Customer: _____

Li-ion Cylindrical Battery Cell

Specification

锂离子圆柱电芯规格书

Model: ICR18650-3000mAh

Checked & Approved by 批准	Prepared by 编制	Date 日期
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1. Scope

适用范围

This specification is applied to ICR18650-3000mAh battery

2. Product Configuration

产品构成

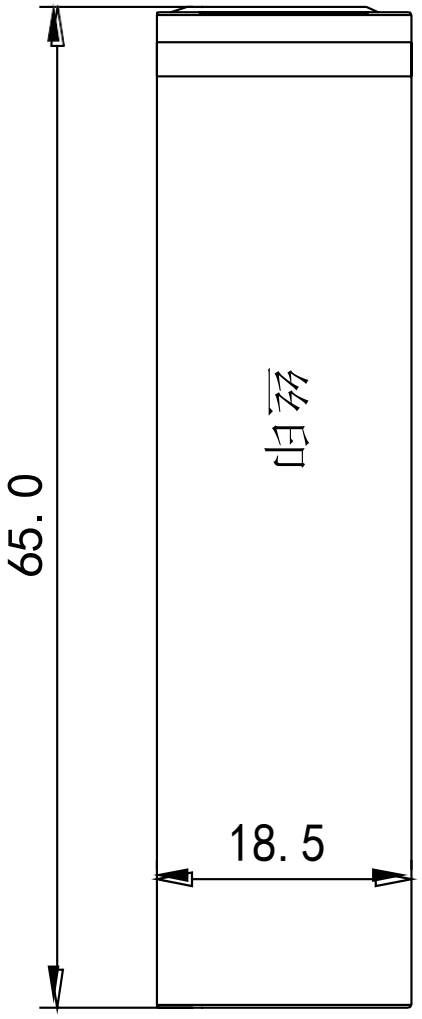
No 编号	Item 项目	Criteria 标准	Remark 备注
1	Li-ion Cylindrical Cell 锂离子圆柱电芯	ICR18650-3000mAh 3.7V	

3. Product Dimension

产品尺寸

3.1 Pack Dimension

成品尺寸



4. Product Specification

产品规格

Table 1:

表 1：

No 序号	Item 项目	Rated Performance 产品性能		Remark 备注
1	Rated Capacity 额定容量	Typical 标称容量	3000mAh	Discharge at 0.2C_5A after standard charge fully. 标准充电后 0.2C5A 放电
		Minimum 最小容量	2950mAh	
2	Nominal Voltage 标称电压	3.7V		Mean operation voltage during standard discharge. 标准放电过程电压平均值
3	OCV 出货电池	3.5V-3.75V		The battery power with 30%-50% 电池电量的 30%-50%
4	Voltage at end of Discharge 放电终止电压	2.5V		Discharge cut-off voltage. 放电截止电压
5	Charging Voltage 充电电压	4.2±0.03V		
6	AC (1KHz) Impedance New Cell Max.(mΩ) 内阻	≤18mΩ		
7	Standard Charge 标准充电	Constant Current 0.5C_5A Constant Voltage4.2V 0.02C_5A cut-off 0.5C_5A 恒流充电至 4.2V 然后恒压 4.2V至 0.02C_5A		Charge time : Approx 4.0h. 充电时间约 4 小时
8	Standard Discharge 标准放电	Constant current 0.2C_5A end voltage 2.5V 0.2 C_5A 恒流放电至 2.5V		
9	Fast Charge 快速充电	Constant Current 1.0C_5A Constant Voltage 4.2V 0.02C_5A cut-off 1.0C_5A 恒流充电至 4.2V 然后恒压 4.2V至 0.02C_5A		Charge time : Approx 2.5h. 充电时间约 2.5 小时
10	Fast Discharge 快速放电	Constant current 1.0 C_5A end voltage 2.5V 1.0 C_5A 恒流放电至 2.5V		
11	Maximum Continuous Charge Current 最大持续充电电流	1.0C_5A		

12	Maximum Continuous Discharge Current 最大持续放电电流	5.0C_5A, 15A	
13	Max. Pulse Discharge Current 最大瞬间放电电流	30A	t<2S
14	Operation Temperature Range 工作温度范围	Charge: 0~50℃ 充电：0~50℃	60±25%RH.Bare Cell.
		Discharge: -20~75℃ 放电：-20~75℃	
15	Storage Temperature Range 储存温度范围	Less than 1 year: -20~25℃ 1 年：-20~25℃	60±25%RH.
		Less than 3 months: -20~40℃ 3 个月：-20~40℃	
16	Storage Humidity Range 储存湿度范围	60±25%RH.	
17	Weight 重量	Approx: 48g 约：48g	Whole product 产品总重量
18	Product Dimension 产品尺寸	Highly: Max 65.0mm 高度：最大 65.0mm	
		Diameter: Max 18.5mm 直径：最大 18.5mm	

5. Product Performance

性能测试

5.1 Standard Testing Conditions

标准测试条件

Test should be conducted with new batteries within one week after shipment from our factory and the cells shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of 23±2℃ and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature 15~30℃ and humidity 25~85%RH.

测试样品为出厂一周以内的新电池，循环次数 5 次以下。测试环境温度为 23±2℃， 湿度为 45~85%，一般情况下，测试数据在以下的环境中应该不会受到明显影响：温度 15~30℃，湿度 25~85%

5.2 Measuring Instrument or Apparatus

测试的设备仪器

5.2.1 Dimension Measuring Instrument

外形尺寸测试设备

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

游标卡尺，精度 0.01mm

5.2.2 Voltmeter

电压计

Standard class specified in the national standard or more sensitive class having inner impedance more than 10kΩ/V

精确程度高于等于国标，内阻大于 10kΩ/V

5.2.3 Ammeter

电流表

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω.

精确程度高于等于国标，内阻小于 0.01Ω

5.2.4 Impedance Meter

内阻仪

Impedance shall be measured by a sinusoidal alternating current method (1kHz LCR meter).

交流电方法测量，参数（1kHz LCR meter）

5.3 Standard Charge\Discharge

标准充放电

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

标准充电：测试程序和标准要求如下

$0.5C_5A$ =1500mA

Charging shall consist of charging at a $0.5C_5A$ constant current rate until the cell reaches 4.2V. The cell shall then be charged at constant voltage of 4.2volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to $0.02C_5A$. Charge time : Approx 4.0h, The cell shall demonstrate no permanent degradation when charged between 0 ℃ and 45 ℃.

以 $0.5C_5A$ 持续充电至电池电压达到 4.2V，然后以 4.2V 的恒定电压继续给电池充电，直到充电电流小于 $0.02C_5A$ 充电时间大约为 4.0h，在温度为 0 ℃－45 ℃。范围内充电效果较佳。

5.3.2 Standard Discharge

标准放电

0.2C_5A =600mA

Cells shall be discharged at a constant current of 0.2C_5A to 2.5V @ 23±2℃.

电池以 0.2C_5A 的恒定电流放电到 2.5V， 环境温度为 0 ºC－45℃。

5.4 Appearance

外观

There shall be no such defect as flaw, crack, rust, leakage, which may adversely affect commercial value of battery.

外观整洁，电池无破损，无污渍，露液和腐蚀。

5.5 Initial Performance Test

化学性能测试

Table 2:

表 2：

Item 项目	Measuring Procedure 测试方式	Requirements 要求指标
(1) Open-Circuit Voltage 开路电压	The open-circuit voltage shall be measured within 24 hours after standard charge. 标准充电之后在 24 小时内开路测试	≥4.08V
(2) AC Impedance Resistance 内阻	The Impedance shall be measured in an alternating current method (1kHz LCR meter) after standard charge at 23±2℃. 内阻仪参数(1kHz LCR meter) 标准充电后在 23±2℃状态下	≤18mΩ
(3) Nominal Capacity 标称容量	The capacity on 0.2C discharge shall be measured after standard charge at 23±2℃. 在 23±2℃状态下以 0.2C放电	Discharge Capacity ≥2950mAh

5.6 Temperature Dependence of Capacity (Discharge)

不同温度放电容量表现

Cells shall be charged per 5.3.1. and discharged @0.2C_5A to 2.5V, except to be discharged at temperatures per Table 3. Cells shall be stored for 3 hours at the test temperature prior to discharging and then shall be discharged at the test temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 23±2℃ and the percentage shall be calculated. Each cell shall meet or exceed the requirements of Table 3.

以标准电流充电后，电池以 0.2C5A放电到 2.5V，电池在各种温度条件下的放电数据如下表。测试前电池要在测试温度环境中静置 3H，然后进行放电测试，数据比率参照电池在 23±2℃情况下的放电容量。测试后的数据应达到或超过下表数据

Table 3:

表格 3

Discharge Temperature 放电环境温度	-10℃	0℃	23℃	60℃
Discharge Capacity （0.2C_5A） 放电容量（0.2C_5A）	85%	90%	100%	95%

5.7 Cycle Life and Leakage-Proof

循环寿命及漏液测试

Table 4:

表格 4

No. 序号	Item 项目	Criteria 测试要求	Test Conditions 测试方法
1	Cycle Life 循环寿命	Higher than 70% of the Initial Capacities of the Cells 高于标称容量 70%	Carry out 500 cycle charging/ 以下方式进行 500 次充放电 ◆ Charge: 0.5C_5A Charge to 4.2V, 0.02C_5A cut-off 充电:0.5C_5A 充电至 4.2V,截止电流 0.02C_5A. ◆ Discharge:0.5C_5A to 2.5V 放电:0.5C_5A 放电至 2.5V ◆ Rest Time between charge/discharge:30min. 充放电之间静置 30min ◆ Temperature:23±2℃ 温度:23±2℃
2	Leakage-Proof 漏液	No leakage (visual inspection) 无漏液(目测)	After full charge, store at 60±3℃ 60±10%RH for 1month. 满充电，在 60±3℃温度及 60±10%湿度状态放置 30 天

6.Mechanical characteristics and Safety Test

（安全测试及机械特性）

Item 项目	Battery Condition 电池状况	Test Method 测试方法	Requirements 要求
Over charge test 过充测试	Fresh,Fully Charged 新电池带电量 100%	电池标准充电后， 测量电池的初始状态，保证电池 状态正常（下同）,以 1.0C_5A 电流充电至 4.6V 或 90 分钟，观察电池的温度及外观变化。 Standard charged. Charged at 1.0 C_5A to 4.6V or 90 min. Observe the variation of the cell's appearance and temperature.	No explode No fire 不爆炸，不起火
Over discharge test 过放测试	Fresh,Fully Charged 新电池带电量 100%	Cell be discharged at constant current 0.5C_5A to 2.5V, then discharged at 0.2C_5A to 0V. 0.5C_5A恒流放电 2.5V，然后 0.2C_5A放电到 0V	No explode no fire,nor smoke 不爆炸，不起火 不冒烟
Heat shock test 热冲击测试	Fresh, Fully Charged 新电池带电量 100%	Put the cell in hot box ,then heat up to 130℃ in1 minute, remain for 10 minutes. 把电池放进热箱里，然后 1min 内升高到 130℃，并保持 10min	No explode No fire 不爆炸，不起火

Impact test 冲击试验	Fresh, Fully Charged 新电池带电量 100%	A 9.1kg weight to be dropped from 610mm height onto the cell center. 提起 9.1KG 重的尖锤，在 610mm 高的空中自由落下，正击底部的电池	No explode No fire 不爆炸，不起火 不爆炸，不起火
Crush 挤压	Fresh, Fully Charged 新电池带电量 100%	Crush between two flat plates. Applied force is about 13kN(1.72Mpa) for 10min. 平放于两块水平的金属板之间，施以 13kN(1.72Mpa) 力静置 30 分钟	No explode, No fire 不爆炸，不起火
Short Circuit test 短路测试	Fresh, Fully Charged 新电池带电量 100%	make short-circuited by connecting the (+) and (-) terminals of the cell with a Cu wire having a maximum resistance load of 0.1Ω.Tests are to be conducted at room temperature(23±2℃). 在 23±2℃)温度环境中，用内阻低于 0.1Ω 的导线将电池正负极直接连接	No explode, No fire Top temperature no exceed 150℃ 不爆炸，不起火，表面温度不超过 150℃
Rate test 倍率测试	Fresh, Fully Charged 新电池带电量 100%	0.2C/0.5C/1C charge & discharge.	
Low temperature discharge test 低温放电	Fresh, Fully Charged 新电池带电量 100%	put the cell in -10℃ for 1h, then discharge at $0.2C_5A$ to 2.5V. 把电池放到-10℃环境保持 1h，$0.2C_5A$ 放电至 2.5V	Discharge capacity ≥70% 放电容量≥70%
High temperature discharge test 高温放电	Fresh, Fully Charged 新电池带电量 100%	Put the cell in 60℃ for 1h, then discharge at $0.2C_5A$ to 2.5V. 把电池放到 60℃环境保持 1h，$0.2C_5A$ 放电至 2.5V	Discharge capacity ≥95% 放电容量≥95%
Vibrate test 振动测试	Fresh, Fully Charged 新电池带电量 100%	Vibrate the cell for 30 minutes per each of the three mutually perpendicular axis (X,Y,Z) after rated charge. X、Y、Z 每个方向振动 30min	No rupture, no fire Nor critical damage 不爆炸，不起火
Drop test 跌落测试	Fresh, Fully Charged 新电池带电量 100%	Drop the cell from 1m above onto concrete board with 18~20mm thickness for one time each fro every direction after rated charge. After test, cells are discharged at 1C and charged at 1C,cycles 3times to obtain the time of discharging. 标准充电后，从 1m 高的位置每个方向跌落 1 次，然后以 1C/1C 循环 3 次，记录放电时间	No rupture, no fire Nor critical damage ≥51min 不断裂，不起火，无严重损伤 ≥51min

7. Storage and Transportation

储存和运输

7.1 Storage:

储存

7.1.1 The Li-ion battery pack should be stored in a cool, dry and well-ventilated area. and should be far from the fire and the high temperature.

包装后的锂离子电池应该储存在低温、干燥和通风良好的地方，不应靠近有火和高温的地方

7.1.2 The best capacity in storage is 30%-50% .

最好的存储容量是 30% - -50%之间.

7.1.3 The battery should store in the product specification book stipulation temperature range. the best storage temp. is 0 to 25℃. The best humidity is 60±25%.

电池应该在本规格书规定的温度范围内存放。最好的存放温度为 0 ~25℃。最佳存放湿度为 60±25%

7.1.4 If has surpasses above for six months the long time storage, suggested you should carry on additional charge to the battery.

如果有超过六个月以上的长时间存储,建议你应该进行额外的电池充电。

7.2 Transportation:

运输

7.2.1 Do not mix the battery products with other cargoes.

不要将电池和其他的产品混装。

7.2.2 Do not immerse the battery products in water or allow it to get wet.

不要将电池产品置于水中或是将电池受潮

7.2.3 Do not over 7 layers staking and upside-down.

不要将电池放置超过 7 层和倒置电池。

7.2.4 The highest temperature in transportation is lower than 65℃.

最高运输电池的温度要低于 65℃。

8. Use Attentions:

使用说明

To ensure proper use of the battery please read the manual carefully before using it.

为了确保电池的安全和正确使用，请在使用电池之前仔细阅读以下内容。

8.1 Handling:

操作

8.1.1 Do not expose to, dispose of the battery in fire.

电池必须使用适用的充电器充电。

8.1.2 Do not put the battery in a charger or equipment with wrong terminals connected.

在充电或接入用电器时，注意正负极不要接反。

8.1.3 Avoid shorting the battery

请勿将电池短路。

8.1.4 Avoid excessive physical shock or vibration.

避免敲击及震动电池。

8.1.5 Do not disassemble or deform the battery.

请勿解剖电池体。

8.1.6 Do not immerse in water.

请勿浸入水中。

8.1.7 Do not use the battery mixed with other different make, type, or model batteries.

请勿不同厂家、不同类型、不同型号混用。

8.1.8 Keep out of the reach of children.

避免让儿童接触到。

8.2 Charge:

充电

8.2.1 Battery must be charged in appropriate charger only.

电池必须使用适用的充电器充电。

8.2.2 Never use a modified or damaged charger.

不要使用经修理过的或是已损坏的充电器充电。

8.2.3 Do not leave battery in charger over 24 hours.

不要让电池充电超过 24 个小时。

8.2.4 Charging current： Can not surpass the biggest charging current which in this specification book stipulated.

充电电流：不能高于本规格书规定的充电电流上限。

8.2.5 Charging voltage： Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

充电电压：不能高于本规格书规定的充电电压上限。

8.2.6 Charge temperature：The battery must carry on the charge in the ambient temperature scope which this specification book stipulated.

充电环境温度：必须在本规格书规定的温度范围内进行充电。

8.2.7 Uses the constant electric current and the constant voltage way charge, the prohibition reverse charges. If the battery positive electrode and the cathode meet instead, can damage the battery.

先恒流后恒压充电，不可反向充电。如果电池的正负极接触将会损伤电池。

8.2.8 Storage battery storage, it must be charged state, and requires every 3 months on a charge and discharge.

电池存放时，必须带电态储存，并要求每 3 个月进行一次充放电。

8.3 Discharge:

放电:

8.3.1 The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat。

放电电流不能高于本规格书规定的放电电流上限，过高的放电电流可能导致电池容量受损，并可能导致电池体过热而造成危险。

8.3.2 Electric discharge temperature: The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

放电环境温度：必须在本规格书规定的温度范围内放电使用。

8.3.3 Over-discharges: After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flashover characteristic certain excessively discharges the condition, for prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity.

过放：瞬间过放不影响使用，但长时间的过放会影响电池性能。如果电池长期不使用，电池性能也会降低，使用时需做几次充分的充放电后才能恢复。

8.4.4 Disposal:

处置:

Regulations vary for different countries. Dispose of in accordance with local regulations.
依据使用当地的法规处理废旧电池。

9 Period of Warranty

保质期

There is a twelve-month warranty for our export batteries from the date of shipment. If the problem happened during the warranty period, we are responsible to replace the defective ones according to the accurate analysis results. However, we won't take any responsibility if the problem is caused by the battery-related applications and related products.
出厂后 12 个月内，正常使用情况下，电池性能表现不良者给予更换；正常使用情况下，如因电池原因给客户造成不良后果者，负责赔偿。

10.Others

其它

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.
因为电池为化学制品，长期使用或长期贮存不用都会造成电池性能变差。如果使用条件如充电，放电，环境温度等超出了规格书规定的范围，电池的容量和寿命会缩短或者使用该电池的设备会由于漏液收到损害。如果电池采用正确的方法长时间充电而不能充满的话，就需要及时更换电池。

11.Note:

备注

Any other items which are not covered in this specification shall be agreed by both parties.
本规格书中未提及事宜，可由双方协商解决。