

**FCC §15.407(f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

**Applicable Standard**

According to subpart 15.407(f) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
<b>Frequency Range (MHz)</b>	<b>Electric Field Strength (V/m)</b>	<b>Magnetic Field Strength (A/m)</b>	<b>Power Density (mW/cm<sup>2</sup>)</b>	<b>Averaging Time (minutes)</b>
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;

According to §1.1310 and §2.1091 RF exposure is calculated.

**Calculated Formulary:**

Predication of MPE limit at a given distance

S = PG/4πR<sup>2</sup> = 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:

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

**Calculated Data:**  
**MPE evaluation for single transmission:**

Frequency Range (MHz)	Mode	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)			
2412-2462	2.4G-802.11b	2462	5.0	3.16	23.00	199.53	20	0.125	1.0
	2.4G-802.11g	2437	5.0	3.16	25.59	362.24	20	0.228	1.0
	2.4G-802.11n HT20	2412	5.0	3.16	24.92	310.46	20	0.195	1.0
	2.4G-802.11n HT40	2422	5.0	3.16	23.70	234.42	20	0.147	1.0
5150-5250	5G-802.11a	5180	5.0	3.16	17.32	53.95	20	0.034	1.0
	5G-802.11n HT20	5180	5.0	3.16	15.59	36.22	20	0.023	1.0
	5G-802.11n HT40	5190	5.0	3.16	12.21	16.63	20	0.010	1.0
5725-5850	802.11a	5825	5.0	3.16	14.81	30.27	20	0.019	1.0
	5G-802.11n HT20	5825	5.0	3.16	14.18	26.18	20	0.016	1.0
	5G-802.11n HT40	5755	5.0	3.16	10.36	10.86	20	0.007	1.0

**MPE evaluation for simultaneous transmission:**

2.4 G and 5G can transmit at the same time, MPE evaluation is as below formula:

$$PD1/Limit1+PD2/Limit2+..... < 1, PD (Power Density)$$

**MPE evaluation**= Max MPE of 2.4G + Max MPE of 5G = 0.228/1+0.034/1=0.262 < 1

**Result:** MPE evaluation of single and simultaneous transmission meet the requirement of standard.