

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

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

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

SUB1G

Test Channel	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	LIMIT (dBm)	Verdict
01	915	Default	14.18	30	PASS
02	922	Default	14.16	30	PASS
03	927.25	Default	14.14	30	PASS

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	18.7	18.7	30	PASS
6	2437	Default	0	18.4	18.4	30	PASS
11	2462	Default	0	18.4	18.4	30	PASS
	802.11g						
1	2412	Default	0	18.2	18.2	30	PASS
6	2437	Default	0	17.9	17.9	30	PASS
11	2462	Default	0	17.8	17.8	30	PASS
	802.11n HT20						
1	2412	Default	0	16.6	16.6	30	PASS
6	2437	Default	0	16.2	16.2	30	PASS
11	2462	Default	0	16.2	16.2	30	PASS
	802.11n HT40						
3	2422	Default	0	16.2	16.2	30	PASS
6	2437	Default	0	15.9	15.9	30	PASS
9	2452	Default	0	16.0	16.0	30	PASS

Measurement Result

Operation Frequency: GFSK: 915MHz~927.25MHz

WIFI: 2412-2462MHz for 802.11b/g/11n(HT20);

2422-2452MHz for 802.11n(HT40);

Power density limited: 1mW/ cm²

Antenna Type: LDS antenna

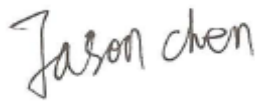
Antenna gain: 0 dBi,

R=20cm

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
915	GFSK	14.18	14±1	15	31.623	0.00	1.00	0.0063	0.6100
922		14.16	14±1	15	31.623	0.00	1.00	0.0063	0.6147
927.25		14.14	14±1	15	31.623	0.00	1.00	0.0063	0.6182
2412	802.11b	18.70	18±1	19	79.433	0.00	1.00	0.0158	1
2437		18.40	18±1	19	79.433	0.00	1.00	0.0158	1
2462		18.40	18±1	19	79.433	0.00	1.00	0.0158	1
2412	802.11g	18.20	18±1	19	79.433	0.00	1.00	0.0158	1
2437		17.90	18±1	19	79.433	0.00	1.00	0.0158	1
2462		17.80	18±1	19	79.433	0.00	1.00	0.0158	1
2412	802.11n HT20	16.60	16±1	17	50.119	0.00	1.00	0.0100	1
2437		16.20	16±1	17	50.119	0.00	1.00	0.0100	1
2462		16.20	16±1	17	50.119	0.00	1.00	0.0100	1
2422	802.11n HT40	16.20	16±1	17	50.119	0.00	1.00	0.0100	1
2437		15.90	16±1	17	50.119	0.00	1.00	0.0100	1
2452		16.00	16±1	17	50.119	0.00	1.00	0.0100	1

Conclusion:

For the max result : $0.0063 \leq 0.6100$ for Max Power Density, compliance RF exposure.



Signature:

Date: 2019-04-15

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