

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

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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)

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 (BLE)	2.5	1.78	-1.5	0.71	20	0.0003	1
2412-2472(Wi-Fi)	2.5	1.78	15	31.62	20	0.011	1

Note: The 2.4G Wi-Fi can't transmit with the 5G Wi-Fi at the same time, but 2.4G Wi-Fi can transmit with BT/BLE simultaneously.

For the simultaneously consideration:

The worst case is 2.4G Wi-Fi with BT, refer to the DSS report, the power density is $0.002\text{mW}/\text{cm}^2$ for BT

The ratio= $\text{MPE}_{\text{BT}}/\text{Limit}_{\text{BT}} + \text{MPE}_{2.4\text{G Wi-Fi}}/\text{Limit}_{2.4\text{G Wi-Fi}} = 0.002/1 + 0.11/1 = 0.112 < 1.0$

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

Result: Compliance