



RF Exposure Evaluation

For

WYBOTICS CO., LTD.

ROBOTIC POOL CLEANER

Test Model: WYBOT S2 Pro

Additional Model No.: WY210

Prepared for : WYBOTICS CO., LTD.
Address : No.30, 4th Street Zhongnan, West Zone, TEDA, Tianjin, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : May 27, 2024
Number of tested samples : 2
Sample No. : A240326055-1, A240326055-2
Serial number : Prototype
Date of Test : May 27, 2024 ~ April 08, 2025
Date of Report : April 09, 2025



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Scan code to check authenticity



RF Exposure Evaluation	
Report Reference No.	LCSA04094199EE
Date of Issue	April 09, 2025
Testing Laboratory Name	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	WYBOTICS CO., LTD.
Address	No.30, 4th Street Zhongnan, West Zone, TEDA, Tianjin, China
Test Specification	
Standard	FCC KDB publication 447498 D01 General RF Exposure Guidance v06 FCC CFR 47 part1 1.1310 FCC CFR 47 part2 2.1091
Test Report Form No.	TRF-4-E-215 A/0
TRF Originator	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	Dated 2011-03
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Test Item Description : ROBOTIC POOL CLEANER	
Trade Mark	N/A
Test Model	WYBOT S2 Pro
Ratings	For AC Adapter Input: 100-240V~, 50/60Hz, 2.5A Adapter Output: 29.4V=3.0A, 88.2W Battery capacity: 7800mAh
Result	Positive

Compiled by:

Ling Zhu/ Administrator

Supervised by:

Jack Liu / Technique principal

Approved by:

Gavin Liang/ Manager



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RF Exposure Evaluation

Test Report No. : LCSA04094199EE	<u>April 09, 2025</u> Date of issue
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EUT.....	: ROBOTIC POOL CLEANER
Test Model.....	: WYBOT S2 Pro
Applicant.....	: WYBOTICS CO., LTD.
Address.....	: No.30, 4th Street Zhongnan, West Zone, TEDA, Tianjin, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: WYBOTICS CO., LTD.
Address.....	: No.30, 4th Street Zhongnan, West Zone, TEDA, Tianjin, China
Telephone.....	: /
Fax.....	: /
Factory.....	: WYBOTICS CO., LTD.
Address.....	: No.30, 4th Street Zhongnan, West Zone, TEDA, Tianjin, China
Telephone.....	: /
Fax.....	: /

Test Result	Positive
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History





Report Version	Issue Date	Revision Content	Revised By
000	April 09, 2025	Initial Issue	---





TABLE OF CONTENTS

Description	Page
1. Product Information	6
2. Evaluation Method	7
3. Limit	7
4. MPE Calculation Method	8
5. Antenna Information	8
6. Conducted Power	9
7. Manufacturing Tolerance	10
8. Measurement Results	11
9. Conclusion	12
10. Description of Test Facility	12
11. Measurement Uncertainty	12





1. Product Information

EUT	: ROBOTIC POOL CLEANER
Test Model	: WYBOT S2 Pro
Additional Model No.	: WY210
Model Declaration	: PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Power Supply	: For AC Adapter Input: 100-240V~, 50/60Hz, 2.5A Adapter Output: 29.4V---3.0A, 88.2W Battery capacity: 7800mAh
Hardware Version	: /
Software Version	: /
Bluetooth	:
Frequency Range	: 2402MHz~2480MHz
Channel Number	: 79 channels for Bluetooth V5.0 (DSS) 40 channels for Bluetooth V5.0 (DTS)
Channel Spacing	: 1MHz for Bluetooth V5.0 (DSS) 2MHz for Bluetooth V5.0 (DTS)
Modulation Type	: GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V5.0 (DSS) GFSK for Bluetooth V5.0 (DTS)
Bluetooth Version	: V5.0
Antenna Description	: PCB Antenna, 4.16dBi(Max.)
WIFI(2.4G Band)	:
Frequency Range	: 2412MHz~2462MHz
Channel Spacing	: 5MHz
Channel Number	: 11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Modulation Type	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: PCB Antenna, 4.16dBi(Max.)
433MHz Operation frequency	: 433.92
Modulation Type	: FSK
Channel Number	: 1
Antenna Type	: PCB Antenna
Antenna Gain	: 0dBi (Max)

Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer.





2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3.1 Refer Evaluation Method

[ANSI C95.1-2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices.

3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
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 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density





4. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

5. Antenna Information

EUT can only use antennas certificated as follows provided by manufacturer;

Internal/ External Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Internal	PCB antenna	2400MHz ~ 2500MHz 436.42MHz~560.42MHz	Bluetooth: 4.16dBi 2.4GWIFI: 4.16dBi 433: 0dBii	BT/WIFI Antenna 433 Antenna



**6. Conducted Power**

[BT]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK	0	2402	-0.74
	39	2441	-0.71
	78	2480	-1.66
$\pi/4$ DQPSK	0	2402	1.1
	39	2441	1.23
	78	2480	0.24
8DPSK	0	2402	1.54
	19	2441	1.91
	39	2480	0.77

[BT LE]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
GFSK	0	2402	1.22
	19	2440	1.01
	39	2480	0.07

[2.4G WIFI]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
11B	1	2412	15.5
	6	2437	14.72
	11	2462	14.81
11G	1	2412	14.74
	6	2437	13.87
	11	2462	14.07
11N20 SISO	1	2412	13.24
	6	2437	13.27
	11	2462	13.6
11N40 SISO	3	2422	13.71
	6	2437	12.52
	9	2452	13.47





Test Procedure

TX frequency range: 433.92MHz

Device category: Portable device (Distance: 5mm)

Max. Field Strength: 61.24BuV/m @3m

EIRP=E-104.8+20logD=61.24-104.8+20log3=-34.02Bm

Maximum Conducted Output Power: -34.02dBm

Tune up: -34±1

7. Manufacturing Tolerance

[BT]

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	0	0	-1.0
Tolerance ±(dB)	1.0	1.0	1.0
π/4-DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	1.0	1.0	0
Tolerance ±(dB)	1.0	1.0	1.0
8DPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	1.0	1.0	0
Tolerance ±(dB)	1.0	1.0	1.0

[BT LE]

BT LE (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	1.0	1.0	0
Tolerance ±(dB)	1.0	1.0	1.0

[2.4G WIFI]

11B (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	15.0	14.0
Tolerance ±(dB)	1.0	1.0	1.0
11G (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	14.0	13.0	14.0
Tolerance ±(dB)	1.0	1.0	1.0
11N20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	13.0	13.0	13.0
Tolerance ±(dB)	1.0	1.0	1.0
11N40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	13.0	12.0	13.0
Tolerance ±(dB)	1.0	1.0	1.0





8. Measurement Results

8.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[BT]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	1.0	1.2589	4.16	2.6062	0.0007	1.0000
$\pi/4$ -DQPSK	2.0	1.5849	4.16	2.6062	0.0008	1.0000
8-DPSK	2.0	1.5849	4.16	2.6062	0.0008	1.0000

[BT LE]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	2.0	1.5849	4.16	2.6062	0.0008	1.0000

[2.4G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11b	16.0	39.8107	4.16	2.6062	0.0207	1.0000
IEEE 802.11g	15.0	31.6228	4.16	2.6062	0.0164	1.0000
IEEE 802.11n HT20	14.0	25.1189	4.16	2.6062	0.0130	1.0000
IEEE 802.11n HT40	14.0	25.1189	4.16	2.6062	0.0130	1.0000

[433.92MHz]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
FSK	-33.0	0.0005	0	1.0	0.0000001	0.2893

Remark:

1. Output power including tune-up tolerance;
2. Output power was adjusted to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.





8.2 Simultaneous Transmission MPE Evaluation

The sample support one 433 transmit antenna, another one Bluetooth & WIFI transmit antenna, so need consider simultaneous transmission;

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Limit: $\sum$ of MPE ratios is ≤ 1.0

Mode	433.92	WIFI ratios	Simultaneous ratios	Limit	Results
433.92+WIFI	0.0000001	0.0207	0.0207001	1.0	PASS

9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

10. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

11. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty	9KHz~30MHz	$\pm 3.10\text{dB}$	(1)
	30MHz~200MHz	$\pm 2.96\text{dB}$	(1)
	200MHz~1000MHz	$\pm 3.10\text{dB}$	(1)
	1GHz~26.5GH	$\pm 4.20\text{dB}$	(1)
Conduction Uncertainty	150kHz~30MHz	$\pm 1.63\text{dB}$	(1)
Power disturbance	30MHz~300MHz	$\pm 1.60\text{dB}$	(1)

BT/BLE/2.4GWIFI:

Test Item	Frequency Range	Uncertainty	Note
Output power	1GHz-40GHz	$\pm 0.57\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

-----THE END OF REPORT-----

