

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

### Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (Minutes)
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

### Result

#### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = 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:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Mode	Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
		(dBi)	(numeric)	(dBm)	(mW)			
Bluetooth	2402-2480	2.0	1.58	7.5	5.62	20	0.0018	1
BLE	2402-2480	2.0	1.58	3.3	2.14	20	0.0007	1
2.4G Wi-Fi	2412-2462	2.0	1.58	21.5	141.25	20	0.044	1
5G Wi-Fi	5150-5250	3.5	2.24	14.5	28.18	20	0.0126	1
	5250-5350	3.5	2.24	15.0	31.62	20	0.0141	1
	5470-5725	3.5	2.24	11.5	14.13	20	0.0063	1
	5725-5850	3.5	2.24	15.0	31.62	20	0.0141	1

Note: 1. the tune up conducted power was declared by the applicant  
 2. The Bluetooth can transmit at the same time with Wi-Fi, the 2.4G Wi-Fi can't transmit at the same time with the 5G Wi-Fi.

#### Simultaneous transmitting consideration:

The ratio=MPEWi-Fi/limit + MPEBT/limit=0.044/1+0.0018/1=0.0458<1.0

So simultaneous exposure comply with the limit.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

#### Result: Compliance