

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

Applicable Standard

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

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

$S = PG/4R^2$ = 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);

Calculated Data:

Mode	Frequency Range	Antenna Gain		Target Output Power	Output Power		Evaluation Distance	Power Density	MPE Limit
	(MHz)	(dBi)	(numeric)	(dBm)	(dBm)	(mW)	(cm)	(mW/cm ²)	(mW/cm ²)
802.11b	2412~2462	3.00	2.00	13±1	14.00	25.12	20	0.0100	1.0
802.11g		3.00	2.00	11.5±1	12.50	17.78	20	0.0071	1.0
802.11n-HT20		3.00	2.00	14.5±1	15.50	35.48	20	0.0141	1.0
802.11n-HT40	2422~2452	3.00	2.00	13±1	14.00	25.12	20	0.0100	1.0
802.11a	5150~5250	3.00	2.00	14±1	15.00	31.62	20	0.0126	1.0
802.11n-HT20		3.00	2.00	17.5±0.5	18.00	63.10	20	0.0250	1.0
802.11n-HT40		3.00	2.00	15.5±0.5	16.00	39.81	20	0.0158	1.0
802.11ac20		3.00	2.00	18±0.5	18.50	70.79	20	0.0281	1.0
802.11ac40		3.00	2.00	16±1	17.00	50.12	20	0.0199	1.0
802.11ac80		3.00	2.00	14.5±0.5	15.00	31.62	20	0.0126	1.0
802.11a	5725~5850	3.00	2.00	14±0.5	14.50	28.18	20	0.0112	1.0
802.11n-HT20		3.00	2.00	17.5±0.5	18.00	63.10	20	0.0250	1.0
802.11n-HT40		3.00	2.00	15.5±1	16.50	44.67	20	0.0177	1.0
802.11ac20		3.00	2.00	17±1.5	18.50	70.79	20	0.0281	1.0
802.11ac40		3.00	2.00	15.5±0.5	16.00	39.81	20	0.0158	1.0
802.11ac80		3.00	2.00	14.5±0.5	15.00	31.62	20	0.0126	1.0

Note:

1. For the above target output power are all declared by the manufacturer.
2. The EUT has the 2.4GHz Wi-Fi, 5GHz Wi-Fi functions, they can transmitting simultaneously. According to KDB 447498 D01 General RF Exposure Guidance v06 and test data, 802.11n-HT20 mode for 2.4G Wi-Fi, 802.11ac20 mode 5150-5250 band for 5GHz Wi-Fi is the worst case, their sum of MPE ratio is 0.0422, which is less than 1.0, so the collocation exposure exclusion applies.

Result: The device meet FCC MPE at 20 cm distance.