



Tianjin Lishen Battery Joint-Stock Co.,Ltd

Product Specification

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产 品 规 格 书

锂离子动力电池 LP2714897-51Ah

天津力神电池股份有限公司

www.lishen.com.cn



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1 适用范围

本规格书适用于天津力神电池股份有限公司生产的 LP2714897 锂离子电池。

2 常规指标

2.1 符号与缩略语说明

C——1h 率额定容量(A h)。

本规格书中 1C(A)=51.0A, 1/3C(A)=17A。

SOC——荷电状态

DOD——放电深度

2.2 该产品常规指标

表 1

序 号	项 目	规 格
1	电池种类	动力型锂离子电池
2	电池型号	LP2714897
3	标称容量☆	51.0Ah
4	标称电压☆	3.65V
5	交流内阻☆	≤1.0mΩ
6	重量	925±35g
7	最大充电电流	2C (连续) 3C (30s)
8	充电电压	4.2V
9	最大放电电流	3C (连续) 5C (30s)
10	放电终止电压	2.5V
	脉冲放电终止电压	2.5V, 0℃>T>-10℃
		2.0V, T<-10℃
11	最大工作温度范围:	- 30 ℃ / + 60 ℃
	充电	0℃~45℃
	放电	-30℃~60℃
12	最佳工作温度范围:	



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	充电	15℃～35℃
	放电	15℃～35℃
13	储藏温度:	- 40 ℃ / + 60 ℃
	1 个月内	-40℃～45 ℃
	6 个月内	-20℃～35 ℃
*电池的保存状态为：处于15%SOC或电压为3.500V～3.550V状态下		

3 外观和尺寸

外观和尺寸见图 1。

4 性能

4.1 测试条件

进货一个月进行测试，测试前循环充放电次数不得超过五次。实验和测量须在标准温度（25±2）℃及标准湿度（65±20）%的条件下进行。除非特别说明，所有测试均需在夹板状态下进行，夹板建议尺寸（T*W*L）：10mm*120mm*200mm，建议材质：铝；定位螺丝扭矩：2.5Nm。

4.2 测量设备

- a) 伏特计 内阻>1000 Ω/V
- b) 游标卡尺 精度为 0.02 mm
- c) 内阻表 在 AC 1kHz 条件下测量
- d) 天平 精度 0.001g

4.3 测试过程及其标准

4.3.1 充电制式

在环境温度（25±2）℃条件下，采用先恒流再恒压方式充电。恒流电流为以 1/3C(A)，恒压电压为 4.2V，在恒压过程中电流降到 2550mA 即可终止充电，静置 1 小时。

4.3.2 测试项目及标准

具体测试项目及标准见表 2。



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表 2

序号	项目	测试程序	标准
1	外观和尺寸	目测及游标卡尺测量，厚度测试须使用工装夹紧，建议压力 50N-200N，不夹测试夹板；	无明显划痕、无漏液，尺寸见图纸
2	重 量	电子天平	925±35g
3	开路电压☆	按4.3.1充电后1小时内测量开路电压，不夹夹板；	≥4.12V
4	标称放电容量☆	按 4.3.1 充电后 1 小时内以 1/3C (A)电流放电到放电终止电压 2.5V，并测容量。上述循环可以重复 5 次，当有 1 次循环容量符合要求时，试验即可终止。	1/3C (A)容量≥标称容量
5	最大充电电流	按 4.3.1 充电后，以 1/3C(A)电流放电到放电终止电压 2.5V，并记录容量。以 3n 倍 1/3C(A)或者指定电流恒流充至 4.2V，再以 4.2V 恒压充至 2550mA 截止。	2C (A) (连续);
6	脉冲充电电流	按 4.3.1 充电后，以 1/3C(A)电流放电到放电至 50%SOC，静置 30min，以脉冲电流充电，电压到达 4.2V 或者充电达到充电时间截至。	3C (A) (50%SOC, 30s)
7	最大放电电流	按 4.3.1 充电后，以 1/3C(A)电流放电到放电终止电压 2.5V，并记录容量。以 1/3C(A)充电，以 n 倍 C(A)或者指定电流放电至 2.5V。	3C (A) (连续);
8	脉冲放电电流	按 4.3.1 充电后，以 1/3C(A)电流放电到放电至 50%SOC，静置 30min，以最大脉冲电流放电，电压 2.5V 或者放电达到持续时间截至。	5C (A) (50%SOC, 30s)
9	充放电循环寿命☆	电池夹好夹板； 充电：1/3C (A) 恒流充电至4.2V，恒压充电至电流降到 2550mA即可终止充电； 休眠：10min 放电：1/3C (A) 恒流放电至 2.5V； 休眠：10min 一次循环定义为一次充电和一次放电。循环充放电 1500 次以上，记录容量。 测试温度：(25±2)℃。	循环寿命≥1500 次，剩余容量≥80%标称容量
10	荷电保持能力☆	按 4.3.1 充电后，在环境温度 (25±2)℃条件下开路搁置 30 天，再以 1/3C (A)电流恒流放电到放电终止电压 2.5V。 按 4.3.1 充电后，在温度 (60±2)℃的高温箱中放置 7 天，	容量≥90%标称容量



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		然后以 1C (A)电流恒流放电至 2.5V， 并记下容量。	
11	高温性能	按 4.3.1 充电后，在温度（60±2）℃的高温箱中放置 5h，然后以 1/3C (A)电流恒流放电至 2.5V， 并记下容量。	容量≥90%标称容量
12	低温性能	按 4.3.1 充电后，在温度（-20±2）℃的低温箱中放置 24h，然后以 1/3C (A)电流恒流放电至 2.0V， 并记下容量。	容量≥70%标称容量
13	密封性☆	将电池在进行荷电保持能力试验前和试验后分别用感量为 0.001g 的电子天平称重，计算电池失重量。	失重< 300 mg
14	振动试验★	按 4.3.1 充电后，将电池固定在振动台上，并开始以 1/3C (A) 电流恒流放电至 2.5V，振动方向为上下，振动加速度为 30m/s ² ，频率 10-55Hz，振动 10 个循环，重复振动 2 小时，不夹夹板。	放电过程没有异常现象
15	短路试验★	按 4.3.1 充电后，将接有热电偶的电池放入通风厨中短路，电池经线路电阻小于 5mΩ 的外部电路短路 10min	电池不起火，不爆炸
16	过充试验★	按 4.3.1 充电后，将接有热电偶的电池进行过充电试验，以下面方式充电： 以 1C (A)电流充电，到电池电压达到 6.3V 或充电时间达到 1h(其中一个条件优先达到即停止试验)	电池不起火，不爆炸
17	过放试验★	按 4.3.1 充电后，在（25±2）℃下以 1C (A)电流放电，放电 90min，结束试验。	电池不起火，不爆炸 不漏液
18	热箱试验★	将接有热电偶的电池放入恒温箱中，关闭箱门后，开启恒温箱加热，监视恒温箱内温度变化（温箱升温速度为 5℃±2℃ /min），箱温达到（130±2）℃时保持 30min 后结束试验。	电池不起火，不爆炸
19	针刺试验★	按 4.3.1 充电后，将接有热电偶的电池放入通风厨中，用 φ5mm~φ8mm 的耐高温钢针以 20mm/s~30mm/s 的速度，从垂直于电池极板的方向贯穿（钢针停留在电池中）	电池不起火，不爆炸
20	跌落试验★	按 4.3.1 充电后，在（25±2）℃下，从 1.5m 高度处自由跌落水泥地面上，要求跌落前正负端子向下。	电池不起火，不爆炸 不漏液

5 注意事项

5.1 充电

- a) 严禁过充，充电电压不得高于 4.2 V。
- b) 严禁反向充电。
- c) 充电器开始充电温度在 0℃-45℃。



d) 建议最佳充电温度为 15℃-35℃，不宜在此温度范围外长期充电。

5.2 放电

a) 严禁短路。

b) 放电电压不得低于 2.5V(0℃以上)/2.5V (-10℃以上) /2.0V (-10℃以下)。

c) 放电温度范围为-30℃-60℃。

d) 建议最佳放电温度为 15℃-35℃，不宜在此温度范围外长期放电。

5.3 将电芯放置在远离儿童的地方

5.4 储存

短时储存（1 个月内）要将电池放置于清洁、湿度低于 65%RH、温度-40℃-45℃的环境及半充满状态。

长期储存（6 个月内）要将电池放置于清洁、湿度低于 65%RH、温度-20℃-35℃的环境及半充满状态。

6 警示

6.1 在使用之前，应详细阅读规格书并对其中警示内容和注意事项有足够深刻的理解。

6.2 严禁电池过热；严禁改装、拆解电池；这些行为非常危险，可能会引起电池起火、漏液、爆炸。

6.3 严禁将电芯暴露在极热环境或投入火中，不要将电池放置在太阳直射的地方。

6.4 严禁将电池正负极柱用金属或其他导线直接连在一起形成通路，这样将导致电池短路，可能引起电池起火甚至爆炸。

6.5 严禁将正负极柱颠倒使用。

6.6 严禁将电芯浸入水中或者其它导电性液体中，或者使其吸湿

6.7 严禁使电芯承受过重的机械冲击。

6.8 严禁直接焊接电池，过热可能会引起电池零部件（如垫片）变形，这将导致电池鼓胀、漏液、起火甚至爆炸。

6.9 严禁使用运输中发生挤压、跌落、短路、漏液及其他不正常问题的电池。

6.10 在使用过程中严禁各电池之间外壳直接接触或通过导体连接在一起形成通路。



6.11 电池应该在远离静电的场所进行储存、使用

6.12 禁止把电池同其他一次电池或二次电池一起使用，也不要同不同包装、不同型号或其他品牌的电池一起使用。

6.13 在使用、充放电或者存储过程中发现电池急剧变热、散发气味、变色、变形或者其他反应，应立即停止使用，并进行相应的处理。

6.14 如电池漏液到皮肤或衣物上，请立即用清水冲洗，以免造成皮肤不适等

7 运输

运输过程中应防止剧烈振动、冲击、日晒雨淋。

运输过程中应使电池处在低于 30%的 SOC 状态。

8 其它

如果客户需要将电芯在该文件之外的条件下操作或应用，请先咨询力神公司相关事宜。在该文件说明的条件之外使用该电芯而产生的事故，公司不承担任何责任。

对单体电池与电路，电池组，充电器搭配使用不当所产生的问题公司不承担任何责任。

出货后客户在电芯组装过程中，因加工产生的不良电芯不在质量保证的范围之列。

9 产品图

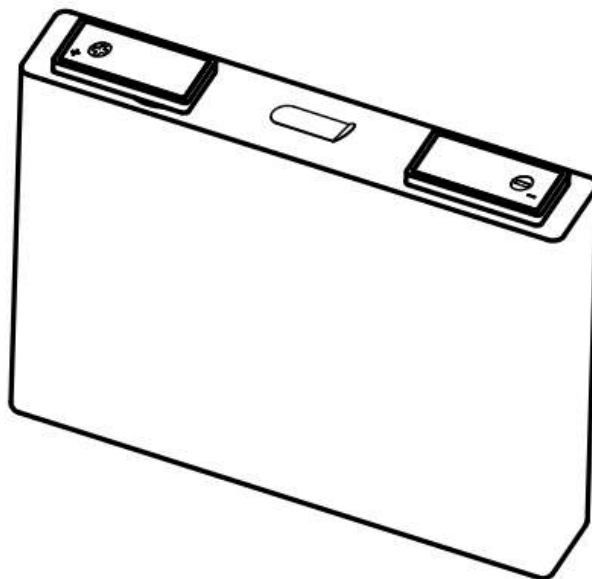


图 1 电池外形图

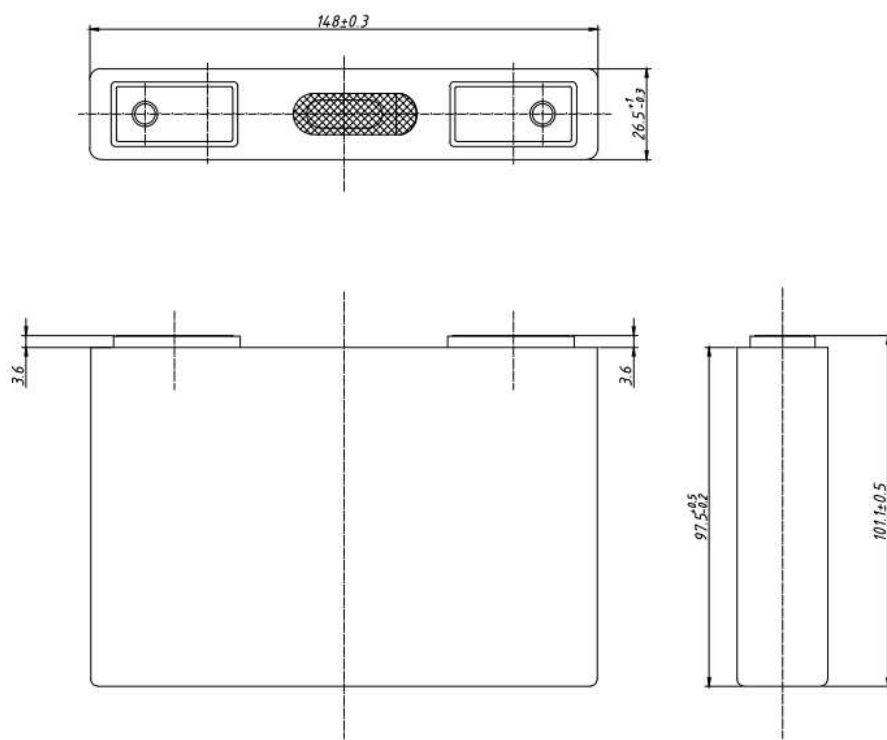


图 2 电池尺寸图



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Lithium-ion Power Cell of LP2714897-51Ah

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1. Scope

The product specification describes the requirement of the Prismatic Lithium Ion Power Cell to be supplied to the customer by Tianjin Lishen Battery Joint-Stock Co.,Ltd.. If there is any additional information required by the customer, customers are advised to contact Tianjin Lishen Battery Joint-Stock Co., Ltd.

2. General Specifications

2.1 Abbreviation Definitions

C—— the rated capacity (in ampere-hours) of the cell for an-hour discharge.

In the following specification $1\ C\ (A) = 51.0A$, $1/3C(A) = 17A$.

SOC —— state of charge.

DOD—— depth of discharge.

AC—— alternating current

OCV—— open circuit voltage

2.2 Specification

	Item	Specification
1	Cell Type	Lithium -ion power cell
2	Cell Model	LP2714897
3	Nominal Capacity☆	51.0Ah
4	Average Working Voltage☆	3.65V
5	AC-impedance☆	$\leq 1.0m\Omega$
6	Weight	925±35g
7	Maximum Charge Current	2C (Continuous) 3C (30s, 50%SOC)
8	Charging End Voltage	4.2V
9	Maximum Discharge Current	3C (Continuous) 5C(30s, 50%SOC)
10	Discharge End Voltage	2.5V
11	Max Operating Temperature Range	-30℃/+60℃
	Charge	0℃ ~ 45℃
	Discharge	-30℃ ~ 60℃
12	Optimal Operating Temperature Range	



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	Charge	15℃ ~ 35℃
	Discharge	15℃ ~ 35℃
13	Storage Temperature	-40℃/+60℃
	1 month	-40℃~ 45℃
	6 months	-20℃ ~ 35℃
*Cells should be stored at the voltage is between 3.500V and 3.550V (no higher than 15%SOC) ;		

3. Appearance and Dimension

Appearance and Dimension refer to the attached drawing 1.

4. Characteristics

4.1 Test Condition

Cells should be tested within a month after purchase and the charge-discharge times of the test cells should be less than 5. Unless noted otherwise, all tests are to be conducted at standard temperature which is $(25 \pm 2)^\circ\text{C}$ and standard humidity which is $(65 \pm 2)\%$. Unless otherwise specified, all the tests are to be conducted using cells clamped by plates. Dimensions of plates suggested to be $(T*W*L): 1\text{cm}*12\text{cm}*20\text{cm}$, material of plates suggested to be aluminum. Torque of positioning screws is about 2.5~3N.

4.2 Test Equipment

a) Voltmeter

Inner impedance $> 1000\Omega$ per volt.

b) Slide caliper

The slide caliper should have a minimum scale of 0.02mm.

c) Impedance meter

The impedance meter should be operated at AC 1kHz.

d) Balance

The Balance's accuracy should be up to 0.001 gram

4.3 Test Process and Specification

4.3.1 Charge Method



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Cells are charged with Constant Current and Constant Voltage (CC/CV) method at the environment temperature of $(25\pm 2)^{\circ}\text{C}$. The constant current is $1/3C(A)$ and the constant voltage is 4.2V, Charge shall be terminated when the charge current has tapered to 2550mA, then store cells for 1h.

4.3.2 Test Item and Specification

Test Item and Specification Should refer to table 2.

Table 2

Number	Item	Test profile	Specification
1	Appearance and Dimension	1.Eyeballing 2.Test cells' dimension with slide caliper Without plates. 3.The cell's thickness should be tested with the cell clamped. The pressure should be 50N-200N.	No deep scratch, No leakage , dimension should refer to the attached drawing 1
2	Weight	Electronic Scale, without plates	$925\pm 35\text{g}$
3	Open Circuit Voltage☆	Measure the open circuit voltage within 1h after charge cells per 4.3.1. without plates	$\text{OCV}\geq 4.12\text{V}$
4	Rated discharge capacity☆	Charge cells per 4.3.1. Then discharge cells at a $1/3C(A)$ current to 2.5V within 1h and measure the capacity. The cycle can repeat 5 times, when the capacity of one cycle meet the requirement, the test can be terminated.	$1/3C \text{ capacity} \geq \text{Nominal}$ capacity
5	Maximum charge current	1、 Discharge cells at a $1/3C(A)$ current to 2.5V within 1h after charge cells per 4.3.1. And record the capacity; 2、 Charge cells to 4.2V, charge shall be terminated when the charge current has tapered to 2550mA, the charge current is nC .	$2C(\text{continuous});$
6	Pulse Charge	Charge cells per 4.3.1, then discharge to 50%SOC at $1/3C(A)$ current. Rest 30min. Charge the cell at pulse current. Charge shall be terminated when the voltage reach 4.2V or charge	Max current: $3C(50\%\text{SOC}, 30\text{s})$



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		withstand 30s.	
7	Maximum discharge current	1、 Discharge cells at a 1/3C (A) current to 2.5V after charge cells per 4.3.1. And record the capacity; 2、 Charge cells at 1/3C(A) current, and discharge to 2.5V at a current of nC .	3C (continuous);
8	Pulse discharge	Charge cells per 4.3.1, then discharge to 50%SOC at 1/3C (A) current. Rest 30min. Discharge cells at pulse current, discharge shall be terminated when the voltage reach 2.5V or discharge withstand 30s.	Max current: 5C (50%SOC,30s)
9	Cycle Life☆	Single cell, stabilized between 2 metallic plates (alumina); Cycle schedule is as below: Charge: CC/CV, 1/3C charge to 4.2V and 2550mA cut-off; Rest: 10min; Discharge: 1/3C to 2.5V; Rest: 10min; A cycle is defined as one charge and one discharge. Discharge capacity shall be measured after 1500 cycles. Test temperature: (25±2) °C	Discharge capacity (1500th Cycle) ≥80% of Nominal Capacity
10	Capacity Retention☆	1.After charge per 4.3.1. store the testing cells for 30 days at the environment temperature of (25±2) °C,then discharge to 2.5V at a 1/3C (A) current. 2.After charge per 4.3.1. store the testing cells at (60±2) °C for 7 days, then discharge to 2.5V at a 1/3C (A) current and measure the capacity.	Residual capacity≥90% of Nominal capacity
11	Characteristics at high temperature	Cells shall be charged per 4.3.1 and store for 5h at (60±2) °C, then discharge to 2.5V at a 1/3C (A)current and measure the capacity.	Residual capacity≥90% of Nominal capacity
12	Characteristics at low temperature	Cells shall be charged per 4.3.1 and store for 20h at (-20±2) °C, then discharge to 2.0V at a 1/3C	Residual capacity≥70% of Nominal capacity



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		(A)current and measure the capacity。	
13	Airproof Characteristics☆	Weighed the testing cells before the storage test with an electronic scale which has a minimum scale of 0.001g, storage the cells at 60℃ , 95%RH for 16 hours. Test the weight again and then calculate the weight loss.	Loss of weight < 300 mg
14	Vibration Test★	A cell is charged in accordance with 4.3.1., then firmly installed onto the vibration desk and discharge at a constant current of 1/3C A. Equipment parameters of frequency and amplitude are as follows: the vibration direction is only up and down, the frequency is to be varied at the rate of 30m/s ² between 10 and 55 hertz, sweep cycle for 10 times, and repeat vibration for 2h.	No exceptional phenomenon during the discharge process
15	Short-circuit Test★	External resistance of short circuit ≤ 5 mOhm. Single cell, stabilized between 2 metallic plates (alumina) or a module with one cell inside. Cell fully charged (SOC 100%). Ambient temperature 25℃ ± 2℃. Hold short circuit for 10 minutes.	No Explosion, No Fire
16	Overcharge Test★	After charged per 4.3.1, test cells (with thermocouple) shall be overcharged with a sort of method below: Charge current 1C for Single cell, stabilized between 2 metallic plates (alumina) or a module with one cell inside. Ambient temperature 25℃±2℃. Charge shall be terminated when voltage rise to 6.3V or charge for 1 hour.	No Explosion, No Fire
17	Over Discharge test★	Discharge test cells at a 1C (A) current for 90 minutes after charge cells per 4.3.1.	No Explosion, No Fire, No leakage
18	Thermal Test★	Put cells (with thermocouple) into the oven, then close the door of it The oven temperature shall be raised at a rate of 5℃±2℃/min to a temperature of	No Explosion, No Fire



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		(130±2) °C , the cells shall remain at this temperature for 30min before the test is discontinued.	
19	Nail penetration Test★	After charged test cells per 4.3.1, Single cell, stabilized between 2 metallic plates (alumina). put the cells with thermocouple into the fume hood, then penetrate completely the center of the largest side at the speed of 20-30mm per second by a Φ5-8mm stainless steel nail.	No Explosion, No Fire
20	Drop Test	A cell is charged in accordance with 4.3.1, then dropped from a height of 1500mm to cement ground .Cells shall be dropped with the terminals downward.	No Explosion, No Fire, No leakage

5.Caution

5.1 Charge

- a) NO over-charge, the charge voltage should not be over 4.2 V.
- b) NO reverse charging
- c) Charger to start charging temperature 0 °C -45 °C
- d) Recommended charging temperature range is 15°C ~ 35°C。 Cannot be charged many times at the temperature less than 15°C.

5.2 Discharge

- a) No short circuit
- b) The end of discharge voltage must be over 2.5V (above 0°C)/2.5V (above-10°C) /2.0V(below -10°C)
- c) Discharge temperature range of -30°C~60°C
- d) Recommended discharging temperature range is 15 °C~ 35°C. Do not discharged for long times at any temperature out of 15 °C~ 35°C.

5.3 Put cells away from children.



5.4 Storage

a) For any short time storage (in one month), cell should be in a clean and dry area (humidity $\leq 65\%$ RH) and at $-40^{\circ}\text{C} \sim +45^{\circ}\text{C}$ at half charged stage.

b) For any long time storage (in 6 month), cell should be in a clean and dry area (humidity $\leq 65\%$ RH) and at $-20^{\circ}\text{C} \sim +35^{\circ}\text{C}$ at half charged stage.

6. Warning

6.1 Before using, read the specifications to have an enough understanding for the warning content and Notes.

6.2 Avoid overheat in any circumstances. Don't modify or disassemble the battery. It will be dangerous, and may cause ignition, heating, leakage or explosion.

6.3 Don't put cells in overheat circumstances or disposed in fire ,don't put cells under the sunshine.

6.4 Don't short-circuit positive(+) and negative(-) terminals. Keep away from metal or other conductive materials. Jumbling the batteries of direct contact with positive(+) and negative(-) terminals or other conductive materials may cause short-circuit and may even cause fire and explosion.

6.5 Don't reverse the positive (+) and negative (-) terminals.

6.6 Don't put cells in water or other conductive liquids or let cells absorb amoisture.

6.7 Don't impact cells excessively.

6.8 Don't solder the battery directly. Excessive heating may cause deformation of the battery components such as the gasket, which may lead to the battery swelling,leakage, explosion,or ignition.

6.9 Don't use abnormal cell which has damages by shipping stress, drop, short or something else, and which gives off electrolyte odor.

6.10 Don't contact cans directly or with other conductive materails during the using process.

6.11 During store or using, The battery should be away from the static place,

6.12 This battery cannot mix with deposal or twice-recycled batteries in use. Otherwise, for its abnormal charge and discharge, it will cause over-heated, distort, smoke or burning.



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6.13 If find the cell have the phenomenon of rapid heating, emitting gas, the emission of odor, discoloration, distort etc., must stop using and take effective measures to prevent personnel from harm or fires

6.14 To avoid the leak-out liquid be exposed to the skin or clothes. If touched, please wash by clean water so as not to cause the skin uncomfortable.

7. Shipping

7.1 During transportation, keep the battery from acutely vibration, impacting, insolation, drenching.

7.2 The delivery battery should be at a half charged state (no higher than 30%SOC).

8. Others

If customers need to use or operating cells beyond the specified range of this file, please contact Tianjin Lishen Battery Joint-Stock Co., Ltd. Manufacturer will not be responsible for trouble caused by using cells beyond the specified range of this file.

Manufacturer will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.

Manufacturer will be exempt from warrantee any defect cells during assembling after acceptance.



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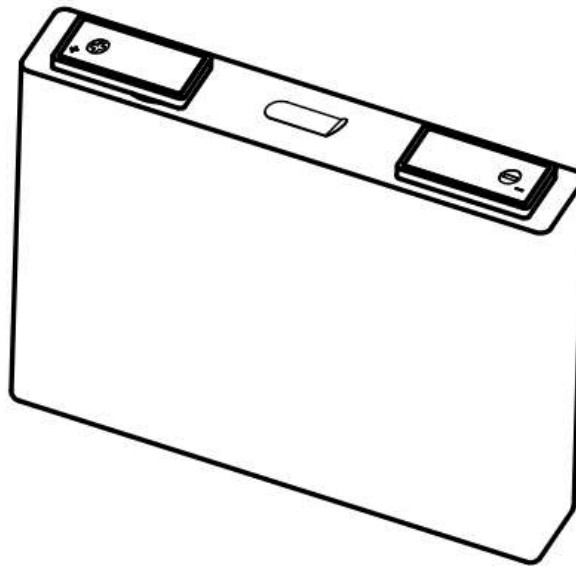
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Attached drawing 1



Attached drawing 2

