

EMC TEST REPORT
For

Zhongshan Yatai Electric Appliances Co., Ltd.

Electric Outboard Motor

Model No.: 50736

Additional Model No.: 50737, 50738, 50739, 50742, 50743

Prepared for : Zhongshan Yatai Electric Appliances Co., Ltd.
Address : No.4 Xinlong St. Nanlong Industrial Park, SanXiang
Town, ZhongShan City, 528463, GuangDong, China

Prepared by : Shenzhen AOCE Electronic Technology Service Co.,
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Date of receipt of test sample : February 24, 2025
Number of tested samples : 1
Serial number : Prototype
Date of Test : February 24, 2025 ~ March 5, 2025
Date of Report : March 5, 2025



EMC TEST REPORT EN IEC 55014-1:2021 Requirements for household appliances, electric tools and similar apparatus -- Part 1: Emission EN IEC 55014-2:2021 Requirements for household appliances, electric tools and similar apparatus -- Part 2: Immunity - Product family standard	
Report Reference No.:	AOC250624101E-R2
Date Of Issue.....:	March 5, 2025
Testing Laboratory Name.....:	Shenzhen AOCE Electronic Technology Service Co., Ltd.
Address.....:	Room 202, 2nd Floor, No.12th Building of Xinhe Tongfuyu Industrial Park, Fuhai Street, Baoan District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....:	Full application of Harmonised standards ☒ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name.....:	Zhongshan Yatai Electric Appliances Co., Ltd.
Address.....:	No.4 Xinlong St. Nanlong Industrial Park, SanXiang Town, ZhongShan City, 528463, GuangDong, China
Test Specification:	
Standard.....:	EN IEC 55014-1:2021 EN IEC 55014-2:2021
Test Report Form No.....:	AOCEMC-1.0
TRF Originator.....:	Shenzhen AOCE Electronic Technology Service Co., Ltd.
Master TRF.....:	Dated 2011-03
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Test Item Description.....:	Electric Outboard Motor
Trade Mark.....:	HASWING
Model/ Type Reference.....:	50736
Ratings.....:	For battery: DC 12-36V , 60A
Result	Positive

Compiled by:

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Jackson Fang

Jackson Fang/ Manager

EMC -- TEST REPORT**Test Report No. : AOC250624101E-R2**March 5, 2025

Date of issue

Type / Model..... : 50736

EUT..... : Electric Outboard Motor

Applicant..... : Zhongshan Yatai Electric Appliances Co., Ltd.Address..... : No.4 Xinlong St. Nanlong Industrial Park, SanXiang Town,
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Fax..... : /

Factory..... : Zhongshan Yatai Electric Appliances Co., Ltd.Address..... : No.4 Xinlong St. Nanlong Industrial Park, SanXiang Town,
ZhongShan City, 528463, GuangDong, China,

Telephone..... : /

Fax..... : /

Test Result according to the standards on page 5: **Pass**

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.

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1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION (EN IEC 55014-1:2021)			
Description of Test Item	Standard	Limits	Results
Conducted disturbance at mains terminals	EN IEC 55014-1:2021	-----	N/A
Clicks	EN IEC 55014-1:2021	-----	N/A
Radiated disturbance	EN IEC 55014-1:2021	-----	PASS
Harmonic current emissions	EN IEC 61000-3-2: 2019+A1: 2021+A2:2024	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3:2013+A1:2019+A2:2021 +AC:2022	-----	N/A
IMMUNITY(EN IEC 55014-2:2021)			
Description of Test Item	Basic Standard	Performance Criteria	Results
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN 61000-4-3: 2006+A1: 2010	A	N/A
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	N/A
Surge (Input a.c. power ports)	EN 61000-4-5: 2014+A1: 2017	B	N/A
Radio-frequency, Continuous conducted disturbance	EN 61000-4-6: 2014+AC: 2015	A	N/A
Power frequency magnetic field	EN 61000-4-8: 2010	A	N/A
Voltage dips, 60% reduction	EN 61000-4-11: 2004+A1: 2017	C	N/A
Voltage dips, 30% reduction		C	N/A
Voltage interruptions		C	N/A
N/A is an abbreviation for Not Applicable.			

1.2. Description of Performance Criteria

General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

- essential operational modes and states;
- tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.);
- quality of software execution;
- quality of data display and transmission;
- quality of speech transmission.

1.2.1. Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.2. Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.3. Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : Electric Outboard Motor

Model Number : 50736

Power Supply : For battery: DC 12-36V , 60A

EUT Clock Frequency : $\leq$ 108MHz

2.2. Description of Test Facility

Site Description
EMC Lab.

2.3. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the AOC quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.4. Measurement Uncertainty

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

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

3. MEASURING DEVICES AND TEST EQUIPMENT

3.1.Radiated Disturbance (Electric Field)

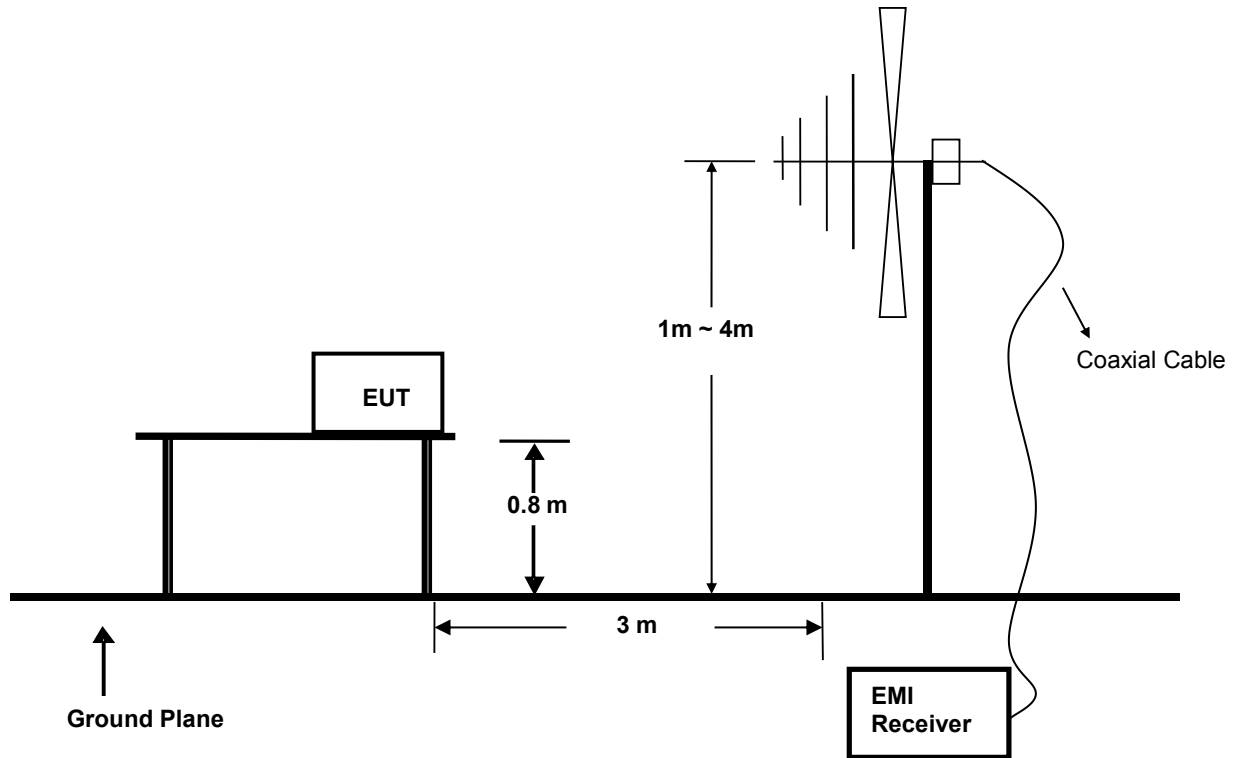
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101142	2024/04/13
2	EMI Test Receiver	ROHDE & SCHWARZ	ESPI	101840	2024/04/13
3	Log per Antenna	SCHWARZBECK	VULB9163	9163-470	2024/04/13
4	Amplifier	Compliance Direction	PAP-0102	21001	2024/04/13
5	EMI Test Software	AUDIX	E3	N/A	2024/04/13

3.2.Electrostatic Discharge

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	KIKUSUI	KC001311	KES4021	2024/04/13

4. RADIATED EMISSION MEASUREMENT

4.1. Block Diagram of Test Setup



4.2. Measuring Standard

EN IEC 55014-1:2021

4.3. Radiated Emission Limits

EN 55032: 2015 Limits:

All emanations from a class B device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

4.4.EUT Configuration on Test

The EN 55032 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.5.Operating Condition of EUT

4.5.1 Turn on the power.

4.5.2 After that, let the EUT work in test mode (ON) and measure it.

4.6.Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the Receiver is set at 120kHz.

The frequency range from 30MHz to 1000MHz is investigated.

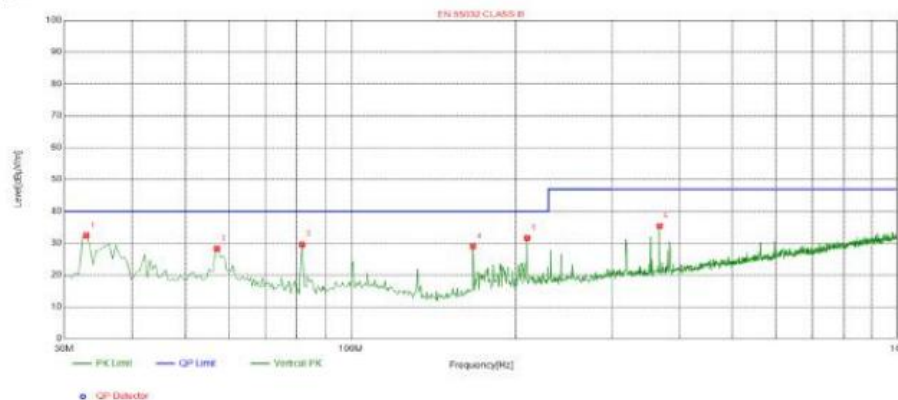
4.7.Test Results

PASS.

The test result please refer to the next page.

Model No.	50736	Test Date	March 5, 2025
Environmental Conditions	24°C/ 56% RH	Test Mode	On
Pol	Vertical	Detector Function	Quasi-peak
Test Engineer	Andy	Distance	3m

Test Graph

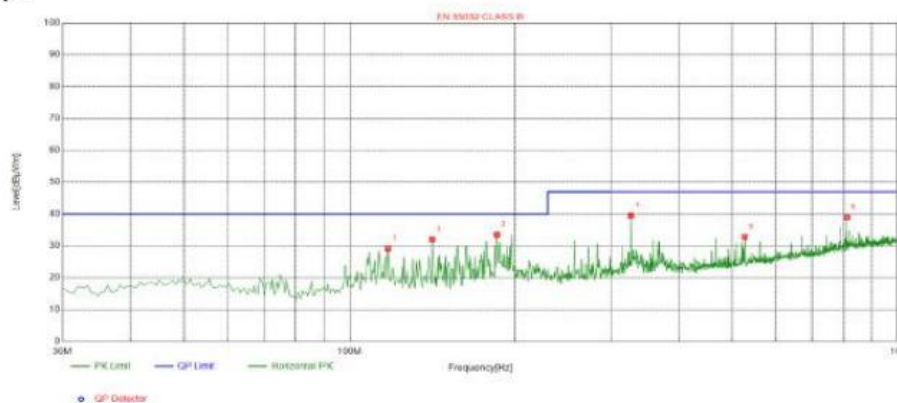


Suspected List

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	32.9100	-16.23	48.68	32.45	40.00	7.55	100	65	Vertical
2	57.1600	-14.73	42.97	28.24	40.00	11.76	100	55	Vertical
3	81.8950	-19.02	48.60	29.58	40.00	10.42	100	38	Vertical
4	167.2550	-17.55	46.51	28.96	40.00	11.04	100	45	Vertical
5	210.4200	-14.79	46.36	31.57	40.00	8.43	100	24	Vertical
6	367.5600	-11.08	46.44	35.36	47.00	11.64	100	34	Vertical

Model No.	50736	Test Date	March 5, 2025
Environmental Conditions	24°C/ 56% RH	Test Mode	Charging
Pol	Horizontal	Detector Function	Quasi-peak
Test Engineer	Andy	Distance	3m

Test Graph

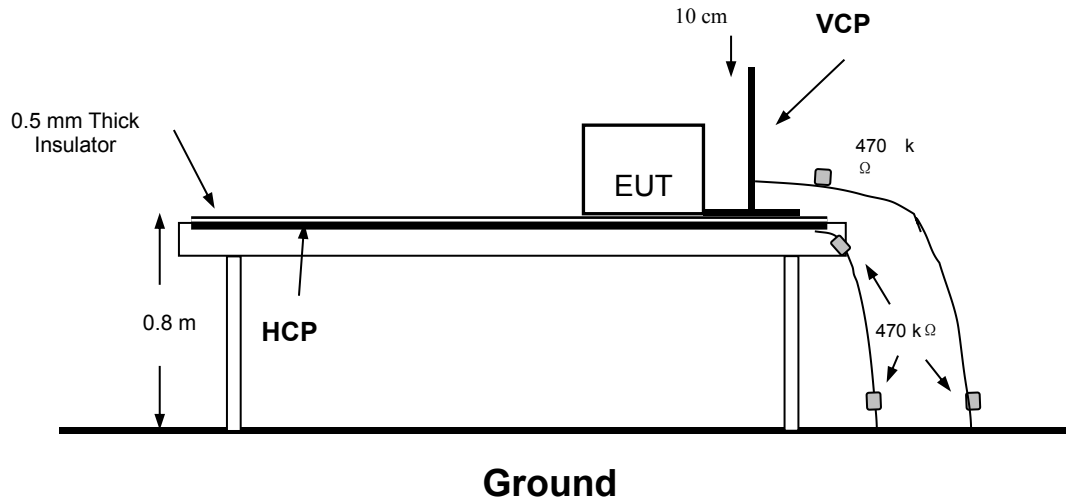


Suspected List

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	117.3000	-16.65	45.81	29.16	40.00	10.84	100	347	Horizontal
2	141.5500	-19.14	51.07	31.93	40.00	8.07	100	347	Horizontal
3	185.6850	-16.37	49.81	33.44	40.00	6.56	100	306	Horizontal
4	326.8200	-11.75	51.29	39.54	47.00	7.46	100	118	Horizontal
5	527.6100	-7.52	40.35	32.83	47.00	14.17	100	261	Horizontal
6	811.8200	-2.91	41.86	38.95	47.00	8.05	100	271	Horizontal

5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

5.1. Block Diagram of Test Setup



5.2. Test Standard

EN IEC 55014-2:2021 ,

Severity Level: 3 / Air Discharge: $\pm 8\text{KV}$, Level: 2 / Contact Discharge: $\pm 4\text{KV}$)

5.3. Severity Levels and Performance Criterion

5.3.1. Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	± 2	± 2
2.	± 4	± 4
3.	± 6	± 8
4.	± 8	± 15
X	Special	Special

5.3.2. Performance Criterion: **B**

5.4. EUT Configuration on Test

The configuration of EUT is listed in Section 3.2.

5.5.Operating Condition of EUT

5.4.1.Setup the EUT as shown on Section 5.1.

5.4.2.Turn on the power of all equipments.

5.4.3.Let the EUT work in measuring mode (ON) and measure it.

5.6.Test Procedure

5.6.1.Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT.

After each discharge, the discharge electrode shall be removed from the EUT.

The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

5.6.2.Contact Discharge

All the procedure shall be same as Section 5.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

5.6.3.Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

5.6.4.Indirect Discharge For Vertical Coupling Plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT.

Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

5.7.Test Results

PASS.

Please refer to the following pages

Electrostatic Discharger Test Results

Standard	☐ IEC 61000-4-2 ☒ EN 61000-4-2		
Applicant	Zhongshan Yatai Electric Appliances Co., Ltd.		
EUT	Electric Outboard Motor	Temperature	24°C
M/N	50736	Humidity	53%
Criterion	B	Pressure	1021mbar
Test Mode	ON	Test Date	March 5, 2025
Test Engineer	Andy		

Air Discharge

Test Points	Test Levels			Results		
	± 2kV	± 4kV	± 8kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☒	☐	☐ A ☒ B
Back	☒	☒	☒	☒	☐	☐ A ☒ B
Left	☒	☒	☒	☒	☐	☐ A ☒ B
Right	☒	☒	☒	☒	☐	☐ A ☒ B
Top	☒	☒	☒	☒	☐	☐ A ☒ B
Bottom	☒	☒	☒	☒	☐	☐ A ☒ B

Contact Discharge

Test Points	Test Levels		Results		
	± 2 kV	±4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐ A ☒ B
Back	☒	☒	☒	☐	☐ A ☒ B
Left	☒	☒	☒	☐	☐ A ☒ B
Right	☒	☒	☒	☐	☐ A ☒ B
Top	☒	☒	☒	☐	☐ A ☒ B
Bottom	☒	☒	☒	☐	☐ A ☒ B

Discharge To Horizontal Coupling Plane

Side of EUT	Test Levels		Results		
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐ A ☒ B
Back	☒	☒	☒	☐	☐ A ☒ B
Left	☒	☒	☒	☐	☐ A ☒ B
Right	☒	☒	☒	☐	☐ A ☒ B

Discharge To Vertical Coupling Plane

Side of EUT	Test Levels		Results		
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐ A ☒ B
Back	☒	☒	☒	☐	☐ A ☒ B
Left	☒	☒	☒	☐	☐ A ☒ B
Right	☒	☒	☒	☐	☐ A ☒ B

6. Photograph

7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT



Fig.1



Fig.2

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