FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

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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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

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)

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

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

Mode	Frequency (MHz)	Antenna Gain		Max Tune Up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G Wi-Fi	2412-2472	6.93	4.93	21.0	125.89	20	0.124	1.0
BLE	2402-2480	-0.042	0.99	9.0	7.94	20	0.002	1.0
5G Wi-Fi	5150-5250	8.56	7.18	20.0	100.0	20	0.143	1.0
5G Wi-Fi	5725-5850	7.53	5.66	20.0	100.0	20	0.113	1.0

Note: 1. the tune up conducted power was declared by the applicant
2. the BLE, 2.4G Wi-Fi functions can transmit at the same time with 5G Wi-Fi.
3. For the Wi-Fi, as it can support the beam-forming function, so the antenna gain should add the 10lg2.

So the worst simultaneous transmitting consideration:

The ratio=$MPE_{2.4GWi\text{-}Fi}$/limit + $MPE_{5GWi\text{-}Fi}$/limit + MPE_{BLE}/limit =0.124/1.0+0.143/1.0+0.002/1.0 =0.269＜1.0

so simultaneous exposure is not required.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliance