



Test Report issued under the responsibility of:

TEST REPORT UL 1236 STANDARD FOR SAFETY Battery Chargers for Charging Engine-Starter Batteries	
Report Number	SJS2304147SG-UL-R1
Tested by(+signature)	Test Engineer Tony Zhang
Approved by(+signature)	Manager Victory Song
Date of issue	2023-04-26
Total number of pages	35 pages
Testing laboratory	ShenZhen SJS Testing Technology Services Co., Ltd
Address	Room 405, No.6095-2, Bao'an Road, Qiaotou Community, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Applicant's name	Shenzhen Jiawei Hengxin Technology Co.,Ltd
Address	Floor 4 Building 6, MaSha Xuda High-tech Industrial Park, Education North Road, Pingdi Town, Longgang District, Shenzhen city , GD, China
Manufacturer's name	Shenzhen Jiawei Hengxin Technology Co.,Ltd
Address	Floor 4 Building 6, MaSha Xuda High-tech Industrial Park, Education North Road, Pingdi Town, Longgang District, Shenzhen city , GD, China
Test specification:	
Standard.....	UL 1236
Test procedure.....	UL 1236
Non-standard test method.....	N/A
Test Report Form No TR_UL1236	
Test Report Form(s) Originator.....	UL
Master TRF.....	Dated 2015-04
Test item	
Description.....	Car Battery Charger
Trade Mark.....	KONNWEI
Model/Type reference.....	KW520,KW510,KW530,KW550,RC10,RC15,RC20,RC25,RC30,RC35,RC40,RC45,RC50
Model differences.....	All models are identical except for model No and enclosure Colour . After comparison, tests carried out on model KW520 were considered
Rating.....	Input:AC 110-230V,50-60Hz,150W; Output:DC 12V 10A, 24V 5A



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..... : 2023-04-20

Date (s) of performance of tests..... : 2023-04-20 to 2023-04-26

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.

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

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

Throughout this report a comma (point) is used as the decimal separator.

Copy of Marking plate (marking will be the one finally provided on product for selling)

Remarks

The use of certification marks on a product must be authorized by the respective certification bodies that own these marks.



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict

CONSTRUCTION			
6	General		P
6.1	If the operation and maintenance of a battery charger by the user involves a risk of injury to persons, a risk of electric shock, or a risk of fire, means shall be provided to reduce the risk.		P
6.2	When evaluating a product with respect to the requirement in 6.1, consideration shall be given to reasonably foreseeable misuse of the product.		P
7	Frame and Enclosure		P
7.1	General		P
7.2	Mounting		P
7.3	Integral meters		P
7.4	Supporting materials		P
7.5	Materials		P
7.6	Barriers		P
7.7	Protection against injury to persons		P
7.8	Outdoor enclosures		P
8	Accessibility of Live Parts		P
8.1	An opening in the enclosure of a battery charger is acceptable if a probe as illustrated in Figure 8.1, when inserted through the opening, cannot be made to touch any uninsulated live part that can cause electric shock. See 5.19.		P
8.2	Thermoplastic covering an opening for user servicing, such as replacement of a pilot lamp, and that reduces the risk of unintentional contact with a live part involving a risk of electric shock shall be considered an enclosure and evaluated as described in 7.5.1 and 25.4. It shall be reliably retained in place.		P
8.3	An uninsulated live part that can cause electric shock shall be located or enclosed so that protection against unintentional contact is provided.		P
8.4	A door or cover that provides access to a live part that can cause electric shock shall be securely held in place so that it can be opened or removed only by using a tool.		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
8.5	The door or cover of an enclosure shall be hinged or attached in an equivalent manner if it provides access to an overload-protective device, the functioning of which requires renewal, or if it is necessary to open the cover in connection with the operation of the protective device. A door or cover providing access to a fuseholder shall be tight-fitting and shall be positively held closed. See 19.1. a) Connected in control circuits, provided the protective devices and the circuit loads are within the same enclosure; b) Rated 2 amperes or less for loads not exceeding 100 volt-amperes; c) Extractor fuses having an integral enclosure; or d) Fuses connected in a low-voltage limited energy circuit.		P
8.6	The operating handle of a circuit breaker, an operating button of a manually operable protector, the capped portion of an extractor-type fuseholder, or a similar part may project outside the enclosure.		P
9	Assembly		P
9.1	An uninsulated live part shall be secured to the base or surface so that it is prevented from rotating or shifting in position as the result of normal stresses, if such movement results in a reduction of spacings below the minimum acceptable values. See Spacings, Section 23.		P
9.2	A component such as a control switch, lampholder, attachment plug receptacle, or plug connector shall be mounted securely and shall be prevented from turning by means other than friction between surfaces. a) The switch is a plunger or other type that does not tend to rotate when operated. A toggle switch is considered to be subject to forces that tend to turn the switch; b) The means for mounting the switch makes it unlikely that operation of the switch will loosen it; c) Spacings are not reduced below the minimum acceptable values if the switch rotates; and d) Operation of the switch is by mechanical means rather than by direct contact by persons.		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
9.3	A small stem-mounted device having a single-hole mounting means may be prevented from rotating by a properly applied lock washer.		P
10	Protection Against Corrosion		P
10.1	Iron and steel parts shall be protected against corrosion by enameling, painting, galvanizing, plating, or an equivalent means.		P
10.2	The interior of a metal compartment housing a battery shall be protected by two coats of acid-resistant paint, two coats of enamel individually baked on, or the equivalent.		P
11	Supply and Output Connections		P
11.1	Permanently connected battery chargers	Not Permanently connected battery chargers	N/A
11.2	Cord connected battery chargers		P
11.3	Output wiring		P
11.4	Specialized Vehicle Connector		P
12	Live Parts		P
12.1	A current-carrying part shall be of silver, copper, a copper alloy, or other material acceptable for the application.		P
12.2	Plated iron or steel may be used for a current-carrying part: a) If acceptable in accordance with Components, Section 2; b) Within a motor; and c) In a secondary circuit rated 42.4 volts peak – 30 volts rms -or less. Unplated iron or steel is not acceptable. Stainless steel and other corrosion-resistant alloys may be used for current-carrying parts.		P
12.3	An uninsulated live part shall be secured to an insulating base or mounting surface so that it is prevented from turning or shifting in position if such motion results in a reduction of spacings below the minimum acceptable values.		N/A
12.4	Friction between surfaces is not acceptable as a means to prevent shifting or turning of a live part, but a properly applied lock washer is acceptable.		N/A
13	Internal Wiring		P
13.1	General		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
13.2	Tubing		P
13.3	Protection of wiring		P
13.4	Electrical connections		N/A
13.5	Separation of circuits		P
13.6	Barriers		P
14	Insulating Materials		P
15	Motors		P
15.1	A fan motor used in a battery charger shall be provided with either of the following: a) Thermal protection complying with the requirements in the Standard for Thermally Protected Motors, UL 1004-3; or b) Impedance protection complying with the Standard for Impedance Protected Motors, UL 1004-2.		P
15.2	A motor winding shall resist the absorption of moisture.		P
16	Transformers		P
16.1	General		P
16.2	Insulation		P
17	Resistors		N/A
17.1	A resistor shall be reliably supported and the assembly shall be provided with a means other than friction between surfaces to reduce the likelihood of loosening or rotating.		N/A
17.2	An assembly employing lock washers may be considered to comply with 17.1.		N/A
18	Switches and Controllers		N/A
18.1	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 circuit that it controls when the battery charger is operated as intended. See 36.4.		N/A
18.2	A primary circuit switch that controls an inductive load having a power factor less than 75 percent, such as a transformer or some ballasts, and that does not have an inductive rating, shall be rated not less than twice the full-load current rating of the load, or the switch shall be investigated for the application.		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
18.3	Unless rated for the application, a switch or other device that controls a motor and is not interlocked so that it will not break the locked-rotor motor current shall be subjected to the overload test required by 36.1 and described in 36.2.		N/A
18.4	A switch that controls a tungsten-filament lamp shall have a tungsten-filament-lamp current rating not less than the maximum current it will control.		N/A
18.5	A switch shall not disconnect the grounded conductor of a circuit.		N/A
18.6	If unintentional operation of a switch results in a risk of injury to persons, the actuator of the switch shall be located or guarded so that such operation is unlikely. The actuator of a switch may be guarded by recessing, ribs, barriers, or the like.		N/A
19	Overload Protective Devices		N/A
19.1	A protective device, such as a fuse or a circuit breaker, the intended functioning of which requires renewal, replacement, or resetting, shall be in a readily accessible location. See 50.17.		N/A
19.2	A household battery charger shall be provided with a manually or automatically reset protector or other overload protective device that complies with the requirements in 38.1 – 38.4.		N/A
19.3	A thermal cutoff or other device employed to reduce a risk of fire or electric shock due to overheating of a transformer during abnormal operation shall comply with the requirements applicable to such a device in addition to the applicable requirements in this Standard – for example, a thermal cutoff shall comply with the applicable requirements in this Standard and those in the Standard for Thermal-Links – Requirements and Application Guide, UL 60691.		N/A
20	Fuses and Fuseholders		P
20.1	A fuse and a fuseholder shall have voltage and current ratings acceptable for the circuit in which they are connected.		P
20.2	An uninsulated live part of a fuseholder that is capable of causing a risk of electric shock, other than the screw shell or clips, shall not be exposed to contact by a person removing or replacing the fuse.		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
20.3	If a polarized attachment plug is used, the screw shell of a plug fuseholder and the accessible contact of an extractor fuseholder shall be connected toward the load.		N/A
20.4	If a polarized attachment plug is used, the screw shell of a plug fuseholder and the accessible contact of an extractor fuseholder shall be connected toward the load.		N/A
21	Lampholders		N/A
21.1	The screw shell of a lampholder shall be connected to a conductor that is intended to be connected to the grounded conductor of the power supply circuit.		N/A
21.2	A lampholder shall be designed or installed so that uninsulated live parts, other than a screw shell, are not exposed to contact by persons removing or replacing the lamp in normal service.		N/A
22	Printed Wiring		P
22.1	A printed-wiring board shall comply with the requirements in the Standard for Printed-Wiring Boards, UL 796.		P
22.2	A resistor, capacitor, inductor, or other part that is mounted on a printed circuit board to form a printed circuit assembly shall be secured so that it cannot be displaced to cause a risk of fire or electric shock by a force likely to be exerted on it during assembly, normal operation, or servicing of the battery charger.		P
22.3	Consideration is to be given to a barrier or partition that is part of the battery charger assembly and that provides mechanical protection and electrical insulation for a component connected to a printed circuit board.		N/A
22.4	A printed wiring board complying with Exception No. 1 to 23.2 shall also: a) Comply with the Standard for Printed-Wiring Boards, UL 796; and b) Have a minimum flammability classification of V-0.		P
23	Spacings		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
23.1	Spacings at field-wiring terminals shall not be less than specified in Table 23.1 between: a) Terminals of opposite polarity; and b) Terminals and other uninsulated metal parts not always of the same polarity.		P
23.2	Spacings, other than at field-wiring terminals, between live parts of opposite polarity, and between live and dead metal parts shall not be less than specified in Table 23.2 or Table 23.4, whichever applies. If an uninsulated live part is not rigidly secured in position by means other than friction between surfaces, or if a movable dead metal part is in proximity to an uninsulated live part, the construction shall be such that at least the minimum acceptable spacings are maintained. See 23.3.		P
23.3	The spacing requirements in Table 23.2 and Table 23.3 do not necessarily apply to the inherent spacings of a component of a battery charger, such as a switch, fuse, or attachment plug. Such spacings shall comply with the requirements for the component in question if they are less than the values specified in Table 23.2 and Table 23.3.		P
23.4	In a low-voltage limited-energy secondary circuit, spacings between live parts of opposite polarity and between a live part and dead metal that is grounded are not specified.		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
23.5	Epoxy or equivalent material may be used to reduce spacings when all of the following are met: a) Spacings of a minimum 1/32 inch (0.8 mm) are maintained prior to application of the encapsulant; b) There are no significant voids in the encapsulant; c) The encapsulant is a minimum 1/32 inch (0.8 mm) thick; d) The area of reduced spacing, with the encapsulant applied, withstands the applicable dielectric voltage withstand test described in Section 29, Dielectric Voltage Withstand Test; and Exception: When the normal operating potential between the parts under consideration does not exceed 600 Vrms, the dielectric test is not required to be conducted. e) The encapsulant temperature during the temperature test of Section 28, Normal Temperature Test, does not exceed 65° C (117° F) rise [based on an assumed operating ambient rating of 25° C (45° F)] or 90° C (194° F) limit (when tested at an ambient rating of greater than 25° C).		P
23.6	As an alternative to the spacing requirements of Table 23.2, the spacing requirements in the Standard for Insulation Coordination Including Clearances and Creepage Distances For Electrical Equipment, UL 840 may be used. The spacing requirements of UL 840 are not to be used for field wiring terminals and spacings to a dead metal enclosure. In determining the pollution degree and overvoltage category, the end-use application is to be considered and may modify those characteristics given in 23.7 and 23.8.		P
23.7	It is anticipated that the level of pollution expected or controlled for indoor use equipment will be pollution degree 2. For outdoor use equipment, pollution degree 3 is expected. Hermetically sealed or encapsulated enclosures, or coated printed-wiring boards in compliance with the Printed-Wiring Board Coating Performance Test of the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840, are considered pollution degree 1.		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
23.8	It is anticipated the equipment will be rated overvoltage category II and overvoltage category I as defined in the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840.		P
23.9	In order to apply clearance B spacings, control of overvoltage shall be achieved by providing an overvoltage device or system as an integral part of the product.		P
23.10	For the purpose of battery chargers, all printed-wiring boards are considered to have a minimum comparative tracking index of 100 without further evaluation.		P
23.11	An insulating liner or barrier of material such as vulcanized fiber or thermoplastic employed in lieu of required spacings shall not be less than 0.028 inch (0.71 mm) thick and shall be so located or of such material that it is not adversely affected by arcing.		P
23.12	Insulating material having a thickness less than that specified in 23.11 may be used if, upon investigation, it is found to be acceptable for the application, and has a dielectric breakdown strength of not less than 5000 volts in the thickness used for 23.11 - 2500 volts in the thickness used for Exception No. 1 to 23.11 - as determined by Tests on Insulating Materials, Section 40.		P
23.13	Film coated wire is regarded as an uninsulated live part when spacings are being considered.		P
23.14	Spacings within a transformer shall comply with Table 23.4.		P
24	Grounding		N/A
PERFORMANCE			
25	General		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
25.1	A representative sample of a battery charger shall be subjected to the tests described in Sections 26 -47. Unless otherwise specified, all tests are to be conducted at the voltage specified in Table 25.1, and at rated frequency. A battery charger rated 50 – 60 hertz shall be tested at the frequency which will produce the highest temperatures. For tests in which the unit is to be connected to a supply circuit, the branch circuit shall be protected by a branch-circuit protective device having a rating equal to the smallest rated receptacle to which the battery charger could be connected.		P
25.2	When testing a charger with voltage sensing, the charger may need to be connected to a load that will cause the charger to operate. For example, a battery supplemented by a resistive load, or an RC load with an additional voltage source that is removed from the circuit when the charger has turned on. Alternatively, the voltage sensing feature may be defeated provided its defeat does not otherwise impact the normal operation of the charger.		N/A
25.3	A charger with multiple functions or output settings (such as charging, float, desulfation, alternator check, crank assist or engine start, battery type, equalize, and the like) shall be tested in each mode or combination of modes.		N/A
25.4	In addition to the applicable performance tests specified in Sections 26-43, a polymeric enclosure (see 7.5.1) shall be evaluated to the following tests in the Standard for Polymeric Materials-Use in Electrical Equipment Evaluations, UL 746C: a) Mold Stress Relief Distortion; and b) Strain Relief Test After Mold Stress Relief Distortion.		N/A
26	Leakage Current Test		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
26.1	The leakage current of a cord-connected battery charger, when tested in accordance with 26.2-26.8, shall not be more than: a) 0.5 MIU for a portable charger; or b) 0.75 MIU for a stationary battery charger. To avoid undue risks of severe body tissue burns, the leakage current shall be not greater than 70 mA rms, measured as V_2 (volts rms) divided by 0.5 (kilohms), using the measuring instrument of Figure 26.3 with the frequency-sensitive network disconnected.	See table 26	P
26.2	All exposed conductive surfaces are to be tested for leakage currents. The leakage currents from these surfaces are to be measured to the grounded supply conductor individually as well as collectively if simultaneously accessible, and from one surface to another if simultaneously accessible. Parts are considered to be exposed surfaces unless guarded by an enclosure considered acceptable for protection to reduce the risk of electric shock as defined in 8.1. Surfaces are considered to be simultaneously accessible if they can be readily contacted by one or both hands of a person at the same time.		
27	Power Input Test		P
27.1	The input current and power factor to a battery charger shall be measured with the charger operating while connected to the maximum normal load. The current input shall not be more than 110 percent of the rated value.	See table 27	P
27.2	The input current is to be measured with the load adjusted to draw the continuous output current rating. If the charger is provided with a tap switch or other means for adjustment of the output current or voltage, measurements of the primary input current are also to be made with the output load adjusted to draw the continuous output current rating.		P
27.3	A battery charger with a non-continuous output current rating shall comply with 27.1 while connected to a load adjusted to draw a current equal to the maximum non-continuous current output rating.		P
28	Normal Temperature Test	See table 28	P
28.1	General		



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
28.2	Non-continuous current rating temperature test		P
28.3	Discharge temperature test		N/A
29	Dielectric Voltage Withstand Test	See table 29	P
29.1	General		P
29.2	Induced potential test		N/A
30	Water Spray Test	Indoor used only	N/A
31	Impact Test		P
31.1	General		P
31.2	Ball impact test.		
31.3	Drop test	Tested and passed	P
32	Stability Test		N/A
32.1	Under conditions of normal use, a portable or stationary battery charger intended for floor or table use shall not become physically unstable to the degree that it poses a risk of injury to persons		N/A
32.2	A battery charger shall not tip over but shall return to its normal at-rest position when: a) Tipped through an angle of 10 degrees from an at-rest position on a horizontal surface; b) Placed on a plane inclined at an angle of 10 degrees from the horizontal; or c) Subjected to an externally applied horizontal force of 20 percent of the weight of the battery charger or 50 pounds (22.7 kg), whichever is less. See 32.5.		N/A
32.3	A battery charger is not to be energized during the stability test. The test is to be conducted under conditions most likely to cause the battery charger to overturn. The following conditions are to be such as to result in the least stability: a) The position of all adjustable or movable parts such as doors, drawers, or casters; b) The supply and output cords placed in either the stored position or on the surface supporting the battery charger, whichever is more severe; c) Provision of or omission of any normal mechanical load in the battery charger such as stored parts; and d) Direction in which the battery charger is tipped, or the supporting surface is inclined.		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
32.4	With reference to the requirement in 32.2(a), for a battery charger that is constructed so that while being tipped through an angle of 10 degrees a part or surface of the battery charger not normally in contact with the horizontal supporting surface touches the supporting surface before the charger has been tipped through an angle of 10 degrees, the tipping is to be continued until the surface or plane of the surface of the charger originally in contact with the horizontal supporting surface is at an angle of 10 degrees from the horizontal supporting surface.		N/A
32.5	The force specified in 32.2(c) is to be applied in a horizontal direction at that point on the charger most likely to overturn the battery charger, but is not to be applied more than 5 feet (1.52 m) above floor level. The legs or points of support may be blocked to prevent the unit from sliding during the application of the force.		N/A
33	Static Load Test	Tested and passed	P
33.1	When mounted as recommended by the manufacturer, a battery charger intended to be fixed to a supporting structure shall be loaded as described in 33.2 for 1 minute with a force equal to three times the weight of the device but not less than 20 pounds (89 N). As a result of this loading, there shall be no permanent deformation, breakage, dislocation, cracking, or other damage to the mounting means.		P
33.2	The force is to be applied through the approximate center of gravity of the device, is to be increased gradually to reach the required value in 5 to 10 seconds, and is to be maintained at that value for 1 minute.		P
34	Strain Relief Test	Tested and passed	P
34.1	The strain relief means provided on a flexible cord shall withstand for 1 minute without displacement a direct pull of 35 pounds (156 N) applied to the cord, with the connections within the battery charger 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.		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
34.2	A 35-pound (15.9-kg) or a 20-pound (9.1-kg) weight, as applicable, is to be suspended from the cord and supported by the battery charger so that the strain relief means is stressed from any angle the construction of the battery charger permits.		P
34.3	With reference to 11.4.3, the strain relief for a specialized vehicle connector shall withstand a straight pull of 30 lbf (133 N) if the conductors are 18 AWG or larger, and 20 lbf (89 N) if smaller than 18 AWG, applied between the connector and the cord. The connector is to be securely supported by a rigid, flat plate mounted horizontally. The plate is to have a hole just large enough for the cord to pass through. The pull is to be applied by means of a weight for 1 minute to the flexible cord, in a direction perpendicular to the plane of the cord-entry to the connector.		P
35	Push-Back Relief Test	Tested and passed	P
35.1	To determine compliance with 11.3.14, a product shall be tested in accordance with 35.2 without occurrence of any of the conditions specified in 11.3.14 (a) - (d).		P
35.2	The supply cord or lead 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, 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 supply cord or lead within the product is to be manipulated to determine compliance with 11.3.14.		P
36	Overload of Switches and Controls Test		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
36.1	Unless known to be acceptable for the application (See Switches and Controllers, Section 18), a switch or other control device shall perform acceptably when subjected to an overload test consisting of 50 cycles of operation making and breaking the applicable load. There shall be no electrical or mechanical breakdown of the device, undue burning or pitting of the contacts as a result of the overload or endurance test, or opening of the fuse in the grounding connections.		N/A
36.2	To determine whether a switch or other control device complies with the requirements in 36.1, the battery charger is to be connected to a supply circuit of rated frequency and 110 percent of maximum rated voltage. The load for the device under test is to be the same as that which it is intended to control in regular service. During the test, exposed dead metal parts of the battery charger are to be connected to ground through a 3-ampere plug fuse. The device is to be operated at a rate of not more than 10 cycles per minute, except that a faster rate of operation may be employed if agreeable to those concerned.		N/A
36.3	A switch or other device that controls a motor and has not been shown to be acceptable for the purpose, unless interlocked so that it does not break the locked rotor current of the motor, shall perform acceptably when subjected to an overload test consisting of 50 cycles of operation, making and breaking the locked-rotor current of the motor. There shall be no electrical or mechanical breakdown of the device, undue pitting or burning of the contacts, or opening of the fuse in the grounding connection.		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
36.4	To determine whether a switch or other control device complies with the requirement in 36.3, the battery charger is to be connected to a grounded supply circuit of rated frequency and maximum rated voltage - see Table 25.1 - with the rotor of the motor locked in position. During the test, exposed dead metal parts of the battery charger are to be connected to ground through a 3-ampere plug fuse, and the connection is to be such that any single-pole, current-rupturing device will be located in the ungrounded conductor of the supply circuit. The device is to be operated at a rate of not more than 10 cycles per minute, except that a faster rate of operation may be employed if agreeable to those concerned.		N/A
37	Strength of Handles Test		N/A
37.1	A handle used to lift or carry a charger shall withstand a force of four times the weight of the charger without breakage of the handle, its securing means, or that portion of the enclosure to which the handle is attached.		N/A
37.2	To determine whether a battery charger complies with the requirements in 37.1, a force equal to four times the weight of the charger is to be uniformly applied over a 3-inch (76-mm) width at the center of the handle, without clamping. The load is to be started at zero and is to be gradually increased so that the test value will be attained in 5 to 10 seconds and maintained at that value for 1 minute. If more than one handle is provided on a charger and the charger cannot be carried by one handle alone, the force is to be distributed between the handles. The distribution of forces is to be determined by measuring the percentage of the weight of the charger sustained by each handle with the charger in the normal carrying position. If a charger is furnished with more than one handle and can be carried by one handle only, each handle shall withstand the total force.		N/A
38	Abnormal Tests		P
38.1	General.		P
38.2	Output short-circuit test	Tested and passed	P
38.3	Reverse polarity test	Tested and passed	P
38.4	Switch position test		N/A
38.5	Blocked fan test	Tested and passed	P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
38.6	Component short and open test	Tested and passed	P
38.7	Intermediate abnormal test		N/A
38.8	Relay and solenoid burnout		N/A
38.9	Transformer burnout test	Tested and passed	P
38.10	Transformer overload test	Tested and passed	P
38.11	Printed wiring board abnormal operation test	Tested and passed	P
39	Fifteen Day Abnormal Tests		N/A
39.1	If a transformer is required to be tested as provided in 16.2.9, the transformer shall comply with the 15 day abnormal operation tests described in 39.3 – 39.14. The abnormal tests may be conducted with a protective device built into the transformer or with an external protective device having a rating specified by the manufacturer connected in either the primary or secondary circuit, or in both. A protective device that is relied upon to open the circuit as a result of an abnormal test is to be one that has been investigated and found to be acceptable for the purpose.		N/A
39.2	For the purposes of these requirements, each secondary winding tap other than a center tap and each primary winding tap designed to supply power to a load shall be considered to be the equivalent of a secondary winding.		N/A
39.3	A transformer shall operate for the full 15 days with the secondary winding or windings loaded to the current levels described in 39.5.		N/A
40	Tests on Insulating Materials		N/A
40.1	If required by Exception No. 2 of 16.2.4, Type C of Table 16.1, 16.2.6(c), or 23.12, the transformer insulating material shall be subjected to the test described in 40.2.		N/A
40.2	The insulating material is to be placed between two opposing electrodes. The electrodes are to be cylindrical brass or stainless steel rods 1/4 inch (6.4 mm) in diameter with edges rounded to a 1/32 inch (0.8 mm) radius. The upper moveable electrode is to weigh 50 ± 2 grams to exert sufficient pressure on the specimen to provide good electrical contact. The test potential is to be increased to the test value and the maximum test potential is to be maintained for 1 second. The result is acceptable if there is no dielectric breakdown.		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
41	Tests of Connector Guards		N/A
41.1	A required rubber or neoprene connector guard shall be tested as described in 41.2. Deterioration of the guard shall not be apparent and its hardness shall not have changed more than ten numbers as a result of the exposure.		N/A
41.2	Three connector and guard assemblies are to be used. The hardness of the rubber is to be determined as the average of five readings with an acceptable gauge such as a Rex hardness gauge or a Shore urometer. The connector guard assemblies are then to be placed in an air oven for 70 hours at 100° C (212° F). The assemblies are to be allowed to cool at room temperature for at least 4 hours after removal from the oven. The hardness is to be determined again as the average of five readings. The difference between the original average hardness reading and the average reading taken after oven aging is the change in hardness.		N/A
41.3	Samples of each basic rubber compound employed for a connector guard are to be subjected to the accelerated aging tests described in 41.1 and 41.2.		N/A
42	Accelerated Aging of Gaskets, Sealing Compounds, and Adhesives		N/A
42.1	The requirements in 42.2-42.6 apply to gaskets and sealing compounds employed to make an enclosure raintight or rainproof as determined by the Water Spray Test, Section 30, and to a cart-type battery charger as mentioned in the Exception to 50.9. The requirements in 42.7 apply to an adhesive used to secure a gasket.		N/A
42.2	Neoprene and rubber gasket materials shall have physical properties as specified in Table 42.1 before and after accelerated aging under the conditions specified in Table 42.2.		N/A
42.3	Foamed neoprene and foamed rubber gasket materials shall be subjected to accelerated aging under the conditions specified in Table 42.2. The material shall not harden or otherwise deteriorate to a degree that affects its sealing properties.		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
42.4	Thermoplastic gasket materials shall be subjected to accelerated aging under the conditions specified in Table 42.2. A thermoplastic material shall not deform or melt, or otherwise deteriorate to a degree that will affect its sealing properties. A solid polyvinyl chloride material shall have physical properties as specified in Table 42.1 before and after the accelerated aging.		N/A
42.5	Tensile strength and elongation are to be determined using the test methods and apparatus described in Tension Testing of Vulcanized Fiber, ASTM D412.		N/A
42.6	A sealing compound shall be applied to the surface it is intended to seal. For a temperature rise not exceeding 35° C (63° F), a representative sample of the surface with the sealing compound applied shall be conditioned for 7 days in an air oven at 87.0 ± 1.0° C (189.0 ± 1.8° F). The sealing compound shall not melt, become brittle, or otherwise deteriorate to a degree that will affect its sealing properties as determined by comparing the aged sample to the unaged sample.		N/A
43	Automatic Battery Chargers		N/A
43.1	A battery charger marked in accordance with 50.4 shall incorporate a control circuit or other means to: a) Achieve and maintain the battery at full charge capacity (see 43.2); b) Reduce gas formation or evaporation of the electrolyte; and c) Maintain the temperature of the electrolyte or battery case below 120° F (49° C).		N/A
43.2	The readings for full charge capacity shall be taken one hour after being disconnected from the battery charger, and the readings shall comply with the specifications of 43.3.		N/A
43.3	The typical terminal voltage shall be 2.1 to 2.15 volts/cell.		N/A
44	Grounding Conductor Tests		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
44.1	A grounding means in accordance with the Exception to 24.6 may be used when, using a separate sample for each test, the grounding path does not open when: a) Carrying currents equal to 135 and 200 percent of the rating or setting of the intended branch-circuit overcurrent-protective device for the times specified in Table 44.1; and b) Three samples are subjected to a limited-short-circuit test using a test current as specified in Table 44.2 while connected in series with a nonrenewable fuse rated in accordance with Table 44.1.		N/A
44.2	The test circuit described in 44.1 (b) is to have a power factor of 0.9 -1.0 and a closed-circuit test voltage as specified in 25.1. The open-circuit voltage is to be 100-105 percent of the closed-circuit voltage.		N/A
45	Hot, Flaming Oil Test		N/A
MANUFACTURING AND PRODUCTION TESTS			
46	Dielectric Voltage Withstand Test		P
46.1	Each battery charger shall withstand without electrical breakdown, as a routine production line test, the application of a potential: a) Between the primary wiring, including connected components, and accessible dead metal parts that are likely to become energized; and b) Between primary wiring and accessible secondary parts, including terminals.		P
46.2	The production line test shall be in accordance with either Condition A or Condition B of Table 46.1.		P
46.3	The battery charger may be in a heated or unheated condition for the test.		P
46.4	The test is to be conducted when the battery charger is complete-fully assembled. It is not intended that the battery charger be unwired, modified, or disassembled for the test.		P
47	Grounding Continuity Test		N/A



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
47.1	Each battery charger that has a power supply cord having a grounding conductor shall be tested, as a routine production line test, to determine that grounding continuity exists between the grounding blade of the attachment plug and accessible dead metal parts of the battery charger that are likely to become energized.		N/A
47.2	Only a single test need be conducted if the accessible metal selected is conductively connected by design to all other accessible metal.		N/A
47.3	Any acceptable indicating device such as an ohmmeter, battery-and-buzzer combination, or the like, may be used to determine whether a battery charger complies with the requirement in 47.1.		N/A
47.4	With reference to the Exception to 24.6, each battery charger shall be tested, as a routine production line test, to determine that grounding continuity exists between the grounding blade of the attachment plug and accessible dead metal parts of the battery charger that are likely to become energized. The continuity test shall consist of passing a 60 Hz current of 30 amperes for one minute. At one minute the grounding impedance shall not exceed 0.2 ohms.		N/A
RATING			
48	Details		P
48.1	The input circuit of a battery charger shall be rated in amperes or watts and volts, and may be rated for alternating current only. For a charger having a non-continuous current output rating, the input rating shall indicate the value of amperes or wattage under the maximum normal charging conditions and non-continuous current conditions. The rating shall include the number of phases, if the charger is designed for use on a polyphase circuit, and the frequency. The voltage rating shall be in accordance with any appropriate single voltage or range of voltages such as 100 -120, 208, 220 --240, 254 -277, 416, 440-480, 550, 575, and 600.	110-230V	P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
48.2	The output circuit of a battery charger shall be rated in volts, dc, and amperes. The minimum voltage shall be the nominal voltage of the battery intended to be charged (6, 12, 24, etc.). The output rating for a battery charger intended for non-continuous current operation, such as engine start and/or cranking assist shall include all non-continuous current ratings.		P
MARKINGS			
49	General		P
49.1	A battery charger shall be legibly and permanently marked, where readily visible, with: a) The manufacturer's name, trade name, or trademark; b) A distinctive model number or the equivalent; c) The date or other dating period of manufacture not exceeding any three consecutive months; and d) The electrical rating. e) An indication of whether it is intended for household use, commercial use, or both.		P
49.2	When the date of manufacture is abbreviated, it shall be in a nationally accepted conventional code or in a code affirmed by the manufacturer and shall: a) Not repeat in less than 20 years; and b) Not require reference to the manufacturer's records to determine when the battery charger was manufactured.		P
49.3	A noncontinuous duty cycle marking (such as a charger having an engine start and/or cranking assist capability) shall consist of a maximum "on" and a minimum "off" time, or a maximum "on" time and an on/off ratio. The time may be indicated in seconds or minutes, or fractions thereof. The duty cycle shall anticipate a minimum "on" time of one second.		P
49.4	The polarity of the output leads shall be plainly indicated by: a) The words "positive" and "negative"; b) The signs "+" for positive and " - " for negative; c) The abbreviations "pos" for positive and "neg" for negative; or d) Color coding of red for positive and black for negative.		P



UL 1236			
Clause	Requirement + Test	Result - Remark	Verdict
50	Cautionary Markings		P
51	Permanency of Marking		P
INSTRUCTIONS			
52	Instruction Manual		P
53	Important Safety Instructions		P
54	Assembly Instructions		P
55	Operating Instructions		P
56	Maintenance Instructions		P
57	Moving and Storage Instructions		P
58	Packaging		P

**Appendix 1: Critical components information**

Component Name	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity
Plastic Enclosure	CHI MEI CORPORATION	PA-765(+)	Min thickness 1.5mm, V-0 HWI=2, HAI=0, 80°C, screw for fixing	UL 94	UL E56070
Appliance coupler	Various	Various	250Vac, 2.5A	UL	UL
Internal wire	Various	Various	Various	UL	UL
PCB material	BOLUO YIYANG ELECTRON CO LTD	YY-02	130 °C, V-0	UL 796 UL 94	UL E364546
Alt.	Various	Various	130 °C, V-0	UL 796 UL 94	UL
Fuse(F1)	Various	Various	T5A, 250VAC	UL	UL
Y-cap (CY1)	Various	Various	2200PF, 125°C	UL	UL
Optocoupler	Various	Various	CI>5mm; Cr>5mm	UL	UL
Transformer (T1)	Interchangeable	3230-12V10A	Class B	UL 62368-1	Tested with appliance
- Bobbin	CHANG CHUN PLASTICS CO LTD	T375J	V-0, 150° C, thickness min.0.43 mm	UL 94	UL E59481
- Magnet wire	TAI-I ELECTRIC WIRE & CABLE CO LTD	UEW	130° C	UL 1446	UL E85640
-Triple insulated wire	SHANGHAI XIANGXIANG ELECTRON CO LTD	TKW-B	130° C	ANSI/UL 1446	UL E308908
- Insulating tape	JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD	CT* (c)(g)	130° C	UL 510	UL E165111
- Insulating tube	FUREDA PLASTIC CO LTD	FRD-TT-T	200° C, 300Vac	UL 224	UL E254113
Output wire	Various	Various	Various	UL	UL



Remark:

26	TABLE: Leakage current			P
	rated voltage (V).....:	110V		—
Leakage current between		I (mA)	Max. allowed I (mA)	
AC input to enclosure		0.09	0.5	

27	TABLE: Power Input Test					p
Current deviation of/at		W rated (W)	W measured (W)	ΔI (%)	Required ΔI (%)	Remark
110Vac		150	137.2	-8.53	+10%	pass
230Vac		150	148.9	-0.74	+10%	pass

28	Normal Temperature Tests						P
	Supply voltage (V) :	230V	--	--	--		—
	Ambient T_{min} (°C) :	25.0	--	--	--		—
	Ambient T_{max} (°C) :	25.0	--	--	--		—
Maximum measured temperature T of part/at:		T (°C)				Allowed T_{max} (°C)	
Power plug		35.6	--	--	--		105
Appliance coupler		38.9	--	--	--		85
PCB near U10		84.5	--	--	--		130
C21		58.7	--	--	--		105
T3 winding		86.5	--	--	--		110
C31		66.8	--	--	--		125
Optocoupler(U5)		61.2	--	--	--		100
PCB near D7		78.1	--	--	--		130
C29		63.4	--	--	--		105
Enclosure outside		47.8	--	--	--		Ref.
Output wire		36.1	--	--	--		85
Supplementary information:							
Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class
--	--	--	--	--	--	--	--
Supplementary information:							

29	TABLE: Dielectric Voltage-Withstand Test			P
Test voltage applied between:		Voltage (V)	Breakdown (Yes/No)	
AC Input to enclosure		1460	No	

31	TABLE: Impact tests				P
Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation	
Top enclosure	See table 4.1.2	1.5	1300	No hazard	
Bottom enclosure	See table 4.1.2	1.5	1300	No hazard	
Side enclosure	See table 4.1.2	1.5	1300	No hazard	
Supplementary information:					
Test Material:					

34	TABLE: Stress relief test				P
Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation
Overall enclosure	Plastic	Min1.5	75°C	7	No shrinkage, warpage, or other distortion
Supplementary information:					

38	Abnormal Operation Test					N/A	
	Supply voltage (V) :	--	--	--	--	—	
	Ambient T _{min} (°C) :	--	--	--	--	—	
	Ambient T _{max} (°C) :	--	--	--	--	—	
Maximum measured temperature T of part/at:		T (°C)				Allowed T _{max} (°C)	
--		--	--	--	--	--	
Supplementary information:							
Temperature T of winding:	t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class
--	--	--	--	--	--	--	--
Supplementary information: Lock fan							

Appendix: Photos

Fig.1



Fig.2



Fig.3



Fig.4



Fig.5



Fig.6

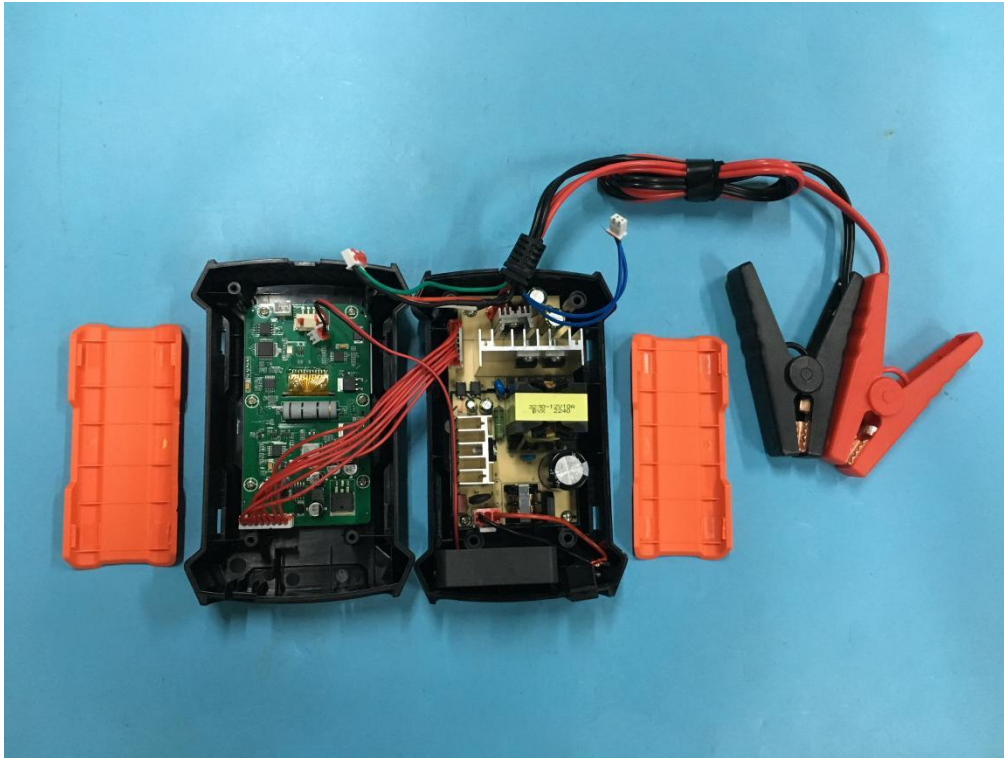


Fig.7



Fig.8

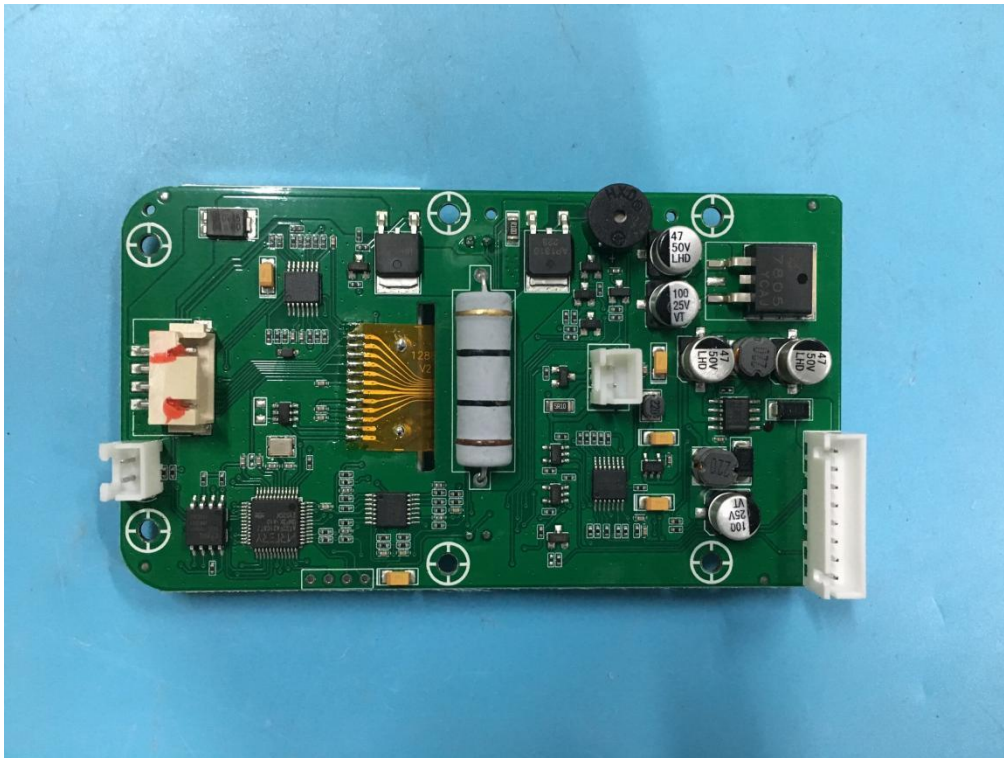


Fig.9

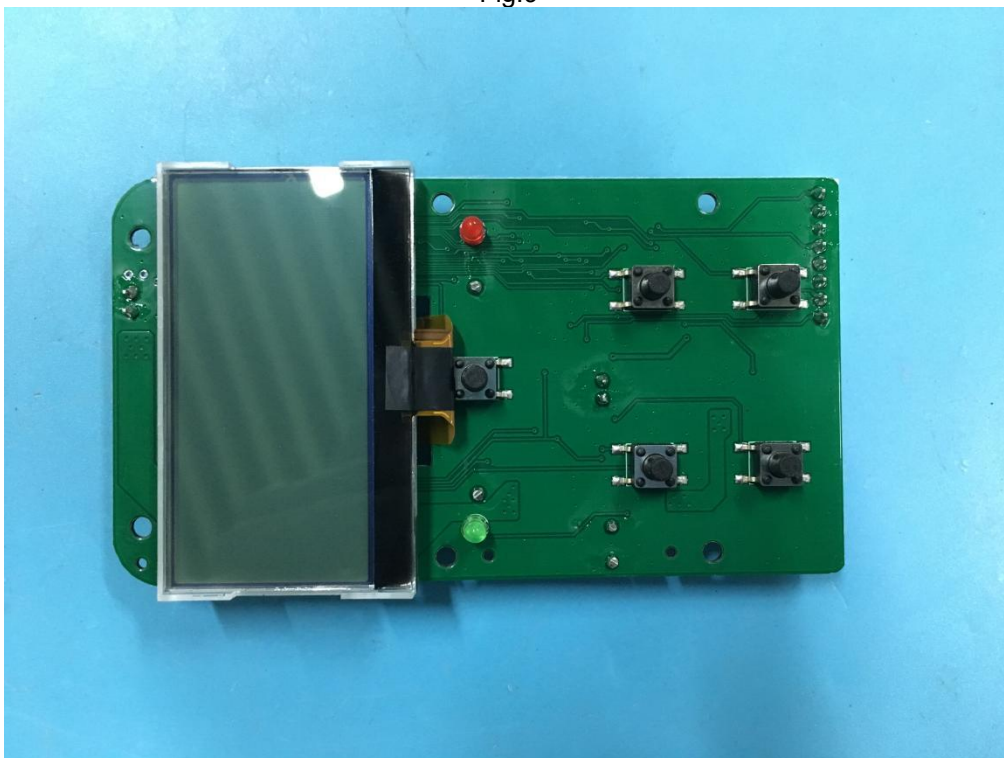


Fig.10

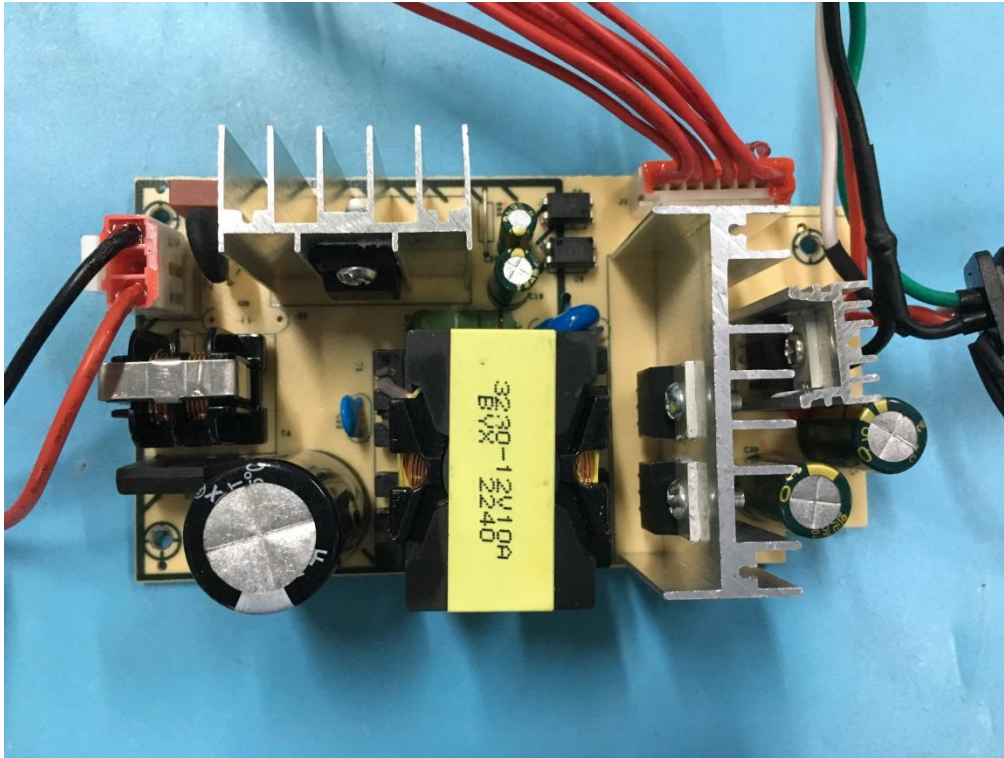


Fig.11

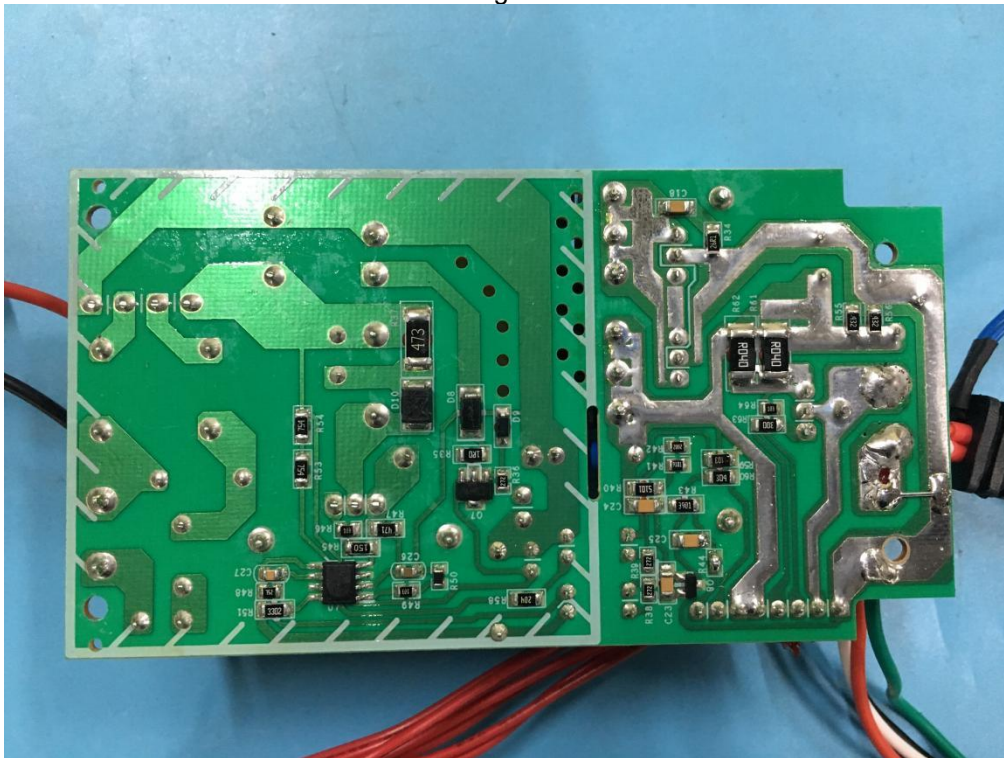


Fig.12



Fig.13



Fig.14

---End of report---