

# Specification Approval Sheet

## 产品规格书

Battery Type: GRPA6C0200-10C-22.8V 32000mAh

电池型号: GRPA6C0200-10C-22.8V 32000mmAh

Supplier 供应商	Prepared By 编制	Liuxiaofeng	2018-06-28
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	Checked By (QC) 审核 (品质)	Wujintao	2018-06-28
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	Signature/Date (签名/日期)
	Company Stamp (公司印章)

Amendment Records

( 修正记录 )

Edition ( 版本 )	Description ( 记 述 )	Prepared by ( 编 制 )	Checked ( 审 核 )	Date ( 日 期 )
A	First Publish ( 首次编写 )	Liuxiaofeng	Wuwentao	2018-06-28

Appendix

附

Customer's Checking Criterion

(customer required)

**客户验收标准 ( 客户必填 ):**

By Grepow's Testing Criterion for Lithium Polymer Battery.

按格瑞普电池有限公司电池检验标准

By Customer's Testing Request and Criterion (Customer must supply the checking criterion)

按客户要求检验 ( 需附验货标准 )

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### 1. Scope 适用范围

This document describes the Product Specification of the Lithium-Polymer (LIP) rechargeable battery cell supplied by Grepow Battery Corporation Limited.

本规格说明书描述了深圳市格瑞普电池有限公司生产的可充电聚合物锂离子电池的产品性能指标

### 2. Specification 产品规格

NO.	Items	Specifications
1	Connecting mode (组合方式)	6S1P (六串一并)
2	Nominal capacity (标称容量)	32000mAh @ 0.2C Discharge (放电)
3	Minimum capacity (最小容量)	31262mAh @ 0.2C Discharge (放电)
4	Nominal voltage (标称电压)	22.8V (cell 3.8V)
5	Open-Circuit Voltage (开路电压)	24.9V (cell 4.15V)
6	PACK Voltage(As of shipment) 电池电压 (出货状态)	22.5~23.1V (cell 3.75~3.85V)
7	Internal Impedance (内阻)	≤8mΩ
8	Dimensions (尺寸)	MAX (T*W*H) : 67*122*222mm
9	Pack weight (电池重量)	3400g (APPROX)
10	Standard Charge 标准充电	5ACC (constant current) charge to 26.1V, then CV (constant voltage 26.1V) charge till charge current decline to ≤0.05C 5ACC (恒流) 充电至 26.1V, 再 CV (恒压 26.1V) 充电直至充电电流 ≤0.05C
11	Rapid Charge 快速充电	Constant Current 10A, Constant Voltage 26.1V, 0.05C cut-off 持续电流: 10A 持续电压: 26.1V 截止电流: 0.05C
12	Charging time 充电时间	Standard Charging: 9.6 hours (Ref.) 标准充电: 9.6 小时 (参考值) Rapid charge: 4.8 hours (Ref.) 快速充电: 4.8 小时 (参考值)
13	Constant discharge current 持续放电电流	Constant current 100A end voltage 18.0V (持续电流: 100A 截止电压: 18.0V)
14	Peak discharge current 峰值放电电流	Peak current 180A, Continue time ≤3S (瞬间电流 180A, 持续时间: ≤3S)
15	High Rate Discharge 倍率放电性能	≥17.2min Standard Charge/rest 5min discharge at 100A to 18.0V; (标准充电/休息 5 分钟用 100A 放电至 18.0V)

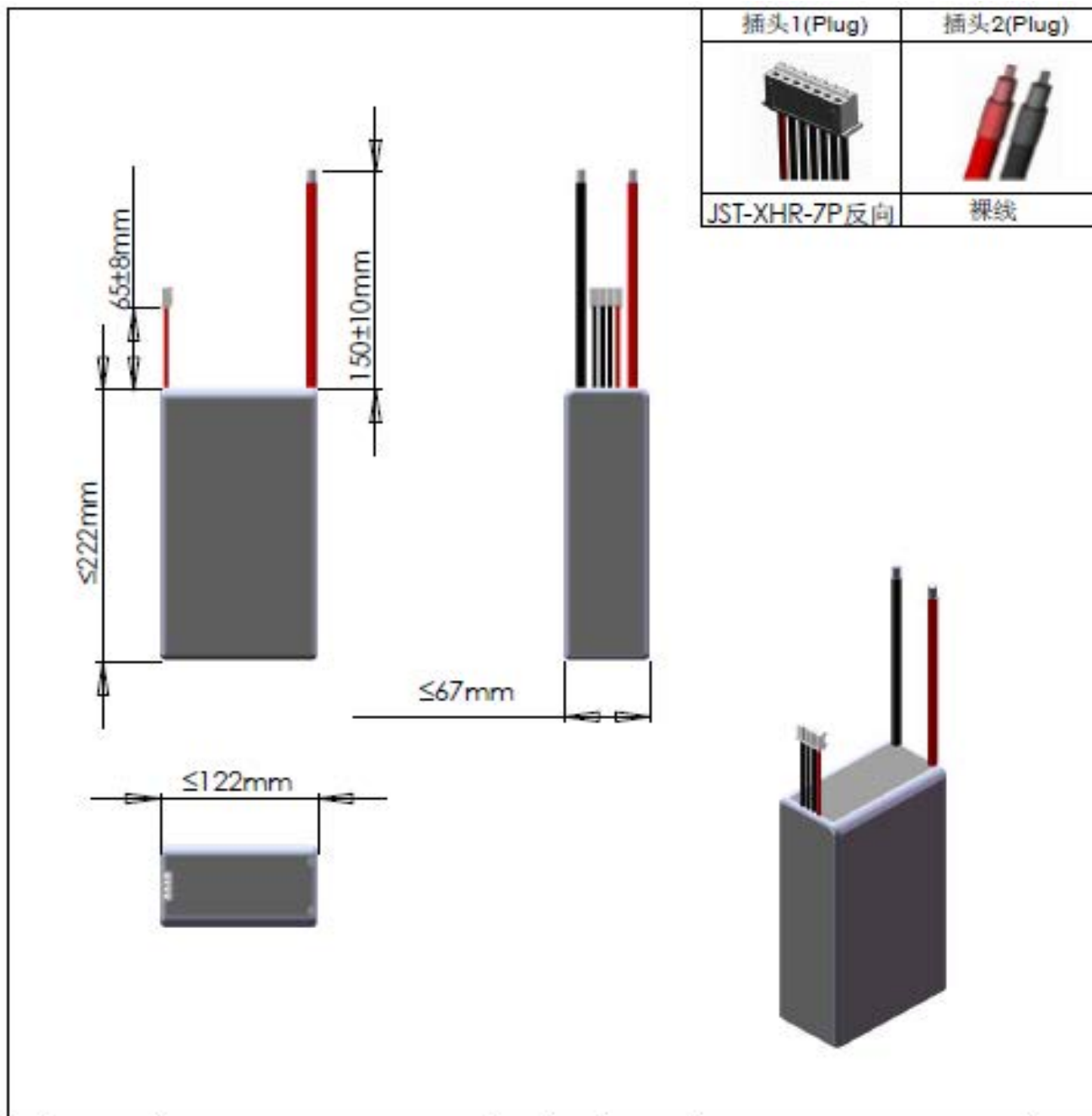
Notice: Please do not assemble the battery privately, Parallel charging for two packs of batteries maybe lead to short circuit or ignition.

If no otherwise specified, an interval rest time is 30min between charging and discharging.

注意: 请勿私自组装电池, 将两组电池并联在一起进行充电, 此有可能造成短路或燃烧。

如果没有特别说明, 电池充放电间隔时间为 30 分钟

3. Pack Drawing 组装示意图



NO	名称	规格型号	用量	NO	名称	规格型号	用量
01	电芯	GRPA6C0200-E1A	6	05			
02	充电线	JST-XHR-7P反向+22#硅胶线	1	06			
03	放电线	单节线+8#硅胶线	1	07			
04			1	08			

标记	处数	变更内容	成品电池图 GRPA6C0200-6S1P		图纸号	
			深圳市格瑞普电池有限公司 SHENZHEN GREPOW BATTERY CO., LTD		客户名称	比例
						A4
设计		样品确认			共 页	第 页
绘图	刘晓峰	复核				
审核		批准				
版本	A	日期	2018-6-28			

#### 4. Performance And Test Conditions ( 电池性能及测试条件 )

##### 4.1 Standard test condition ( 标准测试条件 )

Before proceed the following tests, the cells should be discharged at 0.5C to 3.0V cutoff. Unless otherwise stated, tests should be done within one month of delivery under the following conditions:

Ambient temperature:  $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$  Relative Humidity:  $65 \pm 20\%$

Note Standard Charge/Discharge Conditions:

Charge: The battery will be charged to 4.2V with 0.5C from constant current to constant voltage, when the current is 0.05C, stop to charge.;

Discharge: 0.5C to 3.0V/cell

在进行下列各项测试前每颗电池应用 0.5C 放至 3.0V。如果没有特别规定，测试应在电池交付 1 个月内按以下各项条件进行：

环境温度： $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$  相对湿度： $65 \pm 20\%$

注意标准充放电为：

充电：以 0.5C 电流恒流充电至限制电压 4.2V 时，改为恒压充电，直到截止电流为 0.05C 时停止充电；

放电：以 0.5C 电流恒流放电至限制电压 3.0V

##### 4.2 Visual inspection ( 外观检查 )

There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of the cell..

不允许有任何影响电池性能的外观缺陷，诸如裂纹、裂缝、泄漏等。

##### 4.3 Measuring Instrument or Apparatus ( 测量器具及设备 )

###### 4.3.1 Dimension Measuring Instrument ( 尺寸测量器具 )

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

尺寸测量器具的精度等级应不小于 0.01 mm。

###### 4.3.2 Voltmeter ( 伏特计 )

Standard class specified in the national standard or more sensitive class having inner impedance more than  $10\text{k}\Omega/\text{V}$

按照国家标准指定规格等级或采用灵敏度更高的，测量电压时内阻不应小于  $10\text{k}\Omega/\text{V}$ 。

###### 4.3.3 Ammeter ( 安培计 )

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

按照国家标准指定规格等级或采用灵敏度更高的，包括电流表及电线在内的总外阻应小于  $0.01\Omega$ 。

###### 4.3.4 Impedance Meter ( 电阻计 )

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

内阻测试仪测量原理应为交流阻抗法 (1kHz LCR)。



4.4 Routine Inspection And Testing Of Battery Performance 电池常规性能检查及测试

NO	Items	Test Method and Condition	Criteria
1	Discharge Performance at different temperature 不同温度下放电特性	High Temperature : Storage 2hrs at $60 \pm 2^\circ\text{C}$ after standard charge, 0.5C discharge at $60 \pm 2^\circ\text{C}$ 高温 : 标准充电后储存在 $60 \pm 2^\circ\text{C}$ 的环境中, 2 小时后用 0.5C 放电	$\geq 95\%$
		Room Temperature : Storage 2hrs at $20 \pm 2^\circ\text{C}$ after standard charge, 0.5C discharge at $20 \pm 2^\circ\text{C}$ 常温 : 标准充电后储存在 $20 \pm 2^\circ\text{C}$ 的环境中, 2 小时后用 0.5C 放电	$\geq 100\%$
		Low Temperature : Storage 2hrs at $-20 \pm 2^\circ\text{C}$ after standard charge, 0.2C discharge at $-20 \pm 2^\circ\text{C}$ 低温 : 标准充电后储存在 $-20 \pm 2^\circ\text{C}$ 的环境中, 2 小时后用 0.2C 放电	$\geq 90\%$
2	Cycle Life 循环寿命	Test condition : Step1 : Charge: 5A to 26.1V, end current 0.05C Step2 : Rest : 30min Step3 : Discharge: 100A to 18.0V Step4 : cycle from step1 to step 3 More than 80% first capacity at 100A discharging 测试条件 : 1) 恒流恒压充电 : 5A 充电到 26.1V 限流 0.05C 2) 静置 : 30min 3) 恒流放电 : 100A 放电到 18.0V 4) 循环 1) 至 3) 工步 当以 100A 放电容量小于初始容量 80% 时, 所完成的循环次数定义为该电芯的循环寿命	$\geq 150$ Circle
3	Self-discharge 自放电	Standard full charge, storage at $20 \pm 2^\circ\text{C}$ for 28 days, Standard discharge (0.5C) to test residual capacity 标准充满电后 $20 \pm 2^\circ\text{C}$ 贮藏 28 天。 标准 0.5C 放电, 所得容量为剩余容量	Residual capacity $\geq 85\%$ (First Capacity) 剩余容量 $\geq 85\%$ 初始容量
		Standard charge/discharge for 2 cycles, to test recovery capacity 按标准充放电制式循环 2 次, 取最大值为恢复容量	Recovery Capacity $\geq 95\%$ (First Capacity) 恢复容量 $\geq 95\%$ 初始容量
4	High temperature storage characteristics 高温储存特性	$60^\circ\text{C}$ 4 小时 $60^\circ\text{C}$ for 4 hours	Residual capacity $\geq 95\%$ 容量保持率 $\geq 95\%$ ,

Appendix

附录

Handling Precautions and Guideline

For LIP(Lithium-Ion Polymer)Rechargeable Batteries

聚合物锂离子充电电池操作指示及注意事项

Preface

This document of Handling Precautions and Guideline for LIP Rechargeable Batteries shall be applied to the battery cells manufactured by GREPOW.

前言

本文件“聚合物锂离子充电电池操作指示及注意事项”仅适用于深圳市格瑞普电池有限公司生产的电池。

Note(1):

The customer is requested to contact GREPOW in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

声明一：

客户若需要将电池用于超出文件规定以外的设备，或在文件规定以外的使用条件下使用电池，应事先联系格瑞普，因为需要进行特定的实验测试以核实电池在该使用条件下的性能及安全性。

Note(2):

GREPOW will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

声明二：

对于在超出文件规定以外的条件下使用电池而造成的任何意外事故，格瑞普概不负责。

Note(3):

GREPOW will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the cell, if it is deemed necessary.

声明三：

如有必要，格瑞普会以书面形式告知客户有关正确操作使用电池的改进措施。

1. Charging 充电

1.1 Charging current 充电电流:

Charging current should be less than maximum charge current specified in the Product Specification. Charging with higher current than recommended value may cause damage to the electrical, mechanical and safety performance and could lead to heat generation or leakage. 充电电流不得超过本标准书中规定的最大充电电流。使用高于推荐值电流充电将可能引起电池的充放电性能、机械性能和安全性能的问题，并可能会导致发热或泄漏。

1.2 Charging voltage 充电电压：

Charging shall be done by voltage less than that specified in the Product Specification 4.20V. Charging beyond 4.25V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition.

It is very dangerous that charging with higher voltage than maximum voltage may cause damage to the electrical, mechanical safety performance and could lead to heat generation or leakage.

充电电压不得超过本标准书中规定的额定电压 4.20V，4.25V 为充电电压最高极限，充电器设计应满足此条件。

电芯电压高于额定电压值时，将可能引起电池的充放电性能、机械性能和安全性能的问题，可能会导致

## 发热或泄漏。

### 1.3 Charging temperature 充电温度:

The battery shall be charged within  $10^{\circ}\text{C}\sim 45^{\circ}\text{C}$  range in the Product Specification.

电池必须在  $10^{\circ}\text{C}\sim 45^{\circ}\text{C}$  的环境温度范围内进行充电。

### 1.4 Prohibition of reverse charging 禁止反向充电:

Reverse charging is prohibited. The battery shall be connected correctly. The polarity has to be confirmed before wiring. In case of the battery is connected improperly, the battery cannot be charged. Simultaneously, the reverse charging may cause damaging to the battery which may lead to degradation of battery performance and damage the battery safety, and could cause heat generation or leakage.

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

## 2. Discharging 放电

### 2.1 Discharging current 放电电流

The battery shall be discharged at less than the maximum discharge current specified in the Product Specification, High discharging current may reduce the discharging capacity significantly or cause over-heat.

放电电流不得超过本标准书规定的最大放电电流，大电流放电会导致电池容量剧减并导致过热。

### 2.2 Discharging temperature 放电温度

The battery discharge temperature is  $-20\sim 60^{\circ}\text{C}$ ,  $5\sim 45^{\circ}\text{C}$  environment suggested when discharge with large current, small current discharge suggested under  $< 5^{\circ}\text{C}$  or  $> 45^{\circ}\text{C}$ , Discharged under too low or too high temperature could lead to battery failure or other conditions.

电池放电环境温度为  $-20\sim 60^{\circ}\text{C}$ ，大电流放电建议  $5\sim 45^{\circ}\text{C}$  环境下进行， $< 5^{\circ}\text{C}$  或  $> 45^{\circ}\text{C}$  建议用小电流进行放电，过低或过高温度大电流放电将可能导致电池失效或出现其他状况。

### 2.3 Over-discharging 过放电：

It should be noted that the battery would be at over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the battery shall be charged periodically to maintain between 3.6V and 3.9V.

Over-discharging may causes loss of cell performance, characteristics, or battery functions.

The charger shall be equipped with a device to prevent further discharging exceeding a cut-off voltage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows:

The battery pack shall start with a low current (0.01C) for 15-30 minutes, i.e.-charging, before rapid charging starts. The rapid charging shall be started after the (individual) cell voltage has been reached above 3.0V within 15-30 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 3.0V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

需要注意的是，在电池长期未使用期间，它可能会用其它自放电特性而处于某种过放电状态。为防止放电的发生，电池应定期充电，将其电压维持在 3.6V 至 3.9V 之间。

过放电会导致电池性能、电池功能的丧失。

充电器应有装置来防止电池放电至低于本标准书规定的截止电压。此外，充电器还应有装置以防止重复充电，步骤如下：

电池在快速充电之前，应先以一小电流 (0.01C) 预充电 15~30 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) 电池的

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/电池正处于非正常状态。

### 3. Storage 贮存

#### 3.1 Storage condition 储存条件

- When voltage is over 3.9V, battery should be stored in the environment humidity  $65 \pm 20\%$ , temperature  $-20 \sim 35^{\circ}\text{C}$ . Storage time should be less than 7 days.
- When voltage is 3.7V~3.9V, battery could be stored for long term in the environment humidity  $65 \pm 20\%$ , temperature  $-20 \sim 35^{\circ}\text{C}$ . Need to active the battery once every three month, so as to keep voltage during 3.7V~3.9V.
- Storage time >7 days, voltage is NOT allowed to be higher than 3.9V
- 环境湿度  $65 \pm 20\%$ , 温度  $-20 \sim 35^{\circ}\text{C}$ , 电压大于 3.9V 时储存时间  $\leq 7$  天；
- 环境湿度  $65 \pm 20\%$ , 温度  $-20 \sim 35^{\circ}\text{C}$ , 电压 3.7V~3.9V 时可长期储存，3 个月需要激活一次。保持电压处于 3.7V~3.9V；
- 禁止在高电压下（电压 > 3.9V）长时间（> 7 天）储存。

#### 3.2 Activate method 激活方法

- Please activate the battery once every 3 months according to the following method:
- Charge at 0.2C to 4.2V, rest 5 min, then discharge with 0.2C to 3.2V/cell, rest 5 min, then charge at 0.2C to 3.9V.
- 请每隔 3 个月按下面方法激活电池一次:
- 0.2C 充电至 4.2V，休息 5 分钟，然后用 0.2C 放电至每颗电池 3.2V，休息 5 分钟，0.2C 充电 3.9V.

### 4. Handling of Cells 电池操作注意事项

- #### 4.1 Since the battery is packed in soft package, to ensure its better performance, it's very important to carefully handle the battery
- 由于电池属于软包装，为保证电池的性能不受损害，必须小心对电池进行操作。
- #### 4.2 The protection of soft aluminum foil 铝箔包装材料的防护
- The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles.
  - Don't strike battery with any sharp edge parts
  - Trim your nail or wear glove before taking battery
  - Clean worktable to make sure no any sharp particle
  - 铝箔包装材料易被尖锐部件损伤，诸如镍片，尖针。
  - 禁止用尖锐部件碰撞电池；
  - 取放电池时，请修短指甲或戴上手套；
  - 应清洁工作环境，避免有尖锐物体存在
- #### 4.3 Note: Any other items which are not covered in this specification shall be agreed by both parties
- 注意：任何本产品规格书未包含的其它条款，应由双方协议确定。