



PRODUCT SPECIFICATION

DOC NO.: PS-602535-01

REV. : A

SHEET : 1 OF 13

Specification Approval Sheet(cell)

产 品 规 格 书 (电 芯)

Customer Name 客户名称 _____

Cell Model 电芯型号 602535Cell Capacity 电芯容量 500 mAhCustomer Model 客户型号 602535Cell P/N 电芯料号 PLC.602535-500mAhPLC.602535-500mAh

| Prepared by制作 | Checked by审核 | Approved by批准 |
|---------------|--------------|---------------|
| 08/26/18 | 08/26/18 | 08/26/18 |

| Customer Approved 客户承认 (Stamp) (盖章) | Approved by 批准 | Date 日期 |
|--|----------------|---------|
| | | |



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AMENDMENT RECORDS

规格变更记录

| Revision | Description | Date | Approval |
|----------|-------------|----------|----------|
| A | New Release | 08/26/18 | |
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1. Scope 使用范围

This document describes the Product Specification of the Lithium-ion Polymer (LIP) rechargeable battery ce supplied by Dongguan taisko energy co. LTD

本规格书适用于taisko生产的可充电聚合物锂离子电芯的产品性能指标。

2. Model 型号

602535

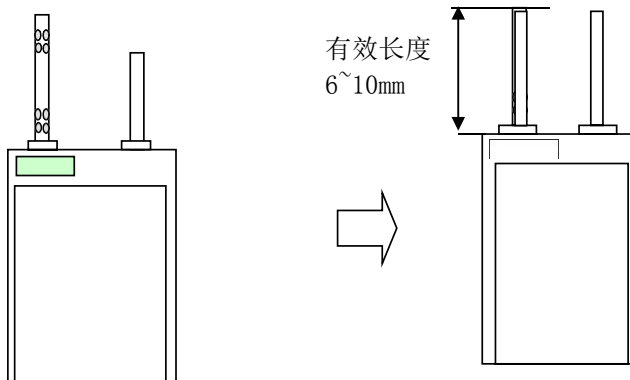
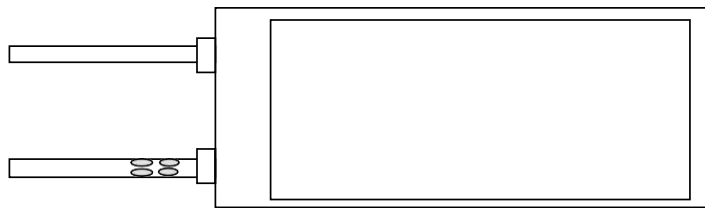
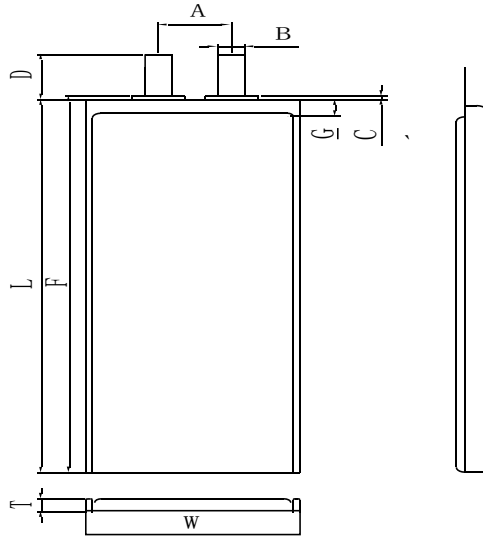
3. Reference standard 参考标准

GB31241-2014 UL1642

4. Specification 产品参数

| NO. | Items 项目 | Specifications 规格 | | |
|-----|------------------------------------|--|--|--|
| 1 | Nominal voltage 标称电压 | 3.7V | | |
| 2 | Charge cut-off voltage 充电截止电压 | 4.2V | | |
| 3 | Discharge cut-off voltage 放电截止电压 | 3.0V | | |
| 4 | Typical capacity 典型容量 | 500mAh@0.2C discharge | | |
| 5 | Standard charge method 标准充电 | Charging the cell initially with constant current at 0.5C and then with constant voltage at 4.2V till charge current declines to 0.02C. 先以0.5C恒流充电，当电芯电压达到4.2V后，改为恒压充电直到充电电流小于或等于0.02C。 | | |
| 6 | Max charge rate 最大充电倍率 | 1.0C | | |
| 7 | Max discharge rate 最大放电倍率 | 1.0C | | |
| 8 | Operating temperature 工作温度 | Charge temperature 充电温度 | 0~15℃ Standard charge method 15~45℃ Charge current:0.5C | |
| | | Discharge temperature 放电温度 | -20~60℃ | |
| 9 | Initial Impedance 初始内阻 | ≤180mΩ | 交流阻抗 AC 1kHz | |
| 10 | Cell Voltage of shipment 出货电压 | 3.80-4.00V | / | |
| 11 | Whether there is coulometer 是否带电量计 | | 否 | |
| 12 | Weight 电芯重量 | 约9.8 g | | |
| 13 | Match battery team 电芯配组 | 配组方式: 1S1P | | |
| 14 | 外形尺寸 | T | 6.20mm Max | Thickness 厚度(不含胶纸) |
| | | W | 25.5mm Max | Width 宽度(不含胶纸, 双折边) |
| | | L | 35.5mm Max | Length(Without sealant) 电芯长度(含极耳胶) |
| | | G | 3.0±0.5mm | Top sealing length 顶边宽度 |
| | | A | 13.0±1.5mm | Tab distance 极耳中心距 |
| | | B | 2.0±0.5mm | Tab width 极耳宽度 |
| | | D | 6~10mm | 裁极耳尺寸(含极耳胶) |
| | | C | 0.5~2.0mm | Sealant Length 极耳胶尺寸 |
| 15 | Storage temperature 储存温度 | 3 months 三个月内 | -20℃ ~+45℃ | The capacity for a long time storage shall be 60~70% range 长期存储容量为60%~70% |
| | | 6 months 六个月内 | 23℃±2℃ | |
| | | Long Time Storage 长期存储 | 23℃±2℃ | |
| | | Humidity 湿度 | 60%±20% | |

5. Cell Drawing 电芯外形尺寸示意图





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

6.1 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.

不允许有影响电芯价值的外观缺陷,例如:裂纹、裂缝、泄漏等。

6.2 Standard environmental test condition 标准测试环境

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

除非有其他特殊说明,本规格书中所有测试都在以下环境条件进行:

Temperature 温度 : 20 ± 5 °C , Humidity 相对湿度: 60 ± 20 %

6.3 Electrical characteristics 充放电性能

| NO. | Items 项目 | Test Method and Condition 测试方法 | Criteria 标准 |
|-----|---------------------------------|---|--|
| 1 | Charge/Discharge Cycle 充放电循环 | The capacity on 0.5C discharge shall be measured after 150 cycles Of 0.5C charge and discharge at 23 ± 2 °C. 300cls cell thickness swelling $\leq 8\%$ 23 ± 2 °C 条件下 0.5C 充放电循环 150 次。循环厚度膨胀 $\leq 8\%$ | Capacity $\geq 80\%$ THK swelling $\leq 8\%$ 容量 $\geq 80\%$ 厚度膨胀 $\leq 8\%$ |
| 2 | Retention Capability 荷电保持能力 | After full charging, storing the battery 28 days with 20 ± 5 °C condition, and then staying 1 hours with discharge current of 0.5C till 3.0V cut-off voltage. 电芯满充电后,在 20 ± 5 °C 的环境条件下存放 28 天,然后以 0.5C 电流连续放电至 3.0V 终止电压。 | Capacity $\geq 85\%$ 容量 $\geq 85\%$ |

※ Typical capacity 典型容量

The capacity means the average discharge capacity of the cell, which is measured with discharge current of 0.2C with 3.0V cut-off voltage after the standard charge at 23 ± 5 °C environment temperature, unit: mAh
典型容量指 23 ± 5 °C 温度下,以 0.2C 电流放电至终止电压时所放出容量对应的容量分布中心值,单位为 mAh。

※ Charge/Discharge current rate 充放电电流倍率

Charge/Discharge current rate: $AC(Ah) = A * \text{Minimal capacity (mAh)}$, for example,
 $0.02C = 0.02 * \text{Minimal capacity}$

充放电电流倍率: $AC(Ah) = A * \text{最小容量 (mAh)}$, 例如, $0.02C = 0.02 * \text{最小容量}$



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6.4 Mechanical and Environmental Test 环境适应性

| No. | Items 项目 | Test Method and Condition 测试方法 | Criteria 标准 |
|-----|---|--|--|
| 1 | Vibration 振动 | After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied from 7HZ to 200HZ ,then return to 7HZ , the excursion of the vibration is 0.8mm. The cell shall be vibrated for 3 hrs. 满充电后的电芯在三个相互垂直的方向按振幅0.8mm的正弦波进行振动, 频率从7HZ增加到200HZ 再降回7HZ, 往复振动3小时。 | Voltage is not less than 90% of the primary, no leakage, no venting, no rupture, no fire, no explosion. 开路电压不低于90%的初始电压、不泄漏、不泄气、不破裂、不起火、不爆炸 |
| 2 | Constant temperature and Humidity 恒定湿热 | After standard charging, put cell into the chamber that the temperature is $40\pm 2\text{ }^{\circ}\text{C}$ and the humidity ranges between 90and 95% for 48hours,then put it at $23\pm 2\text{ }^{\circ}\text{C}$ for 2hrs,measure0.5C CAP. 满充电后将电芯放入 $40^{\circ}\text{C}\pm 2\text{ }^{\circ}\text{C}$ 及相对湿度为90~95%的恒温恒湿箱中48小时后, 取出在 $23\pm 2\text{ }^{\circ}\text{C}$ 环境下搁置2h, 再以0.5C电流放电至3.0V。 | No distortion, no rust, no leakage ,no venting ,no rupture ,no fire ,no explosion, the discharge time is not less than 3hrs 不变形、不锈蚀、不泄漏、不泄气、不破裂、不起火、不爆炸、放电时间不低于3h |



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6.5 Safety 安全性能

| No. | Items 项目 | Test Method and Condition 测试方法 | Criteria 标准 |
|-----|-----------------------------|--|---|
| 1 | Overcharge 过充 | After discharge to limit voltage, charged at constant current of 3C and constant voltage of 4.6V, While voltage reaches to the max ,if charging continued over 7 hours or temperature is 20% less than the top , close the test. 电芯放电至终止电压后，用3C电流和4.6V的极限电压充电，电压达到最大值后，当充电时间大于7h或者温度降至比峰值低20%时终止测试。 | No fire, no explosion 不起火、不爆炸 |
| 2 | Short protection 短路保护 | After the battery is fully charged, short the positive and negative terminal with 100m wire resistance for 1 hour 电池满充电后，将正负极用100mΩ电阻短路1H后，将正负极断开 | No explosion, no fire, no smoking. 无冒烟、起火、爆炸 |

7. Others 其他事项

Any matters that this specification doesn't cover should be conferred between the customer and taisko任何本规格书中未提及的事项，需要经双方协商确定。



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8 Appendix 附录

Handling Precautions and Guideline For LIP Rechargeable Batteries

对可再充电锂聚合物电芯操作指引和注意事项

Foreword

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

前言

“对可再充电锂聚合物电芯操作指引和注意事项”的文件仅适用于由taisko制作的电

芯。Statement (1):

Customers are requested to contact taisko 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(1):

如果客户需要其他方面的说明或工作条件与规格书内容不一致，请客户提前和taisko公司联系。客户可以要求验证在规格书提供的条件下的特性和安全性能的测试。

Statement (2):

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

声明(2):

对于没有按规格书提供的条件而其他条件下使用导致电芯出现事故，taisko公司将不承担任何责任。

Statement (3):

taisko will inform, in a written form, customers of improvement(s) regarding proper usage and handling of cells, if it is deemed necessary.

声明(3):

如果客户需要，taisko公司将以书面形式，提供关于电芯的正确使用和操作方法的改进。

Appendix –A Charge

附录-----A 充电

1.Charging current 充电电流

Charging current should be less than the maximum value specified in the Product Specification. Charging with higher current than recommended value may cause damage to cells' electrical, mechanical, and safety performance and could lead to heat generation or leakage.

充电电流应小于产品规格书里提到的最大充电电流，没有按照推荐值而用大电流充电可能会产生电芯的电气、机械和安全性能事故，会导致发热或漏液。



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2.Charging Voltage 充电电压

Charging shall be done by voltage less than that specified in the Product Specification (4.2V/cell). Charging beyond 4.3V, which is the absolute maximum voltage, must be strictly prohibited. The charger and protection circuit of battery pack shall be designed to comply with this condition. It is very dangerous that charging with higher voltage than the maximum value and may cause damage to the cell electrical, mechanical safety performance and could lead to heat generation or leakage.

充电电压应小于产品规格书里提到的电压(4.2V/cell)。充电电压禁止超过最大值4.3V，充电器要和电芯使用条件相符合。没有按照规格书提供的电压而用高电压充电将会产生电芯的电气、机械和安全性能事故，会导致发热或电芯燃烧，这是非常危险的。

3.Charging temperature 充电温度

The cell shall be charged within the specified temperature range in the Product Specification.

电芯应当在产品规格书中指定的温度范围内充电。

4.Prohibition of Reverse Charge 禁止反向充电

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

禁止反向充电。电芯按照正确方法连接，焊接导线之前，确定电芯极性。在不正确连接情况下，电芯不能充电。同时，反向充电可能对电芯有破坏性,将会导致电芯性能的退化和危害电芯安全性能，产生发热和漏液现象。

Appendix –B Discharge

附录----- B 放电

1. Discharge Current 放电电流

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

放电电流应小于产品规格书里提到的最大放电电流。高放电电流将极大降低放电容量或者使电芯发烫。

2. Discharge Temperature 放电温度

The cell shall be discharged within the temperature range specified in the Product Specification.

电芯应当在产品规格书中指定的温度范围放电。

3. Over-Discharge 过放电

It should be noted that cells would be at an over-discharged status due to self-discharge characteristics in case they were not used for a long time. In order to prevent over-discharging, cells shall be charged periodically to maintain the voltage between 3.7V and 3.9V. Over-discharging may cause the loss of cell performance, characteristics, or battery functions.



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如果电芯长时间不用，由于自身放电特性，电芯将处于过放电状态,这是应注意的。为了避免过放电，电芯应周期性充电，使电压保持在3.7V到3.9V之间，过放电会导致电芯性能，特性或功能的降低。

Appendix -C Storage

附录-----C存储

If the Cell is stored for a long time, the cell's storage voltage should be 3.7~3.9V and the cell is to be stored in a condition as Item. 4.11.

电芯在4.11 的存放条件下长期存放后,电芯的存储电压应在3.7~3.9V。

Appendix -D Handling of Cells

附录-----D 电芯操作

1.Consideration of strength of film package包装膜注意事项

Easily damaged by sharp edge parts such as nail and needle, so don't strike by those sharp parts.

铝箔软包装比较容易被锐利部件刺破，如钉子、针，不要用这些锐利的部件刻划电池。

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

封边被加热到100°C 以上以及弯折封边都容易使封边受损。

2.Short短路

Don't bend the tabs.Short terminals of cells is strictly prohibited, it may damage cells, even result in safety accident.

禁止弯折极耳。禁止短路电芯，它会导致电芯严重损坏，甚至引发安全事故。

3.Mechanical Shock机械冲击

Don't Fall, shock, Crush, bend cell body.

禁止跌落，冲击，挤压，弯折电芯。

Appendix -E Others

附录-----E 其他

1. Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection.

The battery pack shall be structured with no short circuit within the battery pack, which may cause generation of smoke or firing.

在导线和电芯之间有足够多的绝缘材料将用于保持电芯较好的安全特性。包装盒内不要设计短路电路，短路会产生冒烟或起火。

2. Prohibition of disassembly禁止拆卸电芯

Never disassemble the cells The disassembling may generate internal short circuit in the cell, which may cause gassing, fining, explosion, or other problems.

不要拆卸电芯。拆卸电芯会导致电芯内部短路，产生有毒气体，澄清剂，爆炸和其他问题。



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Electrolyte is harmful LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought

电解液是有毒的。锂聚合物电芯LIP不能有流动的液体，但是如果电解液接触到皮肤，或者进入眼睛内，医生将立即用清水清洗电解液，遵医嘱检查。

3. Prohibition of dumping of cells into fire禁止把电芯放进火里

Never incinerate nor dispose the cells in fire. These may cause explosion of the cells, which is very dangerous and is prohibited.

不要烧毁电芯也不要投掷火中，这样将导致电芯爆炸，这些是非常危险和禁止的。

4. Prohibition of cells immersion into liquid禁止把电芯放在液体里

The cells shall never be soaked with liquids such as water, seawater, and drinks such as soft drinks, juices, coffee or others.

电芯不能被液体浸湿比如水、海水，和饮料如不含酒精的饮料、果汁、咖啡、或其他。

5. Cells replacement置换电芯

The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.

电芯置换仅仅由其他电芯厂商或设备厂商操作，不能由使用者置换。

6. Prohibition of using the damaged cells禁止使用损坏电芯

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of an electrolyte, an electrolyte leakage and others, the cells shall never be used any more. The Cells with smell of the electrolyte or leakage shall be placed away from fire to avoid firing or exploding

电芯在运输其间由于振动而损坏，如果发现电芯有任何不正常现象，例如：电芯的塑料包装的损害，包装的变形，有电解液的气味，漏液和其他现象，电芯将不再使用。有电解液或漏液气味的电芯应远离火源避免发生火灾或爆炸。

7. Power consumption at standby status整机静态功耗

Products using LIB battery can charge from 0V but not preferred: Power consumption of products with LIB battery at standby status maybe cause battery discharged deeply.

本产品不支持0V充电，在设计配套产品时请考虑整机静态功耗，以免电芯造成过放。



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Customer Inquiry 客户要求

Model: 602535
型号: 602535
Version: A
版本: A

1. IF clientele ratify specification and showpiece, please sign back specification to taisko in 1 week, or else blank out it.

如果客户认可规格书和样品，请于7天内回签规格书给taisko公司，过期视为作废。

2. The customer is requested to write down your information and contact taisko in advance, if and when the customer needs applications or operating conditions other than those described in this document. RENCHUAN could design and build such products according to your special request.

如果客户需要其他方面的说明或工作条件与规格书内容不一致，请客户提前和taisko公司联系。

taisko公司将按照贵公司特殊要求设计和开发产品，特殊要求标准如下：

| | Special Request特殊要求 | Criteria标准 |
|--|---------------------|------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Company Name: _____ Signature: _____ Date: _____
 公司名称: _____ 签名: _____ 日期: _____