Li-ion Polymer Battery Specification

锂离子聚合物电池规格书

Series 产品系列	Lithium Polymer
Model and Capacity 型号及容量	602035P400-400mAh
Customer Name or code 客户名称或代码	
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1.Modified List 修订履历

Product Modified Record List
产品变更履历表

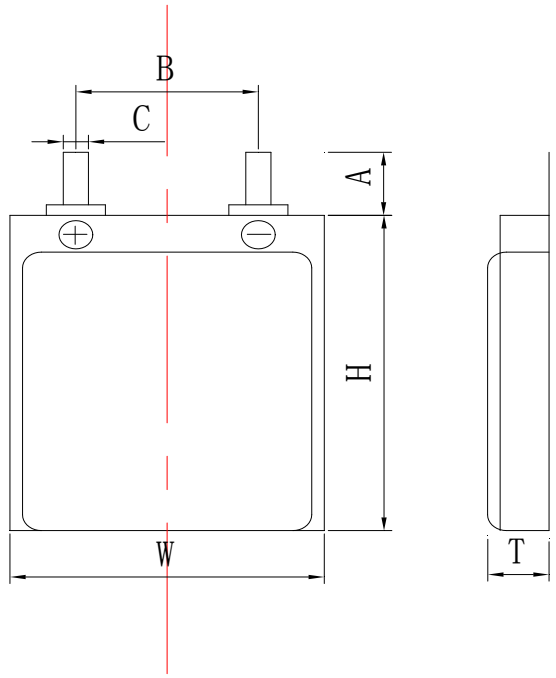
Revision 版本	Date 日期	Mark 标记	Modified content 变更内容	Approved by 批 准
A.0	2023-01-01	/	NEW RELEASE	

2. Scope 适用范围

This specification describes the basic performance, technical requirement, testing method, warning and caution of the Li-Ion Polymer rechargeable battery.

本标准规定了锂聚合物可充电池的基本性能、技术要求、测试方法及注意事项。

3.Initial Dimension 初始尺寸



Unit 单位（mm）					
T （厚度）	Max:6.0±.0.2	W （宽度）	Max:20±.0.2	H（高度）	Max:35±.0.5
B（极耳中心距）	10±1.50	A(极耳长）	3.5±1.0	C（极耳宽）	2±0.05

4.Specification 产品规格

NO.	Item 项目		Specifications 规格要求
4.1	Typical capacity	典型容量	400mAh 0.5C discharge (0.5C放电)
4.2	Min. capacity	最小容量	355mAh 0.5C Discharge (0.5C放电)
4.3	Initial impedance	初始内阻	≤220mΩ
4.4	Weight	重量	Approx(约)：2.0g
4.5	Nominal voltage	标称电压	3.7 V

	Fully charge voltage 满充电压 Fully discharge voltage 满放电压		4.2 V Defined in this DOC: FC = 4.2 V 3.0 V Defined in this DOC: FD = 3.0 V	
4.6	Standard charge current 标准充电电流		0.5 C	
4.7	Standard charging method 标准充电方法		0.5C CC（constant current）charge to FC, then CV(constant voltage FC)charge till charge current decline to ≤0.01C 0.5C CC（恒流）充电至 FC，再 CV（恒压 FC）充电直至充电电流≤0.01C	
4.8	Charging time 充电时间		Standard charging (标准充电) Approx 3 hours 大约 3 小时	
4.9	Standard discharge current 标准放电电流		Constant current 0.2 C，end voltage FD 持续电流：0.2C，截止电压：FD	
4.10	Max. charge current 最大充电电流	0℃～15℃	0.2C	
		15℃～25℃	0.5C	
		25℃～45℃	1C	
4.11	Max.discharge current 最大放电电流	-2℃～15℃	0.2C	
		15℃～60℃	1C	
4.12	Discharge lower limit voltage 放电下限电压		FD	
4.13	Charge upper limit voltage 充电上限电压		FC	
4.14	Storage temperature 储存温度	-20℃~60℃	≤1 month	Percentage of recoverable capacity no less than 80% of the initial capacities 恢复容量不低于初始容量的 80%
		-20℃~45℃	≤3 month	
		-20℃~28℃	≤1 year	
4.15	capacity testing 容量测试		Constant current 0.5C charge to FC, then constant voltage FC charge to current declines to 0.01C, rest for 10min，constant current 0.5C discharge to FD，rest for 10min.Repeat above steps 3 times, recording the maximum capacity 先用 0.5 C 恒流充电至 FC，再恒压 FC 充电直至充电电流≤0.01C,搁置 10 分钟,再用 0.5C 电流放电至 FD;又搁置 10 分钟,重复以上步骤 3 次,记录容量最大值	
4.16	Storage humidity 储存湿度		≤75% RH	
4.17	Appearance 外观		Without distortion and leakage 无变形、电解液泄露	
4.18	Standard testing condition 标准测试环境		Temperature(温度) ： 23±5℃ Humidity（湿度） ： ≤75%RH Atmospheric pressure（大气压） ： 86-106 Kpa	

1. Remark: 1.From 4.1 to 4.13 and 4.15, the testing condition is following 4.18 (standard testing condition)

从 4.1 至 4.13 及 4.15 项目，测试环境遵从 4.18（标准测试环境）

2. If the working condition is out of 4.18, the performance will be some shift.

如果工作环境超出 4.18 范围，性能将会有一些偏移。

5.General Performance 常规性能

No.	Item 项目	Test Methods and Condition 测试方法和条件	Criteria 标准
5.1	0.2C Capacity 0.2C 容量	At standard testing condition，after standard charging, rest for 10min, then discharging at 0.2C to voltage FD, recording the discharging time. 在标准测试环境下，标准充饱电后，搁置 10 分钟，然后用 0.2C 电流放电至 FD，记录放电时间.	≥300min(分钟)
5.2	1C Capacity 1C 容量	At standard testing condition，after standard charging, rest for 10min, then discharging at 1C to voltage FD, recording the discharging time. 在标准测试环境下，标准充饱电后，搁置 10 分钟，然后用 1C 电流放电至 FD，记录放电时间.	≥54min（分钟）
5.3	Cycle Life 循环寿命	At standard testing condition, constant current 0.5C charge to FC, then constant voltage FC charge to current declines to 0.01C, rest for 10min, constant current 0.5C discharge to FD, rest for 10min. Repeat above steps till continuously discharging capacity higher than 80% of the initial capacity of the cell. 在标准测试环境下，先用 0.5 C 恒流充电至 FC，再恒压 FC 充电直至充电电流≤0.01C ,搁置 10 分钟 ,再用 0.5C 电流放电至 FD；搁置 10 分钟，重复以上步骤，直到放电容量是初始容量的 80%.	≥300times(次)
5.4	Capability of Keeping Electricity 荷电保持能力	At standard testing condition，after standard charging, no outer loading circuit, rest the cell 28days, discharging at 0.2C to voltage FD, recording the discharging time. 在标准测试环境下 ,标准充饱电后 ,无外接负载线路，电池搁置 28 天，然后用 0.2C 放电至 FD，记录放电时间.	≥240min(分钟)

6.Environment Performance 环境性能

No.	Item 项目	Test Methods and Condition 测试方法和条件	Criteria 标准
6.1	Discharge at high temperature	Step1：at standard testing condition，fully charge the cells with standard charging method. Step2: rest the cells 4h at 60±2℃, then discharging	≥54min(分钟)

	高温放电	at 1C to voltage FD at the same temp., Recording the discharging time. 第一步：在标准测试环境下，按标准充电方式满充电芯. 第二步：在 60±2℃条件下贮存 4h，然后在相同温度下用 1C 放电至 FD，记录放电时间.	
6.2	Discharge at low temperature 低温放电	Step1：at standard testing condition，fully charge the cells with standard charging method. Step2: rest the cells 16h at -10±2℃, then discharging at 0.2C to voltage FD at the same temp., Recording the discharging time. 第一步：在标准测试环境下，按标准充电方式满充电芯. 第二步：在-10±2℃条件下贮存 16h，然后在相同温度下用 0.2C 放电至 FD，记录放电时间.	≥210min(分钟)

7.Safe Characteristic 安全性能

No.	Item 项目	Test Methods and Condition 测试方法和条件	Criteria 标准
7.1	Thermal shock 热冲击	Step1：at standard testing condition，fully charge the cells with standard charging method. Step2: put the cells in the oven, the temperature of the oven is to be raised at 5±2℃ per minute to a temperature of 130±2℃ and remains 30 minutes. 第一步：在标准测试环境下，按标准充电方式满充电芯. 第二步：将电池放进烘箱内， 以 5±2℃/min 速度升高烘箱内温度至 130±2℃后,恒温 30min.	No fire, no smoke 不起火,不冒烟
7.2	Over discharge testing/（NO PCM） 过放测试（无保护板）	At standard testing condition，the cells be discharge to FD according to the requirements of standard discharge, then connect with external load of 30 ohm for 24 hours. 在标准测试环境下，按标准放电的要求放电至 FD 后，外接 30Ω负载放电 24 小时	No fire, no smoke, no leakage. 无起火,无冒烟,无泄液

※ Above testing of safe characteristic must be with protective equipment.(安全性能测试应在有保护措施下进行)

8.Battery Protection 电池保护

The battery shall be with the over-charging protection, over-discharging protection, and over-current protection during use. Protective circuit shall have protective functions as follows:

电池必须在有过充、过放、过流保护的条件下使用，保护电路必须具有以下保护功能。

1）Over-charging protection 过充电保护

Overcharging protection stops charging if any cell of the battery pack reaches 4.25V.

过充保护电路防止电池中任何电芯电压超过 4.25V。

2） Over-discharging protection 过放电保护

The Over-discharging protection monitors the voltage of any cell in the pack and works to avoid a drop in the cell voltage to 2.8V or less.

过放保护电路防止电池中任何电芯电压低于 2.8V。

3) Over-current protection 过流保护

The cell shall be discharged at less than the maximum discharge current specified in the Specification Approval Sheet. A high discharging current may reduce the discharge capacity significantly or cause overheating.

电池放电电流不可高于规格书中指定的最大电流。大电流放电将导致电池容量降低或电池过热。

9.Warnings 警告

To prevent the possibility of the battery from leaking, heating, fire, please observe the following precautions:

为防止电池可能发生的泄漏,发热,起火,请注意以下预防措施:

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs and needles, do not strike battery with any sharp edge parts.

☆ 电池外包装膜易被镍片,尖针等尖锐部件损伤,禁止用尖锐部件碰伤电池.

Do not immerse the battery in water and seawater

☆ 严禁将电池浸入海水或水中.

Do not use and leave the battery near a heat source such as fire and heater

☆ 禁止将电池在热高温源旁,如火,加热器等使用设备.

When recharging, use the battery charger specifically for that purpose

☆ 充电时请选用锂离子电池专用充电器.

Do not reverse the positive and negative terminals

☆ 禁止颠倒正负极使用电池

Do not connect the battery to an electrical outlet

☆ 禁止将电池直接接入电源插座

Do not discard the battle in fire or heat it

☆ 禁止将电池丢入火或加热器中

The battery tabs are not so stubborn especially for aluminum tab. Do not bend tab.

☆ 电池极耳的机械强度不坚固,特别是铝极耳,禁止弯折.

Do not short-circuit the battery by directly connecting the positive and negative terminal with metal object such as wire.

☆ 禁止用金属直接将电池的正负极进行短路连接.

Do not transport and store the battery together with metal objects such as necklaces, hairpins etc.

☆ 禁止将电池与金属,如发夹,项链等一起运输或贮存.

Do not strike or throw the battery.

☆ 禁止敲击或抛掷,踩踏电池等.

Do not directly solder the battery and pierce the battery with a nail or other sharp object.

☆ 禁止直接焊接电池和用钉子或其它利器刺穿电池.

10. Cautions 注意

Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or a vehicle in extremely hot conditions).Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.

△ 禁止在高温下(直热的阳光下或很热的汽车中)使用或放置电池,否则可能会引起电池过热,起火或功能失效,从而导致电池寿命减短.

Do not use it in a location where static electricity is great, otherwise, the safety

devices may be damaged and cause hidden trouble of safety.

△ 禁止在强静电和强磁场的地方使用,否则易破坏电池安全保护装置,带来不安全隐患.

If the battery leaks and the electrolyte get into the eyes, do not rub eyes, instead, rinse the eyes, with clean running water, and immediately seek medical attention. Otherwise, eye injury can result.

△ 如果电池发生泄漏,电解液进入眼睛,请不要揉擦,应用清水冲洗眼睛,并立即送医院治疗,否则会伤害眼睛.

If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charge and stop using it.

△ 如果电池在使用或贮存中发出异味,发热,变色,变形,或者是在充电过程中出现任何异常现象,立即将电池从充电器或装置中移开,并停止使用.

In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.

△ 如果电池弄脏,使用前应用干布抹净,否则可能会因接触不良而影响性能失效.

Be aware discharged battery may cause fire, tape the terminals to insulate them.

△ 废弃之电池应用绝缘纸包住电极,以防起火, 冒烟.

The batteries should be stored at room temperature, charged to about 40% to 60% of capacity. In case of over-discharge, batteries should be charged with standard charging method for one time every 3 months while storing and batteries should be charging-discharge with standard method for one time after being stored more than a year in order to activate it and restore energy.

△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 6 个月，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。

11.Period of Warranty 保质期

The period of warranty is one year from the date of shipment. DianDe guarantees to give a replacement in case of battery with defects proven due to manufacturing process instead of the customer’s abuse.

电池的保质期从出货之日算起为 12 个月。如果证明电池的缺陷是在我们公司制造过程中造成的而不是客户错误使用造成，本公司负责退换电池。