FCC §1.1310 & §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §2.1091 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/f²)	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/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 simultaneously transmit system, the calculated power density should comply with:

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

Calculated Data:

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Output Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
802.11b	2412~2462	3.0	2.00	21.50	141.25	20	0.0562	1.0	0.0562
802.11g		3.0	2.00	24.50	281.84	20	0.1121	1.0	**0.1121**
802.11n-HT20		3.0	2.00	24.50	281.84	20	0.1121	1.0	0.1121
802.11 n-HT40	2422~2452	3.0	2.00	24.00	251.19	20	0.0999	1.0	0.0999

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up EIRP		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
SRD	915	3.0	2.0	0.00	1.00	20	0.0002	0.61	**0.0003**

Note: (1) The Tune-up output power was declared by the Manufacturer.

(2) SRD: ERP= 90.88 dBμV/m -95.2=-4.32 dBm, EIRP=ERP+2.15= -2.17 dBm, Tune up EIRP= 0 dBm

(3) 2.4G Wi-Fi and SRD can transmit simultaneously, The worst condition is 2.4G Wi-Fi & SRD, as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.1121+0.0003 = 0.1124<1$$

Conclusion: The device meets MPE at distance 20cm.