Product Specification for Lithium-ion Rechargeable Cell

锂离子电芯产品规格书

Cell Model: IFP117/163/202PA 30Ah

电芯型号：IFP117/163/202PA 30Ah

Prepared 准备	Checked 审核 （开发）	Checked 审核 （营销）	Checked 审核 （品质）	Approved 批准

Customer Confirmation 客户确认	Signature 签订	Date 日期
	Company Name of Customer: 客户名称：	
	Company Stamp of Customer: 客户公章：	

Revision History 版本记录			
Revision **版本号**	**Date** **日期**	**Originator** **发起人**	**Description** **描述**

1. Purpose 目的

The specification sheet is designed to build up and improve Victpower technical documentation so as to instruct production and product shipment and consequently guarantee product quality. At the same time, it is convenient for to confirm product specifications with customers and finally reach an agreement.

为建立健全的公司技术资料，确保产品质量，用于指导产品生产、出货。方便与客户确认产品规格，并达成一致，制定本产品规格书。

2. Scope 适用范围

This product specification describes the type, size, structure, electrochemistry performance, environmental characteristics, warning and cautions of the IFP117/163/202PA cell. This PS only applies to the IFP117/163/202PA cell that supplied by

本产品规格书规定了 IFP117/163/202PA 电芯的类型、尺寸、结构、电化学性能、环境适应性能及注意事项，本标准仅适用本公司生产的 IFP117/163/202PA 电芯。

3. Responsibility and Authority 职责与权限

None 无

4. Term and Definition 术语和定义

4.1 Rated Capacity 标称容量

Rated Capacity is 30.0Ah, cells shall be tested at 25±3°C, 65±20%RH, it means the capacity value of being discharged by 3-hours ratio to the cut-off voltage 2.5V, which is signed as C_3, the unit is Ah.

标称容量 C=30.0Ah，指在 25±3°C, 65±20%RH 环境条件下，以 3 小时率放电至终止电压 2.5V 时的容量，以 C_3 表示，单位为安时(Ah)。

4.2 Standard Charging Method 标准充电方法

The cell is to be conditioned at 25±3°C, 65±20%RH, charging the battery with 1/3C_3A (10.0A) constant current to 3.65V, then 3.65V constant voltage charge with current taper to 0.02C_3 A (0.60A).

标准充电方法是指将电芯放在 25±3°C, 65±20%RH 的环境条件下，先以 1/3C_3 A (10.0A)的电流恒流充到 3.65V，然后 3.65V 恒压充电，直至充电电流减少到 0.02C_3 A (0.60A)时，充电停止。

4.3 Standard Discharging Method 标准放电方法

Full charged cell is to be conditioned at 25±3°C, 65±20%RH, discharging the cell with 1/3C_3 A (10.0A) constant current to 2.5V.

标准放电方法是指将电芯放在 25±3°C, 65±20%RH 的环境条件下，以 1/3C_3 A (10.0A)的电流恒流放到 2.5V。

4.4 Quick Charging Method 快速充电方法

The Cell is to be conditioned at 25±3°C, 65±20%RH, charging the Cell with 2C_3 A (60.0A)constant current to 3.65V, then 3.65V constant voltage charge with current taper to 0.02C_3 A (0.60A).

快速充电方法是指将电芯放在 25±3°C, 65±20%RH 的环境下，先以 2C_3 A (60.0A)的电流恒流充到 3.65V，然后 3.65V 恒压充电，直至充电电流减少到 0.02C_3 A (0.60A)时，充电停止。

4.5 Quick Discharging Method 快速放电方法

Full charged cell is to be conditioned at 25±3°C, 65±20%RH, discharging the cell with 3.0C_3 A (90.0A) constant current to 2.5V.

快速放电方法是指将电芯放在 25±3°C, 65±20%RH 的环境下，以 3C_3 A (90.0A)的电流恒流放到 2.5V。

5. Content 内容

5.1 Cell Structure 电芯结构

The cell consists of the cathode electrode, anode electrode, separator, tab, electrolyte, Al-plastic film, etc.

电芯由正极极片、负极极片、隔离膜、极耳、电解液、铝塑膜等组成。

5.2 Cell Specification 电芯规格

Item 项目	Specification 规格
Cell Weight 电芯重量	**≤712g**
Cell Dimension 电芯尺寸	Thickness ： **11.95** mm Max. 最大厚度：**11.95** mm Width ： **162.5** mm Max. 最大宽度：**162.5**mm Length ： **202**mm Max. 最大长度：**202**mm（不含 Sealant） As shown in figure 1 如图 1 所示
Normal Capacity 标称容量	**30.0Ah@1/3C_3A (10.0A)**
Normal Voltage 标称电压	**3.2V**
Charging Cut-off Voltage 充电截止电压	**3.65 ±0.05 V**
Discharging Cut-off Voltage 放电截止电压	**2.50±0.05V (>0°C); 2.00±0.05V (-20°C~0°C);**
Standard Charging Current 标准充电电流	**1/3C_3A (10.0A)**
Standard Discharging Current 标准放电电流	**1/3C_3A (10.0A)**
Max Continuous Charging Current 最大连续充电电流	**2C_3A (60.0A)**
Max Continuous Discharging Current 最大连续放电电流	**3C_3A (90.0A)**
Max. Plus Discharging Current 最大瞬间放电电流	**8C_3A (240A)＜10s**
Transport Voltage 运输电压	**3.296～3.310V**
Internal Resistance 内阻	**≤ 1.5mΩ(AC Impedance, 1000 Hz)**

Appearance 外观	**Without break, leakage and so on.** **电芯表面无破裂、电解液泄露等缺陷**

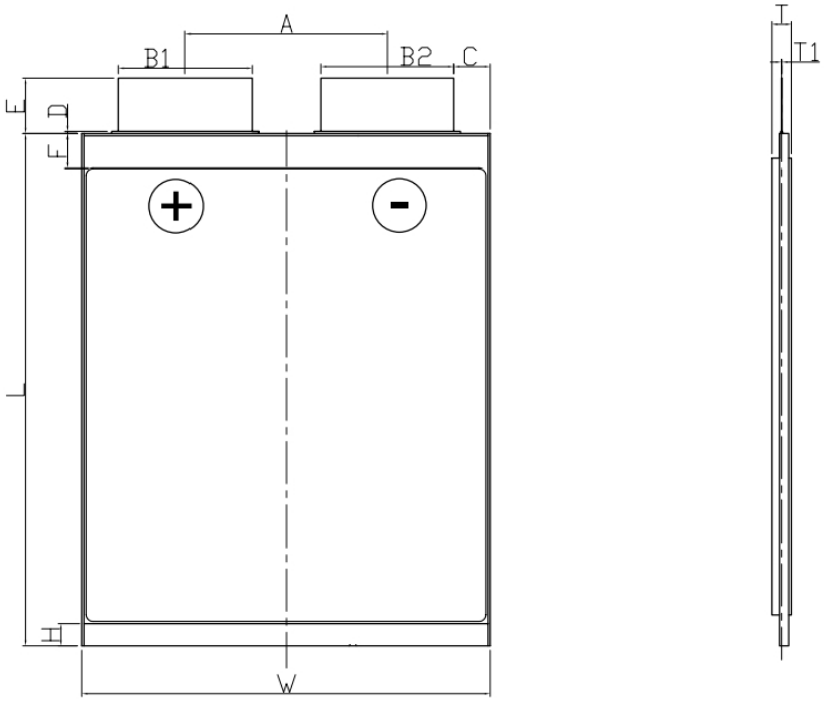


Fig.1 Cell Dimension schematic diagram
图 1. 电芯尺寸示意图

项目 Items	Parameters 参数/mm	Tolerance 公差/mm
电芯宽度(W) Cell Width(W)	161.0	±1.5
电芯长度(L) Cell Length(L)	201.0	±1.0
电芯厚度(T) Cell Thickness(T)	11.65	±0.3
极耳中心距(A) Tab Distance(A)	75.0	±1.0
正极耳宽度(B1) Cathode Tab Width(B1)	60.0	±0.2
负极耳宽度(B2) Anode Tab Width(B2)	50.0	±0.2
负极极耳边距(C)	15.5	±1.5

Anode Tab Apothem(C)		
Sealant 外露（D） Sealant Width of the Leak（D）	2.0	±1.5
极耳长度(E) Tab Length(E)	35.0	±1.5
电芯顶边宽(F) Cell Top Side Width((F)	17.0	±0.5
电芯底边宽(H) Cell Bottom Side With(H)	8.0	±0.5
极耳厚度(T1) Tab Thickness(T1)	0.3	±0.02

5.3Technical Request 技术要求

5.3.1 Cell Operating Temperature 电芯工作温度

Charging Temperature 充电温度：0°C ~ 45°C

Discharging Temperature 放电温度：-20°C ~ 60°C

5.3.2 Cell Storage Requirements 电芯存储要求

Less than 7 days 小于 7 天： -20℃~+45℃

Less than 1 month 小于 1 个月: -20℃~+40℃

Less than 3 months 小于 3 个月: -10℃~+35℃

Above 3 months 超过 3 个月: +20℃~+30℃

Relative Humidity 相对湿度：85%RH Max.

The state of charge (SOC) for storage shall be 40%~60%. Cells shall be charged and discharged for at least one cycle every three months.

存储荷电状态在 40%~60%。电芯至少每三个月充放电循环一次。

5.3.3 Cell Testing Conditions 电芯试验条件

Tests should be conducted with new cells within one month after shipment from our factory and the cells shall not be cycled more than five times before the test. All of the testing is done on the conditions hereinafter, unless there is individually requirement:

测试电芯必须是本公司出厂时间不超过一个月的新电芯，且电芯未进行过五次以上充放电循环。除非测试项目另有规定，本产品规格书中各项测试应在以下条件下进行：

Ambient Temperature 温 度： 25±3°C

Relative Humidity 相对湿度： 65±20%RH

Atmospheric Pressure 大气压力： 86kPa~106kPa

5.3.4 Requirements of the Testing Meters 测量仪表要求

Voltage Meter：Internal resistance of the voltage meter should be no less than 10 kΩ/V.

电压仪表要求：测量电压内阻的仪表准确度不小于 10kΩ/V。

Temperature Meter： The precision of the temperature meter should be no less than 0.5°C.

温度仪表要求：测量温度的仪表准确度不低于 0.5°C。

5.4 Electrochemical Performance 电化学性能

No. 序号	Items 项目		Criterion 标准	Testing Method 测试方法	Remark 备注
1	Discharging Performance at High and Low Temperature 高低温放电特性	-20°C	Discharge capacity retention ratio at 1/3C_3 A (10.0A) should be no less than 60% of the initial capacity. 1/3C_3 A (10.0A)放电容量≥60%初始容量	• Cell shall be charged following the standard charging method. And then standby for 8 hours at -20±2°C followed by a discharge at 1/3C_3 A (10.0A) to 2.0V at this temperature. • Then cell shall be allowed to rise to room temperature for one hour, followed by standard charging and then standby for 5 hours at 55±2°C followed by a discharge at 1/3C_3 A (10.0A) to 2.5V at this temperature. • The discharge times and capacity at different temperatures shall be recorded. • 电芯按照标准充电方式充满电后，于-20±2°C条件下存放 8 h 后，在该温度下以 1/3C_3 A (10.0A)的电流放电至 2.0V； • 将温度恢复到室温，静置 1h 后，然后电芯按照标准充电方式充满电，再于 55±2°C 条件下存放 5 h，在该温度下以 1/3C_3A (10.0A)的电流放电至 2.5V； • 记录不同温度条件下的放电时间和放电容量。	
		55°C	Discharge capacity retention ratio at 1/3C_3 A (10.0A) should be no less than 98% of the initial capacity 1/3C_3 A (10.0A)放电容量≥98%初始容量		
2	RT Cycle Life 常温循环寿命		After 2000 cycles, the discharge capacity retention ratio should be no less than 80% of the initial capacity. 2000 次循环后，容量保持率≥80%初始容量	First charge and discharge the cell with 1C_3 A (30.0A), the time interval between charging and discharging should not less than 30 minutes, then repeat the steps mentioned above. 首先以 1C_3 A (30.0A)将电芯充放电，连续循环，中间充放电的时间间隔不少于 30 分钟。	
3	55°C Cycle Life 55°C 循环寿命		After 500 cycles, the discharge capacity retention ratio should be no less than 70% of	First charge and discharge the cell with 1C_3 A (30.0A), the time interval between charging and discharging should not less than 30 minutes, then repeat the steps mentioned above. Test temperature should be at 55±2°C	

		the initial capacity. 500 次循环后，容量保持率≥70%初始容量	首先以 1C_3 A (30.0A)将电芯充放电，连续循环，中间充放电的时间间隔不少于 30 分钟。测试应在 55±2°C 温度范围内进行；	
4	RT Charge Retention 常温荷电保持	After standing for 28 days, discharge capacity retention ratio should be no less than 95% of the initial capacity. 静置 28 天后，放电容量保持率不低于95%初始容量	The capacity of the cell is tested by fully charged and discharged with standard method. Charging the cell with standard charging method, then stored with open- circuit at RT for 28days, discharged the cell with standard discharging method. The discharging capacity should be recorded. 将电芯用标准充放电模式做容量测试，再以标准充电方式充电，然后将电芯放置在常温环境中 28 天，放置 28 天后用标准放电方法放电，记录放电容量。	
5	RT Charge Recovery 常温荷电恢复	Discharge capacity retention ratio should be no less than 96% of the initial capacity. 放电容量保持率不低于96%初始容量	The cell which had been through charge retention test is to be fully charged with standard charging method, then discharge the cell with standard discharging method. The discharging capacity should be recorded. The discharging capacity should be recorded. 经过荷电保持测试的电芯，标准充满电后，再用标准放电方法进行放电，记录放电容量。	
6	55°C Charge Retention 55°C 荷电保持	After standing for 7 days, discharge capacity retention ratio should be no less than 95% of the initial capacity. 静置 7 天后，放电容量保持率不低于 95%初始容量	The capacity of the cell is tested by fully charged and discharged with standard method. Charging the cell with standard charging method, then stored with open- circuit at 55±2°C for 7days, discharged the cell with standard discharging method. The discharging capacity should be recorded. 将电芯用标准充放电模式做容量测试，再以标准充电方式充电，然后将电芯放置在 55±2°C 环境中 7 天，放置 7 天后用标准放电方法放电，记录放电容量。	
7	55°C Charge Recovery 55°C 荷电恢复	Discharge capacity retention ratio should be no less than 96% of the initial capacity. 放电容量保持率不低于96%初始容	The cell which had been through charge retention test is to be fully charged with standard charging method, then discharge the cell standard discharging method. The discharging capacity should be recorded. 经过荷电保持测试的电芯，标准充满电后，再用标准放电方法进行，记录放电容量。	

		量		
8	Rated Performance 倍率性能	Discharge capacity retention ratio at $3C_3$ A (90.0A) should be no less than 90% of the initial capacity. $3C_3$ A (90.0A)放电容量≥90%初始容量。	The capacity of the cell is tested by fully charged and discharged with standard method. Charging the cell with standard charging method, then discharge the cell with $3C_3$ A (90.0A) constant current to 2.5V. The discharging capacity should be recorded. 将电芯用标准充放电模式做容量测试，再以标准充电方式充电，然后将电芯以 $3C_3$ A (90.0A)的恒定电流进行放电至 2.5V，记录放电容量。	

5.5 Environmental Characteristics 环境适应性测试

No. 序号	Item 测试项目	Criterion 性能标准	Testing method 测试条件与方法
1	Vibration Test 振动测试	No explosion no fire, and no leak. 不泄露、不起火、不爆炸。	The cell is fully charged with standard charging method, and then the voltage and resistance of the cell is to be measured after 4 hours' standing. After that, the cell is to be fixed and tested as followed: a) The vibration direction: uprightness; b) The frequency: from 10 to 55 Hz; c) peak acceleration: 30m/s^2; d) Swept cycle: 10cycles; e) The vibration time: 2h. 将电芯以标准充电方法充满电，静置 4 小时后测试电压和内阻，然后将充满电样品固定夹在振动机平台上，按下述条件进行线性扫频振动试验： a）振动方向：上下单振动；b）振动频率：10～55Hz；c）最大加速度：30m/s^2；d）扫频循环 ：10 次；e）振动时间：2h；
2	Temperature Cycling Test 温度循环测试	No explosion, no fire, and no leak. 不泄露、不起火、不爆炸。	The cell is fully charged with standard charging method, and then it is to be stored for four hours at a test temperature equal to -40±2 °C, followed by a storage for two hours at a test temperature equal to 25±3°C, the temperature of the oven is to be raised at 75±2°C and remain for four hours at that temperature, the maximum time interval between test temperature extremes is 30 minutes, this procedure is to be repeated for 9 times, after which all test cells are to be stored for six hours at ambient temperature (25±3°C). 将用标准充电方法充满电的电芯放入-40±2°C 的低温环境中搁置 4 小时, 再在 25±3°C 条件下搁置 2 小时，最后在 75±2°C 条件下搁置 4 小时，两个温度变换时时间不超过 30min。如此循环 9 次结束实验，试验结束后将样品取出，在 25±3°C 环境中搁置 6 小时。
3	Low Pressure	No explosion, no	The fully charged cell is to be stored for 6 hours at an absolute

	Test 低压测试	fire, and no leak. 不泄露、不起火、不爆炸。	pressure of 11.6kPa and a temperature of 25±3°C. 将电芯在绝对压力为 11.6kPa、25±3°C 条件下贮存 6 小时。
4	130°C Storage Test 130°C 储存测试	No fire and no explosion. 不起火、不爆炸。	The fully charged cell is to be heated in gravity convection or circulating air oven, the temperature of the oven is to be raised at a rate of 5±2°C per minute to a temperature of 130±2°C and remain for 30 minutes at that temperature before the test is discontinued. 将标准充电方法充满电的电芯放在自然对流或强制对流烘箱中加热，烘箱温度以 5±2°C/min 的速度升温至 130±2°C，并保持 30 分钟。
5	Constant Temperature and Constant Humidity Test 恒温恒湿测试	No explosion, no fire, no leak and retention capacity≥80%. 不泄露、不冒烟、不爆炸、电池容量不低于初始容量的 80%。	The cell is fully charged with standard charging method, the cell is to be stored for 48 hours in an oven with a constant temperature of 45±2°C and a relative humidity of 90~95% RH, after testing the cell should be stored for 2 hours at a temperature of 25±3°C, 65±20% RH relative humidity and a pressure of 86kPa~106kPa. 将电芯用标准充电方法充满电，然后放入温度 45±2°C,相对湿度 90~95%RH 的恒温恒湿箱中,持续时间 48 小时,试验结束后将样品放在 25±3°C,相对湿度 65±20%RH,大气压力 86kPa~106kPa 的环境中搁置 2 小时。

5.6 Safety Characteristics 安全性能

No. 序号	Item 测试项目	Criterion 性能标准	Testing Method 测试条件与方法
1	Drop Test 自由跌落测试	No smoke, no explosion and no fire. 不冒烟，不起火，不爆炸。	The cell is fully charged with standard charging method, standby for 1 hour and then it is submitted to free fall at a height of 1.5m down to one solid board. It should be fallen for 1 times on each direction. 将电芯用标准充电方法充满电后放置 1 小时；然后将电芯从 1.5m 高度自由落到硬木板上，每个面上各试验 1 次。
2	Over-charge Test 过充测试	No fire and no explosion. 不起火、不爆炸。	First discharge the cell with standard discharging method, then the cell is to be charged with $1C_3$ A (30.0A) constant current to 5.0V and continue to be charged for 8 h with the constant voltage before the test is discontinued. 将电芯按标准放电方法放电，然后以 $1C_3$ A (30.0A)的恒定电流充电至 5.0V，并在此电压下继续恒压充电 8 小时。
3	Over-discharge Test 过放测试	No smoke, no explosion and no fire. 不冒烟，不起火，不爆炸。	The cell is discharged to 2.5V with standard discharging method, then continue discharging the cell with $1/3C_3$A (10.0A) current to 0±0.2V. 将以标准放电模式完全放电至 2.5V 的电芯再以恒电流 $1/3C_3$A (10.0A)继续放电到 0±0.2V。

4	RT External Short-circuit Test 常温短路测试	No explosion and no fire. 不爆炸、不起火	The cell is fully charged with standard charging method and it is to be stored at room temperature（25±3°C） for 1hour, the cell is to be short-circuited by connecting the positive and negative terminals of the cell with wire having a resistance load of less than 5mOhm at RT for 10 minutes. 将电芯用标准充电方法充满电后，在常温下放置 1 小时，然后在常温下用小于 5mOhm 的导线将电芯短路 10 分钟。
5	55°C External Short-circuit Test 55°C 短路测试	No fire and no explosion, the cell temperature should not exceed 150°C. 不爆炸、不起火，表面温度不超过 150°C。	The cell is fully charged with standard charging method and it is to be stored at room temperature for 1hour, then standby for 5 hours at 55±2°C, and the cell is to be short-circuited by connecting the positive and negative terminals of the cell with wire having a resistance load of less than 5mOhm at 55±2°C for 10 minutes. 将电芯用标准充电方法充满电后，在常温下放置 1 小时，然后在 55±2°C 下搁置 5h，在此温度下再用小于 5mOhm 的导线将电芯短路 10 分钟。
6	Nail Test 针刺测试	No fire and no explosion, the cell temperature should not exceed 150°C, but deformation is allowed 不爆炸、不起火，但允许电芯变形，表面温度不超过 150°C。	The cell is fully charged with standard charging method, then it is to be penetrated vertically through the center of the largest side of the cell with a speed of 10~40mm/s and left for over 30s, the diameter of the nail is 3-8mm. 将电芯按照标准充电方法充满电，然后用一个直径 3-8mm 的钉子(对方形电芯必须以垂直于宽度的方向)以 10~40mm/s 的速度穿过电芯最大表面的中心，并把钉子停留在电芯内 30 秒以上。
7	Crush Test 挤压测试	No fire and no explosion. 不起火、不爆炸。	The cell is fully charged with standard charging method, stand by for 1 hour, and then it is pressed by the perpendicular direction t of the battery plates. The cell is pressed by the extrusion head which the area is no less than 20cm^2 until the cell rupture or short (open voltage turn down to 0V). The voltage and temperature are monitored in whole test. 将电芯按照标准方法充满电，静置 1h 后再垂直于电池极板方向施压，挤压头面积不小于 20cm^2，直至电池壳体破裂或内部短路（开路电压变为 0V），试验过程中记录电芯电压和温度变化。

6. Handling Precautions and Guidelines for Lithium-ion Batteries 锂离子电池使用警告事项及指南

This document of this “Handling Precautions and Guidelines for Lithium-ion Batteries” shall apply to the cells that are be manufactured byVICTPOWER.

这份“锂离子电池使用警告事项及指南”适用于 VICTPOWER 制造的电芯。

6.1 Charging 充电

6.1.1 Charging Current 充电电流：

Charging current should be less than the maximum charging current specified in the Cell Specifications. Charging with higher current than recommended value may cause damage to the electrochemical, environmental and safety performance of the cell and could lead to heat generation or leakage.

充电电流不应超过“电芯规格”中规定的最大充电电流。使用超出本规格书建议的最大充电电流充电，会对电池的电化学性能，环境适应性能及安全性能造成损害，可能会引起漏液或起火。

6.1.2 Charging Upper Limit Voltage 充电上限电压：

Charging shall be done by upper limit voltage less than that specified in the Cell Specifications (3.65V/cell). Charging beyond 3.75V, which is the absolute maximum upper limit voltage, must be strictly prohibited. The charger and protection circuit of battery pack shall be designed to comply with this condition. It is very dangerous that charging with higher voltage than the maximum value and may cause damage to the electrochemical, environmental and safety performance of the cell and could lead to heat generation or leakage.

充电上限电压应低于“电芯规格”中规定的充电上限电压(3.65V)。严禁超过充电上限电压的极限值 3.75V。充电器和保护板的设计也需要符合这个上限电压。如若不然，将会对电池的电化学性能，环境适应性能及安全性能造成损害，可能会引起漏液或着火。

6.1.3 Charging Temperature 充电温度

Cells shall be charged according to the temperature condition specified in this document. If the cell is charged at the temperature out of the specified range, leakage, heat generation or other damages may be caused.

充电温度范围需在本文件中规定的范围之内。如果充电温度超出本规格书规定之外，可能会引起漏液，着火或其它危险。

Repeated charging and discharging at high and low temperature may cause degradation of the cell performance even within the specified temperature range.

电池反复在高低温下充电，虽然在规格书规定的温度范围内，但也会对电池的性能产生不利影响。

6.1.4 Prohibition of Reverse Charging 禁止反充

Reverse charging is prohibited. Cells shall be connected correctly. The polarity has to be confirmed before wiring. In case of the cell is connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause damage to the cell which may lead to degradation of the cell performance and damage the cell safety, and could cause heat generation or leakage.

禁止反充。充电时，电池的极性必须连接正确。引线前应确认电池的极性。电池极性连接错误时应禁止充电。反充可能会降低电池的性能，甚至对电芯的安全产生影响，引起着火或漏液。

6.1.5 Prohibition of 0V Charging 禁止 0V 充电

It is prohibited to charge the cell that is with 0V voltage. Simultaneously, the 0V charging may cause damage to the cell which may cause heat generation.

禁止对 0V 的电池进行充电。否则会对电池性能产生影响，引起着火。

6.2 Discharging 放电

6.2.1 Discharging Current 放电电流：

Discharging current should be less than the maximum discharging current specified in the Cell Specifications. Discharging with higher current than recommended value may reduce the discharge capacity significantly or cause over-heat.

放电电流不应超过“电芯规格”中规定的最大放电电流。使用超出本规格书建议的最大放电电流放电，会明显降低电池的放电容量，可能引起电池过热的问题。

6.2.2 Over-discharging 过放：

It should be noted that cells would be at an over-discharged status due to self-discharge characteristics in case they were not used for a long time. In order to prevent over-discharging, cells shall be charged periodically to maintain between 3.2V to 3.3V.Over-discharging may cause loss of the cell performance, characteristics, or battery functions.

应该注意，电池长期不使用时，可能会因电池本身的自放电问题导致电池处于过放的状态。为防止电池过放，电池应定期的进行充电，保证电池的电压在 3.2~3.3V 范围内。过放会导致电池性能降低，并对电池的功能产生不利的影响。

6.2.3 Discharging Temperature 放电温度

Cells shall be discharged according to the temperature condition specified in this document. If the cell is discharged at the temperature out of the specified range, it may reduce the discharge capacity significantly.

放电温度范围需在本文件中规定的范围之内。如果放电温度超出本规格书规定之外，会显著降低电池的放电容量。

6.3 Notice for Designing Battery Pack　Pack 设计注意事项

6.3.1 Pack Design Pack 设计

6.3.1.1 The case of the battery pack should have sufficient strength to sustain the mechanical impact, such as collide, dropping, distortion and folding etc., to protect the cell inside.

电池设计时壳体需确保有足够的强度来避免内部的电芯受到机械的撞击，如碰撞，跌落，扭曲，折叠等。Leakage and short-circuit may be caused if the cell is suffered from strong mechanical impact. Take care in using the polymer Lithium ion cells due to its soft package and is easier to be damaged than metal case cell when suffering from strong impact.

当电芯受到强烈的机械撞击时，可能导致电芯漏液或者短路等问题。聚合物锂离子电池与硬壳电芯相比，因其包装为软包装，因而更容易受到损害。

6.3.1.2 The polymer Lithium ion cell should be fastened inside the pack in order to avoid the motion when suffering from strong impact.

为避免聚合物锂离子电芯在受到强烈碰撞时产生的松动，电芯应牢固地固定在 pack 内部。

If the cell is in loose status, the cell, PCB and connective wire may be damaged due to the motion of the cell when the pack is suffered from strong impact.

若电芯在 pack 内部处于松动状态，当受到撞击时，电芯，PCB 以及连接线会因电芯的松动而受到损害。

Do not make any damage to the bottom of the polymer Lithium ion cell due to it is easy to be damaged.

因聚合物锂离子电芯的底部很容易受到损害，因此应避免任何可能会损害到电芯底部的情况发生。

6.3.1.3 Sharp edge components should be avoid inside the pack that containing the polymer Lithium ion cells.

采用聚合物锂离子电芯制作的 Pack，pack 的元器件要避免存在尖角。

6.3.1.4 The design should consider the variation of the thickness during charge-discharge.

电池设计时需要考虑到电芯在充放电过程中的厚度变化。

6.3.2 Avoid any components or conductive plate from devices to contact the edge of packing foil of the cell. Put an isolated membrane between cell and PCB to avoid them connecting directly if the PCB of cell is put on the surface of the polymer cell directly.

电池设计时应避免任何金属元器件与电芯的铝塑包装膜外边缘接触。为了防止 PCB 与聚合物锂离子电池直接接触造成的损害，应在电芯表面与 PCB 之间增加一层绝缘层。

6.3.3 Tab Connection 极耳连接

6.3.3.1 Ultrasonic welding, laser welding or spot welding is recommended to connect the cells with PCM or other parts.

我司建议使用超声波焊接，激光焊接或点焊形式来连接电芯与 PCM 或其它元器件。

6.3.3.2 Direct soldering of wire leads or devices to the cell is strictly prohibited.

禁止将导线或其它元器件与电芯直接锡焊在一起。

6.3.3.3 The tabs is easily to be broken especially for Aluminum tab, Do not bend the tabs repeatedly.

电芯的极耳尤其是铝极耳很容易被折断，因此禁止反复弯折极耳。

6.4 Cautions in Handling the Polymer Lithium ion cell 电芯使用注意事项

Since the polymer Lithium ion cell is easily to be damaged, to ensure its better performance, careful handling is very important.

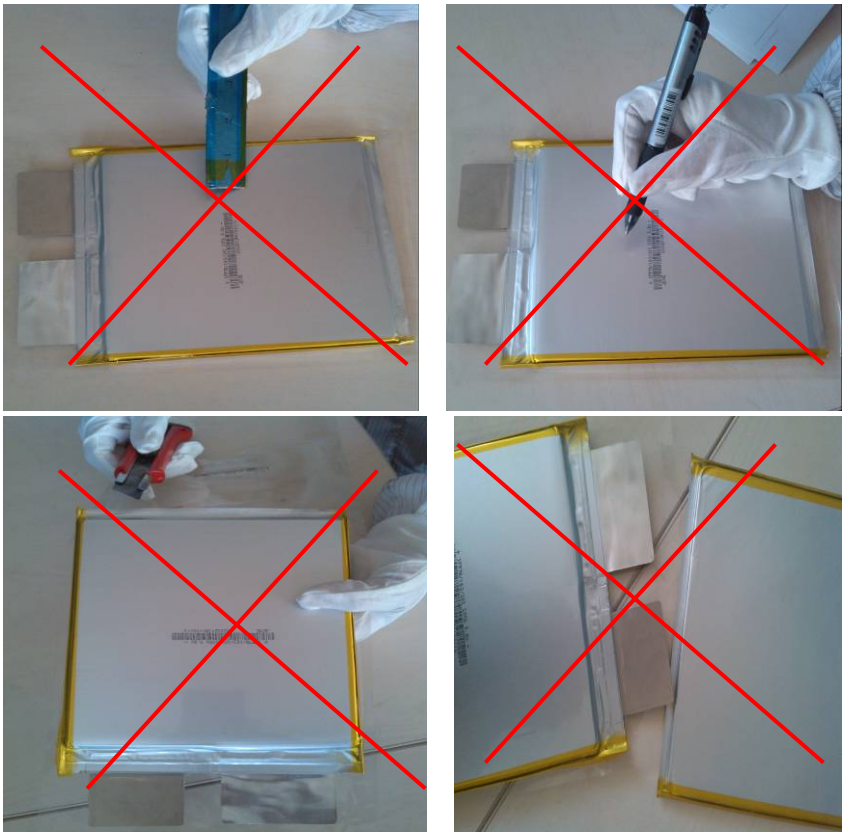
因聚合物锂离子电池很容易被损害，因此为保证电芯性能，使用电芯时需格外注意。

6.4.1 The soft aluminum packing foil may be damaged by sharp things such as knives; scissors, pins or other tooling and fixtures. The following items need be pay attention.

铝塑包装膜易被尖锐的器物，如刀、剪刀、针或其它的工具损坏，因此下述事项需要注意。

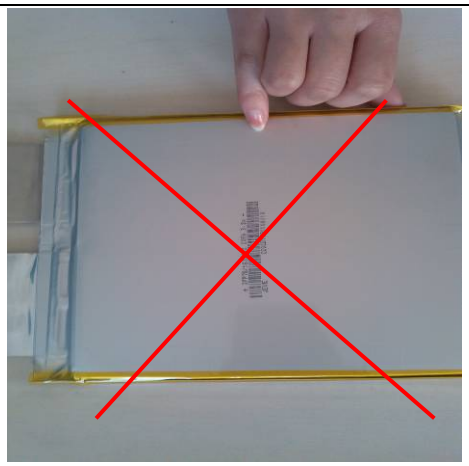
6.4.1.1 Do not cut the polymer Lithium ion cell with any sharp things.

禁止使用尖锐的器物损害聚合物锂离子电芯。



6.4.1.2 Wear gloves before taking cells to avoid damage with nail.

为避免指甲损伤电芯，触摸电芯时应佩戴手套。




6.4.1.3 Make the workbench clean.

保持工作台面清洁。

6.4.2 The side sealing edge has been folded under specifically conditions and the reliability has been verified valid. Do not repeat fold-and-unfold the edge, otherwise the aluminum packing foil may break.

电芯的侧封边是在特定的条件下折起固定的，并经验证可靠性是有效的。因此禁止反复打开，翻折该侧封边，否则会造成铝塑包装膜的破损。


6.4.3 Top-side sealing edge is flimsy and easy to be delaminated. Do not bend or fold this edge.

电芯的顶封边易损耗，且易分层。禁止弯折或折叠该边缘。

6.4.4 Do not short the anode and cathode tabs with metal things, it may cause serious damage to cell and even cause fire.
禁止使用金属物体将电芯的正负极短路，否则会对电芯造成严重的损害甚至引起失火。

6.4.5 Do not drop, shock, or bend the cell body.
禁止撞击，摔打或弯折电芯主体。


6.5 Warning and Cautions in Handing the Lithium-ion Battery 电池使用时警告事项及注意事项

！Danger Warning(It should be described in manual or instruction for users)
！危险警告（应在使用说明手册或说明书中特别注明）

To prevent the possibility of the battery from leaking, heating, explosion, please observe the following precautions:
为防止电池可能发生泄露，发热，爆炸，请注意以下预防措施：

- Don’t immerse the battery into water. Please store battery in a cool and dry place when not use.
- 严禁将电池浸入水中，保存不用时，应放置在阴凉干燥的环境中。
- Do not use and leave the battery near a heat source such as fire or heater.
- 禁止将电池放在热高温源旁，如火，加热器等旁边使用和留置。
- When charging, use a battery charger specifically for that purpose.
- 充电时请选用锂离子电池专用充电器。
- Don’t reverse the positive and negative terminals.
- 严禁颠倒正负极后使用电池。
- Don’t connect the battery to an electrical outlet directly.
- 严禁将电池直接插入电源插座。
- Don’t discard the battery in fire or heater.
- 禁止将电池丢入火或加热器中。
- Don’t connect the positive and negative terminal directly with metal objects.
- 禁止用金属直接连接电池正负极，造成短路。
- Don’t transport and store the battery together with metal objects such as necklaces, hairpins.
- 禁止将电池与金属，如发卡、项链等一起运输或存储。
- Don’t strike, throw or trample the battery.
- 禁止敲击，抛掷或踩踏电池等。
- Don’t directly solder the battery.
- 禁止直接焊接电池。

- Don't pierce the battery with a nail or other sharp object.
- 禁止用钉子或其它利器刺穿电池。
- Don't disassemble or open the battery.
- 禁止拆解或打开电池。
- Don't keep a battery at rest for a long time(over 3 months).
- 禁止长期(3 个月以上)不使用电池。

! CAUTION 小心

- Don't use or leave the battery at very high temperature conditions (for example, strong direct sunlight or a vehicle in extremely hot conditions). Otherwise it may cause battery overheat, fire, failure of functioning or shortening of life time.
- 禁止在高温下（直射强的日光下或很热的汽车中）使用或放置电池，否则可能会引起电池过热，起火或功能失效，寿命减短。
- Don't use it in a location where there is the possibility of a strong electrostatic discharge or strong magnetic field. This may causes the safety devices may be damaged.
- 禁止在强静电和强磁场的地方使用，否则容易破坏电池安全保护装置，带来安全隐患。
- If the battery leaks and the electrolyte get into your eyes, don't wipe eyes, instead, thoroughly rinse the eyes with clean running water for at least 15 minutes, and immediately seek medical attention. Otherwise, eyes injury can result.
- 如果电池发生泄露，电解液进入眼睛，请不要搓揉，应用清水冲洗眼睛至少 15min，必要时请立即前往医院接受治疗，否则会伤害眼睛。
- If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during usage, recharging or storage, immediately remove it from the device or battery charger and stop using it.
- 如果电池发出异味，发热，变色，变形或使用、存储、充电过程中出现任何异常现象，立即将电池从装置或充电器中移开并停用。
- In case the battery terminals get dirty, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the device.
- 如果电池弄脏，使用前应用干布抹净，否则可能会导致接触不良，功能失效。

7.0. Relevant Documents 相关文件

《QC/T743-2006 电动汽车用锂离子蓄电池》（2006）

《"863 计划"节能与新能源汽车重大项目-2008 年度 EV 用锂离子动力蓄电池性能测试规范》

《UL1642, UL Standard for Safety for Lithium Batteries》（2005）

《关于危险货物运输的建议书 试验和标准手册》UN38.3 41 页—49 页（2011）

《FreedomCAR Electrical Energy Storage System Abuse Test Manual for Electric and Hybrid Electric Vehicle Applications》（2006）

《Electric Vehicle Battery Test Procedures Manual 》（1996）

《“863 计划”节能与新能源汽车重大项目-2010 年度 EV 用锂离子动力蓄电池性能测试规范》

《GJB4477-2002 锂离子蓄电池组通用规范》

《GB 19521.11-2005 锂电池组危险货物危险特性检验安全规范》

《UL2054-2004 锂离子安全标准》

8.0. Relevant Records 相关记录

None 无

9.0. Flow Chart 流程图

None 无

10. Attachment 附件

None 无