4 FCC §1.1310, §2.1091, §15.407(f) - Maximum Permissible Exposure (MPE)

4.1 Applicable Standard

According to §15.407(f), U-NII devices are subject to the radio frequency radiation exposure requirements specified in § 1.1307(b), and 2.1091 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request

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

$S = PG/4\pi R^2$ = 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: $\sum_i \frac{S_i}{S_{Limit,i}} \le 1$

4.2 RF Exposure Evaluation Result

MPE Evaluation

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Wi-Fi 2.4G	2412-2462	3.20	2.0893	27.00	501.1872	20	0.2084	1
Wi-Fi 5G B1	5150-5250	3.20	2.0893	21.00	125.8925	20	0.0524	1
Wi-Fi 5G B4	5725-5850	3.20	2.0893	23.00	199.5262	20	0.0830	1

Wi-Fi 2.4G and Wi-Fi 5G can transmit simultaneously，MPE evaluation is as below formula:
PD1/Limit1+PD2/Limit2+……＜1, PD (Power Density)

The worst case is as below:
Max MPE of Wi-Fi 2.4G + Max MPE of Wi-Fi 5G B4 = 0.2084/1.0+0.0830/1 =0.2914 ＜ 1.0

Result: MPE evaluation of single and simultaneous transmission meet the requirement of standard.