

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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm², P_{out} = output power to antenna in mW, G = gain of antenna in linear scale;

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

Conducted Power Results & Manufacturing tolerance

Specification	Operating Mode	Conducted Peak Output Power (dBm)	Target (dBm)	Tolerance \pm (dB)
2.4GWIFI	802.11b	10.12	9.5	1
	802.11g	10.58	10	1
	802.11n(HT20)	10.35	9.5	1
	802.11n(HT40)	10.30	9.5	1

Evaluation Results

Spec.	Operating Mode	Antenna Distance (cm)	Conducted Output Power		Gain of antenna in linear scale	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
			dBm	mW				
2.4GWIFI	802.11b	20	10.5	11.22	2.36	0.005	1	PASS
	802.11g	20	11	12.59	2.36	0.006	1	PASS
	802.11n(HT20)	20	10.5	11.22	2.36	0.005	1	PASS
	802.11n(HT40)	20	10.5	11.22	2.36	0.005	1	PASS

Remark:

1. Output power including tune up tolerance;
2. The maximum 2.4G antenna gain is 3.73dBi
3. The exposure safety distance is 20cm.

Simulation Transmission

EUT can only work in 2.4GWIFI mode

The formula of calculated the Simulation Transmission MPE is:

$$CPD1/LPD1+CPD2/LPD2+.....etc. < 1$$

CPD=Calculation Maximum Power Denisty

Mode	Calculate	Limit	Result
2.4GWIFI mode	0.006	1	Pass

Conclusion

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