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INR21700-RS50 产品规格书

INR21700-RS50 Product Specification

Model	INR21700-RS50	Version No.	A0

Revision History

Version No.	**Date (M-D-Y)**	**Description/Note**	**Author**
A0	01/02/2025		

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1.0 范围 Scope

本产品规格书描述了江苏睿恩新能源科技有限公司提供给客户的可充电锂离子电池的产品性能指标。

This product specification has been prepared to specify the specifications of the rechargeable lithium-ion cell to be supplied to customers (buyers) by Jiangsu Reliance Energy Tech. Co., Ltd.

2.0 产品描述和产品型号 Product Description and Model

2.1 产品描述: 可充电锂离子电池 Product Description: Rechargeable Lithium-ion Cell

2.2 产品型号：INR21700-RS50 Product Model：INR21700-RS50

3.0 规格参数 Specifications

项目 **Item**	规格参数 **Specifications**
3.1 标准放电容量 3.1 Standard discharge capacity	最小容量 4950mAh。 25±3℃下，按照标准充电(0.5C(2.5A)恒流恒压充电到 4.20V，100mA 截止)，搁置 30 分钟，0.2C (1.0A)放电到 2.5V。1C = 5.0A。 Min. 4950mAh. Charge: 0.5C(2.5A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 30min. Discharge: 0.2C(1.0A), 2.5V cut-off, 25±3℃. 1C = 5.0A.
3.2 交流内阻 3.2 ACIR	交流 1KHz 测量 ≤4.0mΩ By 1kHz AC ≤4.0mΩ
3.3 标称电压 3.3 Nominal voltage	3.6V
3.4 充电截止电压 3.4 End-of-charge voltage	4.2V
3.5 放电终止电压 3.5 Discharge cut-off voltage	2.5V
3.6 标准充电电流 3.6 Standard charge current	2.5A

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3.7 标准放电电流 3.7 Standard discharge current	1.0A	
3.8 倍率充电 3.8 Rate charge	8A	
3.9 最大持续充电电流 3.9 Maximum continuous charge current	15A	
3.10 最大持续放电电流 3.10 Maximum continuous discharge current	70A（有 80℃温度截止） 70A (with 80℃ temperature cut-off)	
3.11 重量 3.11 Weight	≤67.0g	
3.12 尺寸 3.12 Dimension	最大直径：21.35mm Max Diameter: 21.35mm 最大高度：70.30mm Max Height: 70.30mm	
3.13 工作温度(电芯表面温度) 3.13 Operating temperature (Cell surface temperature)	充电温度区间：0℃～60℃ Charge Temperature: 0℃～60℃ 放电温度区间：-40℃～80℃ Discharge: -40℃～80℃	
3.14 储存温度 3.14 Storage temperature	1 年 1 year 3 个月 3 months 1 个月 1 month	-20℃ ~ 25℃ -20℃ ~ 45℃ -20℃ ~ 60℃

4.0 电芯尺寸 Cell Dimension

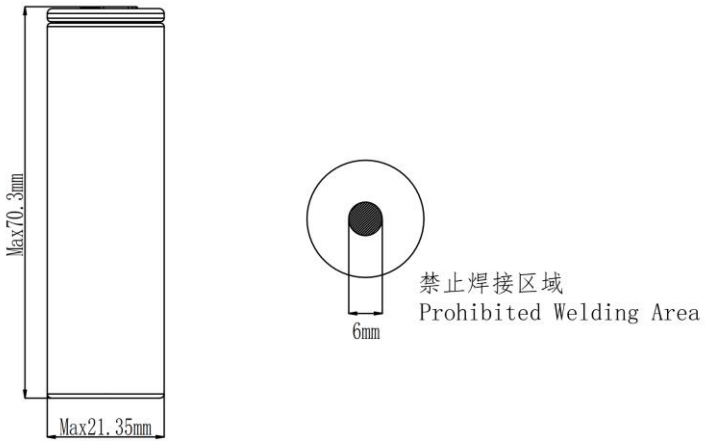

图 1. 电芯尺寸(含套膜) Figure 1. Cell dimension with tube.

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电芯总高小于 70.30mm，电芯直径小于 21.35mm。

The cell height should be less than 70.30mm and the cell diameter should be less than 21.35mm.

5.0 电芯外观 Cell Appearance

电池不应该存在划痕、锈蚀、变色、泄漏等缺陷，影响外观。

Cells shall arrive nominally clean on all visible surfaces. There shall be no defects, such as scratch, rust, discoloration, and liquid leakage, which may adversely affect commercial value of the cell.

6.0 试验条件 Test Conditions

6.1 测试环境 Environmental Conditions

若无特别要求，此规格书上的产品测试时，温度为 25±3℃，湿度为 65%±20%RH。

Unless otherwise specified, all tests stated in this Product Specification are conducted at temperature of 25±3℃ and humidity of 65±20%RH.

6.2 测试设备 Measuring Equipment

6.2.1 充放电设备 Charge and discharge equipment

电压精度：±0.05%F.S

Voltage precision: ±0.05%F.S

电流精度：±0.05%F.S

Current precision: ±0.05%F.S

6.2.2 游标卡尺 Slide caliper

游标卡尺的精度是 0.01mm。

The slide caliper should have 0.01mm scale.

6.2.3 内阻测试仪 Impedance meter

内阻是在 1kHz 交流条件下进行测试。

AC impedance is measured by an impedance meter at 1kHz.

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7.0 特性 Characteristics

7.1 标准充电 Standard Charge

25±3℃下，0.5C (2.5A) 恒流恒压充电到 4.2V，100mA 截止。 Charge: 0.5C(2.5A) CCCV 4.2V, 100mA cut-off, 25±3℃.

7.2 倍率充电 Rate Charge

25±3℃下，1.6C (8A)恒流恒压充电到 4.2V，100mA 截止。 Charge: 1.6C(8A) CCCV 4.2V, 100mA cut-off, 25±3℃.

7.3 快速充电 Fast Charge

25±3℃下，3C(15A)恒流恒压充电到 4.2V，100mA 截止。 Charge: 3C(15A) CCCV 4.2V, 100mA cut-off, 25±3℃.

7.4 15min 阶梯快速充电 15min Stepwise Fast Charge

25±3℃下，10A 充电 2min，16A 充电 3.5min，20A 充电 7min，10A 充电 2.5min，充电到 4.0Ah(80%SOC)，保护电压为 4.2V，充电保护温度为 55℃。 Charge: 25±3℃, Charge at 10A-2min/16A-3.5min/20A-7min/10A-2.5min to 4.0Ah (80%SOC) with 4.20V protection voltage and 55℃ protection temperature.

7.5 标准放电容量 Standard Discharge Capacity

25±3℃下，按照标准充电(0.5C(2.5A)恒流恒压充电到 4.20V，100mA 截止)，搁置 30 分钟，0.2C (1.0A)放电到 2.5V。 Charge: 0.5C(2.5A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 30min, Discharge: 0.2C(1.0A), 2.5V cut-off, 25±3℃.	
放电容量 Discharge Capacity	≥4950mAh

7.6 倍率放电容量 Rate Discharge Capacity

25±3℃下，按照倍率充电 (1.6C(8A)恒流恒压充电到 4.20V，100mA 截止)，搁置 30 分钟，以 1.0/10/20/30/40/50/60/70A 的电流恒流放电 2.5V 或者 80℃截止，记录放电容量。 Charge: 1.6C(8A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 30min. Discharge: 1.0/10/20/30/40/50/60/70A to 2.5V or 80℃ cut-off, 25±3℃.				
放电电流	1.0A	10A	20A	30A

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Discharge Current				
相对容量 Relative Capacity	100%	≥96%	≥96%	≥95%
放电电流 Discharge Current	40A	50A	60A	70A
相对容量 Relative Capacity	≥95%	≥90%	≥60%	≥50%

7.7 放电容量随温度变化特性 Temperature Dependence of Discharge Capacity

25±3℃下，按照倍率充电(1.6C(8A)恒流恒压充电到 4.20V，100mA 截止)，在-20℃/-10℃/0℃/25℃/45℃的条件下恒温 4h，然后以 40A 电流恒流放电至 2.5V 或者 75℃截止，以 25±3℃下 40A 放电容量作为 100%基准。 Charge: 1.6C(8A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 4h at -20℃/ -10℃/ 0℃/ 25℃/ 45℃. Discharge: 40A to 2.5V or 75℃ cut-off. Percentage index of the discharge at 25±3℃ at 40A is 100%.					
放电温度 Discharge Temperature	-20℃	-10℃	0℃	25℃	45℃
相对容量 Relative Capacity	90%	92%	95%	100%	90%

7.8 0℃ +8/-10A 循环寿命 0℃ +8/-10A Cycle Performance

0±3℃下，按照倍率充电(1.6C(8A)充电到 4.20V，100mA 截止)，搁置 30 分钟，10A 恒流放电至 2.5V 或者 75℃截止，循环 200 圈。 Charge: 1.6C(8A) CCCV 4.2V, 100mA cut-off, 0±3℃, rest 30min. Discharge: 10A to 2.5V or 75℃ cut-off, 0±3℃. Cycle 200 times.	
循环 200 圈后剩余容量保留率 200 Cycles Capacity Retention	≥80%

7.9 -10℃ +3/-10A 循环寿命 -10℃ +3/-10A Cycle Performance

-10±3℃下，3A 充电到 4.20V，100mA 截止，搁置 30 分钟，10A 恒流放电至 2.5V 或者 75℃截止，循环 50 圈。(备注：低于 0 度时充电，不能确保循环和安全。) Charge: 3A CCCV 4.2V, 100mA cut-off, -10±3℃, rest 30min.

Discharge: 10A to 2.5V or 75℃ cut-off, -10±3℃. Cycle 50 times. (Remark: we're not responsible for cell cycle life and cell safety when charging the cell below 0℃.)	
循环 50 圈后剩余容量保留率 50 Cycles Capacity Retention	≥80%

7.10 常温+8/-40A 循环寿命 RT +8/-40A Cycle Performance

25±3℃下，按照倍率充电(1.6C(8A)充电到 4.20V，100mA 截止)，搁置 30 分钟，40A 恒流放电至 2.5V 或者 75℃截止，循环 400 圈。 Charge: 1.6C(8A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 30min. Discharge: 40A to 2.5V or 75℃ cut-off, 25±3℃. Cycle 400 times.	
循环 400 圈后剩余容量保留率 400 Cycles Capacity Retention	≥60%

7.11 常温+15/-30A 循环寿命 RT +15/-30A Cycle Performance

25±3℃下，按照快速充电(3C(15A)充电到 4.20V，100mA 截止)，搁置 30 分钟, 30A 恒流放电至 2.5V 或者 75℃截止，循环 400 圈。 Charge: 3C(15A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest 30min. Discharge: 30A to 2.5V or 75℃ cut-off, 25±3℃. Cycle 400 times.	
循环 400 圈后剩余容量保留率 400 Cycles Capacity Retention	≥60%

7.12 存储性能 Storage Characteristic

25±3℃下，按照倍率充电(1.6C (8A)充电到 4.20V，100mA 截止)，60℃搁置 30 天后，以 2.5A 电流恒流放电至 2.5V 的容量为剩余容量；电芯再按照倍率充电(1.6C(8A)模式充电，搁置 10min，以 2.5A 电流恒流放电至 2.5V 的容量为恢复容量；剩余容量/初始容量≥80%，恢复容量/初始容量≥90%。 Charge: 1.6C(8A) CCCV 4.2V, 100mA cut-off, 25±3℃. Storage: 60±3℃, 30 days. Discharge: 2.5A to 2.5V cut-off, 25±3℃, defined as retained capacity. Charge: 1.6C(8A) CCCV 4.2V, 100mA cut-off, 25±3℃, rest for 10min Discharge: 2.5A to 2.5V cut-off, 25±3℃, defined as recovered capacity.	
容量保留率	≥80%

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Retained Capacity/Initial Capacity	
容量恢复率 Recovered Capacity/Initial Capacity	≥90%

7.13 电芯出厂状态 Status of the Cell as of Ex-factory

电芯出货电压范围为 3.46~3.52V。 The cell should be shipped between 3.46V and 3.52V.

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8.0 机械特性 Mechanical Characteristics

8.1 振动测试 Vibration Test

根据UN38.3标准，电池在25±3℃下按照倍率充电（8A充电到4.20V，100mA截止），将电芯用夹具安装在振动台的台面上，沿着电池的径向和轴向进行15min扫频振动（7Hz→200Hz→7Hz），重复12次，共3小时。(扫频振动：以1G的加速度使频率从7Hz上升到18Hz，保持0.8mm的振幅增加频率使加速度达到8G，保持8G的加速度使频率提高到200Hz) 。 According to the UN38.3 standard, the test sample cell is charged at a rate of 8A (8A CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3℃. The cell is then installed on the table of the vibration table with fixtures, and radial and axial vibrations are performed along the cell for 15 minutes (7Hz→200Hz→7Hz) for 12 repetitions, totaling 3 hours. (Sweep vibration: accelerate from 7Hz to 18Hz with an acceleration of 1G, maintain a vibration amplitude of 0.8mm and increase the frequency to achieve an acceleration of 8G, maintain an acceleration of 8G to increase the frequency to 200Hz).	
通过标准： Criteria:	不漏液，电压降小于 10%。 No leakage, with less than 10% of OCV drop.

8.2 自由跌落 Drop Test

根据 IEC62133 标准，电池在 25±3℃下按照倍率充电（8A 充电到 4.20V，100mA 截止），由高度为 1m 的位置从 X、Y、Z 每个方向自由跌落至水泥地面各 1 次。 According to the IEC62133 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3℃, and dropped freely from a height of 1m in each direction (X, Y, Z) to the concrete ground once.	
通过标准： Criteria:	不起火，不爆炸。 No fire, no explosion.

8.3 挤压测试 Crush Test

根据 UL1642 标准，电池在 25±3℃下按照倍率充电（8A 充电到 4.20V，100mA 截止），电池被两个平面内被挤压，用它的圆面平行于挤压装置的平面做挤压测试，直到压力达到 13±1KN，力一旦达到最大值就释放。

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According to the UL1642 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3℃. The cell is then subjected to compression between two flat planes, with its circular face parallel to the plane of the compression device, until the pressure reaches 13±1kN (3000 ±224lbs). Once the force reaches its maximum, it is released.	
通过标准： Criteria:	不起火，不爆炸。 No fire, no explosion.

9.0 安全测试 Safety Test

9.1 2C 6V 过充测试 2C 6V Overcharge Test

根据 IEC62133 标准，电池以 1.0A 电流恒流放电至 2.5V 后，以 10A 的电流过充至 6V，观察 1h。 According to the IEC62133 standard, the test sample cell is discharged to 2.5V at a constant current of 1.0A. The cell is then overcharged at 10A to 6V. The cell is monitored for 1h.	
通过标准： Criteria:	不起火，不爆炸。 No fire, no explosion.

9.2 过放电测试 Forced-Discharge Test

根据 IEC62133 标准，电芯以 1.0A 电流恒流放电至 2.5V 后，以 5.0A 电流恒流放电 90min，观察 1h。 According to the IEC62133 standard, the test sample cell is discharged to 2.5V at a constant current of 1.0A. The cell is then discharged at 5.0A for 90min. The cell is monitored for 1h.	
通过标准： Criteria:	不起火，不爆炸。 No fire, no explosion.

9.3 短路测试 Short-circuit Test

根据 UL1642 标准，电池在 25±3℃下按照倍率充电（8A 充电到 4.20V，100mA 截止），用导线（导线电阻 80±20mΩ）将电池正负极外部短路 10min，观察 1h。 According to the UL1642 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3℃, then short-circuit the positive and negative for 10min with the copper wire (resistance: 80±20mΩ). The cell is monitored for 1h.

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通过标准： Criteria:	不起火，不爆炸。 No fire, no explosion.

9.4 热箱测试 Heating Test

根据 UL1642 标准，电池在 25±3℃下按照倍率充电（8A 充电到 4.20V，100mA 截止），放至恒温箱中，以 5℃/min 的速率升温至 130℃±2℃，保温 10min。 According to the UL1642 standard, the test sample cell is charged at a rate of 8A (CCCV at 8A to 4.20V, with a cutoff of 100mA) at 25±3℃, and then transferred into a circulating air oven. The temperature of the oven is raised at a rate of 5℃ per minute to a temperature of 130℃±2℃ and remain for 10min at that temperature.	
通过标准： Criteria:	不起火，不爆炸。 No fire, no explosion.

10.0 正确使用和处理锂离子电芯说明 Proper Use and Handling of Lithium Ion Cells

使用之前请阅读，江苏睿恩新能源科技有限公司提供

Before using lithium-ion cell, read the document provided by Jiangsu Reliance Energy Tech. Co., Ltd.

10.1 充电 Charge

10.1.1 充电电流 Charge Current

充电电流不得超过本产品规格书中规定的最大充电电流。

Charge current should be less than the maximum value specified in the Specifications.

10.1.2 充电电压 Charge Voltage

充电电压不得超过本标准规格书中规定的充电截止电压。

Charging shall be done by voltage less than that specified in the Specifications.

10.1.3 充电温度 Charge Temperature

电芯必须在指定环境温度范围内才能进行正常充电。当环境温度低于 0℃时，应禁止充电。

Cells shall be charged according to the Temperature Condition specified in the Specifications.

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Charging at subzero temperature shall be prohibited.

10.1.4 充电限制 Prohibition of Charge

禁止对低于电压 1.5V 的单颗应用电芯进行充电。

It is prohibited to charge the cells which are used for single with less than 1.5V voltage.

禁止对电压低于 2.0V 的多串应用电芯进行充电。

It is prohibited to charge the cells which are used for series with less than 2.0V voltage.

10.1.5 禁止反向充电 Prohibition of Reverse Charge

正确连接电芯的正负极，严禁反向充电。若电芯正负极接反，将无法对电芯进行充电。同时，反向充电会降低电芯的充放电性能、安全性，并会导致发热、泄漏。

Reverse charge is prohibited. Cells shall be connected correctly. The polarity has to be confirmed before wiring. If a 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 cell performance and damage the cell safety, and could cause heat generation or leakage.

10.1.6 避免长期浮充 Avoiding Floating Charge

尽量避免长期浮充。

Floating charge (continuous constant voltage control by the end of charging step) for a long term shall be avoided.

10.2 放电 Discharge

10.2.1 放电电流 Discharge Current

放电电流不得超过本规格书规定的最大放电电流，大电流放电会导致电芯容量剧减并导致过热。

The cells shall be discharged at less than the maximum discharge current specified in the Specifications. High discharging current may reduce the discharge capacity significantly or cause

over-heating.

10.2.2 放电温度 Discharge Temperature

电芯必须在规定的温度范围内进行放电。

Cells shall be discharged according to the Temperature Condition specified in the Specifications.

10.2.3 过放电 Over-discharge

需要注意的是，在电芯长期未使用期间，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，电芯应定期充电，将其电压维持在 3.45V 至 3.95V 之间。过放电会导致电芯性能和电芯功能的丧失。

It should be noted that cells would be at an over-discharged status due to self-discharge characteristics if they were not used for a long time. In order to prevent over-discharging, Cells shall be charged periodically to maintain the voltage between 3.45V and 3.95V. Over-discharging may cause the loss of cell performance, characteristics, or battery functions.

10.3 存储 Storage

电芯必须在本产品规格书规定的存贮环境下进行存贮。

The cell should be stored within a range of temperatures specified in the product specification.

在存贮过程中，电压会随着时间下降；容量会随时时间慢慢减少。

During storage, the voltage will drop and the recoverable capacity will be lost little by little with the time.

长时间（超出 3 个月）存贮应该保持电芯电压在 3.45~3.95V 间。

The cell voltage should be kept in the range of 3.45V to 3.95V by charging the cells if the cells are stored more than 3 months.

10.4 循环 Cycle Life

按照规格书中的方法和要求进行电芯充放电，循环数次和容量水平均可达到产品规格书中所

对应的水平。

The cell can be charged/discharged repeatedly up to the cycle life with a certain level of capacity specified in the production specification.

电池寿命取决于充电、放电、使用温度和储存条件。

Cycle life may be determined by conditions of charging, discharging, operating temperature and storage.

10.5 电池和主机对电芯的保护功能要求 Protection Function Requirements for Battery and Host Device

电池和主机应具备下列保护功能，以确保电芯处于安全使用状态：过充电保护；过放电保护；过流保护；过热保护；短路保护。

Battery pack and host device shall be designed with the following protection functions to make sure that the cells would be under safe usage conditions: Over-charge protection; Over-discharge protection; Over current protection; Over-heat protection; Short circuit protection.

10.5.1 过充电保护 Over-charge Protection

主机和充电器的设计必须保证能够承受来自适配器的不确定大电压并防止超过电池承受能力的大电压向电池传播。

The host device and battery pack shall be designed to indefinitely withstand the maximum voltage from the adapter, under a single fault condition, to prevent a cascading failure through the system to the battery pack and/or cell.

10.5.2 过放电保护 Over-discharge Protection

当电池任何一个电芯的电压降至 2.5V 以下时，过放保护功能应启动并停止放电以避免电芯的深度放电。推荐 PCM 的静态电流小于 1.0uA，并具有过放保护功能。该保护功能应实时监控所有电芯。

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When the voltage of any cell in a battery pack is lower than 2.5V, over-discharge protection function shall work and stop discharging to prevent the cells from over-discharge. It is recommended that the dissipation current of PCM shall be less than 1.0uA. The voltage of each cell in a battery pack shall be monitored and current shall be controlled by the PCM at all times.

10.5.3 过流保护 Over-current Protection

当充电电流大于本产品规格书规定的最大过流保护电流时，保护板应截止充电，以避免过大电流向电芯充电。

In case the charge current is over the limitation specified in Specifications, the charging must be cut off. The battery pack shall have at least one over current protection circuitry or devices designed to meet the specification to avoid the cell from becoming charged with current greater than the Specifications.

为了预防单一故障导致的级联失效，主机应该有能无限期承受充电器最大电流的设计。

The host device shall be designed to indefinitely withstand the maximum current from the adapter, under a single fault condition, to prevent a cascading failure through the system to the battery pack and/or cell.

10.5.4 保护电路元件的要求 The Requirements to the Components of Protection Circuit

电芯、元件以及用于电池的材料必须符合最大和最小温度的要求且具备足够的余量。保护电路板的元器件（热敏装置除外）的正常工作温度范围必须在-25℃-+85℃之间。

Cells, components, and materials used in the battery pack shall meet the minimum and maximum temperature requirements with adequate margin. Protection circuit components (excluding thermal devices designed to activate at specific temperatures) shall be applied for a minimum operating range of –25 °C to +85 °C.

10.5.5 过热保护 Over-temperature Protection

无论电芯本身是否具有过热保护装置，电池和主机至少必须包含一个过热保护装置或机构。用于过热保护的热敏元件必须具备一致的温度-电压对应关系，可接受误差应≤±10%。

The battery pack or host device shall contain at least one thermal protection device or mechanism independent of internal cell devices or mechanisms. For a thermistor type temperature protection circuit, all packs of the same model shall have the same voltage to temperature translation (acceptable tolerance no more than ±10%), with consideration for any temperature lag over time.

充放电过程中，电芯温度必须通过过热保护装置（如 PTC、热敏电阻等）实施监控，当电芯温度超过规定温度范围时，主机或电池的保护电路必须终止充/放电。

During charge and discharge, the temperature of the cell shall be monitored. When temperature limitations are exceeded, action shall be taken to mitigate hazards. Action should include shutdown, or disabling of charging, or other protective action. The action may be taken by the battery pack and/or host.

10.5.6 充电时间限制 The Limitation of Charge Time

为防止不正常电芯或组包的出现，应对充电时间予以限制。当充电时间超过了限制时间，主机或电池保护电路必须动作以切断充电。

In order to prevent abnormal cells or battery packs, charge time shall be limited according to the Specifications. When time limitations are exceeded, action shall be taken by the host device or the battery pack to shut down or disable the charging.

10.5.7 预充电功能 Pre-charge Function

当电芯电压低于过放保护电压时，电池保护电路或主机应具备预充电功能，建议充电步骤如下：电池在快速充电之前，应先以一小电流（0.02Cmin mA）预充电~30 分钟，以使（每个）电芯的电压达到 3.0V 以上，再进行快速充电。可用一记时器来实现该预充电步骤。如果在预充电规定时间内，（个别）电芯的电压仍未升到 3.0V 以上，充电器应能够停止下一步快

速充电，并显示该电芯/电池正处于非正常状态。

The system shall not initiate normal charging if the battery voltage is below the over-discharge protection voltage defined in the Specifications. In this case, the system may support a pre-charging function to bring the battery voltage above the required threshold. The recommended pre-charge procedure is as below: the cell battery pack charging shall start with a low current (0.02Cmin mA) for approximately 30 minutes before rapid charging starts. The normal charging shall be started after the（individual）cell voltage has been reached above 3V within approximately 30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) cell voltage does not rise to 3V within the pre-charging time, then the charger shall have functions to stop further charging and display that the cell/pack is at an abnormal state.

10.5.8 主机设计的其它注意事项 The Other Requirements to Main Device Designation

主机设计必须保证防止主机故障向电池蔓延。

If the source of the fault is in the host device, it shall not disable the safety features inside the battery pack(s).

充电系统或主机的任何部分不能使得电池的安全保护功能失效

The charging system, or any part of the host device, shall not disable or override the safety features inside the battery pack(s).

10.6 组包结构设计注意事项 Notice for Designing Battery Pack

10.6.1 组包设计 Pack Design

电池外壳应有足够的机械强度以保证其内部电芯免受机械损伤。

Battery pack should have sufficient strength to make sure the cell inside is protected from mechanical shock.

外壳内安装电芯的部位周围不应有锋利的边角。

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No sharp edge components should be inside the pack containing the battery cells.

电池或主机的设计应为电芯的尺寸公差和产品寿命期间电芯尺寸的变化预留足够的空间。

Allowances shall be made for cell and battery pack dimensional tolerance and changes throughout the product lifetime.

10.6.2 电芯安装 Cell Fixing

电芯不得在壳内活动。

Movement of cell in the battery pack should not be allowed.

防止电芯在电池包装或主机内产生短路:引线与电芯之间要有足够的绝缘层以保证绝对安全。电池壳内不得有任何短路发生隐患，以防止冒烟或着火。

Short circuit of cell in a battery pack or Host Device should not be allowed： Enough insulation layers between wiring and the cell shall be used to maintain extra safety protection. The battery pack or host device shall be structured without any potential short circuit, which may cause generation of smoke or firing.

10.7 运输 Transportation

出货电芯约 30%荷电状态，由于电芯存在自放电，运送到客户端的电芯无法完全保证 30%荷电量。

The cell capacity is approximately at 30% of charging for delivery. It is not specified more than 30% capacity remaining at customer due to self-discharge.

运输过程应防止剧烈振动、冲击、日晒雨淋。

During transportation, keep the cell from severe vibrations, impacts, and exposure to sunlight and rain.

11.0 安全守则 Safety Instruction

锂离子电池使用不当可能会导致泄漏、发热、冒烟、爆炸或火灾，这可能会导致性能下降或

失效，请务必仔细阅读指引。

Inaccurate handling of lithium ion batteries rechargeable battery may cause leakage, heat, smoke, explosion, or fire. This could cause deterioration of performance or failure. Please be sure to follow instructions carefully.

11.1 危险 Danger

11.1.1 使用专用充电器。

Use dedicated charger.

11.1.2 仅在专用应用中使用电池。

Use or charge the battery only in the dedicated application.

11.1.3 不要直接用电源插座给电池充电。

Don't charge the battery by an electric outlet directly.

11.1.4 不要给电池反向充电。

Don't charge the battery reversely.

11.1.5 不要将电池靠近火源或热源。

Don't leave the battery near the fire or a heated source.

11.1.6 不要把电池扔进火里。

Don't throw the battery into the fire.

11.1.7 请勿将电池留在车内或内部温度可能超过 60℃的类似地方充电或使用。

Don't leave, charge or use the battery in a car or similar place where inside of temperature may be over 60℃.

11.1.8 不要将电池浸入水/海水中，也不要将其丢弃或弄湿。

Don't immerse, throw, wet the battery in water / seawater.

11.1.9 不要将电池与钥匙、项链、发夹、硬币或螺丝等金属物品一起存放在口袋或包里。

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Don't store the battery in a pocket or a bag together with metallic objects such as keys, necklaces, hairpins, coins, or screws.

11.10 不要故意用金属物体短路（+）和（-）端子。

Don't short circuit (+) and (-) terminals with metallic object intentionally.

11.11 不要用针、螺丝刀等尖锐物体刺穿电池。

Don't pierce the battery with a sharp object such as a needle, screw drivers.

11.12 不要用烙铁等加热物体加热电池的部分区域。

Don't heat partial area of the battery with heated objects such as soldering iron.

11.13 不要用锤子、重物等重物敲击电芯。

Don't hit with heavy objects such as a hammer, weight.

11.14 不要踩踏电池，也不要将电池扔在坚硬的地板上，以避免机械震动。

Don't step on the battery and throw or drop the battery on the hard floor to avoid mechanical hock.

11.15 不要拆卸电池或修改电池设计，包括电路。

Don't disassemble the battery or modify the battery design including electric circuit.

11.16 不要直接在电池上焊接。

Don't solder on the battery directly.

11.17 不要使用严重刮伤或变形的电池。

Don't use seriously scared or deformed battery.

11.18 不要将电池放入微波炉、烘干机或高压容器中。

Don't put the battery into a microwave oven, dryer ,or high-pressure container.

11.19 请勿将电池与其他制造商的电池、不同类型和/或型号的电池（如干电池、镍氢电池或镍镉电池）一起使用或组装。

Don't use or assemble the battery with other makers' batteries, different types and/or models of

batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries.

11.20 不要将新旧电池一起使用或组装。

Don't use or assemble old and new batteries together.

11.2 警告 Warning

11.2.1 如果电池在使用、充电或储存过程中出现异常发热、异味、变色、变形或检测到异常情况，请停止使用电池。

Stop using the battery if the battery becomes abnormally hot, ordor, discoloration, deformation, or abnormal conditions is detected during use, charge, or storage.

11.2.2 检测到泄漏或恶臭时，应立即远离火源。如果液体漏到皮肤或衣服上，请立即用清水彻底清洗。

Keep away from fire immediately when leakage or foul odors are detected. If liquid leaks onto your skin or cloths, wash well with fresh water immediately.

11.2.3 如果电池泄漏的液体进入眼睛，不要揉眼睛，用清水冲洗，立即去看医生。

If liquid leaking from the battery gets into your eyes, don't rub your eyes and wash them with clean water and go to see a doctor immediately.

11.2.4 如果电池的端子变脏，请在使用电池前用干布擦拭。

If the terminals of the battery become dirty, wipe with a dry cloth before using the battery.

11.2.5 处理电芯前，用适当的绝缘胶带覆盖端子。

Cover terminals with proper insulating tape before disposal.

11.3 注意 Caution

11.3.1 请将电池远离婴儿和儿童，以避免发生任何事故，如吞下。

Keep the battery away from babies and children to avoid any accidents such as swallow.

11.3.2 如果年幼的儿童使用电池，他们的监护人应解释正确的

使用前的处理方法和注意事项。

If younger children use the battery, their guardians should explain the proper handling method and precaution before using.

11.3.3 在使用电池之前，请务必阅读用户手册和操作注意事项。

Before using the battery, be sure to read the user's manual and precaution of its handling.

11.3.4 在使用充电器之前，请务必阅读充电器的用户手册。

Before using charger, be sure to read the user's manual of the charger.

11.3.5 在安装和拆卸电池之前，请务必阅读应用程序的用户手册。

Before installing and removing the battery from application, be sure to read user's manual of the application.

11.3.6 当电池的使用时间比平时短得多时，请更换电池。

Replace the battery when using time of battery becomes much shorter than usual.

11.3.7 在合适处置电芯之前，用绝缘胶带覆盖端子。

Cover terminals with insulating tape before proper disposal.

11.3.8 如果电池需要长期存放，应将电池从应用中取出，存放在湿度和温度较低的地方。

If the battery is needed to be stored for an long period, battery should be removed from the application and stored in a place where humidity and temperature are low.

11.3.9 电池充电、使用和储存时，应远离带有静止充电器的物体。

While the battery is charged, used and stored, keep it away from object materials with static electric chargers.

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联系方式

Contact information

如有任何有关电芯或应用方面的技术疑问和咨询，请按以下地址联系：

If you have any questions regarding the cell and application, please contact the following address:

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