

## 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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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/cm<sup>2</sup>,  $P_{out}$  = 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**

**WIFI**

Mode	Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)
802.11b	1	2412	11.57
	6	2437	11.20
	11	2462	10.80
802.11g	1	2412	12.61
	6	2437	12.57
	11	2462	12.69
802.11n(HT20)	1	2412	11.41
	6	2437	11.33
	11	2462	12.14
802.11n(HT40)	3	2422	12.88
	6	2437	12.36
	9	2452	12.51

**Manufacturing tolerance**

**WIFI**

<b>802.11b</b>			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	11	11	11
Tolerance ±(dB)	1	1	1
<b>802.11g</b>			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12	12	12
Tolerance ±(dB)	1	1	1
<b>802.11n20</b>			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12	12	12
Tolerance ±(dB)	1	1	1
<b>802.11n40</b>			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	12	12	12
Tolerance ±(dB)	1	1	1

**Evaluation Results**

**WIFI**

Band/Mode	Antenna Distance (cm)	Conducted Output Power		Gain of antenna in linear scale	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
		dBm	mW				
802.11b	20	12	15.85	1.32	0.0042	1.0	Pass
802.11g	20	13	19.95	1.32	0.0053	1.0	Pass
802.11n20	20	13	19.95	1.32	0.0053	1.0	Pass
802.11n40	20	13	19.95	1.32	0.0053	1.0	Pass

*Remark:*

1. Output power including tune up tolerance;
2. The maximum antenna gain is 1.22dBi
3. The exposure safety distance is 20cm.

**Conclusion**

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