



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..... : CN21CPMV 001

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Total number of pages..... 19 pages

Name of Testing Laboratory preparing the Report TÜV Rheinland (Shenzhen) Co., Ltd.
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Kejibei 2nd Road, High-Tech Industrial Park North Nanshan
District, 518057, Shenzhen, China

Applicant's name..... : Beijing XD Battery Technology Co., Ltd.
Address..... : No.27 Yongwang Road, Beijing Bioengineering and Medicine
Industry Base, Daxing District, Beijing, P.R China

Test specification:
Standard..... : IEC 62619: 2017
Test procedure..... : CB Scheme
Non-standard test method : N/A

Test Report Form No. : IEC62619A
Test Report Form(s) Originator.... : UL(Demko)
Master TRF : Dated 2018-06-07

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Test item description :	Rechargeable lithium ion Cell	
Trade Mark :	 XD BATTERY	
Manufacturer :	Same as applicant	
Model/Type reference	IFP36130235B-100Ah	
Ratings :	3.2 V, 100 Ah, 320 Wh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.
	Testing location/ address	1F East & 3F West -4F, Cybio Technology Building No.1, No.16 Kejibei 2nd Road, High-Tech Industrial Park North Nanshan District, 518057, Shenzhen, China
	Tested by (name, function, signature)	Xun Yu / PE 
	Approved by (name, function, signature) ..:	Corney Zhang / Reviewer 
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
	Testing location/ address	
	Tested by (name, function, signature)	
	Approved by (name, function, signature) ..:	
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
	Testing location/ address	
	Tested by (name + signature)	
	Witnessed by (name, function, signature) .:	
	Approved by (name, function, signature) ..:	
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	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): Attachment 1: Photo documentation (3 pages).	
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 (cell); cl.7.2.5 Overcharging (cell); cl.7.2.6 Forced discharge (cell); cl.7.3.2 Internal short-circuit test (cell); The samples comply with the requirement of IEC 62619: 2017.	Testing location: TÜV Rheinland (Shenzhen) Co., Ltd. 1F East & 3F West -4F, Cybio Technology Building No.1, No.16 Kejibei 2nd Road, High-Tech Industrial Park North Nanshan District, 518057, Shenzhen, China
Summary of compliance with National Differences (List of countries addressed): No EU Group differences <input checked="" type="checkbox"/> The product fulfils the requirement of <u>EN 62619:2017</u>	

Copy of marking plate

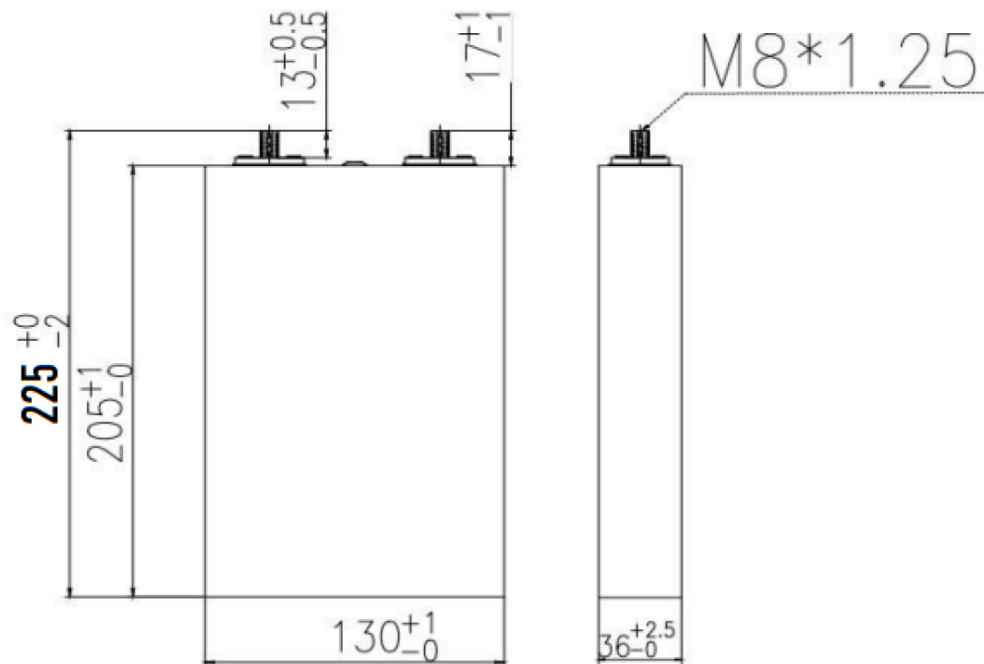
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks

+**-****Rechargeable Lithium Ion Cell****IFP36130235B-100Ah****3.2V,100Ah,320Wh****IFpP/36/130/225/M/-10+40/90****Date: DDMMYY****Beijing XD Battery Technology Co Ltd**

Remark: 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 cell.

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 : 2020.12.23	
Date (s) of performance of tests : 2020.12.23 to 2021.01.13	
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	
Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60080-02:	
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..... :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : Same as applicant	
General product information and other remarks:	
The main features of the cell are shown as below:	
Product name	Rechargeable Lithium Ion Cell
Model	IFP36130235B-100Ah
Capacity	100.0 Ah
Nominal voltage	3.2 V
Nominal charge current	50 A

Maximum continuous charge current	100 A
Nominal discharge current	50A
Maximum continuous discharge current	300 A
Maximum charge voltage	3.65 V
Upper charge temperature	+45 °C
Lower charge temperature	0 °C
Upper discharge temperature	+55 °C
Lower discharge temperature	-20 °C
Storage temperature range	1 month: -20~45°C >1 months: -20~25°C
Recommend charging method declared by the manufacturer	At constant current 0.5 C till cell voltage reaches 3.65 V, then switch to constant voltage 3.65 V till charge current drops to 0.05 C.
Charging procedure for internal short-circuit test	At constant current 0.5 C till cell voltage reaches 3.65 V, then switch to constant voltage 3.65 V till charge current drops to 0.05C.
Recommend discharging method declared by the manufacturer	Discharging the cell with 0.5 C constant current to discharge cut-off voltage 2.50 V
Nominal mass (kg)	2±0.1 kg
External dimensions (mm)	Thickness: 36±2.5mm High: 205±1 mm Width: 130±1 mm

Cell Drawing:


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. :	See also table 5.1 for Critical components information	P
5.2	Insulation and wiring		N/A
	Voltage, current, altitude, and humidity requirements		N/A
	Adequate clearances and creepage distances between connectors		N/A
	The mechanical integrity of internal connections		N/A
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		N/A
	The design prevents abnormal temperature-rise	Cell only	N/A
	Voltage, current, and temperature limits of the cells		N/A
	Specifications and charging instructions for equipment manufacturers		N/A
5.5	Terminal contacts of the battery pack and/or battery system		N/A
	Polarity marking(s)	Cell only	N/A
	Capability to carry the maximum anticipated current		N/A
	External terminal contact surfaces		N/A
	Terminal contacts are arranged to minimize the risk of short circuits		N/A
5.6	Assembly of cells, modules, or battery packs into battery systems		N/A
5.6.1	General	Cell only	N/A
	Independent control and protection method(s)		N/A
	Recommendations of cell operating limits by the cell manufacturer		N/A
	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		N/A
5.6.2	Battery system design	Cell only	N/A
	The voltage control function		N/A

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The voltage control for series-connected batteries		N/A
5.7	Operating region of lithium cells and battery systems for safe use		P
	The cell operating region		P
	Designation of battery system to comply with the cell operating region	See page 6 for cell operating region.	P
5.8	Quality plan		P
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented.....	ISO9001 certification 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)		P
	Short circuit with total resistance of 30 mΩ ± 10 mΩ at 25 °C ± 5 °C		P
	Results: no fire, no explosion	See Table 7.2.1.	P
7.2.2	Impact test (cell or cell block)		P
	Cylindrical cell, longitudinal axis impact		N/A
	Prismatic cell, longitudinal axis and lateral axis impact	Prismatic cell	P
	Results: no fire, no explosion.		P
7.2.3	Drop test (cell or cell block, and battery system)		P
7.2.3.1	General		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.3.2	Whole drop test (cell or cell block, and battery system)		P
	Description of the Test Unit	Cell	—
	Mass of the test unit (kg)	2 kg	—
	Height of drop (m)	1.0	—
	Results: no fire, no explosion		P
7.2.3.3	Edge and corner drop test (cell or cell block, and battery system)	The mass of cell is less 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
7.2.4	Thermal abuse test (cell or cell block)		P
	Results: no fire, no explosion		P
7.2.5	Overcharge test (cell or cell block)		P
	For those battery systems that are provided with only a single protection for the charging voltage control	Cell only	—
	Results: no fire, no explosion.....	See Table 7.2.5.	P
7.2.6	Forced discharge test (cell or cell block)		P
	Upper limit charge voltage of the cell.....	3.65 V	P
	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.....	-3.65 V applied.	—
	Maximum discharge current of the cell, I _m	300 A	—
	Discharge current for forced discharge, 1.0 It	100 A	—
	Discharging time, t = (1 It / I _m) x 90 (min.).....	90min	—
	Results: no fire, no explosion.....	See Table 7.2.6.	P
7.3	Considerations for internal short-circuit – Design evaluation		P
7.3.1	General		P
7.3.2	Internal short-circuit test (cell)		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.....	Test accordance with 8.3.9 of IEC 62133: 2012.	P

IEC 62619			
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	See Attachment 1: Photo documentation	—
	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	400N	P
	Results: no fire, no explosion.....	See Table 7.3.2.	P
7.3.3	Propagation test (battery system)	7.3.2 was selected.	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)		N/A
8.1	General requirements	Cell only	N/A
	Functional safety analysis for critical controls		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)		N/A
8.2.1	Requirements for the BMS	Cell only	N/A
	The safety integrity level (SIL) target of the BMS		N/A
	The charge control evaluated by tests in clauses 8.2.2 to 8.2.4		N/A
8.2.2	Overcharge control of voltage (battery system)	Cell only	N/A
	The exceeded charging voltage applied to the whole battery system		N/A
	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.....		N/A
	The BMS interrupted the overcharging before reaching 110% of the upper limit charging voltage		N/A
8.2.3	Overcharge control of current (battery system)	Cell only	N/A
	Results: no fire, no explosion.....		N/A
	The BMS detected the overcharging current and controlled the charging to a level below the maximum charging current		N/A
8.2.4	Overheating control (battery system)	Cell only	N/A
	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..... :		N/A
	Results: no fire, no explosion..... :		N/A
	The BMS detected the overheat temperature and terminated charging		N/A
	The battery system operated as designed during test		N/A
9	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.		N/A
10	MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)		P
	The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual.	See page 4	P
	Cell or battery system has clear and durable markings		P
	Cell designation	IFpP/36/130/225/M/-10+40/90	P
	Battery designation		N/A
	Battery structure formulation		N/A

IEC 62619			
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		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	Beijing XD battery Technology Co Ltd	IFP36130235B -100Ah	3.2Vdc, 100Ah,320W	IEC 62129: 2017	Tested with appliance	
-Electrolyte	Shandong Huaneng Battery Material Co. ,Ltd	JN-HN-802	Conductivity: 8.5±0.5mS/cm, LiPF ₆ +DEC+EC	--	--	
-Separator	Xinxiang Xinrui Battery Material Co. ,Ltd	22µmx26880 mmx212mm	PP, single layer, shutdown temperature: 135°C	--	--	
-Positive electrode	RT Advanced Materials Co. ,Ltd	Al foil	Thickness: 150±3µm, Wide x Length: 119mm x 201mm, LiFePO ₄ , Carbon black, PVDF, Conductive additive,Aluminum foil	--	--	
-Negative electrode	Chengdu Eminent New Energy Technology Co. ,Ltd	Cu foil	Thickness: 123±2µm, Wide x Length: 122mm x 205mm, Graphite, CMC, SBR, Conductive additive, Copper foil	--	--	
-Cell case	Suzhou Chuangneng New Energy Co. ,Ltd	0.75mm	36*130*225	--	--	
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)					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	
C1#	22.4	3.339	26.80	43.6	A, E	
C2#	21.4	3.356	25.89	25.6	A, E	
C3#	21.3	3.375	25.58	26.3	A, E	

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
C16#	3.063	3.337	100	4.015	37.5	A, E
C17#	3.040	3.345	100	4.015	36.7	A, E
C18#	3.086	3.343	100	4.015	37.3	A, E

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): ____

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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 I _t , (A)	Total Time for Reversed Charge Application (min)	Results	
C19#	3.086	-3.65	100	90	A	
C20#	3.060	-3.65	100	90	A	
C21#	3.068	-3.65	100	90	A	

Supplementary information:
 Results:
 A - No fire or Explosion
 B - Fire
 C - Explosion
 D - Other (Please explain): ____

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	
C22#	3.348	1	400	A, E	
C23#	3.347	1	400	A, E	
C24#	3.346	1	400	A, E	
C25#	3.348	1	400	A, E	
C26#	3.347	1	400	A, E	

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 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): ___						

8.2.2	TABLE: Overcharge control of voltage (battery system)					N/A
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	
			Charge Voltage Applied Battery System: 1)			
			Whole		Part	

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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)			N/A
Sample No.	OCV at start of test, (V dc)	Max. Charging Current, (A)	Max. Charging Voltage, (V dc)	Results

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): ____

8.2.4	TABLE: Overheating control (battery system)			N/A
Model No.	OCV at start(SOC 50%) of test, V dc	Maximum Charging Current, A	Maximum Charging Voltage, V dc	
Maximum Specified Temperature of Battery System, °C	Maximum Measured Cell Case Temperature, °C	Results		

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

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): _____

Remark:

- End of test report -

Product: Rechargeable Lithium ion Cell

Type Designation: IFP36130235B-100Ah

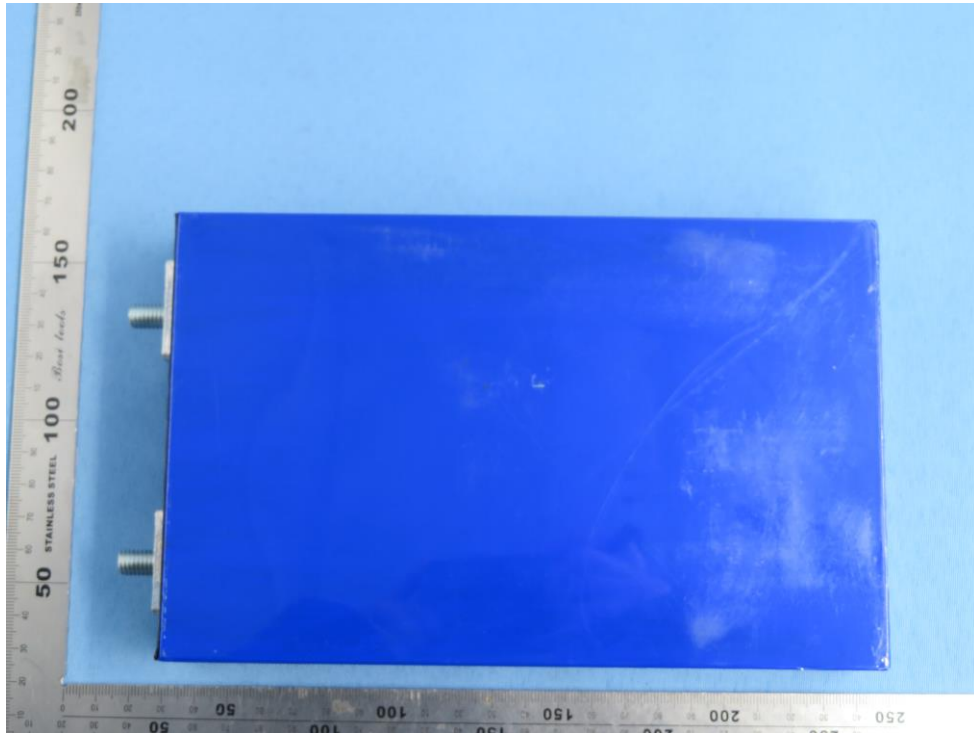


Figure 1 View of cell

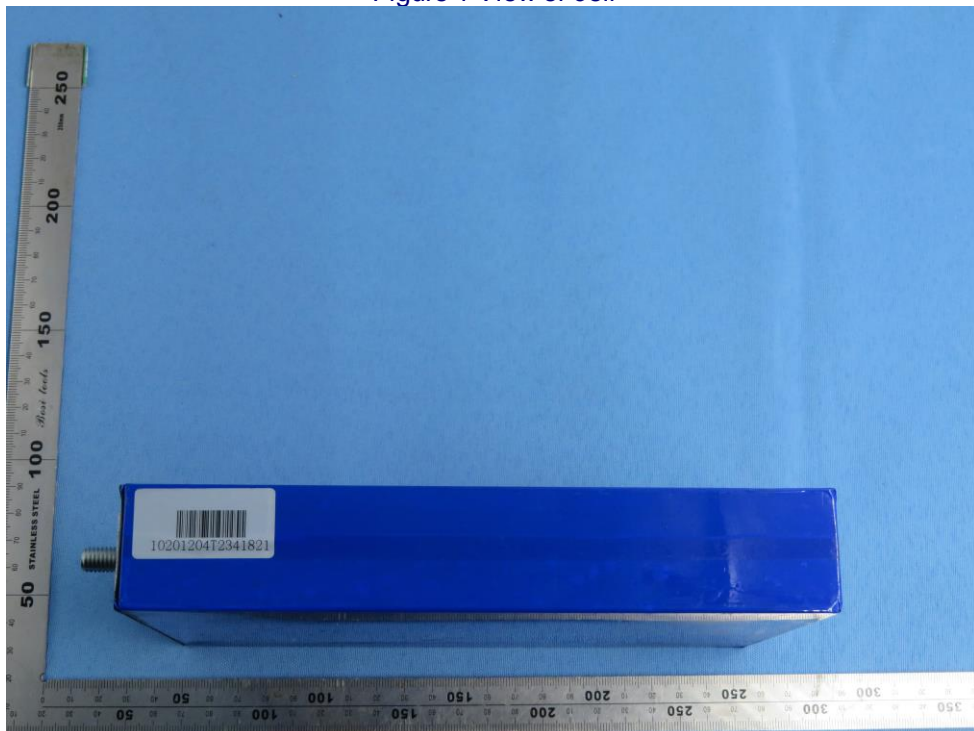


Figure 2 View of cell

Product: Rechargeable Lithium ion Cell

Type Designation: IFP36130235B-100Ah

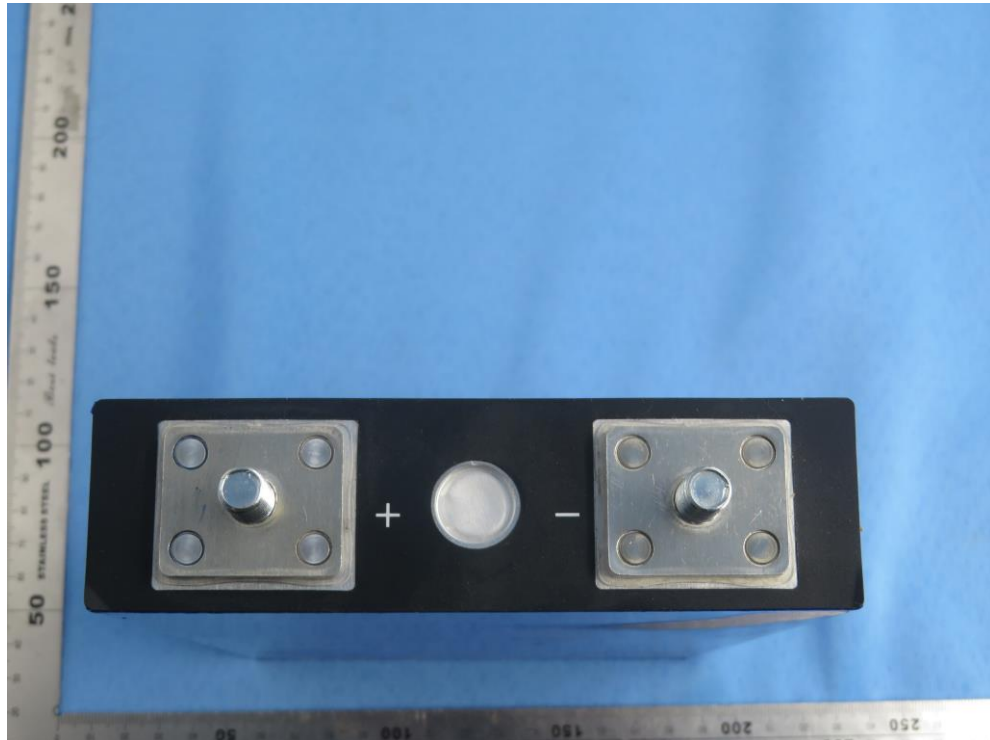


Figure 3 View of cell

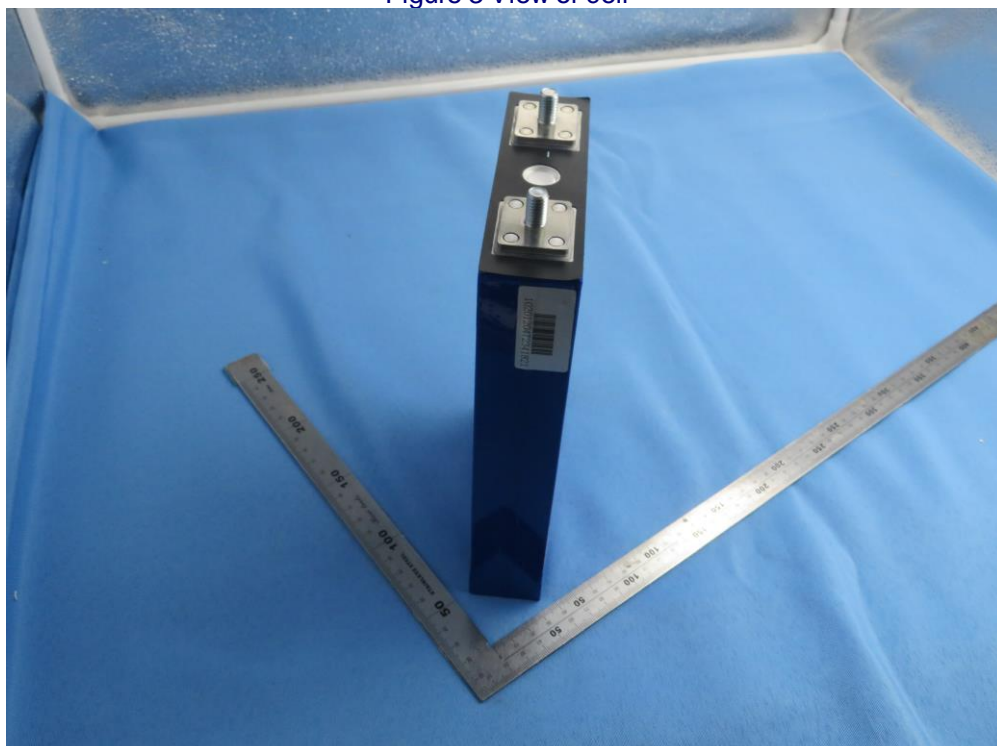


Figure 4 View of cell

Product: Rechargeable Lithium ion Cell

Type Designation: IFP36130235B-100Ah

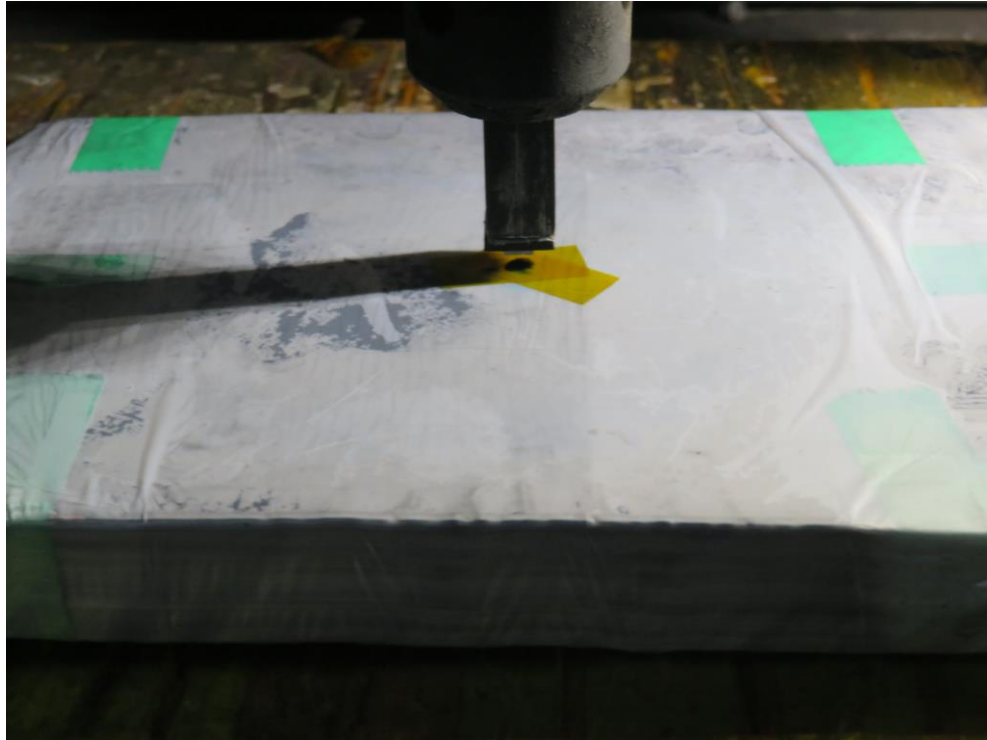


Figure 5 View of cell Internal short-circuit test