

FCC ID:2APUZ-Z1-N

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)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

11.1 Friis transmission formula: $P_d = \frac{P_{out} \cdot G}{4 \cdot \pi \cdot R^2}$

Where

P_d = Power density in mW/cm²

P_{out} =output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

π =3.1416

R = distance between observation point and center of the radiator in cm(20cm)

P_d the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

$mW = 10^{(dBm/10)}$

11.2 Measurement Result

Operation Frequency: 2412MHz~2462MHz

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

Antenna Type: PCB Antenna

Antenna gain: 0.72dBi,

R=20cm

$\text{mW}=10^{(\text{dBm}/10)}$

BLE

Channel Freq. (MHz)	modulation	conducted pow er	Tune-up pow er (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Pow er density Limits (mW/cm ²)
		(dBm)		tune-up pow er		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK	6.03	6±1	7	5.012	0.72	1.18	0.0012	1
2440		6.71	6±1	7	5.012	0.72	1.18	0.0012	1
2480		5.22	6±1	7	5.012	0.72	1.18	0.0012	1

2.4G WIFI

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)
2412	802.11b	17.61	17±1	18	63.096	0.72	1.18	0.0148	1
2437		17.38	17±1	18	63.096	0.72	1.18	0.0148	1
2462		17.3	17±1	18	63.096	0.72	1.18	0.0148	1
2412	802.11g	14.5	14±1	15	31.623	0.72	1.18	0.0074	1
2437		14.56	14±1	15	31.623	0.72	1.18	0.0074	1
2462		14.33	14±1	15	31.623	0.72	1.18	0.0074	1
2412	802.11n H20	14.48	14±1	15	31.623	0.72	1.18	0.0074	1
2437		14.55	14±1	15	31.623	0.72	1.18	0.0074	1
2462		14.29	14±1	15	31.623	0.72	1.18	0.0074	1
2422	802.11n(HT 40)	14.02	14±1	15	31.623	0.72	1.18	0.0074	1
2437		14.12	14±1	15	31.623	0.72	1.18	0.0074	1
2452		14.24	14±1	15	31.623	0.72	1.18	0.0074	1

Conclusion:

For the max result : $0.0148 \leq 1\text{mW}/\text{cm}^2$ for Power density, compliance with RF exposure.

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Signature:

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