1.0 Reference and Address			
Report Number	220510031GZC-001	Original Issued: 20-Oct-2022	Revised: None
Standard(s)	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications [ANSI/CAN/UL 1973:2018 Ed.2]		

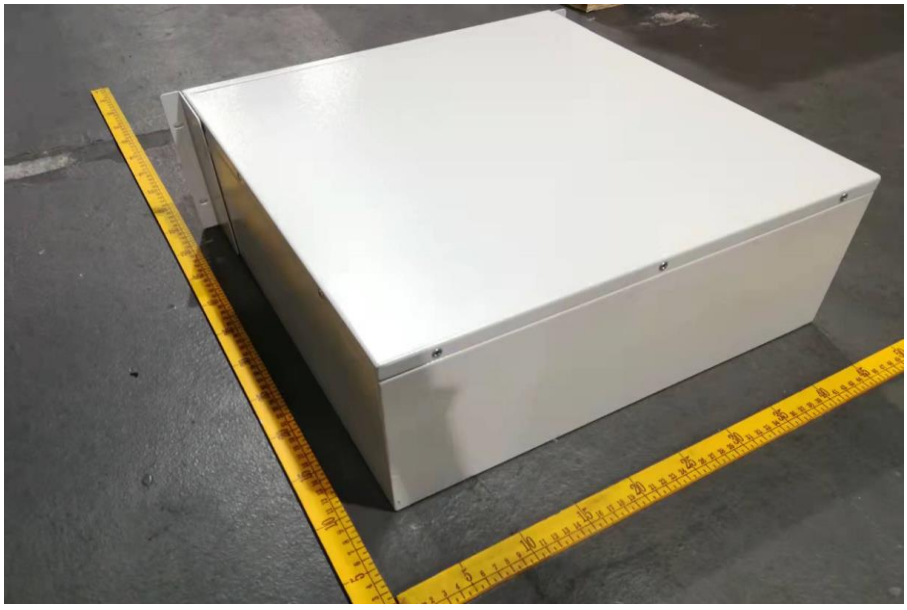
Applicant	Hocan Group Co., LIMITED	Manufacturer	**Zhuhai SEPICN Electronics And Technology Co., Ltd**
Address	FLAT/RM 803 CHEVALIER HOUSE 45-51 CHATHAM ROAD SOUTH TSIM SHA TSUI KL	Address	No. 16, 1st, Jinyuan Rd, Jinding, ZHUHAI CITY Guangdong 519085
Country	Hong Kong SAR, China	Country	China
Contact	Min Wang	Contact	Min Wang
Phone	13928002860	Phone	13928002860
FAX	NA	FAX	NA
Email	Info@sokbattery.com	Email	Info@sokbattery.com

2.0 Product Description	
Product	Lithium ion Battery
Brand name	(SOK)
Description	The product covered in this report is SOK 48V Lithium ion Battery. It's a Rechargeable Lithium-ion Battery system and Home Energy Storage System which contains 16 cells in 16S1P, and has overcharge, over-discharge, over current and short-circuits proof circuit. Indoor use only.
Models	SK48V100
Model Similarity	NA
Ratings	Nominal Voltage: 51.2Vdc Rated Capacity: 100Ah Nominal Energy: 5120Wh Short Current and Duration: 1600A, 5ms
Other Ratings	NA
Conditions of Acceptability	The products covered in this Report are incomplete in construction features or limited in performance capabilities and are intended for use and evaluation in other products. Consideration should be given to the following when the component is used in or with another product. 1. Suitability of the enclosure should be evaluated when installed in the end product. 2. Temperature Testing should be performed on this component when installed in the end product. 3. The IP code should be evaluated when installed in the end product. 4. Manual disconnect device shall be provided and evaluated when installed in the end product. 5. System safety analysis should be evaluated when installed in the end product. 6. The battery pack only provide one overcharge and overdischarge protective circuits and controls, and the single fault conditions should be evaluated when installed in the end product.

3.0 Product Photographs

Photo 1 -External view

Photo 2 - External view



3.0 Product Photographs

Photo 3 - External view

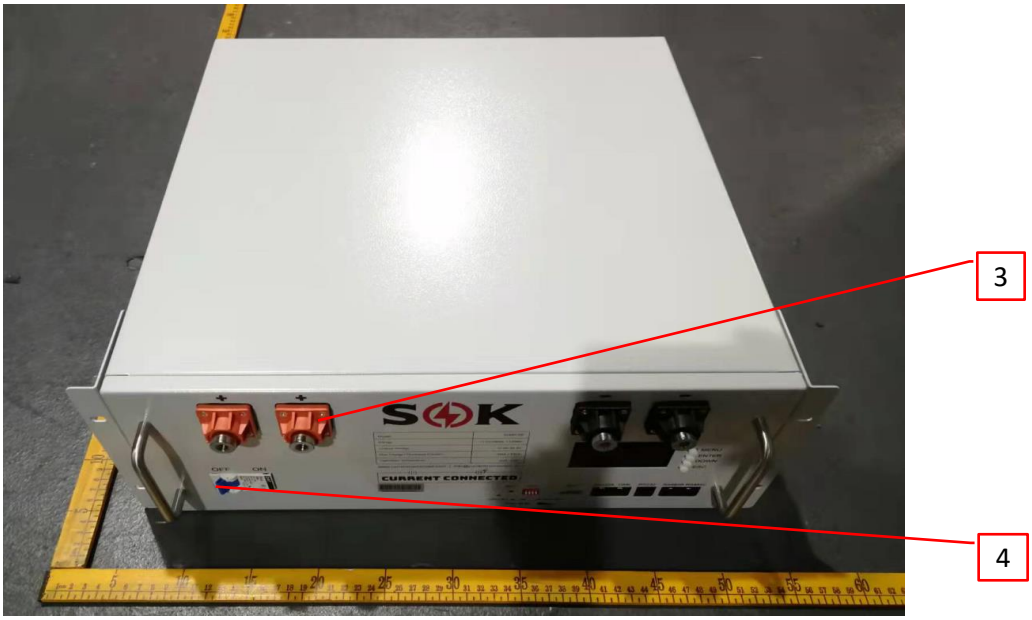


Photo 4 - External view

3.0 Product Photographs

Photo 5 - Internal view

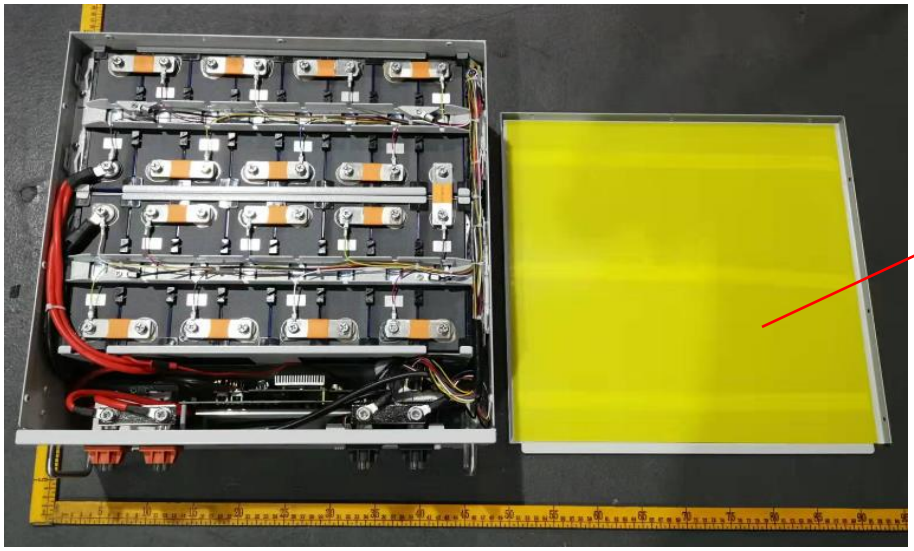
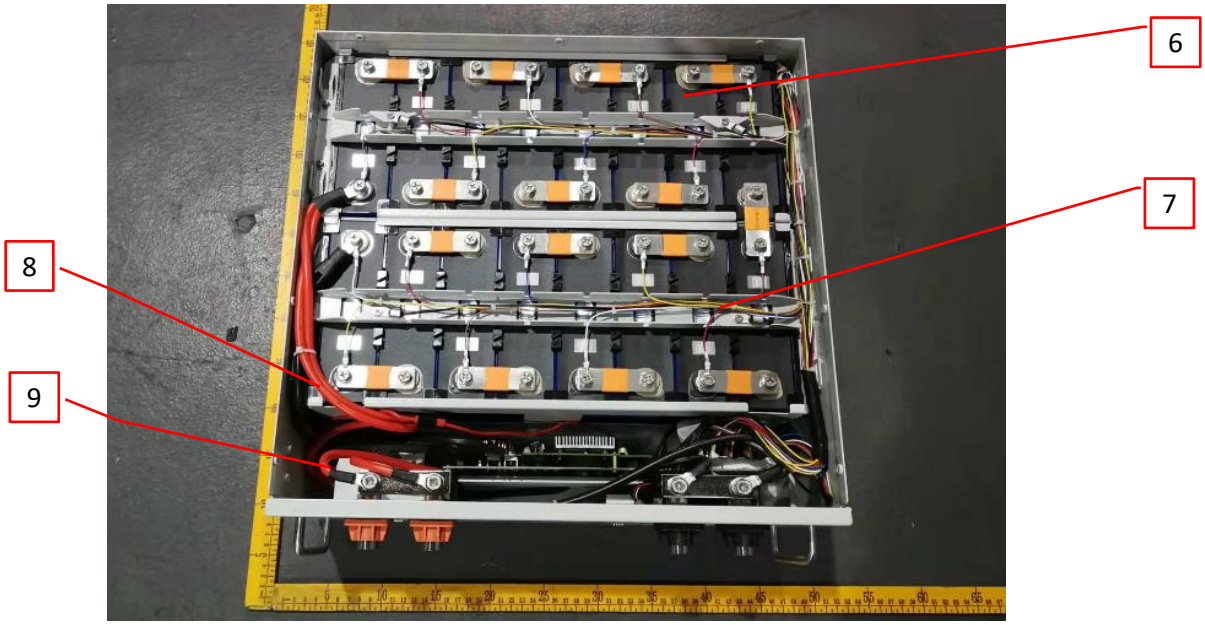


Photo 6 - Internal view



3.0 Product Photographs

Photo 7- Internal view

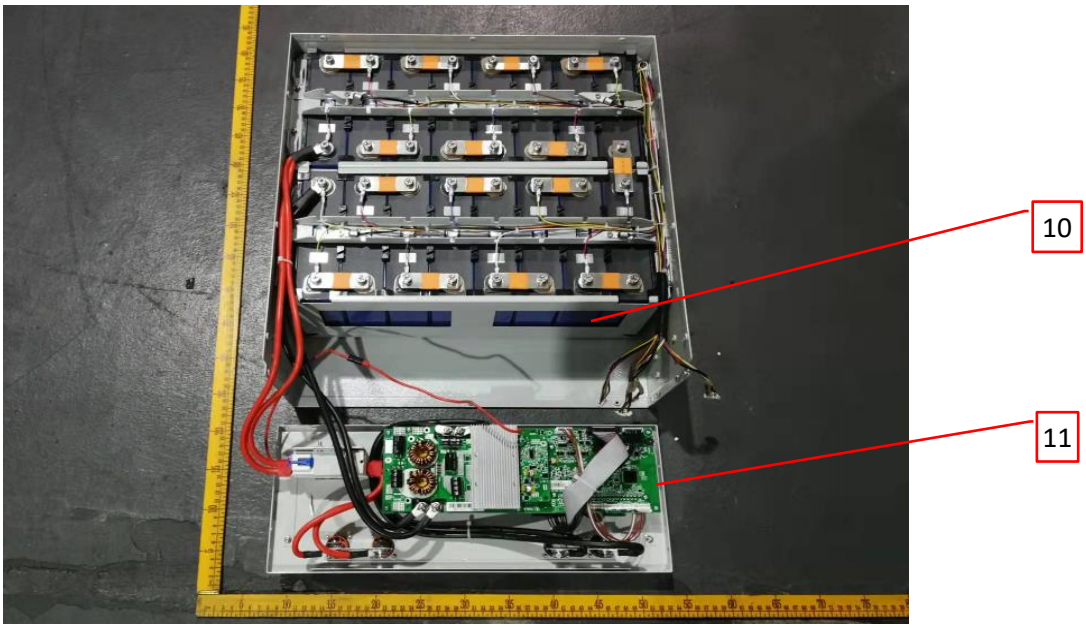
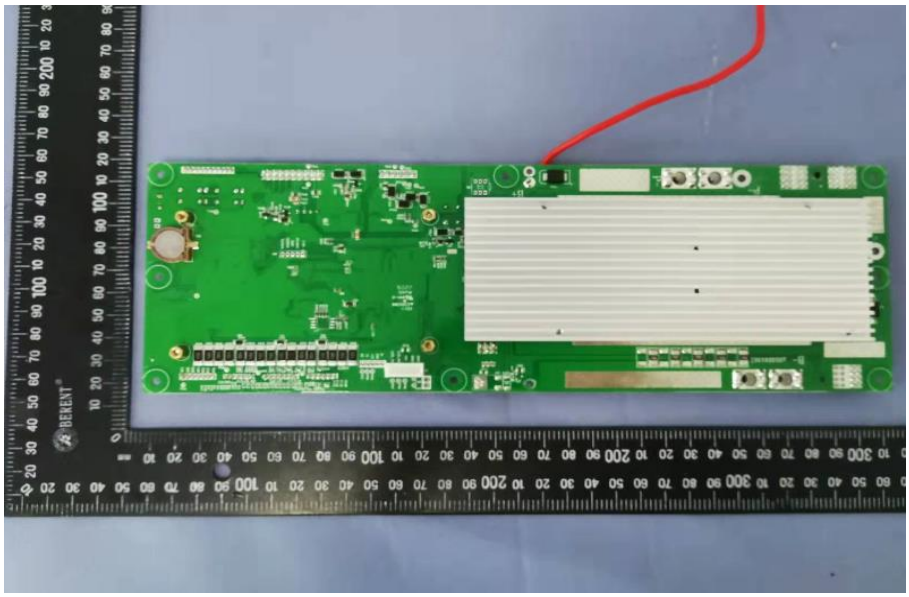


Photo 8 - PCB view



3.0 Product Photographs

Photo 9 - PCB view

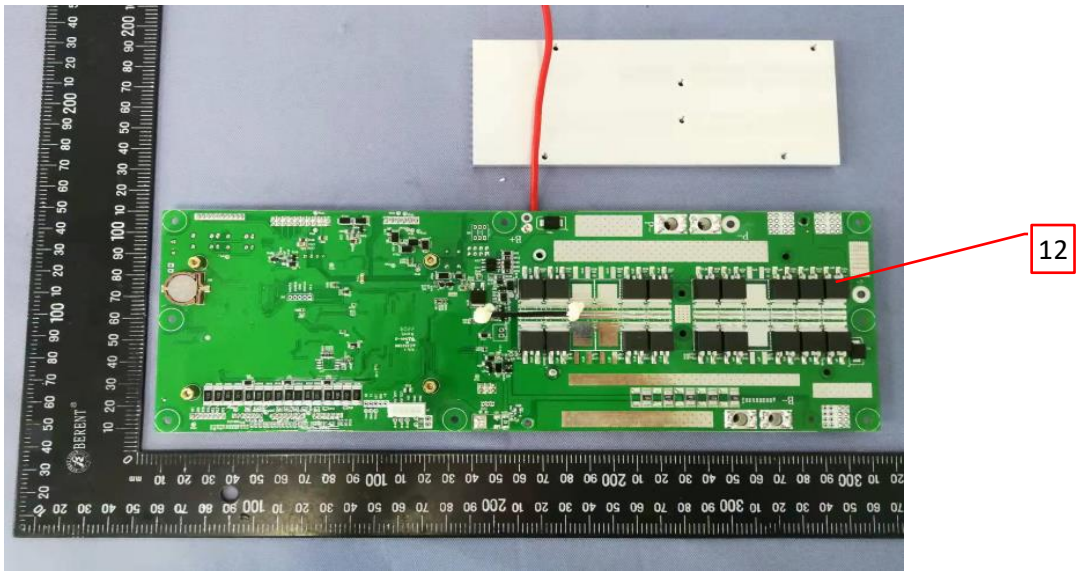
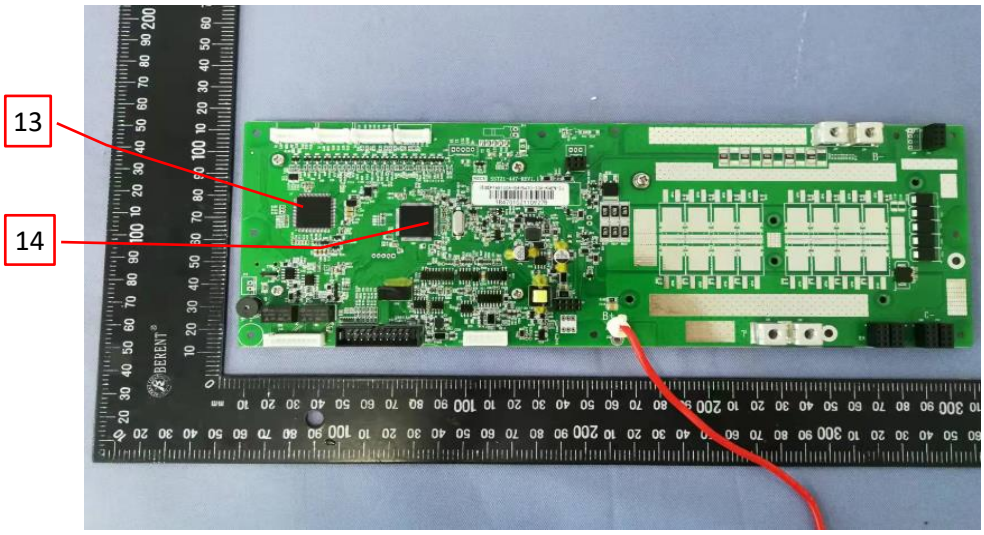


Photo 10- PCB view



3.0 Product Photographs

Photo 11 - PCB view

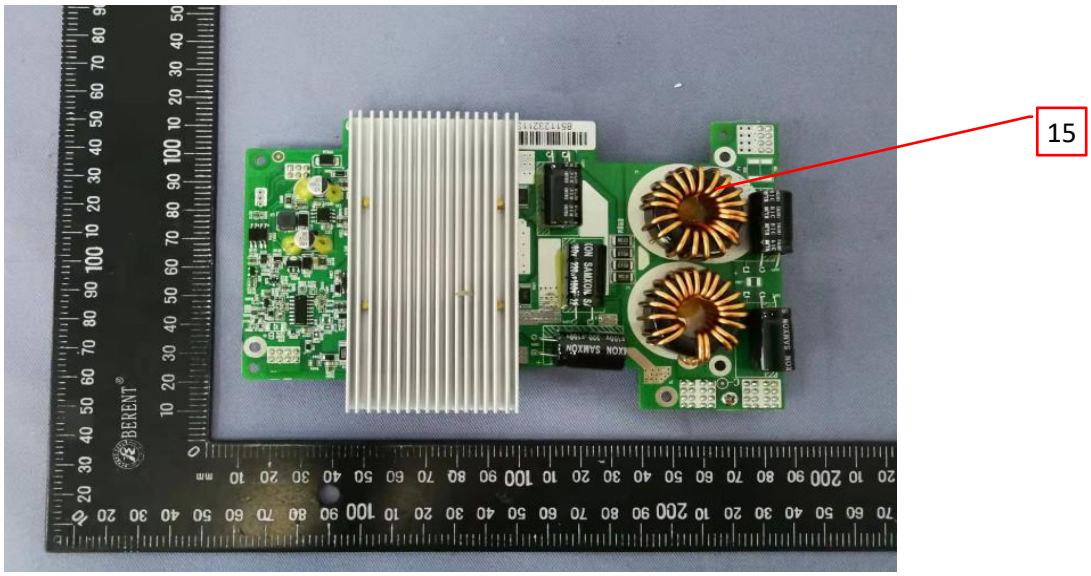
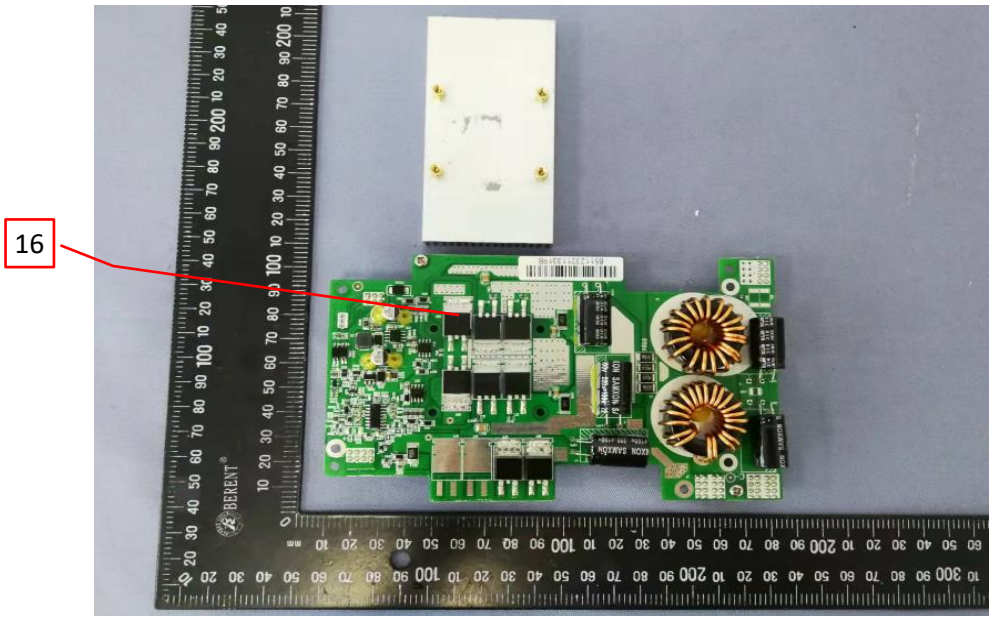


Photo 12- PCB view



3.0 Product Photographs

Photo 13 - PCB view

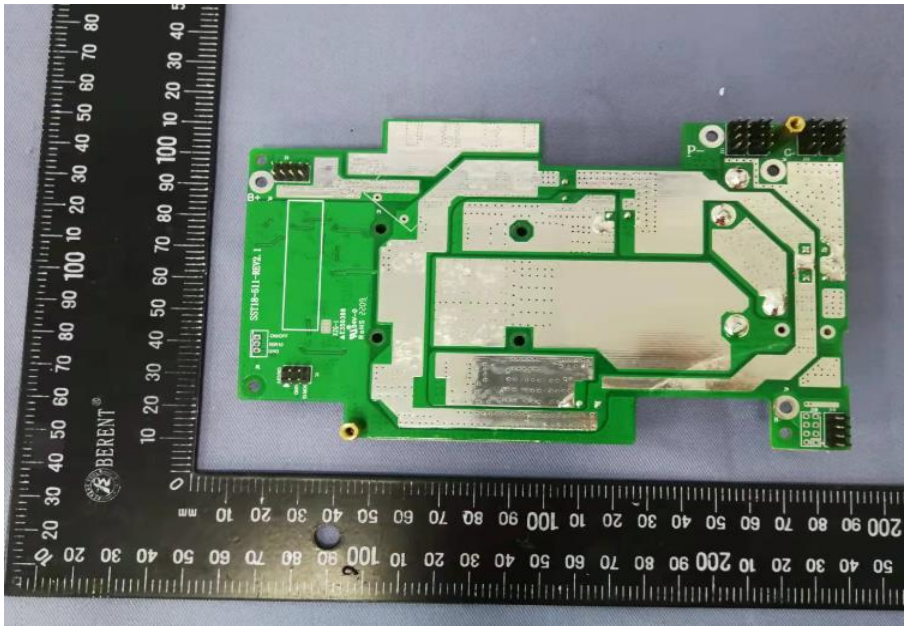
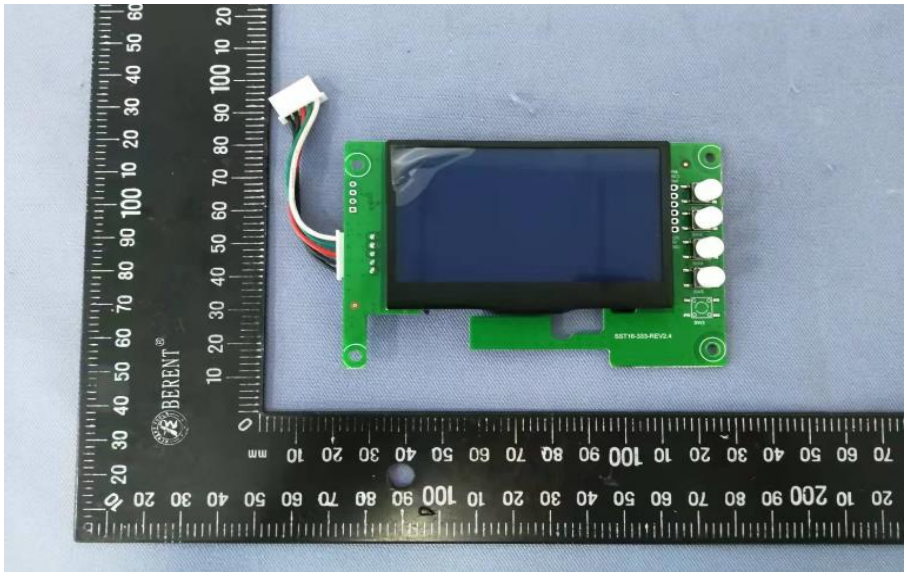


Photo 14- PCB view



3.0 Product Photographs

Photo 15 - PCB view

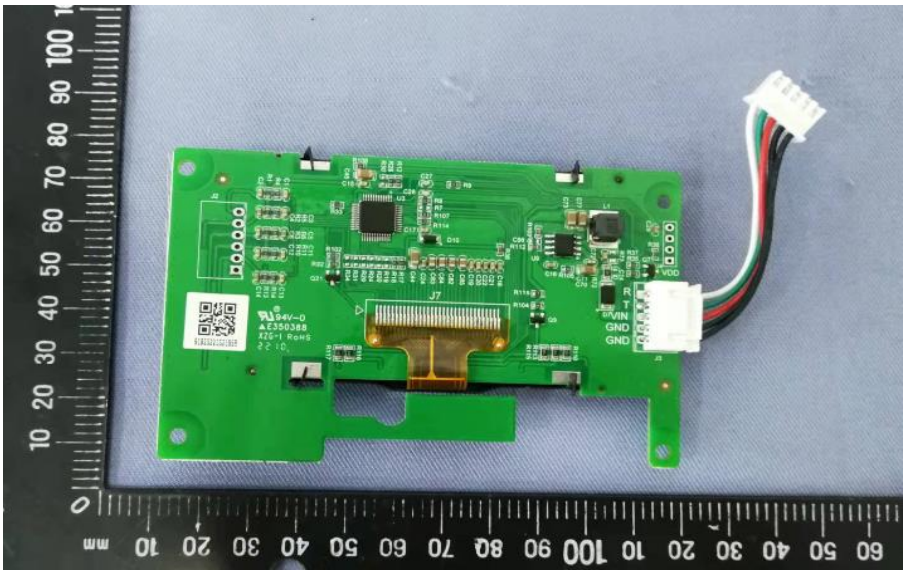
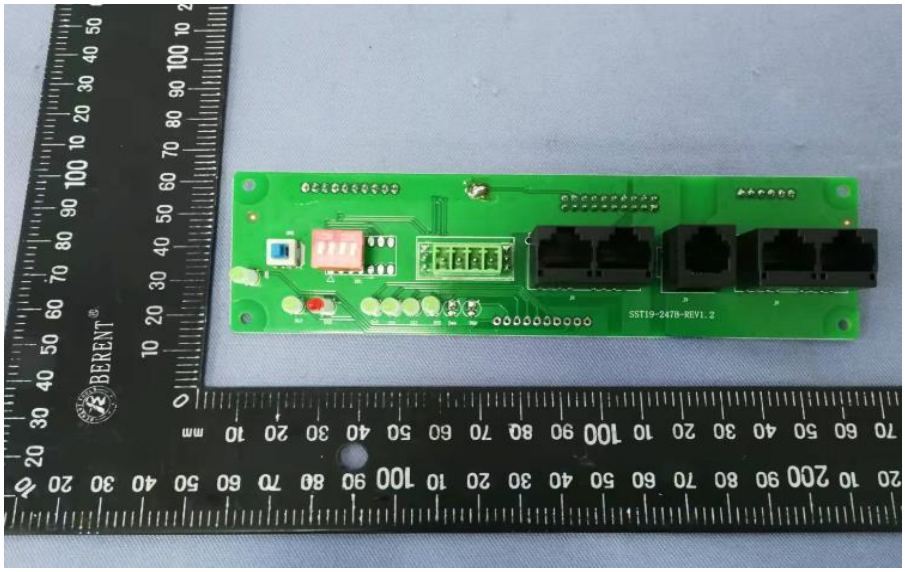
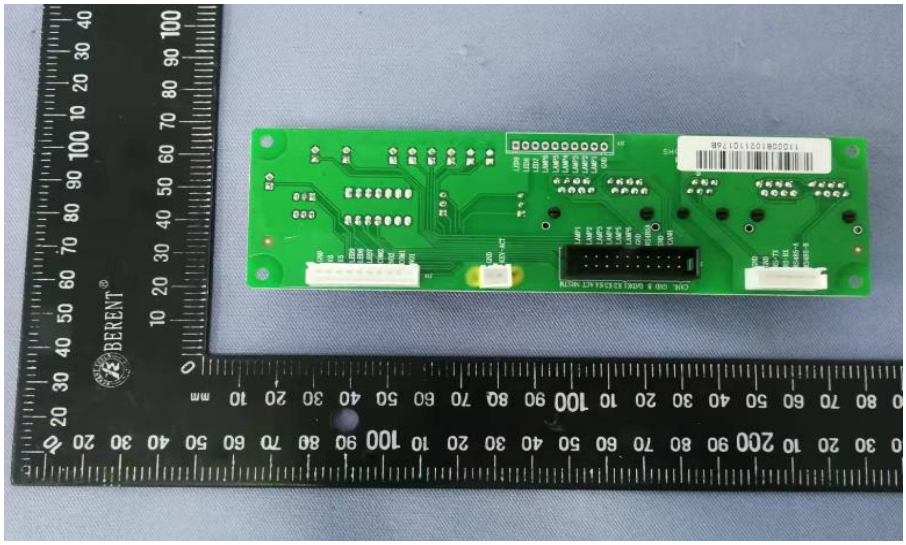


Photo 16- PCB view



3.0 Product Photographs

Photo 17 - PCB view



4.0 Critical Components						
Photo #	Item no.[1]	Name	Manufacturer/ trademark[2]	Type / model[2]	Technical data and securement means	Mark(s) of conformity [3]
1	1	External Metal Enclosure	Guangxi Iron and Steel Group Co., Ltd.	48100-case	Material: SPCC, 442mm x460mmx177mm, Minimum thickness: 1mm	NR
3	2	Label (not shown)	ZHONGSHAN ZHANTU PRINTING CO LTD	ZT969-1	Steel surface: 150°C.	cURus
				ZT969-2		cURus
				ZT969-3		cURus
			Various	Various	Steel surface: 150°C.	cURus
3	3	Terminal	SHENZHEN CONNECTION ELECTRONIC CO LTD	ACTB135	Rated 600 Vdc, 310 A	cURus
3	4	Breaker	ZHEJIANG CHINT ELECTRICS CO	DZ158-125	Rated 60Vdc, 125A, 1P	cURus
5	5	Insulation film	JIANGSU RODA ELECTRON MATERIAL CO LTD	RH150	V-0, 90°C, min thickness: 0.38mm	cURus
6	6	Cell Holder	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC310(+)	V-0, RTI Imp: 85°C, Min thickness: 1.5mm	cURus
6	7	Internal wire	DONGGUAN WENCHANG ELECTRONIC CO LTD	1430	Connect to battery Minimum 24AWG, minimum 300V, minimum 105°C, VW-1	cURus
			Various	1430		cURus
6	8	Cord	Dongguan Dingpai Electronic Technology Co Ltd	3512	Minimum 7AWG, minimum 600V, minimum 200°C, VW-1	cURus
			Various	3512		cURus
6	9	Cord	SHENZHEN SHUNJIA ELECTRICAL TECHNOLOGY CO LTD	3135	Connect to terminal Min 16AWG, 600V, min 105 °C	cURus
			Various	3135		cURus
7	10	Cell	Jiangxi Ganfeng Battery Technology Co Ltd(BBGA2. MH63648)	48173125-100Ah	3.2V, 100Ah	UR
7	11	PCB	Kingboard electronics Co., LTD	KB-6160A	V-0, 130°C	cURus
			Various	Various	V-0, 130°C	cURus
9	12	MOSFET	CRMICRO	CRSS028N10N	QP1 to QP24 VDS=100V, VGS=±20V D=200A, TJ=-55~175ºC	NR

4.0 Critical Components

Photo #	Item no.[1]	Name	Manufacturer/ trademark[2]	Type / model[2]	Technical data and securement means	Mark(s) of conformity [3]
10	13	IC	SINO WEALTH ELECTRONIC LTD.	SH367309U/048UR	U7 Supply voltage: Vbat= 8.5 V~65V Topr: -40°C ~ 85°C	NR
10	14	MCU	HUADA	HC32F460PETB	UM1 VBAT=1.8~3.6V, TA=-40~105ºC LQFP100-0.5-14X14	NR
11	15	Inductor	GLR	T106060-7.5uH-H-GLR	L1 and L2 7.5uH, 105°C	NR
12	16	MOSFET	China Resources Microelectronics (Chongqing) Limited	CRSS057N10N	QC1, QC2, QC3, QC4 VDS=100V, VGS=±20V, ID=120A, TJ=-55~150ºC	NR

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.

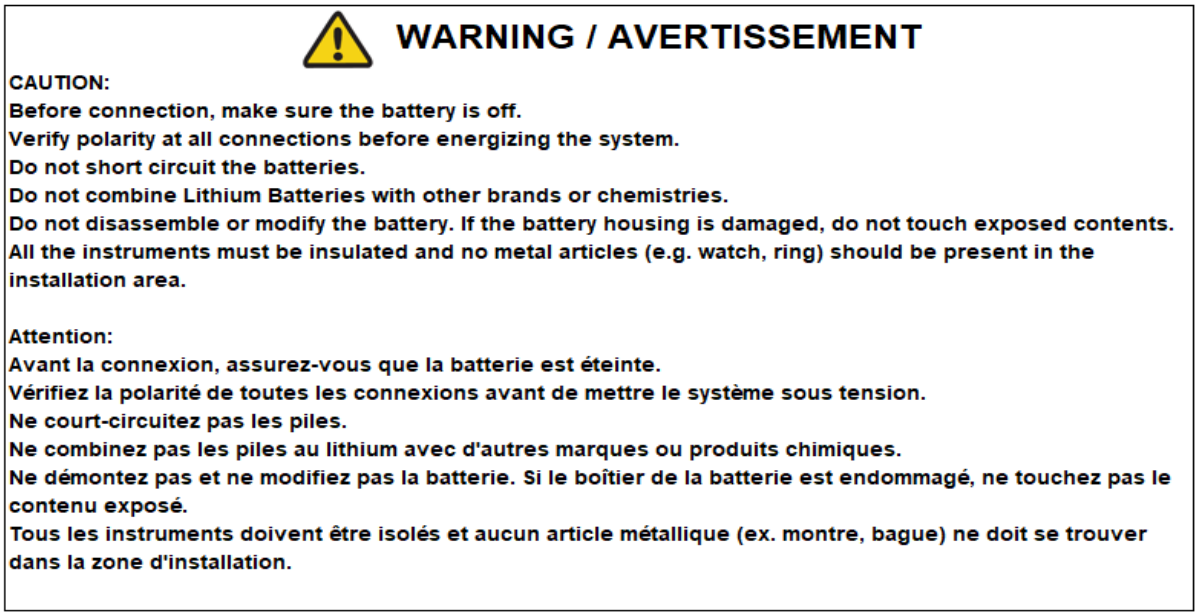
Critical Features/Components - An essential part, material, subassembly, system, software, or accessory of a product that has a direct bearing on the product's conformance to applicable requirements of the product standard.

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. 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.
2. Corrosion Protection - All ferrous metal parts are protected against corrosion by painting, plating or the equivalent.
3. Polarized Connection - This product is provided with a polarized power supply connection.
4. 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. Details please see Sec. 4.0.
5. Schematics - Refer to Section 7.0, Illustration 2 schematics requiring verification during Field Representative Inspection Audits.
6. Markings - The product is marked on a labeling system as described in item 2 of Section 4.0 as follows:
   - Applicant's name,brand name;
   - Model number;
   - Electrical ratings(in volts dc and capacity in Ampere hours or Watt hours and chemistry);
   - Polarity of battery system terminals.
   - Maximum short circuit current and duration;
   - Date of manufacturer.
7. Cautionary Markings - Refer to Section 7.0, Illustration 1.
8. Installation, Operating and Safety Instructions - Instructions for installation and use of this product are provided by the manufacturer. Refer to Section 7.0, lllustration 5 and 5a.

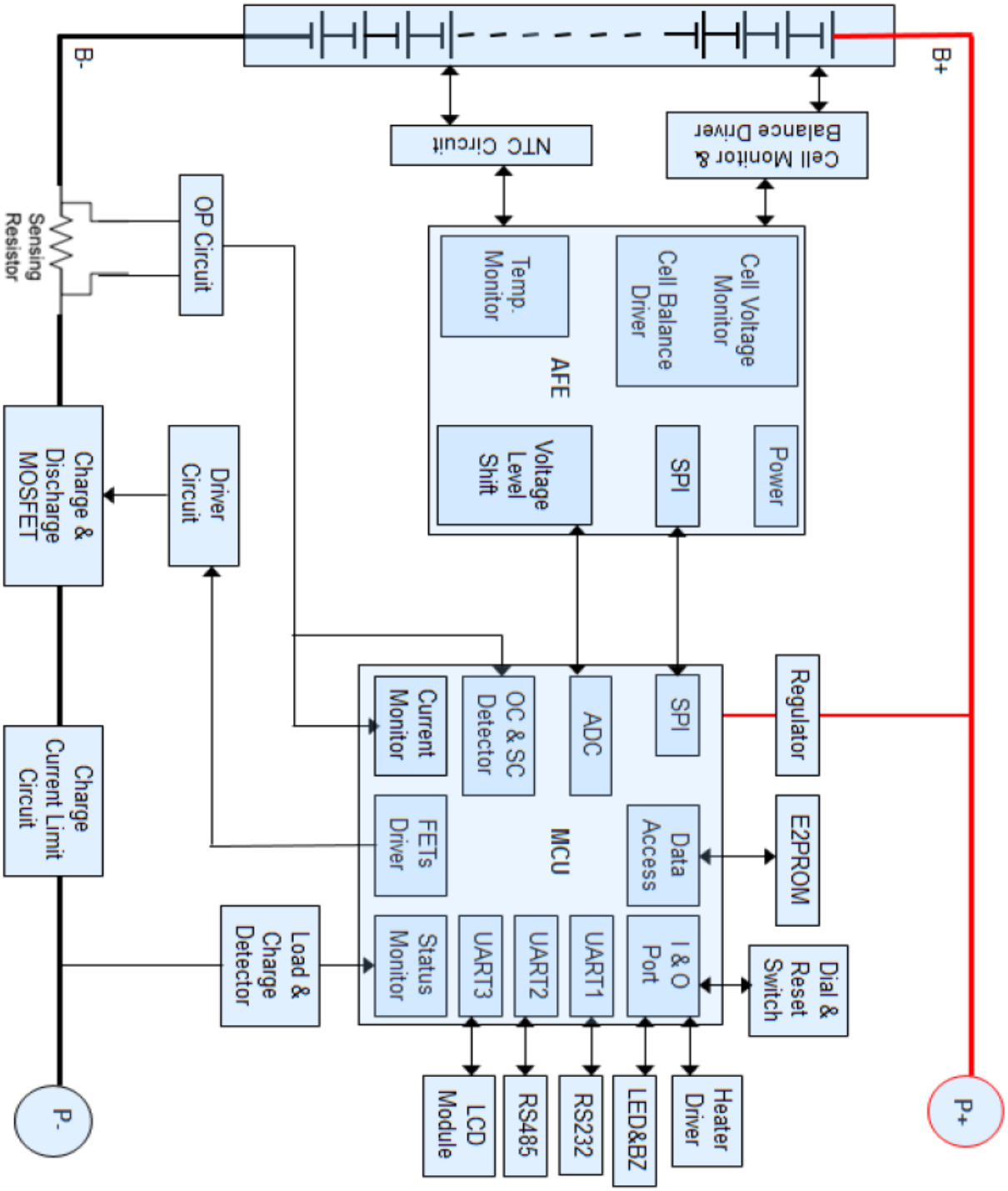
7.0 Illustrations

Illustration 1 - Cautionary marking



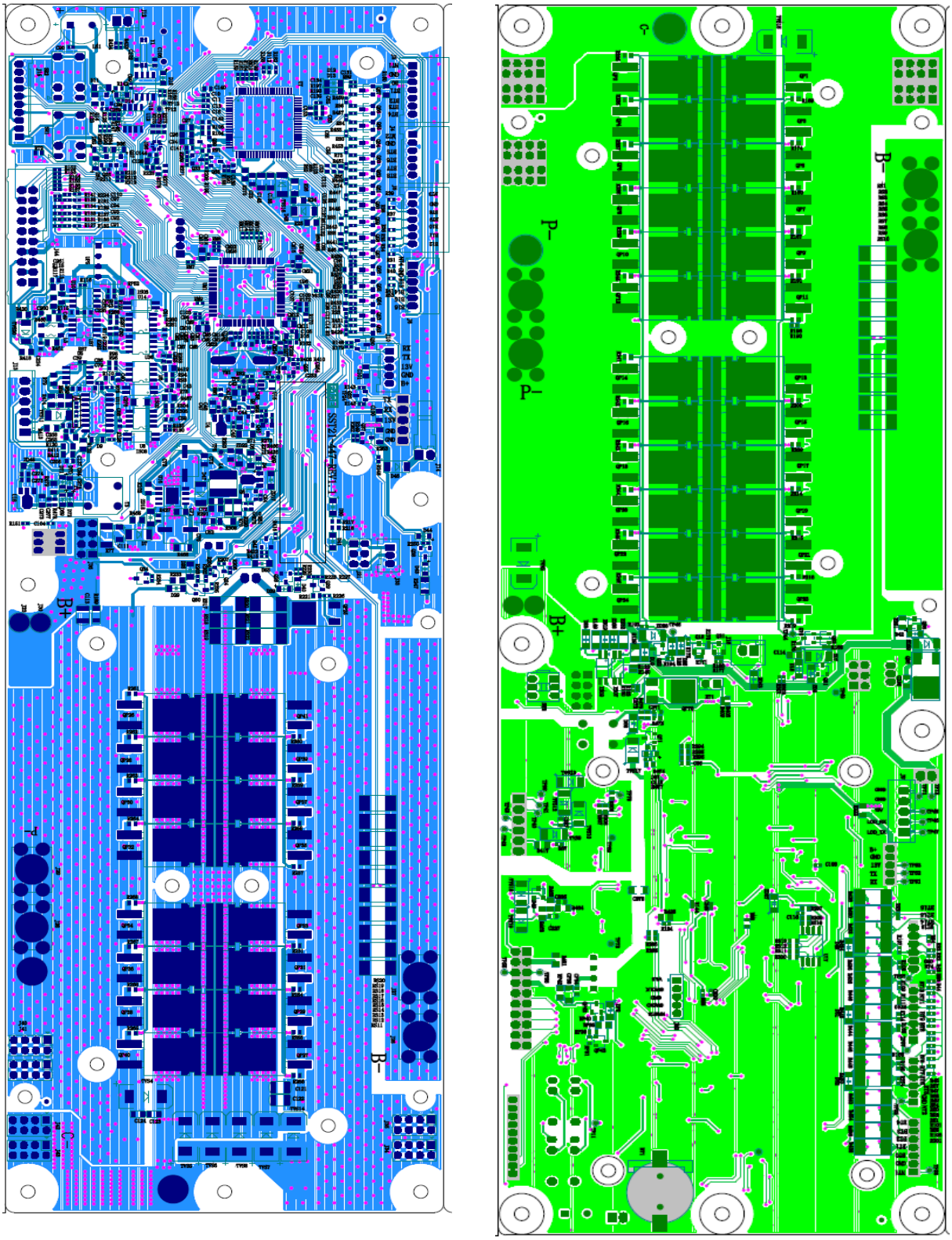
7.0 Illustrations

Illustration 2 - Circuit diagram



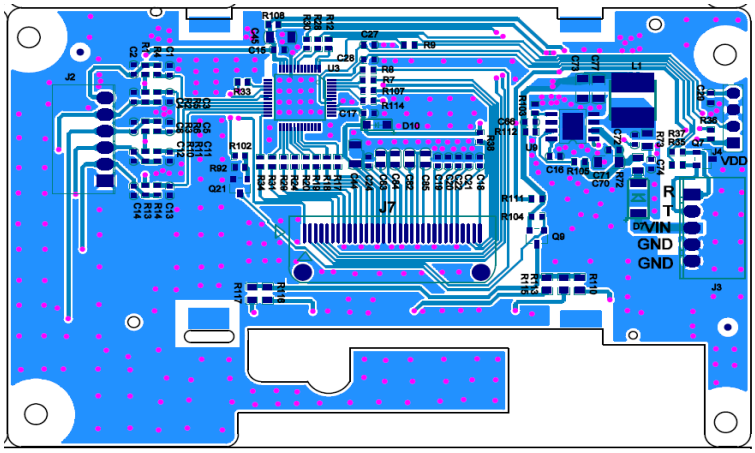
7.0 Illustrations

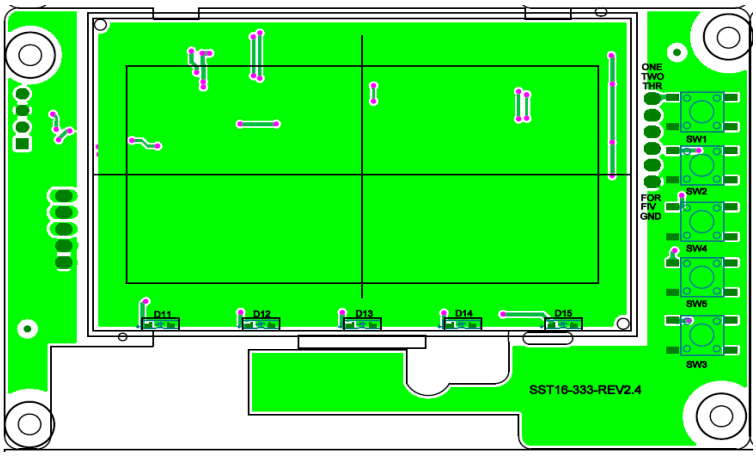
Illustration 3 - PCB layout

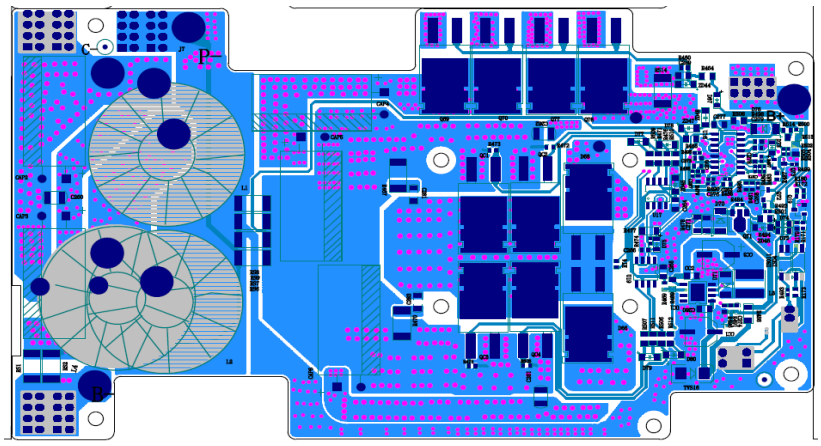


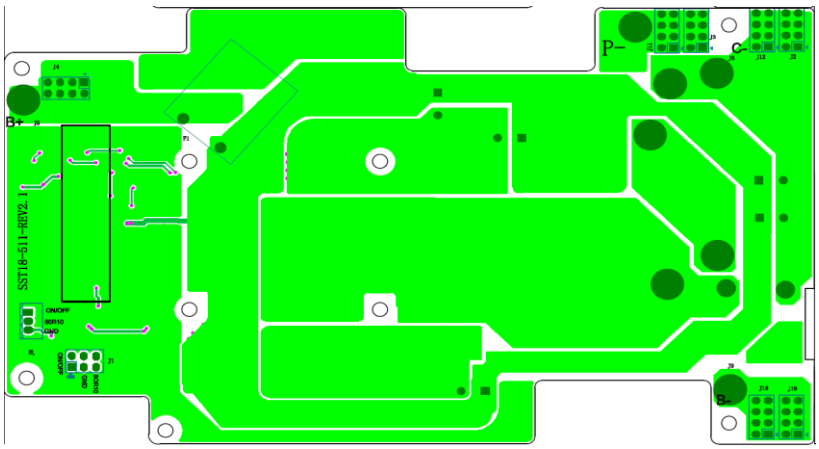
7.0 Illustrations

Illustration 3a - PCB layout



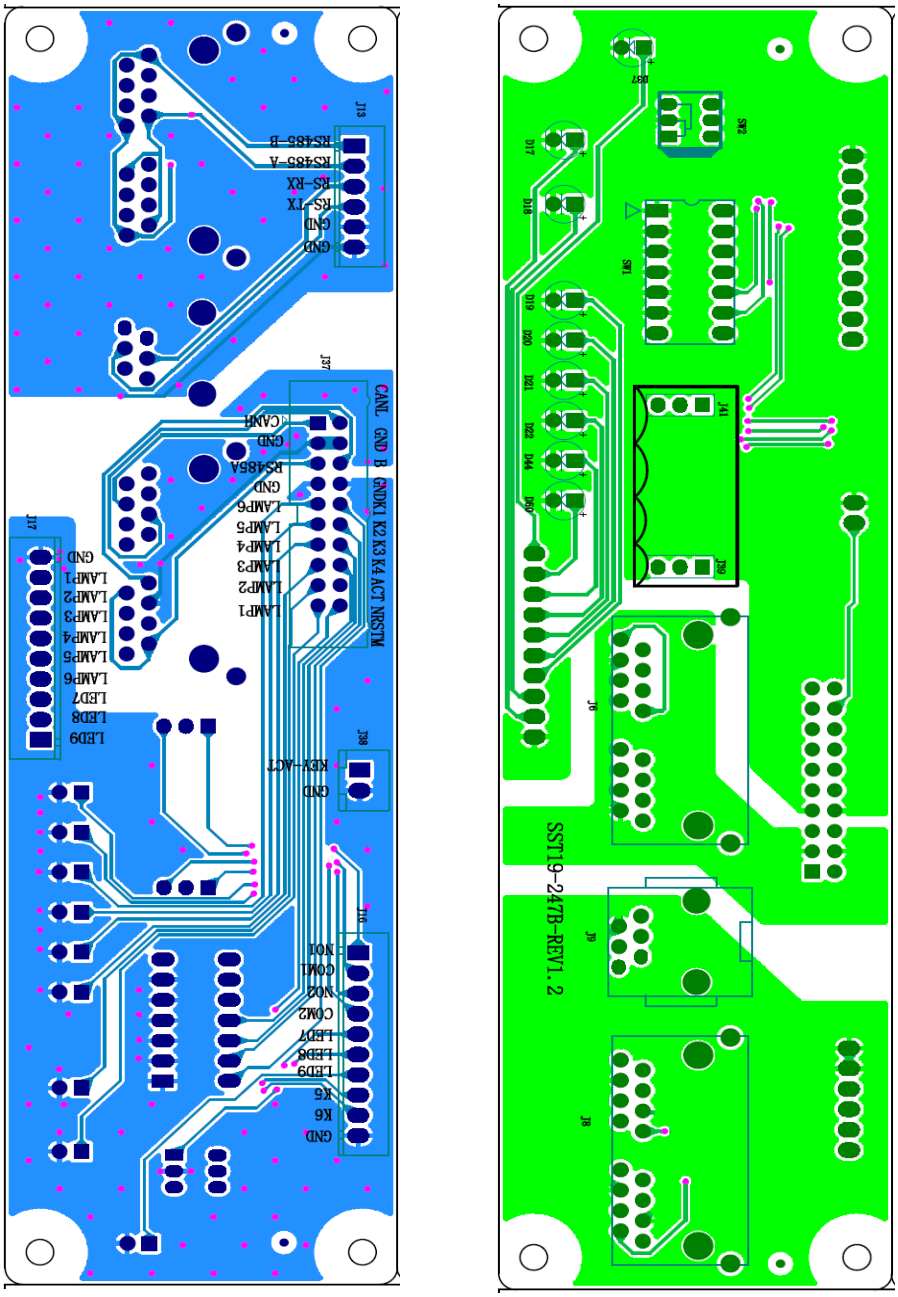






7.0 Illustrations

Illustration 3b - PCB layout



7.0 Illustrations

Illustration 4 - The specification of battery module

Product technical data	
Model	SK48V100
Configuration: XP/YS	16S1P
Technology	Lithium ion
Capacity, Ah	100
Nominal Voltage, Vdc	51.2
Standard Charging Current, A	20
Standard Full Charging Voltage, Vdc	57.6
End of Charging Current, A	5
Maximum Charging Current, A	100
Maximum Charging Voltage, Vdc	58.4
Standard Discharging Current, A	20
Discharge End Point Voltage, Vdc	42.5
Maximum Discharge Current, A	100
Charging Temperature Range, °C	0~55
Discharging Temperature Range, °C	-15~55

7.0 Illustrations

Illustration 5 - User manual (Representative)(Partial)

Please comply with all warnings and operating instructions in this manual strictly. Save this manual properly and read carefully the following instructions before installing the unit. Do not operate this unit before reading through all safety information and operating instructions carefully.

1. Safety Precaution

1.1 When Using battery

Danger of High Voltage:

The high voltage power supply offer the equipment power, wet object contact high voltage power supply directly or indirectly , can cause fatal danger.

Using a special tool :

Working in high voltage and ac power, be sure to use a special tool instead of individual tools.

Static-free:

Static electricity would damage veneer on the electrostatic sensitive components, before touching the plug-in, circuit board or chips, be sure to use correct electrostatic prevention measures.

Disconnect the power supply in operation:

When operate the power supply, you must first cut off power supply, power operation is prohibited.

Dc short circuit dangerous:

Power system provides dc regulated power supply. Dc short circuit could cause fatal damage to the e quipment.

1.2 While Charging

CAUTION

The temperature range over which the battery can be charged is 0°C to 45°C. Charging the battery at temperatures outside of this range may cause the battery to become hot or to break. Charging the battery outside of this temperature range may also harm the performance of the battery or reduce the battery's life expectancy.

1.3 When Discharging the Battery

DANGER

Do not discharge the battery using any device except for the specified device. When the battery is used in devices aside from the specified device it may damage the performance of the battery or reduce its life expectancy, and if the device causes an abnormal current to flow, it may cause the battery to become hot and cause serious injury.

CAUTION

The temperature range over which the battery can be discharged is -20°C to 60°C. Use of the battery outside of this temperature range may damage the performance of the battery or may reduce its life expectancy.

7.0 Illustrations

Illustration 5a - User manual(Representative)(Partial)

4 I NSTALLATION ET ESSAIS _

4.1 P RÉPARATION À L' INSTALLATION

● Règles de sécurité

L'installation, le fonctionnement et la maintenance des modules de batterie au lithium fer phosphate SK-48V100 doivent être effectués par un personnel professionnel formé et qualifié. Avant l'installation ou l'utilisation, veuillez lire les précautions de sécurité du produit et les instructions d'utilisation associées. Respectez scrupuleusement les règles de sécurité suivantes et toutes les réglementations de sécurité locales, sinon des blessures corporelles ou des dommages au produit peuvent survenir.

1. Assurez-vous que toute source ou charge connectée aux bornes du module de batterie est en bon état et exempte de défauts.
2. Avant l'installation, assurez-vous que toutes les sources d'alimentation du réseau sont coupées, que le disjoncteur de sortie du module de batterie est sur "OFF" et que le module de batterie est sur "OFF".
3. Tous les fils électriques doivent avoir le même degré d'isolation. Assurez-vous également que les fils électriques sont exempts d'entailles, de coupures ou de métal exposé.
4. Assurez-vous que le module de batterie et l'équipement associé disposent d'une mise à la terre fiable et sécurisée.

4.2 I NSTALLATION

4.2.1 MISES EN GARDE

L'installation du module de batterie nécessite une attention aux détails critiques, tels que :

1. Espace d'installation et limites de charge. Assurez-vous qu'il y a suffisamment d'espace pour la circulation de l'air autour du ou des modules de batterie ; les supports de montage sont solidement fixés entre le(s) module(s) de batterie et un cadre structurel pour éviter les vibrations ; et les composants matériels et structurels sont capables de supporter le poids combiné du ou des modules de batterie.
2. Spécifications du fil. Assurez-vous que tous les fils de source et de charge connectés au(x) module(s) de batterie ont une température nominale et un calibre de fil (ou section transversale) suffisants pour supporter le courant de fonctionnement continu maximal et le courant de défaut intermittent du(des) module(s) de batterie.
3. Mise en page du projet. Assurez-vous que l'ensemble de la disposition de construction des câbles, du câblage, de l'équipement de source/charge, des fusibles, des interrupteurs, des boîtiers et des modules de batterie est raisonnable et permet les activités de maintenance.
4. Disposition du câblage. Assurez-vous que tous les fils et câbles sont acheminés proprement et en toute sécurité, sans plis ou contre des bords abrasifs/tranchants ; considérez également les avantages de l'étanchéité à l'humidité et de la prévention de la corrosion.
5. Au moins deux personnes doivent effectuer l'installation du module de batterie pour des raisons de sécurité.

ATTENTION : Assurez -vous que le site d'installation est sûr avant de continuer.

8.0 Test Summary					
Evaluation Period	12-May-2022 to 8-Oct-2022			Project No.	220510031GZU
Sample Rec. Date	12-May-2022	Condition	Prototype	Sample ID.	S220510031-001~004
Test Location	Intertek Testing Services Shenzhen Ltd. Zengcheng Branch C2-1, Heping Xu, Yongning Street, Zengcheng District, Guangzhou, 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			[ANSI/CAN/UL 1973:2018 Ed.2] Clauses	--	--
Overcharge			15	--	--
Short Circuit			16	--	--
Overdischarge Protection			17	--	--
Temperature and Operating Limits Check			18	--	--
Imbalanced Charging			19	--	--
Dielectric Voltage Withstand			20	--	--
Working Voltage Measurements			23	--	--
Static Force			28	--	--
Impact			29	--	--
Drop Impact (rack mounted module)			30	--	--
Wall Mount Fixture/Handle Test			31	--	--
Single Cell Failure Design Tolerance(lithium ion)			39	--	--
Evaluation Period	12-May-2022 to 8-Oct-2022			Project No.	220510031GZU
Sample Rec. Date	12-May-2022	Condition	Prototype	Sample ID.	S220510031-005
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 60730-1:2016 Ed.5] & [CSA E60730-1:2015 Ed.5+A1:2017] Clauses	--	--
Environmental stress of temperature			16.2	--	--
Thermal cycling test			H.17.1.4.2	--	--
Surge immunity test			H.26.8	--	--
Electrical fast transient/burst immunity test			H.26.9	--	--
Ring wave immunity test			H.26.10	--	--
Electrostatic discharge test			H.26.11	--	--
Radio-frequency electromagnetic field immunity-Immunity to conducted disturbances			H.26.12.2	--	--
Radio-frequency electromagnetic field immunity-Immunity to radiated disturbances			H.26.12.3	--	--
Power frequency magnetic field immunity test			H.26.14	--	--
Evaluation of compliance			H.26.15	--	--
Software evaluation			H.11.12	--	--
Component testing reviewer			Runze Hu	--	--

8.0 Test Summary

8.1 Signatures

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:	David Yao	Reviewed by:	Carl Chen
Title:	Engineer	Title:	Reviewer
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	Hocan Group Co., LIMITED
Address	FLAT/RM 803 CHEVALIER HOUSE 45-51 CHATHAM ROAD SOUTH TSIM SHA TSUI KL
Country	Hong Kong SAR, China
Product	Lithium ion Battery

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

One hundred percent of production of the products covered by this Report shall be subjected to a routine production line dielectric withstand test.

The test shall be conducted on products, which are fully assembled. Prior to applying the test potential, all switches, contactors, relays, etc., should be closed so that all primary circuits are energized by the test potential. If all primary circuits cannot be tested at one time, then separate applications of the test potential shall be made.

The test voltage specified below shall be applied between primary circuits and accessible dead-metal parts. The test voltage may be gradually increased to the specified value but must be maintained at the specified value for one second or one minute as required.

Test Equipment

The test equipment shall incorporate a transformer with an essentially sinusoidal output, a means to indicate the applied test potential, and an audible and/or visual indicator of dielectric breakdown.
The test equipment shall incorporate a voltmeter in the output circuit to indicate directly the applied test potential if the rated output of the test equipment is less than 500VA.
If the rated output of the test equipment is 500VA or more, the applied test potential may be indicated by either:
1 - a voltmeter in the primary circuit;
2 - a selector switch marked to indicate the test potential; or
3 - a marking in a readily visible location to indicate the test potential for test equipment having a single test potential output.
In cases 2 and 3, the test equipment shall include a lamp or other visual means to indicate that the test potential is present at the test equipment output. All test equipment shall be maintained in current calibration.

Products Requiring Dielectric Voltage Withstand Test:

Product	Test Voltage	Test Time
All products covered by this Report.	500Vpeak	60 s
Terminal + to metal enclosure	or	
Terminal - to metal enclosure	707Vdc	1 s

12.0 Revision Summary

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