

## **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> )
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2412-2462	1.88	1.54	19.53	89.74	20	0.0275	1.0
802.11g		1.88	1.54	23.39	218.27	20	0.0669	1.0
802.11n-HT20		1.88	1.54	22.20	165.96	20	0.0508	1.0
BLE-1M	2402-2480	1.88	1.54	8.50	7.08	20	0.0022	1.0

Mode	Frequency Range (MHz)	Tune-up EIRP*		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
		(dBm)	(mW)			
SRD	433.92	-16.5	0.02	20	<0.0001	0.3

**Note:**

1. For the above tune up power were declared by the manufacturer.
2. The EUT contains a certified module, FCC ID: 2ANDL-CR3L (Grant on: 12/28/2020) without any modifications
3. The SRD EIRP = 78.99 dBμV/m -95.2 = -16.21 dBm.
4. WiFi, BLE and SRD cannot be transmitted simultaneously

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