TEST REPORT

UL 60384-14：2017

STANDARD FOR SAFETY

Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains

For

Zhuzhou Chenxin Induction Equipment Co.,LTD

4-2# Huijia Huanbao Industrial Park, Aviation Street, Lusong, Zhuzhou, Hunan

Model: RFMO.5-850-2.5S

2023-11-30

This Report Concerns:	**Equipment Type:**
☒ Original Report	RFM

Test Engineer:	Engine Chen / Engine Chen
Report Number:	TH2310260-C04-R01
Test Date:	2023-10-15 to 2023-11-30
Reviewed By:	Prince Huang / Prince Huang
Approved By:	Prince Huang / Prince Huang
Prepared By:	**Shenzhen Tian Hai Test Technology Co,.Ltd.** 4F, A3 BLDG, The Silicon Valley Power intelligent terminal industrial park, Guanlan street, Longhua district, Shenzhen Tel: +86-755-86615100 Fax: +86-755-86615105

深圳市天海检测技术有限公司 检测报告专用章

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen Tian Hai Test Technology Co,.Ltd.

TEST REPORT
UL 60384-14：2017

STANDARD FOR SAFETY Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains

Report Reference No.....:	TH2310260-C04-R01
Tested by (signature).....:	Engine Chen /
Reviewed by (signature).....:	Prince Huang /
Approved by (signature).....:	Prince Huang /
Date of issue.....:	2023-11-30

Testing Laboratory Name.....:	**Shenzhen Tian Hai Test Technology Co., Ltd.**
Address.....:	4F, A3 BLDG, The Silicon Valley Power intelligent terminal industrial park, Guanlan street, Longhua district, Shenzhen
Applicant's Name.....:	**Zhuzhou Chenxin Induction Equipment Co.,LTD**
Address.....:	4-2# Huijia Huanbao Industrial Park, Aviation Street, Lusong, Zhuzhou, Hunan

Test specification

Standard.....:	UL 60384-14：2017
Test procedure .....:	N/A
Procedure deviation.....:	N/A

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Test item description.....:	**RFM**
Trade mark.....:	/
Model No.....:	RFMO.5-850-2.5S
Manufacturer.....:	**Jiande Dingxin Capacitor Co., Ltd**
Address.....:	Houtang Industrial Park, Genglou Street, Jiande City, Hangzhou City, Zhejiang Province
Rating(s).....:	/
Note.....:	This test report is limited to the above client company and the product model (high temperature furnace) only.

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Test case verdicts	
Test case does not apply to the test object …….:	N/A(Not applicable)
Test item does meet the requirement ……..:	P(ass)
Test item does not meet the requirement…….:	F(ail)
Testing:	
Date of receipt of test item……..:	2023-10-15
Date(s) of performance of test……..:	2023-10-15 to 2023-11-30

General remarks:

This test report shall not be reproduced, except in full, without the written approval of the testing laboratory.

The test results presented in this report relate only to the object(s) tested.

"(see remark #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

General product information:

/

Test conclusion:

The products are tested according to UL 60384-14：2017.

Test result:

Pass

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UL 60384-14：2017			
Clause	**Requirement-Test**	**Result**	**Verdict**
4	**Test and measurement procedures**		**P**
4.1	Visual examination and check of dimensions		P
	See IEC 60384-1:2008, 4.4 with the following additional details.	Complied	P
4.1.1	Creepage distances and clearances		P
	Creepage distances and clearances on the outside of the capacitor between live parts of different polarity or between live parts and a metal case shall be not less than the appropriate values given in Table 9.	Complied	P
	Table 9 is based on IEC 60664-1, but equipment safety standards IEC 60335-1, IEC 60065and IEC 60950-1have been considered, also. Further information may be obtained from IEC 60664-1.	Complied	P
	Table 9 is generated using following environmental conditions as main guideline:	Complied	P
	Pollution degree 2, altitude ≤ 2 000 m and CTI (Comparative Tracking Index) of materials ≥ 100.	Complied	P
	The creepage distances smaller than those in the Table 9 can be used, if rules given in IEC 60664-1for CTI of materials in components allow that. Creepage distance shall always be larger or equal to clearance distance from this table. Equipment standards may require larger distances than ones given here.	Complied	P
	Compliance shall be checked by measurement according to the rules laid down in IEC 60664-1 for measurements on the outside of the capacitor. Additional requirements may be necessary, for example for capacitors intended to be used in other environments than pollution degree 2 (e.g. drip-proof and splash-proof capacitors) or for the use of capacitors in altitudes higher than 2 000 m. See IEC 60664-1 for guidance.	Complied	P
4.2	Electrical tests		P
4.2.1	Voltage proof		P
	See IEC 60384-1:2008, 4.6, with the following details.	Complied	P
4.2.2	Capacitance		P
	See IEC 60384-1:2008, 4.7 with the following details.	Complied	P
4.2.2.1	Measuring conditions		P
	The capacitance measured shall be the series equivalent capacitance.	Complied	P

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Clause	**Requirement-Test**	**Result**	**Verdict**
4.3	Robustness of terminations		P
	See IEC 60384-1:2008, 4.13 with the following details.	Complied	P
	The test method and degree of severity to be used shall be specified in the detail specification.	Complied	P
	The test for snap-in contacts shall be specified in the detail specification; the test methods and severity shall comply with the applicable parts of IEC 61210.	Complied	P
4.4	Resistance to soldering heat		P
	This test is not applicable to capacitors with insulated leads longer than 10 mm, or to capacitors with terminations not intended to be soldered (such as screw and fast-on terminations).	Complied	P
	When preconditioning is performed, initial measurements shall be carried out after preconditioning.	Complied	P
	When, for fixed capacitors of ceramic dielectric Class 2, a precise measurement of capacitance drift is required, preconditioning should be performed as advised by the manufacturer (see Annex G).	Complied	P
	See IEC 60384-1:2008, 4.14 with the following details.	Complied	P
4.5	Solderability		N/A
	This test is not applicable to capacitors with terminations not intended for soldering (such as screw terminations and snap-in contacts).		N/A
	See 4.15 of IEC 60384-1, with the following details.		N/A
4.5.1	Test conditions		N/A
	No ageing is required.		N/A
	When Method 2 is used, a soldering iron of size A shall be used.		N/A
4.5.2	Requirements		N/A
	See Table 7.		N/A
4.6	Rapid change of temperature		P
	When for fixed capacitors of ceramic dielectric, Class 2 a precise measurement of capacitance drift is required, preconditioning should be performed as advised by the manufacturer (see Annex G).	Complied	P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	When preconditioning is performed, initial measurements shall be carried out after preconditioning.	Complied	P
	See IEC 60384-1:2008, 4.16 with the following details.	Complied	P
	Number of cycles: 5.	Complied	P
	Duration of exposure at the temperature limits: 30 min.	Complied	P
4.6.1	Final inspection		P
	The capacitors shall be visually examined and there shall be no visible damage.	Complied	P
4.7	Vibration		P
	See IEC 60384-1:2008, 4.17 with the following details.	Complied	P
4.7.1	Test conditions		P
	The following degree of severity of test Fc applies: 0,75 mm displacement or 100 m/s2, whichever is the lower amplitude, over one of the following frequency ranges: 10 Hz to 55 Hz, 10 Hz to 500 Hz, 10 Hz to 2000 Hz. The total duration shall be 6 h.	Complied	P
	The detail specification shall prescribe the frequency range and shall also prescribe the mounting method to be used. For capacitors with axial leads which are intended to be mounted by the leads, the distance between the body and the mounting point shall be 6 mm ± 1 mm.	Complied	P
4.7.2	Final inspection		P
	The capacitors shall be visually examined and there shall be no visible damage.	Complied	P
4.8	Bump		P
	The detail specification shall state whether the bump or the shock test applies.	Complied	P
	See IEC 60384-1:2008, 4.18 with the following details.	Complied	P
4.8.1	Test conditions	Complied	P
	The following are the preferred severities.		P
	Total number of bumps: 1 000 or 4 000		P
	Acceleration: 400 m/s2		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	Pulse duration: 6 ms		P
	The mounting method and the severity shall be specified in the detail specification.		P
4.8.2	Final inspection, measurements and requirements		P
	The final measurements after this test are the intermediate measurements after the tests of Subgroup 1B and before the remainder of the tests of Group 1.		P
	The capacitors shall be visually examined and measured and shall meet the following requirements.		P
	• There shall be no visible damage.	Complied	P
	• The change of capacitance compared with the value measured in Group 0 of Table 4 shall not exceed 5 % except for ceramic capacitors where it shall not exceed 10 %.	Complied	P
	• The value of tan δ shall not exceed the limit prescribed in the detail specification.	Complied	P
	• The change of resistance (if applicable) shall not exceed the limit in Table 14.	Complied	P
	When preconditioning is performed, initial measurements for reference shall be carried out after preconditioning.	Complied	P
4.9	Shock		P
	The detail specification shall state whether the bump or the shock test applies.	Complied	P
	See IEC 60384-1:2008, 4.19 with the following details.		P
4.9.1	Test conditions		P
	The following severities are preferred.	Complied	P
	Pulse-shape: half-sine wave	Complied	P

Peak acceleration m/s^2	Corresponding duration of the pulse ms
500	11
1 000	6

	The mounting method, the severity and the number of shocks along each axis shall be specified in the detail specification.		P
4.9.2	Final inspection, measurements and requirements		P

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Clause	**Requirement-Test**	**Result**	**Verdict**
	The final measurements after this test are the intermediate measurements after the tests of Subgroup 1B and before the remainder of the tests of Group 1.		P
	The capacitors shall be visually examined and measured and shall meet the following requirements.		P
	• There shall be no visible damage.	Complied	P
	• The change of capacitance compared with the value measured in Group 0 of Table 4 shall not exceed 5 % except for ceramic capacitors where it shall not exceed 10 %.	Complied	P
	• The value of tan δ shall not exceed the limit prescribed in the detail specification.	Complied	P
	• The change of resistance (if applicable) shall not exceed the limit in Table 14.	Complied	P
	When preconditioning is performed, initial measurements for reference shall be carried out after preconditioning.	Complied	P
4.10	Container sealing		P
	This test is applicable only if prescribed in the detail specification.	Complied	P
	See IEC 60384-1:2008, 4.20 with the following details.	Complied	P
4.10.1	Test conditions		P
	The capacitors shall be subjected to either Test Qc or to Test Qd of IEC 60068-2-17, as appropriate.	Complied	P
	Unless otherwise specified in the detail specification, Method 1 shall be used when Test Qc is employed.	Complied	P
4.10.2	Requirements		P
	During or after the test, as applicable, there shall be no evidence of leakage.	Complied	P
4.11	Climatic sequence		N/A
	When, for fixed capacitors of ceramic dielectric Class 2, a precise measurement of capacitance drift is required, preconditioning should be performed as advised by the manufacturer (see Annex G).		N/A
	See IEC 60384-1:2008, 4.2.1 with the following details.		N/A
4.12	Damp heat, steady state		N/A

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Clause	**Requirement-Test**	**Result**	**Verdict**
	When, for fixed capacitors of ceramic dielectric Class 2, a precise measurement of capacitance drift is required, preconditioning should be performed as advised by the manufacturer (see Annex G).		N/A
	Requirements for capacitors used in high humidity applications are contained in Annex I.		N/A
	See IEC 60384-1:2008, 4.22 with the following details.		N/A
4.13	IMPULSE VOLTAGE		P
	This test is to be carried out as a sequence with the endurance test described in 4.14.	Complied	P
4.13.1	Initial measurements		P
	Initial measurements have been made in Group 0 of Table 3 or Table 4.	Complied	P
	When preconditioning is performed, initial measurements shall be carried out after preconditioning.	Complied	P
4.14	Endurance		P
	When, for fixed capacitors of ceramic dielectric Class 2, a precise measurement of capacitance drift is required, preconditioning should be performed as advised by the manufacturer (see Annex G).	Complied	P
	The endurance test shall be started within one week of the completion of the IMPULSE VOLTAGE test. See IEC 60384-1:2008, 4.23 with the following details.	Complied	P
4.14.1	Test conditions		P
	The capacitors shall be placed in the test chamber in such a manner that no capacitor is within 25 mm of any other capacitor.	Complied	P
	However, there is an exception, when the width or diameter of the capacitor is less than 25 mm, then the distance between the capacitors may be reduced to the value of this width or diameter, provided that this causes no extra heating of the capacitors. In case of doubt, the 25 mm spacing shall be used.		N/A
	The capacitors shall not be heated by direct radiation and the circulation of the air in the chamber shall be adequate to prevent the temperature from exceeding ±3 °C of the specified temperature at any point where capacitors are placed.		N/A
	For non self-healing capacitors,a1A fuse or larger, if the capacitance value under test so requires, shall be connected in the supply circuit and shall not rupture during the test.		N/A

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Clause	**Requirement-Test**	**Result**	**Verdict**
4.15	Charge and discharge		P
	This test is applicable only to metallized capacitors, ceramic capacitors and RC units using such capacitors.	Complied	P
	See IEC 60384-1:2008, 4.27 with the following details.	Complied	P
4.16	Radiofrequency characteristics		N/A
	The detail specification may prescribe measuring methods and requirements for one or more of the following radiofrequency characteristics:		N/A
	– the MAIN RESONANT FREQUENCY of the capacitor;		N/A
	– INSERTION LOSS (the methods of CISPR 17 shall be used where possible);		N/A
	– resistance at resonant frequency;		N/A
	– impedance of the capacitor;		N/A
	– inductance of the capacitor.		N/A
4.17	PASSIVE FLAMMABILITY test		N/A
4.17.1	Testing according to IEC 60384-1		N/A
	See IEC 60384-1:2008, 4.38, with the following details.		N/A
	No test according to Group 0 and no preconditioning are required.		N/A
	The test shall be carried out on 6 to 18 specimens, depending on the number of case sizes tested. The smallest, a medium (in the case of more than 4 case sizes in the range to be qualified), and the largest case size in the range to be qualified, shall be tested. For each case size, 3 specimens, each of the highest and lowest capacitance values of the range to be qualified, shall be tested.		N/A
4.18	ACTIVE FLAMMABILITY test		N/A
4.18.1	This test is not applicable to Y1 capacitors.		N/A
4.18.2	The sample of 24 specimens shall contain equal numbers of specimen of the highest, the lowest and an intermediate capacitance value in the range to be qualified. Where there are only two capacitance values in the range, 12 of each value shall be tested; where only 1 capacitance value is involved, 24 capacitors of this value shall be tested.		N/A

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Clause	**Requirement-Test**	**Result**	**Verdict**
4.19	Component solvent resistance (if applicable)		N/A
	See IEC 60384-1:2008, 4.31, with the following details.		N/A
	The detail specification shall specify whether tests are required using solvents additional to those specified in the generic specification.		N/A
	The requirements shall be specified in the detail specification.		N/A
4.20	Solvent resistance of the marking		P
	See IEC 60384-1:2008, 4.32, with the following details.	Complied	P
	The detail specification shall specify whether tests are required using solvents additional to those specified in the generic specification.	Complied	P
	The marking shall be legible.	Complied	P

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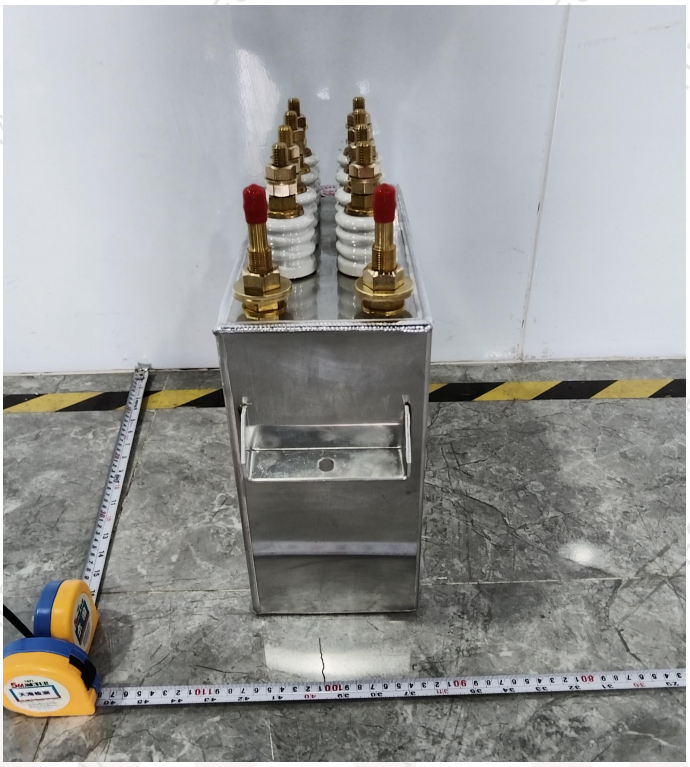

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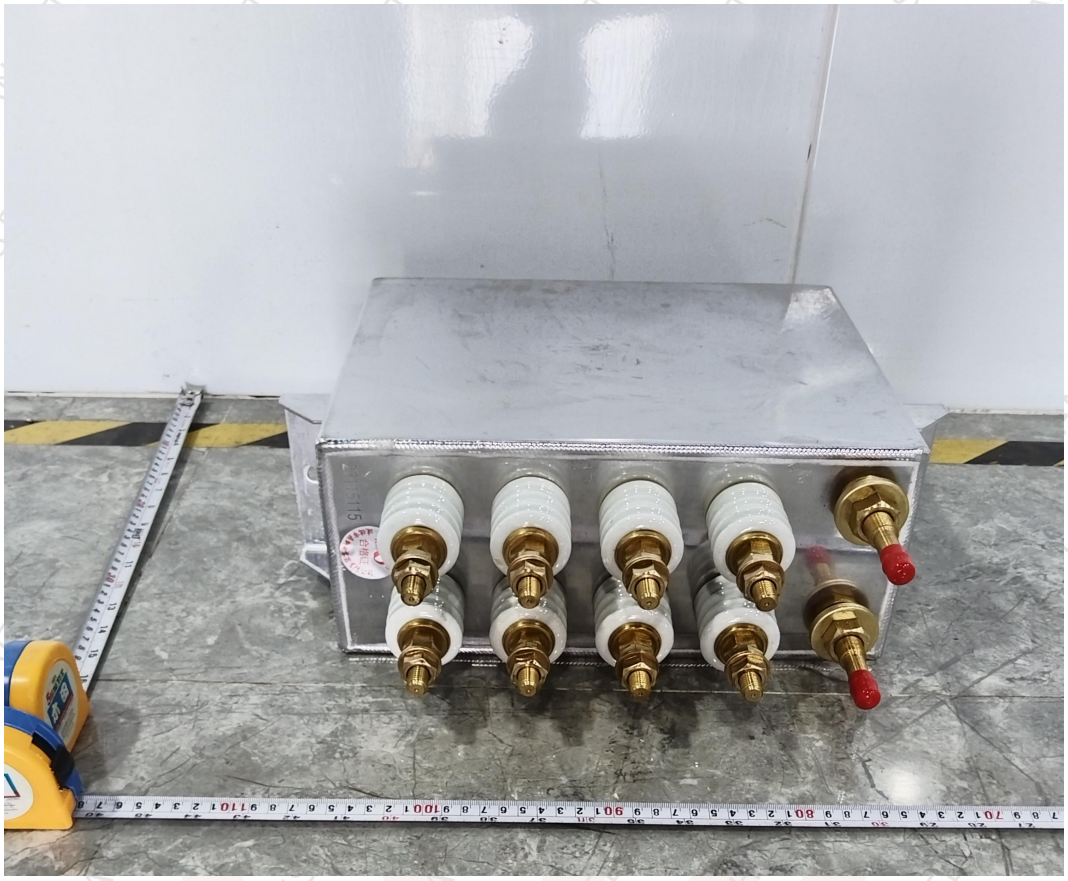

**********END OF REPORT**********

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China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L5885)

Shenzhen Tianhai Test Technology Co., Ltd.

(Legal Entity: Shenzhen Tianhai Test Technology Co., Ltd.)

4B/F., Building A3, The Silicon Valley Power Intelligent Terminal Industrial Park, Guanlan Street, Longhua District, Shenzhen, Guangdong, China

is accredited in accordance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence to undertake the service described in the schedule attached to this certificate.

The scope of accreditation is detailed in the attached schedule bearing the same registration number as above. The schedule forms an integral part of this certificate.

Effective Date：2019-01-22

Expiry Date：2025-01-21

Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment(CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is a signatory of the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) and the Asia Pacific Laboratory Accreditation Cooperation Mutual Recognition Arrangement (APLAC MRA).

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