

产 品 规 格 确 认 书

Specification for Lithium-ion Rechargeable Cell

客户名称:

Customer Name

产品名称:

Model Name

聚合物锂离子电池

规格型号:

Product model

FLY.602040.450.3.7V

送样日期:

Date:

◆ 出厂签章:

工程部 PIE	品质部 QA	业务部 B&D	批准 Approved
黄烈清	王仁树	王培	陈远洪
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规格书修订记录

Revision history

更改日期 Date	更改内容 Event	版本号 Version
2023 年 10 月 17 日 October 17, 2023	首次发行 First issue	A/0

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1. 适用范围 Scope

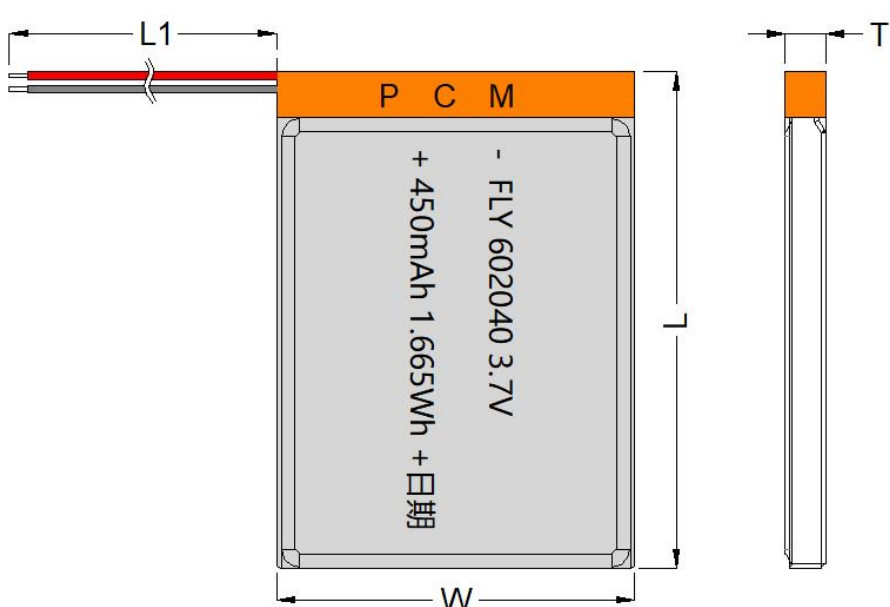
本规格书描述了远阳公司生产的可充电聚合物锂离子电池的产品性能指标。

This specification describes the performance of rechargeable polymer lithium ion batteries manufactured by FLYOUNG Company

2. 电池主要物料 Battery main materials

序号 NO.	物料名称 Material name	规格型号 Specifications	数量 Qty	备注 Remark
1.	电芯/Cell	FLY602040-450mAh 3.7V	1	6*20*40mm
2.	保护板/PCM	XBL-12A1-A (12*3.5mm 精工单 MOS-6)	1	IC:G3J/ MOS:8205A
3.	导线/Wire	UL3302-26#/尾部上锡 2.0mm	2	黑线 P-,红线 P+
4.	标签/Label			
5.	热缩套管/PVC			
6.	连接器端子 Connector terminal			

3. 电池尺寸及显示信息 Battery size and display information

		项目 Item	规格参数 Specification
		L	42.5±1.0mm
		W	20.0±1.0mm
		T	6.0±0.3mm
		L1	60.0±5.0mm
		说明:	

4. 电池规格 Specifications of cell

序号 NO.	项目 Items	规格参数 Specifications		
1.	标称电压 Nominal voltage	3.7V		
2.	标称容量 Nominal capacity	450mAh 0.2C 放电(0.2C Discharge)		
3.	最小容量 Min capacity	440mAh 0.2C 放电(0.2C Discharge)		
4.	充电电流 Charge current	标准充电: 0.2C Standard Charging: 0.2C 快速充电: 1.0C Rapid charge: 1.0C		
5.	标准充电方法 Standard Charging method	0.2C CC(恒流)充电至 4.2V,再 CV(恒压 4.2V)充电直至充电电流 $\leq 0.02C$ 0.2C CC (constant current) charge to 4.2V,then CV(constant voltage 4.2V)charge till charge current decline to $\leq 0.02C$		
6.	充电时间 Charging time	标准充电: 6.5 小时 (参考值) Standard Charging: 6.5hours(Ref.) 快速充电: 2.5 小时 (参考值) Rapid charge: 2.5hours(Ref.)		
7.	最大充电电流 Max.charge current	1.0C (450mA)	最大瞬间充电电流 Max instantaneous charging current	2.0C (900mA)
8.	最大放电电流 Max.discharge current	1.0C (450mA)	最大瞬间放电电流 Max instantaneous discharge current	2.0C (900mA)
9.	充电电压 Charge voltage	4.2V		
10.	放电截止电压 Discharge cut-off voltage	3.0V		
11.	过充保护电压 Overcharge protection	4.2V $\pm 0.02V$		
12.	过放保护电压 Overdischarge protection	3.0V $\pm 0.05V$		
13.	关断模式电压 Cell shutdown voltage			
14.	工作温度 Operating temperature (不可在极限温度长时间持续充放电) Do not charge and discharge at the limit temperature for a long time	充电/ Charging:	0 $^{\circ}C$ ~45 $^{\circ}C$: 0.2C	16 $^{\circ}C$ ~45 $^{\circ}C$: 1.0C
		放电/ Discharging:	-10 $^{\circ}C$ ~55 $^{\circ}C$: 1.0C	
15.	储存温度 Storage temperature	1 个月内:-10 $^{\circ}C$ ~ +45 $^{\circ}C$ Within 1 month: -10 $^{\circ}C$ ~ +45 $^{\circ}C$	3 个月内:-10 $^{\circ}C$ ~ +40 $^{\circ}C$ Within 3 months -10 $^{\circ}C$ ~ +40 $^{\circ}C$	6 个月内:-10 $^{\circ}C$ ~ +35 $^{\circ}C$ Within 6 months: -10 $^{\circ}C$ ~ +35 $^{\circ}C$
16.	电池内阻 Resistance	$\leq 220m\Omega$ (成品 finish product)		
17.	出厂电压 Factory voltage	3.8V-4.1V(SOC $\geq 50\%$)		
18.	重量 Weight	$\approx 8.9g$		
19.	环保要求 Environmental request	满足 ROHS 要求 Meet ROHS requirements		

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5. 外观检查 Visual inspection

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。

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

6. 测试条件 Test Conditions

6.1 标准测试条件 Standard Test Conditions

除非特别说明，本标准书中所有测试均在以下环境条件下进行：

温度：25±2℃ 湿度：≤65%RH

Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition:

Temperature: 25±2℃ Humidity: ≤65%RH

6.2 标准充电方式 Standard Charge Method

“标准充电”即在环境温度为 25°C±2°C 的条件下，先以恒定电流（0.2C）充电至 4.2V，再以 4.2V 的恒压充电至电流小于（0.02C）。

The "Standard Charge" means charging the cell at a constant current of （0.2C）until the voltage is 4.2V, and then charged at a constant voltage of 4.2V until its current is less than （0.02C）mA. For test purpose, charging shall be performed at 25°C±2°C.

6.3 标准放电方式 Standard discharge method

“标准放电”即在环境温度为 25°C±2°C 的条件下，以恒定电流（0.2C）放电到 3.0V。

The "Standard Discharge" means discharging the cell at a constant current of （0.2C）until the voltage is 3.0V. For test purpose, discharging shall be performed at 25°C±2°C.

7. 性能检查及测试 Performance Criteria

7.1 电性能 Electrical characteristics

序号 NO.	项目 Items	测试方法 Test Method	标准 Criteria
1.	初始容量 Rated Capacity	该容量是指标准充电后，0.2C 放电至 3.0V 截止电压所放出的容量。 The capacity means the discharge capacity of the cell, which is measured with discharge current of 0.2C with 3.0V cut-off voltage after standard charge.	≥450mAh
2.	循环寿命 Cycle Life	测试条件：先用 5.1.1 方法将电池充电，再以 0.2C 放电至 3.0V 截止，每个步骤中间间隔 10 分钟，当放电容量降至初始容量的 80%时，所完成的循环次数定义为该电池的循环寿命。 Test conditions: first charge the battery by method 5.1.1, and then discharge the battery at 0.2C to 3.0V, with an interval of 10 minutes between each step. When the discharge capacity drops to 80% of the initial capacity, the cycle life of the battery is defined as the number of completed cycles.	≥300 次 ≥300Times
3.	自放电 Self-discharge	标准充电后，在 No.5.4 条件下贮存 28 天，再以 0.2C 放电至 3.0V 所放电的容量。 After the standard charging, storied the cells under the condition as No.5.4 for 28 days, then measured the capacity with 0.2C till 3.0V	余容量>85% Residual capacity >85%

4.	温度特性 Temperature Characteristics	1.在 25±2℃条件下, 用 5.1.1 方法将电池充电。 2.在不同温度条件下, 用 0.2C 的电流恒流放电至截止电压 3.0V。以 25℃时放电容量为基准计算百分比。 1. According to item 5.1.1, at 25±2℃. 2. Capacity comparison at each temperature, measured with constant discharge current 0.2C with 3.0V cut-off. Percentage as an index of the capacity compared with 100% at 25℃	-10℃: ≥60% 0℃: ≥85% 25℃: 100% 55℃: ≥90%
5.	内阻 Resistance	环境温度 (25±2)℃, 电池荷电 50%状态时以 1KHz 交流电测得的内部阻抗。 Ambient temperature (25± 2) When ℃, 50% of the battery charge status to 1KHz AC measured internal impedance	≤220mΩ

7.2 安全测试 Safety test

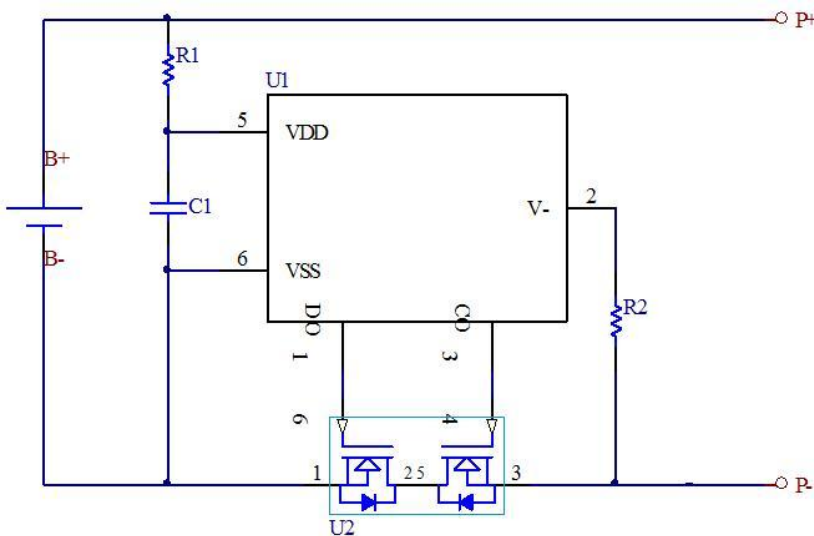
序号 NO.	项目 Items	测试方法 Test Method	标准 Criteria
1.	跌落测试 Drop Test	将标准充电后的电池从 1 米高度跌落至混凝土地面 2 次 The cell is to be dropped from a height of meter twice onto concrete ground.	无起火、无泄漏 No fire, no leakage.
2.	过充实验 (无保护板) Overcharge experiments	在标准测试环境下, 电池用 3C 电流限制电压 4.6V 的制式充电 7 小时 Under the standard test environment, battery 3C current limit voltage of 4.6V charging standard 7 hours.	不爆炸、不起火 No explosion, no fire
3.	振动测试 Vibration Test	将标准充电后的电池固定在振动台上, 沿 X、Y、Z 三个方向各振动 30 分钟, 振幅 1.6 mm, 振动频率为 10Hz~55Hz, 每分钟变化为 1Hz。 After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz and 55Hz, the excursion of the vibration is 1.6mm.The cell shall be vibrated for 30 minutes per axis of XYZ axes.	无起火、无泄漏 No fire, no leakage.
4.	过放实验 (无保护板) Over-discharge experiments	电池以 0.2C 电流恒流放电至终止电压 3.0V,外接 30Ω负载放电 7 小时 Batteries 0.2C termination voltage constant current discharge to 3.0V, external 30Ω load discharge 7 hours.	不爆炸、不起火 No explosion, no fire
5.	短路保护性能 (无保护板) Short-circuit protection performance	电池充满电后, 将正负极用 0.1Ω电阻器短路 1h, 观察电池外观, 断开正负极, 以 1C 电流瞬时充电 5S 后用电压表测量电池电压。 After the battery is fully charged , the positive and negative with a 0.1Ω resistor short circuit 1h, observe the appearance of the battery , disconnect the positive and negative , in order to charge the 5S 1C current instantaneous measurement of the battery voltage with a voltmeter .	不爆炸、不起火 No explosion, no fire

7.3 环境适应性 Reliability

序号 NO.	项目 Items	测试方法 Test Method	标准 Standard
1.	高温实验 High temperature experiments	将充满电的电池在 55℃环境中放置 2 小时。 The fully charged battery is placed in 55℃ environment in two hours .	电性能、外观不受影响 Electrical performance, appearance is not affected
2.	低温实验 Low temperature experiments	将充满电的电池在-10℃的环境中放置 2 小时后在室温中放置 3 小时。 After fully charged battery is placed in the environment -10℃ for 2 hours at room temperature for 3 hours to place .	电性能、外观不受影响 Electrical performance, appearance is not affected
3.	高温高湿实验 High temperature and humidity test	将充满电的电池放入 40±2℃、相对湿度为 90%~95%的恒温湿箱中搁置 48h 后, 取出电池在环境温度 20±5℃的条件下搁置 2h。 The fully charged battery into 40 ± 2 °C, relative humidity of 90 % to 95 % of the wet tank thermostat shelved after 48h, remove the battery for 2h at 20 ± 5 °C ambient temperature conditions .	电性能、外观不受影响, 包括包装。 Electric properties, appearance is not affected, including packaging.

8. 保护板参数 PCM parameter

8.1 保护板原理图 PCM Schematic Diagram



8.2 保护板性能 PCM performance

项目 Items	经典值 Criteria	最小值 MIN	最大值 MAX
1. 过充保护电压 Over charge protection voltage	4.28V	4.235V	4.325V
2. 过充保护恢复电压 Over charge release voltage	4.08V	4.03V	4.13V

3. 过放保护检测电压 Over discharge detection voltage	3.00V	2.95V	3.05V
4. 过放保护恢复电压 Over discharge release voltage	3.00V	2.95V	3.05V
5. 充电过流检测电压 Charging Overcurrent Detection Voltage	0.20V	0.15V	0.25V
6. 放电过流检测电压 Discharge overcurrent detection voltage	0.08V	0.065V	0.095V
7. 放电过流保护电流 Discharge overcurrent protection current	2.00A	1.3A	3.0A
8. 充电过流保护电流 Charging Overcurrent Protection Current	5.0A	3.0A	6.5A
9. 过充保护延迟时间 Overcharge protection delay time			
10. 过放保护延迟时间 Over discharge protection delay time			
11. 短路保护延迟时间 Short protection delay time	300us		400us
12. 恢复条件 Release Conditions	断开负载/充电恢复		
13. 正常工作时自耗电电流 Current consumption(Operation)	3.0μA		6.0μA
14. 备机状态时自耗电电流 Current consumption(standby)			0.1μA
15. 内阻 Internal resistance	45mΩ		60mΩ
16. 最大持续充电电流 Maximum continuous charging current			1.0A
17. 最大持续放电电流 Maximum continuous discharge current			1.0A
18. 0V充电功能 0V battery charge functions	允许 Available		

8.3 保护板主要元件清单 PCB component list

序号 NO	物料名称 Description	物料型号 Material model	单位 Unit	用量 Quantity	位号 Tag number	品牌 Brand
1.	保护 IC Protection IC	G3J/SOT-23-6	PCS	1	U1	
2.	MOS	8205A/ SOT-23-6	PCS	1	U2	
3.	贴片电阻 SMD Resistance	470Ω/±5%/0603	PCS	1	R1	
4.	贴片电阻 SMD Resistance	2KΩ/±5%/0603	PCS	1	R2	
5.	贴片电容 SMD Capacitance	0.1uF/+80%-20%/0402	PCS	1	C1	

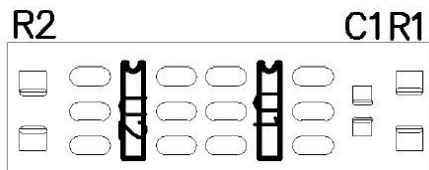
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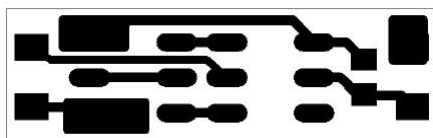
电话:0769-83269986 地址: 东莞市寮步镇松湖智谷研发中心 A4 栋 4F

8.4 保护板布局 PCM layout

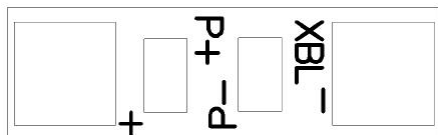
TOP SILKSCREEN



TOP SIDE



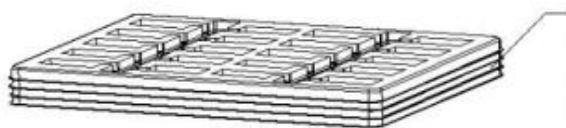
BOTTOM SILKSCREEN



BOTTOM SIDE

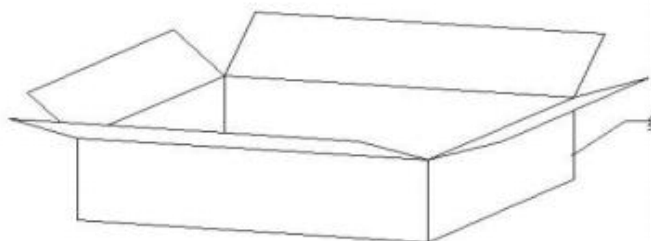


9. 包装说明 Packing instruction



每盘以及每箱数量根据实际量产为准。

The quantity of each plate and box is subject to actual mass production.



纸箱尺寸以实际量产为准；

The size of the carton is subject to actual mass production.;

整箱重量≤15KG。

weight ≤15KG.

10. 储存及运输 Storage and Transportation

10.1 储存 Storage:

10.1.1 锂电池需保存在阴凉，干燥，通风的环境中，避免接触火源与热源。

The Li-ion battery pack should be stored in a cool, dry and well-ventilated area, and should be far from the fire and the high temperature.

10.1.2 电池需按规格书规定温度范围进行储存，最佳储存温度为 0 到 25℃，最佳湿度为 65±25%。

The battery should store in the product specification book stipulation temperature range, the best storage temp. is 0 to 25℃. The best humidity is 65±25%.

10.1.3 电池应当在室温下存放，应充到 40%至 60%的电量。为防止电池过放，建议每 3 个月按标准充电方式进行一次充电，如储存时间超过一年，建议每年按标准充放电方式进行一次充、放电循环以激活电池。

The battery should be stored within room temperature, and charged to 40%~60% electric quantity. In order to avoid over-discharge, we suggest charge the batteries every three months. If stored over one year, we suggest activate the battery as per standard charge-discharge method.

10.2 运输 Transportation:

10.2.1 请勿与其他货物混合。

Do not mix the battery products with other cargos.

10.2.2 请勿将电池浸入水中或使其受潮。

Do not immerse the battery products in water or allow it to get wet.

10.2.3 请勿叠放超过 7 层或倒置。

Do not over 7 layers staking and upside-down.

10.2.4 最高运输温度不超过 55℃。

The highest temperature in transportation is lower than 55℃.

10.2.5 出货电池处于 3.8~4.0V 充电状态，由于电池存在自耗，运送到客户端的电池无法完全保证 3.8~4.0V。

The capacity of delivery cell is approximately at 3.8~4.0V of charging. It is not specified more than 3.8~4.0V at customer, because of self-discharge.

11. 使用注意事项 Use Attentions:

为确保电池正确使用，请在阅读使用说明书。

To ensure proper use of the battery please read the manual carefully before using it.

11.1 警告 Warnings :

11.1.1 不可将电池置于火中。

Do not expose to, dispose of the battery in fire.

11.1.2 不可将电池充电器正负极反接。

Do not put the battery in a charger or equipment with wrong terminals connected.

11.1.3 不可将电池短路。

Avoid shorting the battery.

11.1.4 避免电池过度冲击和震荡。

Avoid excessive physical shock or vibration.

11.1.5 不可拆解或扭曲电池。

Do not disassemble or deform the battery.

11.1.6 不可浸入水中。

Do not immerse in water.

11.1.7 不可将该电池与其他种类和型号的电池混用。

Do not use the battery mixed with other different type or model batteries.

11.1.8 请置于儿童接触不到的地方。

Keep out of the reach of children.

11.2 充电 Charge:

11.2.1 请使用合适的充电器对电池充电。

Battery must be charged in appropriate charger only.

11.2.2 请勿对电池充电 24H 以上。

Do not leave battery in charger over 24 hours.

11.2.3 不可使用超出本规格书最大充电电流对电池进行充电。

Charging current: Can not surpass the biggest charging current which in this specification book stipulated.

11.2.4 充电电压: 请不要超出本规格书所规定最高充电电压。

Charging voltage: Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

11.2.5 充电温度: 电池需在指定温度范围内进行充放电。

Charge temperature: The battery must carry on the charge in the ambient temperature scope which this specification book stipulated.

11.2.6 请使用恒流恒压方式进行充电。请勿反接正负极, 以免损坏电池。

Uses constant current and constant voltage way charge. PLS connect the positive and negative terminals in right way, or the battery may be damaged.

11.2.7 电池必须带电储存, 并且每三个月进行充放电一次。

The battery must be stored after charged, and should be charged and discharged once every 3 months.

11.3 放电 Discharge :

11.3.1 放电电流不可超过规格书最大额定放电电流。大电流会导致电池发热和容量降低。

The discharging current should not surpass the biggest discharging current this specification book stipulation, The large discharge current can cause heat and lower capacity.

11.3.2 放电温度: 电池必须在规格书规定温度范围内放电。

Discharge temperature: The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

11.3.3 过放电: 电池瞬间过放然后立即充电不会损坏电池。但是如果长时间过放, 电池将会被损坏。在长期储存中, 可能由于电池自放电而导致电池处于过放状态。因此为避免电池过放, 必须带电储存。

Over-discharge: After short time over discharge, then charge immediately won't damage the battery. But the battery will be damaged for being long time over discharged. During long-term storage, the battery may be within over-discharging condition for self discharge. To prevent the occurrence of over discharging, the battery should maintain the certain capacity when storage.

11.4 电池操作注意事项 Handling of Cells

1 铝箔软包装 Soft Al foil

- 勿用尖锐处撞击电池。
- Don't strike battery with any sharp edge parts.
- 剪掉指甲, 或者戴手套。
- Trim your nail or wear glove before taking battery.
- 清理工作台, 避免尖锐零部件。
- Clean worktable to make sure no any sharp particle.
- 严禁直接加热电池, 高于 55°C 度会损害电芯。
- Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approx. 55°C

10.5 处理措施 Disposal :

不同国家有不同规定。请按当地规定进行处理。

Regulations vary for different countries. Dispose of in accordance with local regulations.

12. 质保期限 Warranty

质保是从出厂日期（喷码）开始起十二个月。

Warranty period for this product is 12 months starting from the date when the products left the door of manufacturer.

自出货之日起，电池的保质期限依合同而定，但是在此期限内，如果非远阳公司的制程原因而是客户的误用造成的电池质量问题，远阳公司不承诺免费更换。

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

＞远阳公司对违反安全守则操作所产生的问题不承担任何责任。

FLYOUNG will not be responsible for trouble occurred by handling outside of the precautions in instructions.

＞远阳公司对与电路、电芯组、充电器搭配使用所产生的问题不承担任何责任。

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

＞出货后客户在产品组装过程中产生的不良电池不在远阳公司质量保证的范围之列。

FLYOUNG will be exempt from warrantee any defect cells during assembling after acceptance.

＞规格书所未包含的其它条款由双方协议解决。

Any other items which are not covered in this specification shall be agreed by both parties.