

# Specification Approval Sheet

## 产品规格书

Battery Type: GRPA042124-20C-14.8V 5500mAh

电池型号: GRPA042124-20C-14.8V 5500mAh

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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)	4S1P (四串一并)
2	Nominal capacity (标称容量)	5500mAh @ 0.2C Discharge (放电)
3	Minimum capacity (最小容量)	5292mAh @ 0.2C Discharge (放电)
4	Nominal voltage (标称电压)	14.8V (cell 3.7V)
5	Open-Circuit Voltage (开路电压)	16.6V (cell 4.15V)
6	PACK Voltage(As of shipment) 电池电压 (出货状态)	15.2~15.6V (cell 3.8~3.9V)
7	Internal Impedance (内阻)	≤8.5mΩ
8	Dimensions (尺寸)	MAX (T*W*H) : 43*43.5*141mm
9	Pack weight (电池重量)	495g (APPROX)
10	Standard Charge 标准充电	2.75ACC ( constant current ) charge to16.8V,then CV(constant voltage 16.8V)charge till charge current decline to ≤0.05C 2.75ACC ( 恒流 ) 充电至 16.8V , 再 CV ( 恒压 16.8V ) 充电直至充电电流≤0.05C
11	Rapid Charge 快速充电	Constant Current5.5A, Constant Voltage16.8V, 0.05C cut-off 持续电流 : 5.5A 持续电压 : 16.8V 截止电流 : 0.05C
12	Charging time 充电时间	Standard Charging : 4.8hours(Ref.) 标准充电 : 3.0 小时 (参考值) Rapid charge : 2.4hours(Ref.) 快速充电 : 1.5 小时 (参考值)
13	Constant discharge current 持续放电电流	Constant current 90A end voltage12.0V (持续电流 : 90A 截止电压 : 12.0V)
14	Peak discharge current 峰值放电电流	Peak current 120A , Continue time ≤3S (瞬间电流 120A , 持续时间 : ≤3S)
15	High Rate Discharge 倍率放电性能	≥3.6min Standard Charge/rest 5min discharge at90A to 12.0V; (标准充电/休息 5 分钟用 90A 放电至 12.0V)

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

The diagram illustrates the assembly of a battery pack. It features a main assembly view with dimensions: a total height of  $100 \pm 10\text{mm}$ , a top section height of  $45 \pm 8\text{mm}$ , a main body height of  $\leq 141\text{mm}$ , and a width of  $\leq 43.5\text{mm}$ . A secondary view shows a width of  $\leq 43\text{mm}$ . A 3D perspective view shows the battery pack with a yellow XT-90 connector. A legend identifies the components: '插头1(Plug)' is a JST-XHR-5P reverse connector, and '插头2(Plug)' is an XT-90 yellow male connector.

NO	名称	规格型号	用量	NO	名称	规格型号	用量
01	电芯	GRPA042124-5500mAh	4	05	泡棉	黑色防火	1
02	充电线	JST-XHR-6P反向+22#硅胶线	1	06	青裸纸	国产, 防火	1
03	放电线	XT-90黄色公插+10#硅胶线	1	07	胶纸	高温胶/玛拉胶/纤维胶	若干
04	铝片	0.4mm厚	2	08	pvc	白色	若干

标记	处数	变更内容	<b>成品电池图</b> <b>GRPA042124-4S1P</b>	图纸号		
				客户名称	比例	A4
设计		样品确认	<b>深圳市格瑞普电池有限公司</b>	共	页	
绘图	何丽	复核		第	页	
审核		批准				
版本	A	日期				
		2018-4-28				

#### 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 4.8V 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 4.8V/cell

在进行下列各项测试前每颗电池应用 0.5C 放至 4.8V。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 4.8V

##### 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。

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

###### 4.8.1 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。

###### 4.8.2 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  $10\text{k}\Omega/\text{V}$ 。

###### 4.8.3 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  $0.01\Omega$ 。

###### 4.8.4 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: 0.9A to 16.8V, end current 0.05C Step2 : Rest : 30min Step3 : Discharge: 27A to 9.0V Step4 : cycle from step1 to step 3 More than 80% first capacity at 27A discharging 测试条件 : 1) 恒流恒压充电 : 0.9A 充电到 16.8V 限流 0.05C 2) 静置 : 30min 3) 恒流放电 : 27A 放电到 9.0V 4) 循环 1) 至 3) 工步 当以 27A 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 $20^{\circ}\text{C}$ for 28 days, Standard discharge (0.5C) to test residual capacity 标准充满电后 $20^{\circ}\text{C}$ 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 $\geq 95\%$ ,



## 5. Discharging 放电

### 5.1 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。

### 5.2 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。

## 6. Storage 贮存

### 6.1 Storage condition 储存条件

·When voltage is over  $3.9\text{V}$ , 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  $3.7\text{V}\sim 3.9\text{V}$ , 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  $3.7\text{V}\sim 3.9\text{V}$ .

Storage time  $>7$  days, voltage is NOT allowed to be higher than  $3.9\text{V}$

环境湿度  $65\pm 20\%$ ，温度  $-20\sim 35^{\circ}\text{C}$ ，电压大于  $3.9\text{V}$  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  $3.7\text{V}\sim 3.9\text{V}$  时可长期储存，3 个月需要激活一次。保持电压处于  $3.7\text{V}\sim 3.9\text{V}$ ；

禁止在高电压下（电压  $>3.9\text{V}$ ）长时间（ $>7$  天）储存。

### 6.2 Activate method 激活方法

Please activate the battery once every 3 months according to the following method:

Charge at  $0.2\text{C}$  to  $4.2\text{V}$ , rest 5 min, then discharge with  $0.2\text{C}$  to  $3.2\text{V}/\text{cell}$ , rest 5 min, then charge at  $0.2\text{C}$  to  $3.9\text{V}$ .

请每隔 3 个月按下面方法激活电池一次:

$0.2\text{C}$  充电至  $4.2\text{V}$ ，休息 5 分钟，然后用  $0.2\text{C}$  放电至每颗电池  $3.2\text{V}$ ，休息 5 分钟， $0.2\text{C}$  充电  $3.9\text{V}$ 。