RF Exposure Compliance Requirement

1 Standard requirement

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 limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

(a) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm^2)	Averaging Times $\|E\|^2$,$\|H\|^2$or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	F/300	6
1500-100000	--	--	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm^2)	Averaging Times $\|E\|^2$,$\|H\|^2$or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	F/1500	30
1500-100000	--	--	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

2 MPE Calculation Method

E (V/m)=$(30*P*G)^{0.5}/d$ Power Density: Pd(W/m^2)=$E^2/377$

E=Electric Field (V/m)

P= RF output Power (W)

G=EUT Antenna numeric gain (numeric)

d= Separation distance between radiator and human body (m)

The formula can be changed to

Pd= $(30*P*G)/(377*d^2)$

From the average EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

3 Calculated Result and Limit

(1)

Frequency (MHz)	Antenna Gain (Numeric)	Output Power (dBm)	Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
ZigBee	1.585	21.11	129.122	0.04071	1	Complies
WiFi 2.4GHz 802.11b	1.585	18.74	74.817	0.02359	1	Complies
WiFi 2.4GHz 802.11g	1.585	16.98	49.888	0.01573	1	Complies
WiFi 2.4GHz 802.11n20	1.585	16.54	45.082	0.01421	1	Complies
WiFi 2.4GHz 802.11n40	1.585	14.57	28.642	0.00903	1	Complies

(2)

ZigBee and WiFi function transmit simultaneously maximum Power Density (mW/cm^2): 0.04071+0.02359=0.0643 mW/cm^2

It does meet the RF Exposure Compliance Requirement.