

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.....	TCT2303217B022
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Testing laboratory	Shenzhen TCT Testing Technology Co., Ltd.
Address	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Testing location	As above
Applicant's name	Fujian Bettenergy Technology Co., Ltd.
Address	No.5, Unit1203, No.359, Chengyi Street, Phase III, Xiamen Software Park
Manufacturer's name.....	Liwatt Contemporary Amperex Technology Co. Ltd.
Address	Floor 2, Building 3, No.33 Gongye South Road, Chengnan Industrial Park, Chengnan Town, Ninghua County, Sanming City, Fujian Province, P.R. China
Test specification : Standard: IEC 62619: 2017 Test procedure.....: Type approved Test result: Pass Non-standard test method: N/A	
This test report is specially limited to the above client company and product model only, It may not be duplicated without prior written consent of Shenzhen TCT Testing Technology Co., Ltd.	
Test item description.....	Lithium-ion Battery Pack
TradeMark.....	BETTENERGY
Model/type reference	ELECUBE-5K
Ratings	51.2V, 100Ah, 5120Wh

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

Attachment 1: Photo documentation (See page 21~22).

Summary of testing:

Tests performed (name of test and test clause):

cl.7.2.1 External short-circuit test (cell);
cl.7.2.2 Impact test (cell);
cl.7.2.3.2 Whole drop test (cell);
cl.7.2.4 Thermal abuse test (cell);
cl.7.2.5 Overcharge test (cell);
cl.7.2.6 Forced discharge test (cell);
cl.7.3.2 Internal short-circuit test (cell);
Functional safety test:
cl.8.2.2 Overcharge control of voltage (Battery system);
cl.8.2.3 Overcharge control of current (Battery system);
cl.8.2.4 Overheating control (Battery system);

The samples comply with the requirement of IEC 62619: 2017.

Testing location:

Shenzhen TCT Testing Technology Co., Ltd.
2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

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

N/A

Copy of marking plate:

Lithium-ion Battery Pack
Model: ELECUBE-5K
51.2V, 100Ah, 5120Wh IF_PP/49/174/116/[1P16S]M/0+60/80
Recharge Voltage/Current: 57.9V/100A
Liwatt Contemporary Amperex Technology Co. Ltd.
Date: YYYYMMDD Made in China

BETTENERGY

WARNING:

1. The current-limiting function (Charger limiter) must be active for parallel connection using.
2. Risk of fire, explosion, or burns. Do not disassemble, heat above the 120°C, or incinerate

CAUTION:

1. Read all instructions before installation, operation and maintenance of the system;
2. Please charge battery fully before first use.

For model: ELECUBE-5K

Remark:

1.The model name and manufacturing traceability shall be marked on the battery surface. The other items listed above can be marked on the smallest package or supplied with the battery.

The others required marking items are indicated on the battery manual.

Charge the battery at constant current 50A until voltage reaches 57.9V, then charge at constant voltage 57.9V till charge current is 2.0A

Date code: YYYY=Year, MM=Month, DD=Day.

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	2023-03-27
Date (s) of performance of tests	2023-03-27 to 2023-05-22
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 ☐ comma / ☒ point is used as the decimal separator.	
Name and address of factory (ies) : Liwatt Contemporary Amperex Technology Co. Ltd. Floor 2, Building 3, No.33 Gongye South Road, Chengnan Industrial Park, Chengnan Town, Ninghua County, Sanming City, Fujian Province, P.R. China	

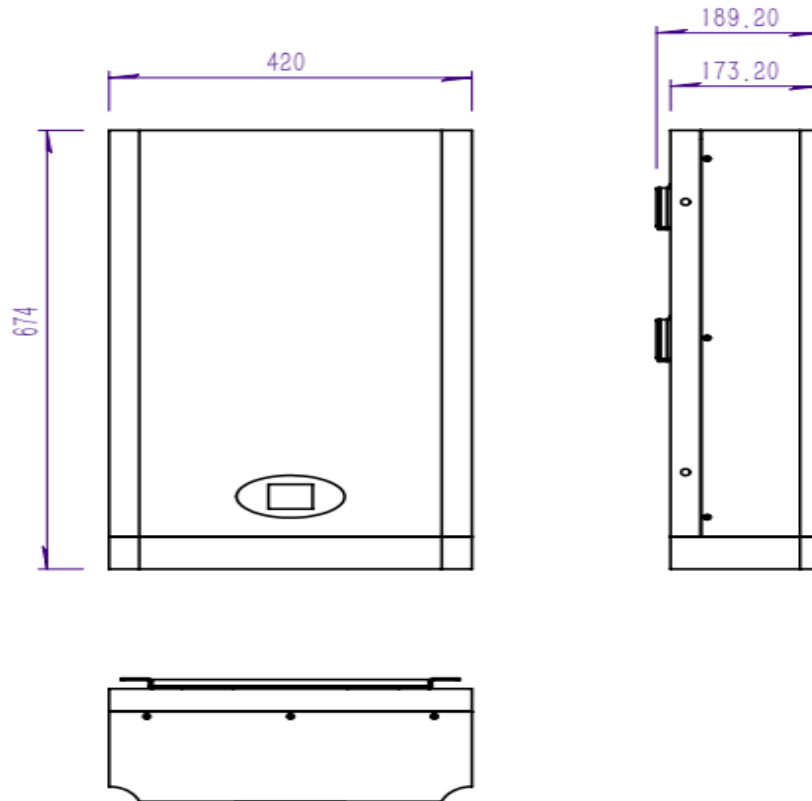
General product information and other remarks:

The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte, case. The positive and negative electrode plates are housed in the case in the state being separated by the separator.

The main features of the Battery are shown as below:

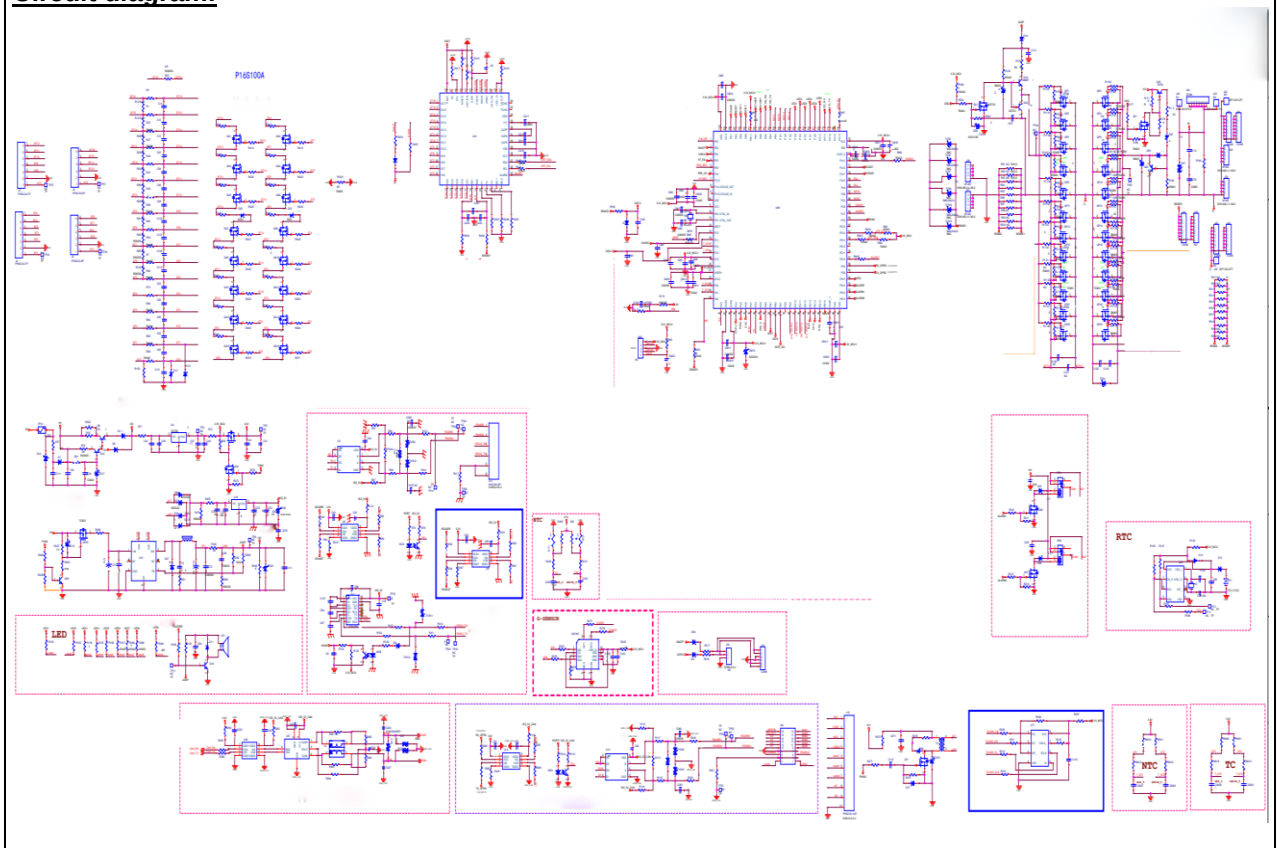
Product name	Lithium-ion Battery Pack
Type/model	ELECUBE-5K
Rated capacity (Ah)	100
Nominal voltage (V)	51.2
Standard Charge Current (A)	50
Standard Discharge Current (A)	50
Maximum Charge Current (A)	100
Maximum Discharge Current (A)	100
Charge temperature (°C)	0 to 60
Discharge temperature (°C)	0 to 60
Storage temperature range (°C)	-20 to 75
Standard Charge Voltage (V)	57.9
Maximum Charge Voltage (V)	57.9
Cut off Voltage (V)	46.4
Pack Pattern	1P16S
Recommend charging method declared by the manufacturer	50A CC charge to 57.9 Vdc, then CV charge till charge current decline to 2.0A.
Standard discharging method by manufacturer	Discharge the battery at constant current 50A until the voltage of battery reaches 46.4V. Then discharge cut-off.
Battery Size	Approx. 189.2*420.0*674.0 mm for model ELECUBE-5K
Weight	Approx. 58 Kg for model ELECUBE-5K
Overcharge protected voltage supply by battery system	3.65V / cell, or 57.9V
Overheating protect temperature supplied by battery pack (Charge)	62 °C

The battery dimension diagram:



For model ELECUBE-5K (Unit: mm)

Circuit diagram:



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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.. :	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	Vent design in cell.	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	Overcharge, over discharge, over current and short-circuit proof circuit used in this battery. See tests of clause 7 and 8.	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
	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
	Recommendations of cell operating limits by the cell manufacturer		P
	Batteries designed for the selective discharge of a portion of their series connected cells	No such part	N/A
	Protective circuit component(s) and consideration to the end-device application		P

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Clause	Requirement + Test	Result - Remark	Verdict
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..... :	Listed in the specification of cell.	P
	Designation of battery system to comply with the cell operating region	Information mentioned in manufacturer's specifications.	P
5.8	Quality plan		P
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented	Reference: Quality plan provided.	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)		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±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	The method mentioned in manufacturer's specifications.	P
7.2	Reasonably foreseeable misuse		P
7.2.1	External short-circuit test (cell or cell block)	Tested complied.	P
	Short circuit with total resistance of 30 mΩ± 10 mΩ at 25 °C ± 5 °C		P
	Results: no fire, no explosion	No fire, no explosion	P
7.2.2	Impact test (cell or cell block)	Tested complied.	P
	Cylindrical cell, longitudinal axis impact		P
	Prismatic cell, longitudinal axis and lateral axis impact		P
	Results: no fire, no explosion.	No fire, no explosion	P
7.2.3	Drop test (cell or cell block, and battery system)		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.3.1	General		P
7.2.3.2	Whole drop test (cell or cell block, and battery system)	The mass of battery system is over 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..... :		—
	Mass of the test unit (kg)..... :	Approx. 58 Kg for model ELECUBE-5K	—
	Height of drop (m)..... :	5 cm	—
	Results: no fire, no explosion	No fire, no explosion.	P
7.2.4	Thermal abuse test (cell or cell block)	Tested complied.	P
	Results: no fire, no explosion	No fire, no explosion.	P
7.2.5	Overcharge test (cell or cell block)	Tested complied.	P
	For those battery systems that are provided with only a single protection for the charging voltage control		—
	Results: no fire, no explosion..... :	No fire, no explosion.	P
7.2.6	Forced discharge test (cell or cell block)	Tested complied.	P
	Upper limit charge voltage of the cell..... :		P
	Cells connected in series in the battery system	16S1P	P
	Redundant or single protection for discharge voltage control provided in battery system		P
	Target Voltage	-3.65V	P
	Maximum discharge current of the cell, I_m :	100A	P
	Discharge current for forced discharge, 1.0 I_t	100A	P
	Discharging time, $t = (1I_t / I_m) \times 90$ (min.)	90min	P
	Results: no fire, no explosion..... :	No fire, no explosion.	P
7.3	Considerations for internal short-circuit – Design evaluation		P
7.3.1	General		P
7.3.2	Internal short-circuit test (cell)	Tested complied.	P
	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		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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 °C ± 5 °C.		P
	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		P
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) was reached	400N (prismatic cells).	P
	Results: no fire, no explosion..... :	No fire, no explosion.	P
7.3.3	Propagation test (battery system)	cl. 7.3.2 for cell have tested.	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		N/A
	Functional safety analysis for critical controls	FMEA or similar not evaluation as client's request.	N/A
	Conduct of a process hazard, risk assessment and mitigation of the battery system		N/A
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..... :	See Table 8.2.2.	P
	The BMS interrupted the overcharging before reaching 110% of the upper limit charging voltage	Tested complied.	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	Tested complied.	P
8.2.4	Overheating control (battery system)		P
	The cooling system, if provided, was disconnected		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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	Tested complied.	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	Specific in cell user manual.	P
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.	Specific in battery user manual.	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.		P
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A
	Battery designation	See marking on page 3 and page 4.	P
	Battery structure formulation		P

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Clause	Requirement + Test	Result - Remark	Verdict

ANNEX A	OPERATING REGION OF CELLS FOR SAFE USE		P
A.1	General		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

ANNEX B	PROCEDURE OF 7.3.3 PROPAGATION TEST		N/A
B.1	General		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
	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	UN38.3 test report provided	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

5.1	TABLE: Critical components information				
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
Cell	JIANGXI ANCHI NEW ENERGY TECHNOLOGY CO., LTD	IFP48173115-100Ah	100Ah, 3.2V	IEC 62619: 2017	Tested with appliance
PCB	KINGBOARD LAMINATES HOLDINGS LTD	KB-6160A	V-0, 130°C, thickness: 2mm	UL 796 UL 94	UL E123995
PCB (Alternative)	Interchangeable	Interchangeable	V-0, 130°C, thickness: 2mm	UL 796 UL 94	UL approved
MCU (UM1)	HUADA SEMICONDUCTOR Co., Ltd	HC32F460PETB	V _{CU} : 3.60±0.08V, V _{DL} : 1.65±0.02V, Topr: -40°C~85°C	--	Tested with appliance
IC (UA1)	SINO WEALTH ELECTRONIC LTD.	SH367309U/048 UR	Vbat: 8.5V~65V, Topr: -40°C~85°C	--	Tested with appliance
IC (U4)	Shanghai Beiling Co., LTD	BL8078CC3TR33	Input Voltage Range: 3V~40V, Output Voltage Range: 1.2V~5.0V	--	Tested with appliance
IC (U8)	Sit electronic technology Co., Ltd.	NIRS21	Powersupply voltage: 2.5V~5.5V, Topr: -40°C~125°C	--	Tested with appliance
IC (U5)	Shanghai Beiling Co., LTD	BL3085(I47)	V _{CC} : +5V±5%, T _A : -40°C~85°C	--	Tested with appliance
IC (U16)	Shanghai Xinlong Semiconductor Technology Co., LTD	XL7045E1	Vin: 10V~80V, Vout: 1.25V~20V	--	Tested with appliance
IC (U11)	Cypr Microelectronics Technology (Suzhou) Co., LTD	TP3232N-SR	V _{CC} to V _{GND} : -0.3V~+6V, Temperature Range: -40°C~125°C	--	Tested with appliance
MOSFET (QP1~QP24)	China Resources Microelectronics (Chongqing) Limited	CRSS028N10N	V _{DS} : 100V, V _{GS} : ±20V, I _D : 180A, T _J : -55~150°C	--	Tested with appliance
MOSFET (Q26、Q40)	Jiangsu Haide Semiconductor Co. LTD	2N7002K	V _{DS} : 60V, V _{GS} : ±20V, I _D : 340mA, T _J : -55~150°C	--	Tested with appliance

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Clause	Requirement + Test			Result - Remark	Verdict
MOSFET (QA1-QA16)	NIKO-SEM Semiconductor Co., Ltd	PM5G8EA	V_{DS} : 20V, V_{GS} : $\pm 12V$, I_D : 6.5A (T_A : 25 °C), T_J : -55~150°C	--	Tested with appliance
MOSFET (QP70)	Jiangsu Jiejie Microelectronics Co., Ltd	IRFR5410TRPBF	V_{DS} : -100V, V_{GS} : $\pm 20V$, I_D : -13A, T_J : -55~150°C	--	Tested with appliance
Lead wire	DONGGUAN YUE ZHEN WIRE & CABLE CO LTD	3135	200°C, min. 18AWG, 600V	UL 758	UL E354338
Lead wire (Alternative)	Interchangeable	Interchangeable	200°C, min. 18AWG, 600V	UL 758	UL approved
DC Connector	Molex L L C	105142	4Pins, 600V, 150A	UL 1977	UL E29179
Metal shell	Dongguan Xuanyu Hardware Co., Ltd	SPCC	SPCC, thickness min.: 1.0mm	--	Tested with appliance
Supplementary information:					
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

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7.2.1

TABLE: External short-circuit test (cell or cell block)

P

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
TS230306018C 1#	23.8	3.47	34	104.7	A
TS230306018C 2#	23.8	3.48	36	102.6	A
TS230306018C 3#	23.8	3.47	35	103.9	A

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)

P

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
TS230306018 C4#	2.75	3.63	100	3.65	58.7	A
TS230306018 C5#	2.74	3.64	100	3.65	60.2	A
TS230306018 C6#	2.76	3.63	100	3.65	58.5	A

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):

Remark: the maximum specified charging current of the battery is 100A

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7.2.6

TABLE: Forced discharge test (cell or cell block)

P

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
TS230306018 C7#	2.75	-3.65	100	90	A
TS230306018 C8#	2.75	-3.65	100	90	A
TS230306018 C9#	2.76	-3.65	100	90	A

Supplementary information:

Results:

A – No fire or Explosion

B – Fire

C – Explosion

D – Other (Please explain): _____

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.2	TABLE: Internal short-circuit test (cell)				P
Sample No.	OCV at start of test, (V dc)	Particle location ¹⁾	Maximum applied pressure, (N)	Results	
TS230306018C 10#	3.47	1	400	A	
TS230306018C 11#	3.48	1	400	A	
TS230306018C 12#	3.46	1	400	A	
TS230306018C 13#	3.47	1	400	A	
TS230306018C 14#	3.47	1	400	A	
TS230306018C 15#	3.44	1	400	A	
TS230306018C 16#	3.43	1	400	A	
TS230306018C 17#	3.44	1	400	A	
TS230306018C 18#	3.43	1	400	A	
TS230306018C 19#	3.44	1	400	A	

Supplementary information:

- 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): __

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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:

- 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
- 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): ____

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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	
TS230306018B 1#	For cell1~cell 16: 3.59 to 3.62	100	57.9	3.63V max measured for cell 1~cell 16 cell	A, D, F	
			Charge Voltage Applied Battery System: 1)			
			Whole		Part	
			60.24		--	
Supplementary information: 8. 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)	Measured Charging Current (A)	Max. Charging Voltage, (V dc)	Results	
TS230306018B2#	49.83	120	57.9	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): ____					

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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	
TS230306018B3#	53.01	100	57.9	
Maximum Specified Temperature of Battery System, °C		Maximum Measured Cell Case Temperature, °C	Results	
60.0		61.7	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): _____				

Attachment 1

Photo Documentation

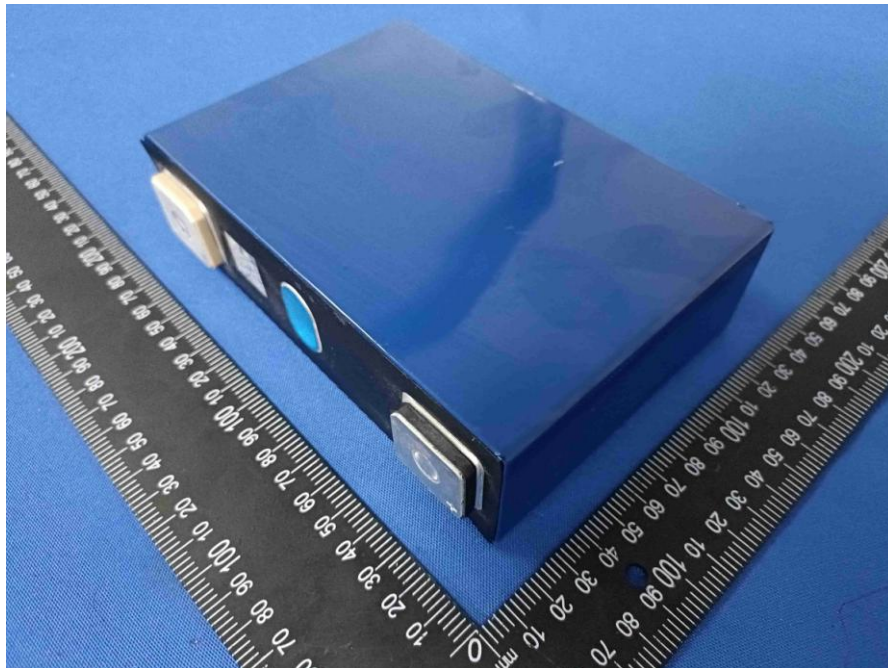


Picture 1 Battery view-1

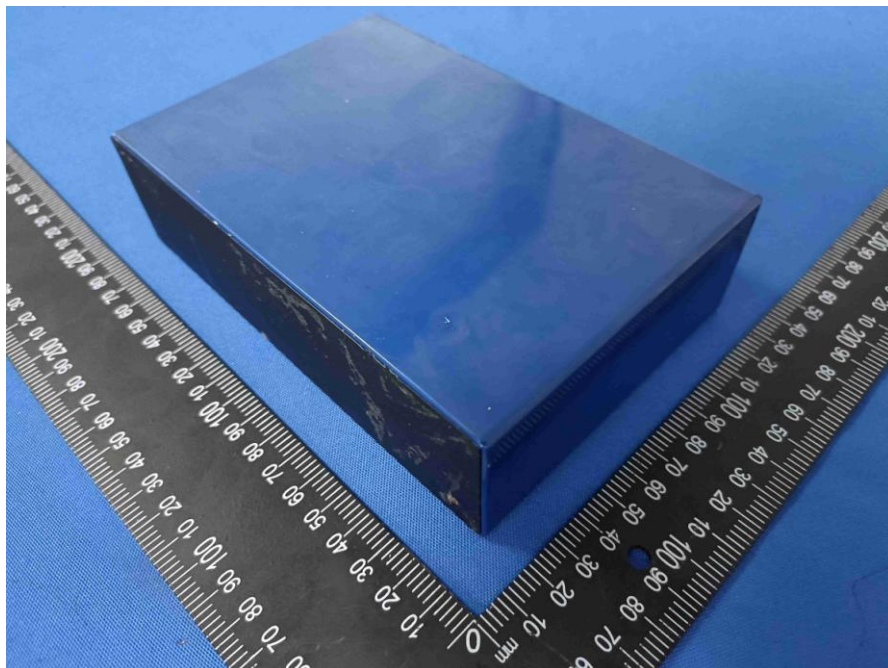


Picture 2 Battery view-2

Photo Documentation



Picture 3 Cell view-1



Picture 4 Cell view-2

***** End of Test Report *****