

**FCC §15.247 (i) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

**Applicable Standard**

According to subpart 15.247(i) 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:**

Prediction of power density at the distance of the applicable MPE limit:

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:**

Modes	Frequency Range (MHz)	Antenna Gain		Maximum Power Including Tolerance		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G SDR	2403.5-2477.5	4.1	2.57	28	630.96	20.00	0.32	1.0
5.8G SDR	5728.5-5846.5	4.3	2.69	22	158.49	20.00	0.08	1.0
2.4G WiFi	2412-2462	4.1	2.57	27	501.19	20.00	0.26	1.0
5.8G WiFi	5745-5825	4.3	2.69	18	63.10	20.00	0.03	1.0

Note: The Maximum Power Including Tolerance was declared by manufacturer.

The system configuration SDR and WiFi can transmit simultaneously when operated in difference frequency band, the worst as below:

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

$$= S_{SDR\ 2.4} / S_{limit-SDR\ 2.4} + S_{WIFI\ 5.8} / S_{limit-WIFI\ 5.8}$$

$$= 0.32 / 1 + 0.03 / 1$$

$$= 0.35$$

$$< 1.0$$

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