FLYOUNG ENERGY 远阳®

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 锂电池 602035-400mAh

物料编码:

Model Number FLY.602035.400

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
送样数量 sample quantity:		确认书份数 Copy:	

◆ 客户确认签章:

审 核 Checked	批 准 Approved	确认签章 Company Stamp

效 率 服 务 创 造 品 牌　　诚 信 品 质 铸 就 未 来

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

规格书修订记录 Revision history

更改日期 Date	更改内容 Event	版本号 Version
2022 年 09 月 23 日	首次发行 First issue	A/0

目 录 Content

1.适用范围 Scope **4**

2.型 号 Model **4**

3.电芯尺寸 Battery size **4**

4.电芯规格 Specifications of cell **5**

5.电芯性能检查及测试 Battery Cell Performance Criteria **6**

5.1 充放电性能 Electrical characteristics 6

5.2 机械特性 Mechanical characteristics 6

5.3 外观检查 Visual inspection 7

5.4 标准测试环境 Standard environmental test condition 7

6.储存及运输 Storage and Transportation **8**

6.1 储存 Storage: 8

6.2 运输 Transportation: 8

7.使用注意事项 Use Attentions: **8**

7.1 警告 Warnings : 8

7.2 充电 Charge: 9

7.3 放电 Discharge : 9

7.4 电池操作注意事项 Handling of Cells 10

7.5 处理措施 Disposal : 10

8.附录 Appendix **11**

9.电池组规格 Specifications of battery pack **12**

10.保护板参数 PCM parameter **13**

10.1 保护板性能 Protect the board performance 13

10.2 保护板主要元件清单 PCB component list 13

10.3 应用原理图 Application Schematic 14

10.4 保护板图纸 PCB dimention 14

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。

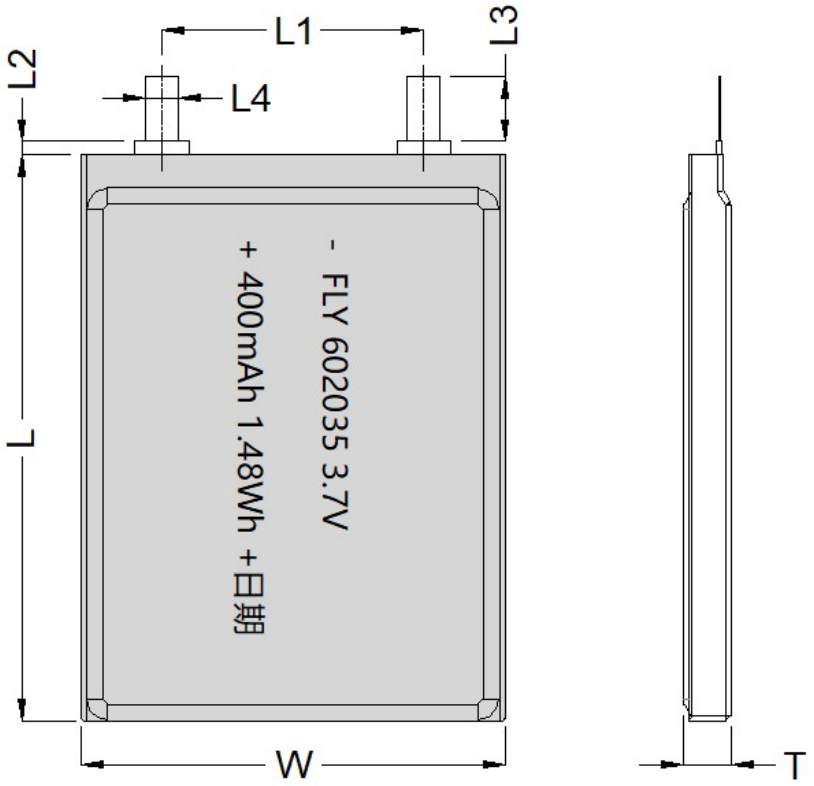
This specification describes the performance of rechargeable polymer lithium ion batteries manufactured by FLYOUNG Company

2. 型 号 Model

FLY 602035-400mAh 3.7V

3. 电芯尺寸 Battery size

项目 Item	均值 Mean	公差 Tolerance
T	6.00mm	±0.3mm
W	20.0mm	±1.0mm
L	35.0mm	±1.0mm
L1	9.0mm	±2.0mm
L2	1.2mm	±1.0mm
L3	6.5mm	±1.0mm
L4	2.0mm	±0.3mm



4. 电芯规格 Specifications of cell

NO.	Items	Specifications
1	充电电压 Charge voltage	4.2V
2	标称电压 Nominal voltage	3.7V
3	标称容量 Nominal capacity	400mAh 0.2C 放电(0.2C Discharge)
4	最小容量 Min capacity	390mAh 0.2C 放电(0.2C Discharge)
5	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
6	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≤0.02C 0.2C CC（constant current）charge to 4.2V,then CV(constant voltage 4.2V)charge till charge current decline to ≤0.02C
7	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： 3.5 小时（参考值） Rapid charge： 3.5hours(Ref.)
8	最大充电电流 Max.charge current	1.0C (400mAh)
9	最大放电电流 Max.discharge current	1.0C (400mAh)
10	放电截止电压 Discharge cut-off voltage	3.0V
11	工作温度 Operating temperature	充电：0℃~45℃ Charging：0℃~45℃ 放电：-10℃~55℃ Discharging：-10℃~55℃
12	储存温度 Storage temperature	1 个月内:-10℃~ +45℃ Within 1 month：-10℃ ~ +45℃ 3 个月内:-10℃~ +40℃ Within 3 months -10℃ ~ +40℃ 6 个月内:-10℃~ +35℃ Within 6 months：-10℃ ~ +35℃
13	电芯尺寸 Cell Dimension	长度 Length ： 36.0mm Max (not including tabs) 宽度 Width ： 21.0mm Max 厚度 Thickness ： 6.3 mm Max
14	电芯内阻 Resistance	≤160mΩ
15	出厂电压 Factory voltage	3.8V-4.1V

5. 电芯性能检查及测试 Battery Cell Performance Criteria

5.1 充放电性能 Electrical characteristics

NO.	Items	Test Method and Condition	Criteria
1	标准充电 Standard Charge	先用 0.2C 恒流充电至 4.2V，再恒压 4.2V 充电直至充电电流 ≤0.02C First, charge with 0.2c constant current to 4.2V, and then charge with 4.2V constant voltage until charging current ≤ 0.02C	
2	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.	≥400mAh
3	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，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 condition：Charge: 5.1.1，Discharge: 0.2C to3.0V 80% or more of 1st cycle capacity at0.2C discharge of Operation	≥300
4	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 for28 days, then measured the capacity with 0.2C till 3.0V	余容量>90% Residual capacity >90%
5	温度特性 Temperature Characteristics	1.在 25±5℃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±5℃. 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% 25℃: 100% 55℃: ≥85%
6	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	≤160mΩ

5.2 机械特性 Mechanical characteristics

NO.	Items	Test Method and Condition	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 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 8 小时 Under the standard test environment, battery 3 c current limit voltage of 4.6 V charging standard 8 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 Over-discharge experiments	电池以 0.2C 电流恒流放电至终止电压 2.5V,外接 30Ω 负载放电 24h Batteries 0.2C termination voltage constant current discharge to 2.5V, external 30Ω load discharge 24	不爆炸、不起火 No explosion, no fire
5	短路保护性能 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
6	热冲击实验 Thermal shock test	将充满电的电池放在重力对流或循环空气的烘箱中进行加热，烘箱的温度以 5±2℃的速率上升到 130±2℃后保温 10 分钟。 The fully charged battery in gravity convection or circulating air oven for heating , the temperature of the oven at a rate of 5 ± 2 ℃ for 10 minutes after rising to 130 ± 2 ℃.	不爆炸、不起火 No explosion, no fire

5.3 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.

5.4 标准测试环境 Standard environmental test condition

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±5℃　　湿度：≤75%RH

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

Temperature：25±5℃

Humidity:　≤75%RH

序号 NO.	项目 Project	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 60℃环境中放置 2 小时。 The fully charged battery is placed in 60 ℃ 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	将充满电的电池在-20℃的环境中放置 2 小时后在室温中放置 3 小时。	电性能、外观不受影响 Electrical performance,

	experiments	After fully charged battery is placed in the environment -20 ℃ for 2 hours at room temperature for 3 hours to place .	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 ℃, relative humidity of 90 % to 95 % of the wet tank thermostat shelved after 48h, remove the battery for 2h at 20 ± 5 ℃ ambient temperature conditions .	电性能、外观不受影响，包括包装。 Electric properties, appearance is not affected, including packaging.

6. 储存及运输 Storage and Transportation

6.1 储存 Storage:

6.1.1 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.

6.1.2 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 60±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 60±25%.

6.1.3 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.

6.2 运输 Transportation:

6.2.1 请勿与其他货物混合。

Do not mix the battery products with other cargos.

6.2.2 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.

6.2.3 请勿叠放超过 7 层或倒置。

Do not over 7 layers staking and upside-down.

6.2.4 最高运输温度不超过 65℃。

The highest temperature in transportation is lower than 65℃.

7. 使用注意事项 Use Attentions:

为确保电池正确使用，请在使用之前阅读使用说明书。

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

7.1 警告 Warnings :

7.1.1 不可将电池置于火中。

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

7.1.2 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.

7.1.3 不可将电池短路。

Avoid shorting the battery.

7.1.4 避免电池过度冲击和震荡。

Avoid excessive physical shock or vibration.

7.1.5 不可拆解或扭曲电池。

Do not disassemble or deform the battery.

7.1.6 不可浸入水中。

Do not immerse in water.

7.1.7 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.

7.1.8 请置于儿童接触不到的地方。

Keep out of the reach of children.

7.2 充电 Charge:

7.2.1 请使用合适的充电器对电池充电。

Battery must be charged in appropriate charger only.

7.2.2 请勿用返修或损坏过的充电器充电。

Never use a modified or damaged charger.

7.2.3 请勿对电池充电 24H 以上。

Do not leave battery in charger over 24 hours.

7.2.4 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.

7.2.5 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.

7.2.6 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.

7.2.7 请使用恒留恒压方式进行充电。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.

7.2.8 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.

7.3 放电 Discharge :

7.3.1 放电电流不可超过规格书最大额定放电放电电流。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.

7.3.2 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.

7.3.3 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.

7.4 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.

2 封边被加热到 100°C 以上以及弯折封边都容易使封边受损。

Sealed edge may be damaged by heat above 100°C, bend or fold sealed edge.

3 极耳操作注意事项 Handling of Tabs

●极耳的机械强度并非异常坚固，特别是铝极耳。没有必要时禁止弯折极耳。

● The battery tabs are not so stubborn especially for aluminous tab.Do not bend tabs unnecessarily.

4 极耳连接 Tab Connection

建议使用超声波或点焊焊接方法；外壳设计应使极片不受外力,如果使用人工焊接保护板，下面的注意事项对于确保电池性能非常重要：

Ultrasonic or spot welding is recommended; The shell shall be designed so that the pole piece is free from external force. If manual welding protective plate is used, the following precautions are very important to ensure the performance of the battery

●焊接铬铁的温度必须可控且可防静电；

●The solder iron should be temperature controlled and ESD safe;

●焊接时铬铁的温度不能超过 370℃；

●Soldering temperature should not exceed 370°C;

●焊锡时间不能超过 3 秒钟；

●Soldering time should not be longer than 3s;

●焊锡次数不能超过 5 次，待极片冷却后才能进行下一次焊锡；

●Soldering times should not exceed 5 times, Keep battery tab cold down before next time soldering;

●严禁直接加热电芯，高于 100℃度会损害电芯。

●Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approx. 100°C

7.5 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.

8. 附录 Appendix

前言：文件“聚合物锂离子充电电池操作指示及注意事项”仅适用于远阳公司生产的电池。
Preface:This document of ‘Polymer lithium ion rechargeable battery operating instructions and matters needingattention ’shall be applied to the battery cells manufactured by FLYOUNG company .

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芯，应事先联系远阳公司，因为需要进行特定的实验测试以核实电芯在该使用条件下的性能及安全性。
Note(1):
The customer is requested to contact FLYOUNG company in advance, if and when the customer needs otheapplications or operating conditions than those described in this document. Additional experimentationmay be required to verify performance and safety under such conditions.

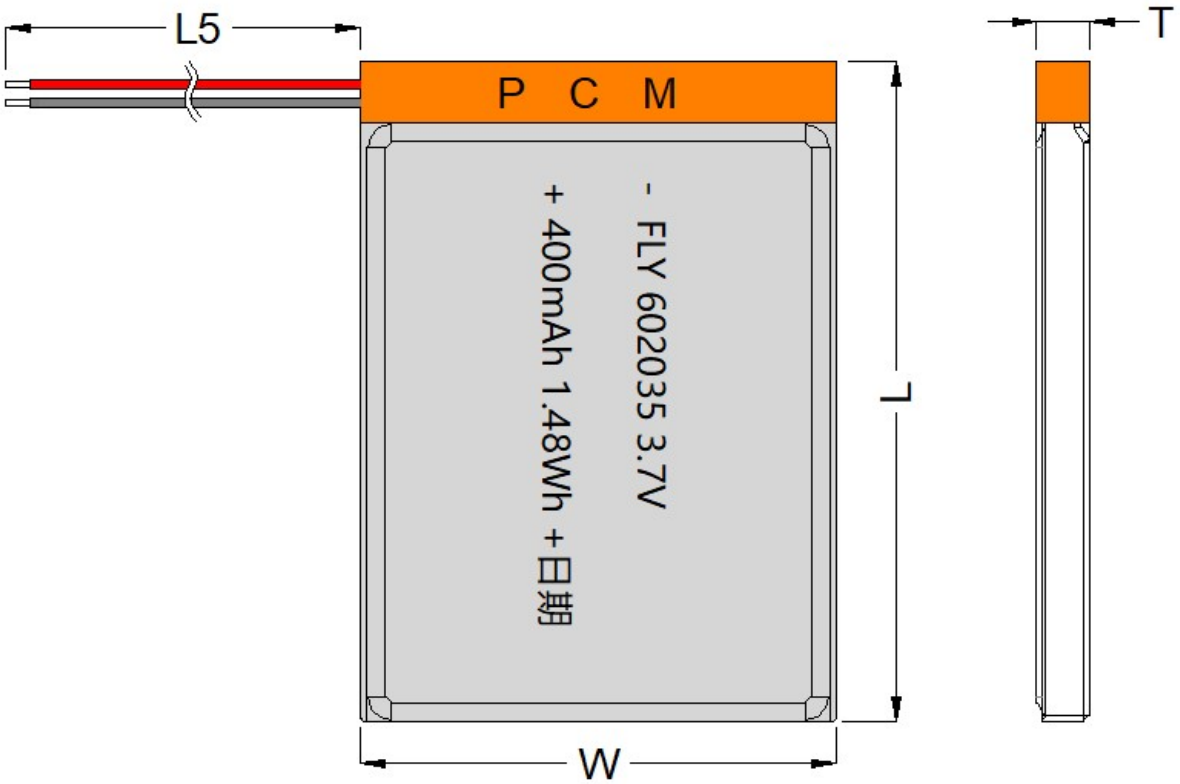
声明二：
对于在超出文件规定以外的条件下使用电芯而造成的任何意外事故远阳概不负责。
Note(2):
FLYOUNG company will take no responsibility for any accident when the cell is used under other conditions than thosedescribed in this Document.

声明三：
如有必要，远阳公司会以书面形式告之客户有关正确操作使用电池的改进措施。
Note(3):
FLYOUNG company will inform, in a written form, the customer of improvement(s) regarding proper use and handing of theif it is deemed necessary

声明四：
规格书所未包含的其它条款由双方协议解决。
Note(4):
Any other items which are not covered in this specification shall be agreed by both parties.

9. 电池组规格 Specifications of battery pack

项目 Item	规格参数 Specification
L	Max32.5mm
W	Max21.0mm
T	Max6.3mm
L5	30.0±5.0mm
保护板 PCM	15mm 普通板单 MOS-6
线材 Wiring & Connection	1571-28#/尾部上锡 2.0mm
成品电池内阻 Interior Resistance	≤250mΩ



10. 保护板参数 PCM parameter

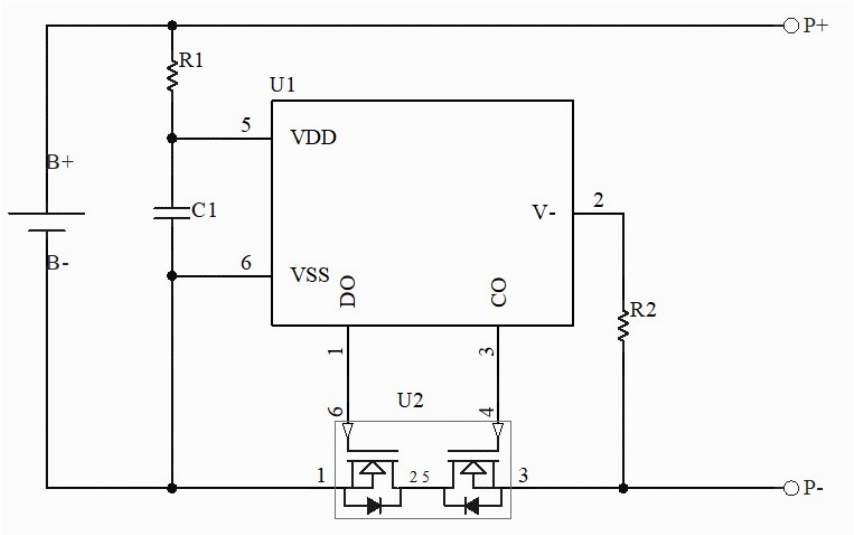
10.1 保护板性能 Protect the board performance

项目Item	经典值Criteria	最小值MIN	最大值MAX
1. 过充保护电压 Over charge protection voltage	4.30V	4.25V	4.35V
2. 过充保护恢复电压 Over charge release voltage	4.10V	4.05V	4.15V
3. 过放检测电压 Over current detection voltage	2.5V	2.4V	2.6V
4. 过放保护恢复电压 Over discharge release voltage	3.00V	2.90V	3.10V
5. 放电过流检测电压 Discharge over current to detect voltage	0.15V	0.12V	0.18V
6. 充电过流检测电压 Charging Over current detection voltage	/	/	/
7. 放电过流保护电流 Discharge overcurrent protection current	3.5A	2.0A	5.0A
8. 充电过流保护电流 Charging Overcurrent Protection Current	/	/	/
9. 短路保护延迟时间 Short protection delay time	400us	/	600us
10. 正常工作时自耗电流 Current consumption(Operation)	3.0μA		6.0μA
11. 备机状态时自耗电流 Current consumption(standby)	1.5μA		3.0μA
12. 正常工作时导通内阻 Impedance	45mΩ		60mΩ
13. 最大持续充放电电流 Maximum continuous charge discharge current			1.2A

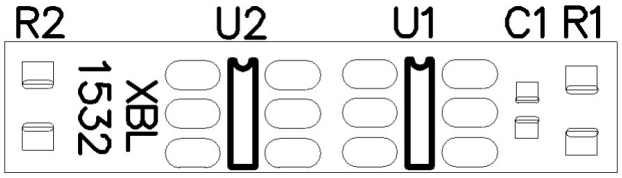
10.2 保护板主要元件清单 PCB component list

序号 NO.	物料名称 Description	物料代号 Location	物料规格 Part No.	用量 Qty
1	保护IC Protection IC	U1	DW01/SOT-23-6	1
2	MOS	U2	8205/ SOT-23-6	1
3	贴片电阻 SMD Resistance	R1	100Ω/±5%/0603	1
4	贴片电阻 SMD Resistance	R2	1KΩ/±5%/0603	1
5	贴片电容 SMD Capacitance	C1	0.1uF/+80%-20%/0402	1

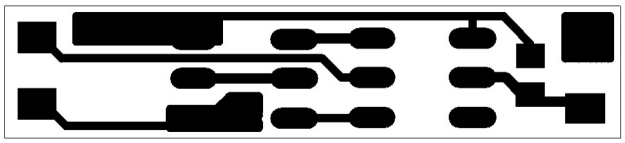
10.3 应用原理图 Application Schematic



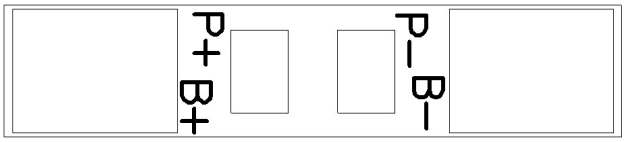
10.4 保护板图纸 PCB dimention



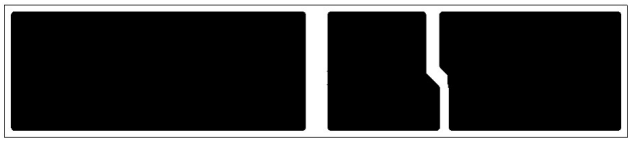
TOP SILKSCREEN



TOP SIDE



BOTTOM SILKSCREEN



BOTTOM SIDE