

FCC §1.1307(b) & 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/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

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:

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

Result**For worst case:**

Mode	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)			
Wi-Fi	2412-2462	2.84	1.92	26	398.11	20	0.1521	1
WCDMA B2	1850-1910	2.56	1.8	23	199.53	20	0.0715	1
WCDMA B5	824-849	-2.31	0.59	25	316.23	20	0.0371	0.549
LTE B2	1850-1910	2.56	1.8	23	199.53	20	0.0715	1
LTE B4	1710-1755	1.62	1.45	22	158.49	20	0.0457	1
LTE B12	699-716	-1.56	0.7	23	199.53	20	0.0278	0.466
LTE B17	704-716	-1.56	0.7	24	251.19	20	0.0350	0.469

Note: The tune-up power and antenna gain was declared by the applicant.

Simultaneous transmitting consideration (worst case):

The ratio= $\text{MPE}_{\text{Wi-Fi}}/\text{limit}_{\text{Wi-Fi}} + \text{MPE}_{\text{LTE Band 17}}/\text{limit}_{\text{LTE Band 17}} = 0.1521/1 + 0.0350/0.469 = 0.227 < 1.0$

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

Result: Compliant.