



Co-location Report

FCC ID: 2A64B-MR2452L

Applicant: Ecovacs Home Service Robotics Co., Ltd.

Address: No.518 Songwei Road, Wusongjiang industry Park,
Guoxiang Street, Wuzhong District, Suzhou, 215100
Jiangsu, P.R. China

Product: Lawn Mowing Robot

Model No.: MR2452K

Serial Model No.: MR2452L

FCC Rule(s): Part 15 Subpart C (Section 15.247)

Result: Complies

Received Date: 2024-11-18

Test Date: 2024-12-09 ~ 2025-01-04

Reviewed By:

Denise Zhou

Approved By:

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

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-U4	V01	Initial Report	2025-01-22	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
	Laboratory Accreditations
	A2LA: 3628.01 FCC: CN1166 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
	CNAS: L10551 ISED: CN0001
<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 FCC: CN1284
CNAS: L10551 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
Serial No.	E09V12345F164S310015
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. Radio Specification under Test

For Bluetooth-LE:

Frequency Range	2402 ~ 2480MHz
Channel Number	40
Type of Modulation	GFSK
Data Rate	1Mbps & 2Mbps
Antenna Type	PIFA Antenna
Antenna Gain	4.56 dBi

For 2.4G Wi-Fi:

Frequency Range	802.11b/g/n-HT20: 2412 ~ 2472 MHz 802.11n-HT40: 2422 ~ 2462 MHz
Channel Number	802.11b/g/n-HT20: 13 802.11n-HT40: 9
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM
Data Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps
Antenna Type	PIFA Antenna
Antenna Gain	4.56 dBi

Note: The above information is declared by the manufacturer.

For Lora:

Frequency Range	902.75 ~ 920.95MHz
Channel Number	10
Type of modulation	FSK
Antenna Type	PIFA Antenna
Antenna Gain	0.5 dBi

1.7. Working Frequencies

For Bluetooth-LE:

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 MHz
21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz
27	2456 MHz	28	2458 MHz	29	2460 MHz
30	2462 MHz	31	2464 MHz	32	2466 MHz
33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz
39	2480 MHz	--	--	--	--

2.4G Wi-Fi:

802.11b/g/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	12	2467 MHz
13	2472 MHz	--	--	--	--

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	10	2457 MHz	11	2462 MHz

For Lora:

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	902.75MHz	01	904.15MHz	02	906.25MHz
03	908.35MHz	04	910.45MHz	05	912.55MHz
06	914.65MHz	07	916.75MHz	08	918.85MHz
09	920.95MHz	--	--	--	--

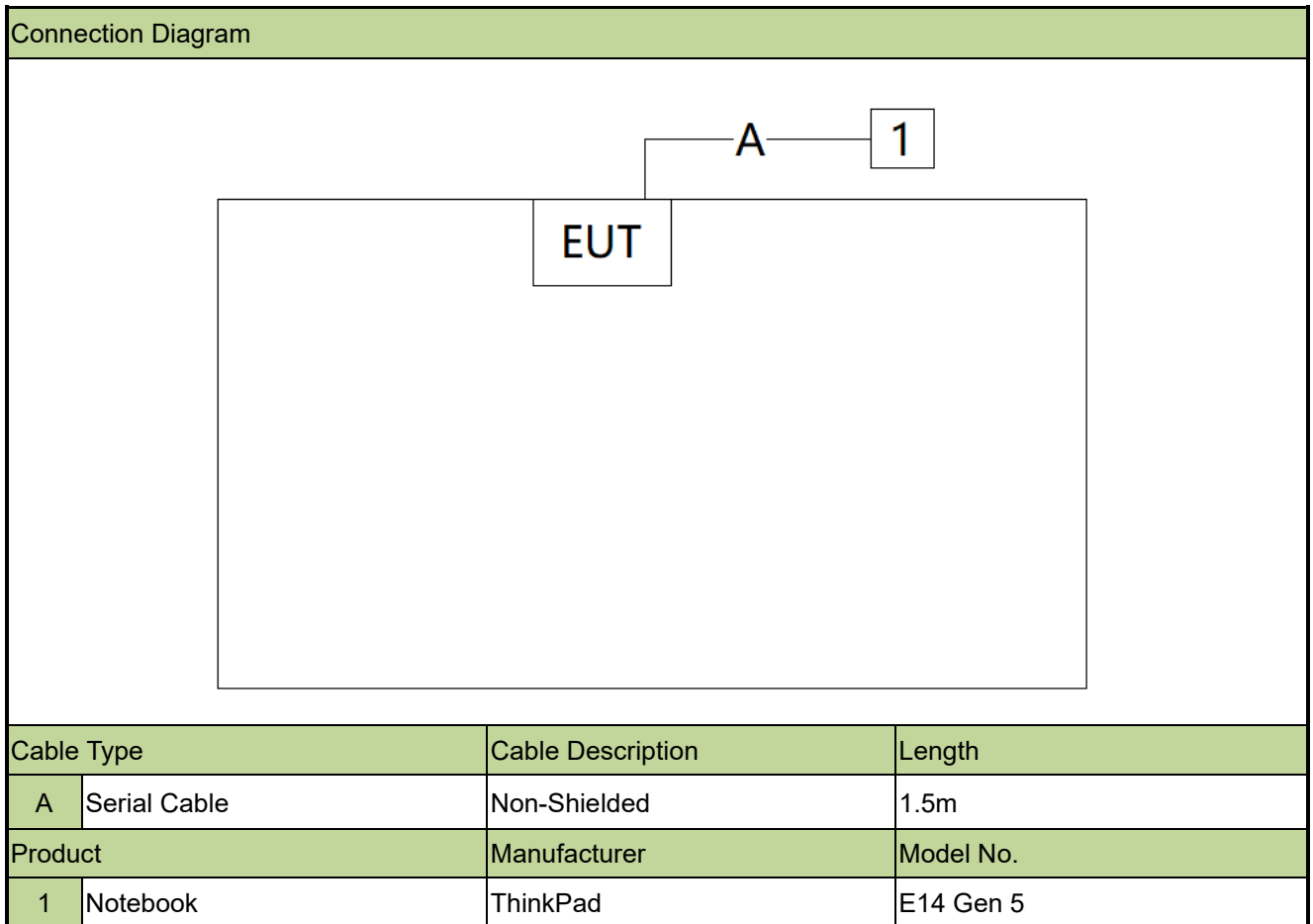
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit Normal Operation in 2.4G Wi-Fi and Bluetooth + Transmit Lora at 910.45MHz.

Note: The above testing scenarios were provided by the manufacturer, these are the worst case.

2.2. Test System Connection Diagram



2.3. Test Software

The test utility software used during testing was “Putty” and commands were provided by the manufacturer.

2.4. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20% ~ 75%RH

3. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Thermohygrometer	testo	608-H1	MRTSUE06616	1 year	2025-10-16	SIP-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06645	1 year	2025-07-05	SIP-AC1
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2024-12-21	SIP-AC1
					2025-12-20	
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2025-12-05	SIP-AC1
Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2025-02-03	SIP-AC3
Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2025-07-07	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2025-10-16	SIP-AC3
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2025-01-11	SIP-AC3
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2024-12-21	SIP-AC3
					2025-12-20	
Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2025-10-13	SIP-AC3
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2025-01-27	SIP-AC3
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06599	1 year	2025-09-08	SIP-AC3
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2025-10-08	SIP-AC3

Software	Version	Function
e3	230711	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & Turntable

4. Decision Rules and Measurement Uncertainty

4.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.
(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Radiated Emission Measurement

The maximum measurement uncertainty is evaluated as:

Coaxial: 9kHz~30MHz: 2.61dB

Coplanar: 9kHz~30MHz: 2.62dB

Horizontal: 30MHz~200MHz: 3.79dB

200MHz~1GHz: 3.91dB

1GHz~40GHz: 4.99dB

Vertical: 30MHz~200MHz: 4.06dB

200MHz~1GHz: 5.21dB

1GHz~40GHz: 4.90dB

5. Radiated Spurious Emissions Measurement (Co-location)

5.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

5.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.11 & 11.12

ANSI C63.10 - 2013 - Section 6.3 (General Requirements)

ANSI C63.10 - 2013 - Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 - 2013 - Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 - 2013 - Section 6.6 (Standard test method above 1GHz)

5.3. Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000MHz	1MHz

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz

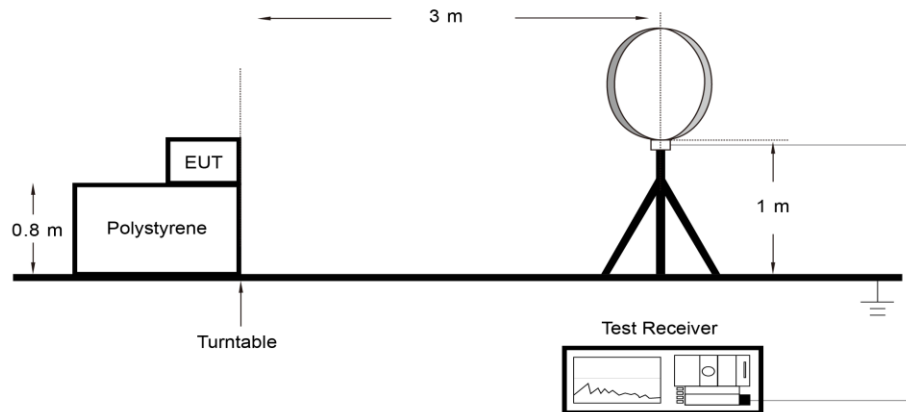
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

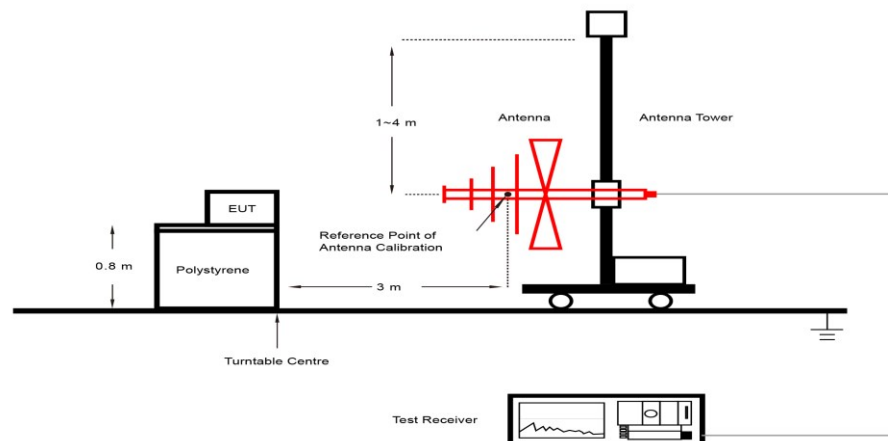
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; if the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10Hz
If the EUT duty cycle is $< 98\%$, set $\text{VBW} \geq 1/T$. T is the minimum transmission duration.
4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak
6. Sweep time = Auto
7. Trace mode = Max hold
8. Trace was allowed to stabilize

5.4. Test Setup

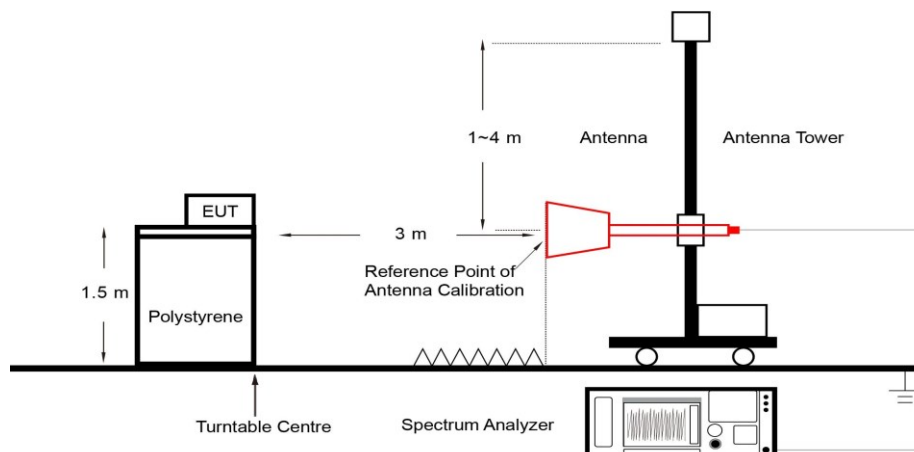
Below 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



Above 1GHz Test Setup:



5.5. Test Result

The Result of Radiated Emission above 1GHz:

Test Site	SIP-AC3	Test Engineer	Mero Zhou
Test Date	2024-12-09	Test Configuration	Mode 1

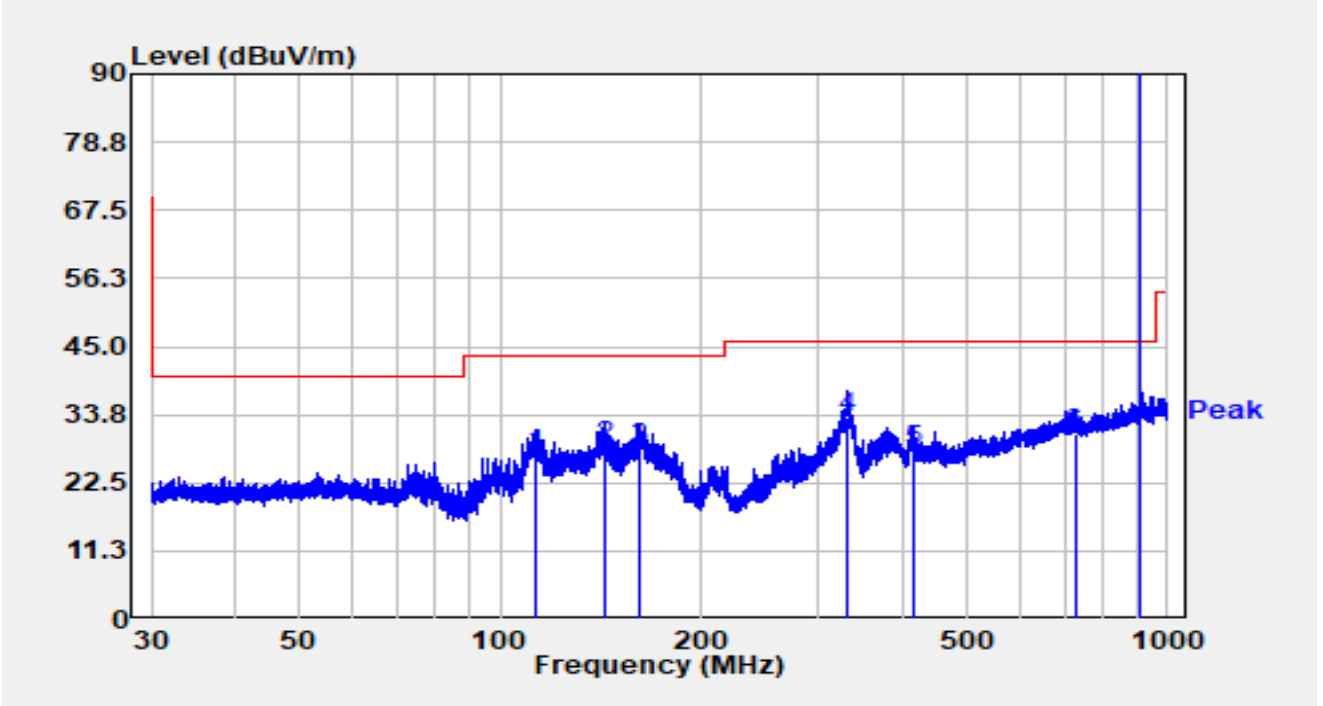
Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
11405.7	34.8	13.2	48.0	74.0	-26.0	Peak	Horizontal
15732.2	34.4	20.0	54.4	74.0	-19.6	Peak	Horizontal
15732.2	20.4	20.0	40.4	54.0	-13.6	Average	Horizontal
17954.1	33.4	23.5	56.9	74.0	-17.1	Peak	Horizontal
17954.1	18.2	23.5	41.7	54.0	-12.3	Average	Horizontal
11200.0	35.1	13.6	48.7	74.0	-25.3	Peak	Vertical
15747.5	33.8	20.1	53.9	74.0	-20.1	Peak	Vertical
15747.5	20.3	20.1	40.4	54.0	-13.6	Average	Vertical
17811.3	33.6	24.2	57.8	74.0	-16.2	Peak	Vertical
17811.3	18.5	24.2	42.7	54.0	-11.3	Average	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

The Result of Radiated Emission below 1GHz:

Site	SIP-AC1	Test Date	2025-01-04
Temperature	17.5°C	Humidity	43.9%
Limit	FCC_Part15.209_RSE(3m)	Test Engineer	Mero Zhou
Factor	VULB 9168_00998_25-2000MHz	Polarity	Horizontal
EUT	Lawn Mowing Robot	Test Voltage	By Battery
Test Mode	Mode 1		

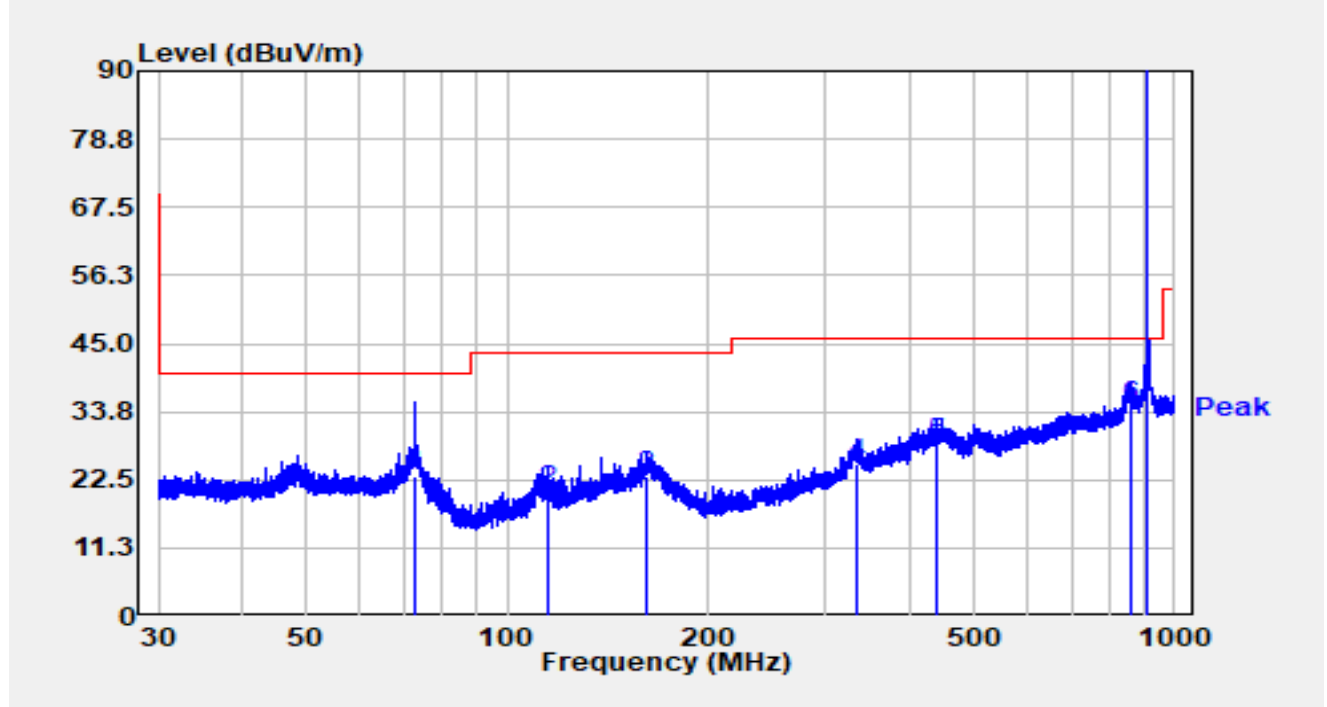


No	Mark	Frequency (MHz)	Reading (dBμV)	C.F (dB/m)	Measurement (dBμV/m)	Margin (dB)	Limit (dBμV/m)	Detector
1		113.277	11.90	15.30	27.20	-16.30	43.50	QP
2		143.981	10.30	18.17	28.47	-15.03	43.50	QP
3		162.041	10.30	18.01	28.31	-15.19	43.50	QP
4		330.311	14.20	19.15	33.35	-12.65	46.00	QP
5		415.742	6.70	21.03	27.73	-18.27	46.00	QP
6		726.041	3.40	27.32	30.72	-15.28	46.00	QP
7	*	910.624	75.61	29.29	104.89	N/A	N/A	Peak

Notes:

1. " * ", means this data is the worst emission level.
2. C.F (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement(dBμV/m) = Reading(dBμV) + C.F (dB/m).
4. The point (7) is fundamental frequency that is not evaluated in this standard.
5. The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Site	SIP-AC1	Test Date	2025-01-04
Temperature	17.5°C	Humidity	43.9%
Limit	FCC_Part15.209_RSE(3m)	Test Engineer	Mero Zhou
Factor	VULB 9168_00998_25-2000MHz	Polarity	Vertical
EUT	Lawn Mowing Robot	Test Voltage	By Battery
Test Mode	Mode 1		



No	Mark	Frequency (MHz)	Reading (dBμV)	C.F (dB/m)	Measurement (dBμV/m)	Margin (dB)	Limit (dBμV/m)	Detector
1		72.694	7.60	15.46	23.06	-16.94	40.00	QP
2		115.078	5.10	15.49	20.59	-22.91	43.50	QP
3		161.078	4.80	18.15	22.95	-20.55	43.50	QP
4		335.329	5.80	19.31	25.11	-20.89	46.00	QP
5		439.271	6.60	22.08	28.68	-17.32	46.00	QP
6		863.965	5.80	28.82	34.62	-11.38	46.00	QP
7	*	910.624	83.81	29.29	113.09	N/A	N/A	Peak

Notes:

1. " * ", means this data is the worst emission level.
2. C.F (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement(dBμV/m) = Reading(dBμV) + C.F (dB/m).
4. The point (7) is fundamental frequency that is not evaluated in this standard.
5. The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Appendix A - Test Setup Photograph

Refer to "2411RSU032-UT" file.

Appendix B - EUT Photograph

Refer to "2411RSU032-UE" file.

_____ The End _____