

## 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)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBi)	(numeric)	(dBm)	(mW)			
2412-2472 WIFI	3.0	2.00	15	31.62	20	0.013	1.0
1850-1910 WCDMA	3.5	2.24	23.5	223.87	20	0.100	1.0
1710-1755 WCDMA	3.5	2.24	23.5	223.87	20	0.100	1.0
824-849 WCDMA	3.5	2.24	23.5	223.87	20	0.100	0.55
1850-1910 LTE	3.5	2.24	24	251.19	20	0.112	1.0
1710-1755 LTE	3.5	2.24	24	251.19	20	0.112	1.0
699-716 LTE	3.5	2.24	24	251.19	20	0.112	0.47

Note: PCB Data comes from the PCB report.

Simultaneous transmitting consideration for PCB & WIFI:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.112/0.47 + 0.013/1.0 = 0.251 < 1.0$$

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

**Result: Compliance**