

FCC ID: 2BAT4-C300

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

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

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.

BT:

Measurement Result

Operation Frequency: 2402MHz~2480MHz

Power density limited: 1mW/ cm²

Antenna Type: PCB antenna

Antenna gain: 3.42dBi;

R=20cm

mW=10^(dBm/10)

antenna gain Numeric=10^(dBi/10)

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
2402	DH5	2.44	3±1	4	2.512	3.42	2.20	0.0011	1
2441		3.45	3±1	4	2.512	3.42	2.20	0.0011	1
2480		3.49	3±1	4	2.512	3.42	2.20	0.0011	1
2402	2DH5	4.1	4.5±1	5.5	3.548	3.42	2.20	0.0016	1
2441		5.37	5±1	6	3.981	3.42	2.20	0.0017	1
2480		5.39	5±1	6	3.981	3.42	2.20	0.0017	1
2402	3DH5	4.5	5±1	6	3.981	3.42	2.20	0.0017	1
2441		5.68	5.5±1	6.5	4.467	3.42	2.20	0.0020	1
2480		5.81	5.5±1	6.5	4.467	3.42	2.20	0.0020	1

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		
2402	GFSK	2.23	2.5±1	3.5	2.239	3.42	2.20	0.0010	1
2440		3.42	3±1	4	2.512	3.42	2.20	0.0011	1
2480		3.59	3±1	4	2.512	3.42	2.20	0.0011	1

2.4G WIFI:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,
WIFI 802.11n HT40:2422-2452MHz
Power density limited: $1\text{mW}/\text{cm}^2$

Antenna Type: PCB antenna

Antenna gain: 3.42dBi;

R=20cm

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

$\text{antenna gain Numeric}=10^{(\text{dBi}/10)}$

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	13.95	14±1	15	31.623	3.42	2.20	0.0138	1
2437		13.69	14±1	15	31.623	3.42	2.20	0.0138	1
2462		13.91	14±1	15	31.623	3.42	2.20	0.0138	1
2412	802.11g	11.91	12±1	13	19.953	3.42	2.20	0.0087	1
2437		11.81	12±1	13	19.953	3.42	2.20	0.0087	1
2462		11.81	12±1	13	19.953	3.42	2.20	0.0087	1
2412	802.11n H20	11.9	12±1	13	19.953	3.42	2.20	0.0087	1
2437		11.82	12±1	13	19.953	3.42	2.20	0.0087	1
2462		11.83	12±1	13	19.953	3.42	2.20	0.0087	1
2422	802.11n(H T40)	12.54	12±1	13	19.953	3.42	2.20	0.0087	1
2437		11.67	12±1	13	19.953	3.42	2.20	0.0087	1
2452		11.47	12±1	13	19.953	3.42	2.20	0.0087	1

Note: NO simultaneous transmissions are possible for this device of Wi-Fi 2.4G + BT.

The conclusion should be $0.0138 < 1$ for Max Power Density, Compliance the RF Exposure requirement.

Signature:

Date: 2023-08-21



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