

## **FCC §1.1310 & §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

### **Applicable Standard**

According to subpart §2.1091 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

$S = PG/4\pi R^2$  = 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:**

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Output Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
802.11b	2412~2462	3.0	2.00	12.00	15.85	20	0.0063	1.0	0.0063
802.11g		3.0	2.00	15.50	35.48	20	0.0141	1.0	<b>0.0141</b>
802.11n-HT20		3.0	2.00	13.00	19.95	20	0.0079	1.0	0.0079
802.11n-HT40	2422~2452	3.0	2.00	14.00	25.12	20	0.0100	1.0	0.0100

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up EIRP		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
SRD	914.92	3.0	2.0	-1.50	0.71	20	0.0003	0.6	<b>0</b>

**Note:** (1) The Tune-up output power was declared by the Manufacturer.

(2) SRD: ERP= 91.53 dBμV/m -95.2=-3.67 dBm, EIRP=ERP+2.15= -1.52 dBm, Tune up EIRP=-1.5dBm

(3) 2.4G Wi-Fi and SRD can transmit simultaneously, The worst condition is 2.4G Wi-Fi & SRD, as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0141 + 0.0003 = 0.0144 < 1$$

**Conclusion:** The device meets MPE at distance 20cm.