MTBF Expected Test Report

Name of Products	Maxi Charger AC Wallbox
Model：	Maxi C-SE AC W7-S-B
Applicant	R&D
Kind of Test	MTBF & AFR Expected
Testing institutions	Centre Test International Group Co.,Ltd
Date of Issue	13 November 2021
Prepared By/Date	
Approved By/Date	

1. Profile

1.1 Statement

(1) The report is invalid without the signature of project test, project review and project approval personnel.

(2) The report is invalid if altered.

(3) The test conclusion of self-delivered samples is only valid for samples submitted for inspection.

(4) All or part of the test items of this report are within the scope of laboratory accreditation. This laboratory is responsible for the inspection (test) results issued. This report may not be reproduced in whole or in part without written consent of the laboratory.

(5) If you have any objection to this report, you can appeal to the unit within 30 days after receiving the report.

1.2 Report information

No. of Report: RT20211003

Date of Test: 14 Sep. 2021—11 Nov. 2021

1.3 Conclusion

The MTBF（Mean Time of Between Failure）of Sample is no less than **360,000**Hours.

The AFR（Annualized Failure Rate）of Sample is Less than **1.2%**.

2.Information of laboratory

Testing institutions：Centre Test International Group Co.,Ltd

Address：Hongwei industrial Zone，Bao'an 70 District,Shenzhen , Guangdong, China

Tel ：+86 0775-33683666
Fax：+86 0755-33683385

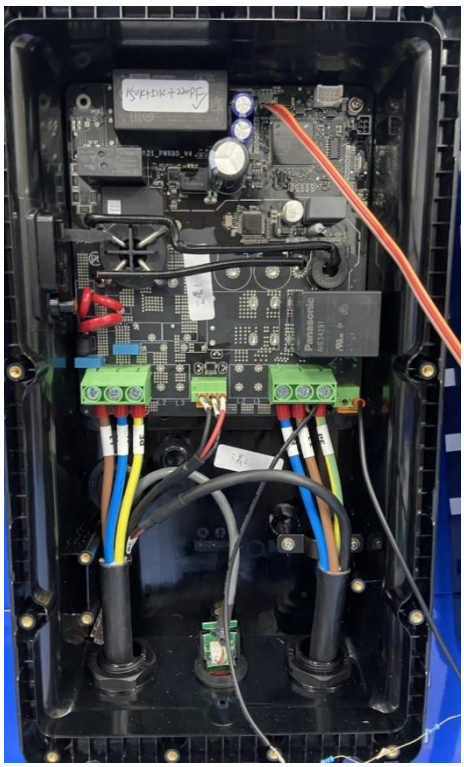
3.Information of sample

Name of Sample：Maxi Charger AC Wallbox

Model of Sample：Maxi C-SE AC W7-S-B

The Number of Sample：4

The Picture of Sample:

Appearance	Internal
	

4.Information of test

4.1 The reference standard

IEC 60605-4 Equipment Reliability Testing - Part 4: Statistical Procedures for Exponential Distribution - Point Estimates, Confidence Intervals, Prediction Intervals and Tolerance Intervals。

4.2 The test conditions

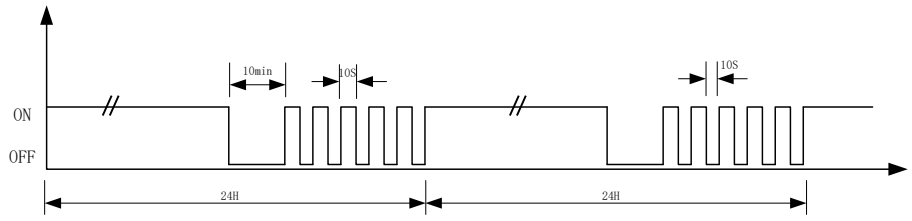
Item	Test Conditions
Pre-conditioning	60℃，90%RH，168H，Unpowered
Operate	85℃, 85%RH, 1000H, Powered,ON/OFF

4.3 Process of Test

The test was carried out according to the following steps：

1）The samples were stored for 168H without power on at 60℃ and 90%RH for experimental pretreatment;

2）Perform the power-on test according to the above test conditions. During the test, perform one power-off operation every day for 10min, and then perform five power-off operations for 10S each;



3）Before and after the test, the functional test should be conducted and recorded to confirm the sample status and test results.

4.4 The failure criterion

During or after the test, if the following phenomenon occurs, it shall be regarded as failure:

1）Abnormal on-off function of power switch;

2）Abnormal function；

3）Function keys or Indicator light fail;

4）Communication is normal.

5. The results of test

After the end of the test， the inspection results are normal，there is no failure such as in Section 4.4.

6. Analysis of the test

6.1 MTBF（Mean Time of Between Failure）

Reference IEC 60605-4 and Arrhenius Acceleration Model,we can obtained the following models:

$$MTBF=2T/X^2(\alpha,DF) =2*(AF*T1)/X2(\alpha,2r+2) =2*(AF*nt)/X2(\alpha,2r+2)=360,000H$$

Parameter	Value	Remark
n	4	Sample Size
t	1000H	Test Time
T1	4000H	Cumulative test time（n×t）
AF	145	Accelerate Factor(reference below)
T	580,000H	Equivalent cumulative test time（AF*T1）
r	0	Failure Size
X^2	/	Chi-square distribution
DF	2	Degree of Freedom(2r+2)
α	20%	Acceptable risk(1- Degree of confidence)
Degree of confidence	80%	

$$AF= AF_T*AF_H=exp[Ea/k\times(1/T_{normal}-1/T_{test})] * (RH_{test}/RH_{normal})^n=145$$

Parameter	Value	Remark
Ea	0.6eV	Activation Energy
k	0.00008617385 eVK-1	Boltzman's Constant
T_{normal}	298k	Temperature in Kelvin
T_{test}	358k	Temperature in Kelvin
RH_{test}	85%	Relative Humidity
RH_{normal}	50%	Relative Humidity
n	2	Humidity Acceleration Constant

6.2 AFR (Annualized Failure Rate)

Reference IEC 60605-4, Product failure rate follows exponential distribution, then the Annualized Failure Rate follows the formula.

AFR≤ 1-exp(-Annual Working Time/MTBF)=1- exp(-8760×Duty Ratio/MTBF)=1.2%

Parameter	Value	Remark
Duty Ratio	50%	According to work 12 hours a day statistics

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Appendix A Test Record

检测报告

报告编号 A2210383125201C 第 1 页 共 5 页

报告抬头公司名称 深圳市道通合创新能源有限公司

地 址 深圳市南山区西丽街道学苑大道 1001 号智园 B1 栋 6 层

以下测试之样品及样品信息由申请者提供并确认

样品名称	电控板
样品接收状态	正常
样品接收日期	2021.09.14
样品检测日期	2021.09.14-2021.11.11

检测要求

序号	测试项目
1	恒定湿热试验
2	恒定湿热试验

检测结果：请参见后续页面。

批 准 肖业湘 日 期 2021.11.11

授权签字人

[illegible]检测认证集团股份有限公司 检验检测专用章

No. R8320936DB

广东省深圳市宝安区 70 区鸿威工业园

CTI 华测检测

检测报告

报告编号 A2210383125201C 第 2 页 共 5 页

测试样品

样品编号	样品名称	样品数量
A2210383125201001-1~5	电控板	5pcs

样品图片

A2210383125201001

CTI 华测检测

检测报告

测试项目 1：恒定湿热试验

1. 测试设备

设备名称	型 号
高低温交变湿热试验箱	EL-10KA

2. 环境条件

温度：24.3℃；湿度：45%RH

3. 测试标准：依客户要求

4. 测试条件

温度：60℃

湿度：90%RH

测试时间：168 小时

样品状态：非工作

5. 测试结果

样品编号	测试结果（目视检查）
A2210383125201001-1~5	客户自行判定

CTI 华测检测

检测报告

测试项目 2：恒定湿热试验

1. 测试设备

设备名称	型 号
高低温交变湿热试验箱	EL-10KA

2. 环境条件

温度：24.4℃; 湿度：47%RH

3. 测试标准：依客户要求

4. 测试条件

温度：85℃

湿度：85%RH

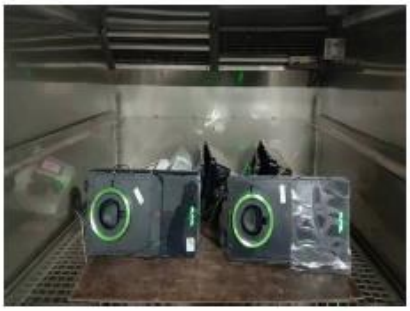
测试时间：1000 小时

样品状态：工作

5. 测试结果

样品编号	测试结果（目视检查）
A2210383125201001-1~5	客户自行判定

测试图片



CTI 华测检测

检测报告

测试后样品图片

A2210383125201001-1

A2210383125201001-1~4

A2210383125201001-5

A2210383125201001-5

备注：本报告中的数据结果供科研、教学、企业内部质量控制、企业产品研发等目的用。

声明：

1.检测报告无批准人签字、“专用章”及报告骑缝章无效；

2.报告抬头公司名称及地址、样品及样品信息由申请者提供，申请者应对其真实性负责，CTI 未核实其真实性；

3.本报告检测结果仅对受测样品负责；

4.未经 CTI 书面同意，不得部分复制本报告。

*** 报告结束 ***

Appendix B Qualification certificate of Lab

检验检测机构
资质认定证书

编号：180000343904

名称：华测检测认证集团股份有限公司

地址：广东省深圳市宝安区 70 区鸿威工业园(518101)

经审查，你机构已具备国家有关法律、行政法规规定的基本条件和能力，现予批准，可以向社会出具具有证明作用的数据和结果，特发此证。资质认定包括检验检测机构计量认证。

检验检测能力（含食品）及授权签字人见证书附表。

你机构对外出具检验检测报告或证书的法律责任由 华测检测认证集团股份有限公司 承担。

许可使用标志

180000343904

发证日期：2018 年 02 月 28 日

有效期至：202[illegible]年 02 月 27 日

发证机关：

本证书由国家认证认可监督管理委员会监制、在中华人民共和国境内有效。

China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L1910)

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China

is accredited in accordance with ISO/IEC 17025: 2005 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 form an integral part of this certificate.

Date of Issue：2018-03-05

Date of Expiry：2024-03-04

Date of Initial Accreditation：2005-01-28

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).
The validity of the certificate can be checked on CNAS website at http://www.cnas.org.cn/english/findanaccreditedbody/index.shtml