
FCC ID:

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)	Peak Output Power (dBm)	Maximum Output Power(dBm)	LIMIT (dBm)	Verdict
802.11b							
1	2412	Default	0	16.3	16.3	30	PASS
6	2437	Default	0	16.1	16.1	30	PASS
11	2462	Default	0	16.2	16.2	30	PASS
802.11g							
1	2412	Default	0	15.7	15.7	30	PASS
6	2437	Default	0	15.6	15.6	30	PASS
11	2462	Default	0	15.6	15.6	30	PASS
802.11n HT20							
1	2412	Default	0	15.5	15.5	30	PASS
6	2437	Default	0	15.5	15.5	30	PASS
11	2462	Default	0	15.5	15.5	30	PASS

BLE

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE	2402	0.81	0	0.81	30	Pass
NVNT	BLE	2440	0.75	0	0.75	30	Pass
NVNT	BLE	2480	0.73	0	0.73	30	Pass

Measurement Result

Operation Frequency: WIFI: 2412-2462MHz for 802.11b/g/11n (HT20);
BLE: 2402-2480MHz

Power density limited: 1mW/ cm²

Antenna Type: PCB Antenna

Antenna gain: 0 dBi,

R=20cm

WIFI:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density limits
		(dBm)		tune-up power		Gain			(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	16.3	16±1	17	50.119	0.00	1.00	0.0100	1
2437		16.1	16±1	17	50.119	0.00	1.00	0.0100	1
2462		16.2	16±1	17	50.119	0.00	1.00	0.0100	1
2412	802.11g	15.7	16±1	17	50.119	0.00	1.00	0.0100	1
2437		15.6	16±1	17	50.119	0.00	1.00	0.0100	1
2462		15.6	16±1	17	50.119	0.00	1.00	0.0100	1
2412	802.11n HT20	15.5	16±1	17	50.119	0.00	1.00	0.0100	1
2437		15.5	16±1	17	50.119	0.00	1.00	0.0100	1
2462		15.5	16±1	17	50.119	0.00	1.00	0.0100	1

BLE:

Channel Freq. (MHz)	modulation	conducted pow er	Tune-up pow er (dBm)	Max		Antenna		Evaluation result	Pow er density Limits
		(dBm)		tune-up pow er		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2402	BLE	0.81	1±1	2	1.585	0.00	1.00	0.0003	1
2440		0.75	1±1	2	1.585	0.00	1.00	0.0003	1
2480		0.73	1±1	2	1.585	0.00	1.00	0.0003	1

Conclusion:

For the max result: 0.0100≤ 1.0 for Max Power Density, compliance RF exposure.

Signature:

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Date: 2019-12-04

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