5 FCC §15.407(f), §1.1310, §2.1091 –Maximum Permissible Exposure (MPE)

5.1 Applicable Standard

According to subpart 1.1310, 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				
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

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:

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

5.2 RF Exposure Evaluation Result

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)			
BLE	2402-2480	6	3.98	1	1.26	30	0.0004	1
WIFI 2.4GHz XOR	2412-2462	12	15.85	20.5	112.20	30	0.16	1
WIFI 5GHz XOR	5150-5850	12.02	15.92	22.5	177.83	30	0.25	1
WIFI 5GHz Regular	5150-5850	12.02	15.92	21.5	141.25	30	0.20	1
WIFI 5GHz Regular 8TX	5150-5850	13.78	23.88	25.5	354.81	30	0.75	1
WIFI 2.4GHz AUX	2412-2462	6	3.98	20	100.00	30	0.04	1
WIFI 5GHz AUX	5150-5850	6	3.98	20	100.00	30	0.04	1

Transmit simultaneously:

Worst case is Mode 6:

0.0004/1+0.75/1+0.04/1 = 0.7904 < 1

Result: The EUT meets exemption requirement- RF exposure evaluation greater than **30cm** distance.