1. Preface（前言）

This Product Specification describes the technique requirements, test procedure and precaution notes ofprismatic type Lithium-ion Rechargeable cell to be supplied to customer

2. Description（说明）

2.1 Product 产品： Lithium-ion Rechargeable cell 锂离子可充性电芯

2.2 Model (Type) 电芯型号： ICR18650/20 P1

2.3 Designation 名称：

A —— ICR 18 650 ——20P

① ② ③ ④ ⑤ ⑥

① Indicates the manufacturing plant 代表厂家名称

② Indicates the property of the cell 代表电池性能

The letter "ICR" defines Cylindrical Li-ion rechargeable cell

" ICR "代表圆柱锂离子二次电池

③ Indicates the diameter of the cell 代表电芯直径

18=18mm

④ Indicates the overall height of the cell 代表电芯高度

650=65mm

⑤ Indicates the capacity of the cell 代表电池容量

20=2000mAh

⑥ The letter "P"defines the power battery

"P"代表功率型电池

3. Cell Size and structure（电芯尺寸及结构）

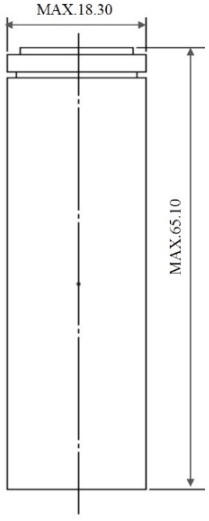

Figure A（图 A）

4. Construction （电芯结构）

A cell is made of cathode, anode, separator, steel can and header etc..

电芯由正极、负极、隔膜、钢壳体和顶盖等组成。

5. Specification （标准）

Item 项目		Specification 标准	Remark 备注
5.1 Nominal Capacity 标称容量		2000mAh	0.5CA Rate discharge capacity ≥1970mAh
5.2 Minimum Capacity 最小容量		1900mAh	
5.3 Internal Impedance 交流内阻		≤18mΩ	By AC 1 kHZ
5.4 Nominal Voltage 标称电压		3.60V	From 4.20 V to 2.75V
5.5 Cell Weight 电芯重量		≤44g	
5.6 End-of-charge Voltage 充电限制电压		4.20V±0.05V	
5.7 End-of-charge Current 充电截止电流		0.02C(40mA)	At CV mode
5.8 End-of-discharge Voltage 放电截止电压		2.75 V	
5.9 Charging Time 充电时间		1）6 h 2）3 h	1）0.2 C（400mA） rate 2）0.5 C(1000mA) rate
5.10 Charge Method 充电方式	Standard charge method 标准充电方式	0.5C(1000mA) to4.20V CC/CV	
	Maximum Charge Current 最大充电电流	1）0.5C(1000mA) to 4.20V CC/CV 2）1C(2000mA) to 4.20V CC/CV	1）0°C ~ +12°C 2）12°C ~ +45°C
5.11 Standard Discharge Method 标准放电方式		0.5C (CC)	
5.12 Max Continuous Discharge current 最大连续放电电流		20A	
5.13 Cycle Life 循环性能		over 300 cycles≥80%	20A Continual Discharge
5.14 Operating Temperature Range 操作温度范围	Charging Temperature 充电温度	0～45℃	
	Discharging Temperature 放电温度	-20℃～70℃	
	Storage Temperature 存储温度	-20～45℃	Recommended temperature range for long term storage is 0 ~ 25℃
5.15 Shelf Life 保质期		1year	Typical value from ship state
5.16 Appearance 外观		Without break, scratch, distortion, contamination, leakage and so on 无破裂、划痕、变形、污迹、电解液泄露等	

6. Test Conditions （测试条件）

6.1 Standard Test Conditions 标准测试条件

Unless otherwise specified, all tests stated in this Product Specification should be conducted at temperature 25℃±2℃ and humidity 65%±20% RH.

若无特别要求，此规格书上的产品测试条件均为温度：25℃±2℃，湿度：65%±20% RH。

6.2 Standard Charge Method 标准充电制式

The "Standard Charge" means charging the cell at a constant current of 0.5C（1000mA） until the voltage is 4.20V, then charged at a constant voltage of 4.20V until its current is less than 0.02C(40mA).

“标准充电”即在环境温度为 25℃±2℃的条件下，先以恒定电流 0.5C（1000mA）充电至 4.20V，再以 4.20V 的恒压充电至电流小于 0.02C(40mA)。

7. Electrical Characteristics （电性能）

Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
7.1 Discharge Performance (0.5C 1000m A) 0.5C(1000mA) 放电性能	A cell is charged in accordance with 6.2, and then stored in an ambient temperature of 25 ℃ ±2 ℃ for 10min, finally discharged to cut-off voltage at a constant current of 0.5C 1000mA. 电芯按 6.2 规定充电后，在环境温度为 25℃±2℃的条件下搁置 10min，而后以 0.5C(1000mA)电流放电到终止电压。	the discharge capacity is ≥ 100% minimum capacity 放电容量≥100%的最小容量
7.2 Discharge Performance (1C 2000mA) 1C(2000mA) 放电性能	A cell is charged in accordance with 6.2, and then stored in an ambient temperature of 25 ℃ ±2 ℃ for 10min, finally discharged to cut-off voltage at a constant current of 1C 2000mA 电芯按 6.2 规定充电后在环境温度为 25℃±2℃的条件下搁置 10min，而后以 1C(2000mA)电流放电到终止电压。	the discharge capacity is ≥95% nominal capacity. 放电容量≥95%标称容量
7.3 High-rate discharge performance （15C 30A） 倍率性能	A cell is charged in accordance with 6.2, and then stored in an ambient temperature of 25 ℃ ±2 ℃ for 10min, finally discharged to cut-off voltage at a constant current of 15C (30A) 电芯按 6.2 规定充电后在环境温度为 25℃±2℃的条件下搁置 10min，而后以 15C(30A)电流放电到终止电压。	the discharge capacity is ≥80% nominal capacity. 放电容量≥80%标称容量
7.4 High Temperature Performance 高温性能	A cell is charged in accordance with 6.2,and stored in an ambient temperature of 55℃±2℃ for 5h,then discharged to cut-off voltage at a constant current of 0.5C(1000mA). After that, fetch out the cell and place it in the ambient temperature of 25℃±2℃ for 2h, then check its appearance. 电芯按 6.2 规定充电结束后，将电芯放入 55℃±2℃的高温箱中恒温 5h，然后以 0.5C (1000mA)电流放电至终止电压，实验结束后，将电芯取出在环境温度为 25℃±2℃的条件下搁置 2h，然后目测电芯外观。	1.the discharge capacity is no less than 95% nominal capacity; 2.no distortion, no rupture. 1.放电容量≥95%标称容量 2.电芯外观无变形、无爆裂

7.5 Low Temperature Performance 低温性能	A cell is charged in accordance with 6.2,and stored in an ambient temperature of -20℃±2℃ for 20h, then discharged to cut-off voltage at a constant current of 0.2C(400mA). After that, fetch out the cell and place it in the ambient temperature of 25℃±2℃ for 2h, then check its appearance. 电芯按 6.2 规定充电结束后，将电芯放入-20℃±2℃的低温箱中恒温 20h，然后以 0.2C(400mA)电流放电至终止电压，实验结束后，将电芯取出在环境温度为 25℃±2℃的条件下搁置 2h，然后目测电芯外观。	1.the discharge capacity is ≥ 70% nominal capacity; 2.no distortion, no rupture. 1.放电容量≥70%标称容量； 2.电芯外观无变形、无爆裂。
7.6 High temperature Charge(Capacity) Retention and Regain 高温荷电保持与恢复能力	A cell is charged in accordance with 6.2,and stored in an ambient temperature of 60℃±2℃ for 7d, after that, fetch out the cell and place it in the ambient temperature of 25℃±2℃ for 5h, then discharged to cut-off voltage at a constant current of 0.5C(1000mA). 电芯按 6.2 规定充电结束后，在环境温度为 60℃±2℃条件下，将电芯搁置 7D，然后在 25℃±2℃下放置 5h，再以 0.5C(1000mA)电流放电至终止电压。	Retention:≥85%CAh Regain:≥95%CAh 容量保持率: ≥85%CAh 容量恢复率: ≥95%CAh
7.7 Cycle Life 循环寿命	A cell is charged in accordance with 1C(2000mA) CC/CV to 4.2V,and stored for 10 min, then discharged to cut-off voltage 2.75V at a constant current of 10C(20A), after that, stored 30 min prior to next charge/discharge cycle. The cell shall be continuously charged and discharged for 200 times. 电芯按 1C(2000mA) CC/CV 4.2V 规定充电，而后搁置 10min，然后以 10C(20A)电流放电至终止电压 2.75V，放电结束后，搁置 30min，再进行下一次充放电循环，连续进行充放电循环 200 次。；	capacity retention≥80% 容量保持率≥80%

8. Environment Characteristic （环境性能）

Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
8.1 Constant Temperature and Humidity 恒定湿热性能	A cell is charged in accordance with 6.2, and stored in an ambient temperature of 40±2℃(90～95%RH) for 48h,then placed in room temperature for 2h. After that,check its appearance prior to being discharged to cut-off voltage at a constant current of 0.5C（1000mA）. 电芯按 6.2 规定充电结束后，将电芯放入 40±2℃（90～95%RH）的恒温恒湿箱中搁置 48h 后，将电芯取出在室温下搁置 2h，目测电芯外观，再以 0.5C（1000mA）电流放电至终止电压。	1.no distorsion, no rust, no fume, no explosion; 2.the discharging time is no less than 36min. 1.电芯外观应无变形、锈蚀、冒烟或爆炸； 2.放电时间应不低于 36min。

9. Safety Test （安全测试）

All below tests are carried out on the equipments with foreced ventilation and explosion-proof device.Before test, all cells should be charged in accordance with 6.2, and stored 24h prior for testing.

下述试验应在有强制排风条件及防爆措施的装置内进行，在试验前所有的电芯都按 6.2 规定充电，并搁置 24h 后，再进行以下试验。

Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
9.1 Impact Test 重物冲击	A cell is to be placed on the impact flat. A Φ15.8mm bar is to be placed on the center of the cell. A 9.1kg weight is to be dropped from a height of 610mm onto the cell, the distortion is allowed. 将电芯放在冲击台上，将一 Φ15.8mm 的钢柱置放电池中心，钢柱的纵轴平行于平面，让重量 9.1kg 重锤自 610mm 高度自由落下，冲击电芯，电芯允许发生变形。	no fire, no explosion 电芯不起火、不爆炸
9.2 Crush Test 挤压测试	A cell is to be placed on the crush flat, the axis is parallel to the crush flat,it is to be crushed between two flat surfaces. Crushing force is approximately 13 kN and hold for 1 min. 电芯放在挤压设备的两个挤压表面之间，圆柱电芯轴平行于挤压平面，逐渐增加压力至 13 kN，保持压力 1min。	no fire, no explosion 电芯不起火、不爆炸
9.3 Heating Test 热冲击	A cell is to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of 5℃±2℃ per minute to a temperature of 130℃±2℃ and remain for 30min at that temperature before the test is discontinued. 将电芯放在电热鼓风干燥箱中，温度以 5℃±2℃/min 的速率由室温升至 130℃±2℃并保持 30min。	no fire, no explosion 电芯不起火、不爆炸
9.4 Overcharge Test （3C/10V）过充电	A cell is discharged to cut-off voltage at CC of 0.2CA, then it is to be subjected to CC/CV power by connecting its positive & negative terminal, then set the current as 3CA, the voltage as 10V, after that, charge the cell up to 10V at CC of 3CA,until that last 7h at the voltage of 10V or the voltage not increased. 先将电池以 0.2CA 放电至终止电压，然后将电芯正负极连接于恒压电源，调节电流至 3C (6A)，电压为 10V，然后对电芯以 3C(6A)充电，直到输出电压不低于 10V，持续充电 7h 或电压不再增大。	no fire, no explosion 电芯不起火、不爆炸
9.5 Short-circuit Test 短路测试	A cell is to be short-circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance load of 50mΩ.Monitor its temperature while testing, the cell is to be discharged until the cell case temperature has returned to be 10℃ less then peak temperature. 将接有热电偶的电芯置于通风橱中，用铜线短路其正负极（线路总电阻不大于 50 毫欧），实验过程中监视电芯温度变化，当电芯温度下降到比峰值低约 10℃时，结束实验。	no fire, no explosion 电芯不起火、不爆炸

10. Shipment （运输）

The capacity of delivery cell is approximately at 30%~40% of charging. It is not specified more than 30%~40% capacityremain at customer, because of self-discharge. During transportation, keep the cell from acutely vibration,impacting, solarization, drenching.

出货电芯处于 30~40%充电状态，由于电芯存在自耗，运送到客户端的电芯无法完全保证 30%~40%荷电量。运输过程应防止剧烈振动、冲击、日晒雨淋。

12.1 Standard cell Precaution 电芯防范措施

a. Do not expose the cell to extreme heat or flame.

不要将电芯暴露在极热或有火星的环境中。

b. Do not short circuit, over-charge or over-discharge the cell.

不要将电芯短路，过充或过放。

c. Do not subject the cell to strong mechanical shocks.

不要使电芯承受过重的机械冲击。

d. Do not immerse the cell in water or sea water, or get it wet.

不要将电芯浸入海水或水中，或者使其吸湿。

e. Do not reverse the polarity of the cell for any reason.

不要颠倒电芯的正负极。

f. Do not disassemble or modify the cell.

不要拆卸或修整电芯。

h.Do not handle or store with metallic like necklaces, coins or hairpins, etc.

不要和项链,硬币或发夹等金属物品放置在一起。

i. Do not use the cell with conspicuous damage or deformation.

不要使电芯受到明显的损害或变形。

j. Do not connect cell to the plug socket or car-cigarette-plug.

不要将电芯与插座连接。

k. Do not make the direct soldering onto a cell.

不要直接焊接电芯。

l. Do not touch a leaked cell directly.

不要直接接触泄漏的电芯。

m. Do not use for other equipment.

不要将电芯用于其它设备。

n. Do not use Lithium-ion cell in mixture.

不要将锂离子电芯混合使用。

o. Do not use or leave the cell under the blazing sun (or in heated car by sunshine).

不要将电芯放置在太阳光直射的地方。

p. Keep cell away from children.

将电芯放置在远离儿童的地方。

q. Do not drive a nail into the cell, strike it by hammer or tread it.

不要针刺、锤打或践踏电芯。

r. Do not give cell impact or fling it.

不要撞击或投掷电芯。

12.2 Cell Operation Instruction 电芯使用说明

12.2.1. Charging 充电

a. Charge the cell in a temperature range of 0°C to + 45°C.

电芯充电温度范围为 0℃～45℃。

b. Charge the cell at a constant current of 0.5CA until 4.20V is attained. Charge rates greater than 1CA are NOT recommended. (C : Rated Capacity of cell)

以 0.5CA 的电流恒流充电至 4.20V，超过 1CA 的电流建议不要使用（C：标称容量）。

c. Maintain charge voltage at 4.20V for 2 hours (recommended for maximum capacity).

恒压 4.20V 充电 2 小时（最大容量）。

* Cell must be charged with constant current-constant voltage method.

必须使用恒流恒压方式对电芯进行充电。

* Do not continue to charge cell over specified time.

不要超过标准时间持续充电。

12.2.2. Discharging 放电

a. Recommended cut-off voltage to 2.75V. Recommended max continuous discharge current is10CA

建议放电终止电压为 2.75V，建议最大持续恒流放电电流为 10CA 。

b. For maximum performance, discharge the cell in a temperature range of -20°C to + 70°C.

为了达到较好的性能，电芯的放电温度范围为－20℃ ～ ＋70℃。

12.2.3. Storage Recommendations 储存建议

a. Storage Temperature and Humidity 储存温度和湿度

- Storage the cell at temperature of –20 ~ 45°C, low humidity and no corrosive gas atmosphere.

  电芯应储存在温度范围为－20 ～45，低湿度和不含腐蚀性气体的环境中。

- No press on the cell

  不要让电芯承担任何压力。

b. Long Period Storage 长期存放

- In case of long period storage (more than 3 months), storage the cell at temperature range of 0 ~ 25°C, low humidity, no corrosive gas atmosphere.

  如果要长时间存放（超过 3 个月），电芯应存储在温度范围为 0～25℃，低湿度和不含腐蚀性气体的环境中。

- No press on the cell

  不要让电芯承担任何压力。