)	Maximum Peak Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
2.412	20	18.11	2.12	0.021

The $\mathbf{P_d}$ at 20 cm distance calculated from the Friis transmission formula is mush smaller than the limit requirement 1 mW/cm^2.

The **Installation Manual** instructs the user to install the device such that it has a separation of at least 20 cm from persons to comply with the FCC's requirements. This separation of 20 cm more than meets the FCC's and Industry Canada RF exposure requirements.