

Model 型号	INR21700/40PL	Spec. No. 规格书编号	PBRI-INR21700/40PL-D06-02	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) INR21700/40PL

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 4000mAh 最小容量 4000mAh Charge: 2.0A(0.5C), 4.20V, CCCV 0.1A cut-off 充电: 2.0A(0.5C)恒流充电至 4.20V, 恒压充电截止电流 0.1A Discharge: 0.8A(0.2C), 2.50V cut-off 放电: 0.8A(0.2C) 恒流放电至 2.50V 截止 *1C=4.0A	
3.2. Nominal Voltage 标称电压	3.60V	
3.3. Standard Charge 标准充电	CCCV, 2.0A(0.5C), 4.20±0.05V, 0.1A cut-off 2.0A(0.5C)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, 8A(2.0C), 4.20±0.05V, 0.1A cut-off 8A(2.0C)恒流充电至 4.20±0.05V, 恒压充电截止电流 0.1A	
3.5. Standard Discharge 标准放电	0.8A(0.2C), 2.50V cut-off 0.8A(0.2C)恒流放电至 2.50V 截止	
3.6. Maximum Discharge 最大放电	70A(17.5C), 2.50V cut-off	T _{Recommended} :75°C
	70A(17.5C)恒流放电至 2.50V	T _{max} :80°C
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	67.0g Max	最大 67.0g
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 80°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 80°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 3 months 3 个月 1 month 1 个月	-20~25°C -20~45°C -20~60°C			

Remark: The Recovery capacity is more than 90% of standard discharge capacity (=4000mAh) 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 (=4000mAh) 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)

The slide caliper should have 0.01mm scale.

游标卡尺的测试精度应为 0.01mm。

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(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 2.0A (0.5C), 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 2.0A (0.5C) 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 8.0A (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 8.0A (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 0.8A (0.2C) and 2.50V cut-off 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 0.8A (0.2C) 放电至 2.50V 截止的容量。 (参考 IEC61960 标准)	Standard Discharge Capacity ≥ 4000mAh 标准放电容量 ≥ 4000mAh
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 ≤ 5mΩ 内阻 ≤ 5mΩ

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8.3. Discharge Rate Capabilities (倍率放电性能)	Discharge capacity is measured with the various currents in the following table and 2.50V cut-off after the standard charge at 25°C. Note: Relative capacity is divided by the 10A discharge capacity at 25°C. 电芯在 25°C 下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。 注释：相对容量是电芯在 25°C 时不同电流放电容量除以 10A 时放电容量。	Item 项目	Discharge Condition 放电条件				
		Current 电流 (A)	0.8	10	30	40	
		Rate 倍率(C)	0.2	2.5	7.5	10.0	
		Relative Capacity 相对容量(%)	≥100	100	≥95	≥95	
8.4. Temperature Dependence of Discharge Capacity (不同温度放电性能)	Capacity comparison at each temperature, measured after 3 hours storage at the test environment with discharge constant current 10A (2.5C) and 2.50V cut-off after the standard charge at 25°C. Note: Relative capacity is divided by the 10A discharge capacity at 25°C. 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 3h 后以 10A(2.5C) 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 10A 时放电容量。	Item 项目	Discharge Temperature 放电温度				
		Temperature 温度(°C)	-20	-10	0	25	60
		Storage Time 存储时间(h)	3	3	3	3	3
		Relative Capacity 相对容量(%)	≥60	≥75	≥80	100	≥90
8.5. Cycle Life (循环寿命)	Charge: 6A(1.5C), 4.20V, 0.1A cut-off. Discharge: 40A(10.0C) discharge, 2.50V or 75°C cut-off. Rest Time: 10min after charge and 30min after discharge. Capacity after 400 cycles. 充电：6A(1.5C), 4.20V, 0.1A 截止 放电：40A(10.0C) 放电，2.50V 或 75°C 截止 搁置时间：充电后搁置 10min，放电后搁置 30min 循环 400 次	Capacity ≥60% C _i Note: C _i : the first discharge capacity of cycle life test at 25±2°C. 400 周循环容量 ≥60% C _i C _i : 25±2°C 时循环第 1 周的放电容量					

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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. After storage for 30days at 60°C. 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）。 60°C存储30天。		Recovery Capacity \geq 3600mAh (90% of Standard Discharge Capacity(=4000mAh)) 恢复容量 \geq 3600mAh（标准放电容量（4000mAh）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
9.2. Vibration Test (振动测试)	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. Vibration test is according to the UN38.3 standard. 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。 (振动测试按照 UN38.3 标准进行)	No fire, no explosion, no leakage, with less than 10% of OCV drop. 电芯不起火、不爆炸、不漏液, 电压下降小于 10%

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)	Fully standard discharged cell is charged with 4.6V and 12.0A (3C) for 7h. Overcharge test is according to the UL1642 standards. 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 12.0A(3C)充电, 直到电压不低于 4.6V, 持续充电 7h。 (过充测试按照 UL1642 标准执行)	No fire, no explosion. 电芯不起火, 不爆炸

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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. 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 4.0A (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 4.0A(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. 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>Heating test is according to the UL1642 standard.</p> <p>将电芯放置于电热鼓风干燥箱中，以 $5^\circ\text{C}/\text{min}$ 的速率由室温升至 130°C 并保持 10min。</p> <p>(热冲击测试按照 UL1642 标准进行)</p>			<p>No fire, no explosion. 电芯不起火，不爆炸</p>	
10.5. Low Pressure Test (低气压测试)	<p>Fully standard charged cell is to be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature.</p> <p>Low pressure test is according to the UN38.3 standards.</p> <p>电芯按标准充电方式充电后，电芯在绝对压力为 11.6kPa，温度为室温条件下贮存 6 小时。</p> <p>(低气压测试按照 UN38.3 标准执行)</p>			<p>No fire, no explosion and no leakage with less than 10% of OCV drop. 电芯不起火、不爆炸、不漏液，电压下降小于 10%</p>	

11. Status of the Cell as of Ex-factory (电芯出厂状态)

The cell should be shipped in 3.450V to 3.600V charging voltage range.

电芯运输时电压应在 3.450V 至 3.600V 范围内。

12. Warranty (质量保证)

The warranty period of cells are made according to business contract. However, even though the problem occurs within this period, EVE won't replace a new cell for free as long as the problem is not due to the failure of EVE manufacturing process or is due to customer's abuse or misuse.

自出货之日起，电芯的保质期限依合同而定。但是，在此期限内，若非 EVE 的制程原因，而是客户的误用造成的电芯质量问题，EVE 不承诺免费更换。

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Attachment (附件) :

Fig 1 (图 1) :

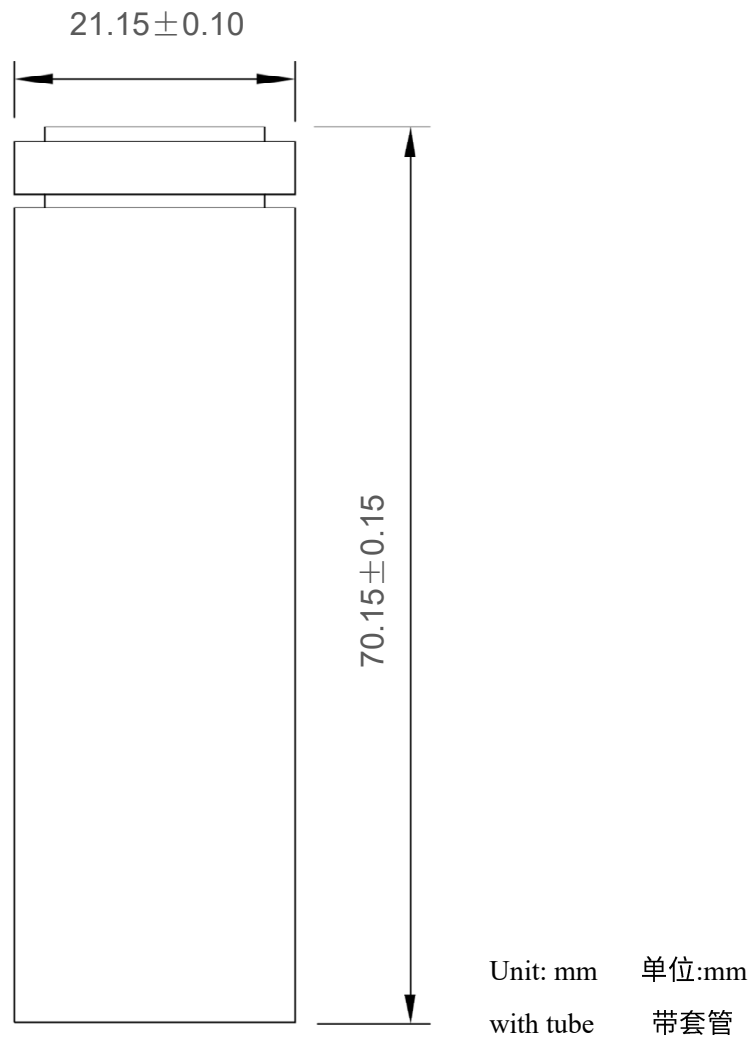


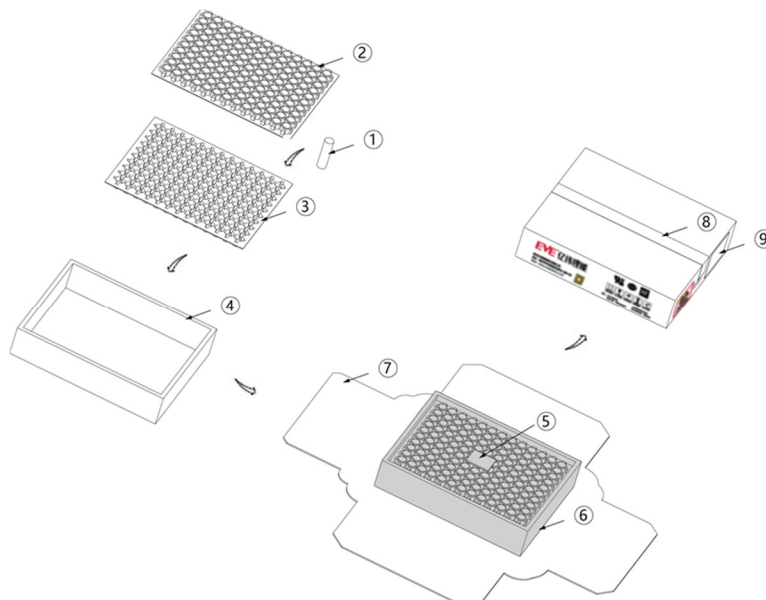
Fig. 1. Outline Dimensions of INR21700/40PL

图 1. INR21700/40PL 外形尺寸

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Attachment (附件) :

Fig 2 (图 2) :



NO.	Part Name 部件名称	Material 材料	Q'Ty 单位
1	Cell 电芯	型号 INR21700/40PL	130 pcs/box
2	Blister upper cover 吸塑上盖	PP 聚丙烯	1 pcs/box
3	Blister lower cover 吸塑下盖	PP 聚丙烯	1 pcs/box
4	Inner box 内箱	K3K Single Wall 单坑瓦楞纸	1 pcs/box
5	Silica Gel 硅胶	Silica Gel 硅胶	1 pcs/box
6	PE Bag 聚乙烯袋	PE 聚乙烯	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	0.01 rol/box
9	Label 标签	Art Paper 铜版纸	1 pcs/box