

§1.1310& §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) 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/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;

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);

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Tune-up Conducted Power		EvaluationDistance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
802.11a	5180	2.00	1.58	13.50	22.39	20	0.0070	1.0	0.0070
802.11n20	5180	2.00	1.58	14.00	25.12	20	0.0079	1.0	0.0079
SRD	2417	2.00	1.58	-1.00	0.79	20	0.0002	1.0	0.0002

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

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

The worst condition is 802.11n20 & SRD, as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0079 + 0.0002 = 0.0081 < 1.0$$

Note:

(1) The Tune-up output power was declared by the Manufacturer.

Conclusion: The device meets MPE at distance 20cm.