

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

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1310, 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				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	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

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = 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);

Calculated Data (worst case):

2.4G WiFi&BLE/BT:

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2412-2462	1.7	1.48	20.50	112.20	20	0.0330	1.0
802.11g		1.7	1.48	20.00	100.00	20	0.0294	1.0
802.11n-HT20		1.7	1.48	20.00	100.00	20	0.0294	1.0
BLE	2402-2480	1.7	1.48	6.00	3.98	20	0.0012	1.0
BT	2402-2480	1.7	1.48	6.00	3.98	20	0.0012	1.0

5G Wi-Fi:

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
802.11a	5150~5250	2.60	1.82	20.00	100.00	20	0.0362	1.0
	5725~5850	2.60	1.82	22.50	177.83	20	0.0644	1.0
802.11ac20	5150~5250	2.60	1.82	19.50	89.13	20	0.0323	1.0
	5725~5850	2.60	1.82	22.50	177.83	20	0.0644	1.0
802.11n20	5150~5250	2.60	1.82	19.50	89.13	20	0.0323	1.0
	5725~5850	2.60	1.82	22.00	158.49	20	0.0574	1.0
802.11ac40	5150~5250	2.60	1.82	18.50	70.79	20	0.0256	1.0
	5725~5850	2.60	1.82	21.50	141.25	20	0.0511	1.0
802.11n40	5150~5250	2.60	1.82	18.50	70.79	20	0.0256	1.0
	5725~5850	2.60	1.82	21.00	125.89	20	0.0456	1.0
802.11ac80	5210	2.60	1.82	16.00	39.81	20	0.0144	1.0
	5775	2.60	1.82	18.50	70.79	20	0.0256	1.0

Note: 1. For the above tune up power were declared by the manufacturer.
 2. Wi-Fi and BT/BLE can't transmit simultaneously.

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