

# 产品规格确认书

## SPECIFICATIONS OF PRODUCT

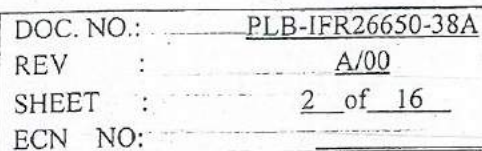
电芯型号 : IFR26650-38A


Cell Type : IFR26650-38A

受控  
2019年2月25日

产品设计 Design	产品设计审批 Design Approved	销售审批 Sales Approved	品质保证审批 QA Approved	产品经理审批 PM Approved
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客 户 确 认  Customer Approved	签名 Signature	
	日期 Date	
	客户印章 Customer signet	

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## 客户要求

Voice of Customer

型号 Model: IFR26650-38A


版本 Version: A/00

要求客户写出他们的需求信息并提前与 PLB 沟通。如果客户有一些特别的应用或者操作条件不同于此文件中所描述的, PLB 可以根据客户的特别要求进行产品的设计和生产。  
Customer should propose their special requirement and communicate with PLB in advance. If there were some application or operation conditions are different from this specification, PLB may change the design or product according to customer's special requirement.

	特殊要求 Special Requirement	标准 Standard
1		
2		
3		
4		
5		
6		

客户代码 Customer Code \_\_\_\_\_ 签字 Signed \_\_\_\_\_ 日期 Date \_\_\_\_\_



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## 术语定义 Definition

产品 Product	本规格书中的“产品”是指 PLB 生产的 3800mAh 3.2V 可充电磷酸铁锂动力电池。 This product specification has been prepared to specify the 3800mAh rechargeable lithium-iron phosphate battery (3.2V) to be supplied to the customer by PLB Co., Ltd.
客户 Customer	指《PLB 产品销售合同》中的买方。 The purchaser of “PLB Product sales contract”
PLB	指《PLB 产品销售合同》中的卖方——东莞力朗电池科技有限公司。 The seller of “PLB Product sales contract” — Dongguan Power Long Battery Co., Ltd.
UD	PLB 为 3800mAh/3.2V 可充电锂电池定义的物料编号。 PLB defined “UD” as the stock number for 3800mAh/3.2V lithium-iron phosphate battery
周围环境温度 Temperature of environment	电池所处的周围环境温度。 Temperature of environment which battery stayed
电池管理系统 Battery management system (BMS)	客户用于监测和记录产品在整个服务期限内的运行参数的一种有效的追踪和控制系统。其追踪和记录的参数包括但不限于电压、电流、温度等，以控制产品的运行并确保产品运行环境及运行条件符合本规格书的规定。 An effective battery management system that could record the parameters of battery during the service life. The parameters including but not limited to “Voltage”, “Current”, “Temperature and so on. This could make sure product application or operation condition are conformity with our specification.
电芯温度 Cell Temperature	由接入电池的温度传感器测量的电芯的温度。温度传感器和测量线路的选择由 PLB 和客户共同商定。 Temperature that was measured by temperature sensor on the surface of cells.
新电池状态 New Cells	是指自产品的入库日期算起 7 天以内的状态 It refers to the status within 7 days from the date of warehousing of the cells
充电倍率 Charge C-Rate	充电电流与电池管理系统多次测量的电池的容量值的比率。例如：电池容量为 3800mAh，充电电流为 760mA 时，则充电倍率为 0.2C；当电池容量跌落为 3040mAh，充电电流为 608mA 时，则充电倍率为 0.2C。 The ratio of the charging current to the battery capacity of the battery. E.g. using 760mA current charging a 3100mAh cell, it means 0.2C charge rate; using 608mA current charging a 3040mAh cell, it means 0.2C charge rate
循环 Cycle	电池按规定的充放标准充放一次为一个循环。循环包括短时的正常充电或者再生充电和放电过程的组合，在充电过程中有时只有正常充电而无再生充电的情况。放电可以由一些部分放电组合在一起形成。 One cycle is defined that the battery is charged and discharged a time by the prescribed charge/discharge standard. The cycle includes a combination of a short period of normal charging or regenerative charging and discharge processes, During the charging process, there are sometimes only normal charging without regenerative charging. Discharge can be formed by some partial discharge combination.

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# PRODUCT SPECIFICATION

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生产日期 Production Date	电池的制造日期。每个相关的电池的热缩膜上印刷的条码中所包含的日期。 The manufacture date of the battery. The date of the printed bar code on each associated battery.
开路电压 (OCV) Open-Circuit Voltage	没有接入任何负载和电路时测得的电池的电压。 The voltage of the battery is not connected to any load and circuit.
可恢复容量 Recoverable Capacity	本规格书 4.1 和 4.2 规定的容量 According to the specification 4.1 & 4.2
产品供货协议 Supply Agreement	PLB 和客户共同签定的有关本规格书产品的协议。 Supply Agreement which was signed by PLB and Customer
标准充电 Standard Charge	本规格书第 2.2.3 条所述的充电模式。 According to the specification 2.2.3
标准放电 Standard Discharge	本规格书 2.3.1 和 2.3.5 规定的标准放电方式 According to the specification 2.3.1&2.3.5
标准保质期 Guarantee period	指 PLB 的产品一般质量保证期限。自产品的制造日期算起一年内或双方约定。 The general quality assurance period of PLB products
充电状态 (SOC) Stage of Charge	在无负载的情况下, 以毫安培小时或者瓦特小时为单位计量的电池充电容量状态的所有的线性关系。如: 若将容量为 3100mAh 的状态视为 100%SOC, 则容量为 0mAh 时, SOC 为 0%。 In the case of no load, the linear relationships of battery charging capacity are measured in Milliampere hour or watt hour. E.g. If the state of capacity of 3100mAh is considered as 100%SOC, then the capacity is 0mAh and SOC is 0%.
温度上升 Temperature rise	在本规格书规定的条件如充电过程或者放电过程中电芯温度的升高。 The increase of cell temperature during charging process or discharge according to the specification.
测量单位 Measurement units	<p>“V” (Volt) 伏特 (V), 电压单位 Voltage</p> <p>“mA” (MilliAmpere) 毫安培 (mA), 电流单位 Current</p> <p>“mAh” (MilliAmpere-Hour) 毫安培-小时 (mAh), 负荷单位 Loading</p> <p>“Wh” (Watt-Hour) 瓦特-小时 (Wh), 能量单位 Energy</p> <p>“mΩ” (MilliOhm) 毫欧姆 (mΩ), 电阻单位 Resistance</p> <p>“°C” (degree Celsius) 摄氏度 (°C), 温度单位 Temperature</p> <p>“mm” (millimetre) 毫米 (mm), 长度单位 Length</p> <p>“s” (second) 秒 (s), 时间单位 Time</p> <p>“Hz” (Hertz) 赫兹 (Hz), 频率单位 Frequency</p>

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## 1. 适用范围 Scope

本规格书详细描述了 PLB 生产的 3.2V 3800mAh (IFR26650-38A) 可充电磷酸铁锂动力电池的产品性能指标以及产品使用条件及风险警示。

This product specification has been prepared to specify the 3100mAh(IFR26650-38A) rechargeable lithium-iron phosphate battery (3.2V) to be supplied to the customer by PLB Co., Ltd.

## 2. 产品电性能指标 Product Electrical Performance

### 2.1 概要 General

No.	参数 Parameter	产品规格 Product specification	条件 Condition
2.1.1	标准容量 Typical Capacity	3800mAh	2.0~3.65V, 1900mA 放电电流, 新电池状态 2.0~3.65V, 1900mA discharge, new cell
2.1.2	最小容量 Minimum Capacity	3600mAh	2.0~3.65V, 1900mA 放电电流, 新电池状态 2.0~3.65V, 1900mA discharge, new cell
2.1.3	工作电压 Operation Voltage	2.0~3.65V	N.A.
2.1.4	电池内阻 (1KHz) Cell AC Impedance (1KH)	≤20 mΩ	新电池 50%SOC New cell at 50% SOC
2.1.5	出货容量 Shipment Capacity	50%SOC 的充电状态 (≥1900mAh) 50% SOC (≥1900mAh)	N.A.
2.1.6	工作温度 (充电) Charge Operating Temperature (Cell Surface Temperature)	0~45°C	参考第 2.2 节 According to 2.2
2.1.7	工作温度 (放电) Discharge Operating Temperature (Cell Surface Temperature)	-20~60°C	参考第 2.3 节 According to 2.3
2.1.8	电池重量 Cell Weight (g)	约 88g About 88g	N.A.
2.1.9	每月自放电率 Self-discharge Rate Per Month	≤3.5%	25°C, 50%SOC, 新电池储存 3 个月 New cell after stored more than 3 months at 25°C
2.1.10	电池尺寸 Cell Dimension	请参考本规格书第 9 条 According No.9 of the specification	N.A.

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## 2.2 充电模式/参数 Charge Model/ Parameter

No.	参数 Parameters	产品规格 Specification	条件 Condition
2.2.1	标准充电电流 Standard Charge Current	1900mA	环境温度 $25 \pm 2^{\circ}\text{C}$ Environment temperature $25 \pm 2^{\circ}\text{C}$
2.2.2	标准充电电压 Standard Charge Voltage	单体电池最大 3.65V 3.65V max for Unit Cells	环境温度 $25 \pm 2^{\circ}\text{C}$ Environment temperature $25 \pm 2^{\circ}\text{C}$
2.2.3	标准充电模式 Standard Charge Model	以 0.5C 的电流恒流充电至单体电芯电压 3.65V 后, 转为 3.65V 恒压充电至充电电流小于 0.02C (76mA) 时, 停止充电。 Cell is charged with constant current of 0.5C to 3.65 V, and the it is converted to 3.65V constant voltage charging until the charging current is less than 0.02C (76mA).	
2.2.4	标准充电温度 Charge Temperature	$25 \pm 2^{\circ}\text{C}$	环境温度 Environment temperature
2.2.5	绝对充电温度 (电芯表面温度) Absolute Charging Temperature (Cell Surface Temperature)	$0 \sim 45^{\circ}\text{C}$	无论电芯处在何种充电模式, 一旦发生电芯温度超过绝对充电温度范围即停止充电 No matter the charging mode of the cell, the charge will be stopped once the cell surface temperature exceeds the absolute charging temperature range
2.2.6	绝对充电电压 Absolute Charging Voltage	最大 3.65V 3.65V max.	无论电芯处在何种充电模式, 一旦发生电芯电压超过绝对充电电压范围即停止充电 No matter the charging mode of the cell, it should be stop charging when the cell voltage exceeds the absolute charging voltage range

## 2.2.7 其他充电条件 (模式) Other Charge Condition (Model)

电芯温度 Cell surface Temperature	标准充电 Standard Charge	快速充电 Fast Charge	猛烈充电 Fierce charge
$< 0^{\circ}\text{C}$	不允许充电 Prohibited	不允许充电 Prohibited	不允许充电 Prohibited
$0 \sim 10^{\circ}\text{C}$	0.3C	0.5C	不允许充电 Prohibited
$10 \sim 20^{\circ}\text{C}$	0.5C	1C	不允许充电 Prohibited
$20 \sim 45^{\circ}\text{C}$	0.5C	1.0C, 电芯 SOC $\leq 50\%$ 且时间 $< 5\text{min}$ 1.0C, Cell's SOC $\leq 50\%$ AND charge time less than 5mins	不允许充电 Prohibited
$> 45^{\circ}\text{C}$	不允许充电 Prohibited		

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### 2.3 放电模式/参数 Discharge Model/ Parameter

No.	参数 Parameters	产品规格 Specification	条件 Condition
2.3.1	标准放电电流 Standard Discharge Current	1900mA	25℃
2.3.2	最大持续放电电流 Max. Discharge Current (Continuous)	5000mA	环境温度 25℃ Ambient temperature 25° C
2.3.3	最大脉冲放电电流 (长脉冲) Max. Discharge Current (Long Pulse)	11400mA	电芯表面温度≤60℃, 最长时间 60S Cell surface temperature less than 60℃, pulse time less than 60s
2.3.4	最大脉冲放电电流 (短脉冲) Max. Discharge Current (Short Pulse)	19000mA	电芯表面温度≤60℃, 且电芯 SOC≥50%最长时间 10S, 电芯 SOC<50%, 最长时间 3S Cell surface temperature less than 60℃ ; when SOC≥50% less than 10S, and SOC<50% less than 3S;
2.3.5	放电截止电压 Discharge Cut-off Voltage	单体电池最小 2.0V 2.0V Min. for unit Cell	
2.3.6	标准放电温度 Standard Discharge Temperature	25±2℃	环境温度 Environment temperature
2.3.7	绝对放电温度 (电芯表面温度) Absolute Discharge Temperature (Cell Surface Temperature)	-20~60℃	无论电芯处在持续放电模式或脉冲放电模式, 若电芯温度超过绝对放电温度, 则停止放电。 No matter the discharging mode of the cell, the discharge will be stopped once the cell surface temperature exceeds the absolute discharging temperature range

### 2.4 脉冲充电模式 Pulse Charge Model

再生脉冲充电是指在产品使用过程中, 脉冲电流对电芯的反充电。再生脉冲充电必须严格符合本规格书所述的充电状态和电芯温度条件。脉冲电流的大小和持续时间必须严格遵守下表所列的所有充电状态以及电芯温度等条件。违反再生脉冲充电条件可能会造成电芯永久性的损坏并进而免除 PLB 的产品质量责任。

Regenerative pulse charging refers to the charging of the electric cell during the process of product use. The regenerative pulse charging must meet the charging state and cell temperature condition described in this specification. The magnitude and duration of the pulse current must strictly observe all the charging states and cell temperature conditions listed in the table below. Violation of regenerative pulse charging conditions may result in permanent damage to the cell and thereby release PLB's product quality responsibility.

2.4.1 最大再生脉冲充电电压 3.65V Maximum regenerative pulse charging voltage is 3.65V

2.4.2 允许的再生脉冲充电电流和持续时间 Regenerative pulse charging current and duration



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SOC	电芯表面温度 Cell Surface Temperature				
	≤0℃	0~10℃	10~20℃	20~45℃	>45℃
>95%	不允许 Prohibited	不允许 Prohibited	不允许 Prohibited	0.5C, <10S	不允许 Prohibited
80%~95%	不允许 Prohibited	不允许 Prohibited	0.5C, <10S	0.5C, <10S	不允许 Prohibited
50%~80%	不允许 Prohibited	0.3C, <10S	0.75C, <10S	0.75C, <10S	不允许 Prohibited
<50%	不允许 Prohibited	0.5C, <10S	1C, <10S	1.0C, <10S	不允许 Prohibited

2.4.3 每次再生脉冲充电后, 电池需要有段休眠时期, 时间应等于或长于再生脉冲持续时间。休眠时期内, 电池可以处于放电状态, 也可以处于零电流不工作状态, 但在休眠时期内, 不允许电池再次发生再生脉冲充电现象。  
After each regenerative pulse charging, the battery needs to have a period of storage, which should be equal to or longer than the duration of the regeneration pulse. During storage, the battery could be discharged, or be a no working condition, but in the storage period, the battery will not be allowed to reproduce pulse charging again.

## 2.5 低温容量 (新电池状态) Low Temperature Capacity(New Cells)

No.	参数 Parameter	产品规格 Specification	条件 Condition
2.5.1	0℃的容量 Capacity At 0℃	≥3040 mAh	25℃以标准电流充电, 0℃ (电芯表面温度) 以标准电流放电 Cell be charged by standard charge current at 25℃, discharged by standard current at 0℃ (25/0℃ refers to cell surface temperature)
2.5.2	-10℃的容量 Capacity At -10℃	≥2470 mAh	25℃以标准电流充电, -10℃ (电芯表面温度) 以标准电流放电 Cell be charged by standard charge current at 25℃, discharged by standard current at -10℃ (25/-10℃ refers to cell surface temperature)
2.5.3	-20℃的容量 Capacity At -20℃	≥1900 mAh	25℃以标准电流充电, -20℃ (电芯表面温度) 以标准电流放电至 1.6V Cell be charged by standard charge current at 25℃, discharged by standard current to 1.6V at -20℃ (25/-20℃ refers to cell surface temperature)

## 2.6 安全与可靠性 Safety and Reliability

所有安全性能测试符合国标 GB/T 31485-2015 标准

All safety performance tests comply with GB/T 31485-2015 standard

## 3. 温度上升 (温升) Temperature Increasing


每个电池温升的测量应该保证电池在测试时的放置位置、方式与本规格书第 9 条电池图纸所描述的一样。电池应在环境温度较为稳定且空间足够大的房间里接受自然对流冷却。每个电池温度测量应选取经过校正的可以记录时间数据的温度感应器。在这种条件下, 温升是指放电后的温度减去放电前的温度。

Each battery temperature increasing is measured at same place where the battery is placed in the same manner as

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described in the battery drawing of article 9 of this specification. The battery should be cooled by natural convection in a room with relatively stable ambient temperature and large space. Each battery temperature measurement should be selected with the correct temperature sensor that can record the time data. In this condition, the temperature increasing is the temperature after the discharge minus the temperature before the discharge.

No.	参数 Parameter	产品规格 Specification	条件 Conditions
3.1	持续放电温升 Temperature Increasing during Continuous Discharge	$\leq 5^{\circ}\text{C}$	每个电池以标准电流放电 2 小时 Cell is discharged at standard current for 2 hours
3.2	脉冲放电温升 Temperature Increasing during Pulse Discharge	$\leq 10^{\circ}\text{C}$	在任何充电状态下, 每个电池以 11400mA 电流放电 10 秒 At any SOC, cell is discharged at 11400 mA current for 10s


#### 4. 储存及循环性能 Storage and cycling performance

No.	参数 Parameter	产品规格 Specification	条件 Conditions
4.1	可恢复容量 (短期) Recoverable Capacity (Short term)	$\geq 97\%$ 初始容量 $\geq 97\%$ of the initial capacity	新电池状态, 标准充电到 50% 的充电状态, $25^{\circ}\text{C}$ 储存 28 天, 按照本规格书第 2.2.3, 2.3.1 和 2.3.5 条所列的标准充放电条件测试容量 New Cell is charge to 50% SOC, then stored at $25^{\circ}\text{C}$ for 28 days, Recoverable Capacity is measured by standard charging and discharging conditions listed in section 2.2.3, 2.3.1 and 2.3.5 in this specification
4.2	可恢复容量 (长期) Recoverable Capacity (Long term)	$\geq 95\%$ 初始容量 $\geq 95\%$ of the initial capacity	新电池状态, 标准充电到 50% 的充电状态, $25^{\circ}\text{C}$ 储存 180 天, 按照本规格书第 2.2.3, 2.3.1 和 2.3.5 条所列的标准充放电条件测试容量 New Cell is charge to 50% SOC, then stored at $25^{\circ}\text{C}$ for 180 days, Recoverable Capacity is measured by standard charging and discharging conditions listed in section 2.2.3, 2.3.1 and 2.3.5 in this specification
4.3	绝对存储温度 Absolute Storage Temperature	$-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$	电芯表面温度 Cell Surface Temperature
4.4	储存相对湿度 Storage Relative Humidity	储存过程中严禁与易吸潮物质直接接触; It is strictly forbidden to contact with the moisture-absorbing material during storage	
		$< 70\% \text{RH}$	储存 1 个月以内(包括 1 个月) Storage for less than 1 month(Include 1 month)
		$< 50\% \text{RH}$	储存一个月以上 Storage for more than 1 month.
4.5	循环容量 Capacity After Cycling	$\geq 80\%$ 初始容量 $\geq 80\%$ of the initial capacity (2000 次循环之后 After 2000 Cycles)	新电池状态, $25 \pm 2^{\circ}\text{C}$ 充电: 恒流恒压, 3.2A, 3.65V, 截止电流 0.02C, 搁置 10 分钟 放电: 恒流, 5A, 2.5V 截止, 搁置 10 分钟 New Cell at $25 \pm 2^{\circ}\text{C}$ Charge: CC-CV, 3.2A, 3.65V, 0.02C cut off, Rest for 10min Discharge: CC, 5A, 2.5V cut off, Rest for 10min

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## 5. 产品寿命终止管理 Product life termination management

电池的使用期限是有限的。客户应该建立有效的跟踪系统检测并记录每个使用期限内电池的内阻。内阻的测量方法和计算方法需要客户和 PLB 共同讨论和双方同意。当使用中的电池的内阻超过这个电池最初的内阻的 250% 时，应停止使用电池，违反该项要求，将免除 PLB 依据产品销售协议以及本规格书所应承担的产品质量保证责任。

Battery life is limited. Customers should set up an effective tracking system to detect and record the internal resistance of the battery. The measurement methods and calculation methods of internal resistance require customers and PLB to discuss and agree with both parties. When the battery internal resistance is more than 250% of the initial resistance, they should stop using the battery. Any violation of the requirements will be exempt from PLB's quality guarantee responsibility which based on product sales contract and this specification.

## 6. 应用条件 Application Condition

客户应当确保严格遵守以下与电池相关的应用条件：

Customers should use the battery according to the following conditions

6.1 客户应配置电池管理系统，严密监控、管理与保护每个电池。

Customer should apply BMS to monitor, manage and protect each battery.

6.1.1 客户应向 PLB 提供电池管理系统详细的设计方案、系统特点、框架、系统数据、格式等相关信息，以供 PLB 对该系统进行设计评估，并建立电池管理档案。

Customer shall provide BMS detailed design, system characteristic, framework, system data information to PLB, based on these data system, PLB could evaluation, and build the battery management files.

6.1.2 未经 PLB 同意，客户不可擅自修改或者改变电池管理系统的设计与框架，以免影响电池的使用性能。

Without authorization of PLB, the customer shall not modify or change the design and framework of the battery management system, to make sure not to affect the performance of the battery.

6.1.3 客户应保存完整的电池运转的监测数据，用作产品质量责任划分的参考。不具备完整的电池系统使用期限内的检测数据的，PLB 不承担产品质量保证责任。

The customer shall keep the monitoring data of the complete battery operation as a reference for product quality responsibility. The PLB does not undertake the product quality assurance responsibility without the inspection data of the complete battery system.

6.1.4 电池管理系统需满足以下最基本的检测和控制要求：

The battery management system needs to meet the following basic requirements

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No.	参数 Parameter	产品规格 Specification	保护动作 Protection Action
6.1.4.1	充电终止 Stop Charging	3.65V	当电池的电压达到 3.65V 时终止充电 Stop charging when the voltage reaches 3.65V
6.1.4.2	第一级过充电保护 First-Stage Overcharge Protection	大于或等于 3.8V ≥3.8V	当电池电压达到 3.8V 终止充电 Stop charging when the voltage reaches 3.8V
6.1.4.3	第二级过充电保护 Second-Stage Overcharge Protection	大于 4.0V >4.0V	当电池电压达到 4.0V 终止充电, 并锁定电池管理系统直到技术人员解决问题 When the cell voltage reaches 4.0V, locking the battery management system until the technician solves the problem
6.1.4.4	放电终止 Stop Discharge	最小 2.5V 2.5V min	终止放电当电池的电压达到 2.5V, 将电流降到最小 Stop discharging when the cell voltage reaches 2.5V, Minimize the current
6.1.4.5	第一级过放保护 First-Stage Over-discharge Protection	最小 2.2V 2.2V min	终止放电当电池的电压达到 2.2V, 将电流降到最小 Stop discharging when the cell voltage reaches 2.2V, Minimize the current
6.1.4.6	第二级过放保护 Second-Stage Over-discharge Protection	最小 2.0V 2.0V min	当电池电压低于 2.0V 时, 锁定电池管理系统直到技术人员解决问题 When the cell voltage reaches 2.0V, locking the battery management system until the technician solves the problem
6.1.4.7	短路保护 Short-circuit Protection	不允许短路 Short-circuit is Forbidden	发生短路时, 由过流器断开电池 When a short circuit occurs, the battery is disconnected from the overcurrent
6.1.4.8	过流保护 Overcurrent Protection	参考第 2.3 条放电要求 According to 2.3	电池管理系统控制放电电流符合规格 The battery management system controls the discharge current to meet the specifications
6.1.4.9	过热保护 Overheat Protection	参考第 2.2 条和第 2.3 条 According to 2.2 & 2.3	当温度超过本规格书规定时, 终止充电/放电 The charge/discharge is terminated when the temperature exceeds the specification of this specification
6.1.4.10	充电时间过长保护 Charging Time Protection	充电时间在 8 小时内 Within 8 hours	充电时间长于 8 小时, 则终止充电 Stop charging when charging time is over 8 hours

备注: 以上 No.6.1.4.2、6.1.4.3、6.1.4.5、6.1.4.6 为警示条款, 请客户注意: 当电池达到上述任何一项条款描述的指标和参数状态时, 意味着电池已超出本规格书规定的使用条件, 客户需依“保护动作”及本规格书其他相关规定对电池采取保护措施, 同时, PLB 声明对上述使用状态的电池质量不承担任何保证责任, 并因此而导致的客户及第三方的任何损失不予赔偿。

NOTES: As for above No. 6.1.4.2, 6.1.4.3, 6.1.4.5, 6.1.4.6 are warning clauses, the customer please note: when the battery reaches any of these describe indicators and parameters, it means that the battery has already beyond the conditions of use, the customer should be in accordance with the "protection" and other relevant provisions this specification of battery protection measures, at the same time, PLB statement on the using state of the battery does not undertake any





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guarantee responsibility for the quality.

6.1.5 避免电池到达过放状态，电池电压低于 1.5V 时，电池内部可能会遭到永久性的损坏，此时 PLB 的产品质量保证责任失效。根据本规格书第 2.3.5 条，当放电截止电压低于 2.0V 时，系统内部能耗降低到最小，并在重新充电之前延长休眠时间。客户需要培训使用者在最短的时间内重新充电，防止电池进入过放状态。

The battery may be permanently damaged when the battery voltage is less than 1.5V, and the product quality assurance of PLB will be invalid. According to 2.3.5 of this specification, the internal energy consumption of the system should be reduced to minimum when the discharge cut-off voltage is below 2.0 V, and the storage time is prolonged before recharging. The customer needs to train the user to recharge the battery in the shortest time to prevent the battery from over-discharge state.

6.1.6 若预计将电池存放 30 天以上的，应将 SOC 调整为 50% 左右。若预计将电池存放 90 天以上的，应将 SOC 调整为 50% 左右并每 90 天对电池进行至少一次全 SOC 范围（单体电芯 2.0~3.65V）充放电维护动作。

If the battery is expected to be stored for more than 30 days, the SOC should be adjusted to about 50%. If the battery is expected to be stored for more than 90 days, the SOC should be adjusted to about 50% and the battery should be charged and discharged at least once in the whole SOC range (unit cell 2.0~3.65 V) for every 90 days.

6.1.7 电池避免在本规格书禁止的低温条件下充电（包括标准充电，快充，紧急情况充电），否则可能出现意外的容量降低现象。电池管理系统应依照最小的充电和再生充电温度进行控制。禁止在低于本规格书规定的温度条件下充电，否则，PLB 不承担质量保证责任。

The battery should avoid charging (including standard charging, quick charging, emergency charging) in the low-temperature conditions which is prohibited in this specification, otherwise, unexpected capacity reduction may occur. The battery management system should be controlled according to the minimum charge and regenerative charging temperature. It is forbidden to charge when temperature is lower than the temperature conditions specified in this specification. Otherwise, PLB will not be liable for quality assurance.

6.1.8 客户在进行配组使用时候 PLB 建议客户使用带均衡功能的保护系统，避免由于长时间使用或储存带来的电芯状态不一致，从而影响电池组性能。

PLB advises customer should use protection system with balance function to avoid the degradation of the electrochemical performance caused by unbalance of the cell.


6.1.9 电箱设计中应充分考虑电芯的散热问题，由于电箱散热设计问题导致的电芯或电池过热损坏，PLB 不承担质量保证责任。

In the design of the electric box, the heat diffusion of the cells should be fully considered. PLB shall not be responsible for the quality assurance due to the overheating of the battery or battery caused by the design of the electric box.

6.1.10 电箱设计中应充分考虑电芯的防水、防尘问题，电箱必须满足国家有关标准规定的防水、防尘等级。由于防水防尘问题而导致的电芯或电池的损坏（如腐蚀、生锈等），PLB 不承担质量保证责任。

The waterproof and dustproof problem should be fully considered in the electrical box design, and the electric box must meet the waterproof and dust-proof grade stipulated by the relevant national standards. PLB is not responsible for quality assurance due to the damage caused by the waterproof and dustproof problem (such as corrosion, rust, etc.)



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## 7.安全防范 Safety Protection

为防止电芯可能发生泄露，发热，爆炸，请注意以下预防措施：

To prevent the cell from leaking, heating and explosion, please pay attention to the following precautions:

7.1 严禁将电芯浸入水中。Do not immerse the core in water

7.2 禁止将电芯在热高温源（如火，加热器等）旁使用和留置。It is forbidden to use or retain the cell near the heat source (such as fire, heater, etc.).

7.3 充电时请选用锂离子电芯专用充电器。Please use the lithium ion battery charger

7.4 严禁颠倒正负极后使用电芯。Don't reverse the positive and negative terminals

7.5 严禁将电芯正负极直接连入电源插座。It is strictly forbidden to connect the electrode directly to the power socket

7.6 禁止将电芯丢入火或加热器中。Do not throw the cell into a fire or heater

7.7 禁止用金属直接连接电芯正负极，造成短路。

Don't connect the positive and negative terminal directly with metal objects

7.8 禁止将电芯与金属，如发卡、项链等一起运输或存储。

Don't transport and store the cell together with metal objects such as necklaces, hairpins.

7.9 禁止敲击，抛掷或踩踏电芯等。Don't strike, throw or trample the cell

7.10 禁止用钉子或其它利器刺穿电芯。Don't pierce the cell with a nail or other sharp object.

## 8.风险警告 Cautions

8.1 禁止在高温下（直热的阳光下）使用或放置电芯，否则可能会引起电芯过热，起火或功能失效，寿命减短。  
Don't use or store the cell at very high temperature conditions (for example, strong direct sunlight or a vehicle in extremely hot conditions).

8.2 如果电芯发生泄露，电解液进入眼睛，请不要搓揉，应用清水冲洗眼睛，必要时请立即前往医院接受治疗，否则会伤害眼睛。

If the cell leaks and the electrolyte get into your eyes, don't wipe eyes, instead, thoroughly rinse the eyes with clean running water for at least 15 minutes, and immediately seek medical attention. Otherwise, eyes injury can result.

8.3 如果电芯发出异味，发热，变色，变形或使用、存储、充电过程中出现任何异常现象，立即将电芯从装置或充电器中移开并停用。


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

8.4 如果电芯弄脏，使用前应用干布抹净。

In case the cell terminals get dirty, clean the terminals with a dry cloth before use.

8.5 如果电池使用寿命达到极限，请将电池放电至 2.0V 以下，将电池头部用绝缘胶纸粘住，送至专业的废品回收站回收。

If the cell beyond the useful-life, please fully discharged, sticks the cell with insulating tape, then put the cell to the specialized recycle bin.

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## 9.电芯（电池）图纸 Cell Drawing

### 9.1 电芯说明及型号 Cell Model

IFR26650-38A 型号的圆柱锂离子二次电芯

IFR26650-38A Cylinder lithium ion battery

### 9.2 电芯尺寸 Cell Dimension

电芯尺寸（包含热缩膜）如图 1 所示（单位：mm）。

Cell physical dimension listed in Figure 1(unit: mm)

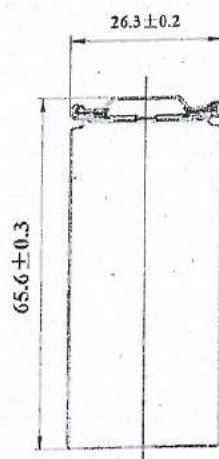


图 1 电芯外观尺寸

Figure 1 Cell appearance size

### 9.3 喷码说明 Code-spurting explanation

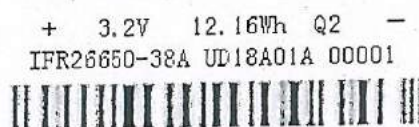


图 2 电芯喷码

Figure 2 Cell Code-spurting

+/-: 位于电芯头部尾部,表示电芯正负极 It refers to battery Positive pole & Negative pole.

3.2V: 表示电芯标称电压 It refes to battery typical voltage.

12.16Wh: 表示该电芯能量 It refes to battery energy.

IFR26650-38A: 表示电芯型号 It refes to battery model.

UD18A01A: 表示电芯批次号 It refes to battery batch.

00001: 表示电芯流水号 It refes to battery serial number.