



Li-ion Battery Specification

锂离子电池规格书

Model/型号: AY (HND18650-2S1P-2600mAh-7.4V)

Prepared by 编制	Checked by 审核	Approved by 批准

Customer Name 客户名称	
Customer Approval 客户确认/盖章	
Date/日期	

Note (注意):

1. Kindly please sign specification back to us, if the sample has been approved.
如果样品已确认, 请回签规格书给我司。
2. Kindly please contact us as soon as possible if the sample has not been approved. Thanks!
如果样品未确认, 请尽快与我司联系, 谢谢!

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AMENDMENT RECORDS

修改记录

Edition 版本	Description 描述	Prepared by 编制	Approved by 批准	Date 日期
A	首次发行	白可可	曾建辉	2021-4-3
A1	更改MOS管：PA1815DA，提升过流能力，过流值：10-30A	白可可	曾建辉	2022-4-23
A2	更改顶层线路板位置图（7.5项）	白可可	曾建辉	2021-4-28
A3	1. 更新最新贴纸内容 2. 更新出货电压为7.7V	白可可	曾建辉	2021-5-5
A4	增加NTC，更改保护板、端子线、标贴	易谦	曾建辉	2022-12-9



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1. Scope/适用范围

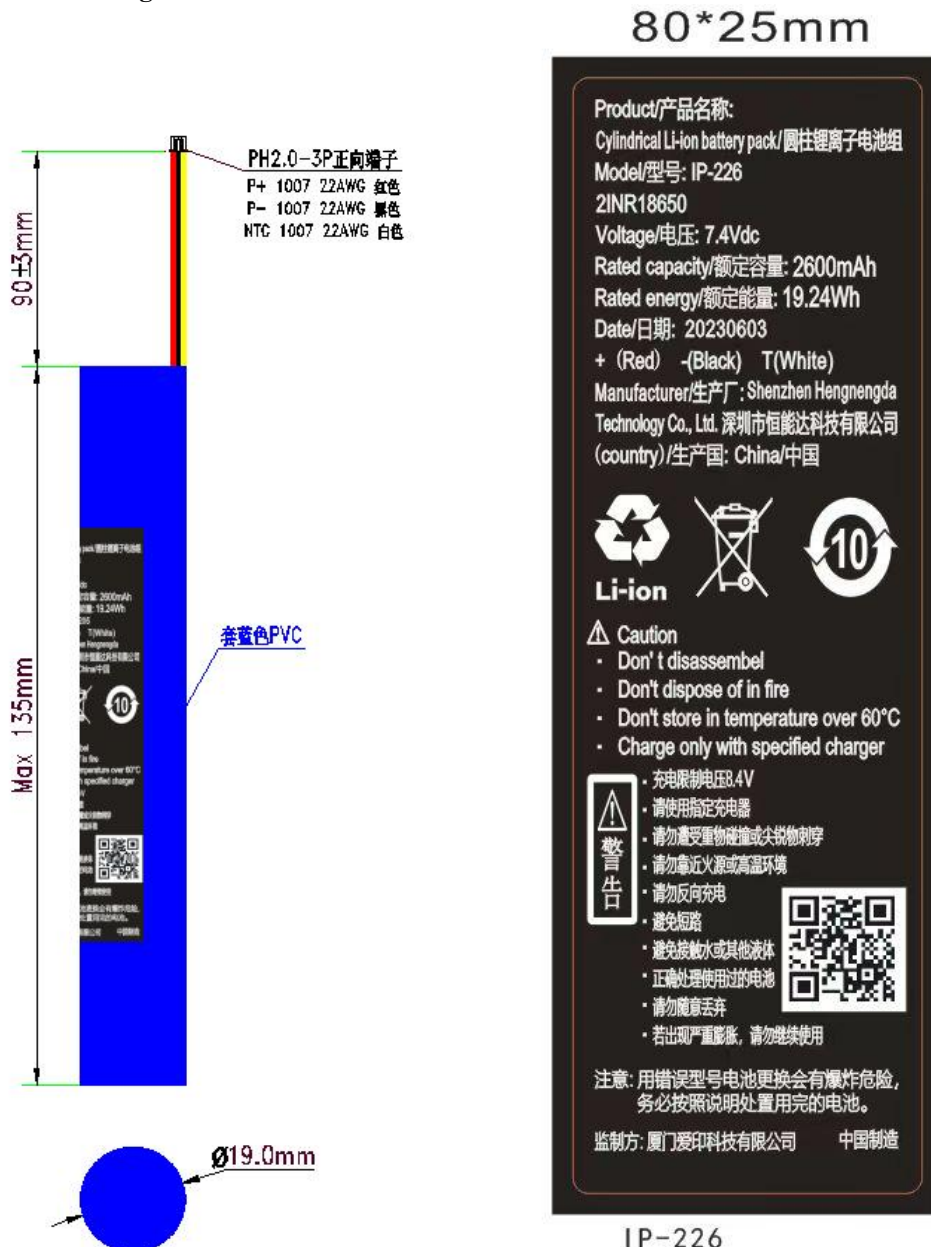
- This specification is applied to AY Manufactured by HND.
- 本规格书适用于恒能达生产的 AY 电池。

2. Product Configuration/产品配置

No./序号	Item/项目	SPEC/规格	Remark/备注
1	Li-ion Cell 锂离子电芯	HND18650-2600mAh-3.7V*2	
2	PCBA/保护板	HD-2S18-V0 PA1815+2120-CB+10KNTC	
3	connector/连接器	PH2.0正向端子UL1007 AWG22#线, P-: 黑色、P+: 红色、T:白色	/

3. Product Dimension/产品尺寸

3.1 pack Drawing/成品图





4. Product Specification/产品规格

Table 1 (表 1):

No. 序号	Items/项目	Rated Performance/额定性能	Remarks/备注
1	Nominal capacity/标称容量	2600mAh	Discharge at 0.2C(25°C) after standard charge fully. 按 0.2C(25°C)标准完全放电。
2	Minimum Capacity/最小容量	2550mAh	
3	Nominal Voltage/标称电压	7.4V	
4	Charge voltage/充电电压	8.4V	
5	Discharge cut-off voltage 放电截止电压	5.8V	
6	Energy/能量	19.24Wh	
8	Voltage at end of Discharge 放电保护电压	5.8V	
9	Charging Protection Voltage 充电保护电压	8.56V	
10	Over discharge current/放电保护过流	10-30A	
11	AC Impedance /电池阻抗	≤ 219mΩ	AC 1KHz
12	Standard Charge/标准充电	0.2C CC/CV→0.01C cutoff	Charge time/充电时间: Approx 9.0h.
13	Standard Discharge/标准放电	0.2C CC→5.8V cutoff	
14	Fast Charge/快速充电	0.5C CC/CV →0.01C cutoff	Charge time/充电时间: Approx 2.5h.
15	Fast Discharge/快速放电	0.5C CC→5.8V cutoff	
16	Maximum Continuous Charge Current/ 最大持续充电电流	1300mA	
17	Maximum Continuous Discharge Current/最大持续放电电流	7800mA	
18	Operation Temperature Range 工作温度范围	Charge 充电: 0~45°C	Humidity /湿度 60±25%
		Discharge 放电: -10~60°C	
19	Storage T/H Range 存储温、湿度范围	-20~60°C/60±25%	
20	Weigh/重量	Approx/大约:101g	
21	Product Dimension/ 产品尺寸	长度 Length:135.0mm (MAX)	Initial dimension 初始尺寸
		宽度 Width:19mm (MAX)	
		厚度 Thickness:19mm (MAX)	



5. Product Performance/产品性能.

5.1 Standard Testing Conditions/标准测试环境

Temperature/温度: 25±5℃

Humidity Range /湿度: 25 ~ 85% 范围内进行。

5.2 Test method and request/检测方法 with 要求

No. 序号	Items / 项目	Test Method / 检测方法	Request/ 要求
1	Appearance 外观	By sight 目测	No obvious flaw、blot、scratch distorted, tympanous. 无凹陷、划痕、污渍、变形、鼓胀等缺陷。
2	Open-Circuit Voltage 开路电压	Shipped with a multimeter test voltage 用万用表测试出货电压	≥7.6V
3	Impedance 内阻	AC Impedance Resistance 交流阻抗电阻	≤219mΩ
4	Nominal Capacity 标称容量	0.2C ₅ A discharge 0.2C放电容量	Discharge Capacity/放电容量 ≥2550mAh
5	Cycle Life 循环寿命 (0.2C)	Test condition: temperature: 测试条件: 温度: 23±5℃ First step:0.2C CC/CV to 8.4V 第 1 步:0.2C 恒流恒压充电至 8.4V Second step: Static 10 min 第 2 步:静置 10 分钟 Third step: 0.2C CC to 5.8V. 第 3 步:0.2C 恒流放电至 5.8V Fourth step: Static 10 min 第 4 步: 静置 10 分钟 Fifth step: Repeat first step to fourth step 300cycles, record 300cycle then compare with first cycle value. 第 5 步:重复第 1 步至第 4 步 300 次, 记录 300 周循环后容量与第 1 次循环容量的比值。 Sixth step: end 第 6 步: 结束	Higher than 80% of the Initial Capacities of the Cell 高于 80%的电池初始容量



5.3 Safety Performance/安全性能

HND product's safety performance is confirmed to UL1642 standard.

恒能达电池产品安全性能遵循 UL1642 标准。

5.4 Reliabilty Test 可靠性测试

No. 序号	Items 项目	Test Method and Condition 测试方法和条件	Criteria 标准
1	High temperature performance 高温性能	When the battery is standard charged ,it shall be put into a chamber at $(55 \pm 2)^{\circ}\text{C}$ for 2h,then discharged at 1.0C ₅ A constant current to 5.8V. 完全充电后置于 $55 \pm 2^{\circ}\text{C}$ ， 2h 用 1C ₅ A 放电至 5.8V	Discharging shall not be less than 51 minutes; and the battery appearance has on deform, no leak-out and no explosion. 电池放电时间不少于 51min,电池外观无变形、无爆裂。
2	High temperature test 高温试验	When the battery is standard charged, it shall be put into a chamber at $(55 \pm 2)^{\circ}\text{C}$ for 4h. 将充满电的电池在 $55 \pm 2^{\circ}\text{C}$ 环境中放置 4 小时。	No deform. Voltage>95%, thickness<108%, Impedance<125% Capacity>90%. 电池不鼓气，电压>95%,厚度<108%,内阻<125%,可恢复容量>90%
3	Low temperature performance 低温性能	When the battery is standard charged, it shall be put into chamber at $(-10 \pm 2)^{\circ}\text{C}$ for 16-24h,then discharged at 0.2C ₅ A constant current to 5.8V before it is taken out and out into the temperature of $(20 \pm 5)^{\circ}\text{C}$ for 2h for its appearance check with eyes. 完全充电后置于 $-10 \pm 2^{\circ}\text{C}$ ， 16-24h 用 0.2C ₅ A 放电至 5.8V， 结束后将电池置于 $20 \pm 5^{\circ}\text{C}$ 条件下搁置 2h,观察电池外观。	Discharging shall not be less than 3 hours; and the battery appearance has no deform, no leak-out and no explosion. 电池放电时间不少于 3 小时， 电池外观无变形， 无爆裂。
4	Electrical load maintenance ability. 荷电保持能力	When the battery has completed standard charged, it shall be disconnected and put aside for 28 Day at $(25 \pm 5)^{\circ}\text{C}$,then discharged at 0.2C ₅ A 完全充电后， 在 $25 \pm 5^{\circ}\text{C}$ 条件下， 将电开路搁置 28 天， 再 0.2C ₅ A 放电	Discharging shall not be less than 4.25hours. 放电时间不少于 4.25 小时
5	Constant Humidity &Heat Requirement. 恒定湿热性能	As the battery has completed fast charging with constant current, it shall be put into the $(40 \pm 2)^{\circ}\text{C}$,90%-95%RH thermos humidistat for 48h; then taken out at $(20 \pm 5)^{\circ}\text{C}$ for 2h.Check its appearance with eyes. Obtain its discharging time after it is discharged at 1C ₅ A to its final voltage 5.8V 完全充电后， 在 $40 \pm 2^{\circ}\text{C}$ 条件下， 相对湿度为 90%-95%的恒温恒湿条件下搁置 48h 后， 再取出放在 $20 \pm 5^{\circ}\text{C}$ 条件下搁置 24h,再以 1C ₅ A 放电至 5.8V。	The battery, appearance shall have no distortion , no explosion, no fire, no smoke and no leak-out, and its discharging time should not be less than 36 minutes. 电池外观应无明显变形、锈蚀、冒烟或爆炸， 放电时间不低于 36min.

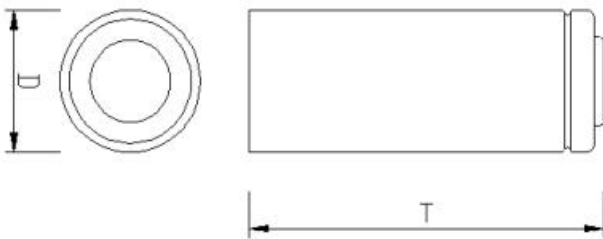


6	Vibration 振动	<p>After the battery is fully charged, put the battery on the vibration table, cycle scanning frequency vibration for 30min, with the amplitude 0.38mm and frequency 10Hz~30Hz as resonance, and scanning frequency 1oct/min from three directions X、Y、Z for 30min respectively in its scanning frequency velocity 10CT/min.</p> <p>完全充电后, 以 0.38mm 的振幅和 10Hz~30Hz 的频率作谐振, 将电池安装在振动台上, 设置好 X,Y,Z 三个方向上从扫频率速度为 10CT/min, 循环扫频振动 30min。</p>	<p>The battery appearance has no distortion, no explosion, no fire, no smoke and no leak-out. Battery open voltage should be over 7.2V.</p> <p>电池外观应无明显变形、锈蚀、冒烟或爆炸, 电池电压不低于 7.2V.</p>
7	Bump 碰撞	<p>After vibration testing use a clip or directly fix the battery on to the platform in the direction X、Y、Z vertical complementary axis, then adjust its acceleration and pulse duration as below to have a bump test. Pulse peak acceleration 100m/s². Bumps per minute 40-80. Pulse duration 16ms. Bump times 1700±10.</p> <p>振动试验结束后, 将电池平均按 X,Y,Z 三个相互垂直轴向上, 设置脉冲峰值加速度为 100m/s², 每分钟碰撞次数 40~80, 脉冲持续时间 16ms, 碰撞次数 1700±10.</p>	<p>The battery appearance has no distortion, no explosion, no fire, no smoke and no leak-out. Battery open voltage should be over 7.2V.</p> <p>电池外观应无明显变形、锈蚀、冒烟或爆炸, 电池电压不低于 7.2V.</p>
8	Free Drop 自由跌落	<p>After bump testing, the battery shall be immediately dropped from the height of 1000mm(minimum height) onto a 18mm~20mm hard board on the cement floor. Free drop one time respectively from X、Y、Z positive and negative axis(six directions). After that, the battery is discharged at 1C₅A to its final voltage.</p> <p>碰撞试验结束后, 将样品电池从 1000mm 高处自由跌落于水泥地面上的 18-20mm 厚的硬木板上, 从 X,Y,Z 正负六个方向每个方向 1 次。试验结束后, 能完全充放电不少于 3 个循环。</p>	<p>The battery appearance has no distortion, no explosion, no fire, no smoke and no leak-out. Its internal construction unloosened discharging shall not be less than 51 minutes.</p> <p>电池应不漏液, 不冒烟, 不爆炸, 能插入蜂窝电话, 锁扣可靠, 放电时间不低于 51min。</p>
9	Overcharge Protection 过充点保护性能	<p>When the battery is fully charged, go on loading for 8h with a twice rating voltage, 2.0C₅A output current, it starts the overcharge protection function.</p> <p>电池完全充电结束后, 用恒流恒压源给电池加载 8h, 恒流恒压源设定为 2 倍标称电压, 电流设定为 2.0C₅A。</p>	<p>The battery appearance has no distortion, no explosion, no fire, no smoke and no leak-out.</p> <p>电池应不爆炸, 不起火, 不冒烟或漏液。</p>
10	Over discharge Protection 过放点保护性能	<p>The battery is discharged at 2.0C₅A in the constant current till it reaches over discharge protection voltage at (20±5)°C, connected with a 30Ω lead and discharged for 24h.</p>	<p>The battery appearance has no distortion, no explosion, no fire, no smoke and no leak-out.</p> <p>电池应不爆炸, 不起火, 不冒烟或</p>



		电池在环境温度 $20 \pm 5^{\circ}\text{C}$ 的条件下，以 $2.0\text{C}_5\text{A}$ 放电至终止电压后，外接 $30\ \Omega$ 负载电阻放电 24h。	漏液。
11	Short-circuit Protection 短路保护性能	As the battery has completed charging, short circuit the positive and negative contacts with $0.1\ \Omega$ resistor for 1h for appearance check, then disconnect the resistor between the contacts, the battery shall be charged at $1.0\text{C}_5\text{AmA}$ in the constant current for 5S. 电池完全充电后，将正负极用 $0.1\ \Omega$ 电阻短路 1h，将正负极断开后，电池以 $1.0\text{C}_5\text{A}$ 电流瞬间充电 5S。	The battery appearance has no distortion, no explosion, no fire, no smoke and no leak-out. Battery voltage should not be less than $N*7.2\text{V}$. 电池应不爆炸，不起火，不冒烟或漏液。瞬间充电后电池电压不低于 $N*7.2\text{V}$ 。
12	Heavy Collision 重物冲击	Put the battery on the bounce table, free fall the 9.1kg hammer from the height 0.61M to shock the fixed battery in the fixture(the maximum area of the battery should be vertical with the table). 电池置于冲击台上，将 9.1KG 重锤自 0.61M 高度自由下落冲击已固定在夹具中的电池（电池的面积最大的面应与台面垂直）。	Allowing the battery to be deformed, but no explosion and no fire. 不起火，不爆炸，电池允许变成。

6. Cell Specification/电芯规格



Items 项目	Description 描述	Dimension and Spec 尺寸规格
D	Thickness/厚度	18.0mm MAX
D	Width/宽度	18.0mm MAX
T	Length (Not including the exposed sealant) / 长度 (含外露极耳胶长度)	$65.0 \pm 0.5\text{mm}$

备注:

Code-spurting /喷码方式:

HND conventional format/按照恒能达内部常规格式喷码。



7. PCM Specification/保护板规格

7.1 Environment request/环境要求: RoHS.

7.2 Function description/功能描述:

Over charge protection, Over discharge protection, Over current protection, Short circuit protection

过充电保护, 过放电保护, 过电流保护, 短路保护

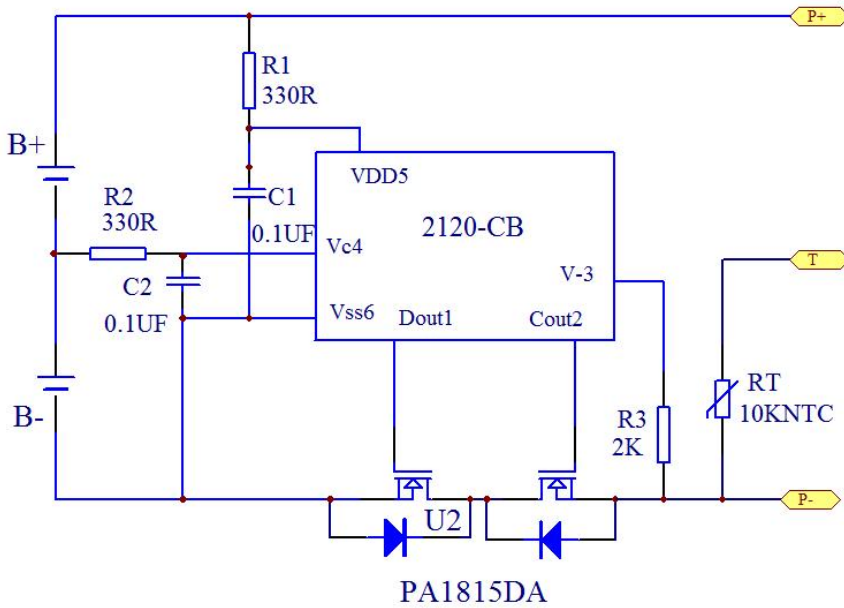
7.3 Electric features/电气特性

Item	Symbol	Content	Criterion
项目	符号	详细内容	标准
Over charge Protection	V _{DET1}	Over charge detection voltage	4.28±0.025V
过充保护		过充电检测电压	
	tV _{DET1}	Over charge detection delay time	0.7~1.3S
		过充电检测延迟时间	
	V _{REL1}	Over charge release voltage	4.08±0.05V
		过充电解除电压	
Over discharge Protection	V _{DET2}	Over discharge detection voltage	2.9±0.08V
过放保护		过放电检测电压	
	tV _{DET2}	Over discharge detection delay time	70~150ms
		过放电检测延迟时间	
	V _{REL2}	Over charge release voltage	3.0±0.1V
		过放解除电压	
Over current protection	V _{DET3}	Over current detection voltage	0.2±0.03V
过流保护		过电流检测电压	
	I _{DP}	Over current detection current	10~30A
		过电流保护电流	以实际测试为准
	tV _{DET3}	detection delay time	6~14ms
		检测延迟时间	
		Release condition	Cut load
		保护解除条件	断开负载
Short protection		Detection condition	Exterior short circuit
短路保护		保护条件	外部电路短路
	T _{SHORT}	detection delay time	150~400us
		检测延迟时间	
		Release condition	Cut short circuit
		保护解除条件	断开短路电路
Interior resistance	R _{DS}	Main loop electrify resistance	V _c =4.5V; R _{DS} ≤60mΩ
内阻		主回路通态电阻	
Current consumption	I _{DD}	Current consume in normal operation	0.3μA Type15μA Max
消耗电流		工作时电路内部消耗	

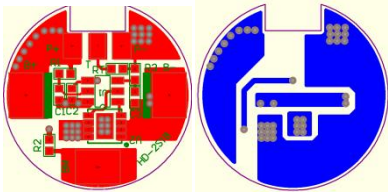
注: 以上测试环境均为 25℃所测出的值,非常温下可能有所不同,该电路的工作温度范围为-40-85℃,具体测试条件及测试电路请参照保护 IC 之规格书。



7.4 Circuit Drawing/电路图



7.5 SMT drawing/贴片图



7.Parts list/元器件清单

序号	元件编号	元件名称	元件规格	封装式	数量
1	U1	Battery protection IC	HY2120-CB	SOT-23-6	1
2	U2	Silicon MOSFET	PA1815DA	DFN3*3	1
4	R1 R2	Resistance	SMD 330R ±5%	0402	2
5	R3	Resistance	SMD 2K ±5%	0402	1
6	RT	Resistance	SMD 10KNTC±1%	0402	1
7	C1 C2	Capacitance	SMD 0.1 μF	0402	2
8	PCB	Print circuit board	17.2*16.9*0.6mm	±0.1mm	1
9	B+ B- BM	镍片	4*3*0.3mm	±0.05mm	4
备注	以上物料均按指定品牌,客户一旦确认不可更改, 以上材料全部要求符合 ROHS。				



8. Packaging, Storage and Transportation/储存和运输

8.1 Packaging/包装:

Using HND standard packaging./采用恒能达标准包装方式。

8.2 Storage/储存:

- The Polymer Li-ion battery should be stored in a cool, dry and well-ventilated area, and should be far from the fire and the high temperature.
聚合物锂离子电池组应储存在阴凉、干燥、通风良好的地方。并应远离火和高温。
- The best capacity in storage is 30%-50% (voltage between 7.4-7.8V).
保持储容量最好是在 30%-50% (在 7.4-7.8V 之间的电压)。
- The battery should be stored within the proper temperature and humidity range specified by specification.
电池应储存在产品规格书规定的温度和湿度范围内。
- If stored for more than six months or longer, the battery will be suggested to charge.
如果电池存放时间超过六个月以上或更长, 建议对电池进行充电。

8.3 Transportation/运输:

- Forbidden to mix battery with other goods. /禁止将电池与其他货物混装。
- Forbidden to immerse battery into liquid such as water or soak it with liquid. /禁止将电池浸入水中或弄湿。
- Forbidden to deposit battery over 6 layers or upside-down. /禁止电池堆放超过 6 层或倒立。
- The highest temperature during battery transportation should be lower than 65°C. /电池运输过程中最高温度应低于 65°C 。

9. Use Attentions/使用注意事项

Because the Polymer battery is packed in soft package, to ensure its better performance, it's very important to carefully handle the Polymer battery./由于聚合物电池属于软包装, 为保证电池的性能不受损害, 必须小心对电池进行操作。

9.1 Attentions /注意事项

- Avoid insolation or dropping into fire. /避免暴晒或投入火中。
- Avoid shorting the battery. /避免将电池短路。
- Avoid excessive physical shock or vibration. /避免电池过度冲击或振动。
- Don't disassemble or deform the battery. /不得拆卸或扭曲电池
- Don't immerse in water. /不得浸入水中
- Don't use the battery mixed with other model or manufacturer batteries.
不要与其他型号或品牌的电池混合使用。
- Battery usage by children should be supervised. /儿童使用电池应受到监督。

9.2 Charge/充电

- Battery charge should be used appropriate charger. /电池充电必须使用专用的充电器。
- Forbidden to use modified or damaged charger. /禁止使用改装或已损坏的充电器。
- Forbidden to charge over 24 hours for battery. /禁止充电超过 24 小时。
- Charge current: can't surpass the biggest charge current specified by battery specification.
充电电流: 不能超过在规格书规定的最大充电电流。
- Charge voltage: can't surpass the highest charge voltage specified by battery specification.
充电电压: 不能超过在规格书规定的最高电压。
- Charge temperature: The battery should be charged within proper temperature range specified in specification.
充电温度: 电池必须在规格书规定的环境温度范围内进行充电。
- Forbidden of reverse charge: The battery should be connected correctly, the polarity has to be confirmed before wiring in case of the battery is connected improperly, the battery can't be charge. Simultaneously, the reverse charge may cause damaging to the battery which may lead to degradation of battery performance and damage the battery safety, and could cause heat generation or leakage.



禁止反充：电池应该当正确连接，配线前就要确认极性，万一连接不正确，电池将不能充电。同时，反充可能会损坏电池，会导致电池性能下降，破坏电池安全性，还可能导致发热或泄漏。

9.3 Discharge/放电:

- Discharge current: can't surpass the biggest discharge current specified by battery specification.
放电电流：不能超过在规格书规定的最大放电电流。
- Discharge temperature: The battery should be discharged within proper temperature range specified by specification.
放电温度：电池必须在规格书规定的环境温度范围内进行放电。
- Over-discharge: it should be noted that the battery would be at over-discharged state by its self-self-discharge characteristics in case the battery is not used for long time. To prevent over-discharge, the battery shall be charged periodically to maintain between 7.4V and 7.8V.

过放：需要注意的是，在电池长期未使用期间，它可能会因其自放电特性而处于某种过放电状态。为防止过放电的发生，电池应定期充电，将其电压维持在 7.4V 到 7.8V 之间。

9.4 Disposal/处置:

The disposal of battery should meet the local law.

电池的处理应当符合当地法律。

10. Warranty Period /保质期

Unless special declaration in product specification, the warranty period of battery is 12 months from the day of battery manufacture.

除在产品规格书中特别声明，电池保质期自制造之日起 12 个月内有效。

11. Note/注释

Any other items which are not covered in this specification shall be agreed with both parties.

任何其他不包括在本规范的项目，应由双方协商决定。