



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	--	--	1	30

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 - Worst case

WIFI (2.4G)

Operation mode		Max tune-up Average power (dBm)	Antenna gain (dBi)	Power density at 20 cm(mW/cm ²)	Limit (mW/cm ²)
802.11b	SISO	14.00	1.99	0.012524	1
802.11g	SISO	11.50	1.99	0.004444	1
802.11n(HT20)	SISO	11.50	1.99	0.004444	1
802.11n(HT40)	SISO	10.00	1.99	0.003146	1



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According to RSS-Gen 3.2: the requirements in Radio Standards Specification RSS-102, Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands), shall be met.

INDUSTRY CANADA EXEMPTION

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

Results - Worst case

Band	Operation mode		Conducted Power (dBm)	Ant Gain (dBi)	EIRP		Limit
					(dBm)	(W)	
	802.11b	SISO	14.00	1.99	17.99	0.063	2.684
	802.11g	SISO	11.50	1.99	13.49	0.022	2.684
	802.11n(HT20)	SISO	11.50	1.99	13.49	0.022	2.684
	802.11n(HT40)	SISO	11.50	1.99	11.99	0.016	2.684