

FCC 47 CFR MPE
Report

FCC ID:2BMMPT9

RF Exposure Report

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Maximum Permissible Exposure

1. Maximum Permissible Exposure Applicable Standards

According to KDB 447498 D01 General RF Exposure Guidance v06, Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

1.1. Limits for Maximum Permissible Exposure (MPE)

(a) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-10000			5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-10000			1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

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1.2. Maximum Permissible Exposure Calculation Method

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

E = Electric Field (V/m)

P = Peak 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

$$P_d = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak 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

2. Conducted Power Result

BLE							
Mode/Type	Frequency	Maximum Output Power		Max Tune-up Power		Antenna Gain	
	(MHz)	(dBm)	(mW)	(dBm)		(dBi)	(Linear)
BLE GFKS 1M	2402	3.63	2.307	4	±1	2.52	1.786
	2440	4.57	2.864	5	±1	2.52	1.786
	2480	4.70	2.951	5	±1	2.52	1.786

Remark: The Maximum Output Power data is derived from the RF test report number mentioned in the title of this document.

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2.4G Wi-Fi							
Mode/Type	Frequency	Maximum Output Power		Max Tune-up Power		Antenna Gain	
	(MHz)	(dBm)	(mW)	(dBm)		(dBi)	(Linear)
IEEE 802.11b	2412	14.58	28.708	15	±1	2.73	1.875
	2437	14.79	30.130	15	±1	2.73	1.875
	2462	14.76	29.923	15	±1	2.73	1.875
IEEE 802.11g	2412	12.42	17.458	12	±1	2.73	1.875
	2437	14.59	28.774	15	±1	2.73	1.875
	2462	14.95	31.261	15	±1	2.73	1.875
IEEE 802.11n HT20	2412	10.45	11.092	10	±1	2.73	1.875
	2437	12.67	18.493	13	±1	2.73	1.875
	2462	12.63	18.323	13	±1	2.73	1.875
IEEE 802.11n HT40	2422	10.45	11.092	10	±1	2.73	1.875
	2437	12.66	18.450	13	±1	2.73	1.875
	2452	12.88	19.409	13	±1	2.73	1.875

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3. Calculated Result and Limit

Mode/Type	Max Tune-up Power	Antenna Gain		Power Density	Limited of Power Density	Result
	(dBm)	(dBi)	(Linear)	(S) (mW/cm ²)	(S) (mW/cm ²)	
BLE GFSK 1M	6	2.52	1.786	0.00141	1.0	Complies
IEEE 802.11b	16	2.73	1.875	0.01485	1.0	Complies
Note: IEEE 802.11b was the Worst case						

Simultaneous Transmission Assessment				
Mode/Type	Max Tune-up Power Calculation	Σ (S _i /Limit _i)	Limited of Power Density	Result
	(dBm)		(S) (mW/cm ²)	
BLE + 2.4G Wi-Fi (Worst case)	0.00141/1+0.01485/1	0.01626	≤1.0	Complies

Conclusion: So, SAR test is not required

-----End of RF Exposure Evaluation -----