



TEST REPORT

UL 2089-2006

Standard for Vehicle Battery Adapters

For

Guangzhou Jingcheng Electronic Technology Co., Ltd.

Room 202, 2nd floor, Shengyue Building, 7 Gongye Road, Daweicun, Dashi, Panyu, Guangzhou, Guangdong,
China, 511430

Model: JO-6291

August 17, 2018

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Car Air Purifier with Car Charger
Test Engineer:	Eric / <i>Eric</i>
Report Number:	TH18HR-1083S
Test Date:	August 14~17, 2018
Reviewed By:	Prince / <i>Prince</i>
Approved By:	Prince / <i>Prince</i>
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



TEST REPORT	
UL 2089-2006	
Standard for Vehicle Battery Adapters	
Report Reference No.....	TH18HR-1083S
Tested by (+ signature).....	Eric
Reviewed by (+ signature).....	Prince
Approved by (+ signature).....	Prince
Date of issue.....	2018-08-17
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.....: Guangzhou Jingcheng Electronic Technology Co., Ltd.	
Address.....	Room 202, 2nd floor, Shengyue Building, 7 Gongye Road, Daweicun, Dashi, Panyu, Guangzhou, Guangdong, China, 511430
Manufacturer.....: Guangzhou Jingcheng Electronic Technology Co., Ltd.	
Address.....	Room 202, 2nd floor, Shengyue Building, 7 Gongye Road, Daweicun, Dashi, Panyu, Guangzhou, Guangdong, China, 511430
Test specification:	
Standard.....	UL 2089-2006
Non-standard test method.....	N/A
Test Report Form No.....: UL 2089-2006	
Test Report Form(s) Originator.....	TIANHAI
Master TRF.....	2010-5
Test item description.....: Car Air Purifier with Car Charger	
Model/Type reference.....	JO-6291
Ratings.....	Input: 12V DC,1.2A, 14.4W Output: 5V DC, 2.1A
Note.....	/



Test item particulars.....	-
Classification of installation and use.....	Class III
Supply Connection.....	DC supply
Possible test case verdicts:	
- test case does not apply to the test object.....	N/A
- test object does meet the requirement.....	P (Pass)
- test object does not meet the requirement.....	F (Fail)
Testing.....	
Date of receipt of test item.....	2018-08-14
Date (s) of performance of tests.....	2018-08-14~2018-08-17
General remarks:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. Throughout this report a comma (point) is used as the decimal separator. Clause numbers between brackets refer to clauses in UL 2089-2006	



UL 2089-2006			
Clause	Requirement – Test	Result – Remark	Verdict
Construction			P
5	Mechanical assembly		P
5.1	A unit shall be formed and assembled so that it will have the strength and rigidity necessary to resist the abuses to which it is likely to be subjected, without resulting in a risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other defects.	Complied	P
5.2	A unit shall have all parts reliably secured in place	Complied	P
5.3	An enclosure, an opening, a frame, a guard, a knob, a handle, or the like shall not be sufficiently sharp	Complied	P
5.4	A unit shall be constructed so that it will not be necessary to open or remove the enclosure when the unit is used as intended	Complied	P
5.5	Each lampholder, switch, and similar component shall be mounted securely and shall be restrained from turning by more than friction between surfaces. For example, the use of a lock washer is an acceptable means to restrain the turning of a device having a single hole mounting means	Complied	P
5.6	A replaceable lamp in a unit shall be replaceable without opening the enclosure		N
5.7	A nonreplaceable pilot lamp, such as an indicating-type overload- or short-circuit protector, a neon light, or an indicator light, is one in which the lamp is sealed-in, such as by an unremovable lens	Complied	P
5.8	A switch or an overcurrent-protective device shall be located within the unit enclosure and protected in such a manner as not to be accessible or exposed to tampering nor subject to mechanical damage during normal use or as a result of abuse. This requirement does not apply to the actuating means of a switch	No switch or overcurrent-protective device	N
5.9	The requirements in 5.8 also apply to the actuating means – toggle, handle, or the like – if the dislodging of such part exposes live parts or film-coated magnet wire that can be contacted as specified in Accessibility of Live Parts, Section 15	No toggle, handle, or the like	N
6	Enclosure		P
6.1	A unit shall be provided with an enclosure that shall house all current-carrying parts that present a risk of electric shock. The enclosure shall have the strength and properties necessary to reduce the risk of mechanical damage to the various parts	Complied	P
6.2	A unit shall have no openings larger than those complying with Section 15	Complied	P



UL 2089-2006																													
Clause	Requirement – Test	Result – Remark	Verdict																										
6.3	<p>If an acceptable grade of vulcanized fiber is used as part of the enclosure for the support of parts (terminals and the like) that do not present a risk of fire or electric shock, the amount of fiber shall not be more than is necessary to support the parts in question. The fiber shall not be less than 1/32 in (0.8 mm) thick and shall not introduce a risk of fire, electric shock, or injury to persons as a result of abuse.</p>	Not used	N																										
6.4	<p>An enclosure constructed of sheet metal shall be formed from stock having a thickness not less than that specified in Table 6.1. The thickness of enclosure sheet metal other than steel or aluminum shall not be less than that specified in Table 6.1 for uncoated steel and shall have the necessary strength and rigidity.</p> <p style="text-align: center;">Table 6.1 Minimum acceptable thickness of enclosure metal</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Metal</th> <th colspan="2">At small, flat, unreinforced surfaces and at surfaces of a shape or size to provide adequate mechanical strength</th> </tr> <tr> <th>in</th> <th>mm</th> </tr> </thead> <tbody> <tr> <td>Die-cast</td> <td>3/64</td> <td>(1.2)</td> </tr> <tr> <td>Cast malleable iron</td> <td>1/16</td> <td>(1.6)</td> </tr> <tr> <td>Other cast metal</td> <td>3/32</td> <td>(2.4)</td> </tr> <tr> <td>Uncoated sheet steel</td> <td>0.026</td> <td>(0.66)</td> </tr> <tr> <td>Galvanized sheet steel</td> <td>0.029</td> <td>(0.74)</td> </tr> <tr> <td>Nonferrous sheet metal other than copper</td> <td>0.036</td> <td>(0.91)</td> </tr> <tr> <td>Copper</td> <td>0.033</td> <td>(0.84)</td> </tr> </tbody> </table>	Metal	At small, flat, unreinforced surfaces and at surfaces of a shape or size to provide adequate mechanical strength		in	mm	Die-cast	3/64	(1.2)	Cast malleable iron	1/16	(1.6)	Other cast metal	3/32	(2.4)	Uncoated sheet steel	0.026	(0.66)	Galvanized sheet steel	0.029	(0.74)	Nonferrous sheet metal other than copper	0.036	(0.91)	Copper	0.033	(0.84)	Complied	P
Metal	At small, flat, unreinforced surfaces and at surfaces of a shape or size to provide adequate mechanical strength																												
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6.5	<p>In addition to the performance tests specified in this standard, the material of a polymeric enclosure shall have a minimum flammability classification of V-0, V-1, or V-2 and shall provide the level of performance specified in Table 6.2 for the corresponding electrical properties</p> <p style="text-align: center;">Table 6.2 Maximum performance level category (PLC) for enclosure material</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Test specified^a</th> <th colspan="3">Flammability rating of material^a</th> </tr> <tr> <th>V-0</th> <th>V-1</th> <th>V-2</th> </tr> </thead> <tbody> <tr> <td>High current arc ignition (HAI)</td> <td>3</td> <td>2</td> <td>2</td> </tr> <tr> <td>Hot wire ignition (HWI)</td> <td>4</td> <td>3</td> <td>2</td> </tr> </tbody> </table> <p><small>^a HAI and HWI are determined in accordance with the Standard for Polymeric Materials – Short Term Property Evaluations, UL 746A. Flammability ratings are determined in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.</small></p>	Test specified ^a	Flammability rating of material ^a			V-0	V-1	V-2	High current arc ignition (HAI)	3	2	2	Hot wire ignition (HWI)	4	3	2	V-1	P											
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6.6	<p>A conductive coating applied to a nonmetallic surface such as the inside surface of a cover, enclosure, and the like shall comply with the applicable requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, unless it can be determined that flaking or peeling of the coating does not result in a reduction of spacings or the bridging of live parts that may result in a risk of fire, electric shock, or injury to persons</p>	No conductive coating	N																										
6.7	<p>An adhesive used in the assembly of the enclosure shall be investigated as specified in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C</p>	Not used	N																										
7	Protection Against Corrosion																												
7.1	<p>Except as noted in 7.2, iron and steel parts shall be protected against corrosion by galvanizing, plating, enameling, or other equivalent means if the corrosion of such unprotected parts would be likely to result in a risk of fire, electric shock, or injury to persons</p>	By plating	P																										



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Clause	Requirement – Test	Result – Remark	Verdict
7.2	The requirement in 7.1 applies to all enclosing cases or to other parts upon which intended mechanical operation may depend. It does not apply to laminations and small minor parts of iron or steel, such as washers, screws, and bolts, that are not current carrying, if the corrosion of such unprotected parts would not be likely to result in a risk of fire, electric shock, or injury to persons, or result in the device not operating as intended. A part made of stainless steel does not require additional protection against corrosion	Stainless steel used	P
8	Switches		N
8.1	The requirements in 8.2 and 8.3 apply to switches not in a Class 2 circuit, and to switches in a Class 2 circuit the breakdown of which electrically or mechanically is likely to result in a risk of fire or electric shock.	No such switch	N
8.2	A switch subjected to a temperature higher than 50°C (122°F) is to be investigated with respect to the temperature limits of the materials used	No such switch	N
8.3	A switch or other control device shall be acceptable for the application and shall have current and voltage ratings not less than those of the load that it controls	No such switch	N
9	Protective Devices		P
9.1	A protective device built into a unit shall comply with the requirements for that device		P
9.2	Crossed or nicked (reduced) cross-section conductors shall not be employed as a protective device	No such conductors	P
9.3	Protective devices as mentioned in 9.1 include, but are not limited to, eutectic material, fuses, overtemperature and overcurrent protectors, thermal protectors, and similar devices intended to interrupt or limit the flow of current as a result of overload		P
9.4	A manually reset thermostat shall be so constructed that automatic tripping of the thermostat is not precluded by any setting or position of the reset mechanism	No thermostat	N
9.5	An automatically or manually reset protective device or replaceable overcurrent-protective device shall not open when the unit is delivering its rated output. See Temperature Test, Section 24	Automatically protective device	P
9.6	A fuse or protective device shall be located in or adjacent to the cigarette lighter connector in the positive side of the supply	No cigarette lighter	N
9.7	The fuse or protective device required by 9.6 shall have a current rating not greater than the ampacity of the interconnecting cord as specified in Table 12.1, and in no case greater than 20 A		N
9.8	If the fuse or protective device is not located within the cigarette lighter connector, the length of wire between the connecting means and the protective device shall not be greater than 5 in (127 mm)	About 3.5mm	P
9.9	A protective device shall be acceptable for the application and shall have voltage and current ratings not less than those of the circuit in which it is connected		P



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Clause	Requirement – Test	Result – Remark	Verdict												
10	Components		P												
10.1	<p>A component – a fixed resistor, PTC or NTC resistor, diode, or the like – used to limit the output of a unit to within the required current or power levels, or otherwise used to obtain acceptable performance, shall have permanence and stability so as not to decrease its limiting capacities. Among the factors considered when determining the acceptability of a limiting component are:</p> <p>a) Effect of operating temperature, b) Electrical stress level, and c) Resistance to moisture</p>	No such component	N												
11	Coil Insulation		P												
11.1	Coil insulation, unless inherently moisture resistant, shall be treated so as to render it moisture resistant		P												
11.2	Film-coated magnet wire is considered moisture resistant	No such wire	N												
12	Flexible Cords		P												
12.1	<p>A unit shall be provided with a flexible cord and shall be type SP-2, SPE-2, SPT-2, SV, SVE, SVT,S, SE, SO, SP-3, SPT-3, ST, STO, SJ, SJE, SJO, SJT, or SJTO. The length of cord external to the unit and including the cigarette lighter connector shall not be less than 3 ft (0.9 m) as measured from the end of the cigarette lighter connector to the point of attachment or entry. Cord AWG size shall be in accordance with Table 12.1</p> <p style="text-align: center;">Table 12.1 Cord sizes Table 12.1 added March 30, 2006</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Adapter input fuse rating, Amps</th> <th>Minimum cord conductor size, AWG</th> </tr> </thead> <tbody> <tr> <td>10 A and less</td> <td>18^a</td> </tr> <tr> <td>12</td> <td>17</td> </tr> <tr> <td>13</td> <td>16</td> </tr> <tr> <td>18</td> <td>14</td> </tr> <tr> <td>20</td> <td>12</td> </tr> </tbody> </table> <p><small>^a Size not specified for conductors in Class 2 or Low Voltage Limited Energy Circuits.</small></p>	Adapter input fuse rating, Amps	Minimum cord conductor size, AWG	10 A and less	18 ^a	12	17	13	16	18	14	20	12	No cord external to the unit	N
Adapter input fuse rating, Amps	Minimum cord conductor size, AWG														
10 A and less	18 ^a														
12	17														
13	16														
18	14														
20	12														
13	Input Contacts		P												
13.1	The diameter of the center (positive) contact shall not be less than 9/64 in (3.57 mm)	4.6mm	P												
14	Output Connections		P												
14.1	General		P												
14.1.1	A unit shall be provided with means for connection of the output consisting of a cord, insulated leads, or output connectors	USB	P												
14.2	Low voltage limited energy circuits		P												



UL 2089-2006											
Clause	Requirement – Test	Result – Remark	Verdict								
14.2.1	<p>A low-voltage limited-energy (LVLE) circuit is defined as a circuit with an open-circuit potential of not more than 42.4 V peak ac, or 60 V dc, with the energy available to the circuit limited:</p> <p>a) So that the current under any condition of load including short circuit is not more than 8 A for potentials up to 42.4 V peak, and 150/V max for potentials from 30 to 60 V dc, measured after 1 min of operation by:</p> <p>1) An isolating transformer, or</p> <p>2) A fixed impedance or reliable regulating network; or</p> <p>b) By a fuse or nonadjustable manually reset circuit protective device that is rated or set at not more than the value specified in Table 14.1</p> <p style="text-align: center;">Table 14.1 Rating for fuse or circuit protector</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Open-circuit potential, V</th> <th>Current rating, A</th> </tr> </thead> <tbody> <tr> <td>0 – 21.2 (peak)</td> <td>5</td> </tr> <tr> <td>21.3 – 42.4 (peak)</td> <td>3.2</td> </tr> <tr> <td>Over 30 to 60 dc only</td> <td>150/V_{max}^a</td> </tr> </tbody> </table> <p>^a V_{max} is defined as the maximum voltage obtained under any condition of load or no load in volts rms.</p>	Open-circuit potential, V	Current rating, A	0 – 21.2 (peak)	5	21.3 – 42.4 (peak)	3.2	Over 30 to 60 dc only	150/V _{max} ^a	12V DC,1.2A	P
Open-circuit potential, V	Current rating, A										
0 – 21.2 (peak)	5										
21.3 – 42.4 (peak)	3.2										
Over 30 to 60 dc only	150/V _{max} ^a										
14.3	Output connectors		P								
14.3.1	Output connectors mounted on the enclosure and intended for direct connection of accessories, such as separable battery holders and the like, shall provide a secure connection between mating parts. The connections shall be polarized if the output is direct-current or if multiple outputs are provided	USB	P								
14.3.2	A fitting having female contacts shall be constructed so that it will not receive the blades of a standard attachment plug. A fitting having male contacts shall be constructed so that the contacts will not touch a live part of a standard attachment-plug receptacle	No such contacts	N								
14.4	Bushings		N								
14.4.1	At a point where a flexible cord passes or is intended to pass through an opening in a metal wall, barrier, or enclosing case, there shall be a bushing or the equivalent that shall:	No such cords	N								
	a) Be secured in place, and										
	b) Have a smooth, rounded surface against which the cord may bear										
14.4.2	If the cord hole is in a nonconducting material, a smooth, rounded surface is considered to be the equivalent of a bushing.		N								
15	Accessibility of Live Parts		N								
15.1	General	No live parts	N								
15.1.1	A live part that presents a risk of electric shock shall be located or enclosed so that protection		N								
15.1.2	The input impedance of the voltmeter used to measure voltage in accordance with the requirements of 15.2.1 and 15.3.1 is to be a minimum of 1 MΩ. The input impedance of a meter with more than 1 MΩ input impedance can be lowered by using shunt impedance		N								



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Clause	Requirement – Test	Result – Remark	Verdict
15.1.3	A guard, baffle, or cover that can be removed without using a tool is to be removed when determining if a live part is accessible to the user. A live part that can be contacted by the test pin, articulate probe, or accessibility probe illustrated in Figure 15.1, Figure 15.2, or Figure 15.4, is considered to be accessible	No such parts	N
15.2	Live parts other than exposed wiring terminals		N
15.2.1	The test pin and articulate probe illustrated in Figures 15.1 and 15.2, respectively, when applied as described in 15.2.3, shall not contact any live part with a voltage greater than that specified in 15.2.2 with respect to the vehicle chassis or any other live part simultaneously accessible, in a different location, to the test pin or articulate probe		N
15.2.2	The maximum voltages which may be accessible in accordance with 15.2.1 are: a) 42.4 V peak for sinusoidal or nonsinusoidal ac; b) 60 V for continuous dc; c) 24.8 V peak for dc interrupted at a rate of 200 Hz or less with approximately 50 percent duty cycle; and d) As indicated in Figure 15.3 for combinations of ac and dc		N
15.2.3	The test pin and articulate probe referenced in 15.2.1 are to be applied with a force not exceeding 1 lbf (4.4 N) to determine whether the live parts are accessible. The test pin shall not be applied to fuseholders and the like		N
15.3	Exposed wiring terminals		N
15.3.1	The accessibility probe illustrated in Figure 15.4, when applied as described in 15.3.3 shall not contact an exposed wiring terminal with a voltage greater than that specified in 15.3.2 with respect to the vehicle chassis or to any other terminal simultaneously accessible to the probe	No exposed wiring terminals	N
15.3.2	The maximum voltages which may be accessible in accordance with 15.3.1 are: a) 42.4 V peak for sinusoidal or nonsinusoidal ac; b) 42.4 V for continuous dc; c) 24.8 V peak for dc interrupted at a rate of 200 Hz or less with approximately 50 percent duty cycle; and d) 42.4 V peak for combinations of ac and dc		N
15.3.3	The accessibility probe referenced in 15.3.1 is to be applied with a force not exceeding 5.62 lbf (25 N) to determine whether the exposed wiring terminals are accessible		N
16	Live Parts		N
16.1	A current-carrying part shall be silver, copper, a copper alloy, plated iron or steel, stainless steel, or other corrosion-resistant alloys acceptable for the application		N
16.2	An uninsulated live part shall be secured to the base or mounting surface so that it will not turn or shift in position if such motion may result in a reduction of spacings below the minimum acceptable values		N



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Clause	Requirement – Test	Result – Remark	Verdict
16.3	Friction between surfaces is not acceptable as a means to prevent shifting or turning of a live part but a lock washer is acceptable		P
17	Strain Relief		P
17.1	Strain relief shall be provided between the cigarette lighter connector and its adjacent cord, and shall be tested in accordance with the Strain Relief Test, Section 28	No cigarette lighter connector	N
17.2	Means shall be provided to prevent the cord or wiring from being pushed into the enclosure through the cord-entry hole when such displacement results in: a) Subjecting the cord or wiring to mechanical damage; b) Exposing the cord or wiring to a temperature higher than that for which it is rated; c) Reducing spacings (such as to a metal strain-relief clamp) below the minimum required	No cord-entry hole	P
18	Internal Wiring	No such wiring	N
18.1	The internal wiring of a unit shall consist of insulated conductors having mechanical strength, dielectric properties, and ampacity for the application		N
18.2	Each splice and connection shall be mechanically secure, shall provide reliable electrical contact, and shall be provided with insulation at least equivalent to that of the wire involved unless acceptable permanent spacing between the splice and all other metal parts will be maintained. When determining the required minimum thickness of splice insulation, the circuit voltage and interaction with other circuits shall be taken into consideration		N
18.3	A wire connector for making a splice in a unit shall be a type that is applied by a tool in which the applicable force of the tool making the splice is independent of the force applied by the operator of the tool.		N
18.4	The connection between a lead, including a flexible cord, and the transformer winding or other part of the unit shall be soldered, welded, or otherwise securely connected within the enclosure. A soldered joint shall be mechanically secure before soldering		N
18.5	If a lead is rigidly held in place without the use of solder, or if it is retained in place so as not to be subjected to any motion, no additional mechanical security is required. Mechanical securement of a lead is not required if separation of the connection does not result in a risk of fire or electric shock		N
18.6	Unless it is to be considered as an uninsulated live part, insulated internal wiring – including an equipment-grounding conductor – shall consist of wire of a type or types acceptable for the applicable, when considered with respect to: a) The temperature and voltage to which the wiring is likely to be subjected; b) Exposure to oil, grease, cleaning fluid, or other substances likely to have a deleterious effect on the insulation; and c) Other conditions of service to which it is likely to be subjected.		N



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18.7	An insulated conductor shall be located or protected to reduce the risk of contact with any sharp edge, burr, fin, moving part, or the like, that can damage the conductor insulation		N																											
19	Insulating Materials		P																											
19.1	Integral parts such as insulating washers and bushings, and bases or supports for mounting of live parts, shall be of moisture-resistant materials that will not be damaged by the temperatures and stresses to which they will be subjected under conditions of actual use.		P																											
19.2	An insulating material is to be investigated with respect to its acceptability for the application in accordance with the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL746C. Materials, such as mica, ceramic, or some molded compounds are usually acceptable for use as the sole support of live parts. If it is necessary to investigate a material to determine its acceptability, consideration is to be given to such factors as its mechanical strength, resistance to ignition sources, dielectric strength, insulation resistance, and heat-resistant properties in both the aged and unaged conditions, the degree to which it is enclosed, and any other features that could result in a risk of fire and electric shock.	Comply with UL746C	P																											
20	Printed Wiring Boards		P																											
20.1	A printed wiring board in a unit shall comply with the Standard for Printed-Wiring Boards, UL 796, and shall be classed V-1 or less flammable, in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94	Comply with UL 796; V-1	P																											
Performance			P																											
21	General		P																											
21.1	The number of representative samples indicated in Table 21.1 shall be subjected to the tests described in Sections 22– 28. Unless otherwise specified, all tests are to be conducted at the marked d-c voltage. The test supply of rated voltage shall have a minimum capacity of 30 A		P																											
21.2	With respect to 21.1 and footnotes a and b of Table 21.1, a sample may be used for more than one test, provided that the previous test did not damage the sample <div style="text-align: center;"> <p>Table 21.1 Performance tests</p> <table border="1"> <thead> <tr> <th>Section</th> <th>Test</th> <th>Number of samples to be subjected to test</th> </tr> </thead> <tbody> <tr> <td>22</td> <td>Maximum Output Voltage</td> <td>1</td> </tr> <tr> <td>23</td> <td>Power Input</td> <td>1</td> </tr> <tr> <td>24</td> <td>Temperature</td> <td>1</td> </tr> <tr> <td>25</td> <td>Dielectric Voltage Withstand</td> <td>1</td> </tr> <tr> <td>26</td> <td>Abnormal: Battery–Supply Cord Short Circuit Reverse Polarity Component Malfunction or Breakdown Abnormal Temperature Test</td> <td>3 1 1^a 1</td> </tr> <tr> <td>28</td> <td>Strain Relief Abuse:</td> <td>1</td> </tr> <tr> <td>27</td> <td>Resistance to Crushing</td> <td>1</td> </tr> <tr> <td>–</td> <td>Tests for Thermoplastic Enclosures: Mold Stress Relief Distortion Strain Relief Test after Mold Stress Relief Distortion</td> <td>b 1 1</td> </tr> </tbody> </table> </div>	Section	Test	Number of samples to be subjected to test	22	Maximum Output Voltage	1	23	Power Input	1	24	Temperature	1	25	Dielectric Voltage Withstand	1	26	Abnormal: Battery–Supply Cord Short Circuit Reverse Polarity Component Malfunction or Breakdown Abnormal Temperature Test	3 1 1 ^a 1	28	Strain Relief Abuse:	1	27	Resistance to Crushing	1	–	Tests for Thermoplastic Enclosures: Mold Stress Relief Distortion Strain Relief Test after Mold Stress Relief Distortion	b 1 1		P
Section	Test	Number of samples to be subjected to test																												
22	Maximum Output Voltage	1																												
23	Power Input	1																												
24	Temperature	1																												
25	Dielectric Voltage Withstand	1																												
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28	Strain Relief Abuse:	1																												
27	Resistance to Crushing	1																												
–	Tests for Thermoplastic Enclosures: Mold Stress Relief Distortion Strain Relief Test after Mold Stress Relief Distortion	b 1 1																												
<small>^a Additional samples may be required if multiple components are present. One sample is required for each component to be faulted.</small> <small>^b Based on the Standard for Polymeric Materials– Use in Electrical Equipment Evaluations, UL 746C.</small>																														



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Clause	Requirement – Test	Result – Remark	Verdict						
21.3	The cheesecloth mentioned in this standard is to be bleached cheesecloth running 14 – 15 yd 2 /lb (approximately 26 – 28 m 2 /kg) and having what is known in the trade as a "count of 32 by 28," that is, for any square inch, 32 threads in one direction and 28 threads in the other direction (for any square centimeter, 13 threads in one direction and 11 in the other direction)		P						
21.4	The tests described in Sections 22 – 28 are to be conducted in an ambient air temperature within the range of 21 – 30°C (70 – 86°F).	23°C	P						
21.5	For tests which specify rated load conditions, a sample is to be connected to the load specified in Table 21.2 Table 21.2 Unit output loading		P						
	<table border="1"> <thead> <tr> <th>Intended use</th> <th>Load for test</th> </tr> </thead> <tbody> <tr> <td>Other than battery charger</td> <td>Variable resistor adjusted to result in rated output current.</td> </tr> <tr> <td>Battery charger</td> <td>Variable resistor in parallel with a 10,000 µF capacitor adjusted to result in rated output current; or, for the temperature test, a load as noted in 23.3, 23.4 or 23.5 if a battery charger is intended for use with specific batteries.</td> </tr> </tbody> </table>	Intended use	Load for test	Other than battery charger	Variable resistor adjusted to result in rated output current.	Battery charger	Variable resistor in parallel with a 10,000 µF capacitor adjusted to result in rated output current; or, for the temperature test, a load as noted in 23.3, 23.4 or 23.5 if a battery charger is intended for use with specific batteries.		
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21.6	With reference to Table 21.2, if an output is rated in watts or volt-amperes, the rated output current is considered to be the quotient of the watt or volt-ampere rating and the voltage rating.		P						
22	Maximum Output Voltage Test		P						
22.1	The maximum output voltage under any load condition (including no load) between any two output terminations of a unit shall not be more than the peak voltages specified in 15.2.2	Input: 12V DC, 1.2A, 14.4W Output: 5V DC, 2.1A	P						
22.2	If a unit has more than one pair of output terminations, the output voltage mentioned in 22.1 is to be measured with any combination of interconnections of the output terminations.		P						
22.3	The maximum voltage between output terminations of a multiple output unit may exceed the values specified in 22.1 when the output terminations are interconnected, if the following conditions are met: a) The maximum output voltage between any two terminations is not more than the values indicated in 15.2.2 when no connections are made between the output terminations; and b) The unit is marked in accordance with 29.1.6.		P						
23	Power Input Test		P						
23.1	The current or watts input to a vehicle battery adapter, when connected to a supply adjusted to the rated input voltage and supplying rated output into a load as described in Table 21.2, shall not be more than 110 percent of the rated value.	Input: DC 12V, 1.2A	P						
23.2	A battery charger intended for use with a specific battery pack shall be tested using the battery pack as its intended load	No specific battery pack	N						
23.3	If a vehicle battery adapter intended to charge batteries is to be tested using a lead-acid battery or batteries as the load, each battery is to be discharged to 1.75 V per cell – measured with the load connected – at a rate not to exceed the discharge rate assigned by the battery manufacturer, but in any case, the rate of the discharge is not to exceed one-sixth of the ampere-hour capacity of the battery. See Table 21.2.		N						



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Clause	Requirement – Test	Result – Remark	Verdict																																																						
23.4	If a battery charger is to be tested with a typical 1.2 V per cell nickel-cadmium battery or batteries as the load, each battery is to be discharged to 0.9 V per cell – measured with the load connected – at a rate not to exceed the discharge rate assigned by the battery manufacturer.		N																																																						
23.5	If a battery charger is to be tested with a battery or batteries other than those specified in 23.3 and 23.4, the battery is to be discharged in accordance with the battery manufacturer’s maximum recommended discharge rate to an appropriate discharge voltage	Lithium battery	P																																																						
24	Temperature Test		P																																																						
24.1	<p>The unit shall be mounted as in intended service and connected as described in 23.1. With the unit operating at its maximum marked duty cycle, the unit shall not reach a temperature at any point high enough to cause a risk of fire, to damage any material used, or to exceed the temperature rises specified in Table 24.1.</p> <p style="text-align: center;">Table 24.1 Maximum acceptable temperature rises</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>°C</th> <th>°F</th> </tr> </thead> <tbody> <tr> <td colspan="3">A. COMPONENTS</td> </tr> <tr> <td>1. Fuses</td> <td>65</td> <td>117</td> </tr> <tr> <td>2. Rubber-or thermoplastic-insulated conductors^a</td> <td>35</td> <td>63</td> </tr> <tr> <td>3. Silicon components^b</td> <td>75</td> <td>135</td> </tr> <tr> <td colspan="3">B. ELECTRICAL INSULATION – GENERAL</td> </tr> <tr> <td colspan="3">1. Class 105 insulation systems:</td> </tr> <tr> <td style="padding-left: 20px;">Resistance method</td> <td>75</td> <td>135</td> </tr> <tr> <td style="padding-left: 20px;">Thermocouple method</td> <td>65</td> <td>117</td> </tr> <tr> <td colspan="3">2. Class 130 insulation systems:</td> </tr> <tr> <td style="padding-left: 20px;">Resistance method</td> <td>95</td> <td>171</td> </tr> <tr> <td style="padding-left: 20px;">Thermocouple method</td> <td>85</td> <td>153</td> </tr> <tr> <td>3. Fiber employed as electrical insulation</td> <td>65</td> <td>117</td> </tr> <tr> <td>4. Phenolic composition ^a</td> <td>125</td> <td>225</td> </tr> <tr> <td>5. Varnish-cloth insulation</td> <td>60</td> <td>108</td> </tr> <tr> <td colspan="3">C. SURFACES</td> </tr> <tr> <td>1. Surface temperature, nonmetallic^c</td> <td>50</td> <td>90</td> </tr> <tr> <td>2. Wood or similar material</td> <td>65</td> <td>117</td> </tr> </tbody> </table> <p>^a The limitation on phenolic composition, rubber and thermoplastic insulation does not apply to compounds that have been investigated and found to be acceptable for use at a higher temperature. The maximum acceptable temperature rise in any case is 25°C (77°F) less than the acceptable temperature limit in question.</p> <p>^b Does not apply to a material that has been investigated and found acceptable for a higher temperature.</p> <p>^c A material having a coefficient of thermal conductivity greater than 2.419 Btu/hr/ft²/ft²/°F (0.01 c/s/cm²/cm²/°C) is considered to be metal.</p>		°C	°F	A. COMPONENTS			1. Fuses	65	117	2. Rubber-or thermoplastic-insulated conductors ^a	35	63	3. Silicon components ^b	75	135	B. ELECTRICAL INSULATION – GENERAL			1. Class 105 insulation systems:			Resistance method	75	135	Thermocouple method	65	117	2. Class 130 insulation systems:			Resistance method	95	171	Thermocouple method	85	153	3. Fiber employed as electrical insulation	65	117	4. Phenolic composition ^a	125	225	5. Varnish-cloth insulation	60	108	C. SURFACES			1. Surface temperature, nonmetallic ^c	50	90	2. Wood or similar material	65	117	No parts exceeded the temperature limits	P
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24.2	If the load specified in 23.1 includes a variable resistance, the load is to be adjusted after 15 min of operation, if necessary, to return the output to the original value. If the load consists of a battery, the battery shall be discharged as specified in 23.4 or 23.5 as applicable	No variable resistance	N																																																						
24.3	If a battery charger which is not likely to be used for consecutive charging of batteries is tested with a battery load, the test is to be continued until temperatures peak. The load is to be replaced by a second discharged battery. The test is terminated when temperatures peak, or temperatures stabilize, whichever occurs first during the second load condition.	Consecutive charging	N																																																						
24.4	A battery charger which is likely to be used for consecutive charging of batteries is to be tested with the intended battery load. The test is to be conducted in accordance with 24.5.		P																																																						



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Clause	Requirement – Test	Result – Remark	Verdict
24.5	<p>With respect to 23.4, a consecutive charger is to be tested in accordance with the following:</p> <p>a) For a charger with no charge status indicator, the test is to be continued until temperatures peak. The load is to be replaced with another discharged battery. This sequence is to be repeated until maximum temperatures are obtained.</p> <p>b) For a charger with a visual charge status indicator, the test is to be continued until the visual indicator indicates that the charge cycle is complete. The load is to be replaced with another discharged battery. This sequence is to be repeated until maximum temperatures are obtained.</p> <p>c) For a charger with a charge time marking or instruction, the test is to be continued until the specified charge time has elapsed. The load is to be replaced with another discharged battery. This sequence is to be repeated until maximum temperatures are obtained.</p> <p>d) For a charger with both a visual charge status indicator and a charge time marking or instruction, the test is to be continued until the specified charge time has elapsed or until the visual indicator indicates that the charge cycle is complete, whichever occurs first. The load is to be replaced with another discharged battery. This sequence is to be repeated until maximum temperatures are obtained.</p>		N
24.6	With reference to 24.1, a unit having voltage adjustment taps for intended use shall operate within the temperature limits at any setting including the maximum and intermediate positions	No voltage adjustment taps	N
24.7	A protective device shall not operate during the temperature test		P
24.8	A unit intended for mounting or support in more than one position or in a confined location is to be tested in a manner representing the most severe conditions. An adjacent mounting or supporting surface is to consist of 1-in (25.4-mm) thick soft-pine boards.	Cofined location	P
24.9	Unless investigated and found acceptable, a supporting means formed of soft rubber or rubberlike material is to be removed prior to the temperature test. If the supporting means has a metal insert, such as a screw or rivet, the test is to be conducted with the power unit supported by the metal insert. At the request of the manufacturer, the test may be conducted without any means of support	No soft rubber or rubberlike material	N
24.10	A thermocouple junction and the adjacent thermocouple lead wires are to be held securely in good thermal contact with the surface of which the temperature is being measured. Usually adequate thermal contact will result from securely taping or cementing the thermocouple in place but, if a metal surface is involved, brazing or soldering the thermocouple to the metal may be necessary.	No thermocouple	N



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Clause	Requirement – Test	Result – Remark	Verdict
24.11	Coil and winding temperatures are to be measured by thermocouples located on exposed surfaces, except that the resistance method may be used for a coil that is inaccessible for mounting thermocouples, such as a coil: a) Immersed in sealing compound, b) Wrapped with thermal insulation, or c) Wrapped with more than two layers of material such as cotton, paper, or rayon more than 1/32 in (0.8 mm) thick	No thermocouple	N
24.12	The temperature rise of a winding is determined by the resistance method by comparing the resistance of the winding at a temperature to be determined with the resistance at a known temperature according to the formula: $\Delta t = \frac{R}{r} (k + t_1) - (k + t_2)$		P
24.13	All values for temperature rises in Table 24.1 are based on an assumed ambient temperature of 25°C (77°F).		P
24.14	Thermocouples are to consist of wires not larger than 24 AWG and not smaller than 30 AWG. When thermocouples are used in determining temperatures in electrical equipment, it is common practice to employ thermocouples consisting of 30 AWG iron and constantan wire and a potentiometer type instrument. Such equipment is to be used whenever referee temperature measurements by thermocouples are necessary. The thermocouples and related instruments are to be accurate and calibrated in accordance with good laboratory practice. The thermocouple wire is to conform with the requirements specified in the Initial Calibration Tolerances for Thermocouple table in Temperature Measurement Thermocouples, ANSI/ISA MC96.1	No thermocouple	N
24.15	A temperature is considered to be constant when three successive readings taken at intervals of 10 percent of the previously elapsed duration of the test, but not less than 15 min, indicate no further increase.		P
25	Dielectric Voltage-Withstand Test		N
25.1	General		N
25.1.1	While still in a heated condition, a unit shall withstand for 1 min without breakdown the application of a 60-Hz essentially sinusoidal potential of: a) 500 V between a circuit operating at 60 V dc or less or 50 V ac rms (70 V peak) or less and dead metal parts; and b) 1000 V plus twice the maximum circuit voltage between a circuit operating at more than 60V dc or more than 50 V ac rms (70 V peak) and dead metal parts	DC supply	N



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Clause	Requirement – Test	Result – Remark	Verdict
25.1.2	To determine whether a unit complies with the requirements in 25.1, the unit is to be tested using a 500 VA or larger capacity transformer, the output voltage of which can be varied. The applied potential is to be increased from zero until the required test level is reached, and is to be held at that level for 1min. The increase in applied potential is to be at substantially uniform rate as rapid as is consistent with correct indication of its value by a voltmeter.		N
26	Abnormal Tests		P
26.1	General		P
26.1.1	A unit shall not emit flame or molten metal or become a risk of fire or electric shock when subjected to the reverse polarity, component breakdown and battery-supply cord short circuit tests.		P
26.1.2	A risk of fire or electric shock is considered to exist if any of the following occurs: a) Charring of cheesecloth; b) Emission of flame or molten material from the unit enclosure and output cord, if provided; or, c) Any condition that exposes live parts which present a risk of electric shock as specified in Section 15.	No such conditions occurred	P
26.1.3	Each test is to be conducted on a separate sample unless the manufacturer requests that more than one test be conducted on the same sample.	Conducted on separate sample	P
26.1.4	A polarity-protection circuit provided to prevent output-current flow until a battery is connected as intended to the output is to be made inoperative so that the required output current will flow	No polarity-protection circuit	N
26.1.5	During all abnormal tests the unit is to be draped with a double layer of cheesecloth conforming to the outline of the unit.		P
26.2	Reverse polarity test		N
26.2.1	For a device intended for charging batteries and provided with nonpolarized output connections, the external output leads are to be connected in reverse polarity to a fully charged battery intended for the application. The unit is then to be connected to its maximum test voltage, and operated until the ultimate condition is observed, or 4 h if cycling of an automatically reset protector occurs.		N
26.3	Component breakdown test		P
26.3.1	A unit having components – such as diodes, resistors, transistors, capacitors, and the like – with a single component fault of short or open, shall not result in the output exceeding the levels specified in 15.3.2, or any condition as specified in 26.1.2. The unit is to be connected to the maximum test voltage and operated until ultimate conditions are observed, or for 4 h if cycling of an automatically reset protector occurs.		P
26.4	Battery-supply cord short circuit test		P



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Clause	Requirement – Test	Result – Remark	Verdict
26.4.1	The battery-supply cord shall be short-circuited at any point on the cord, but not within 5 in (127mm) of the cigarette lighter connector. As a result of this test, the fuse required by 9.7 and 9.8 shall open prior to any damage to the battery-supply cord or the cigarette lighter connector.		N
26.5	Abnormal temperature test		P
26.5.1	Immediately following the temperature test described in Section 24, one sample of the unit shall be subjected to the test described in 26.5.2 – 26.5.4. As a result of the test, the unit shall not attain a temperature high enough to result in a risk of fire, electric shock, or damage to materials, or exceed the temperature rises specified in Table 24.1 by more than 20°C (36°F).		P
26.5.2	The unit is to be tested in accordance with Temperature Test, Section 24 using the input voltages specified in 26.5.3 and 26.5.4, as applicable. The test is to be terminated when temperatures peak, stabilize, or decrease.		P
26.5.3	A unit intended to be connected to a nominal 12 Vdc supply shall be tested at the minimum input voltage at which the unit operates but not less than 10.5 Vdc. The test is to be repeated using the same sample at the maximum input voltage at which the unit operates but not greater than 14.5 Vdc.		P
26.5.4	A unit intended to be connected to a nominal 24 Vdc supply shall be tested at the minimum input voltage at which the unit operates but not less than 21 Vdc. The test is to be repeated using the same sample at the maximum input voltage at which the unit operates but not greater than 29 Vdc.		P
27	Resistance to Crushing Test		N
27.1	One sample of the cigarette lighter connector shall withstand for 1 min a steady crushing force of 75lbf (334 N). The cigarette lighter connector is to be tested between two parallel, flat, maple blocks, each not less than 1/2 in (12.7 mm) thick. The crushing force is to be applied gradually in a direction normal to the mounting surface.	No cigarette lighter connector	N
28	Strain Relief Test		N
28.1	The strain relief means provided between the battery-supply cord and cigarette lighter connector shall withstand for 1 min without displacement a direct pull of 20 lbf (89 N) applied to the cord, with the connections within the cigarette lighter connector disconnected. The strain relief is not acceptable if, at the point of disconnection of the conductors, there is such movement of the cord as to indicate that stress on the connections would have resulted	No cigarette lighter connector	N
28.2	A 20-lb (9 kg) weight is to be suspended from the cord so that the strain relief means will be stressed from any angle the construction permits.		N
28A	Push-Back Relief Test		P
28A.1	To determine compliance with 17.2, a product shall be tested in accordance with 28A.2 without occurrence of any of the conditions specified in 17.2 (a) – (d).	No cord-entry hole	P



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Clause	Requirement – Test	Result – Remark	Verdict
28A.2	The cord is to be held 1 inch (25.4 mm) from the point where the cord or lead emerges from the product and is then to be pushed back into the product. When a removable bushing which extends further than 1 inch is present it is to be removed prior to the test. When the bushing is an integral part of the cord, then the test is to be carried out by holding the bushing. The cord or lead is to be pushed back into the product in 1 inch (25.4 mm) increments until the cord buckles or the force to push the cord into the product exceed 6 pounds-force (26.7 N). The cord or lead within the product is to be manipulated to determine compliance with 17.2		P
Marking			P
29	Details		P
29.1	Cautionary markings		P
29.1.1	A cautionary marking shall be prefixed by the word "CAUTION," "WARNING," or "DANGER" in letters not less than 1/8 in (3.2 mm) high. The remaining letters shall not be less than 1/16 in (1.6 mm) high.		P
29.1.2	There shall be a legible and durable marking for each interchangeable fuse as described in 9.8 indicating the ampere rating and the voltage rating of the fuse to be used for replacement. The marking shall be located so that it is understood as to which fuse or fuseholder the marking applies. A single marking is acceptable for a group of fuses. The marking shall consist of the word "CAUTION" and the following or the equivalent: "For continued protection against risk of fire, replace only with same type and ratings of fuse."	No interchangeable fuse	N
29.1.3	A battery charger shall be marked, where readily visible to the user when connecting batteries, with the word "CAUTION" and the following or equivalent: "Charge only __ type rechargeable batteries. Other types of batteries may burst causing personal injury and damage."		P
29.1.4	A cautionary marking shall be permanent and shall be located on a part that cannot be removed without impairing the operation of the unit.		P
29.1.5	A cautionary marking to instruct the operator shall be visible and legible to the operator during the intended operation of the unit.		P
29.1.6	With reference to 22.3, a multi-output unit shall be marked, where readily visible after installation, with the word "WARNING" and the following or equivalent: "To reduce the risk of fire or electric shock, do not interconnect output terminations."		P
29.2	General markings		P



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Clause	Requirement – Test	Result – Remark	Verdict
29.2.1	<p>A unit shall be legibly and permanently marked where it will be readily visible with the following:</p> <p>a) The manufacturer’s name, trade name, or trademark.</p> <p>b) A distinctive catalog number or the equivalent.</p> <p>c) The input and output ratings in voltage, frequency, and amperes, watts, or volt-amperes.</p> <p>Exception: The output rating need not be included in a unit intended to charge a specific battery or battery pack provided the unit is marked to indicate the battery or battery pack to be used.</p> <p>d) The date or other dating period of manufacture not exceeding any three consecutive months.</p> <p>Exception: The date of manufacture may be abbreviated; or may be in a nationally accepted conventional code or in a code affirmed by the manufacturer provided that the code:</p> <p>1) Does not repeat in less than 20 years; and</p> <p>2) Does not require reference to the production records of the manufacturer to determine when the product was manufactured.</p>		P
29.2.2	With respect to the frequency marking mentioned in 29.2.1, the symbol illustrated in Figure 29.1 may be used for this marking.		P
29.3	Application		P
29.3.1	Unless specifically exempt, marking required by this standard shall be permanent. A permanent marking shall be molded, die-stamped, paint-stenciled; stamped or etched metal that is permanently secured; or indelibly stamped on a pressure-sensitive label secured by adhesive. The marking means shall comply with the Standard for Marking and Labeling Systems, UL 969. Ordinary usage, handling, storage, and the like of the unit are to be considered in determining whether a marking is permanent.		P
30	Instructions – Battery Charger		P
30.1	A battery charger shall be provided with explicit important safety, operation, and maintenance instructions for the user; and if applicable, with assembly, moving and storage instructions.		P
30.2	The important safety instructions and instructions for user assembly, operation, maintenance, and moving and storage shall be in the same manual. The important safety instructions shall appear before the instructions for user assembly, operation, maintenance, and moving and storage.		P
30.3	<p>In an instruction manual intended for use with more than one model or type of battery charger, the instructions applicable to each model or type of battery charger shall be explicitly identified.</p> <p>Exception: Instructions that are exactly the same for more than one model or type of battery charger, and that will not result in confusion or misunderstanding due to different location of controls, operating modes, and the like, need not comply with this requirement.</p>		P



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Clause	Requirement – Test	Result – Remark	Verdict
30.4	Instructions shall be legible, and shall contrast with the background.		P
30.5	The headings for the important safety instructions, and the opening statements of the instructions specified in 30.12 – "IMPORTANT SAFETY INSTRUCTIONS" and "SAVE THESE INSTRUCTIONS"–shall be entirely in upper case letters not less than 3/16 in (4.8 mm) high or emphasized to distinguish them from the rest of the text. Upper case letters in the instructions shall not be less than 5/64 in (2.0 mm) high, and lower case letters shall not be less than 1/16 in (1.6 mm) high.		P
30.6	There shall be no substitute for the word "CAUTION," "WARNING," or "DANGER" in the text of the instructions.		P
30.7	The text of the instructions required by 30.12 shall be verbatim, or in equally definitive terminology. Exception: If a specific conflict in the application to a battery charger exists, or if the wording would be inappropriate, variations from the specified wording may be used.		P
30.8	An illustration may be used with a required instruction to clarify the intent, but shall not replace the instruction.		P
30.9	Important safety instructions shall warn the user of reasonably foreseeable risks of fire, electric shock, or injury to persons; and shall state the precautions that should be taken to reduce such risks.		P
30.10	The important safety instructions shall include the appropriate items in 30.12 followed by the appropriate instructions in Sections 31 – 34.		P
30.11	The items in the list in 30.12 shall be numbered, and other instructions deemed necessary by the manufacturer to reduce the risk of fire, electric shock, or injury to persons may be included.		P



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Clause	Requirement – Test	Result – Remark	Verdict
30.12	<p>The important safety instructions shall include those items in the following list that are applicable to the particular battery charger. The statement "IMPORTANT SAFETY INSTRUCTIONS," shall precede the list and the statement "SAVE THESE INSTRUCTIONS" shall either precede or follow the list. The word "CAUTION," "WARNING," or "DANGER" shall be entirely in upper case letters.</p> <p style="text-align: center;">IMPORTANT SAFETY INSTRUCTIONS</p> <p>1. SAVE THESE INSTRUCTIONS– This manual contains important safety and operating instructions for battery charger Model ____.</p> <p><i>Exception: If the instructions are exactly the same for all models, specific model numbers need not be specified.</i></p> <p>2. Before using battery charger, read all instructions and cautionary markings on battery charger, battery, and product using battery.</p> <p>3. CAUTION – To reduce risk of injury, charge only ____ type rechargeable batteries. Other types of batteries may burst causing injury to persons and damage.</p> <p>4. Do not expose charger to rain, moisture, or snow.</p> <p>5. Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.</p> <p>6. To reduce risk of damage to cigarette lighter connector and cord, pull by cigarette lighter connector rather than cord when disconnecting charger.</p> <p>7. Make sure cord is located so that it will not be stepped on, tripped over, or otherwise subjected to damage or stress.</p> <p>8. Do not operate charger with damaged cord or cigarette lighter connector – replace it immediately.</p> <p>9. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceperson.</p> <p>10. Do not disassemble charger; take it to a qualified serviceperson when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.</p> <p>11. To reduce risk of electric shock, unplug charger before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.</p>		P
31	Assembly Instructions		P
31.1	The assembly instructions, if applicable, shall contain all information needed for proper assembly of parts, such as handles and shall be preceded by the heading "ASSEMBLY INSTRUCTIONS," or the equivalent		P
32	Operating Instructions		P
32.1	The operating instructions shall contain all applicable information needed to operate a vehicle battery adapter in the intended manner, and shall be preceded by the heading "OPERATING INSTRUCTIONS," or the equivalent.		P
32.2	<p>The operating instructions shall:</p> <p>a) Warn that the unit must be properly assembled in accordance with the assembly instructions before it is used.</p> <p>b) Explain and describe the location, function, and operation of each control of the unit, including all user-operated devices intended to reduce the risk of fire, electric shock, or injury to persons; and warn against tampering with such devices.</p> <p>c) Explain any automatic features if the marking on the unit includes the word "Automatic" such as "Automatic Battery Charger" or "Automatic Circuit Protector."</p>		P



UL 2089-2006

Clause	Requirement – Test	Result – Remark	Verdict
32.3	<p>The operating instructions for a unit rated greater than 100 VA input shall include the following or in equally definitive wording. The blanks shall be completed with appropriate current and voltage ratings based on the adapter input ratings.</p> <p>"CAUTION – Risk of Fire. Do not replace any vehicle fuse with a rating higher than recommended by the vehicle manufacturer. This product is rated to draw ___ amperes from a ___V vehicle outlet. Ensure that the electrical system in your vehicle can supply this product without causing the vehicle fusing to open. This can be determined by making sure the fuse in the vehicle which protects the outlet is rated higher than ___ amperes. Information on the vehicle fuse ratings are typically found in the vehicle operator's MARCH 30, 2006 VEHICLE BATTERY ADAPTERS - UL 2089 33 manual. If a vehicle fuse opens repeatedly, do not keep on replacing it. The cause of the overload must be found. On no account should fuses be patched up with tin foil or wire as this may cause serious damage elsewhere in the electrical circuit or cause fire."</p>	Under 100VA	N
33	Maintenance Instructions		P
33.1	<p>The instructions for user maintenance shall include explicit instructions for all cleaning and minor servicing – lubrication, external adjustments, and the like – that should be performed by the user; and shall warn the user that all other servicing should be performed by qualified service personnel. User maintenance instructions shall be preceded by the heading "MAINTENANCE INSTRUCTIONS," or the equivalent.</p>		P
33.2	<p>The user-maintenance instructions, as described in 33.1, shall not include operations that would require disassembly of the unit to accomplish.</p>		P
34	Moving and Storage Instructions		N
34.1	<p>If moving or storage of a unit could result in damage to the unit that could create a risk of fire, electric shock, or injury to persons during subsequent use, the instruction manual shall include explicit instructions for proper moving and storage. Such instructions shall be preceded by the heading "MOVING AND STORAGE INSTRUCTIONS," or the equivalent.</p>	No such risks	N

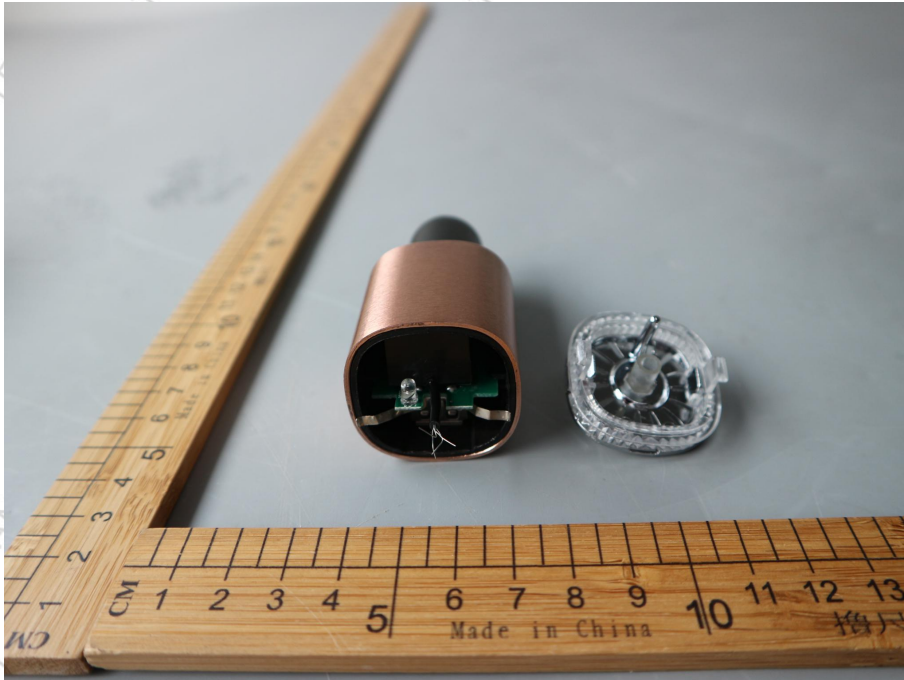
Table	List of critical components and materials			
Name	Manufacturer/trademark	type/model	technical data	mark(s) of conformity
Plastic Enclosure	CHI MEI CORPORATION	PC-540(Y)	PC/ABS, V-0, 70°C	UL E56070
PWB	INTERNATIONAL LAMINATE MATERIAL	ILM-R1##	V-0, 130°C	UL E134893
Internal wire	DONGGUAN DENGSHI MACHINE & ELECTRIC CO LTD	3239	VW-1; 22AWG, 105°C	UL E360170

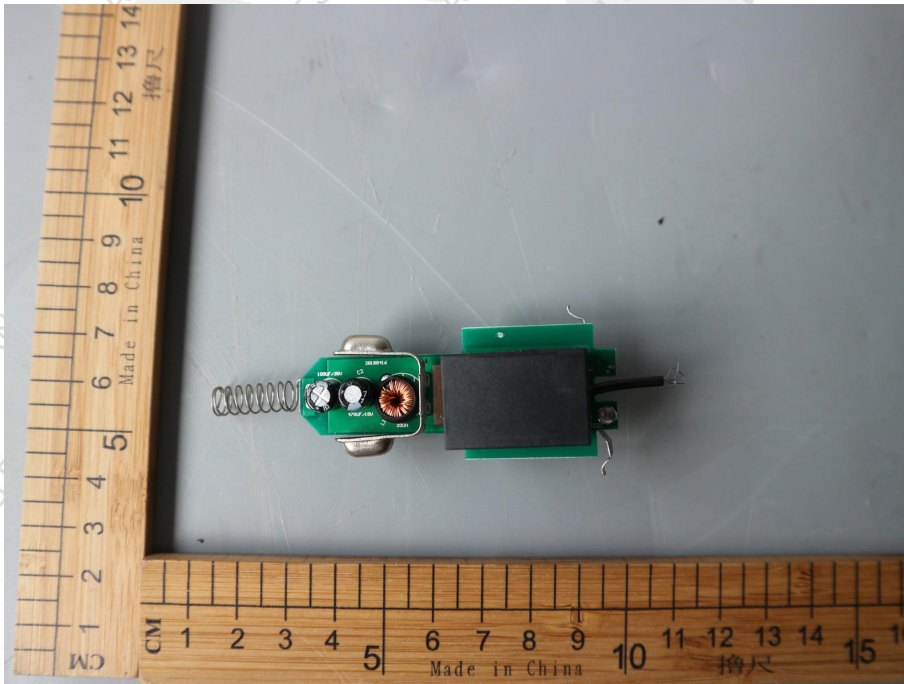


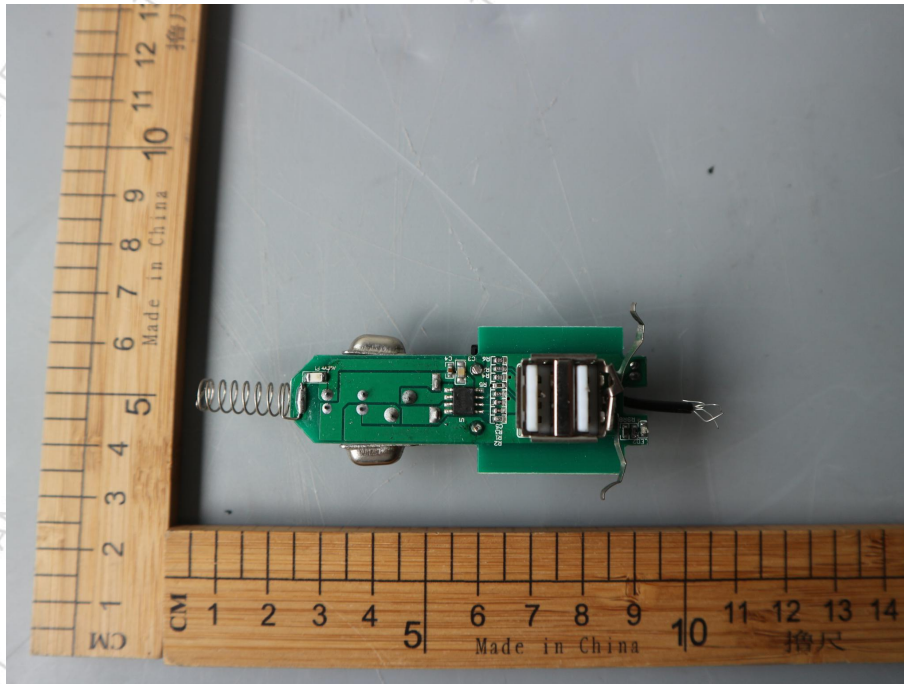
Appendix for sample photos











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



**China National Accreditation Service for Conformity Assessment
LABORATORY ACCREDITATION CERTIFICATE**

(Registration No. CNAS L5885)

Shenzhen Tianhai Test Technology Co., Ltd.

1/F., East Building, Yalian Haoshida Industrial Zone, No.5022, Wuhe Road,
Bantian Street, Longgang 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 testing service as 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: 2015-12-14

Date of Expiry: 2018-12-13

Date of Initial Accreditation: 2012-10-29

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>