
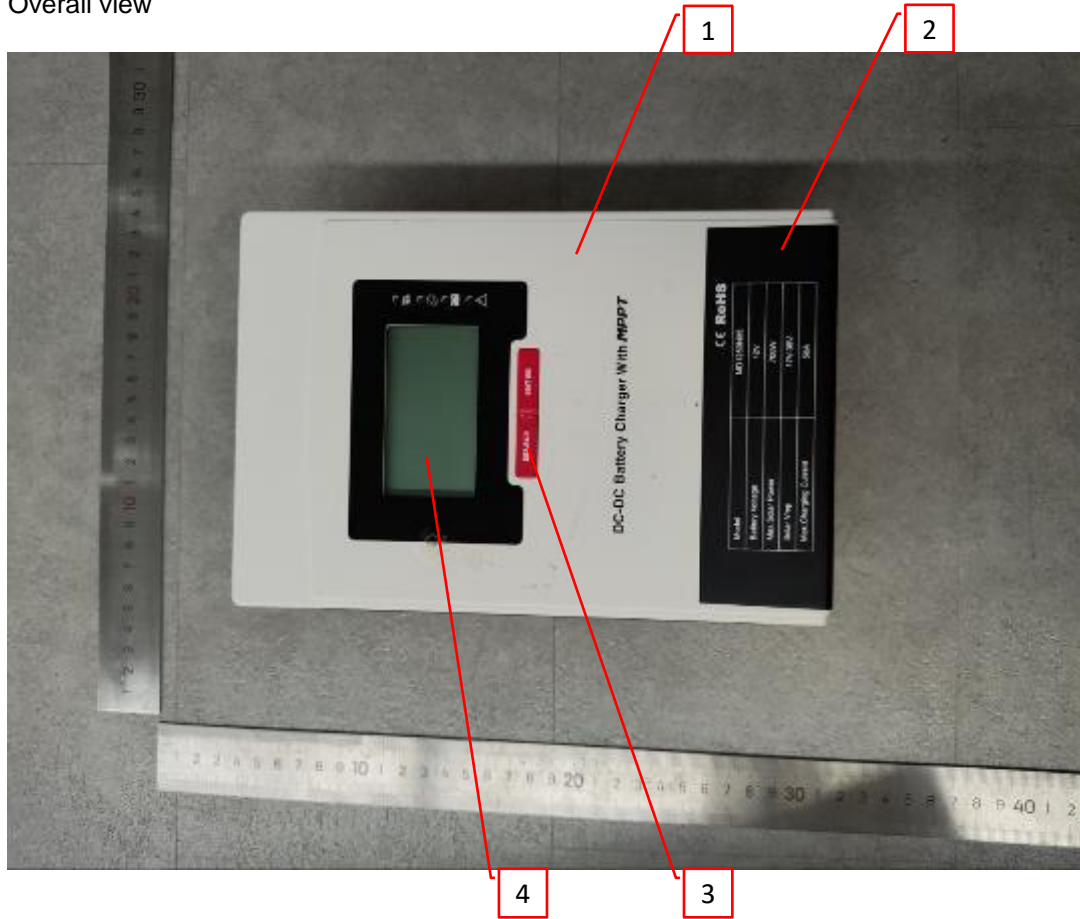


1.0 Reference and Address			
Report Number	220608062GZU-001	Original Issued: 12-Aug-2022	Revised: None
Standard(s)	Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3] Power Conversion Equipment [CSA C22.2#107.1:2016 Ed.4]		
Applicant	SRNE Solar Co., Ltd	Manufacturer	SRNE Solar Co., Ltd
Address	4-5F, 13A Wutong Island, Neihuan Rd, Xixiang, Bao`an, SHENZHEN Guangdong 518100	Address	Room 301, Building 5, Fuxing Road, No. 36, Chang'an Town, DONGGUAN CITY, Guangdong
Country	China	Country	China
Contact	Liu Guang	Contact	Liu Guang
Phone	15521298076	Phone	15521298076
FAX	--	FAX	--
Email	liuguang@szshuori.com	Email	liuguang@szshuori.com

2.0 Product Description			
Product	DC & PV double input Charging Controller		
Brand name	 <b>SRNE</b> 碩日		
Description	Product covered by this report is a DC & PV double input Charging Controller. It's non-isolating between PV/DC and battery circuit. It's designed to be used in off-grid photovoltaic systems to coordinate operation of the solar panel or DC generator to charge battery. Installation should be located in dry, indoor where specified in installation manual as well as in accordance with the National Electrical Code (NEC) and the Canadian Electrical Code (CEC).		
Models	MD1250N05, MD1230N05		
Model Similarity	MD1250N05 and MD1230N05 have identical mechanical and electrical construction except some parameter of the software architecture in order to control the ratings and MD1230N05 uses less capacitors and MOS.		
Ratings	Model	MD1250N05	MD1230N05
	Battery voltage (DC)	12V	
	Max. charging current (DC)	50A	30A
	Max. PV input voltage (DC)	55V	
	Max. PV input current (DC)	45A	27A
	Max. PV input short circuit current (DC)	47.5A	28.5A
	Max. PV and DC input power	700W	400W
	MPPT voltage range	17Vdc - 36Vdc	
	Max. DC input voltage	32V	
	Max. DC input current	60A	35A
	Max. DC input short circuit current	62.5A	36.5A
	DC input voltage range	12V - 16V / 24V - 32V	
	Ambient Temperature	-35°C to +65°C	
Protection Degree	IP30		
Other Ratings	NA		

**3.0 Product Photographs**

**Photo 1 - Overall view**

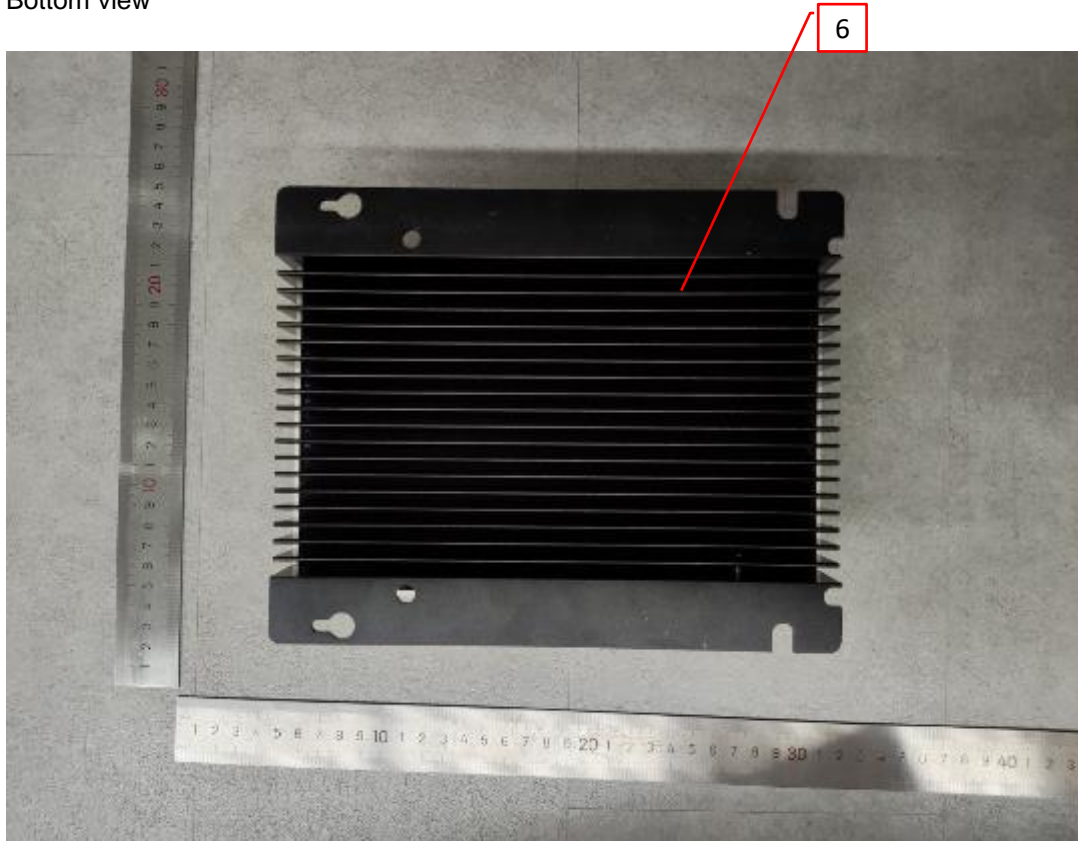


**Photo 2 - Side view**

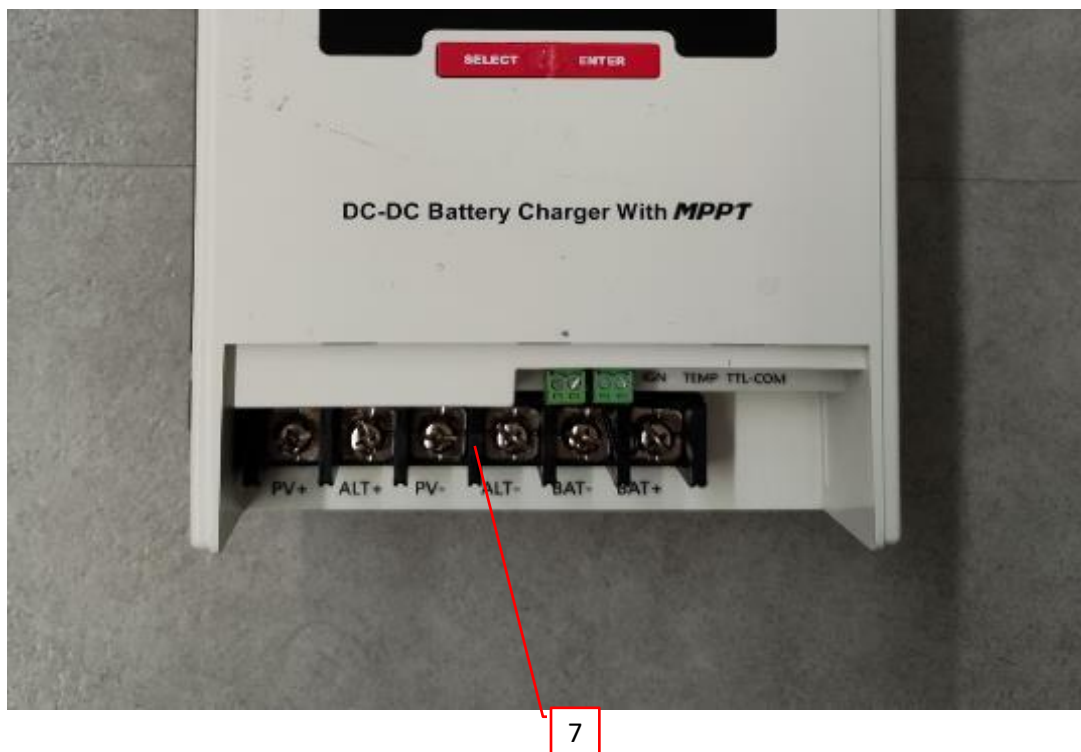


**3.0 Product Photographs**

**Photo 3 - Bottom view**

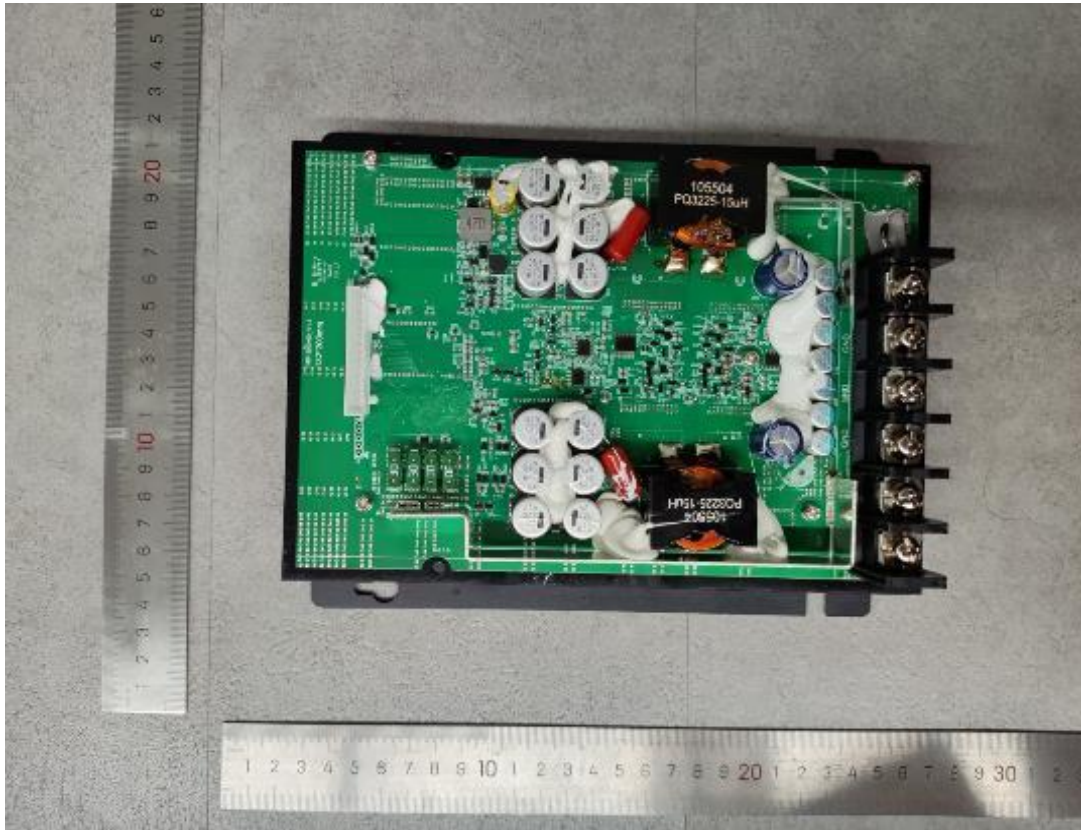


**Photo 4 - Terminal view**

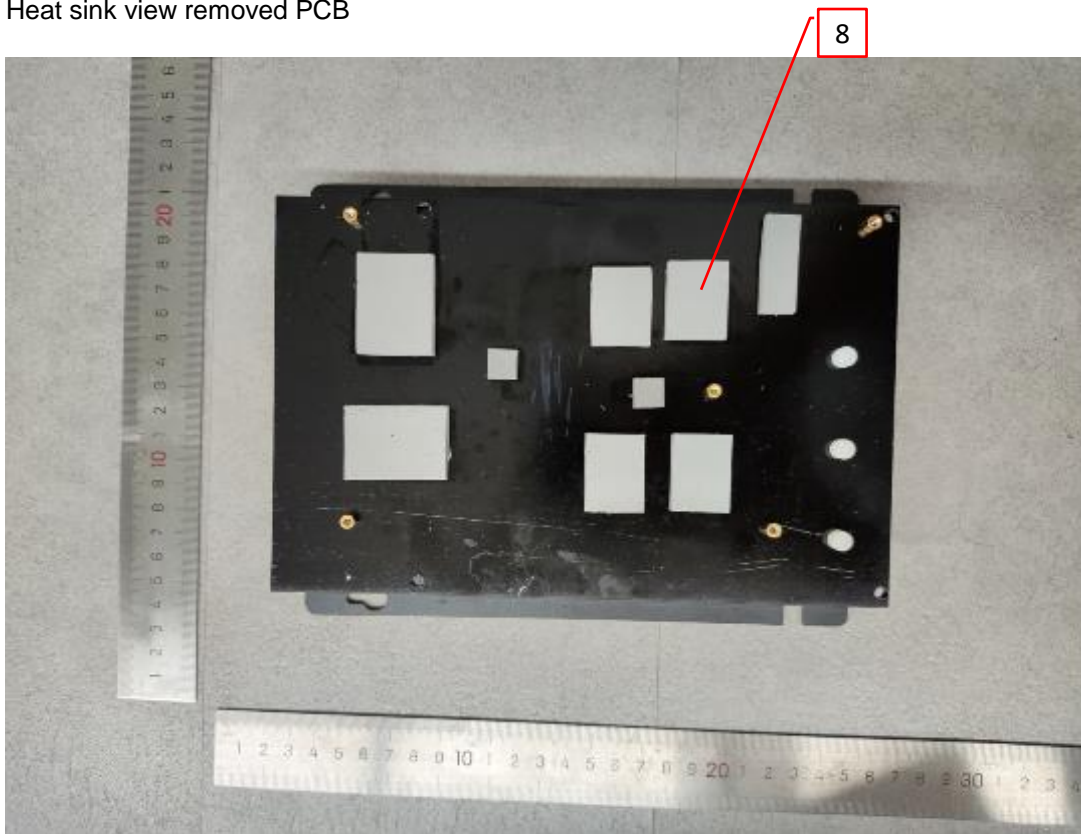


**3.0 Product Photographs**

**Photo 5 - Internal view**

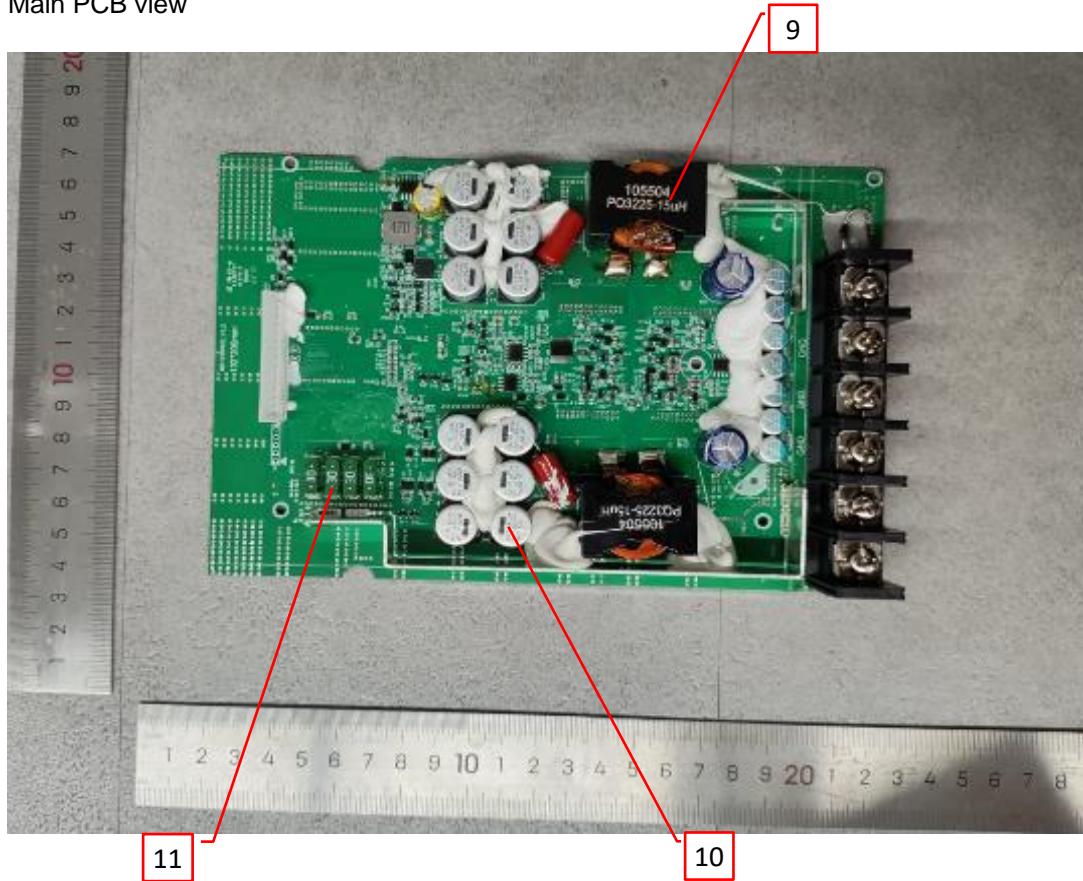


**Photo 6 - Heat sink view removed PCB**

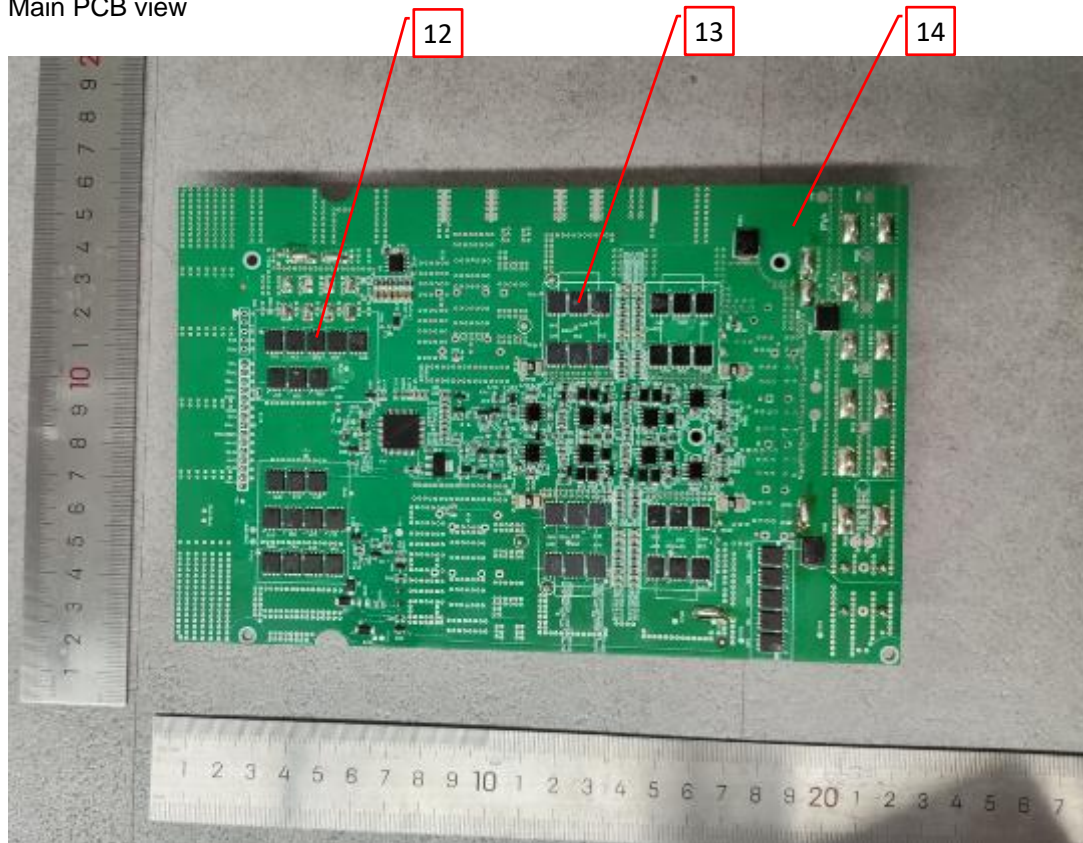


**3.0 Product Photographs**

**Photo 7 - Main PCB view**

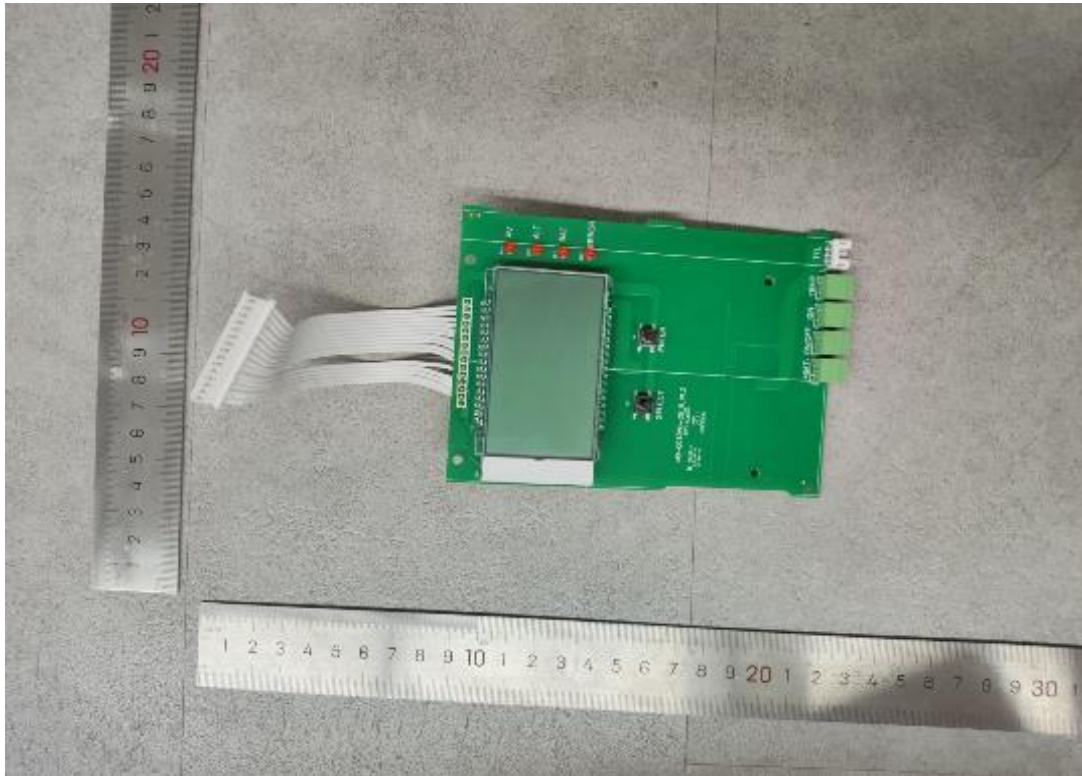


**Photo 8 - Main PCB view**



**3.0 Product Photographs**

**Photo 9 - Display PCB**



**Photo 10 - Display panel**



4.0 Critical Components						
Photo #	Item no. <sup>1</sup>	Name	Manufacturer/ trademark <sup>2</sup>	Type / model <sup>2</sup>	Technical data and securement means	Mark(s) of conformity <sup>3</sup>
1	1	White plastic case	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC310(+)	5VA, 90°C, Thickness: 3.0mm	cURus
1	2	Black plastic lid	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC310(+)	5VA, 90°C, Thickness: 3.0mm	cURus
1	3	Plastic buttons	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC310(+)	5VA, 90°C, Thickness: 3.0mm	cURus
1	4	Transparent cover for display screen	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC310(+)	5VA, 90°C, Thickness: 3.0mm	cURus
2	5	Marking label (not shown)	Various	Various	Adhesive-Type, Min. 80°C	UR
3	6	Heat sink	Various	Various	Aluminium alloy, 213.6*176*42mm	NR
4	7	Terminal blocks	NINGBO DEGSON ELECTRICAL CO LTD	DG88*qq	600V/100A, 105°C	cURus
6	8	Silicon sheet	Shenzhen 3KS Electronic Material Co. LTD	3KS	V-0, 105°C, Thickness: 3mm	UR
7	9	Inductance L4, L5	Shenzhen Jin Yitai Xin Electronic CO., LTD	PQ3225	15µH, Class 180	NR
7	9a	Magnet Wire of the inductor L4, L5 (not shown)	Guangdong Jinyan Electrotechnics Joint Stock Co Ltd	xEIW	180°C	UR
7	10	Capacitor C96, C98, C100, C101, C102, C103, C104, C105, C106, C107, C108, C111	LELON ELECTRONICS CORP	VZH Series	220µF_63V_105°C	NR
7	11	Fuse F7, F8, F9, F10	ADLER ELEKTROTECHNIK LEIPZIG GMBH	BF22300300	30A/32V	cURus
			Various	Various	30A/32V	cURus
8	12	Mosfet Q17, Q21, Q22, Q23, Q24, Q28, Q29, Q33, Q34, Q38, Q39, Q62, Q63, Q66, Q75, Q76, Q77, Q78, Q79	Huayi Microelectronics Co., Ltd	HYG025N06LS 1C2	170A_60V_175°C	NR



4.0 Critical Components						
Photo #	Item no. <sup>1</sup>	Name	Manufacturer/ trademark <sup>2</sup>	Type / model <sup>2</sup>	Technical data and securement means	Mark(s) of conformity <sup>3</sup>
8	13	Mosfet Q18, Q19, Q30, Q31, Q35, Q53, Q65, Q68, Q69, Q71, Q73, Q74	Hangzhou Silan Intergrated Circuit Co., Ltd	SVGP082R6NL 5A	100A_80V_175°C	NR
8	14	PCB	Shenzhen Longteng Circuit Technology Co. LTD	LTM08	V-0, 130°C, Thickness: 1.6mm	cURus
			Various	Various	V-0, 130°C, Thickness: 1.6mm	cURus
NOTES: 1) Not all item numbers are indicated (called out) in the photos, as their location is obvious. 2) "Various" means any type, from any manufacturer that complies with the "Technical data and securement means" and meets the "Mark(s) of conformity" can be used. 3) Indicates specific marks to be verified, which assures the agreed level of surveillance for the component. "NR" - indicates Unlisted and only visual examination is necessary. "See 5.0" indicates Unlisted components or assemblies to be evaluated periodically refer to section 5.0 for details.						

## **5.0 Critical Unlisted CEC Components**

No Unlisted CEC components are used in this report.

## 6.0 Critical Features

Recognized Component - A component part, which has been previously evaluated by an accredited certification body with restrictions and must be evaluated as part of the basic product considering the restrictions as specified by the Conditions of Acceptability.

Listed Component - A component part, which has been previously Listed or Certified by an accredited Certification Organization with no restrictions and is used in the intended application within its ratings.

Unlisted Component - A part that has not been previously evaluated to the appropriate designated component standard. It may also be a Listed or Recognized component that is being used outside of its evaluated Listing or component recognition.

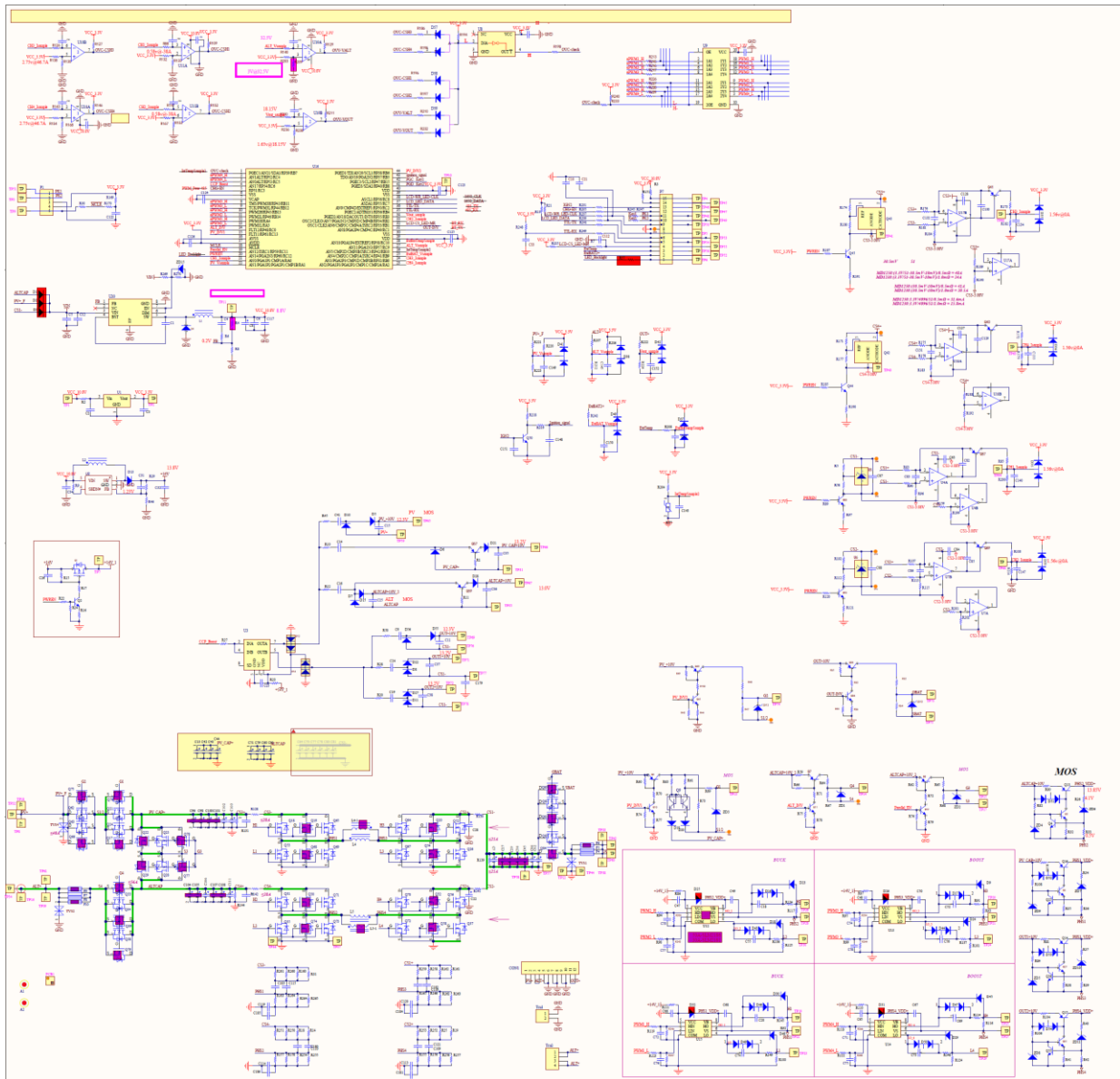
Critical Features/Components - An essential part, material, subassembly, system, software, or accessory of a product that has a direct bearing on the product's conformance to applicable requirements of the product standard.

Construction Details - For specific construction details, reference should be made to the photographs and descriptions. All dimensions are approximate unless specified as exact or within a tolerance. In addition to the specific construction details described in this Report, the following general requirements also apply.

1. Spacing - No hazard voltage and no spacing required.
2. Mechanical Assembly - Components such as switches, fuseholders, connectors, wiring terminals and display lamps are mounted and prevented from shifting or rotating by the use of lockwashers, starwashers, or other mounting format that prevents turning of the component.
3. Corrosion Protection - All ferrous metal parts are protected against corrosion by painting, plating or the equivalent.
4. Accessibility of Live Parts - All uninsulated live parts in primary circuitry are housed within a metal enclosure constructed with no openings other than those specifically described in Sections 4 and 5.
5. Grounding - All exposed dead-metal parts and all dead-metal parts within the enclosure that are exposed are connected to the equipment grounding terminal.
6. Polarized Connection - This product is provided with a polarized connection markings and miswiring tests have been evaluated.
7. Internal Wiring - Internal wiring is routed away from sharp or moving parts. Internal wiring leads terminating in soldered connections are made mechanically secure prior to soldering. Recognized Component separable (quick disconnect) connectors of the positive detent type, closed loop connectors, or other types specifically described in the text of this report are also acceptable as internal wiring terminals. At points where internal wiring passes through metal walls or partitions, the wiring insulation is protected against abrasion or damage by plastic bushings or grommets. For details refer to the component list and photo view.
8. Schematics - Refer to Illustration No(s). 1(a) to 1(b) for schematics requiring verification during Field Representative Inspection Audits.
9. Markings - The product is marked as follows: Applicant's brand name, model number, date of manufacturer, electrical ratings. Refer to item 5 in Sections 4.0.
10. Cautionary Markings - No Cautionary Marking required.
11. Installation, Operating and Safety Instructions - Instructions for installation and use of this product are provided by the manufacturer. Refer to Illustration No(s). 2(a) to 2(e) for details.

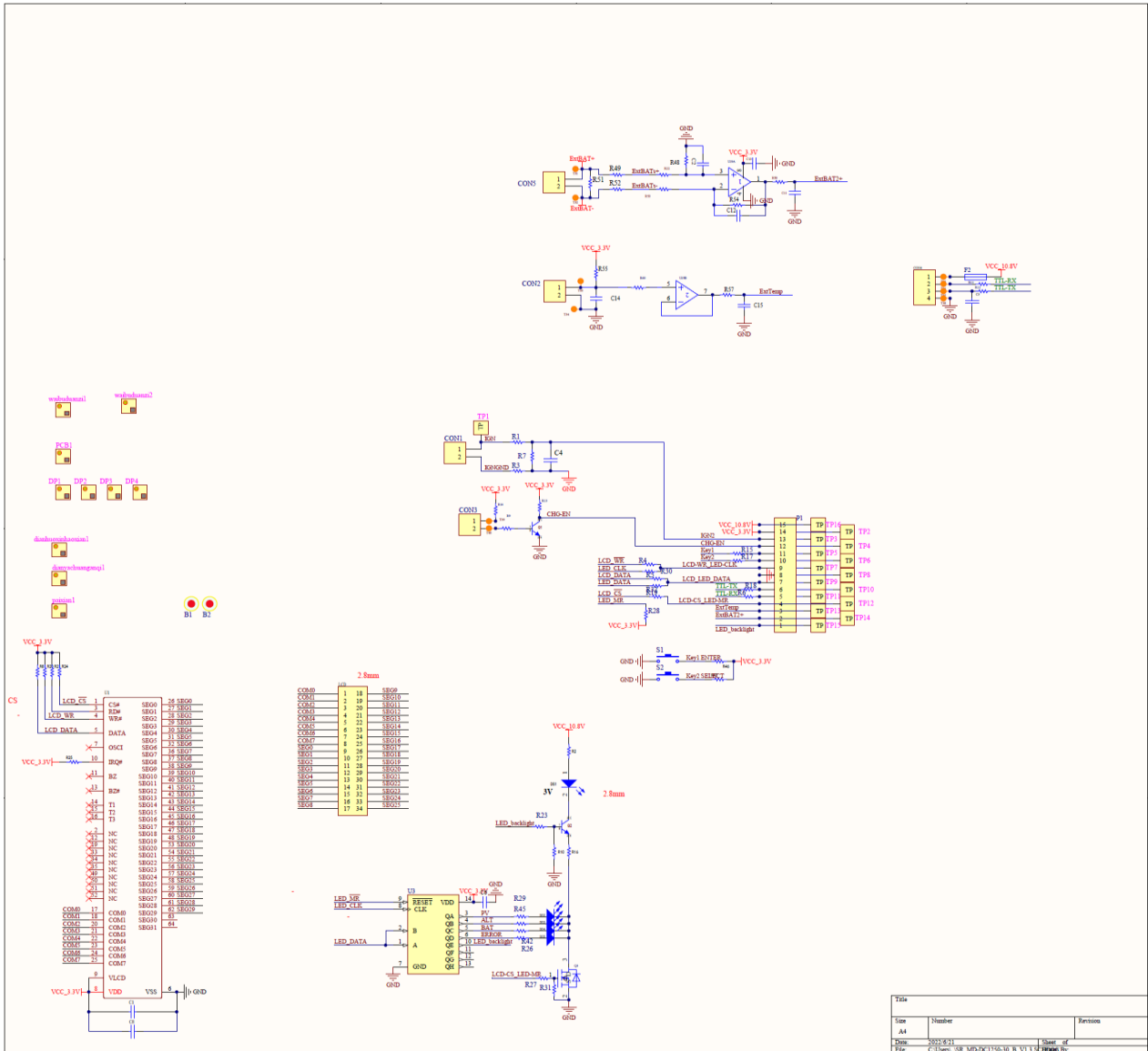
**7.0 Illustrations**

**Illustration 1(a) - Circuit diagram**



**7.0 Illustrations**

**Illustration 1(b) - Circuit diagram**




## 7.0 Illustrations


Illustration 2(a) - Instruction Manual (partial)


# Dear users, Thank you for choosing our product!

## Safety Instructions

1. As this controller deals with voltages that exceed the top limit for human safety, do not operate it before reading this manual carefully and completing safety operation training.
2. The controller has no internal components that need maintenance or service, thus do not attempt to disassemble or repair the controller.
3. Install the controller indoors, and avoid component exposure and water intrusion.
4. During operation, the radiator may reach a very high temperature, therefore install the controller at a place with good ventilation conditions.
5. It's recommended that a fuse or breaker be installed outside the controller.
6. Before installing and wiring the controller, make sure to disconnect the photovoltaic array and the fuse or breaker close to the battery terminals.
7. After installation, check if all connections are solid and reliable so as to avoid loose connections that may give rise to dangers caused by heat accumulation.

 **Warning:** means the operation in question is dangerous, and you should get properly prepared before proceeding.

 **Note:** means the operation in question may cause damage.

 **Tips:** means advice or instruction for the operator.

## 7.0 Illustrations

### Illustration 2(b) - Instruction Manual (partial)

#### 3.4 System Alarms

System Alarm	Meaning	Description
E0	No fault	
E1	Backup battery over-discharge	Indicator Prompt
E2	Backup battery over-voltage	No charging
E3	Backup battery under-voltage	The indicator shows normal charging
E6	Equipment over-temperature	Derating charging according to over-temperature strategy
E7	Battery over-temperature	No charging
E8	Excessive solar panel power	Current-limit charging
E10	Solar panel over-voltage	No charging
E15	Battery disconnected or lithium battery feed protection	
E19	Battery low-temperature	No charging
E22	Generator over-voltage	The generator neither charges nor discharges
E23	Excessive generator power	Current-limit charging

#### 3.5 Common Problems and Solutions

Phenomenon	Possible Problems	Solution
After the backup battery is connected for energizing, there is no response and the indicator lamp is not ON	A. Wrong or loose connection of backup battery B. Lithium battery protection	A1. Please check whether the connection of backup battery wires is correct and reliable; B1. Connect a solar panel or a generator to charge and activate the lithium battery.
the Controller cannot charge the backup battery through the solar panel during the daytime.	A. Wrong or loose wiring with the solar panel B. The solar panel being blocked C. Error in Backup Battery System Voltage Level Setting	A1. Please check whether the connection of solar panel wires is correct and reliable; B1. Ensure that the solar panel is not blocked; C1. The system voltage level set by the Controller is identical with the actual battery voltage level used.
The backup battery cannot be charged by the generator while the vehicle is running.	A. Wrong or loose wiring of generator B. Error in Backup Battery System Voltage Level Setting	A1. Please check whether the connection of generator wires is correct and reliable; B1. The system voltage level set by the Controller is identical with the actual battery voltage level used.

## 4. Product Installation

### 4.1 Precautions for Installation

- ◆ Be very careful when installing the battery. Wear protective glasses when installing the open-type lead-acid battery. Once contacting the acid solution of battery, please rinse with clear water in time.
- ◆ Avoid placing any metal object near the battery against short-circuiting.
- ◆ Acid gas may be generated when the battery is charged so as to ensure good ventilation of surroundings.
- ◆ The battery may produce combustible gas, please stay away from sparking.
- ◆ Direct sunlight and rainwater infiltration should be avoided during the outdoor installation.

**7.0 Illustrations**

**Illustration 2(c) - Instruction Manual (partial)**

- ◆ Virtual junctions and corroded wires may cause great heat, melt the insulation of wire, burn the surrounding material, and even cause fire. Therefore, it is necessary to ensure that all connectors are tightened, and wires are preferably fixed with ties to avoid loose connectors caused by shaking of wires during mobile applications.
- ◆ Once the System is connected, the output voltage of the component may exceed the safe voltage of human body. In the process of operation, attention shall be focused on using insulating tools and ensure that hands are dry.
- ◆ The battery terminals on the Controller can be connected with either a single battery or a group of batteries. Subsequent instructions in the Manual are for use with a single battery, but also applicable to systems with a group of batteries.
- ◆ Please follow the safety recommendations of battery manufacturers.
- ◆ The System's connection wire shall be selected according to the current density no more than 4A/mm<sup>2</sup>.
- ◆ Ground the Controller earth terminal.
- ◆ It is forbidden to connect the battery in reverse, which will cause irreversible damage in the process of installation.

**4.2 Reference for Wire and Fuse Type Selection**

The wiring and installation methods must comply with national and local electrical specifications. PV, generator and battery wiring specifications must be selected according to rated current. Please refer to the following table for wire and fuse specifications:

Type	Maximum input current/A of PV terminal	PV-terminal wire gauge (mm <sup>2</sup> /AWG)	PV Fuse Spec/A	Maximum input current/A of generator terminal	Generator-terminal wire gauge (mm <sup>2</sup> /AWG)	Generator-terminal fuse spec/A	Generator-terminal fuse spec/A	Back-up battery-terminal wire gauge (mm <sup>2</sup> /AWG)	Backup Battery-Terminal Fuse Spec/A
MD1230N05	27A	6	40~50A	35A	6	50~60A	30A	6	40~50A
MD1250N05	45A	9	60~70A	60A	12	80~90A	50A	10	60~70A

**4.3 Installation and Wiring**

- ⚡ Warning:** Danger of Explosion! NEVER install the Controller and open the battery in the same closed space! Do not install it in a closed place where battery gas may accumulate.
- ⚡ Warning:** Danger of High Voltage! Photovoltaic arrays may produce high open-circuit voltage, so please be sure to disconnect the circuit breaker or fuse before wiring and be careful in the process of wiring.
- ⚡ Warning:** Danger of electric shock! We strongly recommend fuses or open circuits on the PV array side, generator side and battery side.
- ⚠ Notice:** When installing the Controller, ensure enough air flowing through the heat sink of the Controller, and reserve at least 150mm space above and below the Controller for natural convection. If installed in a closed box, ensure reliable heat dissipation through the case.

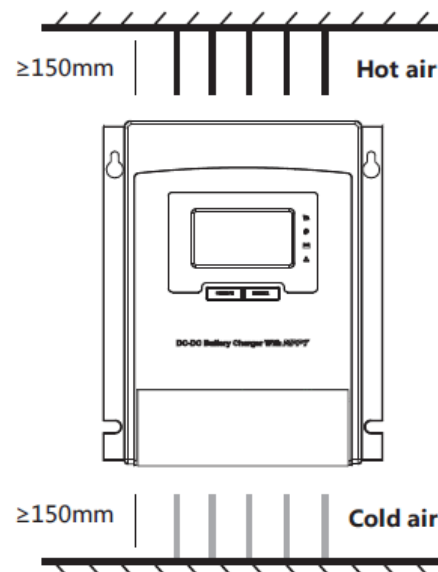


Fig. 4-1 Installation and Heat Dissipation



## 7.0 Illustrations

### Illustration 2(d) - Instruction Manual (partial)

#### Step 1: Select the installation position

Avoid installing the Controller in a place with direct sunlight, high temperature and easy to water flooding, and ensure good ventilation around the Controller.

#### Step 2: Fix the suspension screws

Mark the installation position according to the mounting size of the Controller, bore 2 holes with appropriate size for mounting at the 2 marks, and fix the screws on such 2 holes.

#### Step 3: Fix the Controller

Align the Controller fixing hole with 2 screws fixed in advance, then hang them up, and then fix 2 screws below.

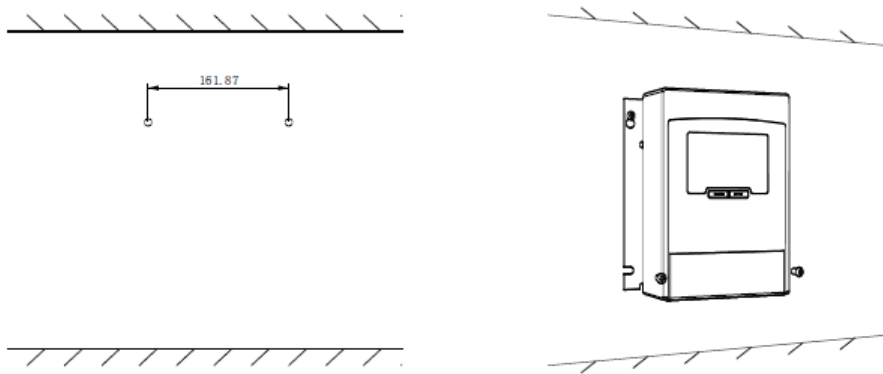


Fig. 4-2 Fixing the Controller

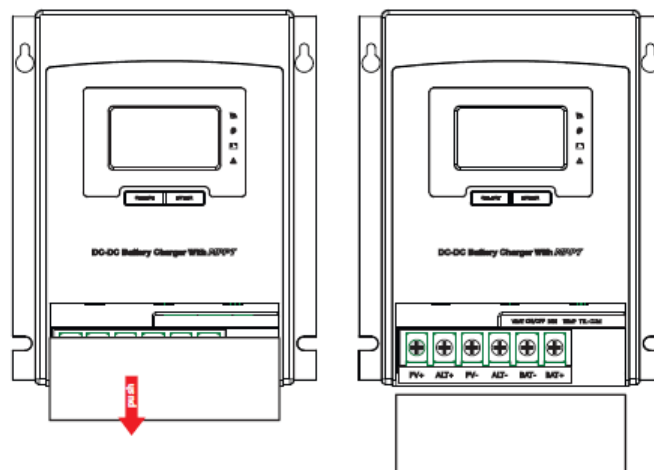
#### Step 4: Connect the Wire

- 4.1 Crimping: select wire with appropriate specification according to the system configuration, and press one end of the wire to the standard copper terminal;
- 4.2 Wiring: Connect the wiring hole of copper terminal into the wiring port corresponding to the Controller.

Step 1: Push open the black terminal cover in the direction of [push] arrow in the following left picture;

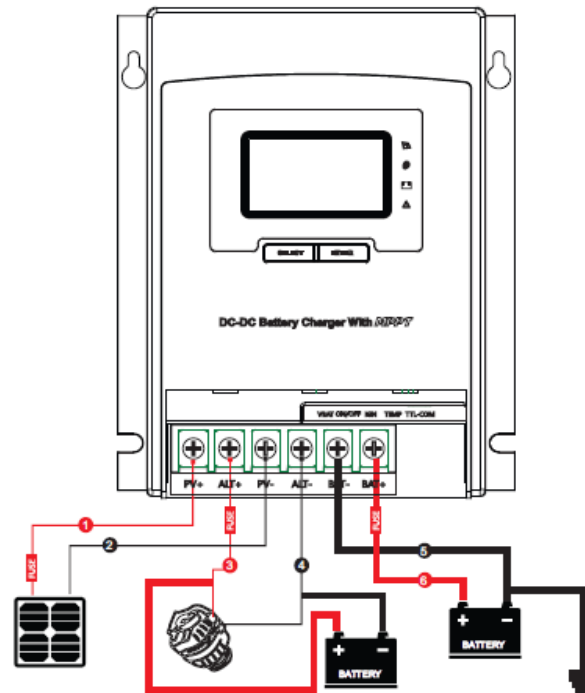
Step 2: Access the corresponding interface according to the screen mark of each terminal, and pay attention not to connect the positive and negative in reverse;

Step 3: Finish the wire and push them into the front cover of the black terminal.






## 7.0 Illustrations

### Illustration 2(e) - Instruction Manual (partial)



**Fig. 4-3 Wiring Sequence**

-  **Warning:** Danger of electric shock! We strongly recommend connecting fuses or circuit breakers at the photovoltaic array end, load end and battery end to prevent electric shock hazard in the process of wiring or misoperation, and ensure that the fuses or circuit breakers are disconnected before wiring.
-  **Warning:** Danger of High Voltage! Photovoltaic arrays may produce high open-circuit voltage, so please be sure to disconnect the circuit breaker or fuse before wiring and be careful in the process of wiring.
-  **Warning:** Danger of Explosion! If the positive and negative terminals of the battery and the wire connected to the positive and negative terminals, short-circuiting would cause fire or explosion. Please be careful.


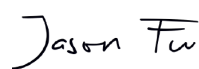
Please connect the battery first, then the battery panel, and finally the load and connect "+" first and then "-" in the process of wiring.

When all power wires are connected firmly and reliably, check whether the wiring is correct and whether the positive and negative are wrongly connected once again. Once confirmed and found no error, connect the battery fuse or circuit breaker first, and observe whether the LED indicator light is lit. If not lit, please cut off the fuse or circuit breaker immediately and then check whether the wire is connected correctly.

If the battery is energized normally, connect the battery panel again. If the sunshine is sufficient, the charging indicator of the Controller will be normally on or flashing and start charging the battery.

-  **Note** that the installation position of battery fuse should be as close to the Controller as possible, and the recommended installation distance should not exceed 150mm.

<b>8.0 Test Summary</b>			
Evaluation Period	8 Jun 2022 – 3 Aug 2022		Project No. 220608062GZU
Sample Rec. Date	8-Jun-2022	Condition Prototype	Sample ID. S220608062-001, 002
Test Location	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China		
Test Procedure	Testing Lab		
Determination of the result includes consideration of measurement uncertainty from the test equipment and methods. The product was tested as indicated below with results in conformance to the relevant test criteria.			
The following tests were performed:			
Test Description	UL 1741:2010 Ed.2+R:16Sep2020, Clause	CSA C22.2#107.1:2016 Ed.4, Clause	
Maximum Voltage Measurements	45	6.1.2	
Temperature	46	6.3	
Dielectric Voltage-Withstand Test	47	6.5	
Abnormal Tests: Short-circuit test	50.3	6.6.1 a)	
Abnormal Tests: DC input mis-wiring test	50.4	13.4.2	
Abnormal Tests: Component Short & open circuit	50.6	6.6.7	
Grounding Impedance	51	--	
Flame (polymeric enclosures)	--	6.11	
Resistance to impact	--	6.12	
Securement of components	--	6.16	
Static Load	62	6.22	
Compression test	63	6.9	
Normal operations	76	6.2 15.3.2	
Temperature	77	--	
Input and output faults	80.2	15.3.5	

<b>8.1 Signatures</b>			
A representative sample of the product covered by this report has been evaluated and found to comply with the applicable requirements of the standards indicated in Section 1.0.			
Completed by:	Tommy Zhong	Reviewed by:	Jason Fu
Title:	Technical Manager	Title:	Supervisor
Signature:		Signature:	

**9.0 Correlation Page For Multiple Listings**

The following products, which are identical to those identified in this report except for model number and Listee name, are authorized to bear the ETL label under provisions of the Intertek Multiple Listing Program.

BASIC LISTEE	SRNE Solar Co., Ltd
Address	4-5F, 13A Wutong Island, Neihuan Rd, Xixiang, Bao`an, SHENZHEN Guangdong 518100
Country	China
Product	DC & PV double input Charging Controller

MULTIPLE LISTEE 1	None
Address	
Country	
Brand Name	

ASSOCIATED MANUFACTURER	
Address	
Country	

MULTIPLE LISTEE 1 MODELS	BASIC LISTEE MODELS

MULTIPLE LISTEE 2	None
Address	
Country	
Brand Name	

ASSOCIATED MANUFACTURER	
Address	
Country	

MULTIPLE LISTEE 2 MODELS	BASIC LISTEE MODELS

MULTIPLE LISTEE 3	None
Address	
Country	
Brand Name	

ASSOCIATED MANUFACTURER	
Address	
Country	

MULTIPLE LISTEE 3 MODELS	BASIC LISTEE MODELS

## 10.0 General Information

The Applicant and Manufacturer have agreed to produce, test and label ETL Listed products in accordance with the requirements of this Report. The Manufacturer has also agreed to notify Intertek and to request authorization prior to using alternate parts, components or materials.

### COMPONENTS

Components used shall be those itemized in this Intertek report covering the product, including any amendments and/or revisions.

### LISTING MARK

The ETL Listing mark applied to the products shall either be separable in form, such as labels purchased from Intertek, or on a product nameplate or other media only as specifically authorized by Intertek. Use of the mark is subject to the control of Intertek.

The mark must include the following four items:

- 1) applicable country identifiers "US" and/or "C" or "US", "C" and "EU"
- 2) the word "Listed" or "Classified" or "Recognized Component" (whichever is appropriate)
- 3) a control number issued by Intertek
- 4) a product descriptor that identifies the standards used for certification. Example:

**For US standards**, the words, "Conforms to" shall appear with the standard number along with the word, "Standard" or "Std." Example: "Conforms to ANSI/UL Std. XX."

**For Canadian standards**, the words "Certified to CAN/CSA Standard CXX No. XX." shall be used, or abbreviated, "Cert. to CAN/CSA Std. CXX No. XX."

Can be used together when both standards are used.

**If all standards on the ATM have the same standard title**, the shared title or its abbreviation may be used in place of the examples above. Example: "Medical Electrical Equipment" or "MEE"; "Information Technology Equipment" or "ITE"; "Audio/Video Information And Communication Technology Equipment" or "A/V ICTE".

**Note: A facsimile must be submitted to Intertek, Attn: Follow-up Services for approval prior to use.**

The facsimile need not have a control number. A control number will be issued **after signed Certification Agreements** have been received by the Follow-up Services office, approval of the facsimile of your proposed Listing Mark, satisfactory completion of the Listing Report, and scheduling of a factory assessment in your facility.

### MANUFACTURING AND PRODUCTION TESTS

Manufacturing and Production Tests shall be performed as required in this Report.

### FOLLOW-UP SERVICE

Periodic unannounced audits of the manufacturing facility (and any locations authorized to apply the mark) shall be scheduled by Intertek. An audit report shall be issued after each visit. Special attention will be given to the following:

1. Conformance of the manufactured product to the descriptions in this Report.
2. Conformance of the use of the ETL mark with the requirements of this Report and the Certification Agreement.
3. Manufacturing changes.
4. Performance of specified Manufacturing and Production Tests.

In the event that the Intertek representative identifies non-conformance(s) to any provision of this Report, the Applicant shall take one or more of the following actions:

1. Correct the non-conformance.
2. Remove the ETL Mark from non-conforming product.
3. Contact the issuing product safety evaluation center for instructions.

### 10.1 Evaluation of Unlisted Components

Because Unlisted Components are uncontrolled, and they do not fall under a third party follow up program, Intertek may require these components to be tested and/or evaluated at least once annually, more often for certain components, as part of the independent certification process. The Unlisted Components in Section 5.0 require testing and/or evaluation as indicated.

**The Applicant will be notified, in writing, via the applicable contact methods, as defined in Section 1.0, when these components must be selected and sent to Component Evaluation Center (CEC) for re-evaluation.**

**Due to particular testing requirements, some components may be requested to be shipped to specific labs. Thus, specific shipment destination(s) for each sample will be provided in the written notification.**

Managing CEC Location:

Intertek Testing Services Shenzhen Limited Guangzhou Branch

ETL Component Evaluation Center

Room 02, &101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2,  
Caipin Road, Science City

GETDD Guangzhou, Guangdong, China

Attn: Ms. Joey Kuang

Sample Disposition: Due to the destructive nature of the testing, all samples will be discarded at the conclusion of testing unless, the manufacturer specifically requests the return of the samples. The request for return must accompany the initial component shipment.

**11.0 Manufacturing and Production Tests**

The manufacturer agrees to conduct the following Manufacturing and Production Tests as specified:

**Required Tests**

Dielectric Voltage Withstand Test

**11.1 Dielectric Voltage Withstand Test**

Method

Each unit shall withstand without breakdown, as a routine production-line test, the application of a potential:

- a) From input and output wiring, including connected components, to accessible dead metal parts that are able to become energized, and
  - b) From input and output wiring to accessible low-voltage, limited-energy metal parts, including terminals.
- The potential for the production-line test shall be in accordance with Condition A or Condition B of Table 70.1 or Table 70.2 at a frequency within the range of 40 – 70 Hertz.

**Table 70.1  
 Production-Line Test Conditions AC Rated Circuits**

Circuit rating, Vac	Condition A		Condition B		Condition C		Condition D	
	Potential, volts ac	Time, seconds	Potential, volts ac	Time, seconds	Potential, volts dc	Time, seconds	Potential, volts dc	Time, seconds
250 or less	1000	60	1200	1	1400	60	1700	1
More than 250	1000+2 V <sup>a</sup>	60	1200+ 2.4 V <sup>a</sup>	1	1400+ 2.8 V <sup>a</sup>	60	1700+3.4 V <sup>a</sup>	1

<sup>a</sup> Maximum marked voltage.

Note: The multipliers in the table are chosen with the following background:

2.4 – A 20 % adder on the multiplier 2 to account for reduced test time.

2.8 – A  $\sqrt{2}$ , truncated after the first decimal (=1.4) multiplier on "2" from condition A to account for the peak value of an AC rms voltage to calculate the DC test potential of AC circuits.

3.4 – A combination of the two above:  $2*1.2*1.4$ , rounded to the next decimal.

**Table 70.2  
 Production-Line Test Conditions for DC Rated Circuits**

Circuit rating, Vdc	Condition A		Condition B		Condition C		Condition D	
	Potential, volts ac	Time, seconds	Potential, volts ac	Time, seconds	Potential, volts dc	Time, seconds	Potential, volts dc	Time, seconds
250 or less	1000	60	1200	1	1400	60	1700	1
More than 250	1000+1.4 V <sup>a</sup>	60	1200+ 1.7 V <sup>a</sup>	1	1400+ 2 V <sup>a</sup>	60	1700+2.4 V <sup>a</sup>	1

<sup>a</sup> Maximum marked voltage.

A unit employing circuitry that is able to be damaged by an ac potential is able to be tested using a dc potential in accordance with Condition C or Condition D. Testing of a unit in a heated or unheated condition meets the intent of the requirement for manufacturing and production tests. The test is to be performed on a complete, fully assembled unit. It is not intended that the unit be unwired, modified, or disassembled for the test.

A unit employing a solid-state component that is not relied upon to reduce a risk of electric shock and that is susceptible to damage by the dielectric potential, is able to be tested before the component is electrically connected or after the component is electrically disconnected. The circuitry is able to be rearranged for the purpose of the test to minimize the potential of solid-state-component damage while retaining representative dielectric stress of the circuit.

During the test, the unit switches are to be in the on position, both sides of the input and output circuits of the unit are to be connected together and to one terminal of the test equipment, and the second test-equipment terminal is to be connected to the accessible dead metal.

**11.1 Dielectric Voltage Withstand Test**

Test Equipment

The test equipment for supplying an ac potential is to include a transformer having a sinusoidal output. The test equipment is to include a means of indicating the test potential, an audible or visual indicator of breakdown, and a manually reset device to restore the equipment after breakdown or a feature to automatically reject a noncomplying unit.

Where the output rating of the test equipment transformer is less than 500 VA, the equipment is to include a voltmeter in the output circuit to directly indicate the test potential.

Where the output rating of the test equipment transformer is 500 VA or more, the test potential is to be indicated:

- a) By a voltmeter in the primary circuit or in a tertiary-winding circuit,
- b) By a selector switch marked to indicate the test potential, or
- c) In the case of equipment having a single test-potential output, by a marking in a readily visible location to indicate the test potential. When marking is used without an indicating voltmeter, the equipment shall include a positive means, such as an indicator lamp, to indicate that the manually reset switch has been reset following a dielectric breakdown.

**Products Requiring Dielectric Voltage Withstand Test:**

<u>Product</u>	<u>Test Voltage</u>	<u>Test Time</u>
All products covered by this Report.	1000Vac	60 s
	or	
	1200Vac	1 s



<b>12.0 Revision Summary</b>				
The following changes are in compliance with the declaration of Section 8.1:				
Date/ Proj # Site ID	Project Handler/ Reviewer	Section	Item	Description of Change
				None.