

FCC §15.247 (i), §2.1091 & §1.1307(b)(1)- 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/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

$$S = PG/4\pi R^2$$

Where:

S = 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);

DTS Band:

Mode	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2462	3	2.00	20.74	118.58	20	0.047	1.0
802.11g	2437	3	2.00	20.61	115.08	20	0.046	1.0
802.11n HT20	2462	3	2.00	19.89	97.45	20	0.039	1.0
802.11n HT40	2422	3	2.00	20.06	101.41	20	0.040	1.0

UNII Band:

5150-5250 MHz

Mode	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11a	5240	3	2.00	20.84	121.34	20	0.048	1
802.11ac VHT20	5180	3	2.00	19.96	99.08	20	0.039	1
802.11ac VHT40	5190	3	2.00	19.27	84.53	20	0.034	1
802.11ac VHT80	5210	3	2.00	19.53	89.74	20	0.036	1
802.11n HT20	5220	3	2.00	19.91	97.95	20	0.039	1
802.11n HT40	5190	3	2.00	19.38	86.70	20	0.034	1

5725-5850 MHz

Mode	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11a	5745	3	2.00	20.62	115.35	20	0.046	1
802.11ac VHT20	5745	3	2.00	20.15	103.51	20	0.041	1
802.11ac VHT40	5755	3	2.00	19.71	93.54	20	0.037	1
802.11ac VHT80	5775	3	2.00	19.51	89.33	20	0.035	1
802.11n HT20	5745	3	2.00	20.18	104.23	20	0.041	1
802.11n HT40	5755	3	2.00	19.70	93.33	20	0.037	1

According to KDB 447498 D01 General RF exposure guidance v05r02, EUT has 5GHz and 2.4GHz transmitting simultaneously. So the sum of MPE ratio for six antennas is 0.095 which is less than 1.0, So the collocation exposure exclusion applies.

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