



产 品 规 格
PRODUCT SPECIFICATION

DOC NO. DFDPSP76161227

REV. : A

SHEET : 1 of 12

Specification Approval Sheet(Battery)

产品规格确认书(电池)

Model: DFDPSP76161227

型号: DFDPSP76161227

拟 制 Prepared by	审 核 Checked by	批 准 Approved by	品管确认 Confirmed by QA

	签 字 Signature	日 期 Date
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1.Scope

The document describes the Product Specification of the Lithium-ion rechargeable battery manufactured by DO - FLUORIDE (JIAOZUO) NEW ENERGY TECHNOLOGY CO., LTD

适用范围

本规格说明书描述了多氟多（焦作）新能源科技有限公司生产的可充电锂离子电池的产品性能指标

2.Model: DFDSP76161227

型号: DFDSP76161227

3.Specification

产品规格

No.	Items	Specifications
1	Charge voltage 充电电压	DC 4.2V
2	Nominal voltage 标称电压	3.7V
3	Minimal capacity 最小容量	32000mAh 0.2C Discharge(放电)
4	Charge current 充电电流	Standard charge: 0.2C 标准充电: 0.2C Rapid charge: 1.0C 快速充电: 1.0C
5	Standard Charging method 标准充电方法	0.2C CC(constant current) charge to 4.2V, then CV(constant voltage 4.2V) charge till charge current decline to 0.05C 0.2C CC (恒流) 充电至 4.2V,再 CV (恒压 4.2V) 充电直至充电电流 0.05C.
6	Charging time 充电时间	Standard charge: 7.0 hours (Ref.) 标准充电: 7.0 小时(参考值) Rapid charge: 1.0 hours (Ref.) 快速充电: 1.0 小时(参考值)
7	Max. charge current 最大充电电流 (安全)	1.0 C
8	Max. discharge current 最大放电电流 (安全)	2.0 C
9	Discharge cut-off voltage 放电截止电压	3.0V
10	Operating temperature 工作温度	Charging: 0℃ ~ 40℃ 充电: 0℃ ~ 40℃ Discharging: -25℃ ~ 60℃ 放电: -25℃ ~ 60℃
11	Storage temperature 储存温度	-10℃ ~ + 40℃
12	Battery Weight 电池重量	Approx. 570g Below 约: 570g 以下
13	Battery Dimension 电池尺寸	Length 长度: 227±1.0mm Width 宽度: 161.0±0.5 mm Thickness 厚度: ≤7.8mm



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4. Battery Performance Criteria

电池性能检查及测试

4.1 Electrical characteristics

充放电性能

No.	Items	Test Method and Condition	Criteria
1	Standard Charge 标准充电	Charging the Battery initially with constant current at 0.2C and then with constant voltage at 4.2 V till charge current declines to 0.05C. 先用 0.2C 恒流充电至 4.2 V, 再恒压 4.2 V 充电直至充电电流 0.05C。	N.A.
2	Capacity 容量	The capacity means the discharge capacity of the Battery, which is measured in terms of discharge current of 1C and 3.0V cut-off voltage after the standard charge. 该容量是指标准充电后, 1C 放电至 3.0V 截止电压所放出的容量。	Greater than or equal 32000mAh ≥32000mAh
3	Rate 倍率	The capacity means the discharge capacity of the Battery, which is measured in terms of discharge current of 2C and 3.0V cut-off voltage after the standard charge. 该容量是指标准充电后, 2C 放电至 3.0V 截止电压所放出的容量。	Greater than or equal 31000mAh ≥31000mAh
4	Cycle Life 循环寿命	Test condition: Charge: 1C to 4.2 Discharge: 1C to 3.0V ,80% or more of 1 st cycle capacity at 0.2C discharge of Operation 测试条件: 充电: 1C 充电到 4.2V 放电: 1C 放电到 3.0V, 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	Greater than or equal 2000 times ≥2000 周
5	Self-discharge 自放电	After the standard charging, store the Batterys under the condition as No.4.5 for 30days, then measured the capacity with 0.2C till 3.0V 标准充电后, 在 No.4.5 条件下贮存 30 天, 再以 0.2C 放电至 3.0V 所放出的容量。	Remaining capacity > 93% 剩余容量 > 93%
6	Initial Impedance 初始内阻	Internal resistance measured at AC 1KHz after 50% charge 半充状态下, 测量其 AC 1KHz 下的交流阻抗	< 4mΩ
7	Battery Voltage 电池电压	As of shipment. 出货状态	3.8V ~ 4.0V



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4.2 Mechanical characteristics

机械特性

No.	Items	Test Method and Condition	Criteria
1	Vibration Test 振动测试	After standard charging, fixed the Battery 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 amplitude of the vibration is 1.6mm. The Battery shall be vibrated for 30 minutes towards per axis of XYZ axes. 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 1.6mm, 振动频率为 10Hz~55Hz, 每分钟变化 1Hz。	No leakage No fire 无泄漏 不起火
2	Shock test 碰撞	No explosion 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 on,	No fire, no explosion, no leakage. 不起火、不爆炸、不 泄漏
3	Drop Test 跌落测试	Drop the battery in the shipment condition from 1m height onto 5cm thicker concrete with p-tile on it 3 times each of X, Y, and Z directions at 25±2℃. 在出货条件下将电池由高度 1m 的位置自由跌落到 5cm 厚的混凝土地板, X, Y, Z 方向上各三次	No explosion, no fire, no leakage. 不爆炸、不起火、不 泄漏

4.3 Safety Performance 安全性能

1	Overcharge Test 过充电测试	1C,CC,6.3V at 23±3℃; When the capacity reach 6.3V , end test. 在 23±3℃的环境下用 1C、6.3V 进行恒流充电, 待电芯达到 6.3V 后, 结束测试	No fire 、 No explosion 不起火、不 爆炸
2	Overdischarge Test 过放电测试	After discharged to the cut-off voltage, the battery shall be subjected to a short-circuit condition with a load of resistance less than 30Ω for 24 hour. 放电至截止电压后, 外接小于 30Ω 的负载电阻放电 24 小时	No fire No explosion 不起火、不 爆炸

3	Heating Test 热冲击	A battery is to be heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of $5\pm 2^{\circ}\text{C}/\text{min}$ to a temperature of $120\pm 2^{\circ}\text{C}$ at which temperature the oven is to remain for 30 minutes before the test is discontinued. 电池放于热箱中，温度以 $5\pm 2^{\circ}\text{C}/\text{min}$ 的速率升至 $120\pm 2^{\circ}\text{C}$ 并保温 30min	No fire 、 No explosion 不起火、不爆炸
4	Short circuiting Test 短路测试	After standard charge, the battery shall be subjected to a short-circuit condition with a wire of resistance less than $100\text{m}\Omega$ for 1 hour. 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 $100\text{m}\Omega$ ，测试 1 小时	No fire 、 No explosion 不起火、不爆炸

4.4 Visual inspection

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

外观检查

不允许有任何影响电池性能的外观缺陷，诸如裂纹、裂缝、划伤等。

4.5 Standard environmental test condition

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

Temperature : $23 \pm 5^{\circ}\text{C}$

Humidity : $65 \pm 20\% \text{RH}$

标准测试环境

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： $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$

湿度： $65 \pm 20\% \text{RH}$

5. Storage and Others

贮存及其它事项

a) Long Time Storage

If the Battery is stored for a long time(over 3 months), the Battery's storage voltage should be 3.8~4.0V and the Battery is to be stored in according to the condition specified about No. 4.5.

长期贮存

长期贮存的电池（超过 3 个月）须置于干燥、凉爽处。贮存电压为 3.8~4.0V 且贮存环境要求如 4.5。

b) Others

Any matters that this specification does not cover should be discussed between the customer and ZQPT.

其它事项

任何本说明书中未提及的事项，须经双方协商确定



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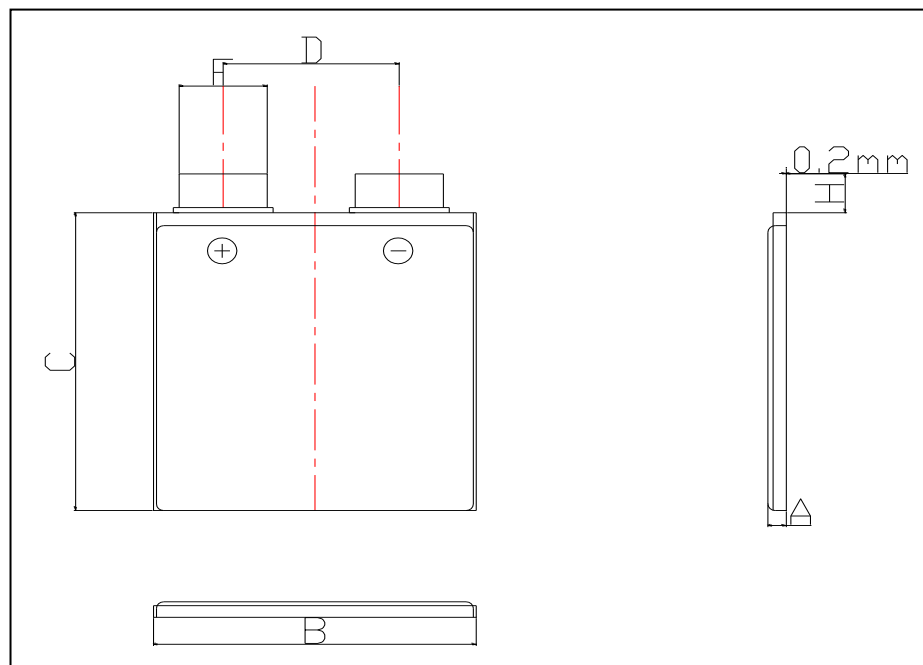
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6. Dimension (all unit in mm, not in scale)

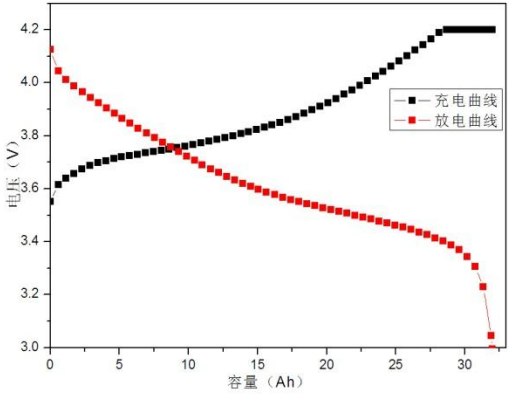
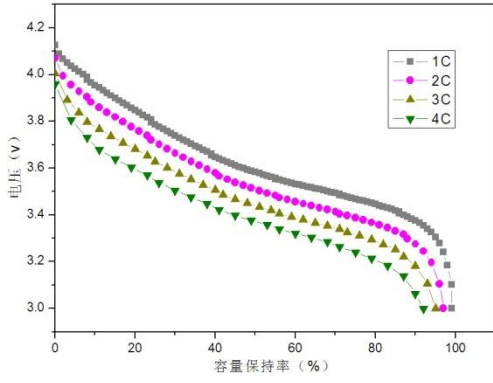
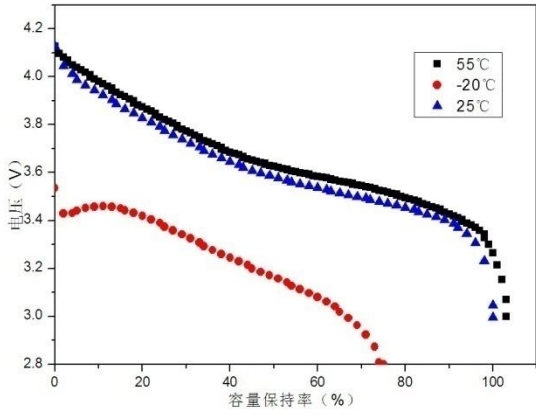
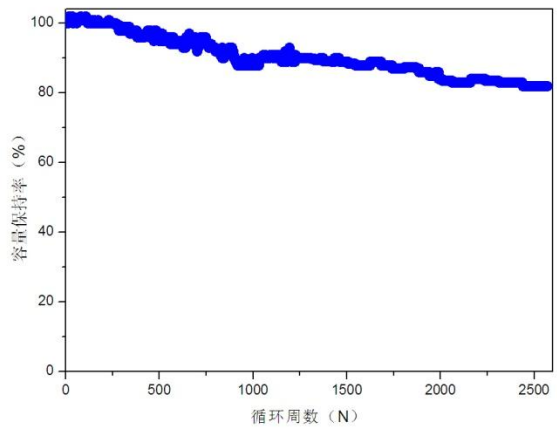
外形尺寸图 (单位: mm; 未按比例)



Item 项目	Description 描述	Dimension 尺寸
A	Thickness (厚度)	$8.0 \pm 0.3 \text{ mm}$
B	Width (宽度)	$161.0 \pm 0.5 \text{ mm}$
C	Length (长度)	$227.0 \pm 1.0 \text{ mm}$
D	Distance of center (极耳中心距)	$80 \pm 1.0 \text{ mm}$
F	Width of tab (极耳宽度)	$45 \pm 0.2 \text{ mm}$
H	Length of tab (金属条外 露长度)	$25 \pm 1.0 \text{ mm}$

7. Performance curve

性能曲线

电池特性曲线	
充放电特征曲线	电池的倍率放电性能
 <p>The graph shows the charge and discharge characteristics. The x-axis is Capacity (Ah) from 0 to 30, and the y-axis is Voltage (V) from 3.0 to 4.2. The charging curve (black squares) starts at 3.6V and rises to 4.2V. The discharging curve (red squares) starts at 4.2V and falls to 3.0V.</p>	 <p>The graph shows rate discharge performance. The x-axis is Capacity Retention (%) from 0 to 100, and the y-axis is Voltage (V) from 3.0 to 4.2. Four curves are shown for discharge rates of 1C (black squares), 2C (magenta circles), 3C (yellow triangles), and 4C (green inverted triangles). Higher discharge rates result in lower voltage retention.</p>
<p>充电：恒流/恒压 32A, 4.2 V; 放电：恒流 32A, 3.0V 截止</p>	<p>充电：恒流/恒压 32A, 4.2 V 放电： 恒流 32A; 64A; 96A; 128A ; 3.0V 截止</p>
电池的不同温度下的放电性能	电池的常温循环性能
 <p>The graph shows discharge performance at different temperatures. The x-axis is Capacity Retention (%) from 0 to 100, and the y-axis is Voltage (V) from 2.8 to 4.2. Three curves are shown for 55°C (black squares), 25°C (blue triangles), and -20°C (red circles). Lower temperatures significantly reduce the capacity retention.</p>	 <p>The graph shows normal temperature cycle performance. The x-axis is Cycle Number (N) from 0 to 2500, and the y-axis is Capacity Retention (%) from 0 to 100. The capacity retention starts at 100% and gradually decreases to approximately 80% after 2500 cycles.</p>
<p>充电：恒流/恒压 32A, 4.2 V 放电：32A, 3.0V 截止</p>	<p>充电：恒流/恒压 32A, 4.2 V 放电：32A, 3.0V 截止</p>



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Appendix

附录

Handling Precautions and Guideline For LIP (Lithium-Ion) Rechargeable Batteries 锂离子充电电池操作指示及注意事项

Preface

This document of 'Handling Precautions and Guideline LIP Rechargeable Batteries' shall only be applied to the battery manufactured by .DO-FLUORIDE (JIAOZUO) NEW ENERGY TECHNOLOGY CO., LTD Advanced Batteries Technology Inc

前言

本文件“锂离子充电电池操作指示及注意事项”仅适用于多氟多（焦作）新能源科技有限公司生产的电池。

Note (1):

The customer is requested to contact DFD 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池，应事先联系多氟多，因为需要进行特定的实验测试以核实电池在该使用条件下的性能及安全性。

Note (2):

DFD will take no responsibility for any accident for the Battery used under other conditions unspecified in this Document.

声明二:

对于在超出文件规定以外的条件下使用电池而造成的任何意外事故，多氟多概不负责。

Note (3):

DFD will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the Battery, if it is deemed necessary.

声明三:

如有必要，多氟多会以书面形式告知客户有关正确操作使用电池的改进措施。

1. Charging

充电

1.1 Charging current:

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

充电电流

充电电流不得超过本标准书中规定的最大充电电流。使用高于推荐值电流充电将可能引起电池的充放电性能、机械性能和安全性能的问题，并可能会导致发热或泄漏。



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1.2 Charging voltage:

Charging shall be done by voltage less than the value specified in the Product Specification (4.2V/Battery). Charging over 4.2, which is the absolute maximum voltage, is strictly prohibited. The charger shall be designed to comply with this condition.

It is very dangerous that charging with higher voltage than maximum voltage, which may cause damage to the battery electrical, mechanical safety performance and could lead to heat generation or leakage.

充电电压

充电电压不得超过本标准书中规定的额定电压（4.2V/电池）。4.2V 为充电电压最高极限，充电器的设计应满足这个条件。

电池电压高于额定电压值时，将可能引起电池的充放电性能、机械性能和安全性能的问题，如可能会导致发热或泄漏等。

1.3 Charging temperature:

The battery shall be charged within 0°C~40 °C range in the Product Specification.

充电温度

电池必须在 0°C~40 °C 的环境温度范围内进行充电。

1.4 Prohibition of reverse charging:

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

禁止反向充电

正确连接电池的正负极，严禁反向充电。若电池正负极接反，将无法对电池进行充电。同时，反向充电会降低电池的充放电性能、安全性，并会导致发热、泄漏。

2. Discharging

放电

2.1 Discharging current

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

放电电流

放电电流不得超过本标准书规定的最大放电电流，大电流放电会导致放电池容量剧减并导致过热。

2.2 Discharging temperature

The Battery shall be discharged within -20°C~60°C range specified in the Product Specification.

电池必须在 -20°C~60°C 的环境温度范围内进行放电。



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2.3 Over-discharging:

It should be noted that the Battery might be at an over-discharged state because of its self-discharge property when the Battery is not long use. In order to prevent over-discharging, the Battery shall be charged periodically to maintain its voltage between 3.8V and 4.0V.

Over-discharging may causes loss of Battery performance, characteristics, or battery functions.

The charger shall be equipped with a device to prevent th battery from further discharging below the cut-off voltage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows:

The Battery pack shall start with a small current (0.01C) for 15 - 30 minutes, i.e. pre-charging, before rapid charging starts. The rapid charging shall be started after the (individual) Battery voltage has been reached above 3.0V within 15 - 30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) Battery voltage does not rise to 3.0V within the pre-charging time, then the charger shall have functions to stop further charging and display the Battery/pack is at an abnormal state.

过放电

需要注意的是，在电池长期未使用期间，它可能会因其自放电特性而处于某种过放电状态。为防止过放电的发生，电池应定期充电，将其电压维持在 3.8V 至 4.0V 之间。

过放电会导致电池性能、电池功能的丧失。

充电器应有装置来防止电池放电至低于本标准书规定的截止电压。此外，充电器还应有装置以防止重复充电，步骤如下：

电池在快速充电之前，应先以一小电流 (0.01C) 预充电 15~30 分钟，以使 (每个) 电池的电压达到 3.0V 以上，再进行快速充电。可用一计时器来实现该预充电步骤。如果在预充电规定时间内，(个别) 电池的电压仍未升到 3.0V 以上，充电器应能够停止下一步快速充电，并显示该电池正处于非正常状态。

3. Protection Circuit Module (PCM)

保护电路模块 (PCM)

The Battery/battery pack shall be equipped with a PCM that can protect Battery pack properly.

PCM shall have functions of (1) overcharging prevention, (2) over-discharging prevention, and

(3) over current prevention to maintain safety and prevent great damages to battery performance. The over current can occur by external short circuit

电池包装应配有 PCM 以正确保护电池。PCM 应具备以下功能以保证安全并防止损坏电池性能：1) 过充电保护；2) 过放电保护；3) 过流保护。

Overcharging prohibition:

Overcharging prevention function shall stop charging if any one of the Battery of the battery pack reaches 4.28V.

过充电保护

当电池中任一电池的电压达 4.28V 时，过充电保护应立刻停止充电。



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Over-discharge prohibition:

Over-discharging prevention function shall work to avoid further drop of battery voltage below 2.5V. It is recommended that the dissipation current of PCM shall be 0.5uA or less with the over-discharge prevention function.

The protection function shall monitor each bank of the battery pack and control the current all the time.

过放电保护

当电池任一电池的电压降至 2.5V 以下时，过放保护功能应起着保护作用以避免电池的深度放电。推荐 PCM 的静态电流小于 0.5uA，并具有过放保护功能。

该保护功能应实时监控所有电池

4. Storage

贮存

The Battery shall be storied within $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$ range environmental condition.

If the Battery has to be storied for a long time (Over 3 months), the environmental condition should be:

Temperature: $23 \pm 5^{\circ}\text{C}$

Humidity: $65 \pm 20\% \text{RH}$

The voltage for a long time storage shall be 3.8V~4.0V range.

电池储存温度必须在 $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$ 的环境下。

长期存储电池（超过 3 个月）须置于温度为 $23 \pm 5^{\circ}\text{C}$ 、湿度为 $65 \pm 20\% \text{RH}$ 。

贮存电压为 3.8V~4.0V

5. Handling of Battery

电池操作注意事项

Because the battery is packed in Gum hull package, in order to ensure its better performance, it's very important to carefully handle the battery

由于电池属于胶壳包装，为保证电池的性能不受损害，必须小心对电池进行操作。

6. Notice for Designing Battery Casing

电池外壳设计注意事项

6.1 Casing design

- Battery pack should have sufficient strength and battery should be protected from mechanical shock
- No Sharp edge components should be inside the casing containing the battery.
外壳设计
- 电池外壳应有足够的机械强度以保证其内部电池免受机械撞击。
- 外壳内安装电池的部位不应有锋利的边角。



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7. Others

其它事项

7.1 Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the Battery shall be used to maintain absolute safety protection.

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

防止电池包装内产生短路

引线与电池之间要有足够的绝缘层以保证绝对安全。外壳内不得有任何短路发生，以防止冒烟或着火。

7.2 Prohibition of disassembly

严禁拆卸电池

1) Never disassemble the Battery

The disassembling may generate internal short circuit in the Battery, which may cause burst, fire, or other problems.

在任何情况下不得拆卸电池

拆卸电池可能会导致内部短路，进而引起鼓气、着火及其它问题。

2) 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.

电解液有害

锂电池存在流动的电解液，万一有电解液泄漏而接触到皮肤、眼睛或身体其它部位，应立即用清水冲洗电解液并就医。

7.3 Prohibition of dispose of Battery into fire

Never burn nor dispose of the Battery in fire. These may cause battery fire, which is very dangerous and is strongly prohibited.

严禁将电池投入火中

在任何情况下，不得燃烧电池或将电池投入火中，否则会引起电池燃烧，这是非常危险的，应绝对禁止。

7.4 Prohibition of Battery immersion into liquid such as water

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

严禁将电池浸入液体中，如水

不得将电池浸泡液体，如淡水、海水、饮料（果汁、咖啡等）。

7.5 Battery replacement

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

电池的更换

更换电池应由电池供应商或设备供应商完成，用户不得自行更换。



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7.6 Prohibition of use of damaged Battery

The Battery might be damaged during shipping because of shock. If any abnormal features of the Battery are found such as damages to a Al foil of the Battery, deformation of the Battery package, smelling of an electrolyte, an electrolyte leakage and others, the Battery shall never be used any more.

The Battery with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing.

禁止使用已损坏的电池

电池在运输过程中可能因撞击等原因而损坏，若发现电池有任何异常特征，如电池铝塑膜封边损坏，外壳破损，闻到电解液气味，电解液泄漏等，该电池不得使用。

有电解液泄漏或散发电解液气味的电池应远离火源以避免着火。