

## FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### Limits for General Population/Uncontrolled Exposure

| Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
|---|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz)                               | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (Minutes) |
| 0.3-1.34  | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30   | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30-300  | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500  | /                             | /                             | f/1500                              | 30                       |
| 1500-100,000  | /                             | /                             | 1.0                                 | 30                       |

f = frequency in MHz

\* = Plane-wave equivalent power density

### Result

#### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

| Frequency<br>(MHz) | Antenna Gain |           | Max tune -up<br>Conducted Power |       | Evaluation<br>Distance<br>(cm) | Power Density<br>(mW/cm <sup>2</sup> ) | MPE Limit<br>(mW/cm <sup>2</sup> ) |
|--------------------|--------------|-----------|---------------------------------|-------|--------------------------------|--|------------------------------------|
|                    | (dBi)        | (numeric) | (dBm)                           | (mW)  |                                |  |                                    |
| 5180-5240          | 3.0          | 2.0       | 17.0                            | 50.12 | 20                             | 0.02                                   | 1.0                                |
| 5745-5825          | 3.0          | 2.0       | 16.0                            | 39.81 | 20                             | 0.02                                   | 1.0                                |
| 2412-2462          | 3.0          | 2.0       | 17.0                            | 50.12 | 20                             | 0.02                                   | 1.0                                |
| 2402-2480          | 3.0          | 2.0       | 6.0                             | 3.98  | 20                             | 0.002                                  | 1.0                                |

Simultaneous transmitting consideration(for 2.4 G wifi & 5G wifi) :

The ratio=MPE<sub>DTS</sub>/limit+MPE<sub>UNII</sub>/limit=0.02+0.02=0.04<1.0, simultaneous exposure is not required.

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

### **Result: Compliance**