

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 ²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	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/cm²)

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:

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

Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2402-2480	4.0	2.51	5.5	3.55	20	0.002	1
2412-2462	4.0	2.51	21.0	125.89	20	0.063	1
5150-5250	3.5	2.24	15.0	31.62	20	0.014	1
5250-5350	3.5	2.24	13.5	22.39	20	0.010	1
5470-5725	3.5	2.24	11.0	12.59	20	0.006	1
5725-5850	3.5	2.24	15.5	35.48	20	0.016	1

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

Simultaneous transmitting consideration (worst case):

The ratio=MPE_{Wi-Fi}/limit+MPE_{BT}/limit=0.063/1+0.002/1=0.065<1.0, so simultaneous exposure is compliant.

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

Result: Compliant.