



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**..... : SHES250801412801  
**Date of issue** ..... : 2025-09-19  
**Total number of pages** ..... : 24 pages

**Name of Testing Laboratory preparing the Report** ..... : SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

**Applicant's name** ..... : Zhejiang Hyxi Technology Co., Ltd.  
**Address** ..... : Room 216, Block A, Building 1, No. 57 Jiang'er Road, Changhe Street, Binjiang District, Hangzhou, Zhejiang, China

**Test specification:**  
**Standard** ..... : IEC 62619:2022  
**Test procedure**..... : CB Scheme  
**Non-standard test method**..... : N/A

**TRF template used** ..... : IECEE OD-2020-F1:2022, Ed.1.5  
**Test Report Form No.**..... : IEC62619B  
**Test Report Form(s) Originator** .... : UL Solutions (Demko)  
**Master TRF** ..... : Dated 2022-12-16

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<b>Test item description</b> .....	Rechargeable Lithium-ion Battery Pack					
<b>Trademark(s)</b> .....						
<b>Manufacturer</b> .....	Zhejiang LeapEnergy Technology Co., Ltd. Room 220-116, Comprehensive Office Building, 222 Luyin Road, Qianjin Street, Qiantang District, Hangzhou, Zhejiang, China					
<b>Model/Type reference</b> .....	HYX-E50-H2-AU, HYX-E100-H2-AU, HYX-E150-H2-AU, HYX-E200-H2-AU, HYX-E250-H2-AU					
<b>Ratings</b> .....	Model	HYX-E50-H2-AU	HYX-E100-H2-AU	HYX-E150-H2-AU	HYX-E200-H2-AU	HYX-E250-H2-AU
	Rated Voltage, V	102,4	204,8	307,2	409,6	512,0
	Max. charging voltage of Battery Pack, V	115,2	230,4	345,6	460,8	576,0
	End of discharge voltage of Battery Pack, V	86,4	172,8	259,2	345,6	432,0
	Rated Capacity, kWh	5,3	10,6	15,9	21,2	26,5
	Rated Capacity, Ah	52				
	Max. charging current, A	35				
	Max. discharging current, A	35				
	Charging Temperature range, °C	-10 - 50				
	Discharging Temperature range, °C	-10 - 50				
<b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b>						
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.				
	<b>Testing location/ address</b> .....	588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China.				
	<b>Tested by (name, function, signature)</b>	Minsen Liu	<i>Minsen Liu</i>			
		Project Engineer				
	<b>Approved by (name, function, signature)</b> .....	Brian Han	<i>Brian Han</i>			
		Report Reviewer				
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 1:</b>	N/A				
	<b>Testing location/ address</b> .....					
	<b>Tested by (name, function, signature)</b>					
	<b>Approved by (name, function, signature)</b> .....					

<input type="checkbox"/>	<b>Testing procedure: CTF Stage 2:</b>	N/A	
<b>Testing location/ address.....</b>			
<b>Tested by (name + signature).....</b>			
<b>Witnessed by (name, function, signature).....</b>			
<b>Approved by (name, function, signature).....</b>			
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 3:</b>	N/A	
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 4:</b>	N/A	
<b>Testing location/ address.....</b>			
<b>Tested by (name, function, signature).</b>			
<b>Witnessed by (name, function, signature).....</b>			
<b>Approved by (name, function, signature).....</b>			
<b>Supervised by (name, function, signature).....</b>			

<p><b>List of Attachments (including a total number of pages in each attachment):</b></p> <p>Attachment 1: 11 pages of Photos.</p> <p>Attachment 2: 1 page of Information for safety.</p> <p>Attachment 3: 1 page of Packaging.</p> <p>Attachment 4: 2 pages of Product specification.</p>	
<p><b>Summary of testing:</b></p> <p>The sample(s) tested complies with the requirements of IEC 62619: 2022.</p> <p>Battery pack test data were copied from original CB Report No. SHES250701203901, dated 2025-08-04, Cert. No.: BE-53116, dated 2025-08-07, with following changes:</p> <ul style="list-style-type: none"> <li>- Changed the Model/Type reference from "HYX-E50-H2, HYX-E100-H2, HYX-E150-H2, HYX-E200-H2, HYX-E250-H2" to "HYX-E50-H2-AU, HYX-E100-H2-AU, HYX-E150-H2-AU, HYX-E200-H2-AU, HYX-E250-H2-AU".</li> <li>- Updated photos of external view of Rechargeable Lithium-ion Battery Pack.</li> <li>- Updated the label for Rechargeable Lithium-ion Battery Pack.</li> <li>- Updated critical components information related "DC Isolator".</li> </ul> <p>After comparison, no additional test was considered necessary.</p> <p>Remark:</p> <p>1. Only battery pack was considered and tested according to standard in this report as the cell (model: IFP28148115A-52Ah) was certified according to IEC 62619: 2022 by TÜV SÜD (Certif. No.: SG PSB-BT-03623, CB report No.: 085-282260450-000).</p> <p>2. The functional safety requirement in clause 8 was also evaluated according to Annex H of IEC 60730-1:2016 (SGS Report No. SHFS230300007371).</p>	
<p><b>Tests performed (name of test, test clause and date test performed):</b></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) Original: 2023-03-16 to 2023-03-27</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) Original: 2023-03-16 to 2023-03-27</p> <p><input checked="" type="checkbox"/>8.2.3 Overcharge control of current (battery system) Original: 2023-03-16 to 2023-03-27</p> <p><input checked="" type="checkbox"/>8.2.4 Overheating control (battery system) Original: 2023-03-16 to 2023-03-27</p>	<p><b>Testing location: (CBTL, SPTL, CTF, Subcontractor)</b></p> <p>SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd 588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China</p>

**Summary of compliance with National Differences (List of countries addressed):****EU Group difference, GB**

The product fulfils the requirements of EN IEC 62619:2022 and BS EN IEC 62619:2022.

**Use of uncertainty of measurement for decisions on conformity (decision rule) :**

No decision rule is specified by the IEC 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").

Other: ... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

**Information on uncertainty of measurement:**

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

**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.**

Label for Rechargeable Lithium-ion Battery Pack

BDU Model: HYX-EBDU-H2-AU					
Product: Rechargeable Li-ion Battery Distribution Unit					
System Model	HYX-E50-H2-AU	HYX-E100-H2-AU	HYX-E150-H2-AU	HYX-E200-H2-AU	HYX-E250-H2-AU
Rated Energy	5.3kWh	10.6kWh	15.9kWh	21.2kWh	26.5kWh
Rated Capacity	52Ah	52Ah	52Ah	52Ah	52Ah
Rated Voltage	102.4V	204.8V	307.2V	409.6V	512V
Operating Voltage Range	86.4~115.2V	172.8~230.4V	259.2~345.6V	345.6~460.8V	432~576V
Output Power	3.0kW	6.0kW	9.0kW	12.0kW	15.0kW
Working Temperature Range	-10~50°C	-10~50°C	-10~50°C	-10~50°C	-10~50°C
Max. Discharge Current	32A	32A	32A	32A	32A
Ingress Protection	IP65	IP65	IP65	IP65	IP65
Protection	Class I	Class I	Class I	Class I	Class I
Battery Designation	IFpP29/149/120[(32S)M]-10+50/95 IFpP29/149/120[(32S)2S]M-10+50/95 IFpP29/149/120[(32S)3S]M-10+50/95 IFpP29/149/120[(32S)4S]M-10+50/95 IFpP29/149/120[(32S)5S]M-10+50/95				

**Zhejiang Hyxi Technology Co., Ltd.**  
Building 1, No. 57 Jiang'er Rd., Changhe St., Hangzhou, China

support@hyxipower.com  
www.hyxipower.com

SN:8511123110001  
  
Made in China

Label for Module

Model : HYX-E50B-H2			
Product: Rechargeable Li-ion Battery			
Cell Type	LFP		SN:8511123110001
Rated Energy	5.3kWh		
Rated Capacity	52Ah		
Rated Voltage	102.4V		
Voltage Range	86.4~115.2V		
Max. Charge&Discharge Current	35A		
Output Power	3kW		
Working Temperature Range	-10~+50°C		Made in China support@hyxipower.com www.hyxipower.com
IFpP29/149/120[(32S)M]-10+50/95			
<b>Zhejiang Hyxi Technology Co., Ltd.</b>			
Building 1, No. 57 Jiang'er Rd., Changhe St., Hangzhou, China			

Polarity marking on Battery Pack



Alternate Polarity marking on Battery Pack



## Remark:

1, The SN number "8511123110001" includes code for production date "2311". Specific coding rules are shown in the table below.

Year	23 means 2023
Month	11 means November

2, Disposal instructions and recommended charge instructions are included in Battery Pack Specification, see attachment 2 and attachment 4 for details.

3, The polarity was marked near the terminals, see above photo for details.

<b>Test item particulars</b> .....: --	
<b>Classification of installation and use</b> .....: --	
<b>Supply Connection</b> .....: --	
.....:	
<b>Possible test case verdicts:</b>	
- 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)	
<b>Testing</b> .....:	
<b>Date of receipt of test item</b> .....: 2025-08-01	
<b>Date (s) of performance of tests</b> .....: Original: 2023-03-16 to 2023-03-27	
<b>General remarks:</b>	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	
<b>Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</b>	
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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.	
<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC62619B:</b>	
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"/> <b>Yes</b> <input checked="" type="checkbox"/> <b>Not applicable</b>
<b>When differences exist; they shall be identified in the General product information section.</b>	
<b>Name and address of factory (ies)</b> .....: Zhejiang LeapEnergy Technology Co., Ltd. No. 888 Xinrong Road, Sumeng Town, Wucheng District, Jinhua, Zhejiang, China	

**General product information and other remarks:**

Product description:	Rechargeable Lithium-ion Battery Pack				
Model of Battery Pack:	HYX-E50-H2-AU	HYX-E100-H2-AU	HYX-E150-H2-AU	HYX-E200-H2-AU	HYX-E250-H2-AU
Designation of Battery Pack:	IFpP29/149/120[(32S)]M/-10+50/95	IFpP29/149/120[(32S)2S]M/-10+50/95	IFpP29/149/120[(32S)3S]M/-10+50/95	IFpP29/149/120[(32S)4S]M/-10+50/95	IFpP29/149/120[(32S)5S]M/-10+50/95
Nominal voltage of Battery Pack:	102,4 V	204,8 V	307,2 V	409,6 V	512 V
Max. charging voltage of Battery Pack:	115,2 V	230,4 V	345,6 V	460,8 V	576 V
End of discharge voltage of Battery Pack:	86,4 V	172,8 V	259,2 V	345,6 V	432 V
Rated Capacity:	5,3 kWh	10,6 kWh	15,9 kWh	21,2 kWh	26,5 kWh
Number of cells in battery Pack:	32S	(32S)2S	(32S)3S	(32S)4S	(32S)5S
Rated capacity of cell of Battery Pack:	52 Ah				
Maximum charge current of Battery Pack:	35 A				
Maximum discharge current of Battery Pack:	35 A				
Charging temperature range of Battery Pack:	-10 - 50 °C				
Discharge temperature range of Battery Pack:	-10 - 50 °C				
Standard charging method of Battery Pack (declared by manufacturer):	Constant charging current 32 A to maximum voltage of above each Battery Pack.				

Model of Module	HYX-E50B-H2
Designation of Module:	IFpP29/149/120[32S]M/-10+50/95
Nominal voltage of Module:	102,4 V
Max. charging voltage of Module:	115,2 V
End of discharge voltage of Module:	86,4 V
Number of cells in Module:	1P32S
Rated capacity of cell of Module:	52 Ah
Maximum charge current of Module:	35 A
Maximum discharge current of Module:	35 A
Charging temperature range of Module:	-10 - 50 °C
Discharge temperature range of Module:	-10 - 50 °C
Ingress protection	IP67
Standard charging method of Module (declared by manufacturer):	Constant charging current 32 A to 115,2 V

Model of cell:	IFP28148115A-52Ah
Rated voltage of cell:	3,2 V
Max. charging voltage of cell:	3,65 V
End of discharge voltage of cell:	2,0 V
Rated capacity of cell:	52 Ah
Maximum charge current of cell:	52 A
Maximum discharge current of cell:	52 A

Remark: See also Attachment 4 for details.

Only model HYX-E50-H2-AU was tested as representative model due to all the 5 models of battery pack have the same high-voltage box and basic battery module (model HYX-E50B-H2), the only difference is the number of the battery module, models HYX-E50-H2-AU, HYX-E100-H2-AU, HYX-E150-H2-AU, HYX-E200-H2-AU, HYX-E250-H2-AU have 1, 2, 3, 4, 5 basic battery modules respectively.

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>PARAMETER MEASUREMENT TOLERANCES</b>		
	Parameter measurement tolerances		P
<b>5</b>	<b>GENERAL SAFETY CONSIDERATIONS</b>		P
<b>5.1</b>	<b>General</b>		<b>P</b>
	Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse... :	Clause 6, Clause 7, 8.1, and 8.2. See also table 5.1 for Critical components information.	P
	Reduce the risk of injuries from moving parts		P
<b>5.2</b>	<b>Insulation and wiring</b>		<b>P</b>
	Voltage, current, altitude, and humidity requirements		P
	Adequate clearances and creepage distances between connectors and live parts at different voltages or between live parts and non-current-carrying accessible parts		P
	Protect from hazardous live parts, including during installation		P
	The mechanical integrity of internal connections		P
<b>5.3</b>	<b>Venting</b>		<b>P</b>
	Pressure relief function	Cell: A pressure relief mechanism was used to relieve excessive internal pressure. Battery Pack: Metal enclosure secured by screws, aperture as the venting mechanism.	P
	Encapsulation used to support cells within an outer casing	Metal encapsulation ware used to support cells, will not cause the module and battery pack to overheat during normal operation nor inhibit pressure relief.	P
<b>5.4</b>	<b>Temperature/voltage/current management</b>		<b>P</b>
	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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
<b>5.5</b>	<b>Terminal contacts of the battery pack and/or battery system</b>		<b>P</b>
	Polarity marking(s)	Marked "HV+" and "HV-".	P
	Polarity marking not provided for keyed external connector		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
<b>5.6</b>	<b>Assembly of cells, modules, or battery packs into battery systems</b>		<b>P</b>
5.6.1	General		P
	Independent control and protection method(s)		P
	Recommendations of cell operating limits, mounting advice, storage conditions and other design recommendations 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
	Maximum charging/discharging current of the cell are not exceeded		P
<b>5.7</b>	<b>Operating region of lithium cells and battery systems for safe use</b>		<b>P</b>
	The cell operating region..... :	Voltage range: 2,0 V to 3,65 V Maximum charge current: 52 A Maximum discharge current: 52 A Charge temperature range: -20-55 °C Discharge temperature range: -30-60 °C (Information from IEC 62619 Certif. No.: SG PSB-BT- 03623, CB report No.: 085- 282260450-000)	P
	Designation of battery system to comply with the cell operating region		P
<b>5.8</b>	<b>System lock (or system lock function)</b>		<b>P</b>
	Non-resettable function to stop battery operation	Evaluated in end product.	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Manual with procedure for resetting of battery operation		P
	Emergency battery final discharge		P
<b>5.9</b>	<b>Quality plan</b>		<b>P</b>
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented..... :	Self-Declaration of ISO9001.	P
	The process capabilities and the process controls		P

<b>6</b>	<b>TYPE TEST CONDITIONS</b>		P
<b>6.1</b>	<b>General</b>		<b>P</b>
<b>6.2</b>	<b>Test items</b>		<b>P</b>
	Cells or batteries that are not more than six months old (See Table 1 of IEC 62619)	Battery Pack production date is within six months.	P
	Capacity confirmation of the cells or batteries	Tests were carried out in an ambient temperature of 25±5 °C.	P
	Default ambient temperature of test, 25 °C ± 5 °C		P

<b>7</b>	<b>SPECIFIC REQUIREMENTS AND TESTS</b>		P
<b>7.1</b>	<b>Charging procedure for test purposes</b>		<b>P</b>
	The battery discharged to a specified final voltage prior to charging	Discharge to End of discharge voltage of each Battery Pack according to the above table with a constant current of 32 A.	P
	The cells or batteries charged using the method specified by the manufacturer..... :	Battery Pack: Constant charging current 32 A to maximum charging voltage of each Battery Pack.	P
<b>7.2</b>	<b>Reasonably foreseeable misuse</b>		<b>P</b>
7.2.1	External short-circuit test (cell or cell block)	Approval cell used.	N/A
	Short circuit with total resistance of 30 m ± 10 m at 25 °C ± 5 °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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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)	The mess of the battery pack is more than 20 kg.	N/A
	Description of the Test Unit..... :		—
	Mass of the test unit (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 pack.	—
	Mass of the test unit (kg)..... :	HYX-E50-H2-AU: Approx. 59 kg.	—
	Height of drop (m)..... :	5 cm for model HYX-E50B-H2.	—
	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..... :	See Table 7.2.5.	N/A
7.2.6	Forced discharge test (cell or cell block)	Approval cell used.	N/A
	Cells connected in series in the battery system .....		N/A
	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 $I_t$ .....		N/A
	Discharging time, $t = (1 I_t / I_m) \times 90$ (min.) .....		N/A
	Results: no fire, no explosion..... :		N/A
<b>7.3</b>	<b>Considerations for internal short-circuit – Design evaluation</b>		<b>P</b>
7.3.1	General		N/A
7.3.2	Internal short-circuit test (cell)	Approval cell used.	N/A
	Samples preparation procedure: In accordance with Clause A.5 and A.6 of IEC 62133-2:2017		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Tested per 7.3.2 b) in an ambient temperature of 25 °C ± 5 °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 .....		N/A
7.3.3	Propagation test (battery system)	Internal short-circuit test has been considered in cell test report.	N/A
	Method to create a thermal runaway in one cell ... :		N/A
	Results: No external fire from the battery system, no battery case rupture .....		N/A

<b>8</b>	<b>BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)</b>		<b>P</b>
<b>8.1</b>	<b>General requirements</b>		<b>P</b>
	Functional safety analysis for critical controls	The functional safety requirement was evaluated according to Annex H of IEC 60730-1:2016 (SGS Report No. SHFS230300007371).	P
	Conduct of a process hazard analysis for both the cell manufacturing process and the battery system manufacturing process		P
	Conduct of risk assessment and mitigation of the battery system		P
<b>8.2</b>	<b>Battery management system (or battery management unit)</b>		<b>P</b>
8.2.1	Requirements for the BMS		P
	The safety integrity level (SIL) target of the BMS	Class B per Annex H of 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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The BMS terminated the charging before exceeding 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..... :	55 °C	P
	Results: no fire, no explosion..... :		P
	The BMS detected the overheat temperature and terminated charging		P
	The battery system operated as designed during test		P

<b>9</b>	<b>EMC</b>		P
	Battery system fulfil EMC requirements of the end-device application..... :	The EMC requirement was evaluated according to EN IEC 61000-6-1:2019, EN IEC 61000-6-2:2019, EN IEC 61000-6-3:2021, EN IEC 61000-6-4:2019 (SGS Report No. SHEMA250800537501).	P

<b>10</b>	<b>INFORMATION FOR SAFETY</b>		P
	The cell manufacturer provides information about current, voltage and temperature limits of their products		P
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.	See attachment 2	P

<b>11</b>	<b>MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)</b>		P
	The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual.	See page 6	P
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Battery designation	IFpP29/149/120[(32S)]M/-10+50/95, IFpP29/149/120[(32S)2S]M/-10+50/95, IFpP29/149/120[(32S)3S]M/-10+50/95, IFpP29/149/120[(32S)4S]M/-10+50/95, IFpP29/149/120[(32S)5S]M/-10+50/95	P
	Battery structure formulation	32S, (32S)2S, (32S)3S, (32S)4S, (32S)5S	P

<b>12</b>	<b>PACKAGING AND TRANSPORT</b>		P
	Refer to Annex D	See attachment 3	P

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

<b>ANNEX B</b>	<b>PROCEDURE OF 7.3.3 PROPAGATION TEST BY LASER IRRADIATION</b>		N/A
<b>B.1</b>	<b>General</b>		<b>N/A</b>
<b>B.2</b>	<b>Test conditions</b>		<b>N/A</b>
B.2.1	Cell test (preliminary test)		N/A
	The cell fully charged according to the manufacturer recommended conditions .....		—
	Laser irradiation point on the cell .....		—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Output power of laser irradiation..... :		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A
	Repeat of cell test for 3 times		N/A
B.2.2	Battery system test (main test)		N/A
	The battery system fully charged according to the manufacturer recommended conditions .....		—
	Target cell to be laser irradiated .....		—
	The irradiation point on the target cell same or similar as that on the cell test		
	Output power of laser irradiation..... :		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A

<b>ANNEX C</b>	<b>PROCEDURE OF 7.3.3 PROPAGATION TEST BY METHODS OTHER THAN LASER</b>		N/A
C.1	General		N/A
C.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.....		—
C.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.....		—

<b>ANNEX D</b>	<b>PACKAGING AND TRANSPORT</b>		P
	The materials and pack design chosen in a way as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P
	Regulations concerning international transport of secondary lithium batteries		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 <sup>1)</sup>	
Cell	Hefei Gotion High-tech Power Energy Co., Ltd.	IFP28148115A -52Ah	3,2 V, 52 Ah	IEC 62619: 2022 EN IEC 62619: 2022	TÜV SÜD (CB Cert. No.: SG PSB-BT- 03623, CB Report No.: 085- 282260450- 000)	
Metallic Enclosure	Interchangeable	SUS430	Material: Stainless steel, minimum thickness 1 mm	--	--	
Lead wires (Signal)	Interchangeable	Interchangeable	24 AWG, Horizontal flame, 200 °C, 300 Vac	UL 758	UL	
Lead wires (Power)	3Q WIRE & CABLE CO LTD	1015	10 AWG, Horizontal flame, 105 °C, 600 Vac	UL 758	UL (E341104)	
Earthing lead wire	Interchangeable	Interchangeable	11 AWG, 105 °C, 600 V, VW-1	UL 758	UL (E312831)	
Foam	Interchangeable	Interchangeable	Min V-2, Min 80 °C, min thickness 1 mm	UL 94, UL 746	--	
Earthing bonding wire	Interchangeable	Interchangeable	18 AWG, 105°C, 600 V, VW-1	UL 758	UL (E355578)	
Heat shrinkable tubing	CHANGYUAN ELECTRONICS GROUP CO LTD	CB-HFT(6P)	600 V, 125 °C, VW-1	UL 224	UL (E180908)	
Heat shrinkable tubing (Alt.)	Interchangeable	Interchangeable	600 V, 125 °C, VW-1	UL 224	UL	
Charging & Discharging Output Connector	AMPHENOL TECHNOLOGY (ZHUHAI) CO LTD	C10-754727- ()()()	1500 V, 70 A	UL 4128	UL (E496781)	
Charging & Discharging Output Connector (Alt.)	AMPHENOL TECHNOLOGY (ZHUHAI) CO LTD	H4PFM4TMS, H4PMM4TMS	1100 Vdc, 35 A	IEC 62852: 2014+A1 EN 62852: 2015+A1	TÜV Rheinland (R 5038808300 12)	

IEC 62619					
Clause	Requirement + Test			Result - Remark	Verdict
DC connector between modules	MXZL Connectivity	MX01-P06-HB MX01-R10-HB	600 V, 36 A	UL1977	UL (E536865)
RELAY in Main Control Box & Module	SHANGHAI LIANGXIN ELECTRICAL CO LTD	NDZ3T- 40B/750V 12	750 V, 40 A	UL 60947-1 UL 60947-4-1	UL (E514982)
RELAY for heating & pre-charge	XIAMEN HONGFA ELECTROACOU STIC CO LTD	HFE80V- 20C/450-12- HTQ2J(864)	450 V, 20 A	UL 508	UL (E133481)
FUSE	EUGARD CO., LTD	EV88	750 V, 75 A	UL 248	UL (E479415)
Pre-charge resistor	Anhui Laidefu Electronic Technology Co., Ltd	RX27-4HS- 100W-50R J	50 $\Omega$ , 100 W, -55 °C to 275 °C	--	--
NTC	SHENZHEN KEMIN SENSOR CO LTD	MF5210K	10 $\pm$ 1% K $\Omega$ @ 25 °C, T <sub>moa</sub> 120 °C	UL 1434	UL (E356449)
DC Isolator	DELIXI ELECTRIC LTD	CDGNE- 50M2112	800 V, 50 A	AS 60947.3:2018 AS/NZS IEC 60947.1:2015	TÜV Rheinland (No. AZ 69027309)
BMU					
PCB	SHENGYI TECHNOLOGY CO LTD	S1000-2M	V-0, 130 °C, CTI>175	UL 796	UL (E109769)
PCB (Alt.)	Interchangeable	Interchangeable	V-0, 130 °C	UL 796	UL
Optical Isolator (OM2, OM3, OM4)	Panasonic Industry Co., Ltd.	AQW216HAXC 88	Isolation voltage 5000 V	UL 1577	UL (E191218)
Optical Isolator (OM5)	Panasonic Electric Works CO.,Ltd.	AQV258HAXC 88	Isolation voltage 5000 V	UL 1577	UL (E191218)
Isolating IC (U21)	Texas Instruments Deutschland GmbH	ISO7741QDW RQ1	8K V <sub>peak</sub> , 125°C, Reinforced insulation	EN IEC 60747- 17:2020+AC: 2021	VDE (40040142)
Signal transformer(T3)	SHENZHEN SUNLORD ELECTRONICS COLTD	ALTWR- H06TF	4K V <sub>peak</sub> , 125°C, Reinforced insulation	UL62368-1	UL (532344)

IEC 62619					
Clause	Requirement + Test			Result - Remark	Verdict
Bridge resistor between primary and secondary circuit (R262, R263, R264, R265, R266, R267, R291, R292, R293, R269, R270, R271)	Interchangeable	Interchangeable	Min. 220 K $\Omega$ , Min. 0,125W	--	Tested with appliance
BSU					
PCB	SHENGYI TECHNOLOGY CO LTD	S1000-2M	V-0, 130 °C, CTI>175	UL 796	UL (E109769)
PCB (Alt.)	Interchangeable	Interchangeable	V-0, 130 °C	UL 796	UL
Network transformer (T1, T2)	SHENZHEN SUNLORD ELECTRONICS CO LTD	ALTWR-F02TFXXX	Ext. cl. / ext. cr.: $\geq 8,0$ mm / $\geq 8,0$ mm; Dti. $\geq 0,4$ 8K Vpeak, 105°C CT1=600	UL 62368-1	UL (E532344)
<b>Supplementary information:</b>					
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	
--	--	--	--	--	--	
<b>Supplementary information:</b> 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
--	--	--	--	--	--	--
<b>Supplementary information:</b> 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 <sub>t</sub> , (A)	Total Time for Reversed Charge Application (min)	Results	
--	--	--	--	--	--	
<b>Supplementary information:</b> 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 <sup>1)</sup>	Maximum applied pressure, (N)	Results	
--	--	--	--	--	
<p><b>Supplementary information:</b></p> <p><sup>1)</sup> 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><b>Results:</b></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 <sup>1)</sup>		Location of target cell		Area for fire protection (m <sup>2</sup> )	
--		--		--	
<p><b>Supplementary information:</b></p> <p>1) Cell can be failed through laser exposure, 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><b>Results:</b></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
5#	2,714 to 2,733	35	115,2	3,65	A, D, F
			<b>Charge Voltage Applied Battery System: 1)</b>		
			<b>Whole</b>	<b>Part</b>	
			128,48 Vdc	--	
<b>Supplementary information:</b>					
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
5#	94,337	42	115,2	A, D, F
<b>Supplementary information:</b>				
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	<b>TABLE: Overheating control (battery system)</b>		<b>P</b>
Model No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Measured Maximum Charging Voltage, V dc
5#	103,021	35	115,2
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results
50		55	A, D, F, H
<b>Supplementary information:</b>			
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): __ Protected immediately when charging __			

9	<b>TABLE: EMC</b>				<b>N/A</b>
Standard used for EMC test:					
Sample No.	EMC Test Item	Battery Condition	EMC Test Level/ Parameters	Compliance Criteria	Results
--	--	--	--	--	--
<b>Supplementary information:</b>					
Battery Condition During EMC test 1 – In Operation Mode, [ ] Supplied at ____, [ ] Load at____ 2 – In non-operation Mode, Battery state of charge (SOC) before test at around____					
Compliance Criteria and Test Results: A – No fire or Explosion B – Fire C – Explosion D – Battery system did operate as intended during the test. E - All function of battery system did operate as intended after the test. F - All function of battery system did not operate as intended during the test, (Please explain): ____ G - Other (Please explain): ____					

--- End of Report ---

**Attachment 1 Photo documentation**

Overall External View of Battery pack, HYX-E50-H2-AU



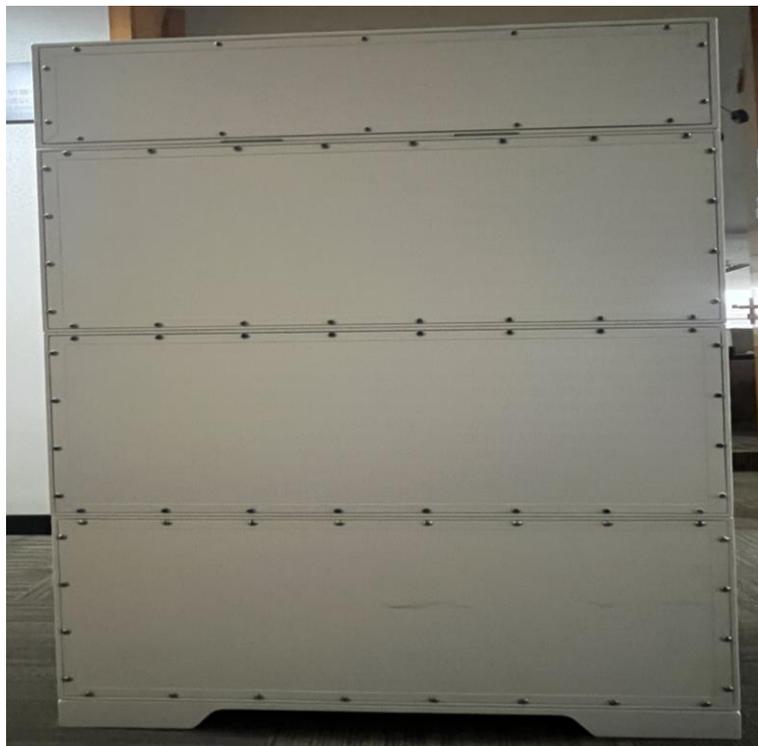
**Attachment 1 Photo documentation**

Overall External View of Battery pack, HYX-E100-H2-AU



**Attachment 1 Photo documentation**

Overall External View of Battery pack, HYX-E150-H2-AU



**Attachment 1 Photo documentation**

Overall External View of Battery pack, HYX-E200-H2-AU



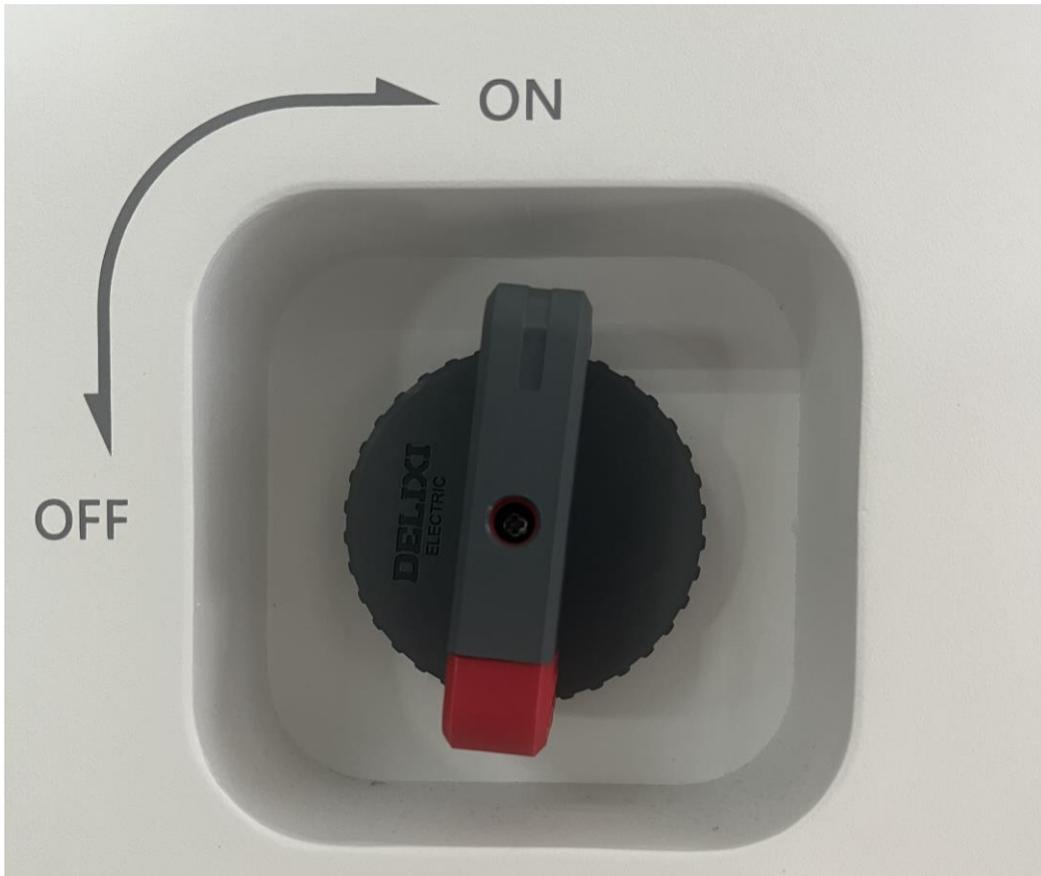
**Attachment 1 Photo documentation**

Overall External View of Battery pack, HYX-E250-H2-AU



**Attachment 1 Photo documentation**

Overall External Side View of High-voltage Box



Polarity marking on Battery Pack



**Attachment 1 Photo documentation**

Alternate Polarity marking on Battery Pack



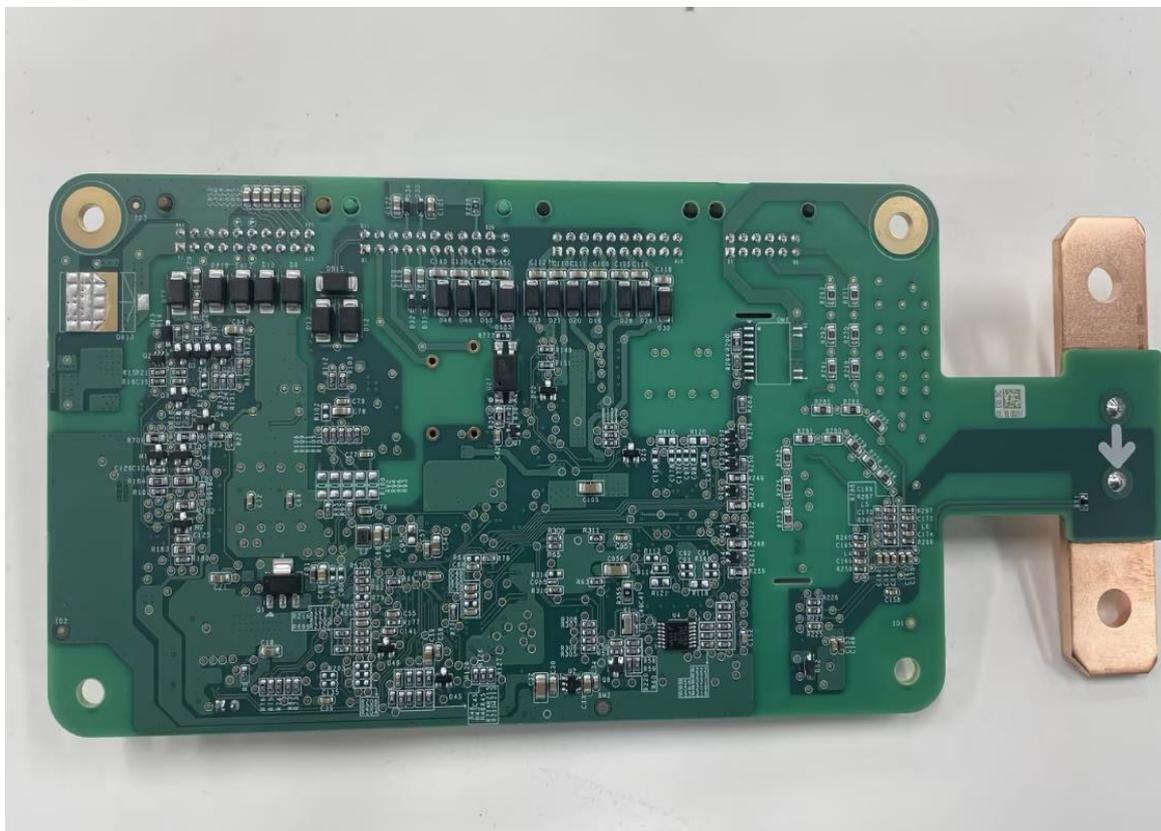
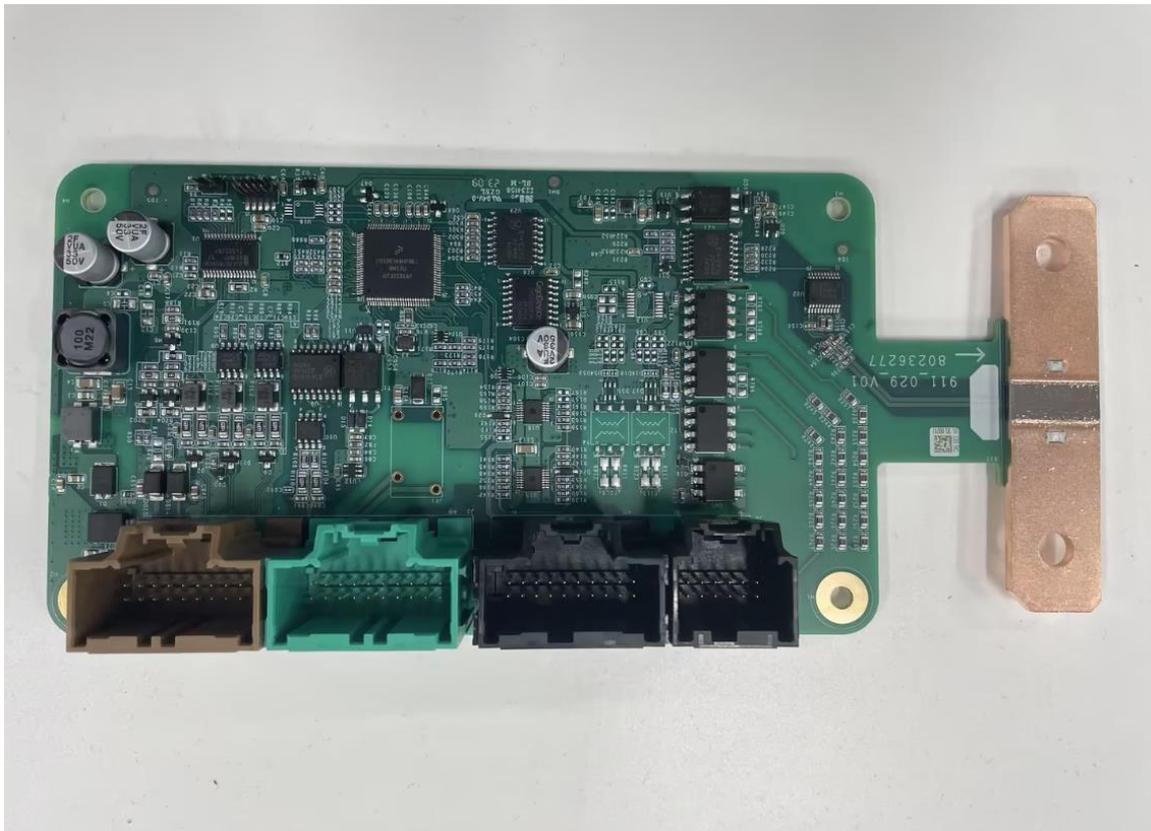
**Attachment 1 Photo documentation**

Internal View of Battery pack, Model HYX-E50-H2-AU



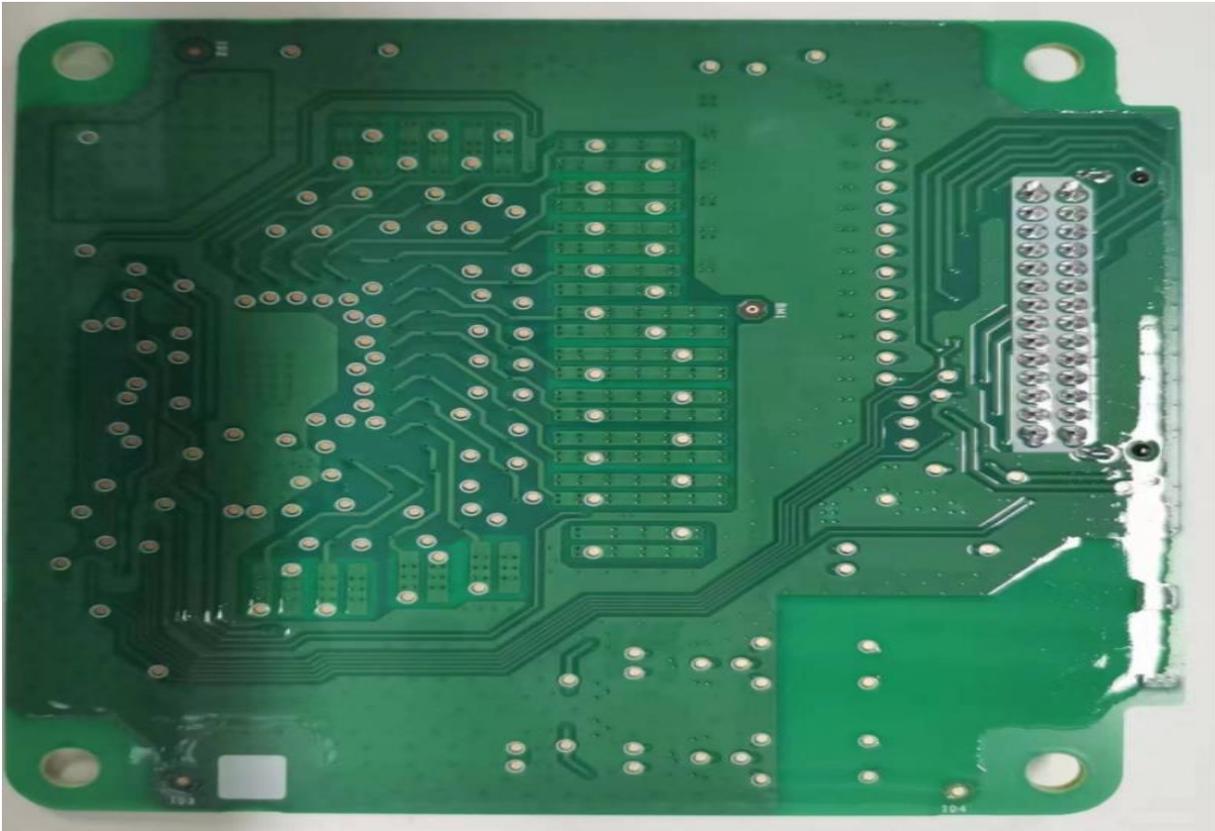
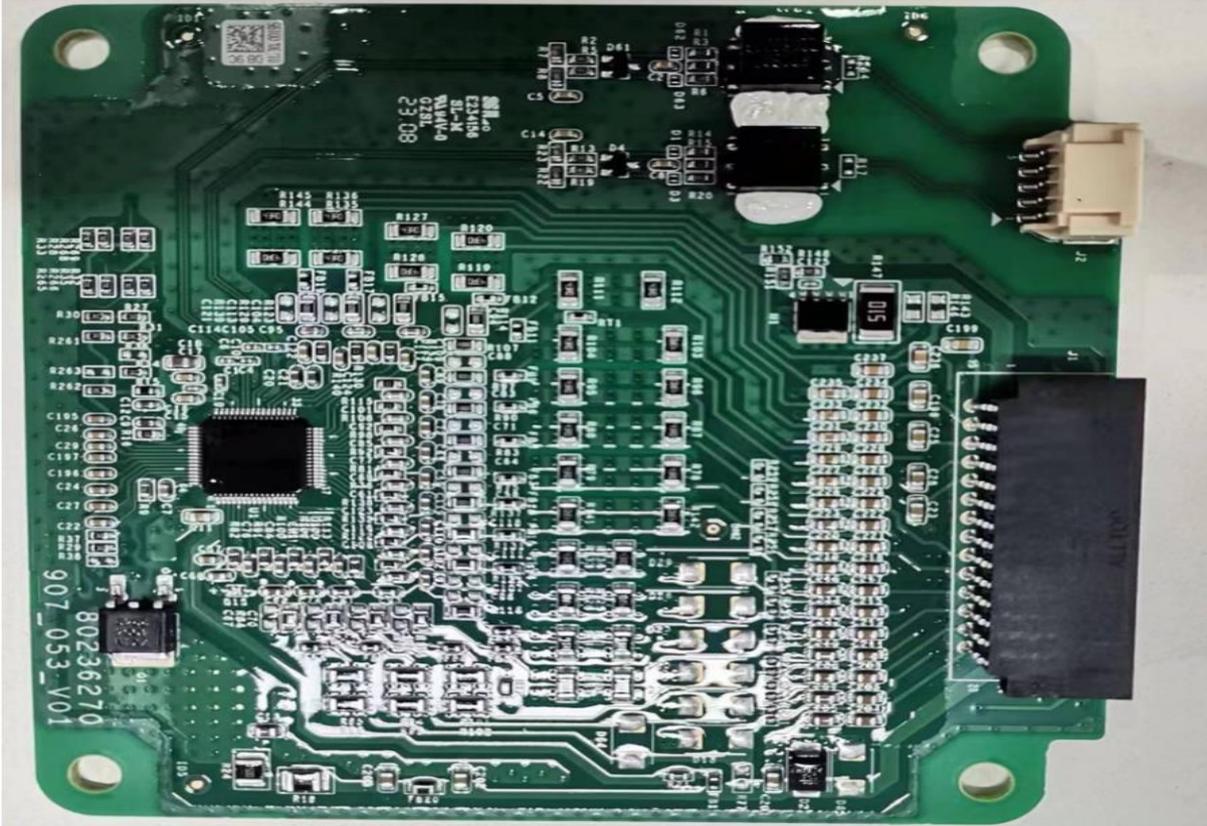
**Attachment 1 Photo documentation**

PCBA of BMU



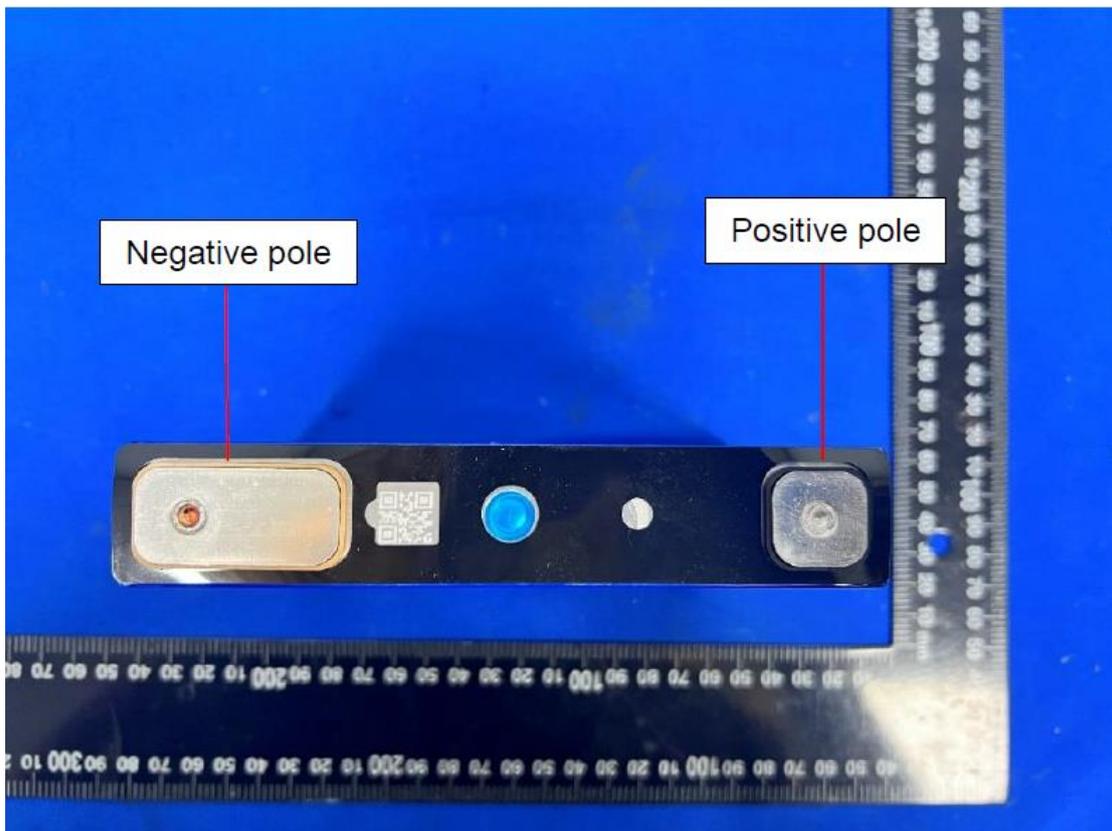
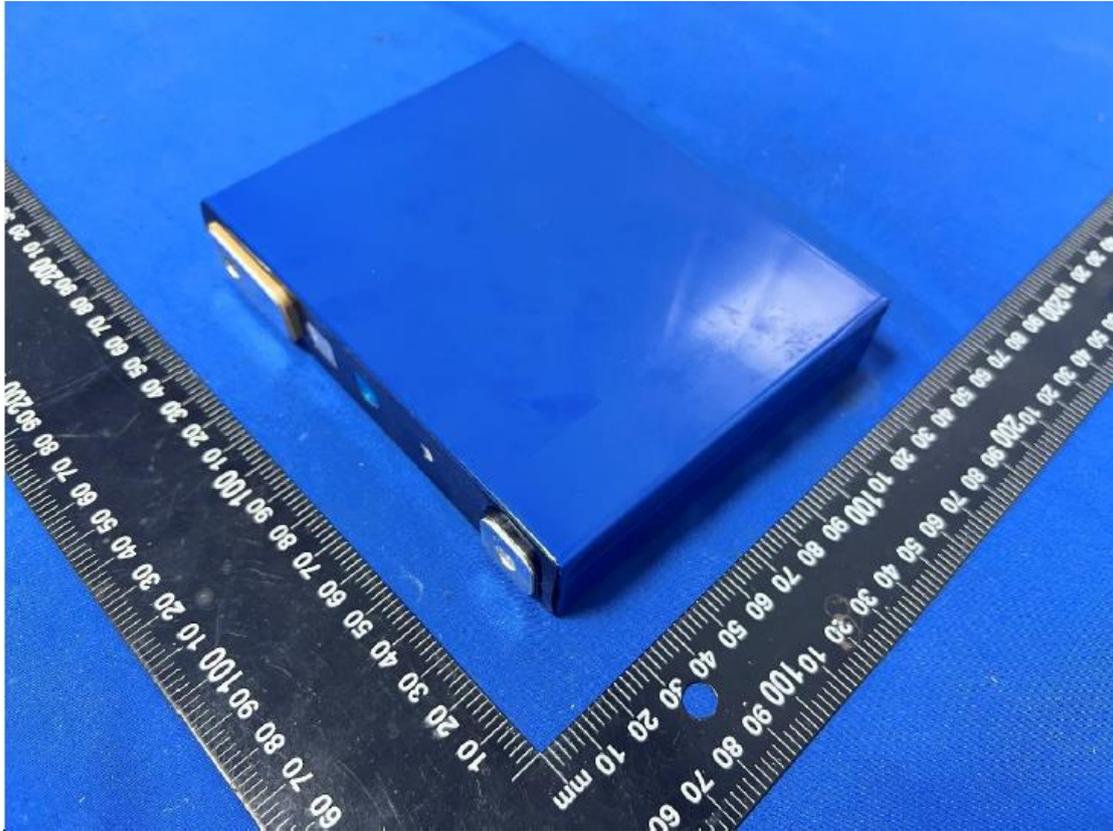
**Attachment 1 Photo documentation**

PCBA of BSU



**Attachment 1 Photo documentation**

Cell



--- End of Attachment 1 ---

## **Attachment 2 Information for safety**

### Precautions for product use

- 1 Do not put the battery in water or get it wet.
- 2 It is forbidden to charge and use the battery outside the temperature range specified by us; do not store, charge and use this product near fire or heat sources.
- 3 When the battery pack emits a peculiar smell or leaks, stop using it or stop charging immediately, and move it to an open and ventilated place, away from the fire source, and contact us in time.
- 4 When connecting to a load, do not connect the positive and negative poles reversely.
- 5 Do not short-circuit the positive and negative poles of the battery pack with metal conductors.
- 6 Do not throw the battery pack into fire or heat it.
- 7 It is strictly forbidden to conduct artificial dissection of the battery pack. It is strictly forbidden to pierce the battery pack with nails or sharp objects. It is strictly forbidden to hit the battery pack with a hammer or other external force. It is strictly forbidden to step on and drop the battery pack.
- 8 It is strictly forbidden to put the battery pack in a microwave oven or pressure vessel.
- 9 If any abnormal phenomenon occurs during charging or use, please stop charging and use immediately.
- 10 The best use temperature of the product is  $25\pm 5^{\circ}\text{C}$ . If the product is not within this temperature range during use, the discharge capacity will be reduced.
- 11 If there is a malfunction or abnormality during use, please contact us and do not disassemble the battery pack privately.

- - - End of Attachment 2 - - -

**Attachment 3 Packaging**



--- End of Attachment 3 ---

**Attachment 4 Product specification****Specification of Pack**

No.	Technical Data	HYX-E50-H2-AU	HYX-E100-H2-AU	HYX-E150-H2-AU	HYX-E200-H2-AU	HYX-E250-H2-AU
1	Usable Energy (kWh)	5,3	10,6	15,9	21,2	26,5
2	Battery Module	HYX-E50B-H2:102,4 V, 52 Ah				
3	Number of Modules	1	2	3	4	5
4	Cell Type	LFP (LiFePO <sub>4</sub> )				
5	Cell Configuration	32S	(32S)2S	(32S)3S	(32S)4S	(32S)5S
6	Nominal Voltage (V)	102,4	204,8	307,2	409,6	512
7	Operating Voltage Range (V)	86,4 to 115,2	172,8 to 230,4V	259,2 to 345,6V	345,6 to 460,8V	432 to 576V
8	Nominal Dis-/Charge Current (A)	0,6 C				
9	Maximum Charge Current (A)	35 A				
10	Maximum Discharge Current (A)	35 A				
11	LED Energy Display	4*LED (25%、 50%、 75%、 100)				
12	Operating Temperature Range (°C)	Charge: -10~+50; Discharge: -10~+50				
13	Relative Humidity	5%~95%				
14	Max. Operating Altitude (m)	≤ 2000				
15	Communication	CAN, RS485				
16	Weight (kg)	59	103,5	148	192,5	237
17	Dimensions (W*H*D mm)	700*600*200	700*950*200	700*1300*200	700*1650*200	700*2000*200
18	Storage Temperature (°C)	-20 to +45(≤One Month); 0 to +35(≤One Year)				
19	Cycle Life	>6000 (70%)				

**Attachment 4 Product specification**

External Dimensions. mm

<p style="text-align: center;">HYX-E50-H2-AU</p>  <p style="text-align: center;">700*600*200</p>	<p style="text-align: center;">HYX-E100-H2-AU</p>  <p style="text-align: center;">700*950*200</p>
<p style="text-align: center;">HYX-E150-H2-AU</p>  <p style="text-align: center;">700*1300*200</p>	<p style="text-align: center;">HYX-E200-H2-AU</p>  <p style="text-align: center;">700*1650*200</p>
<p style="text-align: center;">HYX-E250-H2-AU</p>  <p style="text-align: center;">700*2000*200</p>	

--- End of Attachment 4 ---