RF Exposure Evaluation

Limit

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1310 & 2.1091

Table 1-Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
1500–100,000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
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

Note: f = frequency in MHz

Evaluation Method

Transmission formula: $P_d = (Pout*G)/(4*pi*R^2)$

Where

Pd = power density in mW/cm2, Pout = output power to antenna in mW, G = gain of antenna in linear scale;

Pi = 3.1416, R = distance between observation point and center of the radiator in cm

Conducted Power Results

WIFI

Mode	Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)
802.11b	1	2412	7.34
	6	2437	8.72
	11	2462	8.65
802.11b	1	2412	9.99
	6	2437	9.34
	11	2462	11.11
802.11n(HT20)	1	2412	9.88
	6	2437	9.28
	11	2462	11.02

Manufacturing tolerance

WIFI

802.11b			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	8	8	8
Tolerance ±(dB)	1	1	1
802.11g			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	9	9	9
Tolerance ±(dB)	1	1	1
802.11n20			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	10.5	10.5	10.5
Tolerance ±(dB)	1	1	1

Evaluation Results

WIFI

Band/Mode	Antenna Distance (cm)	EIRP		Gain of antenna in linear scale	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
		dBm	mW				
802.11b	20	9	7.94	1.78	0.003	1.0	Pass
802.11g	20	10	10.00	1.78	0.004	1.0	Pass
802.11n20	20	11.5	14.13	1.78	0.005	1.0	Pass

Remark:

1. Output power including tune up tolerance;

2. The maximum antenna gain is 2.5dBi

3. The exposure safety distance is 20cm.

4. EIRP = Conducted Peak Output Power + Antenna Gain + Tolerance

Conclusion

The measurement results comply with the FCC Limit per 47 CFR 1.1310 & 2.1091 for the uncontrolled RF Exposure and MPE complicance per KDB 447498 v06.