

Li-ion Polymer Battery Specification 锂离子聚合物电池说明书

Product Model

产品型号: HL-PL 502228

Nominal Capacity

标称容量: 350 mAh

Customer Code

客户代码: 032

Product Part Number

成品料号:

Version Number

版本号: A0

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Registered 编制	Checked 审核	Approved 批准

Customer Approve 客户确认		
Dept. 部门	Signature 签名	Date 日期
QA Dept 品质		
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Approved 批准		

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1. MODIFIED LIST

修订履历

Product Modified Record List
产品变更履历表

Revision 版本	Date 日期	Mark 标记	Modified content 变更内容	Approved by 批准
A0	2019/2/22	/	None	

2.Scope 适用范围

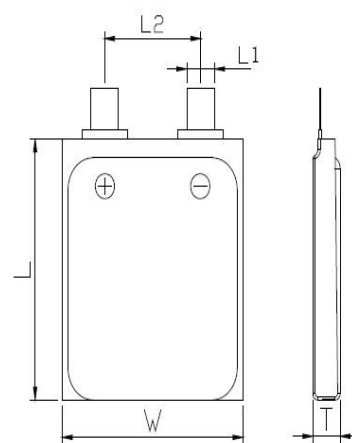
This specification describes the basic performance, technical requirement, testing method, warning and caution of the lithium ion Polymer rechargeable battery .The specification only applies to Dongguang Hilion battery Co Ltd.

本标准规定了锂聚合物可充电电池的基本性能、技术要求、测试方法及注意事项，本标准只适用于东莞市海量能源科技有限公司所生产的锂聚合物电池。

3.Specification 产品规格

3.1 Cell Specification 电芯规格

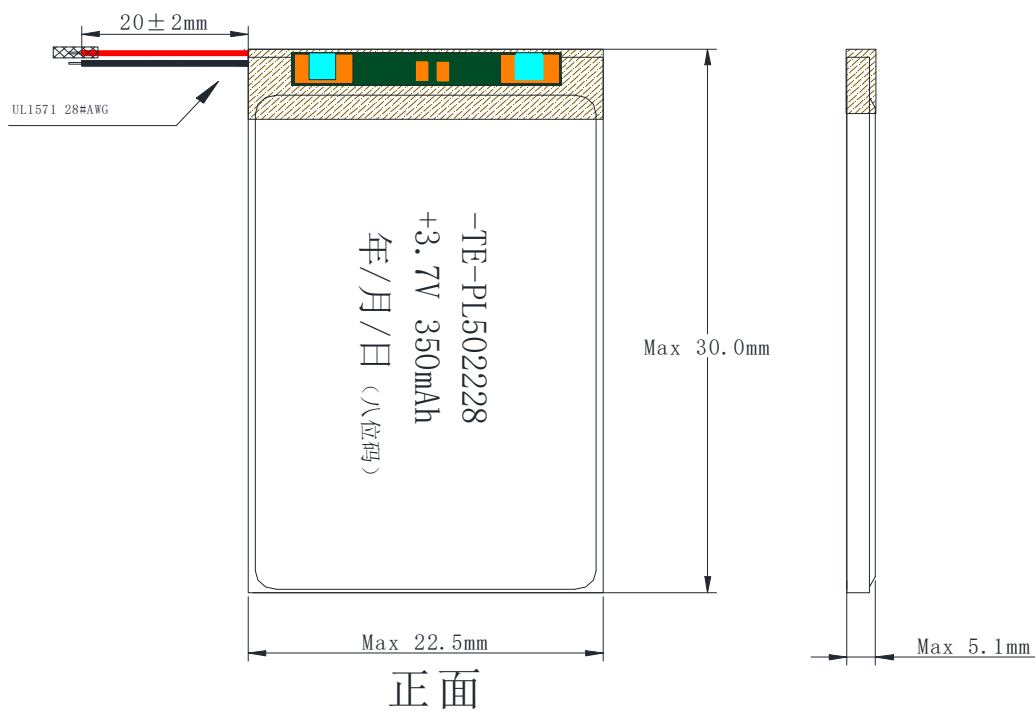
Cell (电芯)	NO.	Items	Specifications	
	1	Nominal capacity 标称容量	350 mAh @ 0.2C Discharge(放电)	
	2	Minimum capacity 最小容量	330 mAh @ 0.2C Discharge(放电)	
	3	Nominal voltage 标称电压	3.8V	
	4	Internal Impedance 内阻	$\leq 130.0 \text{ m}\Omega$	
	5	Dimension 尺寸	Thickness/厚度T:	$\leq 5.0 \text{ mm}$
			Width/宽度W:	$\leq 22.0 \text{ mm}$
			Hight/高度L:	$\leq 28.0 \text{ mm}$
			Tab width/极耳宽度:	$3.0 \pm 0.1\text{mm}$
			Distance between 2 tabs/ 极耳间距L2: $9 \pm 2.0\text{mm}$	
	6	Cell weight 单电芯重量	$6.0 \pm 2 \text{ g}$	
	7	Standard charge 标准充电	0.2C CC (constant current) charge to 4.35V,then CV(constant voltage 4.35V)charge till charge current decline to $\leq 0.01\text{C}$ 0.2C CC (恒流) 充电至4.35V, 再CV (恒压4.35V) 充电直至充电电流 $\leq 0.01\text{C}$	
	8	Rapid Charge 快速充电	Constant Current 0.5C, Constant Voltage 4.35V, 0.01C cut-off 持续电流: 0.5C 持续电压: 4.35V 截止电流: 0.01C	
	9	Charging time 充电时间	Standard Charging: 7hours(Ref.) 标准充电: 7小时 Rapid charge: 4hours(Ref.) 快速充电: 4小时	
	10	Standard discharge 标准放电	Constant current 0.2C,end voltage 3.0V 持续电流: 0.2C 截止电压: 3.0V	
	11	Maximum discharge current 最大放电持续电流	Constant current 1.0C,end voltage 3.0V 持续电流1.0C 截止电压: 3.0V	
	12	Operating temperature 工作温度	Charging (充电): $10^{\circ}\text{C} \sim 45^{\circ}\text{C}$ Discharging (放电): $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$	
	13	Storage temperature 储存温度	$-10^{\circ}\text{C} \sim +45^{\circ}\text{C}$ ($\leq 3\text{months}$)	



3.2 Pack Specification 电池组规格

Pack (电 池组)	1	Combination method 组合方式	1 S 1 P (一串一并)
	2	Combination standard 配组标准	Capacity difference: (容量差):
			Resistance difference : (内阻差):
			Voltage difference: (电压差):
	3	Nominal capacity 标称容量	350 mAh @ 0.2C Discharge (放电)
	4	Minimum capacity 最小容量	330 mAh @ 0.2C Discharge (放电)
	5	Nominal voltage 标称电压	3.8V
	6	PACK Voltage(As of shipment) 电池电压(出货状态)	3.85~3.95V (cell 3.85~3.95V)
	7	Internal Impedance 内阻	≤ 230.0 mΩ
	8	Dimensions 尺寸	MAX(T*W*H): 5.10 * 22.5 * 30.0 mm
	9	Pack weight 电池重量	7.0 ±1 g
	10	Standard Charge 标准充电	0.2C CC (constant current) charge to 4.35V, then CV(constant voltage 4.35V) charge till charge current decline to ≤0.01C 0.2C CC (恒流) 充电至4.35V, 再CV (恒压 4.35V) 充电直至充电电流≤0.01C
	11	Rapid Charge 快速充电	Constant Current 0.5C, Constant Voltage 4.35V, 0.01C cut-off 持续电流: 0.5C 持续电压: 4.35V 截止电流: 0.01C
	12	Charging time 充电时间	Standard Charging: 7hours(Ref.) 标准充电: 7小时 (参考值) Rapid charge: 4hours(Ref.) 快速充电: 4小时 (参考值)
	13	Standard discharge 标准放电	Constant current 0.2C end voltage 3.0V 持续电流: 0.2C 截止电压: 3.0V
	14	Maximum discharge current 最大放电持续电流	Constant current 1.0C end voltage 3.0V 持续电流: 1.0C 截止电压: 3.0V
	15	Operating temperature 工作温度	Charging (充电): 10℃~45℃ Discharging (放电): -20℃~60℃
	16	Storage temperature 储存温度	-10℃~ +45℃ (≤3months)

3.3 Pack drawing(组装示意图)



PACK BATTERY DRAWING

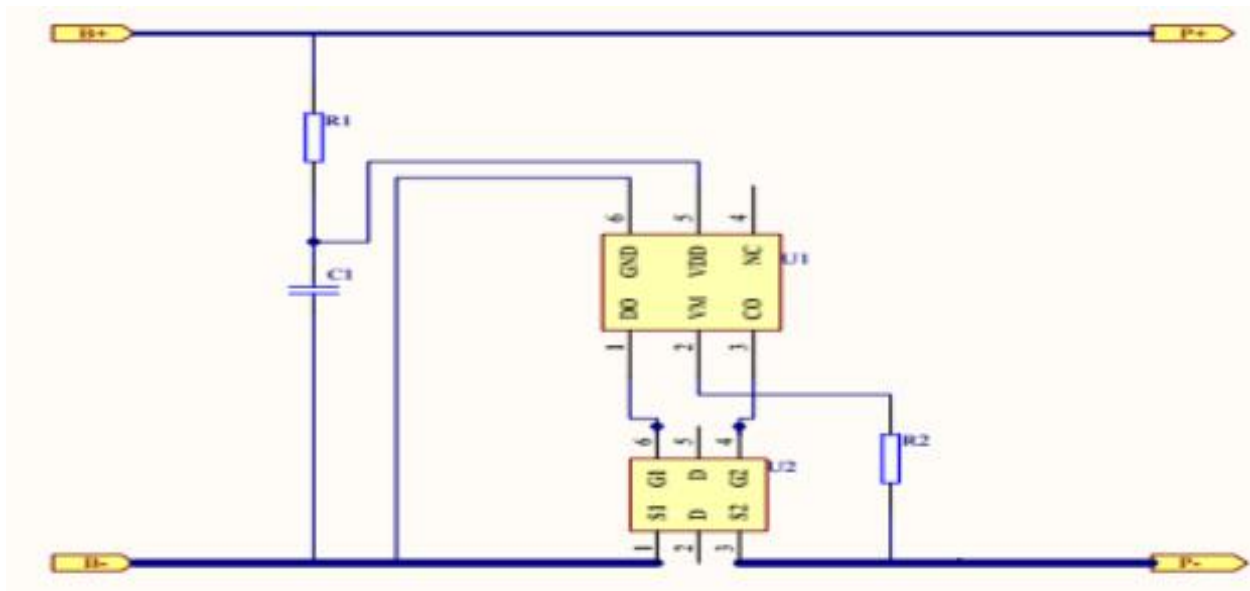
4	TAPE	15mm/6mm	1	
3	WIRE	UL1571 28#AWG	1	
2	PCM	S-8261DAM+8205	1	
1	CELL	502228-350mAh	1	
NO	PART	MODEL	Q'ty	

3.4 Protection circuit(保护电路)

3.4.1 PCM Standard (保护板规格)

Item 项目	Symbol 符号	Content 详细内容	Criterion 标准
Over charge Protection 过充保护	VDET1	Over charge detection voltage 过充电检测电压	$4.40 \pm 0.025V$
	tVDET1	Over charge detection delay time 过充电检测延迟时间	960~1400ms
	VREL1	Over charge release voltage 过充电解除电压	$4.35 \pm 0.05V$
Over discharge protection 过放保护	VDET2	Over discharge detection voltage 过放电检测电压	$3.00 \pm 0.05V$
	tVDET2	Over discharge detection delay time 过放电检测延迟时间	115~173ms
	VREL2	Over discharge release voltage 过放电解除电压	$3.20 \pm 0.10V$
		Rated discharge current 额定放电电流	$\leq 3A$
Over current protection 过流保护	VDET3	Over current detection voltage 过电流检测电压	$0.08 \pm 0.015V$
	IDP	Over current detection current 过电流保护电流	3~7.5A
	tVDET3	Detection delay time 检测延迟时间1	7.2~11ms
		Release condition 保护解除条件	Cut load 断开负载
Short protection 短路保护		Detection condition 保护条件	Cut short circuit 断开短路电路
		Release condition 保护解除条件	Cut short circuit 断开短路电路
Interior resistance 内阻	RDS	Main loop electrify resistance 主回路通态电阻	$RDS \leq 70m\Omega$
Current consumption 消耗电流	IDD	Current consume in normal operation 工作时电路内部消耗	$\leq 5\mu A$

3.4.2 Schematic diagram(原理图)



3.4.3 material spec(材料规格表)

序号	名称	位号	规格	用量	供应商	备注
1	保护IC	U1	S8261-DAM, SOT-23-6	1		
2	MOS	U2	8205, SOT-23-6	1		
3	电阻	R1	SMD 330Ω,±5% 0402	1		
4	电阻	R2	SMD470Ω ±5% 0402	1		
5	电容	C1	104/16V 0402	1		
6	线路板	PCB		1		

4. Performance And Test Conditions (电池性能测试条件)

4.1 Standard environmental test condition （标准测试环境）

Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition:

Temperature: 23±5℃ Humidity: 65±20%RH.

除非特别说明，本标准书中所有测试均在以下环境条件下进行： 温度：23±5℃ 湿度：65±20%RH

4.2 Measuring Instrument or Apparatus （测量器具及设备）

4.2.1 Dimension Measuring Instrument （尺寸测量器具）

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

尺寸测量器具的精度等级应不小于0.01 mm。

4.2.2 Voltmeter （伏特计） Standard class specified in the national standard or more sensitive class having inner impedance more than 10kΩ/V

按照国家标准指定规格等级或采用灵敏度更高的，测量电压时内阻不应小于10kΩ/V。

4.2.3 Ammeter （安培计） Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω.

按照国家标准指定规格等级或采用灵敏度更高的, 包括电流表及电线在内的总外阻应小于 0.01Ω 。

4.2.4 Impedance Meter (电阻计) Impedance shall be measured by a sinusoidal alternating current method (2kHz LCR meter).

内阻测试仪测量原理应为交流阻抗法(2kHz LCR)。

4.3 Visual inspection (外观检查) There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of the cell.

不允许有任何影响电池性能的外观缺陷, 诸如裂纹、裂缝、泄漏等。

4.4 Standard Charge&Discharge (标准充放电)

4.4.1 Standard Charge : Test procedure and its criteria are referred as follows:

标准充电: 测试过程及标准如下:

0.2C The battery will be charged to 4.35V with 0.2C from constant current to constant voltage, when the current is 0.01C, stop to charge.

以0.2C 电流恒流充电至限制电压4.35V 时, 改为恒压充电, 直到截止电流为0.01C 时停止充电

4.4.2 Standard Discharge 0.2C The battery will be discharged at a constant current of 0.5C to 3.0volts 电池以0.2C恒流放电至3.0V

4.4.3 If no otherwise specified, the rest time between Chare and Discharge amount to 10min.

如果没有特别说明, 电池充放电间隔时间为10分。

5 General Performance 常规性能

No.	Item项目	Test Methods and Condition测试方法和条件	Criteria标准
5.1	0.2C Capacity 0.2C容量	After standard charging, laying the battery 5min, then discharging at 0.2C to voltage 3.0V, recording the discharging time. 标准充饱电后,搁置5分钟,然后用0.2C电流放电至3.0V, 所记录放电时间	$\geq 300\text{min}$
5.2	0.5C Capacity 0.5C容量	After standard charging, laying the battery 5min, then discharging at 0.5C to voltage 3.0V, recording the discharging Time 标准充饱电后,搁置5分钟,然后用0.5C电流放电至3.0V, 记录时间	$\geq 114\text{min}$
5.3	Cycle Life 循环寿命	Constant current 0.5C charge to 4.35V, then constant voltage charge to current declines to 0.01C, stay 5min, constant current 0.5C discharge to 3.0V, stay 10min. Repeat above steps till continuously discharging capacity Higher than 80% of the Initial Capacities of the Cells, after cycle the thickness swelling less than 10%. 先用0.5C恒流充电至4.35V, 再恒压4.35V充电直至充电电流 $\leq 0.01\text{C}$,搁置5分钟,再用0.5C电流放电至3.0V;又搁置10分钟,重复以上步骤,直到放电容量是初始容量的80%, 循环后厚度增加不超过10%。	≥ 300 times(次) Thickness swelling $\leq 10\%$
5.4	Capability of keeping electricity 荷电保持能力	20 \pm 5 $^{\circ}\text{C}$, After standard charging, laying the battery 28days, discharging at 0.2C to voltage 3.0V, recording the discharging time. 在20 \pm 5 $^{\circ}\text{C}$ 状态下,标准充饱电后,电芯搁置28天,然后用0.2C放电至3.0V,所记录放电时间。	$\geq 240\text{min}$

6 Environment Performance 环境性能

No.	Item项目	Test Methods and Condition测试方法和条件	Criteria标准
6.1	Discharge at high temperature 高温放电	After standard charging, laying the Cells 4h at $60\pm 2^{\circ}\text{C}$, then discharging at 0.5C to voltage 3.0V, recording the discharging time. 标准充电后, 在 $60\pm 2^{\circ}\text{C}$ 条件下贮存4h, 然后用0.5C放电至3.0V,所记录放电时间.	$\geq 108\text{min}$
6.2	Discharge at low temperature 低温放电	After standard charging, laying the Cells 16h at $-20\pm 2^{\circ}\text{C}$, then discharging at 0.2C to voltage 3.0V, recording the discharging time. 标准充电后, 在 $-20\pm 2^{\circ}\text{C}$ 条件下贮存16h, 然后用0.2C放电至3.0V,所记录放电时间.	$\geq 210\text{min}$
6.3	Thermal shock 热冲击	Put the battery in the oven. The temperature of the oven is to be raised at $5\pm 2^{\circ}\text{C}$ per minute to a temperature of $130\pm 2^{\circ}\text{C}$ and remains 30 minutes. 将电池放进烘箱内, 以 $5\pm 2^{\circ}\text{C}/\text{min}$ 速度升高烘箱内温度至 $130\pm 2^{\circ}\text{C}$ 后,恒温30min.	No fire, no smoke 不起火,不冒烟

7 Safe Characteristic 安全性能

No.	Item项目	Test Methods and Condition测试方法和条件	Criteria标准
7.1	Overcharge testing/NOPCM 过充测试/没有保护板	At $23\pm 5^{\circ}\text{C}$, charging batteries with constant current 3C to voltage 4.6V, then with constant voltage 4.6V till current decline to 0. Stop test till batteries' temperature 10°C lower than max temperature. 在 $23\pm 5^{\circ}\text{C}$ 状态下, 电池用3C电流充电至4.6V, 然后恒压4.6V让电流下降接近为0A, 监视电池温度变化, 当电池温度下降到峰值低约 10°C 时, 停止实验.	No smoke or fire 不起火, 不冒烟
7.2	Over discharge testing / NOPCM 过放测试/没有保护板	At $23\pm 5^{\circ}\text{C}$, According to the requirements of standard charge, the battery will be discharge to cut-off voltage, then connect with external load of 30 ohm for 24 hours. 在 $23\pm 5^{\circ}\text{C}$ 状态下, 按标准放电的要求放电至终止电压后, 外接 30Ω 负载放电24小时.	No fire, no smoke, no leakage. 无起火, 无冒烟, 无泄液
7.3	Short-circuit testing /NO PCM 短路测试 /没有保护板	At $23\pm 5^{\circ}\text{C}$, After standard charging, connect batteries' anode and cathode by wire which impedance less than $80\text{m}\Omega$, keep 6h. 在 $23\pm 5^{\circ}\text{C}$ 状态下, 标准充电后, 将电池的正负极用一根小于 $80\text{m}\Omega$ 的导线连接, 放置6小时.	No smoke or fire 不起火, 不冒烟

※ Above testing of safe characteristic must be with protective equipment.
(安全性能测试应在有保护措施下进行)

8. Warnings 警告

To prevent the possibility of the battery from leaking, heating, fire please observe the following precautions:
为防止电池可能发生的泄漏, 发热, 起火, 请注意以下预防措施:

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles

.Do not strike battery with any sharp edge parts.

☆ 电池外包装膜易被镍片, 尖针等尖锐部件损伤, 禁止用尖锐部件碰伤电池.

Do not immerse the battery in water and seawater

☆ 严禁将电池浸入海水或水中.

Do not use and leave the battery near a heat source as fire or heater

☆ 禁止将电池在热高温源旁, 如火, 加热器等使用设备.

When recharging, use the battery charger specifically for that purpose

☆ 充电时请选用锂离子电池专用充电器.

Do not reverse the position and negative terminals

☆ 禁止颠倒正负极使用电池

Do not connect the battery to an electrical outlet

☆ 禁止将电池直接接入电源插座

Do not discard the battle in fire or heat it

☆ 禁止将电池丢入火或加热器中

The battery tabs are not so stubborn especially for aluminum tab. Do not bend tab.

☆ 电池极耳的机械强度不坚固, 特别是铝极耳, 禁止弯折.

Do not short-circuit the battery by directly connecting the positive and negative terminal with metal object such wire

☆ 禁止用金属直接将电池的正负极进行短路连接.

Do not transport and store the battery together with metal objects such as necklaces, hairpins etc.

☆ 禁止将电池与金属, 如发夹, 项链等一起运输或贮存.

Do not strike or throw the battery.

☆ 禁止敲击或抛掷, 踩踏电池等.

Do not directly solder the battery and pierce the battery with a nail or other sharp object.

☆ 禁止直接焊接电池和用钉子或其它利器刺穿电池.

9. Cautions 注意

Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.

△ 禁止在高温下(直热的阳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, 从而导致电池寿命减短.

Do not use it in a location where static electricity is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety.

△ 禁止在强静电和强磁场的地方使用, 否则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 the eyes. Do not rub eyes, instead, rinse the eyes, with clean running water, and immediately seek medical attention. Otherwise, eye injury can result.

△ 如果电池发生泄漏, 电解液进入眼睛, 请不要揉擦, 应用清水冲洗眼睛, 并立即送医院治疗, 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 use, recharging or storage, immediately remove it from the device or battery charge and stop using it.

△ 如果电池在使用或贮存中发出异味, 发热, 变色, 变形, 或者是在充电过程中出现任何异常现象, 立即将电池从充电器或装置中移开, 并停止使用.

In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or

文件编号: HL-MTSP-E-1749 the poor connection with the instrument

△ 如果电池弄脏,使用前应用干布抹净,否则可能会因接触不良而影响性能失效.

Be aware discharged battery may cause fire or smoke,tape the terminals to insulate them.

△ 废弃之电池应用绝缘纸包住电极,以防起火,冒烟.

If the battery is stored for a long time, When the battery voltage is less than or equal to 3.6, stored electricity to 3.90 V the battery storage should be 3.90V and the battery is to be stored in a condition , Temperature $23\pm 5^{\circ}\text{C}$, Humidity 45-75%RH.

△ 长期贮存的电池（超过3个月）须置于干燥、凉爽处，当电池电压 ≤ 3.6 时，补电至3.90V储存。贮存电压为3.90V且贮存环境要求.温度在 $23\pm 5^{\circ}\text{C}$,湿度在45-75%RH。

10.Period of Warranty 保质期

The period of warranty is half a year from the date of shipment. Hilion guarantees to give a replacement in case of battery with defects proven due to manufacturing process instead of the customers abuse and misuse.

电池的保质期从出货之日算起为半年。如果证明电池的缺陷是在我们公司制造过程中造成的而不是客户滥用或错误使用造成，本公司负责退换电池。

11. Others 其它事项

11.1.The customer is requested to contact Hilion in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

客户若需要将电池用于超出文件规定以外的设备，或在文件规定以外的使用条件下使用电池，应事先联系海量公司，因为需要进行特定的实验测试以核实电池在该使用条件下的性能及安全性。

11.2. Hilion will take no responsibility for any accident when the battery is used under other conditions than those described in this Document.

对于在超出文件规定以外的条件下使用电池而造成的任何意外事故，海量公司概不负责。

11.3. Hilion will inform, in a written form, the customer of improvement(s) regarding proper use and handing of the battery, if it is deemed necessary.

如有必要，海量公司会以书面形式告之客户有关正确操作使用电池的改进措施。

11.4. Any matters that this specification does not cover should be conferred between the customer and Hilion

任何本说明书中未提及的事项，须经双方协商确定