



RF exposure

According to FCC part 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) 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 (mW/cm ²)	Average time
(A) Limits for Occupational / Control Exposures				
300 – 1 500	--	--	f/300	6
1 500 - 100000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300 – 1 500	--	--	f/1500	6
1 500 – 100 000	--	--	<u>1</u>	<u>30</u>

f= frequency in MHz

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

Where,

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, 1 mW/cm². 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 MPE limit is reached.

Results – Wi-Fi (Worst case)

Mode	Max tune-up power (dBm)	Antenna gain (dBi)	Power density at 20 cm (mW/cm ²)	Limit (mW/cm ²)
802.11b	14	0.25	0.005 29	1
802.11g	9	0.25	0.001 67	1
802.11n(HT20)	9	0.25	0.001 67	1
802.11n(HT40)	7	0.25	0.001 06	1

Results – Bluetooth (Worst case)

Mode	Max tune-up power (dBm)	Antenna gain (dBi)	Power density at 20 cm (mW/cm ²)	Limit (mW/cm ²)
BDR (1Mbps)	1	0.25	0.000 27	1
EDR (2Mbps)	1	0.25	0.000 27	1
EDR (3Mbps)	1	0.25	0.000 27	1
LE	1	0.25	0.000 27	1