

**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.

**Calculation formula:**

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

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

Radio	Operation Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
			(dBi)	(numeric)	(dBm)	(mW)			
1	BDR/EDR	2402-2480	2	1.58	-2	0.63	20.00	0.0002	1.0
	BLE	2402-2480	2	1.58	7	5.01	20.00	0.002	1.0
2	BDR/EDR	2402-2480	2	1.58	4	2.51	20.00	0.001	1.0
	BLE	2402-2480	2	1.58	-3	0.50	20.00	0.0002	1.0
	802.11b/g/n	2412-2462	2	1.58	26	398.11	20.00	0.126	1.0

Radio 1 and Radio 2 can transmit simultaneously, different mode in one radio can't transmit simultaneously :

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

$$= S_{Radio 0} / S_{limit-Radio 0} + S_{Radio 1} / S_{limit-Radio 1}$$

$$= 0.002/1 + 0.126/1$$

$$= 0.128$$

$$< 1.0$$

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