

FCC 47 CFR MPE REPORT

Ekoo Electronic Co., Ltd

Robot Vacuum Cleaner

Model Number: E20

FCC ID: 2A2PN-E20

Applicant:	Ekoo Electronic Co., Ltd
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Report Number:	ESTE-R2507149
Date of Test:	Jun. 18, 2025 ~ Jul. 18, 2025
Date of Report:	Jul. 24, 2025

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, $d=0.2\text{m}$, 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	10.31	10.740
	2437	10.56	11.376
	2462	10.47	11.143
IEEE 802.11g	2412	13.61	22.961
	2437	13.72	23.550
	2462	13.95	24.831
IEEE 802.11n HT20	2412	13.05	20.184
	2437	13.14	20.606
	2462	13.21	20.941
IEEE 802.11n HT40	2422	14.66	29.242
	2437	14.78	30.061
	2452	14.89	30.832

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								
IEEE 802.11b	10.56	10±1	11	2.82	1.914	0.00479	1	Complies
IEEE 802.11g	13.95	13±1	14	2.82	1.914	0.00957	1	Complies
IEEE 802.11n HT20	13.21	13±1	14	2.82	1.914	0.00957	1	Complies
IEEE 802.11n HT40	14.89	14±1	15	2.82	1.914	0.01204	1	Complies

End of Test Report