



RF Exposure Evaluation Declaration

FCC ID: 2A64B-MR2452L
Applicant: Ecovacs Home Service Robotics Co., Ltd.
Product: Lawn Mowing Robot
Model No.: MR2452K
Serial Model No.: MR2452L
FCC Rule Part(s): FCC Part 2.1091
Evaluated Date: 2025-04-01
Result: Complies

Reviewed By:

Denise Zhou

Approved By:

Robin Wu



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2411RSU032-U5	V01	Initial Report	2025-01-22	Invalid
2411RSU032-U5	V02	Reassess result of MPE.	2025-04-03	Valid

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1. General Information

1.1. Applicant

Ecovacs Home Service Robotics Co., Ltd.

No.518 Songwei Road, Wusongjiang industry Park, Guoxiang Street, Wuzhong District, Suzhou, 215100

Jiangsu, P.R. China

1.2. Manufacturer

Ecovacs Home Service Robotics Co., Ltd.

No.518 Songwei Road, Wusongjiang industry Park, Guoxiang Street, Wuzhong District, Suzhou, 215100

Jiangsu, P.R. China

1.3. Testing Facility

<input checked="" type="checkbox"/>	Test Site – MRT Suzhou Laboratory				
	Laboratory Location (Suzhou - Wuzhong)				
	D8 Building, No.2 Tian’edang Rd., Wuzhong Economic Development Zone, Suzhou, China				
	Laboratory Location (Suzhou - SIP)				
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Location (Suzhou - Wujiang)				
	Building 1, No.1 Xingdong Road, Wujiang, Suzhou, Jiangsu, People’s Republic of China				
<input type="checkbox"/>	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	<input type="checkbox"/> R-20025	<input type="checkbox"/> G-20034	<input type="checkbox"/> C-20020	<input type="checkbox"/> T-20020
		<input type="checkbox"/> R-20141	<input type="checkbox"/> G-20134	<input type="checkbox"/> C-20103	<input type="checkbox"/> T-20104
<input type="checkbox"/>	Test Site – MRT Shenzhen Laboratory				
	Laboratory Location (Shenzhen)				
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
FCC: CN1284		ISED: CN0105			
<input type="checkbox"/>	Test Site – MRT Taiwan Laboratory				
	Laboratory Location (Taiwan)				
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: 3261				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	Lawn Mowing Robot
Model No.	MR2452K
Serial Model No.	MR2452L
Wi-Fi Specification	802.11b/g/n
Bluetooth Version	Bluetooth v5.2 BLE Only
GNSS Specification	GPS, GLONASS, BDS, Galileo
Lora Specification	902.75 ~ 920.95MHz
Antenna Specification	Refer to Section 1.6
Power Type	By Battery
Accessory	
Rechargeable Lithium-ion Battery Pack	Model: S21-LI-185-5800 Nominal Voltage: 18.5V Rated Capacity: 5200mAh Rated energy: 96.2Wh
Remarks:	
1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. 2. The differences between two Models are in Section 1.5. Model MR2452K is selected for testing.	

1.5. Model Difference

Lawn Mowing Robot Model	Charging Station Model	RTK Reference Station Model	Lift Blades Manually	Lift Blades Electrically	Battery Model	Battery Voltage (V)	Battery Rated Capacity (mAh)	Battery Rated Energy (Wh)
MR2452L	CH2492	FM24A9	√	N/A	S26-LI-185-4000	18	3600	64.8
MR2452K	CH2492B		N/A	√	S21-LI-185-5800	18.5	5200	96.2
Note: These differences do not affect radio test.								

1.6. Antenna Details

BLE/Wi-Fi

Antenna Type	Frequency Band (MHz)	Antenna Gain (dBi)
PIFA	2400 ~ 2483.5	4.56

Lora

Antenna Type	Frequency Band (MHz)	Antenna Gain (dBi)
PIFA	902.75 ~ 920.95	0.5

1.7. Device Classification

According to the user manual, this device is classified as a Mobile Device. So, the RF exposure evaluation requirements of § 2.1091 for mobile device exposure conditions subject to MPE limits.

1.8. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 2.1091 & KDB 447498 D04 Interim General RF Exposure Guidance v01

2. RF Exposure Evaluation

2.1. Test Limits

According to FCC §1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b)

Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500	--	--	f/300	<6
1,500-100,000	--	--	5	<6
(B) Limits for General Population/ Uncontrolled Exposures				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500	--	--	f/1500	<30
1,500-100,000	--	--	1.0	<30

f= frequency in MHz. * = Plane-wave equivalent power density.

2.2. MPE Exemptions

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): A single RF source is exempt if:

(Option A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(ii)(A) of this section.

Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

(Option B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P is given by:

$$P_{th}(mW) = \{ERP_{20cm} (d / 20cm)^x \quad d \leq 20cm$$

$$P_{th}(mW) = \{ERP_{20cm} \quad 20cm < d \leq 40cm$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20cm} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20cm}(mW) = \{2040f \quad 0.3GHz \leq f < 1.5GHz$$

$$ERP_{20cm}(mW) = \{3060 \quad 1.5GHz \leq f \leq 6GHz$$

(Option C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to §1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1920R ²
1.34-30	3450R ² /f ²
30-300	3.83R ²
300-1,500	0.0128R ² f
1,500-100,000	19.2R ²

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P_{th} , including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i .

ERP_j = the ERP of fixed, mobile, or portable RF source j .

$ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j , at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section.

$Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$Exposure Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k , as applicable from §1.1310 of this chapter.

2.3. Calculated Result

Product	Lawn Mowing Robot
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Max. Tune-up Conducted Power (dBm)	Antenna Gain (dBi)	Tune-up ERP (dBm)	Tune-up ERP (mW)
BLE	2400 ~ 2483.5	5.00	4.56	7.41	5.51
Lora	902.75 ~ 920.95	20.00	0.50	18.35	68.39
2.4G Wi-Fi	2400 ~ 2483.5	17.00	4.56	19.41	87.30

Notes:

1. Tune-up power was declared by manufacturer.
2. Tune-up ERP = Tune up Conducted Power + Antenna Gain - 2.15.

For Option C

Test Mode	Frequency Band (MHz)	$\lambda / 2 \pi$ (m)	R (m)	Tune-up ERP (mW)	Threshold ERP (mW)
BLE	2400 ~ 2483.5	0.02	0.2	5.51	768.000
Lora	902.75 ~ 920.95	0.05	0.2	68.39	462.208
2.4G Wi-Fi	2400 ~ 2483.5	0.02	0.2	87.30	768.000

Note: R is from user manual.

For multiple RF sources

Wi-Fi 2.4GHz, Lora and BLE can transmit simultaneously.

So the Max Simultaneous Transmission ratio = $5.51 / 768 + 68.39 / 462.208 + 87.30 / 768 = 0.27 < 1$

Conclusion:

The device qualifies for RF exposure test exemption at 20cm distance.

_____ The End _____