

RF EXPOSURE EVALUATION

According to FCC 1.1310: 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 §1.1307(b)

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

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

MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Average 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

$$Pd = \frac{30 * P * G}{377 * D^2}$$

From the 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.

MAX OUTPUT POWER

WIFI

Test Channel	Frequency (MHz)	Power Setting	Duty Cycle Factor (dB)	Average Output Power (dBm)	Maximum Output Power(dBm)	LIMIT (dBm)	Verdict
	802.11b						
1	2412	Default	0	12.4	12.4	30	PASS
6	2437	Default	0	12.3	12.3	30	PASS
11	2462	Default	0	11.9	11.9	30	PASS
	802.11g						
1	2412	Default	0	10.7	10.7	30	PASS
6	2437	Default	0	11.3	11.3	30	PASS
11	2462	Default	0	10.0	10.0	30	PASS
	802.11n HT20						
1	2412	Default	0	11.0	11.0	30	PASS
6	2437	Default	0	11.4	11.4	30	PASS
11	2462	Default	0	10.0	10.0	30	PASS

Measurement Result

Operation Frequency: WIFI: 2412-2462MHz

Power density limited: $1\text{mW}/\text{cm}^2$

Antenna Type: PCB antenna

Antenna gain: 2.27dBi,
R=20cm

WIFI:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	12.4	12±1	13	19.953	2.27	1.69	0.0067	1
2437		12.3	12±1	13	19.953	2.27	1.69	0.0067	1
2462		11.9	12±1	13	19.953	2.27	1.69	0.0067	1
2412	802.11g	10.7	11±1	12	15.849	2.27	1.69	0.0053	1
2437		11.3	11±1	12	15.849	2.27	1.69	0.0053	1
2462		10.0	11±1	12	15.849	2.27	1.69	0.0053	1
2412	802.11n HT20	11.0	11±1	12	15.849	2.27	1.69	0.0053	1
2437		11.4	11±1	12	15.849	2.27	1.69	0.0053	1
2462		10.0	11±1	12	15.849	2.27	1.69	0.0053	1

Conclusion:

For the max result : $0.0067 \leq 1.0$ for Max Power Density, compliance RF exposure..

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Signature:

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