



FCC 47 CFR MPE REPORT

Guangdong WangJia Intelligent Robot Co., LTD.

Robotic Vacuum Cleaner

Model Number: HL1010

Additional Model: JL1010, S9 Ultra

FCC ID: 2AVYJ-HL1010

pplicant:	Guangdong WangJia Intelligent Robot 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			1.0	30

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

1.2. MPE Calculation Method

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

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

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

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)
BLE 1M	2402	5.93	3.9174
	2440	5.32	3.4041
	2480	4.29	2.6853
BLE 2M	2402	6.02	3.9994
	2440	5.49	3.5400
	2480	4.50	2.8184
IEEE 802.11b	2412	15.49	35.3997
	2437	15.38	34.5144
	2462	15.47	35.2371
IEEE 802.11g	2412	15.26	33.5738
	2437	15.14	32.6588
	2462	15.07	32.1366
IEEE 802.11n HT20	2412	15.05	31.9890
	2437	16.32	42.8549
	2462	15.89	38.8150
IEEE 802.11n HT40	2422	15.24	33.4195
	2437	15.88	38.7258
	2452	15.79	37.9315
IEEE 802.11ax HE20	2412	16.71	46.8813
	2437	16.88	48.7528
	2462	16.74	47.2063

3. Calculated Result and Limit

Mode	Peak output power (dBm)	Target power (dBm)	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
				(dBi)	(Linear)			
2.4G Band								
BLE 1M	5.93	5±1	6	2.25	1.679	0.00133	1	Complies
BLE 2M	6.02	6±1	7	2.25	1.679	0.00167	1	Complies
IEEE 802.11b	15.49	15±1	16	2.25	1.679	0.01330	1	Complies
IEEE 802.11g	15.26	15±1	16	2.25	1.679	0.01330	1	Complies
IEEE 802.11n HT20	16.32	16±1	17	2.25	1.679	0.01674	1	Complies
IEEE 802.11n HT40	15.88	15±1	16	2.25	1.679	0.01330	1	Complies
IEEE 802.11ax HE20	16.88	16±1	17	2.25	1.679	0.01674	1	Complies

End of Test Report