

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);

For simultaneously transmit system, the calculated power density should comply with:

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

Calculated Data (worst case):

Mode	Frequency Range (MHz)	Tune-up Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	MPE ratio
		(dBi)	(numeric)	(dBm)	(mW)				
Wi-Fi 802.11b	2412-2462	0.5	1.12	18.50	70.79	20	0.0158	1.0	0.0158
Wi-Fi 802.11g		0.5	1.12	17.50	56.23	20	0.0125	1.0	0.0125
Wi-Fi 802.11n-HT20		0.5	1.12	17.50	56.23	20	0.0125	1.0	0.0125
Wi-Fi 802.11n-HT40	2422-2452	0.5	1.12	17.50	56.23	20	0.0125	1.0	0.0125
BLE	2402-2480	2.1	1.62	4.00	2.51	20	0.0008	1.00	0.0008
LTE Band 4	1710-1755	2.5	1.78	24.00	251.19	20	0.0889	1.00	0.0889
LTE Band 13	777-787	2.5	1.78	24.00	251.19	20	0.0889	0.52	0.1710
SRD	433.92	/	/	-34.89	0.0003	20	0.0000001	0.29	0.0000003

Note:

- (1) The LTE module FCC ID: RI7LE910SVL.
 (2) The SRD EIRP = 60.31dBμV/m-95.2 = -34.89dBm.
 (3) Wi-Fi & BLE & SRD & LTE can transmit simultaneously; the worst condition is as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0158 + 0.0008 + 0.1710 + 0.0000003 = 0.1876003 < 1.0$$

Conclusion: The device meets MPE at distance 20cm.