

FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.407(f) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

S = PG/4πR² = 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);

Predication of MPE limit at a given distance

S = PG/4πR² = 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:

Modes	Frequency Range (MHz)	Antenna Gain		Maximum Power Including Tolerance		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
1.4MHz	2403.5-2477.5	3.93	2.47	30	1000.00	20.00	0.4920	1.0
10MHz	2405.5-2477.5	3.93	2.47	30	1000.00	20.00	0.4920	1.0
20MHz	2410.5-2472.5	3.93	2.47	30	1000.00	20.00	0.4920	1.0
802.11b	2412-2462	3.93	2.47	25	316.23	20.00	0.1556	1.0
802.11g	2412-2462	3.93	2.47	25	316.23	20.00	0.1556	1.0
802.11n ht20	2412-2462	3.93	2.47	25	316.23	20.00	0.1556	1.0
802.11a	5180-5825	5.05	3.20	16	39.81	20.00	0.0253	1.0
802.11n ht20	5180-5825	5.05	3.20	16	39.81	20.00	0.0253	1.0

Note:

The Maximum Power Including Tolerance was declared by manufacturer.

All of the modes can't transmit simultaneously.

Result: Compliance, The device meet FCC MPE at 20 cm distance