# 10. RF exposure evaluation

According to FCC 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 – 1500 | -- | -- | F/300 | 6 |
| 1500 - 100000 | -- | -- | 5 | 6 |
| (B) Limits for General Population/Uncontrol Exposures | | | | |
| 300 – 1500 | -- | -- | F/1500 | 6 |
| **1500 - 100000** | **--** | **--** | **1** | **30** |

## 10.1 Friis transmission formula : Pd = (Pout*G)/(4*pi*R$^2$)

Where
Pd = power density in mW/cm$^2$
Pout = 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
Pd the limit of MPE, 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 MPE limit is reached.

## 12.2 Test result of RF exposure evaluation

Test Item  ：  RF Exposure evaluation data
Test Mode  ：  Normal operation

## 12.2.1 Output power into antenna & RF exposure evaluation distance

| Operating mode | Channel | Frequency (MHz) | Peak output power (dBm) | Antenna gain (dBi) | Power density at 20cm (mW/cm$^2$) | Limit (mW/cm$^2$) |
|---|---|---|---|---|---|---|
| 11b | Low | 2412 | 14.26 | 2.72 | 0.00993 | 1 |
| | Middle | 2437 | 14.50 | 2.72 | 0.01049 | |
| | High | 2462 | 15.28 | 2.72 | 0.01255 | |
| 11g | Low | 2412 | 12.69 | 2.72 | 0.00691 | 1 |
| | Middle | 2437 | 13.63 | 2.72 | 0.00858 | |
| | High | 2462 | 14.28 | 2.72 | 0.00997 | |

▣Note
The power density Pd (4th column) at a distance of 20cm calculated from the friis transmission formula is far below the limit of 1 mW/ cm$^2$.