

## **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)				
SRD	2400.8-2480	2.49	1.77	8.5	7.08	20	0.0025	1.0	0.0025
2.4G Wi-Fi	2412-2462	2.49	1.77	30	1000.00	20	0.3521	1.0	0.3521
5G Wi-Fi	5150-5250	2.72	1.87	22.0	158.49	20	0.0590	1.0	0.0590
	5250-5350	2.93	1.96	21.0	125.89	20	0.0491	1.0	0.0491
	5470-5725	3.01	2.00	20.0	100.00	20	0.0398	1.0	0.0398
	5725-5850	3.11	2.05	21.5	141.25	20	0.0576	1.0	0.0576
BLE	2402-2480	2.49	1.77	3.0	2.00	20	0.0007	1.0	0.0007
Classic BT	2402-2480	2.49	1.77	5.5	3.55	20	0.0012	1.0	0.0012

**Note:**

1. For the above tune up power were declared by the manufacturer.
2. SRD and 2.4G Wi-Fi/5G WIFI/BT/BLE can transmit simultaneously.

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

$$= S_{SRD}/S_{limitSRD} + S_{2.4G Wi-Fi}/S_{limit2.4G Wi-Fi}$$

$$= 0.0025 + 0.3521$$

$$= 0.3546$$

$$< 1.0$$

**Result:** The device meet FCC MPE at 20 cm distance.