

FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 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		Max Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
Wifi	1.8	1.51	14.0	25.12	20	0.0076	1
BLE	0.5	1.12	2.0	1.58	20	0.0004	1
Bluetooth	0.5	1.12	2.0	1.58	20	0.0004	1
WCDMA B2	0.9	1.23	25	316.23	20	0.0774	1
WCDMA B5	0.9	1.23	25	316.23	20	0.0774	0.55
LTE B2	0.9	1.23	25.7	371.54	20	0.0910	1
LTE B4	0.9	1.23	25.7	371.54	20	0.0910	1
LTE B12	0.9	1.23	25.7	371.54	20	0.0910	0.47

$P_{avg} < \frac{N \cdot P_{max}}{4\pi R^2}$
 Simultaneously consider:
 The ratio = $0.0004/1 + 0.0076/1 + 0.0774/0.55 = 0.1487 < 1$

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

Result: Compliance