Test Report issued under the responsibility of:

intertek
Total Quality. Assured.

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 ..... :	230901251SHA-001
Date of issue ..... :	2023-10-12
Total number of pages ..... :	26
Name of Testing Laboratory preparing the Report ..... :	Intertek Testing Services Shanghai
Applicant's name ..... :	CBQ Auto and Leisure (Aust) Pty Ltd
Address ..... :	9, 83 Burnside Road, Stapylton, QLD, 4207, Australia
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

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	Secondary Li-ion Battery
Trademark(s) ..... :	**HARD KORR**
Manufacturer ..... :	[redacted]
Model/Type reference ..... :	HKPBATL135BH, HKPBATL135B
Ratings ..... :	12.8V, 135Ah

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	Intertek Testing Services Shanghai	
Testing location/ address.....:		Building No.86, 1198 Qinzhou Road (North), 200233 Shanghai, China	
Tested by (name, function, signature).....:		Sybil Shu (Engineer)	
Approved by (name, function, signature)...:		Susanna Xu (Mandated Reviewer)	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

No.	Content	Page
1	Photos of product	23 to 27

Summary of testing:

The results indicate that the specimen complies with standard “IEC 62619: 2022”.

Tests performed (name of test, test clause and date test performed):		**Testing location**
Drop test	7.2.3	**Intertek Testing Services Shanghai**
Overcharge control of voltage	8.2.2	Building No.86, 1198 Qinzhou Road (North),
Overcharge control of current	8.2.3	200233 Shanghai, China
Overheating control	8.2.4	

Summary of compliance with National Differences (List of countries addressed):

None

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.

\+ **Rechargeable Li-ion Battery** -

Model type: HKPBATL135BH

Date of manufacture: 2022-06-16 **HARD KORR**

Rated capacity: 135 Ah

Nominal voltage: 12.8 V d.c

Battery designation: IFpR/27/72/[4S30P] E/-20+40/95

Caution：

Prohibition short circuit.

Don't discard the battery in fire or heater.

Don't reverse the positive and negative terminals.

Don't pierce the battery with a nail or other sharp object.

Disposal acc. to local regulations!

[redacted]

\+ **Rechargeable Li-ion Battery** -

Model type: HKPBATL135B

Date of manufacture: 2022-06-16 **HARD KORR**

Rated capacity: 135 Ah

Nominal voltage: 12.8 V d.c

Battery designation: IFpR/27/72/[4S30P] E/-20+40/95

Caution：

Prohibition short circuit.

Don't discard the battery in fire or heater.

Don't reverse the positive and negative terminals.

Don't pierce the battery with a nail or other sharp object.

Disposal acc. to local regulations!

[redacted]

Test item particulars.....:	
Classification of installation and use.....:	Battery pack for battery system
Supply Connection.....:	---
.....:	---
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2023-09-10
Date (s) of performance of tests.....:	2023-09-16 to 2023-09-19

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 ☐ comma / ☒ point is used as the decimal separator.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

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 ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....:	Same as Manufacturer

General product information and other remarks:

The product covered by this report is Secondary Li-ion Battery, model numbers are HKPBATL135BH and HKPBATL135B which equipped with 4 series-connected cell blocks of 30 parallel connect cells, cell model No. is ITR26/70-46E(R5).

The models are identical except for model numbers and "HKPBATL135B" has Bluetooth function while "HKPBATL135BH" has Bluetooth and heating function.

The module has one protection, the secondary protection should be considered in the end product. Over current depends on fuse (F1) and the other protection actions depend on MOSFET (QD22, QC22, QD23, QC23, QD24, QC24, QD25, QC25, QD26, QC26, QD28, QC28, QD29, QD30, QC30, QC31, QD32, QC32, QD33, QC33, QD34, QC34, QC29, QD31, QD21, QC21, QD27, QC27) controlled by IC

(AFE2). Over temperature and over voltage depend on MOSFET (QD22, QC22, QD23, QC23, QD24, QC24, QD25, QC25, QD26, QC26, QD28, QC28, QD29, QD30, QC30, QC31, QD32, QC32, QD33, QC33, QD34, QC34, QC29, QD31, QD21, QC21, QD27, QC27) controlled by IC (AFE2).
The battery pack shall be charged per specification provided by the manufacturer.

Product Specification of HKPBATL135BH and HKPBATL135B

Type	Cell	module
Configuration	-	4S30P
Product name	Rechargeable Li-ion Cell	Secondary Li-ion Battery
Model	ITR26/70-46E(R5)	HKPBATL135BH, HKPBATL135B
Nominal voltage	3.2V	12.8V
Rated capacity	4600mAh	135Ah
Upper limit charging voltage	3.65V	14.4V
Recommended charging current by manufacturer	2.3A(0.5C)	27A
Maximum charging current	4.6A(1C)	67.5A
Operation Temp. Rang	-20℃~60°C	-20℃~60°C
Charge temperature range	Charge: 0℃~55°	Charge: 0℃~55°
Discharge temperature range	Discharge: -20℃~60°C	Discharge: -20℃~60°C
Standard charging method by manufacturer	At 25℃±2℃, 0.5C(2.3A) constant current (CC) charge to 3.65V, followed by 3.65V constant voltage (CV) charge until current taper to 0.05C(0.23A)	At 25℃±2℃, 0.2C(27A) constant current (CC) charge to 14.4V, followed by 3.65V constant voltage (CV) charge until current taper to 0.05C(6.75A)
Standard discharging method by manufacturer	At 25℃±2℃, discharge with 0.5C (2.3A) constant current, 2.0V cut-off	At 25℃±2℃, discharge with 0.5C (67.5A) constant current, 10V cut-off
Discharging current declared by manufacturer	2.3A	≤67.5A
Max continuous discharge current	9.2A	135A
Final discharge voltage	2.0V	10V
Dimension	（Ø26.4*71）±0.2	305±3*169±2*210±2mm
Weight	<98g	About 14±0.3kg

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
4	**PARAMETER MEASUREMENT TOLERANCES**		**P**
	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... :	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		
5.2	**Insulation and wiring**		**P**
	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
5.3	**Venting**		**P**
	Pressure relief function	Pressure relief mechanism existing.	P
	Encapsulation used to support cells within an outer casing		N/A
5.4	**Temperature/voltage/current management**		**P**
	The design prevents abnormal temperature-rise	Cell	P
	Voltage, current, and temperature limits of the cells		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)		P
	Polarity marking not provided for keyed external connector		P
	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**

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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
5.7	**Operating region of lithium cells and battery systems for safe use**		**P**

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The cell operating region..... :	Charging: 0~55°C: 4.6A/3.65V Max.	P
	Designation of battery system to comply with the cell operating region	Charging: 0~55°C; 67.5A/14.4V Max.	N/A
5.8	**System lock (or system lock function)**		**N/A**
	Non-resettable function to stop battery operation	Cell	N/A
	Manual with procedure for resetting of battery operation		N/A
	Emergency battery final discharge		N/A
5.9	**Quality plan**		**P**
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented..... :	Self-declaration provided	P
	The process capabilities and the process controls		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
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 IEC 62619)		P
	Capacity confirmation of the cells or batteries	Performed by factory.	P
	Default ambient temperature of test, 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		P
	The cells or batteries charged using the method specified by the manufacturer..... :		P
7.2	**Reasonably foreseeable misuse**		**P**
7.2.1	External short-circuit test (cell or cell block)		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)		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)	Battery pack tested only	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..... :		—
	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)..... :	14.273kg.	—
	Height of drop (m)..... :	100mm	—

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)		N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)		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)		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, Im..... :		N/A
	Discharge current for forced discharge, 1.0 It ..... :		N/A
	Discharging time, t = (1 It / Im) x 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)		N/A
	Samples preparation procedure: In accordance with Clause A.5 and A.6 of IEC 62133-2:2017		N/A
	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)		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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
8	**BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)**		**P**
8.1	**General requirements**		P
	Functional safety analysis for critical controls		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
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		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 ..... :		P
	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 ..... :	60°C	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	**EMC**		**N/A**
	Battery system fulfil EMC requirements of the end-device application ..... :		N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
10	**INFORMATION FOR SAFETY**		**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.		P
11	**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.		P
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A
	Battery designation		P
	Battery structure formulation		P
12	**PACKAGING AND TRANSPORT**		**P**
	Refer to Annex D		P
ANNEX A	**OPERATING REGION OF CELLS FOR SAFE USE**		**N/A**
A.1	General		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 BY LASER IRRADIATION**		**N/A**
B.1	**General**		N/A
B.2	**Test conditions**		N/A
B.2.1	Cell test (preliminary test)		N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The cell fully charged according to the manufacturer recommended conditions ..... :		—
	Laser irradiation point on the cell ..... :		—
	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

ANNEX C	**PROCEDURE OF 7.3.3 PROPAGATION TEST BY METHODS OTHER THAN LASER**		**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..... :		—

ANNEX D	**PACKAGING AND TRANSPORT**		**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 [1)]**
Cell	EVPS Anhui Power Battery Co,Ltd.	ITR-2670-46E(R5)	3.2V4600mAh	IEC 62619	CB Certificate/ DE 7-0677
NTC	NEW TIME CONSTANT	MF52$103&3435 (E526963)	B25/85=3435K±5%, R25=10KΩ±5%, Tmoa: 105	IEC 62619	Tested with appliance
Internal wire for P+B+, B-	DONG GUAN SHENG PAI ELECTRIC WIRE&CABLE CO LTD	3135 (E347603)	Min.: 14 AWG, 600V, 200℃	IEC 62619	Tested with appliance
Internal wire for P-	DONG GUAN SHENG PAI ELECTRIC WIRE&CABLE CO LTD	3135 (E347603)	Min.: 8 AWG, 600V, 200℃	IEC 62619	Tested with appliance
Fuse (F1)	DONG GUAN ANDU ELECTRONICS CO.LTD	ADS-175-72V175A (E512028)	72V,175A	IEC 62619	Tested with appliance
Battery case	CHI MEI CORPORATION	PA-765A (E56070)	V0, ABS, 85℃, thickness Min.: 3mm	IEC 62619	Tested with appliance
Plastic trestle	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC310(+) (E162823)	V0, ABS, 60℃, thickness Min.: 1.2mm	IEC 62619	Tested with appliance
BMS	Shen zhen Hanstar Technology	HS-C022-4S-150A-V7-1	Software ID: HS-C022 V7.0 version: V2.0.1	IEC 62619	Tested with appliance
PCB material	GUANGDE LONGTAI ELECTRONIC SCI-TECH CO LTD	LT140 (E357246)	V-0, 130°C Min. thickness: 2mm	IEC 62619	Tested with appliance
AFE chip (AFE2)	TI	BQ7692003PW	20-TSSOP (PW), 3–5 cells, VIN: 6~25V, TOPR: -40 to 85 ℃	IEC 62619	Tested with appliance

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

Mos (QD22,QC22,QD23,QC23,QD24,QC24,QD25,QC25,QD26,QC26,QD28,QC28,QD29,QD30,QC30,QC31,QD32,QC32,QD33,QC33,QD34,QC34，QC29,QD31,QD21,QC21,QD27,QC27)	Chongqing Pingwei Enterprise Co., Ltd.	PW028N10TS	TOLL-1L, VDS: 100V, VGS: ±20V, ID: 200A, T: -55~175°C	IEC 62619	Tested with appliance
MCU (U12)	Geehy Semiconductor	APM32F030C8T6	LQFP48, TA: -40℃~85℃, VDD: 2.0~3.6V	IEC 62619	Tested with appliance
IC for DC/DC POWER (U4)	HOLTEK SEMICONDUCTOR INC	HT7533	SOT-89, Iout: 100mA, Vout: 3.3V±5%	IEC 62619	Tested with appliance
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

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

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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 It, (A)**	**Total Time for Reversed Charge Application (min)**	**Results**
--	--	--	--	--	--
--	--		--		--
--	--		--		--

Supplementary information:

Results:
A – No fire or Explosion

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**
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--

Supplementary information:

[1)] Identify one of the following:
1: Nickel particle inserted between positive and negative (active material) coated area.
2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

Results:

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): __

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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)**
--	--	--
--	--	--
--	--	--

Supplementary information:

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

2) If the battery system has no outer covering, the manufacturer is required to specify the area for fire protection.

Results:
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): __

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**
01	2.713~2.766	67.5	14.561	3.559~3.586	A, D, F

	Charge Voltage Applied Battery System: 1)	
	Whole	**Part**
	Yes	-

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**
01	10.530	81	11.284	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**	Measured **Maximum Charging Voltage, V dc**
01	13.224	27	13.224
Maximum Specified Temperature of Battery System, °C		**Maximum Measured Cell Case Temperature, °C**	**Results**
55		60	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): ____

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

9	TABLE: EMC				N/A
Standard used for EMC test:					
Sample No.	**EMC Test Item**	**Battery Condition**	**EMC Test Level/ Parameters**	**Compliance Criteria**	**Results**
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--

Supplementary information:

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.

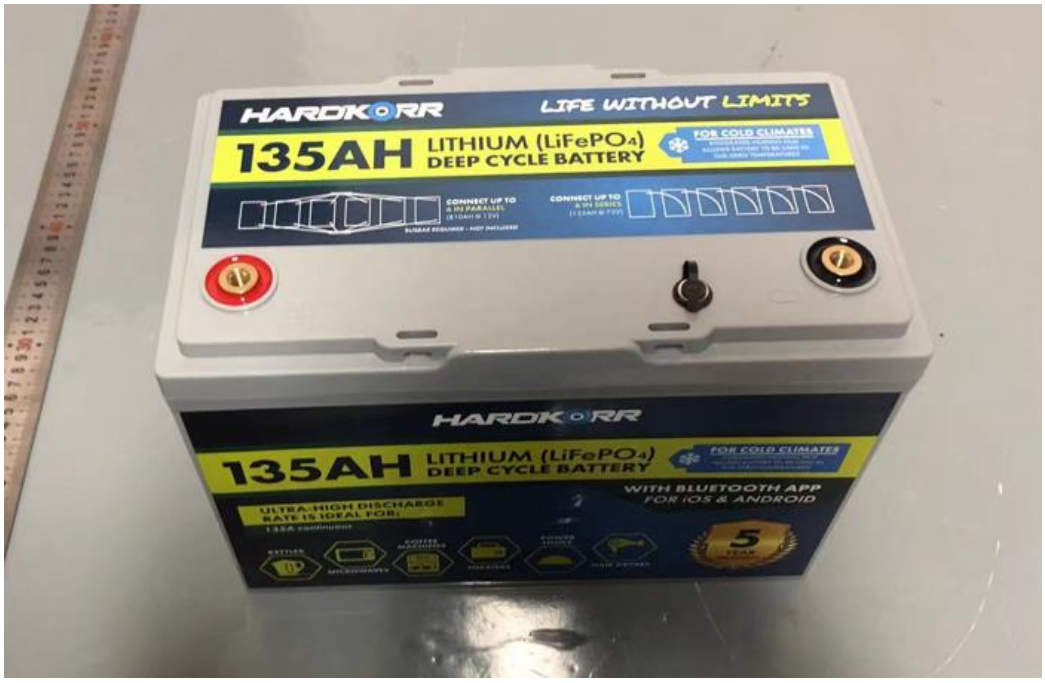
F - All function of battery system did not operate as intended during the test, (Please explain): ____

G - Other (Please explain): ____

Attachment 1: Photos of product

Overall view 1 (HKPBATL135BH)

Overall view 2 (HKPBATL135BH)



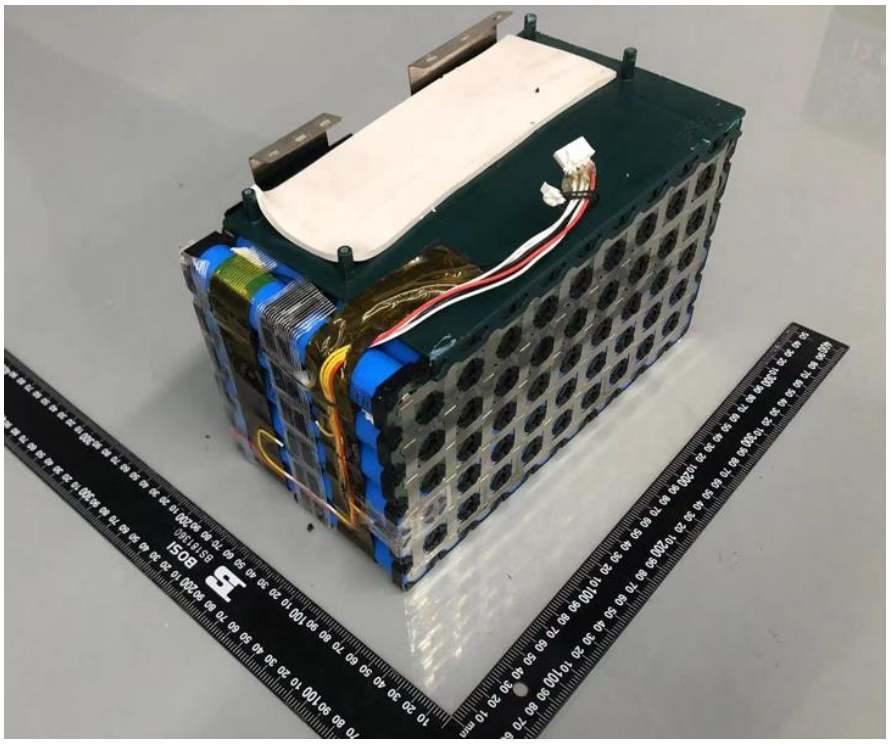
Overall view 3 (HKPBATL135B)

Overall view 4 (HKPBATL135B)

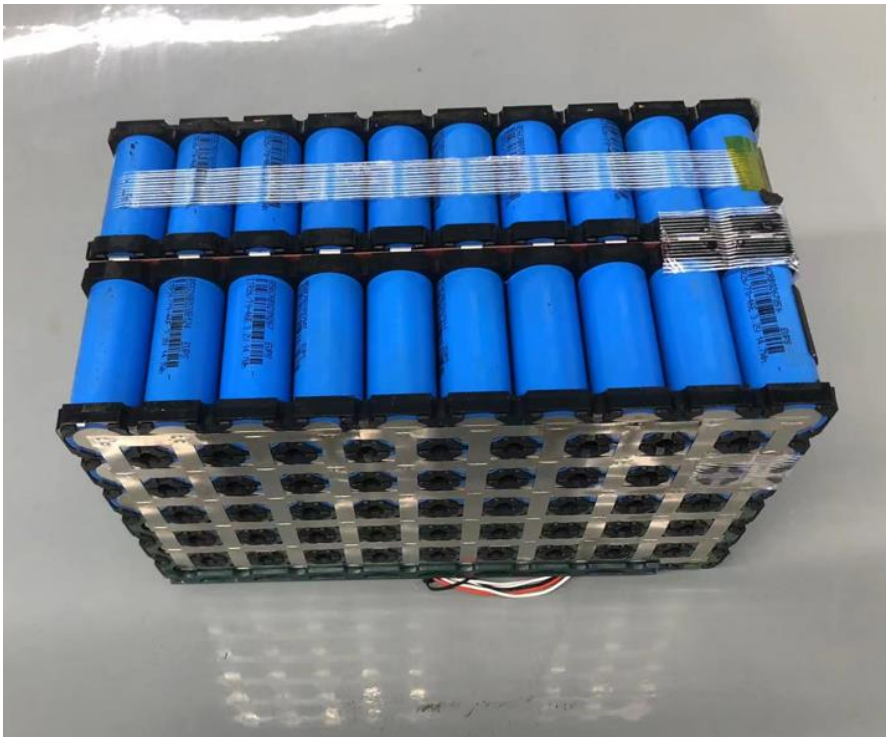
Internal View 1

Internal View 2

Internal View 3



Internal View 4



BMS PCBA 1

BMS PCBA 2