



## 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 <sup>2</sup> ) | 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/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  the limit of MPE, 1 mW/cm<sup>2</sup>. 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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|---------------|-------------------------|--------------------|--|-----------------------------|
| 802.11b       | 15                      | 3.96               | 0.015 66                                     | 1                           |
| 802.11g       | 12                      | 3.96               | 0.007 85                                     | 1                           |
| 802.11n(HT20) | 11                      | 3.96               | 0.006 23                                     | 1                           |
| 802.11n(HT40) | 10                      | 3.96               | 0.004 95                                     | 1                           |