

Model 型号	INR21700/50E	Spec. No. 规格书编号	PBRI-INR21700/50E-D06-52	Version No. 版本	A
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1. Scope (适用范围)

This product specification has been prepared to specify the rechargeable lithium-ion cell to be supplied to customer by EVE Energy CO., LTD.

本产品规格书适用于由惠州亿纬锂能股份有限公司生产的锂离子电芯。

2. Description and Model (基本信息)

2.1 Description (描述) Lithium-ion rechargeable cell (锂离子电芯)

2.2 Model name (型号) INR21700/50E

3. Nominal Specifications (规格参数)

Item 项目	Specification 标准
3.1. Standard Discharge Capacity 标准放电容量	Minimum 4950mAh Nominal 5000mAh 最小容量 4950mAh 标准容量 5000mAh Charge: 1.0A(0.2C), 4.20V, CCCV 0.1A cut-off 充电: 1.0A(0.2C)恒流充电至 4.20V, 恒压充电截止电流 0.1A Discharge: 1.0A(0.2C), 2.50V cut-off 放电: 1.0A(0.2C) 恒流放电至 2.50V 截止 *1C=5.0A
3.2 Nominal Voltage 标称电压	3.65V
3.3 Standard Charge 标准充电	CCCV, 1.0A(0.2C), 4.20±0.05V, 0.1A cut-off 1.0A(0.2C)恒流充电至 4.20±0.05V, 恒压充电截止电流 0.1A
3.4. Maximum Charge 最大充电	CCCV, 10.0A(2.0C), 4.20±0.05V, 0.1A cut-off (not for cycle life) 10.0A(2.0C)恒流充电至 4.20±0.05V, 恒压充电截止电流 0.1A (不用于循环)
3.5 Standard Discharge 标准放电	1.0A(0.2C), 2.50V cut-off 1.0A(0.2C)恒流放电至 2.50V 截止
3.6. Maximum Discharge 最大放电	15.0A(3.0C), 2.50V cut-off (not for cycle life) 15A(3.0C) 恒流放电至 2.50V (不用于循环)
3.7 Charge/Discharge Voltage Range 充电/放电电压区间	4.20~2.50V
3.8 Cell Weight 电池重量	68.0±2.0g
3.9 Cell Dimensions 电芯尺寸	Height: 70.15±0.15mm 高度: 70.15±0.15mm Diameter: 21.15±0.10mm 直径: 21.15±0.10mm

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3.10 Operation Temperature (Cell Surface Temperature) 使用温度范围 (电芯表面温度)	Ambient Temperature Charge: 0 to 45 °C Discharge: -20 to 60°C		环境温度 充电: 0 to 45 °C 放电: -20 to 60°C		
	Charge Temperature: 0 to 60°C (recommended recharge release <45°C) Discharge Temperature: -20 to 70°C (recommended re-discharge release <60°C)		充电温度: 0 to 60°C (建议重新充电温度<45°C) 放电: -20 to 70°C (建议重新放电温度<60°C)		
3.11 Storage Temperature (At Shipping SOC) 存储温度 (出货态 SOC)	1 year	1 年	-20~25°C		
	3 months	3 个月	-20~45°C		
	1 month	1 个月	-20~60°C		

Remark: The Recovery capacity is more than 90% of standard discharge capacity (=4950mAh) after storage at the condition of 3.11.

备注: 在 3.11 条件下储存后, 恢复容量超过标准放电容量 (=4950mAh) 的 90%。

4. Outline Dimensions (外形尺寸)

See the attachment (Fig. 1). (详见附图 1)

5. Appearance (外观)

There shall be no such defects as rust, discoloration, leakage which may adversely affect commercial value of the cell.
电芯不能有生锈、变色、漏液等可能对电芯产生不利影响的缺陷。

6. Standard Test Condition (标准测试条件)

6.1. Environment Condition (环境条件)

Unless otherwise specified, all tests stated in this specification are conducted at temperature 25±2°C and humidity under 65% 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°C, 湿度: <65% RH。

6.2. Measuring Equipment (测量设备)

(1) Amp-meter and Volt-meter (电流表和电压表)

The amp-meter and volt-meter should have an accuracy of the grade 0.5mA and 0.5mV or higher.
电流表和电压表的精度应分别为 0.5mA 和 0.5mV 或以上。

(2) Slide Caliper (游标卡尺)

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The slide caliper should have 0.01mm scale.

游标卡尺的测试精度应为 0.01mm。

(3) Impedance Meter (电压内阻测试仪)

The impedance meter with AC 1 KHz should be used.

使用频率为1KHz的电压内阻测试仪。

7. Charging Method (充电方法)

7.1. Standard Charge (标准充电)

Standard Charge means charging the cell CCCV with charge current 1.0A (0.2C), constant voltage 4.20V and 0.1A cut-off in CV mode at 25°C for capacity.

标准充电即在环境温度为 25°C 的条件下, 先以恒定电流 1.0A (0.2C) 充电至 4.20V, 然后恒压充电至电流小于 0.1A。

7.2. Maximum Charge (最大充电)

Maximum Charge means charging the cell CCCV with charge current 10.0A (2.0C), constant voltage 4.20V and 0.1A cut-off in CV mode at 25°C.

最大充电即在环境温度为 25°C 的条件下, 先以恒定电流 10.0A (2.0C) 充电至 4.20V, 然后恒压充电至电流小于 0.1A。

8. Electrical Characteristics (电性能)

Item 项目	Test Condition 测试条件	Criteria 检验标准
8.1. Standard Discharge Capacity (标准放电容量)	The Standard Discharge Capacity is measured with discharge current of 1.0A (0.2C) and cut-off voltage of 2.50V at 25°C after the standard charge. Referring IEC61960 Standard. 标准放电容量即电芯在 25°C下按照标准充电方式充满电, 然后以 1.0A (0.2C) 放电至 2.50V 截止的容量。 (参考 IEC61960 标准)	Standard Discharge Capacity ≥ 4950mAh 标称容量 ≥ 4950mAh
8.2. Initial Internal Impedance (内阻)	Initial Internal Impedance is measured at AC 1KHz at shipping SOC. 使用频率为 AC 1KHz 的电压内阻测试仪测量出货态电芯的内阻。	Initial Internal Impedance ≤ 18mΩ 内阻 ≤ 18 mΩ

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8.3. Discharge Rate Capabilities (倍率放电性能)	<p>Discharge Capacity is measured with the various currents in the following table and 2.50V cut-off after the standard charge, rest 30min between charge and discharge.</p> <p>Note: Relative capacity is divided by standard discharge capacity at 25°C (=4950mAh). 电芯按标准充电方式充电后，以不同的放电电流恒流放电至 2.50V 截止电压，充电放电中间静置 30min。 注释：相对容量是电芯在 25°C 时不同电流放电容量除以标准放电时容量 (=4950mAh)。</p>	Item 项目	Discharge Condition 放电条件				
		Current 电流 (A)	1	2.5	5	10	15
		Rate 倍率(C)	0.2	0.5	1.0	2.0	3.0
		Relative Capacity 相对容量(%)	100	≥97	≥95	≥93	≥90
8.4. Temperature Dependence of Discharge Capacity (不同温度放电性能)	<p>Capacity comparison at each temperature, measured after storage at the test environment according to the below table with discharge constant current 1.0A(0.2C) and 2.50V cut-off after the standard charge at 25°C.</p> <p>Note: Relative capacity is divided by standard discharge capacity at 25°C (=4950mAh). 电芯在 25°C 环境下按标准充电方式充电后，在不同温度搁置 4h 后以 1.0A(0.2C) 恒流放电至 2.50V 截止电压。 注释：相对容量是电芯在 25°C 时不同电流放电容量除以标准放电时容量 (=4950mAh)。</p>	Item 项目	Discharge Temperature 放电温度				
		Temperature 温度(°C)	-20	25		55	
		Storage Time 存储时间(h)	4	4		4	
		Relative Capacity 相对容量(%)	≥70	100		≥95	
8.5. Cycle Life (循环寿命)	<p>①Charge: 2.5A(0.5C), 4.20V, 0.25A cut-off. Discharge: 5A(1C) discharge, 3.00V cut-off Rest Time: 10min after charge and 30min after discharge. Capacity after 1000 cycles. 充电：2.5A(0.5C), 4.20V, 0.25A 截止 放电：5A(1C)放电，3.00V 截止 搁置时间：充电后搁置 10min，放电后搁置 30min 循环 1000 次</p>	<p>Capacity ≥70% C_i Note: C_i: the first discharge capacity of cycle life test. 1000 周循环容量≥70%C_i; C_i: 循环第 1 周的放电容量</p>					

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		②Charge: 5A(1C), 4.20V, 0.25A cut-off. Discharge: 5A(1C) discharge, 3.00V cut-off Rest Time: 10min after charge and 30min after discharge. Capacity after 500 cycles. 充电: 5A(1C), 4.20V, 0.25A 截止 放电: 5A(1C)放电, 3.00V 截止 搁置时间: 充电后搁置 10min, 放电后搁置 30min 循环 500 次		Capacity $\geq 70\% C_i$ Note: C_i : the first discharge capacity of cycle life test. 500 周循环容量 $\geq 70\% C_i$ C_i : 循环第 1 周的放电容量							
8.6. Storage Characteristic (存储性能)		Recovery Capacity: The capacity of standard discharge of three times cycles after fully standard charged storage at condition as follows. 恢复容量: 电芯充满电后, 在以下条件下存储后标准放电容量 (循环 3 次)。 25°C存储 28 天; 55°C存储 7 天。		Recovery Ratio= Recovery Capacity/ Standard Discharge Capacity (=4950mAh)*100% 容量恢复率=恢复容量/标准放电容量 (=4950mAh) *100%							
				<table border="1"> <thead> <tr> <th>Item 项目</th> <th>Recovery Ratio 容量恢复率</th> </tr> </thead> <tbody> <tr> <td>25°C 28Days 25°C存储 28 天</td> <td>$\geq 4455\text{mAh}$ (标准放电容量 (4950mAh) 的 90%)</td> </tr> <tr> <td>55°C 7Days 55°C存储 7 天</td> <td>$\geq 4455\text{mAh}$ (标准放电容量 (4950mAh) 的 90%)</td> </tr> </tbody> </table>	Item 项目	Recovery Ratio 容量恢复率	25°C 28Days 25°C存储 28 天	$\geq 4455\text{mAh}$ (标准放电容量 (4950mAh) 的 90%)	55°C 7Days 55°C存储 7 天	$\geq 4455\text{mAh}$ (标准放电容量 (4950mAh) 的 90%)	
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55°C 7Days 55°C存储 7 天	$\geq 4455\text{mAh}$ (标准放电容量 (4950mAh) 的 90%)										

9. Mechanical Characteristics (机械性能)

Item 项目	Test Method 测试方法	Criteria 检验标准
9.1. Free Fall Test (跌落测试)	Each fully charged cell is dropped three times from a height of 1.0m onto a concrete floor. The cells are dropped so as to obtain impacts in random orientations. After the test, the cells shall be put on rest for 1h and then a visual inspection shall be performed. Free fall test is according to the IEC62133 standard. 充满电的电芯从 1.0m 的高度以随机的方向跌落至水泥地板 3 次, 实验后放置至少 1h 后进行外观检查。 (跌落测试按照 IEC62133 标准进行)	No fire, no explosion. 电芯不起火, 不爆炸

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9.2. Vibration Test (振动测试)	<p>For X and Y axis with cylindrical cell 7Hz→200Hz→7Hz for 15min , repetition 12 times totally 3 hours, the acceleration 1g during 7 to 18Hz, then amplitude 1.6mm and maximum 8g up to 200Hz.</p> <p>Vibration test is according to the UN38.3 standard.</p> <p>充满电的电芯固定在振动台上，振动频率由7Hz增加到200Hz然后再降到7Hz的时间为15分钟，重复12次，总计3h。从7Hz开始保持1g的加速度直到频率达到18Hz，保持8g的加速度（振幅1.6mm），直到频率达到200 Hz。</p> <p>(振动测试按照 UN38.3 标准进行)</p>			<p>No fire, no explosion, no leakage, with less than 10% of OCV drop.</p> <p>电芯不起火、不爆炸、不漏液，电压下降小于 10%</p>	

10. Safety (安全性能)

Item 项目	Test Method 测试方法	Criteria 检验标准
10.1. Overcharge Test (过充测试)	<p>Fully standard discharged cell is charged with 4.6V and 15.0A (3C) for 7h .</p> <p>Overcharge test is according to the UL1642 standards.</p> <p>先将电芯以标准放电方式放电至截止电压，然后将电芯正负极连接于恒压电源，对电芯以 15.0A(3C)充电，直到电压不低于 4.6V，持续充电 7h。</p> <p>(过充测试按照 UL1642 标准执行)</p>	<p>No fire, no explosion.</p> <p>电芯不起火，不爆炸</p>
10.2. External Short-circuit Test (短路测试)	<p>Fully standard charged cell is to be short-circuited by connecting the positive and negative terminals of the cell with a circuit load having are resistance load of $80\pm 20\text{m}\Omega$ at $55\pm 5^\circ\text{C}$. The cell remains on test for 24h or until the surface temperature declines by 20% of the maximum temperature rise, whichever is the sooner.</p> <p>External short-circuit test is according to the IEC62133 standard.</p> <p>电芯按标准充电方式充满电后，在 $55\pm 5^\circ\text{C}$ 环境下，用一外部电阻 $80\pm 20\text{m}\Omega$ 的导线连接电芯正负极端，使其外部短路，直到测试时间持续到 24h 或者电芯表面温度低于最高温度 20%。</p> <p>(短路测试按照 IEC62133 标准进行)</p>	<p>No fire, no explosion.</p> <p>电芯不起火，不爆炸</p>
10.3. Forced Discharge Test (过 放测试)	<p>A discharged cell is subjected to a reverse charge at 5.0A (1C) for 90 min.</p> <p>Forced discharge test is according to the IEC62133 standard.</p> <p>先将电芯以标准放电方式放电至截止电压，然后以 5.0A(1C)强制放电 90min。</p> <p>(过放测试按照 IEC62133 标准进行)</p>	<p>No fire, no explosion.</p> <p>电芯不起火，不爆炸</p>
10.4. Heating Test (热冲击测试)	<p>To heat up the standard charged cell at heating rate 5°C per minute up to 130°C and keep the cell in oven for 10 minutes.</p>	<p>No fire, no explosion.</p> <p>电芯不起火，不爆炸</p>

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Attachment (附件) :

Fig 1 (图 1) :

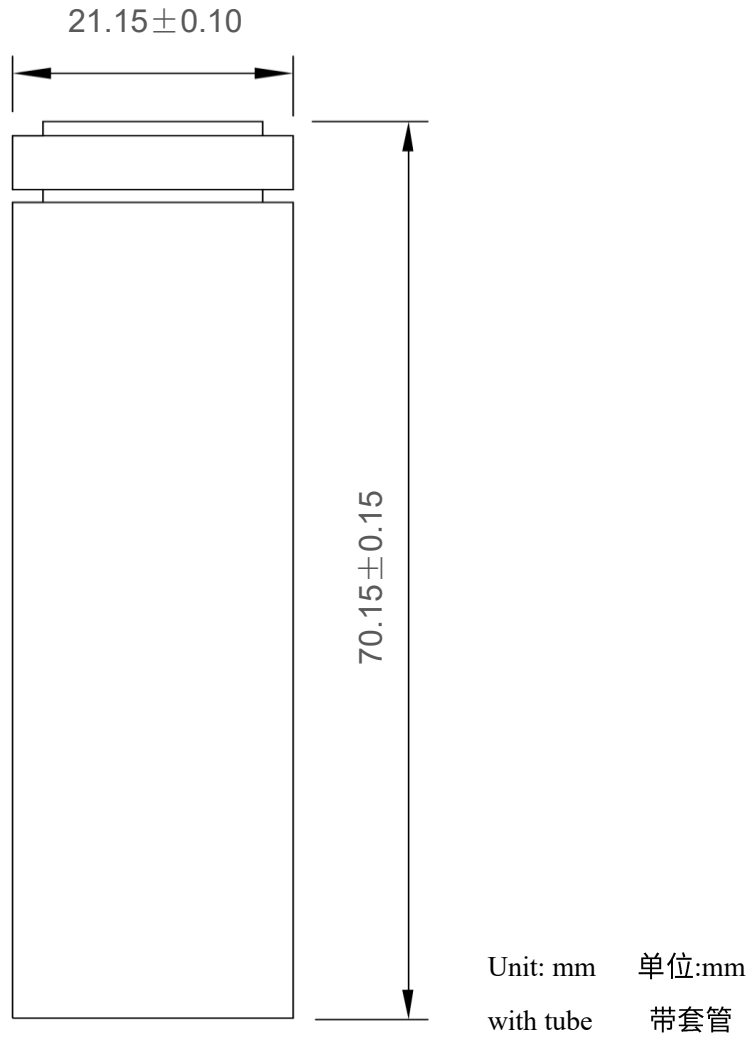


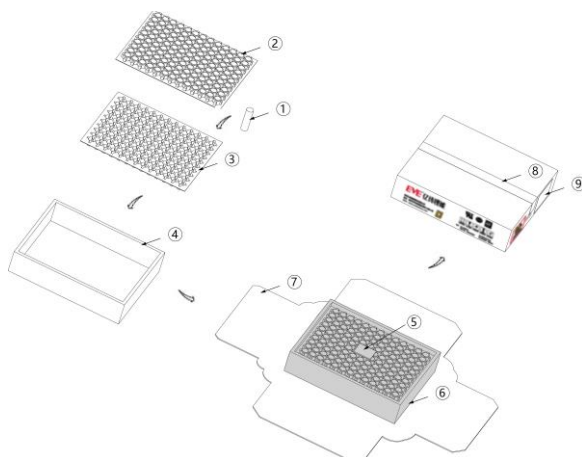
Fig. 1. Outline Dimensions of INR21700/50E

图 1.INR21700/50E 外形尺寸

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Attachment (附件) :

Fig. 2 (图 2) :



NO. 序号	Part Name 部件名称	Material 材料	Q'Ty 单位
1	Cell 电池型号	INR21700/50E	130pcs/box
2	Blister upper cover 上吸塑	PP 聚丙烯	1 pcs/box
3	Blister lower cover 下吸塑	PP 聚丙烯	1 pcs/box
4	Inner box 内盒	K3K Single Wall 瓦楞纸	1 pcs/box
5	Silica Gel 干燥剂	Silica Gel 硅胶	1 pcs/box
6	PE Bag/POF 防水袋/热缩膜	PE/POF 聚乙烯/多层共挤聚烯烃热收缩膜	1 pcs/box
7	Outer box 外箱	H=H Double Wall 双坑瓦楞纸	1 pcs/box
8	Tape 胶带	PE 聚乙烯	0.01rol/box
9	Label 产品标签	Art Paper 铜版纸	1 pcs/box