

# 圆柱型锂离子电芯规格书

## SPECIFICATION OF PRODUCT

for Rechargeable Lifepo4 Cell

电芯型号：IFR32700

Model：IFR32700

	Signature签名	Date日期
Customer		
Approval	Company Name: 公司名称 :	
客户认同	Company Stamp: 公司印章 :	

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## 1. Scope 适用范围

This specification is applicable to cylindrical lithium-ion batteries which are produced by GEB

本规格书适用于由深圳市中美通用科技有限公司生产的圆柱型锂离子电芯。

## 2. Description and Model 型号及说明

2.1 Description 说明 Cell(Cylindrical Lithium-ion battery) 圆柱型锂离子电芯

2.2 Model 电芯型号 IFR32700

2.3 Product specification code 产品规格代码 R1

2.4 Production Address 生产地址 Guangdong Province, China

## 3. Nominal Specification 常规特性

NO. 序号	ITEMS 项目	SPECIFICATION 参数
3.1	Nominal capacity 标称容量	6000 mAh@0.5C (Discharge the cell from 3.65V to 2.0V by 0.5C current) (电芯以 0.5C 从 3.65V 放电至 2.0V)
3.2	Minimum Capacity 最小容量	6000mAh@0.5C (Discharge the cell from 3.65V to 2.0V by 0.5C current) (电芯以 0.5C 从 3.65V 放电至 2.0V)
3.3	Nominal Voltage 标称电压	3.2V
3.4	Charging Voltage 充电电压	3.65 ±0.05 V
3.5	Charging Method 充电方式	CC-CV (3000mA, 3.65V, 300mA cut-off) 恒流恒压充电 (电芯以 3000mA 恒流充电至 3.65V 转 恒压充电, 截止电流 300mA)
3.6	Standard Charge Current 标准充电电流	0.5 C(3000 mA)
3.7	Discharge Cut-off Voltage 放电终止电压	2.0 ± 0.05 V
3.8	Standard Discharge Current 标准放电电流	0.5C(3000mA)
3.9	Operating Temperature (Cell Surface Temperature) working temperature 工作温度 (电芯表面温度)	Charge 充电时: 0 to 50°C Discharge 放电时: -20 to 55°C
3.10	AC Internal Resistance 内阻	< 8 mΩ(ACIR)

3.11	Energy Density 能量密度	> 133Wh/kg
3.12	Weight 重量	≤ 141 g
3.13	Cell Dimension 电芯尺寸	Height (高度) : 70.8mm±0.20 mm Diameter (直径) : 32.5 mm±0.20 mm
3.14	Storage Temperature 存储温度	-20~45 °C
3.15	最大持续充电电流 Maximum Continuous Charging Current	≤ 1C(0~60 °C)
3.16	最大持续放电电流 Maximum continuous discharge current	≤ 3C (-20~60 °C)

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#### 4. Appearance 外观

There are no obvious scratches, pits, cracks, rusts and leaks in the appearance of the battery, which have bad effect for battery performance.

电芯外观不存在明显的刮痕、凹坑、裂痕、锈蚀、漏液等影响电池性能的外观不良。

#### 5. Standard Test Conditions 标准试验条件

##### 5.1 Environmental Conditions

Unless otherwise specified, all tests stated in this specification are conducted at temperature  $25\pm 5^{\circ}\text{C}$  and humidity  $65\pm 20\%$ .

Unless otherwise specified, the environmental conditions required for all tests are as follows: temperature:  $25\pm 5^{\circ}\text{C}$ , humidity:  $65\pm 20\%$ .

除非有特殊说明，所有测试的环境条件要求如下，温度： $25\pm 5^{\circ}\text{C}$ 、湿度： $65\pm 20\%$ 。

##### 5.2 Measuring Instrument Requirements 测量仪表要求

The voltage and current measurement device accuracy grade : 0.5mV and 0.5mA or higher (better)

电压、电流测量仪器精度等级：不低于 0.5mV 和 0.5mA

AC Impedance meter : 1KHz

交流阻抗仪测量频率：1KHz

Temperature meter precision :  $\leq 0.5^{\circ}\text{C}$

温度测试仪精度： $\leq 0.5^{\circ}\text{C}$

Slide caliper : 0.01mm

游标卡尺精度：0.01mm

Electronic scale : 0.1g

电子秤精度：0.1g

#### 6. Characteristics 特性

##### 6.1 Standard Charge 标准充电

This "Standard Charge" means charging the cell with charge current of 0.5C(3000mA) and constant voltage 3.65V at  $25^{\circ}\text{C}$ , 0.05C(300mA) cut-off.

标准充电指电芯在  $25^{\circ}\text{C}$  环境下以 0.5C(3000mA) 电流恒流充电至 3.65V 转恒压充电，恒压充电的截止电流为 0.05C(300mA)。

##### 6.2 Standard Discharge Capacity 标准放电容量

The standard discharge capacity is the initial discharge capacity of the cell, which is measured with discharge current of 0.5C (3000mA) with 2.0V cut-off at  $25^{\circ}\text{C}$  within 2hour after the standard charge.

标准放电容量是电芯在  $25^{\circ}\text{C}$  环境下，标准充电完成后 2 小时内以 0.5C(3000mA) 电流放电至 2.0V。

Standard Discharge Capacity  $\geq 6000\text{mAh}$  标准放电容量  $\geq 6000\text{mAh}$

### 6.3 Initial Internal Impedance 内阻

Initial internal impedance measured at AC 1kHz after Standard charge. 电芯在标准充电后用 1k HZ 交流内阻测试仪测试。

Initial Internal Impedance < 8mΩ 初始内阻 < 8mΩ

### 6.4 Temperature Dependence of Discharge Capacity 不同温度下的放电容量

Discharge capacity comparison at each temperature, measured with discharge constant current 0.5C(3000mA) and 2.0V cut-off with follow temperature after the standard charging at 25°C. (Constant current discharge to 1.6V cut-off at -20°C)

电芯在 25°C 环境下标准充电后, 在下列温度下以 0.5C(3000mA) 电流放电至 2.0V, 对比各个温度下的放电容量。(备注: -10 度放电至 1.6V)

Charge Temperature	Discharge Temperature		
	-10°C	25°C	55°C
25°C			
Relative Capacity	≥65%	100%	≥90%

Note: If charge temperature and discharge temperature is not the same, the interval for temperature change is 2 hours.

备注: 如果充电温度和放电温度不同, 温度变化的间隔时间是 2 小时。

### 6.5 Temperature Dependence of Charge Capacity 不同温度下的充电容量

Capacity comparison at each temperature, measured with discharge constant current 0.5C(3000mA) and 2.0V cut-off at 25°C after the standard charge is as follow temperature.

电芯在下列温度下标准充电后, 以 0.5C(3000mA) 电流放电至 2.0V, 对比各个温度下的放电容量。

	Charge temperature				Discharge temperature
	0°C	10°C	25°C	45°C	
Relative Capacity	≥85%	≥90%	100%	≥90%	25°C

### 6.6 Charge Rate Capabilities 倍率充电

Discharge capacity is measured with constant current 0.5C(3000mA) and 2.0V cut-off after the cell is charged with 3.65V at 25°C as follows.

电芯在 25°C 环境下以下列方式充电至 3.65V, 再以 0.5C (3000mA) 电流恒流放电至 2.0V, 对比放电容量。

	Charge Condition				
Current	0.2C 1200mA	0.33C 1980mA	0.5C 3000mA	0.7C 4200mA	1C 6000mA
Cut-off	0.05C	0.05C	0.05C	0.05C	0.05C
Relative Capacity	≥95%	≥95%	100%	≥95%	≥95%

### 6.7 Discharge Rate Capabilities 倍率放电

Discharge capacity is measured with the various currents in under table and 2.0V cut-off after the Standard charge at 25°C.

电芯在 25°C 环境下标准充电后，以下表中的不同电流放电至 2.0V 的放电容量。

	Discharge Condition			
Current	0.5C(3000mA)	1C(6000mA)	2C(12000mAh)	3C(18000mA)
Relative Capacity	100%	≥95%	≥90%	≥85%

### 6.8 Cycle Life 循环寿命

Each cell is charged in accordance with 6.1, and stored for 30 minutes, then discharged to cut-off voltage 2.0V at a constant current of 1C(4000mA), after that, stored 30 minutes prior to next charge/discharge cycle. The cell shall be continuously charged and discharged for 1500 times. Capacity retention rate ≥80%.

电芯按 6.1 规定充电结束后，而后搁置 30min，然后以 1C(6000mA) 电流放电至终止电压 2.0V，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 2000 次。

After 2000 cycles, Capacity Retention = Cap(2000th)/Cap(Av10)90%

2000 次循环后，容量保持率 90%。

### 6.9 Storage Characteristics 1 存储特性 1

Capacity after storage for 7 days at 55±2 °C after the Standard charged measured with discharge current 0.5C(3000mA) with 2.0V cut-off at 25°C.

电芯标准充电后，在 55±2 °C 环境下存储 7 天，然后在 25°C 环境下以 0.5C(3000mA) 放电至 2.0V 测试容量保持率和恢复率。

$$\text{Capacity retention} = \frac{\text{Residual capacity after the storage}}{\text{Initial Capacity}} \geq 85\%$$

$$\text{容量保持率} = \frac{\text{存储后剩余容量}}{\text{初始容量}} \geq 85\%$$

$$\text{Capacity recovery} = \frac{\text{Recovery capacity after the storage}}{\text{Initial Capacity}} \geq 90\%$$

$$\text{容量恢复率} = \frac{\text{存储后恢复容量}}{\text{初始容量}} \geq 90\%$$

## 6.10 Storage Characteristics 2 存储特性 2

Capacity after storage for 28 days at 25±2 °C after the Standard charged measured with discharge current 0.5C(3000mA) with 2.0V cut-off at 25°C.

电芯标准充电后，在 25±2 °C环境下存储 28 天，然后在 25°C环境下以 0.5C(3000mA)放电至 2.0V 测试容量保持率和恢复率。

$$\text{Capacity retention} = \frac{\text{Residual capacity after the storage}}{\text{Initial Capacity}} \geq 85\%$$

$$\text{容量保持率} = \frac{\text{存储后剩余容量}}{\text{初始容量}} \geq 85\%$$

$$\text{Capacity recovery} = \frac{\text{Recovery capacity after the storage}}{\text{Initial Capacity}} \geq 90\%$$

$$\text{容量恢复率} = \frac{\text{存储后恢复容量}}{\text{初始容量}} \geq 90\%$$

## 6.11 Storage Characteristics 3 存储特性 3

After standard battery charging, the battery is put down for 30min at 25 °C and stored for 28 days at 45±2 °C. After being shelved for 5H at 25 °C, the battery is charged in a standard way, and then the capacity recovery rate is tested by discharging from 0.5C(3000mA) to 2.0v.

电芯标准充电后在 25°C环境下放电 30min，在 45±2 °C环境下存储 28 天，然后在 25°C环境下搁置 5H 后以标准方式充电，然后以 0.5C(3000mA)放电至 2.0V 测试容量恢复率。

$$\text{Capacity recovery} = \frac{\text{Recovery capacity after the storage}}{\text{Initial Capacity}} \geq 90\%$$

$$\text{容量恢复率} = \frac{\text{存储后恢复容量}}{\text{初始容量}} \geq 90\%$$

## 6.12 Status of the cell as of ex-factory 电芯出厂状态

The cell should be shipped in 3.20V ~ 3.25V Charging voltage range.

电芯应该在 3.20V ~ 3.25V 电压范围内运输。

## 7. Safety 安全性能

All below tests are carried out on the equipment with forced ventilation and explosion-proof device. Before test, all cells should be charged in accordance with 6.1, and stored 24 hours 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 6.1 规定标准充电方式充电，并搁置 24h 后，再进行以下试验。

Test Item 测试项目	Test Method 测试方法	Test Criteria 测试标准
7.1 Crush Test 挤压测试	A cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cells and the crushing is to be continued until an applied force of	No explosion, no fire 不起火、不爆炸

		<p>13±1 KN is reached. Once the maximum force has been obtained is to be released.</p> <p>将电芯置于两个挤压平面之间，用液压油缸或类似的力挤压，挤压面与电芯接触，逐渐增加压力值13±1KN后停止。</p>																																	
7.2	<p>Heating Test 加热测试</p>	<p>A cell is to be heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of 5°C per minute to a temperature of 130±2°C and remain for 30 minutes and observed for 1 hour.</p> <p>将电芯放在电热鼓风干燥箱中加热，温度以5°C/min的速率由室温升至130°C并保持30min，观察1h。</p>	<p>No explosion, no fire 不起火、不爆炸</p>																																
7.3	<p>Over-charge Test 过充电</p>	<p>A cell is charged by 1C(4000mA) current with 5.5V or 1h charging time. The test is to be end and observed 1h.电芯以1C电流充电，直到输出电压不低于5.5V或充电时间达到1h后停止充电，观察1h。</p>	<p>No explosion, no fire 不起火、不爆炸</p>																																
7.4	<p>Short-circuit Test 短路测试</p>	<p>Short-circuit the standard charged cell by connecting positive and negative terminal 10min by less than 5mΩ wire.</p> <p>短接电芯的正负极10min，外部线路总电阻小于5mΩ。</p>	<p>No explosion, no fire 不起火、不爆炸</p>																																
7.5	<p>Low Pressure 低气压</p>	<p>Each fully charged cell is placed in a vacuum chamber with the ambient temperature (20±5°C ). Once the chamber has been sealed, its internal pressure is gradually reduced to a pressure equal to or less than 11.6KPa held at that value for 6 hours. And it need take 1 hour to observe.</p> <p>将电芯放入温度为20±5°C的低气压箱中，调节试验箱中气压为11.6KPa，静置6h后观察1h。</p>	<p>No explosion, no fire, no leakage 不起火、不爆炸、不漏液</p>																																
7.6	<p>Seawater Immersion 海水浸泡</p>	<p>Each fully charged cell is immersed in 3.5% NaCl solution(weight percent, this solution concentration is same to seawater) for 2 hours.</p> <p>将电芯完全浸没于质量分数为3.5%NaCl溶液中，浸泡2h。</p>	<p>No explosion, no fire 不起火、不爆炸</p>																																
7.7	<p>Temperature Cycling 温度循环</p>	<p>Test according to the following procedure and the profile shown in table and figure. Fully charged cells or batteries are subjected to temperature cycle forced draught chambers and repeated for five cycles. And it need take 1 hour to observe.</p> <p>将电芯放入温度箱中，温度箱温度按照下表进行调节，循环5次，观察1h。</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>温度/°C</td> <td>25</td> <td>-40</td> <td>-40</td> <td>25</td> <td>85</td> <td>85</td> <td>25</td> </tr> <tr> <td>时间增量/min</td> <td>0</td> <td>60</td> <td>90</td> <td>60</td> <td>90</td> <td>110</td> <td>70</td> </tr> <tr> <td>累计时间/min</td> <td>0</td> <td>60</td> <td>150</td> <td>210</td> <td>300</td> <td>410</td> <td>480</td> </tr> <tr> <td>温度变化率°C/min</td> <td>0</td> <td>1.08</td> <td>0</td> <td>1.08</td> <td>0.67</td> <td>0</td> <td>0.86</td> </tr> </table>	温度/°C	25	-40	-40	25	85	85	25	时间增量/min	0	60	90	60	90	110	70	累计时间/min	0	60	150	210	300	410	480	温度变化率°C/min	0	1.08	0	1.08	0.67	0	0.86	<p>No explosion, no fire, no leakage 不起火、不爆炸、不漏液</p>
温度/°C	25	-40	-40	25	85	85	25																												
时间增量/min	0	60	90	60	90	110	70																												
累计时间/min	0	60	150	210	300	410	480																												
温度变化率°C/min	0	1.08	0	1.08	0.67	0	0.86																												



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## 8. Warranty 保证

Cells are guaranteed to be free from defects in workmanship and materials for a period of a year provided that the manufacturer can confirm such defects are resulted from manufacturing abnormality, not from abusive usage, or else manufacturer will solve the quality problem. GEB won't replace a new cell for free if the defects are not due to the failure of manufacturing process or is due to customer's abuse or misuse.

电芯正常使用一年内, 经确认出现任何制程而非滥用原因造成的质量问题, 均由生产厂方予以解决。此期限外, 非制程原因而是客户误用造成的电芯质量问题, GEB能不承诺免费更换。

For the sake of safety assurance, please discuss the equipment design, its system and protection circuit of Lithium-ion cell with GEB in advance and consult about the high rate current, rapid charge and special application in the same way.

为了安全起见, 如有设备设计、锂离子电芯系统保护电路或高电流、快速充电和其它方面的特殊应用, 请先咨询GEB能公司相关事宜,

GEB will not be responsible for trouble occurred by against the precautions in instructions.

GEB能公司对违反安全守则操作所产生的问题不承担任何责任。

GEB will not be responsible for trouble occurred by matching problems with electric circuit, cell pack and charger.

GEB能公司对于电路, 电池组以及充电器搭配使用所产生的问题不承担任何责任。

GEB will be exempt from warranted any defect cells during assembling after acceptance.

GEB能公司对于出货后客户在电芯组装过程中产生的不良电芯不予以质量保证。

## 9. Others 其它

### 9.1 Storage for a long time 长时间存储

if the cell is kept for a long time (3 months or longer), It is strongly recommended that the cell is preserved at dry and low-temperature.

假如电芯要存放 3 个月或更久, 强烈建议将电芯保存在干燥、阴凉处。

### 9.2 Other 其它

Any matters that specifications does not have, should be conferred with between the both parties.

规格书未尽事宜, 由双方协商解决。

## 10. Package 包装

40cells per box, 2 boxes into a case, totally 80 cells.

电芯包装每盒装 40 只电芯, 每箱装 2 盒, 共 80 只电芯。

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## **Proper Use of Lithium Ion Cells**

### **锂离子电池使用指南**

See before using lithium-ion cell 使用锂离子电池前请参阅此文件。

Supplied by **General Electronics Technology Co., Ltd** 由深圳市中美通用科技有限公司提供

#### **1. General 概括**

This document has been prepared to describe the appropriate cautions and prohibitions, which the customer should take or employ when the customer uses and handles the lithium ion cell to be manufactured and supplied by GEB. in order to obtain optimum performance and safety.

本文件旨在为客户提供适当的警告和禁止措施，以便客户在使用深圳市中美通用科技有限公司生产和提供的锂离子电池时获得最佳的性能和安全性。

#### **2. Charging 充电**

##### **2.1. Charging current 充电电流**

Charging current should be less than maximum charge current specified in the product specification.

充电电流应小于产品规格书规定的最大充电电流。

##### **2.2. Charging voltage 充电电压**

Charging should be done by voltage less than that specified in the product specification.

充电电压应小于产品规格书规定的电压。

##### **2.3. Charging time 充电时间**

Continuous charging under appropriate voltage does not cause any loss of characteristics. However, the charge timer is recommended to be installed from a safety consideration, which shuts off further charging at time specified in the product specification.

在适当电压下连续充电不会造成任何性能损失。但是，出于安全考虑，建议安装充电计时器，这样可以在到达产品规格书指定的时间后停止进一步充电。

##### **2.4. Charging temperature 充电温度**

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

电池应在产品规格书中规定的温度范围内充电。

##### **2.5. Reverse charging 反向充电**

The cell should be connected, confirming that its poles are correctly aligned. Inverse charging should be strictly prohibited. If the cell is connected improperly, it may be damaged.

连接电池时应确认其两极正确对齐，严禁反向充电。如果电池连接不当，可能会损坏。

#### **3. Discharging 放电**

##### **3.1. Discharging 放电**

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3.1.1. The cell should be discharged at less than maximum discharge current specified in the product specification.  
放电电流应小于产品规格书中规定的最大放电电流。

### **3.2. Discharging temperature 放电温度**

3.2.1. The cell should be discharged within a range of temperatures specified in the product specification.  
电芯应在产品说明书规定的温度范围内放电。

3.2.2. Otherwise, it may cause loss of characteristics.  
否则，可能会造成电芯的性能损失。

### **3.3. Over-discharging 过放**

3.3.1. The system should be equipped with a device to prevent further discharging exceeding discharging cut-off voltage specified in the product specification.(over-discharging)

系统应配置防止超过产品规格书中规定的放电截止电压后进一步放电的装置。

3.3.2. Over-discharging may cause loss of performance, characteristics, of battery function.  
过放会导致电芯性能、特性和功能的损失。

3.3.3. Over-discharging may occur by self-discharge if the battery is left for a very long time without any use.  
如果电芯长时间不使用，电芯的自放电可能会导致过放电。

3.3.4. The charger should be equipped with a device to detect cell voltage and to determine recharging procedures.  
充电器应装有检测电池电压和确认充电程序的装置。

## **4. Storage 存储**

### **4.1. Storage conditions 存储条件**

4.1.1. The cell should be stored within a range of temperatures specified in the product specification.  
电芯应储存在产品规格书规定的温度范围内。

4.1.2. Otherwise, it may cause loss of characteristics, leakage and/or rust.  
否则可能会导致电芯性能损失、泄漏和/或生锈。

### **4.2. Long-term storage 长期储存**

4.2.1. The cell should be used within a short period after charging because long-term storage may cause loss of capacity by self-discharging.

充电后应短期内使用，长期存放可能会因电芯的自放电而导致容量损失。

4.2.2. If long-term storage is necessary, the cell should be stored at lower voltage within a range specified in the product specification, because storage at higher voltage may cause loss of characteristics.

如果需要长期储存，电芯应在产品规格书规定的范围内以较低的电压储存，因为较高的电压储存可能造成性能的损失。

## **5. Cycle life 循环寿命**

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## 5.1. Cycle life performance 循环寿命表现

5.1.1. The cell can be charged/discharged repeatedly up to times specified in the produce specification with a certain level of capacity also specified in the product specification.

电芯可在产品规格书规定的次数内重复充放电，并保持有产品规格书内规定的容量。

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

电芯的循环寿命由充电、放电、工作温度和/或储存环境决定。

## 6. Design of System 系统设计

### 6.1. Connection between the cell and the battery 电池与电芯的连接

6.1.1. The cell should not be soldered directly with leads. Namely, the cell should be welded with leads on its terminal and then be soldered with wire or leads to soldered lead.

电芯不能直接用导线焊接。应该先在电芯端子上焊接导线，再在焊点上进行锡焊固定。

6.1.2. Otherwise, it may cause damage of component, such as separator and insulator, by heat generation.

否则，产生的热量会对隔膜、绝缘片等部件造成损坏。

### 6.2 Positioning the battery in the System 在系统中定位电池

6.2.1. The battery should be positioned as possible as far from heat sources and high temperature components.

电池应尽可能远离热源和高温元件。

6.2.2. Otherwise, it may cause loss of characteristics.

否则，会造成性能损失。

### 6.3. Mechanical shock protection of the battery 电池的机械减震保护

6.3.1. The battery should be equipped with appropriate shock absorbers in order to minimize shock.

电池应配备减震器，以尽量减少冲击。

6.3.2. Otherwise, it may cause shape distortion, leakage, heat generation and/or rupture.

否则，会引起变形、漏液、发热和/或破裂。

### 6.4. Short-circuit protection of the cell 电芯的短路保护

6.4.1. The cell is equipped with an insulating sleeve to protect short-circuit which may occur during transportation, battery assembly and /or system operation.

电池配有绝缘套管，以避免在运输、电池组装和/或系统运行过程中可能发生的短路。

6.4.2. If the cell sleeve is damaged by some causes such as outside impact, it may cause short-circuit with some wiring inside the battery.

如果电池套因外部冲击等原因损坏，可能会导致电池内部短路。

### 6.5. Connection between the battery and charger/system 电池与充电器/系统之间的连接

6.5.1. The battery should be designed to be connected only to the specified charger and system.

电池应设计成只能连接到指定的充电器和系统。

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6.5.2. A reverse connection of the battery, even in the specified system, should be avoided by employing special battery design such as a special terminals.

即使在指定的系统中，也应避免使用特殊的电池设计，如特殊的终端，已防止电池反向连接。

## **7. Battery Pack Assembly 电池组组装**

### **7.1. Prohibition of usage of damaged cell 禁止使用已损坏的电芯**

7.1.1. The cell should be inspected visually before battery assembly.

组装前应先目视检查电芯。

7.1.2. The cell should not be used if sleeve-damage, can-distortion and/or electrolyte-smell is detected.

如若发现电芯套膜破损、壳体变形和/或电解液异味，请勿使用。

### **7.2. Transportation 运输**

7.2.1. If the cell is necessary to transport to order place, such as the battery manufacturer, careful precautions should be taken to avoid damage of cell.

如果电芯需要运输到订购地点，如电池制造商，应采取谨慎的预防措施，以避免电池损坏。

## **8. Others 其它**

### **8.1. Disassemble 拆卸**

8.1.1. The cell should not be dismantled from the battery pack.

不允许从电池组中拆卸电芯。

8.1.2. Internal short-circuit caused by disassembled may lead to heat generation and/or venting.

由拆卸引起的内部短路可能导致发热和/或泄气。

8.1.3. When the electrolyte is coming in contact with the skin or eyes, wash immediately with fresh water and seek medical advice.

当电解液接触皮肤或眼睛时，应立即用清水冲洗并就医。

### **8.2. Short-circuiting 短路**

8.2.1. Short-circuit results in very high current which leads to heat generation.

短路会产生巨大的电流而导致发热。

8.2.2. An appropriate circuitry should be employed to protect accidental short-circuiting.

应采用适当的电路来保护意外短路。

### **8.3. Incineration 焚烧**

8.3.1 Incinerating and disposing of the cell in fire are strictly prohibited, because it may cause rupture.

严禁在火中焚烧或处理电芯，因为这会导致电芯破裂。

### **8.4. Immersion 浸泡**

8.4.1 Soaking the cell in water is strictly prohibited, because it may cause melt of components to damaged to functions.

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严禁将电芯浸泡在水中，因为这会导致组件熔化而损伤功能。

### **8.5. Mixing use 混合使用**

8.5.1. Different types of cell, or same types but different manufacturer's cell may lead to cell rupture or damage to system due to the different characteristics of cell.

混用不同类型的电池或不同厂家的相同类型电池，由于电池的特性不同，可能导致电芯破裂或对系统造成损坏。

### **8.6. Battery disposal 电池处理**

8.6.1. Although the cell contains no environmentally hazardous component, such as lead or cadmium. the battery should be disposed according to the local regulations when it is disposed.

虽然电池不含铅或镉等对环境有害的成分，电池在处理时仍应按当地规定进行。

8.6.2. The cell should be disposed with a discharged state to avoid heat generation by an inadvertent short-circuit.

电芯应处理为放完电状态，以避免因意外短路而产生热量。

### **8.7. Caution 警告**

8.7.1 The Battery used in this device may present a risk of fire or chemical burn if mistreated.

如果使用不当，电池可能有起火或化学腐蚀的危险。

8.7.2 Do not disassemble, heat above 100°C or incinerate.

禁止拆卸电池，禁止将电池加热至超过 100° C 或焚烧。

8.7.3 Replace battery with GEB battery only. Use of another battery may present a risk of fire or explosion.

在电池替换时仅可使用用GEB能电池，使用其它电池可能有起火或爆炸的危险。

8.7.4 Dispose of used battery promptly. Do not disassemble and do not dispose of in fire.

及时处理用过的电池。切勿随意拆卸，切勿在火中弃置。

8.7.5 Keep away from children.

远离儿童。

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## **Handling precaution and prohibitions of lithium ion rechargeable cells and batteries**

### **锂离子电池的处理注意事项和禁止事项**

Inaccurate handling of lithium ion and lithium ion polymer rechargeable battery may cause leakage, heat, smoke, an explosion, or fire.

锂离子和锂离子聚合物电池处理不当可能导致泄漏、发热、烟雾、爆炸或火灾。

This could cause deterioration of performance or failure. Please be sure to follow instructions carefully.

这可能会导致性能下降或丧失。请务必仔细按照说明操作。

#### **1.1. Storage 存储**

Store the battery at low temperature (below 20°C is recommended), low humidity, no dust and no corrosive gas atmosphere.

存储电池应在低温（推荐 20°C 以下）、湿度低、没有灰尘和腐蚀性气体的环境中。

#### **1.2. Safety precaution and prohibitions 安全预防和禁止事项**

To assure product safety, describe the following precautions in the instruction manual of the application.

为确保产品安全，请在使用说明书中说明以下注意事项。

### **[Danger] 危险**

#### **Electrical misuse 电滥用**

Use dedicated charger.

使用专用充电器。

Use or charge the battery only in the dedicated application.

仅在专用应用程序中使用或充电电池。

Don't charge the battery by an electric outlet directly or a cigarette lighter charger.

不要直接用插座或点烟器充电器给电池充电。

Don't charge the battery reversely.

不要给电池反向充电。

#### **Environmental misuse 环境滥用**

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

不要把电池放在靠近火源或热源的地方。

Don't throw the battery into the fire.

不要把电池扔进火里。

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

不要在温度可能超过 60°C 的地方放置、充电或使用电池，如汽车内或类似的地方。

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

请勿将电池浸没、抛掷、浸湿于水/海水中。

## Others 其它

Don't fold the battery cased with laminated film such as pouch and Polymer.

不要用薄膜(如聚合物塑料袋)折叠。

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

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袋子里。

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

不要故意将电池的正负极端子用金属物体连接。

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

不要用针、螺丝刀等锋利的物体刺穿电池。

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

不要用烙铁等加热物体加热电池。

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

不要用锤子等重物击打电池。

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

请勿踩在电池上，将电池扔或摔在坚硬的地板上，以免造成机械冲击。

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

请勿拆卸电池或修改电池设计，包括电路。

Don't solder on the battery directly.

不要直接在电池上焊接。

Don't use seriously scared or deformed battery.

不要使用严重损坏或变形的电池。

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

不要将电池放入微波炉、烘干机或高压容器中。

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.

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 old and new batteries together.

不要混合使用或组装新旧电池。



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**[Warning] 警告**

Stop charging the battery if charging isn't completed within the specified time.

如果在规定时间内没有完成充电，请停止充电。

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

如果在使用、充电或储存过程中发现电池出现异常发热、变色、变形或异常情况，请停止使用电池。

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.

如发现有泄漏或异味，应立即远离火源。如果液体泄漏到皮肤或衣物上，立即用清水冲洗干净。

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.

如果电池漏液进入眼睛，不要揉搓眼睛，应用清水洗净并立即前往医院治疗。

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

如果电池的正负极端子变脏，使用前用干布擦拭。

The battery can be used within the following temperature ranges. Don't exceed these ranges.

电池可在以下温度范围内使用。请勿超过这些范围。

Charge temperature ranges 充电温度：0°C ~50°C

Discharge Temperature range 放电温度：-20°C ~ 55°C

Store the battery at temperature below 60°C

存储电池的环境温度应低于 60°C。

Cover terminals with proper insulating tape before disposal.

处理电池前应先用合适的绝缘胶带覆盖正负极端子。

**[ Caution! ] 谨慎操作**

**Electrical misuse 电滥用**

Battery must be charge with constant current-constant voltage (CC/CV).

电池必须使用恒流恒压充电。

Charge current must be controlled by specified value in Cell specification.

充电电流必须控制在电芯规格书中指定的值以内。

Cut-off Voltage of charging must be 3.65V

充电截止电压不得超过 3.65V。

Charger must stop charging battery by detecting either charging time or current specified in Cell's specification.

当达到电芯规格中指定的充电时间或电流时，充电器必须停止充电。

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Discharge current must be controlled by specified value in Cell's specification.

放电电流必须控制在电芯规格书中指定的值以内。

Cut-off Voltage of discharging must be over 2.0V.

放电截止电压不得小于 2.0V。

## Others 其它

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

电池远离婴幼儿，避免发生吞咽等意外。

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

如儿童使用电池，其监护人应在使用前说明正确使用方法及注意事项。

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

在使用电池前，请务必阅读使用说明书及注意事项。

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

在使用充电器前，请务必阅读充电器使用说明书。

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

在从应用中安装和拆卸电池之前，请务必阅读应用的使用说明书。

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

当电池的使用时间比以往短很多时，请及时更换电池。。

Cover terminals with insulating tape before proper disposal.

在处理电池前先用绝缘胶带覆盖电池的正负极端子。

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.

如果电池需要储存较长一段时间，应先将电池从应用中拆卸出，并存放于阴凉干燥处。

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

电池在充电、使用和储存过程中，应远离会产生静电的物体。

## **Safety handling procedure for the transporter**

### 运输安全操作规程

## Quarantine 检疫

Packages that are crushed, punctured or torn open to reveal contents should not be transported. Such packages should be isolated until the shipper has been consulted, provided instructions and, if appropriate, arranged to have the

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product inspected and repacked.

包装被压坏、刺破或撕开查看的，不得运输。在咨询发货人提供指示并在适当情况下安排对产品进行检查和重新包装之前，此类包装应予以隔离。

### **Spilled Product 漏液产品**

In the event that damage to packaging results in the release of cells or batteries, the spilled products should be promptly collected and segregated and the shipper should be contacted for instructions.

如果包装破损导致电芯或电池漏液的，应及时收集和隔离漏液的产品，并与发货人联系以获得指示。

## **Design of positioning the battery pack in application and charger**

### **电池组在应用和充电保护设计**

To prevent the deterioration of the battery performance caused by heat, battery shall be positioned away from the area where heat is generated in the application and the charger.

为防止高温对电池性能的影响，电池在应用和充电过程中应远离产生热量的区域。

## **Design of the battery pack**

### **电池组设计**

Be sure adopting proper safe device such as PTC specified type or model in Cell Specification. If you intend to adopt

different safety device which is not specified in Cell Specification, please contact GEB to investigate any potential safety problem.

确保采用合适的安全装置，如电芯规格书规定的 PTC 或类型模块。如果您想使用电芯规格书中没有说明的其他安全装置，请联系GEB能排查任何潜在的安全问题。

Be sure designing 2nd protective devices such as PTC & PCM at the same time to protect Cell just in case one protective device is fault.

确保同时设计第二保护装置，如 PTC 和 PCM，以便一个保护装置出现故障时保护电芯。

Please contact GEB when you need any help including safety concerns.

如有任何需要，包括安全问题，请与GEB能联络。

### **深圳市中美通用科技有限公司**

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