





Test Report issued under the responsibility of:













TEST REPORT IEC 62619 Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications	
Report Number	SHES220300502001
Date of issue	2022-05-24
Total number of pages	20 pages
Name of Testing Laboratory preparing the Report	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Applicant's name	Jiangsu Hanchu Energy Technology Co., Ltd.
Address	Room I-16-26, Dagongfang Shared International Innovation Center, Building 9, Xuelang Town, 99 Qingshu Road, Wuxi Economic Development zone, Wuxi, Jiangsu, China
Test specification:	
Standard	IEC 62619: 2017
Test procedure	CB Scheme
Non-standard test method	N/A
Test Report Form No.	IEC62619A
Test Report Form(s) Originator	UL(Demko)
Master TRF	Dated 2018-06-07
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Test item description	Rechargeable Lithium-ion Battery Pack (Product name: Energy Storage Battery)	
Trade Mark	HANCHU ESS	
Manufacturer	Same as applicant	
Model/Type reference	HOME-ESS-LV-3.2K	
Ratings	Rated Voltage: 51,2 V; Rated Capacity: 63 Ah Operating voltage range: 43,2-57,6 Vdc Max. charging current: 67 A Max. discharging current: 67 A Charging Temperature range: 0-50 °C Discharging Temperature range: -10-60 °C	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
	Testing location/ address	588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
	Tested by (name, function, signature)	Frank Su / Project Engineer 
	Approved by (name, function, signature) ..	Eric Wang / Report Reviewer 
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	N/A
	Testing location/ address	
	Tested by (name, function, signature)	
	Approved by (name, function, signature) ..	
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	N/A
	Testing location/ address	
	Tested by (name + signature)	
	Witnessed by (name, function, signature) ..	
	Approved by (name, function, signature) ..	
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	N/A
<input type="checkbox"/>	Testing procedure: CTF Stage 4:	N/A
	Testing location/ address	
	Tested by (name, function, signature)	
	Witnessed by (name, function, signature) ..	
	Approved by (name, function, signature) ..	
	Supervised by (name, function, signature) :	

<p>List of Attachments (including a total number of pages in each attachment):</p> <p>Attachment 1: 8 pages of Photos; Attachment 2: 2 pages of Information for safety; Attachment 3: 1 page of Packaging; Attachment 4: 2 pages of Product specification.</p>	
<p>Summary of testing:</p> <p>The sample(s) tested complies with the requirements of IEC 62619: 2017.</p> <p>No decision rule is specified by standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").</p> <p>Remark:</p> <p>1. Only battery pack was considered and tested according to standard in this report as the cell (model: IFP42100140A-67Ah) was certified according to IEC 62619: 2017 by SGS CEBEC (CB test report No.: SHES220300502101, Certif. No.: BE-41662);</p> <p>2. The functional safety requirement in clause 8 was evaluated according to Annex H of IEC 60730-1 (SGS Report No. SHFS220300010471).</p>	
<p>Tests performed (name of test and test clause):</p> <p><input type="checkbox"/> 7.2.1 External short-circuit test (cell or cell block)</p> <p><input type="checkbox"/> 7.2.2 Impact test (cell or cell block)</p> <p><input checked="" type="checkbox"/> 7.2.3 Drop test (cell or cell block, and battery system)</p> <p><input type="checkbox"/> 7.2.4 Thermal abuse test (cell or cell block)</p> <p><input type="checkbox"/> 7.2.5 Overcharge test (cell or cell block)</p> <p><input type="checkbox"/> 7.2.6 Forced discharge test (cell or cell block)</p> <p><input type="checkbox"/> 7.3.2 Internal short-circuit test (cell)</p> <p><input type="checkbox"/> 7.3.3 Propagation test (battery system)</p> <p><input checked="" type="checkbox"/> 8.2.2 Overcharge control of voltage (battery system)</p> <p><input checked="" type="checkbox"/> 8.2.3 Overcharge control of current (battery system)</p> <p><input checked="" type="checkbox"/> 8.2.4 Overheating control (battery system)</p>	<p>Testing location:</p> <p>SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. 588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China</p>
<p>Summary of compliance with National Differences (List of countries addressed):</p> <p>EU Group Difference</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of EN 62619: 2017.</p>	

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

 Energy Storage Battery	
Model	HOME-ESS-LV-3.2K
Type	Lithium iron phosphate battery
Designation	IFpP/44/101/145/[1P16S]M/0+50/95
Nominal Voltage	51.2V
Nominal Capacity	63Ah
Nominal Energy	3.2KWh
Nominal Charging Current	40A
Nominal Discharging Current	60A
Weight	34.9KG
Dimension	484*302*165mm
Manufacturing Date	1-Mar-2022
<p>Jiangsu Hanchu Energy Technology Co., Ltd. Add.:No. 588, Jinhui Road, Huishan District, Wuxi City, Jiangsu Province, China</p>	
       	
 SN:B0A0111416828 CODE:FSfp5VjZ	<p>CAUTION</p> <ul style="list-style-type: none"> -Do not disassemble or modify. -Do not short-circuit. -Do not dispose in fire. -Do not throw the battery into water

Remark:

Disposal instructions and recommended charge instructions were included in Battery Pack Information for safety and Specification, see attachment 2 and attachment 3 for details.

Test item particulars: --	
Classification of installation and use: To be defined in final product	
Supply Connection: Not directly connected to mains: --	
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 : 2022-03-28	
Date (s) of performance of tests : 2022-04-02 to 2022-04-22	
General remarks:	
"(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 <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator. This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx . Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60335-1:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : Jiangsu Hanchu Energy Technology Co., Ltd. No. 588, Jinhui Road, Huishan District, Wuxi, Jiangsu, China	

General product information and other remarks:

Product description:	Rechargeable Lithium-ion Battery Pack (Product name: Energy Storage Battery)
Model of Battery:	HOME-ESS-LV-3.2K
Designation of Battery:	IFpP/44/101/145/[1P16S]M/0+50/95
Nominal voltage of Battery:	51,2 V
Max. charging voltage of Battery:	57,6 V
End of discharge voltage of Battery:	43,2 V
Rated capacity of Battery:	63 Ah
Maximum charge current of Battery:	67 A
Maximum discharge current of Battery:	67 A
Charging temperature range of Battery:	0-50 °C
Discharge temperature range of Battery:	-10-60 °C
Number of cells in battery pack:	1P16S
Standard charging method (declared by manufacturer):	Constant charging current 40 A to 57,6 V, and keep at 57,6 V (constant voltage) till charging current was below 4,5 A
Model of cell:	IFP42100140A-67Ah
Designation of cell:	IFpP/44/101/145/M/0+50/95
Rated voltage of cell:	3,2 V
Rated capacity of cell:	67 Ah
Maximum charge current of cell:	67 A

Remark: See also Attachment 4 for details.

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
4	PARAMETER MEASUREMENT TOLERANCES		
	Parameter measurement tolerances		P
5	GENERAL SAFETY CONSIDERATIONS		P
5.1	General		P
	Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse..:	See also table 5.1 for Critical components information	P
5.2	Insulation and wiring		P
	Voltage, current, altitude, and humidity requirements		P
	Adequate clearances and creepage distances between connectors		P
	The mechanical integrity of internal connections		P
5.3	Venting		P
	Pressure relief function	Metal enclosure secured by screws, aperture as the venting mechanism of battery pack.	P
	Encapsulation used to support cells within an outer casing	Metal encapsulation was used to support cells, will not cause the pack to overheat during normal operation nor inhibit pressure relief.	P
5.4	Temperature/voltage/current management		P
	The design prevents abnormal temperature-rise	BMS was used to prevent abnormal temperature-rise	P
	Voltage, current, and temperature limits of the cells	Overcharge, over current and overheating proof circuit used in this battery. See tests of clause 8.	P
	Specifications and charging instructions for equipment manufacturers		P
5.5	Terminal contacts of the battery pack and/or battery system		P
	Polarity marking(s)	Special connector used to prevent reverse.	N/A
	Capability to carry the maximum anticipated current		P
	External terminal contact surfaces		P
	Terminal contacts are arranged to minimize the risk of short circuits		P
5.6	Assembly of cells, modules, or battery packs into battery systems		P
5.6.1	General		P
	Independent control and protection method(s)		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Recommendations of cell operating limits by the cell manufacturer		P
	Batteries designed for the selective discharge of a portion of their series connected cells		N/A
	Protective circuit component(s) and consideration to the end-device application		P
5.6.2	Battery system design		P
	The voltage control function		P
	The voltage control for series-connected batteries		P
5.7	Operating region of lithium cells and battery systems for safe use		P
	The cell operating region.....:	Voltage range: 2,0 V to 3,65 V Maximum charge current: 67 A Maximum discharge current: 67 A Charge temperature range: 0-60°C Discharge temperature range: -30-60°C.	P
	Designation of battery system to comply with the cell operating region		P
5.8	Quality plan		P
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented.....:	Quality plan self-declaration was submitted.	P
	The process capabilities and the process controls		P
6	TYPE TEST CONDITIONS		P
6.1	General		P
6.2	Test items		P
	Cells or batteries that are not more than six months old (See Table 1 of IEC62619)	Battery Pack production date: Mar. 2022	P
	Capacity confirmation of the cells or batteries		P
	Default ambient temperature of test, 25 °C ± 5 °C	Tests were carried out in an ambient temperature of 25 °C ± 5 °C.	P
7	SPECIFIC REQUIREMENTS AND TESTS		P
7.1	Charging procedure for test purposes		P
	The battery discharged to a specified final voltage prior to charging	Discharge to 43,2 V with a constant current of 12,6 A (0,2 C).	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The cells or batteries charged using the method specified by the manufacturer	Battery Pack: Constant charging current 40 A to 57,6 V, and keep at 57,6 V (constant voltage) till charging current was below 4,5 A.	P
7.2	Reasonably foreseeable misuse		P
7.2.1	External short-circuit test (cell or cell block)	Approval cell used.	N/A
	Short circuit with total resistance of $30 \text{ m}\Omega \pm 10 \text{ m}\Omega$ at $25 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$		N/A
	Results: no fire, no explosion		N/A
7.2.2	Impact test (cell or cell block)	Approval cell used.	N/A
	Cylindrical cell, longitudinal axis impact		N/A
	Prismatic cell, longitudinal axis and lateral axis impact		N/A
	Results: no fire, no explosion.		N/A
7.2.3	Drop test (cell or cell block, and battery system)		P
7.2.3.1	General		P
7.2.3.2	Whole drop test (cell or cell block, and battery system)		N/A
	Description of the Test Unit.....	Battery	—
	Mass of the test unit (kg).....	Approx. 34,9 kg	—
	Height of drop (m).....		—
	Results: no fire, no explosion		N/A
7.2.3.3	Edge and corner drop test (cell or cell block, and battery system)		P
	Description of the Test Unit.....	Battery	—
	Mass of the test unit (kg).....	Approx. 34,9 kg	—
	Height of drop (m).....	10 cm	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)	Approval cell used.	N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)	Approval cell used.	N/A
	For those battery systems that are provided with only a single protection for the charging voltage control		—
	Results: no fire, no explosion		N/A
7.2.6	Forced discharge test (cell or cell block)	Approval cell used.	N/A
	Upper limit charge voltage of the cell		N/A
	Cells connected in series in the battery system		N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Redundant or single protection for discharge voltage control provided in battery system		N/A
	Target Voltage.....		N/A
	Maximum discharge current of the cell, I_m		N/A
	Discharge current for forced discharge, 1.0 It.....		N/A
	Discharging time, $t = (1 It / I_m) \times 90$ (min.).....		N/A
	Results: no fire, no explosion		N/A
7.3	Considerations for internal short-circuit – Design evaluation		N/A
7.3.1	General		N/A
7.3.2	Internal short-circuit test (cell)	Approval cell used.	N/A
	Samples preparation procedure: a), in accordance with 8.3.9 of IEC62133:2012; or b), the nickel particle inserted before charging, or c), the nickel particle was inserted before electrolyte filling		N/A
	Tested according to Cl. 8.3.9 of IEC 62133:2012 test method, except all tests were carried out in an ambient temperature of $25\text{ °C} \pm 5\text{ °C}$.		N/A
	The appearance of the short-circuit location recorded by photograph or other means.....		—
	The pressing was stopped - When a voltage drop of 50 mV was detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) was reached		N/A
	Results: no fire, no explosion		N/A
7.3.3	Propagation test (battery system)	Internal short-circuit test has been considered in cell CB report.	N/A
	Method to create a thermal runaway in one cell ...:		N/A
	Results: No external fire from the battery system or no battery case rupture.....		N/A
8	BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)		P
8.1	General requirements		P
	Functional safety analysis for critical controls	The functional safety requirement was evaluated according to Annex H of IEC 60730-1 (SGS Report No. SHFS220300010471).	P
	Conduct of a process hazard, risk assessment and mitigation of the battery system		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
8.2	Battery management system (or battery management unit)		P
8.2.1	Requirements for the BMS		P
	The safety integrity level (SIL) target of the BMS	Class B per IEC 60730-1	P
	The charge control evaluated by tests in clauses 8.2.2 to 8.2.4		P
8.2.2	Overcharge control of voltage (battery system)		P
	The exceeded charging voltage applied to the whole battery system		P
	The exceeded charging voltage applied to only a part of the battery system, such as the cell(s)		N/A
	Results: no fire, no explosion	See Table 8.2.2	P
	The BMS interrupted the overcharging before reaching 110% of the upper limit charging voltage		P
8.2.3	Overcharge control of current (battery system)		P
	Results: no fire, no explosion	See Table 8.2.3	P
	The BMS detected the overcharging current and controlled the charging to a level below the maximum charging current		P
8.2.4	Overheating control (battery system)		P
	The cooling system, if provided, was disconnected	No cooling system	N/A
	Elevated temperature for charging, 5 °C above maximum operating temperature.....		P
	Results: no fire, no explosion	See Table 8.2.4	P
	The BMS detected the overheat temperature and terminated charging		P
	The battery system operated as designed during test		P
9	INFORMATION FOR SAFETY		P
	The cell manufacturer provides information about current, voltage and temperature limits of their products		N/A
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.	See attachment 2	P
10	MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)		P
	The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual.	See page 4	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A
	Battery designation	IFpP/44/101/145/[1P16S]M/0+50/95	P
	Battery structure formulation	1P16S	P

ANNEX A	OPERATING REGION OF CELLS FOR SAFE USE		N/A
A.1	General	Has been considered in cell test report.	N/A
A.2	Charging conditions for safe use		N/A
A.3	Consideration on charging voltage		N/A
A.4	Consideration on temperature		N/A
A.5	High temperature range		N/A
A.6	Low temperature range		N/A
A.7	Discharging conditions for safe use		N/A
A.8	Example of operating region		N/A

ANNEX B	PROCEDURE OF 7.3.3 PROPAGATION TEST		N/A
B.1	General	Internal short-circuit test has been considered in cell CB report.	N/A
B.2	Test conditions:		N/A
	– The battery fully charged according to the manufacturer recommended conditions		—
	– Target cell forced into thermal runaway		—
	– A specially prepared sample (e.g. a heater or a hole for nail penetration provided) used for ease of testing		—
B.3	Method used for initiating the thermal runaway. 1) Heater (Heater, Burner, Laser, Inductive heating 2) Overcharge 3) Nail penetration of the cell 4) Combination of above methods 5) Other methods		—

ANNEX C	PACKAGING	P
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IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The materials and pack design chosen in such a way as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants	See attachment 3	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

5.1	TABLE: Critical components information					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity ¹⁾	
Cell	Jiangsu Hanchu Energy Technology Co., Ltd.	IFP42100140A- 67Ah	3,2 V, 67 Ah	IEC 62619- 2017 EN 62619- 2017	SGS (CB Cert. No.: BE-41662, Report No.: SHES22030 0502101)	
Metallic Enclosure	Jiangsu Hanchu Energy Technology Co., Ltd.	LV3.2K	484 mm*165 mm*302 mm, Min.thickness: 1,5 mm Material: low carbon steel	--	--	
Epoxy plate	--	HC-FR4	V-0, Min thickness: 0,63 mm	UL 94	UL (E226607)	
Connector (Charging & discharging)	--	LD-CN120A	120 A, 1500 V	EN 61984	ECM (ZR2018041 6007)	
Plastic of charging & discharging connector	--	PA66-NPG25	PA66, V-0, Min thickness: 1,5 mm, Tmax: 125 °C	UL 94 UL 746C	UL (E171666)	
Busbar insulating plastic	--	E-RD4962- S7(#)	Epoxy Powder Coating, V-0, Min thickness: 0,5 mm, 105 °C	UL 94 UL 746C	UL (E481369)	
Plastic of Dial switch	--	4830	PBT (glass reinforced), V-0, Min thickness: 3,0 mm, 75 °C	UL 94 UL 746C	UL (E345326)	
Terminal wire	--	1015	16 AWG, FT-2, 105 °C, 750 Vdc	UL 758	UL (E317806)	
Terminal wire	--	1430	22 AWG, FT-2, 105 °C, 300 Vac	UL 758	UL (E315628)	

IEC 62619					
Clause	Requirement + Test		Result - Remark		Verdict
Terminal wire	--	1430	24 AWG, FT-2, 105 °C, 300 Vac	UL 758	UL (E315628)
Heat shrinkable tube	--	RSFR-H	VW-1, 125°C, 600 V	UL 224	UL (E203950)
PCB for LED indicator board	--	TS-M8	V-0, 130 °C, Min thickness: 0,017 mm	UL 796	UL (E361828)
PCB for BMS board	--	F-D	V-0, 130 °C, Min thickness: 0,017 mm	UL 796	UL (E351308)
BMS:	--	LVESS-3.2K-BMS-48100	--	--	--
- AFE (U11)	--	SH367309U/04 8UR	Overcharge protection voltage: 3,65 V ± 0,02 V Over-discharge protection voltage: 2,5 V ± 0,02 V Operating temperature range: -40 - 85 °C	--	--
- MCU (U19)	--	KF32F330KQV	Supply voltage: 1,8 V - 3,6 V Operating temperature range: -40 - 85 °C	--	--
- MOSFET (M3 – M22)	--	MDE10N026R H	Id: 120 A Vds: 100 V Operating temperature range: -55 - 150 °C	--	--
- NTC (NTC1 – NTC4)	--	SNGA1103F39 50FA	Resistance at 25 °C: 10 k ohm Tmoa: 200 °C	UL1434	UL (E352242)

IEC 62619					
Clause	Requirement + Test			Result - Remark	Verdict
- Fuse (F1)	--	2410WNF	15 A, 125 V	UL 248	UL (E311435)
- Fuse (F3)	--	2410WLF2000 A072V	20 A, 72 V	UL 248	UL (E311435)
- Digital Isolator (U14)	--	NIRS22N1-DSPR	Isolation volatge: 3000 Vrms	UL 1577	UL (E500602)
- Digital Isolator (U35)	--	NSI8221N1-DSPR	Isolation volatge: 5000 Vrms	UL 1577	UL (E500602)
- Optical Couple (U10, U22, U24, U26, U27, U28)	--	EL3H7	Isolation volatge: 3750 Vrms	UL 1577	UL (E214129)
- Transformer (TR1)	--	EPC17-500UH	500 μ H \pm 10%	--	--
- Magnet Wire (TR1)	--	Polysol 155p	MW 79-C, 155 °C	UL 1446	UL (E258243)
- Bobbin (TR1)	--	EC-15G	Epoxy Molding Compound, V-0, Min thickness: 1,6-1,8 mm, 130 °C	UL 94 UL 746C	UL (E59481)
- Current sensors (R409, R411, R413, R415, R417, R420, R422, R424, R426, R428, R458, R460)	--	LR251222R00 3F	0,003 Ohm, 2 W	--	--
Supplementary information:					
1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: External short-circuit test (cell or cell block)					N/A
Sample No.	Ambient (at 25°C ± 5°C)	OCV at start of test (V dc)	Resistance of Circuit (mΩ)	Maximum Case Temperature Rise ΔT (°C)	Results	
--	--	--	--	--	--	
Supplementary information: A - No fire or Explosion B - Fire C - Explosion D - The test was completed after 6 h E - The test was completed after the cell casing cooled to 20% of the maximum temperature rise F - Other (Please explain):_						

7.2.5	TABLE: Overcharge test (cell or cell block)					N/A
Sample No.	OCV at start of test (V dc)	OCV at end of test (V dc)	Measured Maximum Charging Current (A)	Measured Maximum Charging Voltage (V dc)	Max. Cell Case Temperature, (°C)	Results
-	--	-	--	--	--	--
Supplementary information: Results: A - No fire or Explosion B - Fire C - Explosion D - Test concluded when temperature reached a steady state condition E - Test concluded when temperature returned to ambient F - Other (Please explain): _____						

7.2.6	TABLE: Forced discharge test (cell or cell block)				N/A
Sample No.	OCV before applying reverse charge, (V dc)	Target Voltage (V dc)	Measured Reverse Charge Current I _t , (A)	Total Time for Reversed Charge Application (min)	Results
--	--	--	--	--	--
Supplementary information: Results: A - No fire or Explosion B - Fire C - Explosion D - Other (Please explain): _____					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.2	TABLE: Internal short-circuit test (cell)				N/A
Sample No.	OCV at start of test, (V dc)	Particle location ¹⁾	Maximum applied pressure, (N)	Results	
--	--	--	--	--	
<p>Supplementary information:</p> <p>¹⁾ Identify one of the following:</p> <p>1: Nickel particle inserted between positive and negative (active material) coated area.</p> <p>2: Nickel particle inserted between positive aluminium foil and negative active material coated area.</p> <p>Results:</p> <p>A - No fire or explosion B - Fire C - Explosion D - Test concluded when 50 mV voltage drop occurred prior to reaching force limit E - Test concluded when 800/400 N pressure was reached and 50 mV voltage drop was not achieved F - Test was concluded when fire or explosion occurred G - Other (Please explain): __</p>					

7.3.3	TABLE: Propagation test (battery system)				N/A
Sample No.	OCV of Battery System Before Test, (V dc)	OCV of Target Cell Before Test, (V dc)	Maximum Cell Case Temperature, (°C)	Maximum DUT Enclosure Temperature, (°C)	Results
--	--	--	--	--	--
Method of cell failure ¹⁾		Location of target cell		Area for fire protection (m ²)	
--		--		--	
<p>Supplementary information:</p> <p>1) Cell can be failed through applied heat, overcharge, nail penetration or combinations of these failures or other acceptable methods. See supporting documentation for details on cell failure method</p> <p>2) If the battery system has no outer covering, the manufacturer is required to specify the area for fire protection.</p> <p>Results:</p> <p>A - No fire external to DUT enclosure or area for fire protection or no battery case rupture B - Fire external to DUT enclosure or area for fire protection C - Explosion D - Battery case rupture E - Other (Please explain): __</p>					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.2	TABLE: Overcharge control of voltage (battery system)					P
Sample No.	OCV at start of test for Cell/Cell Blocks, (V dc)	Maximum Charging Current, (A)	Max. Charging Voltage, (V dc)	Max. Voltage of Cell/Cell Blocks, (V dc)	Results	
1# (battery)	2,952 to 2,985	67	57,6	3,699	A, E, F	
			Charge Voltage Applied Battery System: 1)			
			Whole	Part		
			64,24 Vdc	--		
Supplementary information:						
1. The exceeded voltage can be applied to only a part of the system such as the cell(s) in the battery system per Figure 6 of IEC 62619, if it is difficult to do it in using the whole battery system.						
Results:						
A - No Fire or Explosion						
B - Fire						
C - Explosion						
D - The voltage of the measured cells or cell blocks did not exceed the upper limit charging voltage						
E - The voltage of the measured cells or cell blocks did exceed the upper limit charging voltage						
F - All function of battery system did operate as intended during the test.						
G - All function of battery system did not operate as intended during the test.						
H - Other (Please explain): ____						

8.2.3	TABLE: Overcharge control of current (battery system)				P
Sample No.	OCV at start of test, (V dc)	Max. Charging Current, (A)	Max. Charging Voltage, (V dc)	Results	
1# (battery)	46,24	80,4	57,6	A, D, F	
Supplementary information:					
Results:					
A - No fire or Explosion					
B - Fire					
C - Explosion					
D - Overcurrent sensing function of BMU did operate and then charging stopped					
E - Overcurrent sensing function of BMU did not operate and then charging stopped					
F - All function of battery system did operate as intended during the test.					
G - All function of battery system did not operate as intended during the test.					
H - Other (Please explain): ____					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.4	TABLE: Overheating control (battery system)			P
Model No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Maximum Charging Voltage, V dc	
1# (battery)	52,87	67	57,6	
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results	
50		55	A, D, F	
Supplementary information: Results: A – No fire or Explosion B – Fire C – Explosion D - Temperature sensing function of BMU did operate and then charging stopped E - Temperature sensing function of BMU did not operate and then charging stopped F - All function of battery system did operate as intended during the test. G - All function of battery system did not operate as intended during the test. H - Other (Please explain): _____				

--- End of Report ---

Attachment 1 Photo documentation

External view of battery

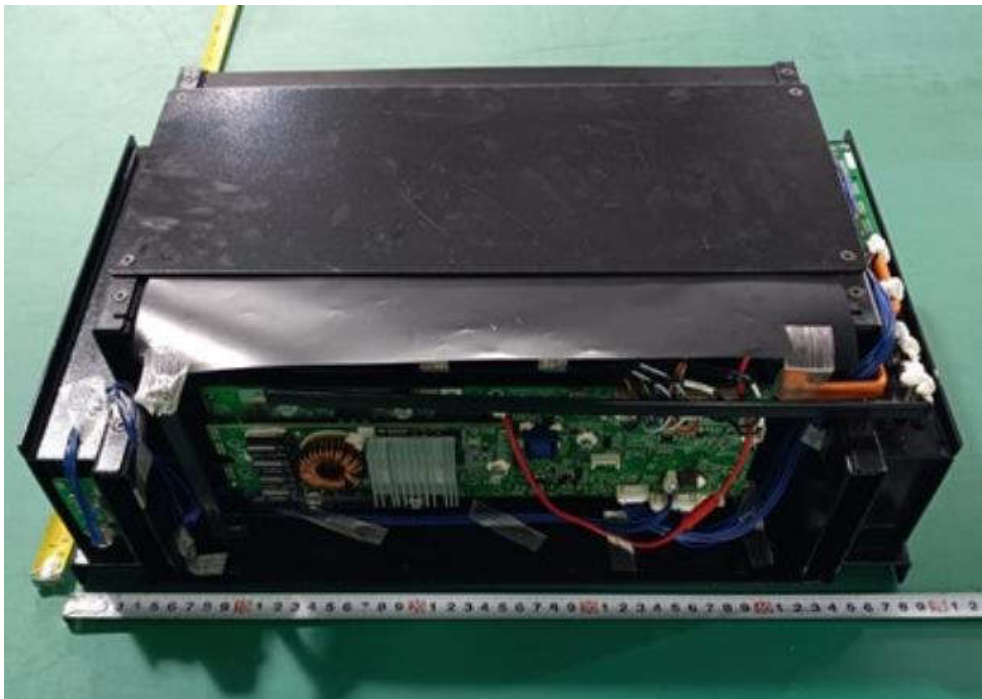
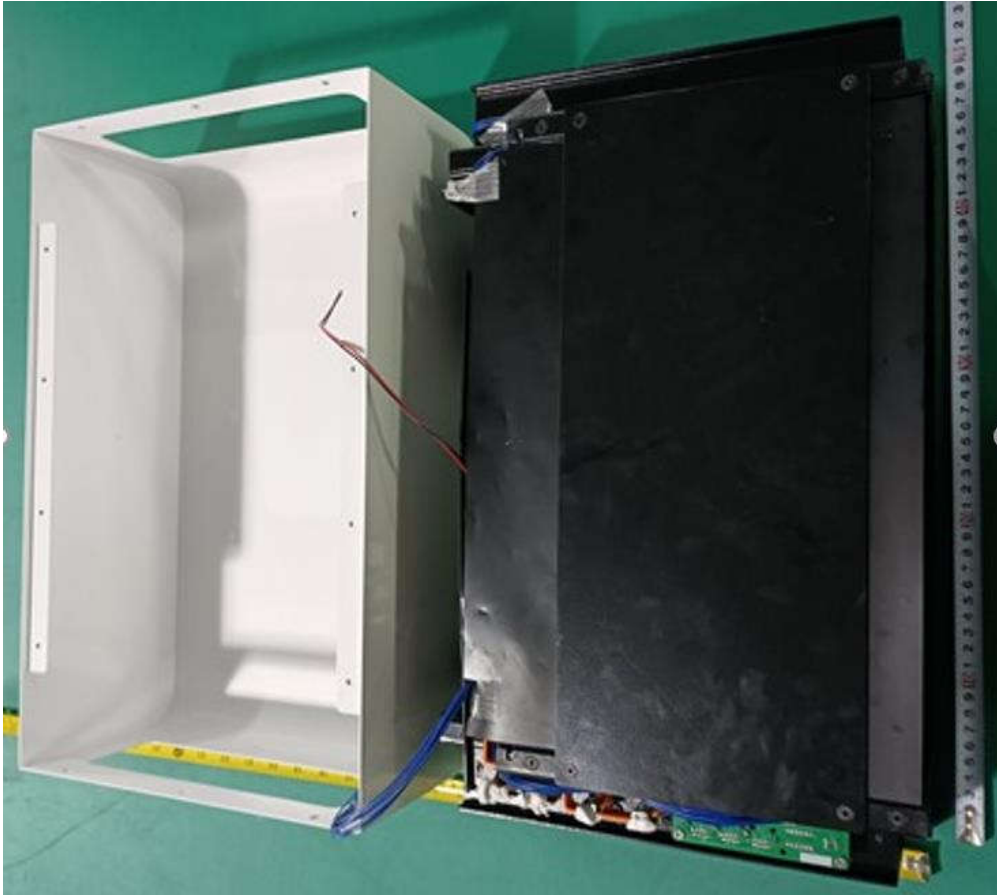


Attachment 1 Photo documentation



Attachment 1 Photo documentation

Internal view of battery



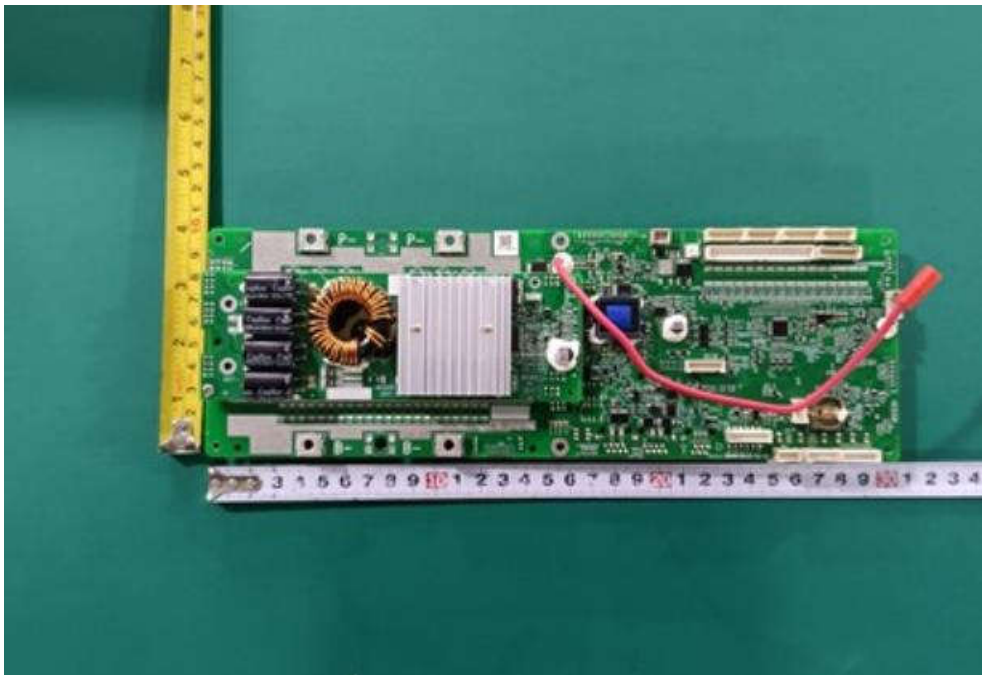
Attachment 1 Photo documentation



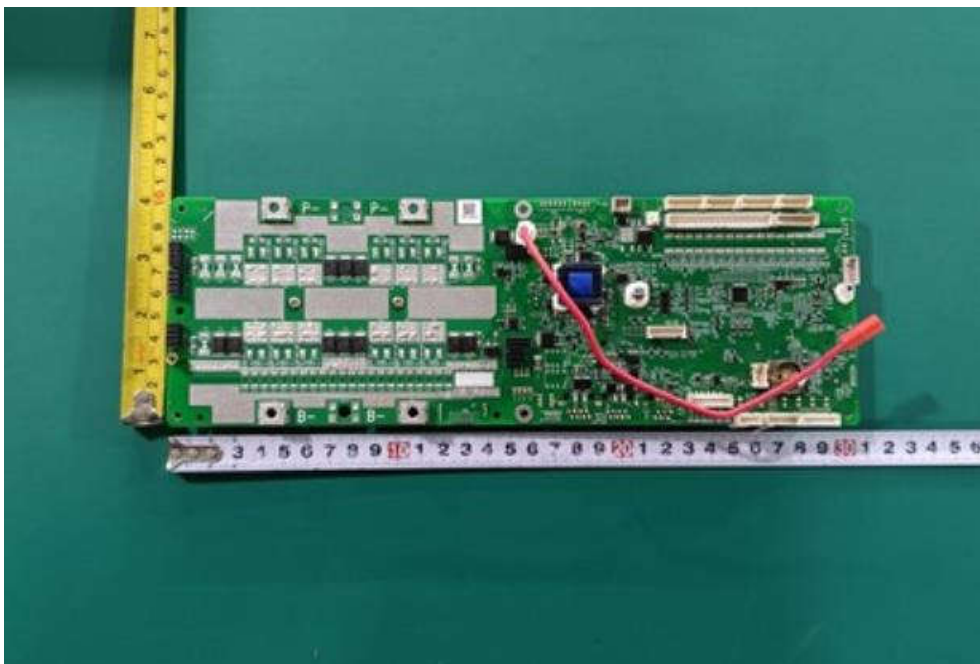
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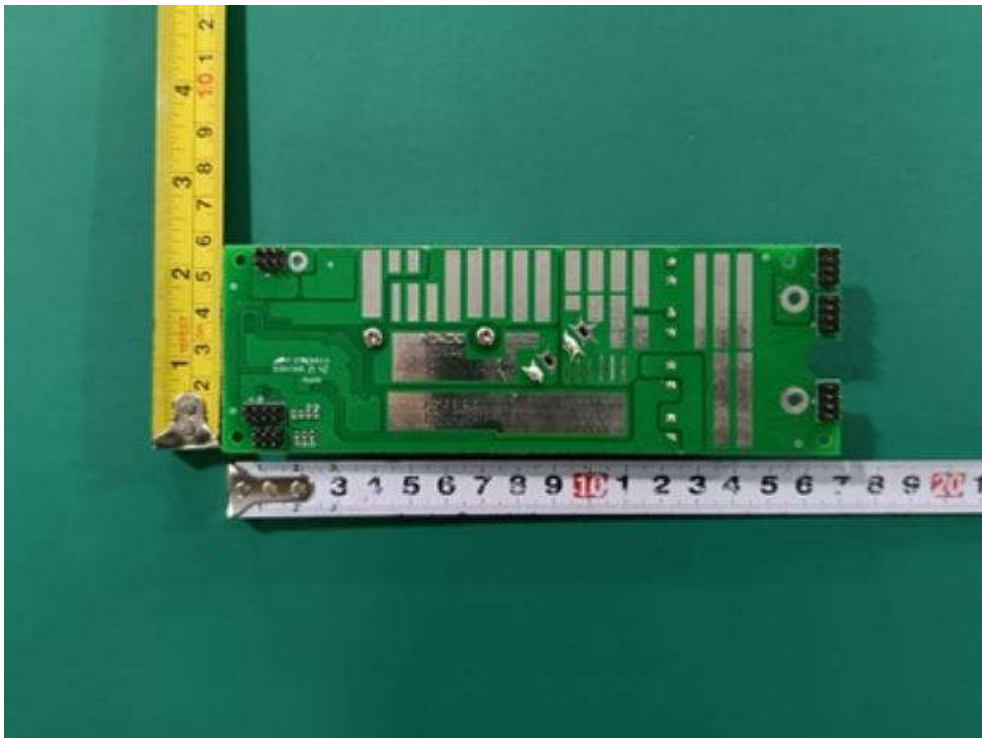
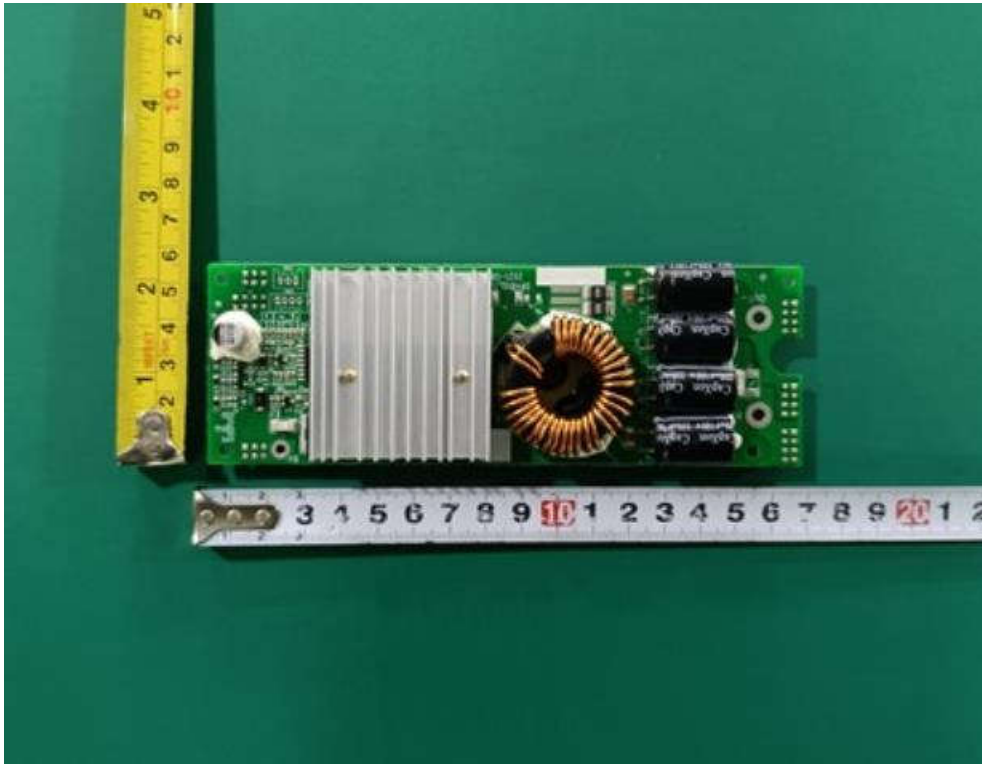
View of BMS



Attachment 1 Photo documentation

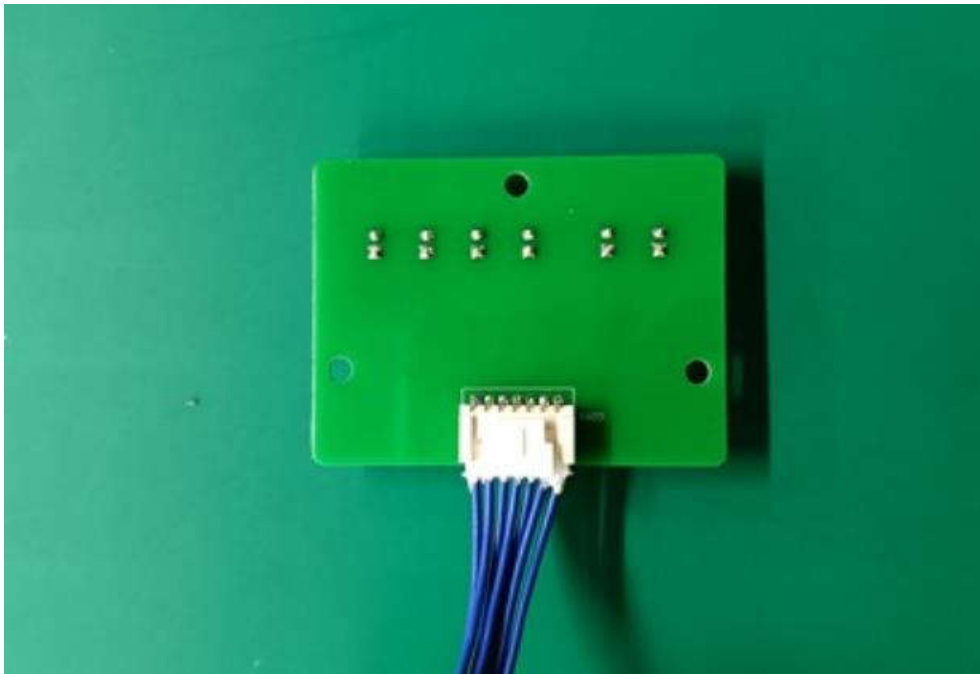


Attachment 1 Photo documentation



Attachment 1 Photo documentation

View of LED indicator board



--- End of Attachment 1 ---

Attachment 2 Information for safety

7. Precautions

7.1. Shipping requirements

When the energy storage system is transported, the system is in a state of 50 % SOC. During transportation, do a good job of moisture-proof and anti-static treatment, and mark moisture-proof, no tumbling and other signs in obvious areas. It is suitable for transportation by car and boat, but it needs to be moisture-proof, pressure-resistant and drop-proof during transportation. During transportation, please use tools or two people to carry it.

7.2. Storage requirements

When the energy storage system is stored, the battery pack needs to maintain more than 50% capacity. The storage time and transportation time of the system should not exceed 3 months. The battery system must be charged for more than three months to ensure that the SOC reaches 50%. The system should be stored in a dry warehouse without exposure to sunlight and rain. No harmful gas, flammable, explosive products and corrosive chemicals are allowed in the warehouse, avoid mechanical shock, heavy pressure and strong magnetic field, avoid direct sunlight, and the distance from the heat source should not be less than 2m, and the packing box should be padded Be at least 20cm above the ground and at least 50cm from walls, windows or air inlets.

7.3. Installation requirements

The installers need to have corresponding qualification certificates or qualified personnel trained by the manufacturer or authorized cooperative manufacturers. Installers should operate in strict accordance with the 'Installation Manual' provided by the manufacturer. Please keep away from harmful gases, flammable, explosive products and corrosive chemicals in the installation location, avoid mechanical shock, heavy pressure and strong magnetic field, avoid direct sunlight, and the distance from the heat source should not be less than 2m, and the installation location should be away from windows or the air inlet should be at least 50cm and the installation environment should be ventilated and dry.

Note: When the system fails, please disconnect the power supply of the system when it is safe to do so, and notify a professional to handle it.

7.4. Usage requirements

Customers should fully consider the battery usage environment when installing the battery system, and try to use the battery pack in a cool, ventilated and dry environment to avoid the risk of battery failure caused by overheating or moisture short circuit.

Not modify the operating parameters of the lithium battery system without authorization, so as not to affect the performance of the battery, please use a dedicated lithium battery PCS device to charge the battery system.

It is forbidden to reversely connect the positive and negative poles of the battery system, short-circuit the battery system, and reverse charging the battery system.

It is forbidden to put the battery system into water or get wet, it is forbidden to disassemble and disassemble the battery system, and keep away from heat and fire.

Avoid charging under low temperature conditions prohibited by this specification, otherwise the battery pack may be damaged.

Attachment 2 Information for safety

After the battery system is used, it needs to be charged in time within 12 hours to prevent the battery pack from being over-discharged due to self-discharge in a long-term state of power loss, which will cause the battery performance to be seriously degraded, and may even be damaged.

When your product needs to be disposed of, please contact the installation manufacturer for a professional solution.

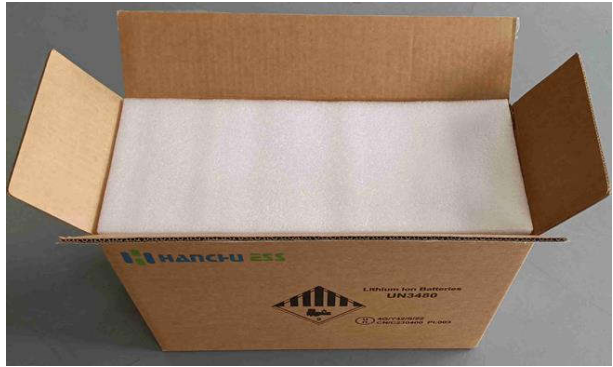
8.Other

Manufacturer reserves the right to change and amend the design and specification without prior notice.

- - - End of Attachment 2 - - -

Attachment 3 Packaging

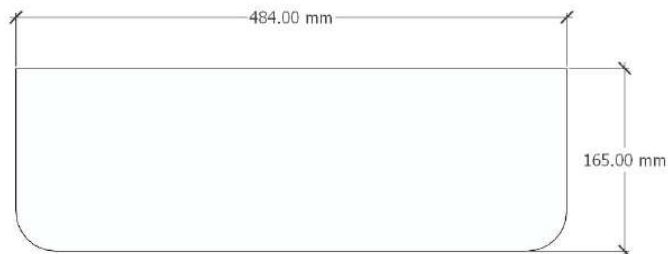
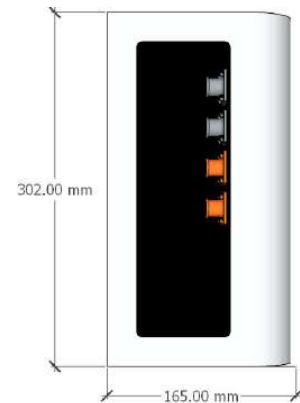
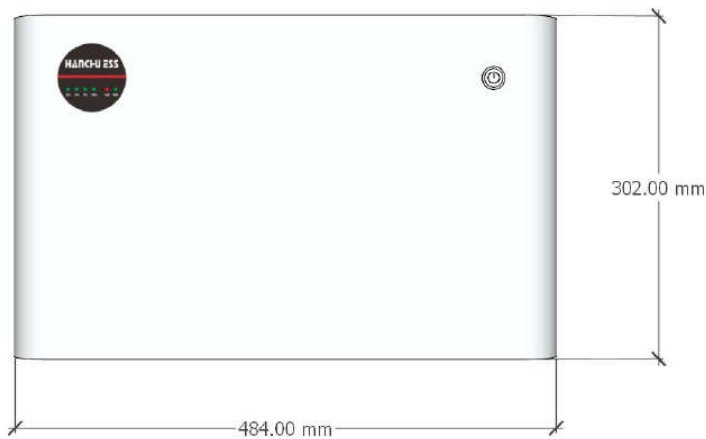
Packing Schematic Diagram



--- End of Attachment 3 ---

Attachment 4 Product specification**Specification of Battery**

Model	HOME-ESS-LV-3.2K
Product description	Rechargeable Lithium-ion Battery Pack (Product name: Energy Storage Battery)
Rated voltage	51,2 V
Rated capacity	63 Ah
Operating voltage range	43,2 V – 57,6 V
Standard charging mode	Constant charging current 40 A to 57,6 V, and keep at 57,6 V (constant voltage) till charging current was below 4,5 A
Maxium charging current	67 A
Maxium discharging current	67 A
Operating temperature range	Charge: 0-50 °C Discharge: -10-60 °C
Weight	Approx. 34,9 kg
Shell	Material: metal , Surface color: black
Communication method	RS485/CAN

Dimensions of battery(unit: mm)

Attachment 4 Product specification

Interface layout of battery

The energy storage battery has two quick-plug power connection terminals, address dial switch, reset button, WiFi interface, 1 CAN communication interface, and 2 485 communication interfaces.



--- End of Attachment 4 ---