

4 FCC §2.1091, §1.1310(d) (3) & RSS-102 - RF Exposure

4.1 Applicable Standards

As per FCC §1.1310(d) (3), At operating frequencies above 6 GHz, the MPE limits listed in Table 1 in paragraph (e)(1) of this section shall be used in all cases to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b) of this part.

TABLE 1 TO §1.1310(E)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
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
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = \text{EIRP}/4\pi R^2$$

Where: S = power density

EIRP = Effective Isotropic Radiated Power

R = distance to the center of radiation of the antenna

4.3 MPE Results for the FCC

Standalone

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Ratio (%)
2.4GHz Wifi	2412	3.26	20.50	23.76	237.68	0.047	1.0	4.70
Bluetooth	2402	3.26	10.00	13.26	21.18	0.004	1.0	0.40
LTE Band 2	1850-1910	4.83	25	29.83	961.61	0.19	1.0	19.13
LTE Band 4	1710-1755	4.83	25	29.83	961.61	0.19	1.0	19.13
LTE Band 5	824-849	3.78	25	28.78	755.09	0.15	0.5	30.04
LTE Band 12	699-716	0.36	25	25.36	343.56	0.07	0.5	13.67
LTE Band 13	777-787	0.36	25	25.36	343.56	0.07	0.5	13.67
LTE Band 17	704-716	0.36	25	25.36	343.56	0.07	0.5	13.67
LTE Band 25	1850-1915	4.83	25	29.83	961.61	0.19	1.0	19.13
LTE Band 66	1710-1780	4.83	25	29.83	961.61	0.19	1.0	19.13

Note: Wifi and BT cannot transmit simultaneously

Note: Refer to antenna datasheet SPE-14-8-054-G provided by TAOGLAS for antenna gain that is to be used by this device.

Sum of Ratios:

Wifi + LTE: $0.047/1.0 + 0.15/0.5 = 0.347 < 1$

BT + LTE: $0.004/1.0 + 0.15/0.5 = 0.304 < 1$

NOTE: LTE ratio shown above is based on band with worst ratio based on above table.