

FCC ID: 2BOZP-RC330B

Maximum Permissible Exposure (MPE)

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.

BLE:
Measurement Result
Operation Frequency: 2402MHz~2480MHz
Power density limited: 1mW/ cm²
Antenna Type: Ceramics antenna
Antenna gain:4.3dBi;
R=20cm
mW=10^{^(dBi/10)}
antenna gain Numeric=10^{^(dBi/10)}= 10^{^(4.3/10)}=2.69

Channel Freq. (MHz)	modulation	conducted power	Tune-up pow er (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2402	BLE 1M	-3.79	-3±1	-2	0.631	4.30	2.69	0.0003	1
2440		-3.26	-3±1	-2	0.631	4.30	2.69	0.0003	1
2480		-2.53	-3±1	-2	0.631	4.30	2.69	0.0003	1
2402	BLE 2M	-3	-2.5±1	-1.5	0.708	4.30	2.69	0.0004	1
2440		-2.5	-2.5±1	-1.5	0.708	4.30	2.69	0.0004	1
2480		-1.98	-2.5±1	-1.5	0.708	4.30	2.69	0.0004	1

2.4GWIFI:
Measurement Result
Operation Frequency: 2412MHz~2462MHz (20M)
2422MHz~2452MHz (40M)
Power density limited: 1mW/ cm²
Antenna Type: Ceramics antenna
Antenna gain:4.3dBi;
R=20cm
mW=10^{^(dBi/10)}
antenna gain Numeric=10^{^(dBi/10)}= 10^{^(4.3/10)}=2.69

Channel Freq. (MHz)	modulation	conducted pow er	Tune-up pow er (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Pow er density Limits (mW/cm2)
		(dBm)		tune-up pow er		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	
2412	11b	16.07	16±1	17	50.119	4.30	2.69	0.0268	1
2437		15.60	16±1	17	50.119	4.30	2.69	0.0268	1
2462		16.17	16±1	17	50.119	4.30	2.69	0.0268	1
2412	11g	13.64	14±1	15	31.623	4.30	2.69	0.0169	1
2437		14.30	14±1	15	31.623	4.30	2.69	0.0169	1
2462		14.94	14±1	15	31.623	4.30	2.69	0.0169	1
2412	11n20	12.15	13±1	14	25.119	4.30	2.69	0.0134	1
2437		12.80	13±1	14	25.119	4.30	2.69	0.0134	1
2462		13.25	13±1	14	25.119	4.30	2.69	0.0134	1
2422	11n40	9.55	10±1	11	12.589	4.30	2.69	0.0067	1
2437		9.93	10±1	11	12.589	4.30	2.69	0.0067	1
2452		10.02	10±1	11	12.589	4.30	2.69	0.0067	1

BLE+2.4GWIFI=0.0004+0.0268=0.0272≤ 1

Conclusion:
For the max result : 0.0272≤ 1.0 for Max Power Density, compliance RF exposure..

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