FCC 47 CFR MPE REPORT

Guangdong Wangjia Intelligent Robot Co., Ltd.

Robotic Vacuum Cleaner

Model Number: T900

FCC ID: 2AVYJ-T900

Applicant:	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.o	30

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

1.2. MPE Calculation Method

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

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)
IEEE 802.11b	2412	18.47	70.307
	2437	18.26	66.988
	2462	18.42	69.502
IEEE 802.11g	2412	22.04	159.956
	2437	21.85	153.109
	2462	21.73	148.936
IEEE 802.11n HT20	2412	20.61	115.080
	2437	20.39	109.396
	2462	20.23	105.439
IEEE 802.11n HT40	2422	20.83	121.060
	2437	20.79	119.950
	2452	20.71	117.761
IEEE 802.11a	5180	14.10	25.704
	5200	13.81	24.044
	5240	14.05	25.410
	5260	13.76	23.768
	5300	14.38	27.416
	5320	14.65	29.174
	5500	17.46	55.719
	5580	18.23	66.527
	5700	17.63	57.943
	5745	16.72	46.989
	5785	15.58	36.141
	5825	14.58	28.708

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
IEEE 802.11n HT20	5180	14.11	25.763
	5200	13.81	24.044
	5240	14.05	25.410
	5260	13.84	24.210
	5300	13.46	22.182
	5320	13.51	22.439
	5500	16.28	42.462
	5580	17.41	55.081
	5700	16.81	47.973
	5745	15.85	38.459
	5785	15.64	36.644
	5825	14.74	29.785
IEEE 802.11ac VHT20	5180	14.09	25.645
	5200	13.70	23.442
	5240	13.33	21.528
	5260	13.31	21.429
	5300	13.60	22.909
	5320	13.51	22.439
	5500	16.40	43.652
	5580	17.64	58.076
	5700	16.74	47.206
	5745	15.80	38.019
	5785	14.66	29.242
	5825	13.59	22.856

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
IEEE 802.11n HT40	5190	13.41	21.928
	5230	13.59	22.856
	5270	13.29	21.330
	5310	13.89	24.491
	5510	16.77	47.534
	5550	17.44	55.463
	5670	19.24	83.946
	5755	16.26	42.267
	5795	15.55	35.892
IEEE 802.11ac VHT40	5190	14.68	29.376
	5230	14.45	27.861
	5270	13.28	21.281
	5310	13.88	24.434
	5510	16.52	44.875
	5550	17.51	56.364
	5670	20.38	109.144
	5755	16.16	41.305
	5795	14.69	29.444
IEEE 802.11ac VHT80	5210	15.35	34.277
	5290	14.56	28.576
	5530	18.56	71.779
	5610	19.54	89.950
	5775	16.46	44.259

3. Calculated Result and Limit

Mode	Max 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								
IEEE 802.11b	18.47	18±1	19	2.3	1.698	0.0268	1	Complies
IEEE 802.11g	22.04	22±1	23	2.3	1.698	0.0674	1	Complies
IEEE 802.11n HT20	20.61	20±1	21	2.3	1.698	0.0425	1	Complies
IEEE 802.11n HT40	20.83	20±1	21	2.3	1.698	0.0425	1	Complies
5G Band								
IEEE 802.11a	18.23	18±1	19	2.3	1.698	0.0268	1	Complies
IEEE 802.11n HT20	17.41	17±1	18	2.3	1.698	0.0213	1	Complies
IEEE802.11ac VHT20	17.64	17±1	18	2.3	1.698	0.0213	1	Complies
IEEE 802.11n HT40	19.24	19±1	20	2.3	1.698	0.0338	1	Complies
IEEE802.11ac VHT40	20.38	20±1	21	2.3	1.698	0.0425	1	Complies
IEEE802.11ac VHT80	19.54	19±1	20	2.3	1.698	0.0338	1	Complies

Note: 2.4 and 5GHz bands are share an antenna, Cann't both the 2.4 and 5 GHz bands operate simultaneously.

End of Test Report