

RADIO TEST REPORT

For

Zhongshan Yatai Electric Appliances Co., Ltd.

Cayman

Test Model No.: 50700

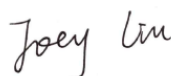
Additional Model NO.: 50718D, 50706

Prepared for	:	Zhongshan Yatai Electric Appliances Co., Ltd.
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Prepared by	:	Shenzhen AOCE Electronic Technology Service Co., Ltd
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Date of receipt of test sample	:	March 11, 2025
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	March 11, 2025~April 2, 2025
Date of Report	:	April 2, 2025

RADIO TEST REPORT ETSI EN 300 220-2 V3.2.1 (2018-06) Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU for nonspecific radio equipment	
Report Reference No.	: AOC250324115E
Date of Issue.....	: April 2, 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.....	: 3F NO.10th Maozhoushan Industrial Zone, Houting Community, Shajing Street, Baoan District, Shenzhen ,China
Test Specification Standard..... : ETSI EN 300 220-1 V3.1.1 (2017-02) : ETSI EN 300 220-2 V3.2.1 (2018-06) Test Report Form No. : AOC EMC-1.0 TRF Originator..... : Shenzhen AOCE Electronic Technology Service Co., Ltd Master TRF : Dated 2015-06	
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Test Item Description.....	: Cayman
Trade Mark	: HASWING
Model/ Type reference.....	: 50700
Ratings	: DC 12-24V, 50A MAX
Result	: Positive

Compiled by:

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Supervised by:

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Approved by:

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RADIO -- TEST REPORT

Test Report No. : AOC250324115E	<u>April 2, 2025</u> Date of issue
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Type / Model.....	: 50700
EUT.....	: Cayman
Applicant.....	: Zhongshan Yatai Electric Appliances Co., Ltd.
Address.....	: No.4 Xinlong St.Nanlong Industrial Park, SanXiang Town, ZhongShan City, 528463, GuangDong, China
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Address.....	: No.4 Xinlong St.Nanlong Industrial Park, SanXiang Town, ZhongShan City, 528463, GuangDong, 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.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

EUT : Cayman
Model Number : 50700, 50718D, 50706
Model Declaration : Only the color is different, the internal structure, PCB board aer all the same.
Power Supply : DC 12-24V, 50A MAX
RF Parameters:
Frequency Range : 2.4GHz
Channel Number : 1
Modulation Type : FSK
Antenna Description : Integral Antenna, 2.0 dBi(Max.)
Receiver Category : 3

1.2. Objective

This Type approval report is prepared on behalf of **Zhongshan Yatai Electric Appliances Co., Ltd.** in accordance with ETSI EN 300 220-2 V3.2.1 (2018-06), Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU for non specific radio equipment

The objective is to determine compliance with ETSI EN 300 220-2 V3.2.1 (2018-06).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 220-2 V3.2.1 (2018-06).

1.5. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
/	/	/	/	/

1.6. External I/O Cable

I/O Port Description	Quantity	Cable
/	/	/

1.7. Measurement Uncertainty

Test Item		Uncertainty
Radio Frequency	:	$\pm 0.9 \times 10^{-4}$
Total RF Power, Conducted	:	± 1.0 dB
RF Power Density, Conducted	:	± 1.8 dB
Spurious Emissions, Conducted	:	± 1.8 dB
All Emissions, Radiated	:	± 3.1 dB
Temperature	:	$\pm 0.5^{\circ}\text{C}$
Humidity	:	± 1 %
DC And Low Frequency Voltages	:	± 1 %

1.8. Description Of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.

All test modes were tested, only the result of the worst case was recorded in the report.

Test Mode	Channel	Frequency Range (Hz)	Data Rate (Mbps)
Tx/Rx	1	2.4G	250kbps
Standby	--	--	

2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen AOC Testing Technology Service Co., Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

3. SUMMARY OF TEST RESULTS ETSI EN 300 220-2 V3.1.1(2017-02)

Test	Clause	Result
Operating frequency	4.2.1	PASS
Unwanted emissions in the spurious domain	4.2.2	PASS
Effective Radiated Power	4.3.1	PASS
Maximum e.r.p. spectral density	4.3.2	N/A
Duty Cycle	4.3.3	PASS
Occupied Bandwidth	4.3.4	PASS
Tx Out of Band Emissions	4.3.5	PASS
Transient power	4.3.6	PASS
Adjacent Channel Power	4.3.7	N/A
TX behaviour under Low Voltage Conditions	4.3.8	PASS
Adaptive Power Control	4.3.9	N/A
FHSS equipment	4.3.10	N/A
Short term behaviour	4.3.11	N/A
RX sensitivity	4.4.1	N/A
Blocking	4.4.2	PASS
Clear Channel Assessment threshold	4.5.2	N/A
Polite spectrum access timing parameters	4.5.3	N/A
Adaptive Frequency Agility	4.5.4	N/A

Remark:

N/A: Not Applicable

4. SUMMARY OF TEST EQUIPMENT

Description	Manufacturer	Model No.	Serial No.	Last Cal.	Due Cal.
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101142	2023/10/26	2024/10/25
Artificial Mains	ROHDE & SCHWARZ	ENV216	101288	2023/10/26	2024/10/25
EMI Test Software	AUDIX	E3	N/A	2023/10/26	2024/10/25
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2023/10/26	2024/10/25
Amplifier	SCHAFFNER	COA9231A	18667	2023/10/26	2024/10/25
Amplifier	Agilent	8449B	3008A02120	2023/10/26	2024/10/25
Amplifier	MITEQ	AMF-6F-2604 00	9121372	2023/10/26	2024/10/25
MXA Signal Analyzer	Agilent	N9020A	MY50510140	2023/10/26	2024/10/25
Loop Antenna	R&S	HFH2-Z2	860004/001	2023/10/26	2024/10/25
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2023/10/26	2024/10/25
Horn Antenna	EMCO	3115	6741	2023/10/26	2024/10/25
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA917015 4	2023/10/26	2024/10/25
RF Cable-R03m	Jye Bao	RG142	CB021	2023/10/26	2024/10/25
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2023/10/26	2024/10/25
Power Analyzer Test System	Voltech	PM6000	20000670053	2023/10/26	2024/10/25
Signal Generator	R&S	SMR40	10016	2023/10/26	2024/10/25

5. EFFECTIVE RADIATED POWER

5.1. Definition

The effective radiated power (e.r.p) is the power radiated in the direction of the maximum radiated power under specified conditions of measurements for any condition of modulation. For equipment with a permanent or temporary antenna connection it may be taken as the power delivered from that connector taking into account the antenna gain.

5.2. Limit

The maximum RF output power is 10mW for the duty cycle is less than 10%.

5.3. EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

5.4. Test Procedure

Please refer to EN 300 220-1 V3.1.1 (2017-02) clause 5.2.2.2

5.5. Measurement Record

Modulation	Frequency (Hz)	Test distance (m)	Test polarity	EIRP (dBm)	Limit(dBm)
FSK	2.4G	3	Horizontal	6.79	10
		3	Vertical	6.54	10
Test Conlusion: Pass					

6. DUTY CYCLE

6.1. Definition

Duty cycle is the ratio expressed as a percentage, of the cumulative duration of transmissions T_{on_cum} within an observation interval T_{obs} .

6.2. Limit

The duty cycle limit is 10%

6.3. EUT Operation Condition

The EUT shall be configured to transmit its maximum length transmissions.

6.4. Test Procedure

Please refer to EN 300 220-1 V3.1.1(2017-02) clause 5.5.2.2

6.5. Measurement Record

Duty cycle = $0.21 / 3.97 * 100\% = 5.29\%$

7. OCCUPIED BANDWIDTH AND OPERATING FREQUENCY

7.1. Definition

The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls.

7.2. Limit

The Operating Channel shall be declared and shall reside entirely within the Operational Frequency Band.

The Maximum Occupied Bandwidth at 99 % shall reside entirely within the Operating Channel defined by Flow and Fhigh.

7.3. EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode .

7.4. Test Procedure

Please refer to EN 300 220-1 V3.1.1(2017-02) clause 5.6.3.4

7.5. Measurement Record

Test Condition: Normal					
Modulation	Frequency	Occupied bandwidth (kHz)		Limit(kHz)	Result
FSK	2.4G	49		/	/
Modulation	Frequency	Frequency Range (MHz)		Limit(kHz)	Result
		Lowest Frequency	Highest Frequency		
FSK	2.4G	433.859	433.956	433.05~434.79	PASS

Note: All modes have been tested and we only record the worst results.

8. TX OUT OF BAND EMISSIONS

8.1. Definition

Two OOB domains are defined, one for OC (see Figure 5) and one for Operational Frequency band

8.2. Limit

Please refer to EN 300 220-1 V3.1.1(2017-02)

8.3. EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

8.4. Test Procedure

Please refer to EN 300 220-1 V3.1.1(2017-02) clause 5.8.3

8.5. Measurement Record

Test Result: Pass

9. TRANSIENT POWER

9.1. Definition

Transmitter transient power is power falling into frequencies other than the operating channel as a result of the transmitter being switched on and off.

9.2. Limit

Absolute offset from centre frequency	RBW _{REF}	Peak power limit applicable at measurement points
≤ 400 kHz	1 kHz	0 dBm
> 400 kHz	1 kHz	-27 dBm

9.3. EUT Operation Condition

The EUT was programmed to be in normal operating mode.

9.4. Test Procedure

Please refer to EN 300 220-1 V3.1.1(2017-02) clause 5.10.3

9.5. Measurement Record

Frequency	Level	Limit	Result
	(dBm)	(dBm)	
-0,5 x OCW - 3 kHz	-67.54	0	Pass
0,5 x OCW + 3 kHz	-19.67	0	Pass
-OCW	-28.63	0	Pass
+OCW	-27.41	0	Pass
-0,5 x OCW - 400 kHz	-31.64	-27	Pass
0,5 x OCW + 400 kHz	-30.54	-27	Pass
-0,5 x OCW -1 200 kHz	-32.47	-27	Pass
-0,5 x OCW -1 200 kHz	-35.55	-27	Pass

10. UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

10.1. Definition

Spurious emissions are unwanted emissions in the spurious domain at frequencies other than those of the Operating Channel and its Out Of Band Domain.

10.2. Limit

Table 1: Transmitter limits for spurious emissions

Frequency range	Maximum power,e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87.5 MHz	-36 dBm	100 kHz
87.5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

10.3. EUT Operation Condition

The EUT was programmed to be in continuously transmitting mode.

10.4. Test Procedure

Please refer to EN 300 220-1 V3.1.1(2017-02) clause 5.9.3

11.5. Measurement Record

Test Result					
Frequency	Antenna	Result	Limit	Margin	Remark
(MHz)	polarization	(dBm)	(dBm)	(dB)	
278.98	H	-65.82	-36	-29.82	Peak
278.98	V	-62.54	-36	-26.54	Peak
868.34	H	-51.67	-30	-21.67	Peak
868.34	V	-46.22	-30	-16.22	Peak
1301.26	H	-56.43	-36	-20.43	Peak
1301.26	V	-52.27	-36	-16.27	Peak
Note: All modes have been tested and we only record the worst results.					

11. RECEIVER SPURIOUS EMISSIONS

11.1. Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

11.2. Limit

Spurious emission limits for receivers

Frequency range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Measurement bandwidth
25 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 6 GHz	-47 dBm	1 MHz

11.3. EUT Operation Condition

The EUT was programmed to be in continuously receiving mode.

11.4. Test Procedure

Please refer to EN 300 220-1 V3.1.1(2017-02) clause 5.9.3.3

11.5. Test Result

Test Result					
Frequency	Antenna	Result	Limit	Margin	Remark
(MHz)	polarization	(dBm)	(dBm)	(dB)	
683.76	H	-65.53	-57	-8.53	Peak
683.76	V	-66.42	-57	-9.42	Peak
1723.66	H	-56.11	-47	-9.11	Peak
1723.66	V	-59.23	-47	-12.23	Peak
Note: All modes have been tested and we only record the worst results.					

12. TX BEHAVIOUR UNDER LOW VOLTAGE CONDITIONS

12.1. Definition

The TX behaviour under low voltage condition is the ability of the equipment to maintain its operating frequency and not produce emissions which exceed any relevant limit when the battery voltage falls below the lower extreme voltage level.

12.2. Limit

The equipment shall either:

- a) remain in the Operating Channel OC without exceeding any applicable limits (e.g. Duty Cycle); or
 - b) reduce its effective radiated power below the Spurious Emission limits without exceeding any applicable limits (e.g. Duty Cycle); or
 - c) shut down, (ceasing function);
- as the voltage falls below the manufacturers declared operating voltage.

12.3. EUT Operation Condition

The EUT was programmed to be in continuously receiving mode.

12.4. Test Procedure

Please refer to EN 300 220-1 V3.1.1(2017-02) clause 5.12.3

12.5. Test Result

When the battery power is less than 2.7V the product shut down.

13. BLOCKING

13.1. Definition

Blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels or bands.

13.2. Limit

Limit for category 3

Requirement	Limits
	Receiver category 3
Blocking at ± 2 MHz from OC edge f_{high} and f_{low}	≥ -80 dBm
Blocking at ± 10 MHz from OC edge f_{high} and f_{low}	≥ -60 dBm
Blocking at $\pm 5\%$ of Centre Frequency or 15 MHz, whichever is the greater	≥ -60 dBm

13.3. EUT Operation Condition

The EUT was programmed to be in normal receiving mode.

13.4. Test Procedure

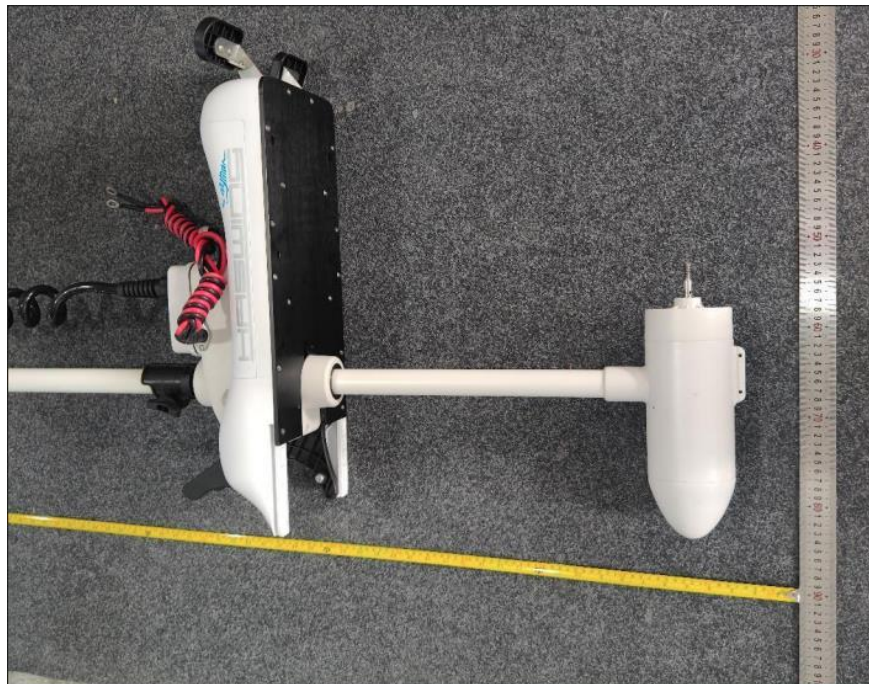
Please refer to EN 300 220-1 V3.1.1(2017-02) clause 5.18.6

13.5. Test Result

Frequency	Level	Limit	Result
	(dBm)	(dBm)	
+2MHz	-71	-80	Pass
-2MHz	-73	-80	Pass
+10MHz	-46	-60	Pass
-10MHz	-47	-60	Pass
+21.7MHz	-42	-60	Pass
-21.7MHz	-45	-60	Pass

14. EXTERNAL AND INTERIOR PHOTOS OF THE EUT







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