FCC 47 CFR MPE REPORT

Shenzhen Free Dynamic Development Co., LTD.

Robot Vacuum Cleaner

Model Number: M30

Additional Model: M30 Pro

FCC ID: 2AT7J-M30

Applicant:	Shenzhen Free Dynamic Development Co., LTD.
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Maximum Permissible Exposure

1. Applicable Standards

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.o	30

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

1.2. MPE Calculation Method

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

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

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

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

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
IEEE802.11b	2412	16.52	44.875
	2437	16.35	43.152
	2462	16.29	42.560
IEEE802.11g	2412	16.84	48.306
	2437	16.72	46.989
	2462	16.63	46.026
IEEE802.11n HT20	2412	16.81	47.973
	2437	16.68	46.559
	2462	16.6	45.709
IEEE802.11n HT40	2422	16.74	47.206
	2437	16.92	49.204
	2452	16.82	48.084

3. Calculated Result and Limit

Mode	Peak output power (dBm)	Target power (dBm)	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW /cm^2)	Limited of Power Density (S) (mW /cm^2)	Test Result
				(dBi)	(Linear)			
2.4G Band								
IEEE 802.11b	16.52	16±1	17	1.8	1.514	0.01509	1	Complies
IEEE 802.11g	16.84	16±1	17	1.8	1.514	0.01509	1	Complies
IEEE 802.11n HT20	16.81	16±1	17	1.8	1.514	0.01509	1	Complies
IEEE 802.11n HT40	16.92	16±1	17	1.8	1.514	0.01509	1	Complies

End of Test Report