



FLYPOWER GRAPHENE BATTERY DELIVERY SPECIFICATIONS

APPROVAL SHEET

PRESENTED TO (呈送) :

MODEL NO. (产品型号) : [14.8V 1000mAh Graphene Battery Pack\(4S1P of FLP-653465P75\)](#)

DATE (制作日期) : September 28, 2016

Customer Part No. (客户物料编码);

Specification Approved (规格书审批项)	Prepared By(编制)	陆 雯
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Customer Approved (客户审批项)	Checked By(审核)	
	Approved By(批准)	
	Please sign and return one copy to us. 请签名盖章确认后回传我司.	Seal the (盖章处)

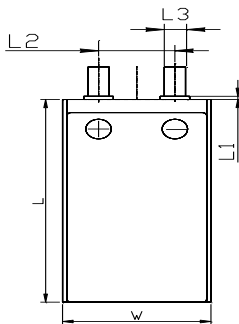
1.Scope 范围

The specification applies to graphene Li-PO battery supplied by FLY POWER INDUSTRIES LTD.

本标准适用于深圳市力飞科技有限公司生产的石墨烯锂离子电池。

2.Specification 产品规格

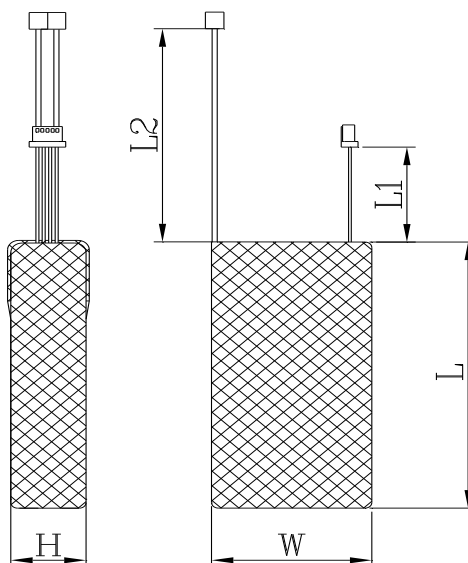
2.1 Cell specification 单电芯规格

NO.	Items	Specifications	
1	Cell Model 电芯型号	FGR-653465P65	
2	Nominal capacity 标称容量	1000mAh @ 1C Discharge(放电)	
3	Nominal voltage 标称电压	3.7V	
4	Dimension 尺寸	Thickness/厚度: 6.5±0.3mm	
		Width/宽度: 34.0±0.5mm	
		Height/高度:65.0±0.5mm	
		Tab width/极耳宽度:6mm	
		Distance between 2 tabs/极耳间距: 26±1mm	
5	Standard charge 标准充电	1C CC(constant current)charged to4.2V, then CV(constant voltage 4.2V)charge till charge current decline to≤0.05C at 23°C 在 23°C下, 用 1C CC (恒流) 充电至 4.2V, 再 CV (恒 压) 充电直至充电电流≤0.05C	
6	Rapid charge 快速充电	Constant Current 6.0C,Constant Voltage4.2V,0.05C Cut-off 持续电流: 6C, 持续电压: 4.2V, 截止电流: 0.05C	
7	Charging time 充电时间	Standard charging:1.0 hours(ref.) 标准充电: 1.0 小时 (参考值) Rapid charge: 30min(ref.) 快速充电: 30min (参考值)	
8	Standard discharge 标准放电	Constant current 75C,end voltage 3.0V 持续电流: 75C, 截止电压 3.0V	
9	Peak discharge currents 瞬间电流	Peak current 130C, end voltage3.0V, time 3S 电流 130C, 截止电压 3.0V 时间 3S	
10	Operating temperature 工作温度	Charging(充电): 0-40°C Discharge(放电): -20-60°C	
11	Storage temperature 储存温度	-10-45°C	

2.2 Package specification 电池组规格

NO.	Items	Specifications
1	Combination method 组合方式	4S1P (四串一并)
2	Combination standard 配组标准	Capacity difference(容量差) $\leq 20\text{mAh}$
		Resistance difference(内阻差) $\leq 0.5\text{m}\Omega$
		Voltage difference(电压差) $\leq 10\text{mv}$
3	Typical capacity 典型容量	1010mAh @ 1C Discharge (放电)
4	Minmum capacity 最小容量	1000mAh @ 1C Discharge (放电)
5	Nominal Voltage 标称电压	14.8V
6	Standard Charging Current 标准充电电流	1C CC(constant current)charged to16.8V, then CV(constant voltage 16.8V)charge till charge current decline to $\leq 0.05\text{C}$ at 23°C 在 23°C下, 用 1C CC(恒流)充电至 16.8V, 再 (恒 压 16.8V) 充电直至充电电流 $\leq 0.05\text{C}$
7	Max.Charging Current 最大充电电流	6CC(constant current)charged to16.8V, then CV(constant voltage 16.8V)charge till charge current decline to $\leq 0.08\text{C}$ at 23°C 在 23°C下, 6C CC(恒流)充电至 16.8V, 再 (恒 压 16.8V) 充电直至充电电流 $\leq 0.08\text{C}$
8	PACK voltage(As of shipment) 电池电压 (出货状态)	15.2-15.4V (cell3.8-3.85V)
9	Internal impedance (内阻)	$\leq 16\text{m}\Omega$
10	Max dimensions (最大尺寸)	27*34*75 (T*W*H)
11	Pack weight (电池重量)	MAX: 140g
12	Storage temperature 储存温度	-10°C-45°C

3.PACK Drawing 组装示意图:



No.序号	Item 项目	Size尺寸	Remarks备注
1	H	Max27mm	
2	W	Max35mm	
3	L	Max75.0mm	
4	L1	Balancer (JST-XHR插)	Wire length:50mm
5	L2	T-Connector (XT60插头)	Wire length:100mm

注：以上物料为简易物料 BOM，仅参考使用，具体参数以实物为准。

4. Performance Data 性能参数表				
4.1 Electrochemical Characteristics 电化学性能				
NO 序号	Item 项目		Criterion 标准	Test Method 测试方法
1	C-rate characteristics 放电倍率特性	0.5C	≥100%	Test Temperature at 23±3°C Charge: 1C, CC/CV, 16.8V, current ≤ 0.05C cut-off Discharge: Each rate, CC, 12V cut-off 测试温度: 23±3°C 充电: 1C 恒流恒压充到 16.8V, 电流 ≤ 0.05C 截止 放电: 每种倍率恒流放电, 截止电压 12.0V
		1C	≥98%	
		65C	≥80%	
2	Temperature Dependence of capacity 容量温度特性	60°C	≥95%	Charge: 1C, CC/CV, 16.8V, current ≤ 0.05C cut-off, at 23±3°C Discharge: 0.2C, CC, 12V cut-off at setting temperature Interval for temperature's change is 2Hrs 充电: 在 23±3°C 1C 恒流恒压充电到 16.8V, 电流 ≤ 0.05C 截止 放电: 在设定温度, 0.2C 恒流放电 12.0V 截止, 温度变化间隔是 2 小时
		45°C	≥97%	
		23°C	100%	
		0°C	≥80%	
		-20°C	≥80%	
3	Cycle Life Characteristics 循环寿命特性		≥300cycle	Capacity ≥ 80% Charge: 3C CC/CV, 16.8V, 0.03C cut-off Discharge: 30C CC 12.0V cut-off 容量 ≥ 80% 充电: 3C 恒流恒压充电到 16.8V, 0.03C 截止 放电: 30C 恒流放电 12.0V 截止
4	Storage Characteristics (Recovery Capacity) 储存特性 (可恢复容量)	23°C 6 个月 Six month at 23°C	≥90%	On a storage, Cell state is 40%~60% charge (3.7~3.9V) 电池充 40%~60% 容量 (3.7~3.9V) 储存
		45°C 3 个月 Three month at 45°C	≥80%	
		60°C 1 个月 One month at 60°C	≥80%	

4.2 Environment Characteristics 环境性能			
NO. 序号	Item 项目	Criterion 标准	Test Method 测试方法
1	Constant temperature and constant humidity test 恒定湿热	NO explosion,no fire,no leakage. Discharging capacity is not less than 60% initial capacity 不起火、不爆炸、不泄漏。放电容量不低于初始容量的 60%	After Standard Charging,test condition: Temperature:40±5℃ Relative Humidity:90~95%RH Storage Time:48Hours Then return to room temperature for 2 hours,Then 1C discharge to ending voltage 标准充电后, 测试条件如下: 温度: 40±5℃ 相对湿度: 90~95% 放置时间: 48小时 电芯取出在室温下放置 2 小时, 然后以 1C 电流放电至终止电压。
2	Vibration Test 振动	NO explosion,no fire,no leakage 不起火、不爆炸、不泄漏	After Standard Charging,fix the cell to vibration table, then subjected to vibration test for 30 minutes per axis of XYZ axes Frequency rate :1 oct/min Vibration frequency : 10Hz-30Hz Excursion(single amplitude): 0.38mm Vibration frequency : 30Hz-55Hz Excursion(single amplitude): 0.19mm 电芯标准充电后, 固定在振动台上, 然后沿XYZ每个坐标 方向振动 30 分钟 扫频速率: 1 oct/min 振动频率: 10Hz-30Hz 位移幅值(单振幅): 0.38mm 振动频率: 30Hz-55Hz 位移幅值(单振幅): 0.19mm
3	Shock test 碰撞	NO explosion,no fire,no leakage. 不起火、不爆炸、不泄漏。	After Standard Charging,test condition: Acceleration :100m/s ² Pulse lasting time :<16ms Shock times : 1000±10times 标准充电后, 测试条件如下: 加速度: 100 m/s ² 脉冲持续时间: < 16ms 碰撞次数: 1000±10次

4	Drop Test 跌落测试	NO explosion,no fire,no leakage. 不起火、不爆炸、不泄漏。	Drop the battery in the shipment condition from 1m height onto 18~20mm thick hard board on it 3 times each of X,Y,and Z directions at 25±2°C. 在出货条件下将电池高度1M的位置自由跌落到18-20M厚的硬质木板上，X，Y，X方向上各三次
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4.3 Safety Performance 安全性能			
NO. 序号	Item 项目	Criterion 标准	Test Method 测试方法
1	Overcharge Test 过充电测试	No fire、No explosion 不起火、不爆炸	0.5CmA,CC,3.0V/PCS Cut-off 3C,CC/CV,10V at 23±3°C;When the capacity reach 2.5C or time reach 60 min , end test. 对电池 0.5C mA 放电至3.0V /支 在 23±3°C的环境下用 3C、10V进行恒流恒压充电，待其充电容量至2.5C或充电时间达 60 min 后，结束测试
2	Over discharge Test 过放测试	No fire、No explosion 不起火、不爆炸	Full charge at 23±3°C 0.5CmA,CC, 0V Cut-off 电池在 23±3°C充满电 用 0.5C mA 对电池恒流放电至 0V
3	Tack Through 穿刺	No fire、No explosion 不起火、不爆炸	Full charge at 23±3°C The tack is hitted through the battery by hammer 电池在 23±3°C充满电后，将铁钉用铁锤击打使电池被刺穿
4	Short circuiting Test 短路测试	No fire、No explosion and The temperature of battery≤150°C 不起火、不爆炸 电池表面温度 ≤150°C	After standard charge, the battery shall be subjected to a short-circuit condition with a wire of resistance less than 50mΩ, the end of battery voltage less than 0.1V or superficial temperature of battery is 25±5°C 标准充电后，将接有电偶的电池置于通风橱中，短路其正负极，线路总电阻不大于 50mΩ,当电池电压小于 0.1V 或电池表面温度达到室温时停止

5. Storage and shipment requirement 存储及运输要求

Item 项目		Requirement 要求
Storage temperature 储存温度	Short period less than 1 month 少于 1 个月的短期储存	-10℃~+45℃
	Long period less than 6 month 不超过6个月长期存储	-10℃~+35℃
Humidity 湿度		<75%RH
Charged 荷电		about 20~50% charged state 20~50%荷电状态

6. Danger and Warning and Caution in handing the battery

电池使用时危险事项、警告事项及注意事项

6.1 Danger Warning 危险警告！

Danger warning(it should be described in manual or instruction for users, indicated especially)To prevent the possibility of the battery from leaking, heating, explosion, Please observe the following precautions:

危险警告：（应在使用说明手册或说明书中，特别注明）为防止电池可能发生泄漏，发热，爆炸，请注意以下预防措施：

1. Do not disassemble or reconstruct battery.
禁止拆卸或重组电池！
2. Do not short-circuit battery
禁止短路电池！
3. Do not use or leave battery nearby fire, stove or heated place(more than 80 ℃)
禁止在热源旁使用！
4. Do not immerse the battery in water or sea water , or get it wet
禁止将电池投入水中、海水中或弄湿！
5. Do not charge battery nearby the fire or under the blazing sun
禁止在近火处或阳光照射下充电！
使用指定充电器，遵照充电要求！
7. Do not drive a nail into the battery. Strike it by hammer, or tread it
禁止将钉子插入电池中、用铁锤敲打或用脚踩！
8. Do not give battery impact or fling it
禁止冲击或投掷！
9. Do not use the battery with conspicuous damage or deformation
禁止严重损害或变形下使用！
10. Do not make the direct soldering on battery
禁止在电池上直接焊接

11. Do not reverse charge or overdischarge the cell

禁止反向充电或过放电！

12. Do not reverse-charge or reverse-connect

禁止反向充电或反极连接！

13. Do not connect battery to the plug socket or car-cigarette-plug

禁止把电池连接到充电插座或汽车点烟插座上！

14. Do not use battery for unspecified equipment

禁止用于非指定设备上！

禁止直接接触漏液电池！

6.2 Warning 警告！

1. Do not use Lithium ion battery in mixture

禁止将一、二次锂电池混合使用！

2. Keep the battery away from babies

远离小孩触手可及的地方！

3. Do not get into a microwave or a high pressure container

禁止将电池置于微波或高压容器中！

4. Do not use a leaked battery nearby fire

禁止在近火处使用漏液电池！

5. Do not use an abnormal battery

禁止使用非正常电池！

6.3 Caution 小心！

1. Do not use or leave the battery under the blazing sun(or heated car by sunshine). The battery may smoke, heat or flame. And also, it might cause the deterioration of battery's characteristics or cycle life.

禁止在阳光照射下（或阳光直射的汽车上）使用或放置电池，否则可能会引起电池过热，起火荷功能实效，寿命减短

2. Do not use nearby the place where generates static electricity (more than 64V) 禁止在静电（超过 64V）场所旁使用！

3. Do not charge the battery out of recommended temperature range of 0°C and 60°C. 禁止在0°C 以下和60°C 以上环境充电！

4. When the battery has rust, bad smell or something abnormal at first-time-using, do not use the equipment and go to bring the battery to the shop which it was bought. 电池首次使用时，若有腐蚀、难闻气味或不正常现象，禁止使用用电器并送回出售点！

5. In case children use the battery, their parents teach how to use batteries according to the manual with care. 小孩要使用电池时，父母须根据手册详细指导其使用方法！

6. If the skin or cloth is smeared with liquid from the battery, wash with fresh water.

若皮肤或衣服沾上电池里的电液，请用清水冲洗！