§2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to 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 Maximum Permissible Exposure (MPE)

Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3 - 3.0	614	1.63	(100)*	6
3.0 - 30	1842/f	4.89/f	($900/f^2$)*	6
30 - 300	61.4	0.163	1.0	6
300 - 1500	/	/	f/300	6
1500 - 100000	/	/	5	6
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	842/f	2.19/f	($180/f^2$)*	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	/	/	f/1500	30
1500 - 100000	/	/	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/cm^2)
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 worst case

Frequency (MHz)	Antenna Gain		Tune up conducted power		Distance (cm)	Power density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2402-2480	2.43	1.75	7	5.0119	40	0.0004	1
2412-2462	2.43	1.75	23	199.5262	40	0.0174	1
410-470	2.14	1.64	34.2	2630.2680	40	0.2142	0.2733

Note1: The BT function can't transmit at the same time with the Wi-Fi function.
Note2: The BT/Wi-Fi function can transmit at the same time with the DMR function.

Simultaneous transmitting consideration:

The ratio= $MPE_{2.4G\ Wi\text{-}Fi}$ /limit+MPE_{DMR} /limit=0.0174/1+0.2142/0.2733=0.80＜1.0

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 40cm from nearby persons.

Result: Compliant.