Li-ion Battery Pack Specification
锂离子电池组规格书

Customer No: **客户代码：**	**G458**
Customer Model: **客户机型：**	**TBD**
Customer Materiel No: **客户物料编码：**	**TBD**
Customer Materiel Description: **客户物料描述：**	**TBD**
Part No: **项目编号：**	**I0328A**
Battery Pack Materiel No: **电池组物料编码：**	**DA12001371**
Cell model: **电芯型号：**	**INR21700 50GB (SDI)**
Mode Of Transport: **运输方式：**	**General transport** **普通运输**
Part Description: **组合方式：**	**2S1P Cell+PCM+ housing** **2S1P 电芯+PCM+插头线**
Name Of Factory: **生产企业：**	**ICON ENERGY SYSTEM (SHENZHEN) CO.,LTD.** **博科能源系统(深圳)有限公司**
Date: **日期：**	**2023-10-19**
Specification Revision: **规格书版本：**	**A0**

Registered **编制**	**Checked** **审核**	**QA Checked** **QA 审核**	**Approved** **批准**	**Supplier Signature** **供应商签章**
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Customer Approve **客户确认**	**Customer Signature** **客户签章**

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1.Revision History 修订履历

Product Revision History
产品修订履历表

REV. 版本	Date 日期	Mark 标记	Revision Description 修订描述	Originator 修订人
A0	2023-10-19	/	First issue 首次制定	杨婷/包银波

2. Scope 适用范围

This specification describes the basic performance, technical requirement, testing method ,warning and caution of the Li-ion Battery Pack, the pack defined in this documentation is an assembly which include cell, PCM and Connector, the specification only applies to Icon Energy System (Shen Zhen) Co; Ltd.. 本标准规定了锂离子电池组的基本性能、技术要求、测试方法及注意事项，电池组合定义的是包括电芯，保护板和插头的组合，本标准只适用于博科能源系统（深圳）有限公司所生产的锂离子电池组。

3. Product Specification 产品规格

NO. 序号	Items 项目	Specifications 规格		Remark 备注
3.1	Typical Capacity 典型容量	4800mAh		From FC to FD by discharge current 0.2C. Standard Discharge Capacity≥1.0Ch. 用 0.2C 电流从 FC 恒流放电至 FD 标准放电容量≥1.0Ch。
	Rated Capacity 额定容量	4722mAh		
	Define 定义	1.0C(h)=4722mA(h)		
3.2	Open Circuit Voltage & SOC 开路电压 & SOC	Air transport 航空运输	--	Measure Battery at standard testing condition. 标准测试条件下测量。 Use the High Precision Digital Multimeter to test the voltage in the voltage range. 用高精度数字万用表电压档位测试电压。
			--	
		General transport 普通运输	7.7V~8.0V	
			SOC:60%~80%	
		Shipment for Shutdown Shutdown 出货	Yes	Recovery Condition: use standard charge method to activate the battery. 恢复条件：用标准充电方法激活。
3.3	Pack Initial Internal Impedance 电池组初始内阻	≤60mΩ		(Measure the AC impedance at 1kHz @25°C) （测量交流内阻在 1kHz 下 25°C）
	Impedance match for cells 电芯内阻匹配	≤3mΩ		Before the battery is charged and discharged. 在电池充电和放电之前。
	Voltage match for cells 电芯电压匹配	≤5mV		
	K-value match for cells 电芯 K 值	≤0.03mV/h		

3.4	Weight 重量	TBD±5g			
3.5	Nominal Voltage 标称电压	7.20V			
	Fully Charge (FC) Voltage 满充(FC)电压	8.4V			Note: Please refer to note (3). 备注：请参考备注(3)。
	Fully Discharge (FD) Voltage 满放(FD)电压	5.6V			It is recommended that the Host stop the discharge Voltage>5.6V. 建议主机端停止放电电压>5.6V。
	Typical low voltage for discharge protection(PUV) 典型的低压保护电压(PUV)	5.6V			Note: Please refer to note (4). 备注：请参考备注(4)。
	End of Discharge Voltage 放电终止电压	5.8V			The coulometer reads 0% 电量计报 0%点
3.6	Standard Charge Current 标准充电电流	0.5C			
3.7	Standard Charge Method 标准充电方法	0.5C CC (constant current) charge to FC Voltage, then CV (constant voltage) charge till charge current decline to 0.02C. 0.5C 恒流充电至 FC 电压，再以 FC 电压恒压充电至电流降低至 0.02C。			
3.8	Charge Time 充电时间	Approx. 3.5 hrs. 大约 3.5 hrs。			With Standard Charge Method. 以标准充电方法充电。
3.9	Standard Discharge Method 标准放电方法	Using 0.2C constant current discharge to FD Voltage. 使用 0.2C 恒流放电至 FD 电压截止。			
3.10	Max. Charge Current 最大充电电流	Temperature range 温度范围	Charge current 充电电流	Charge voltage 充电电压	On the basis of meeting this condition, 6.1.1 should be met. 在满足此条件基础上再满足 6.1.1 Not for cycle life charge current 不是循环寿命的充电电流。 Cell surface temperature should not exceed 45℃. 电芯表面温度不能超过 45℃。
		0~10℃	0.3C	FC	
		10~25℃	0.7C	FC	
		25~45℃	1C	3.0~3.9/Cell	

3.11	Max. discharge current 最大放电电流	持续电流：9.5A Continuous current: 9.5A		Discharge at low temperature, The Battery capacity will be reduced or The battery won't run. It is recommended to use high current temperatures of 0 to 40℃. 低温放电时，放出容量会减少或放不出电量。建议大电流放电使用温度0~40℃。 Large discharge current may trigger temperature protection. 大电流放电，可能会触发温度保护。
		Peak current：14.4A/150s 峰值电流：14.4A/150s		
3.12	Operating Temperature 操作温度	Charge 充电	0 ~ 45℃	This is a typical use temperature. In actual use, it is necessary to consider the protection temperature of the PCM. 这是一个典型的使用温度，实际使用时，需要考虑到保护板的保护温度。
		Discharge 放电	-20 ~ 60℃	
3.13	Storage Temperature 储存温度	≤1 month:	-20℃~60℃	Recommended storage temperature is 25±2℃ of half charge state (SOC=50%). 建议储存温度 25±2℃，电池为半电状态(SOC=50%)储存。 Note: Please refer to 3.14 for the method of restoring the capacity. 备注：恢复容量方法请参考 3.14。
		≤3months:	-20℃~45℃	
		≤1 year:	-20℃~23℃	
		The recoverable capacity no less than 80% of the initial capacity. 恢复容量不小于初始容量的 80%。		
3.14	Recoverable Capacity Measurement Method 恢复容量测量方法	Constant current 0.5C charge to FC Voltage, then constant voltage FC Voltage charge to current declines to 0.02C, rest for 10min, constant current 0.2C discharge to FD Voltage, rest for 10min. Repeat above steps 3 times, record the maximum capacity. 先 0.5C 恒流充电至 FC 电压，再以 FC 电压恒压充电至电流下降至 0.02C，搁置 10min，再 0.2C 恒流放电至 FD 电压，搁置 10min。重复以上步骤 3 次，记录最大容量值。		
3.15	Storage Humidity 储存湿度	≤75% RH		
3.16	Cosmetic Appearance 外观	Prismatic battery No gas, Cylindrical battery and Prismatic battery No rupture, No leakage. 软包电池无胀气，圆柱电池和软包电池无破裂，无漏液。		

3.17	Standard Testing Condition 标准测试条件	Temperature: 25±2℃ 温度:25±2℃ Humidity: ≤75% RH 湿度：≤75% RH Atmospheric Pressure 大气压： 86-106kPa	

Note: (1) From 3.1 to 3.16, the testing condition is following 3.17 (standard testing condition).

(2) If the working condition is out of 3.17, the performance may have some deviation.

(3) According to 3.5 about Fully Charge (FC) Voltage, it is the maximum charging voltage that allows the customer's charger or charging circuit. The charger acts as the first level protection, If can't meet this requirement, please bring it up in time. The PCM is used as the second level protection.

(4) According to 3.5 about Typical low voltage for discharge protection(PUV), it is the low voltage protection value of the PCM(protection circuit Modular).Customer's machine acts as the first level protection.The PCM is used as the second level protection. After over-discharge protection, it should be charged to about 3.8V*S within one week (S means the number of strings).

备注：(1) 从 3.1 至 3.16，测试条件均按照 3.17(标准测试条件)。

(2) 如果工作条件偏离 3.17，电池性能可能发生偏移。

(3) 针对 3.5 的满充(FC)电压，这是允许客户充电器或充电电路的最大充电电压。客户充电器做为第一级保护，如果不能满足这个要求，请及时提出。保护板做为第二级保护。

(4) 针对 3.5 的典型的低压保护电压(PUV)，这是保护板的低压保护值。客户的机器做为第一级保护。过放保护后，应在 1 个星期之内充电到约 3.8V*S(S 表示串数)。

4. Electrical Performance 电性能

No. 序号	Items 项目	Test Methods and Condition 测试方法与条件	Criteria 标准
4.1	Rated Capacity 倍率性能	At item 3.17 condition, charge the battery as per Item 3.7, rest for 10min, then discharge at 0.2C, 0.5C,1C to voltage FD Voltage, record the discharge time. 在 3.17 条件下，按 3.7 方式满充电池后，搁置 10 分钟，然后分别用 0.2C、0.5C、1C 电流放电至 FD 电压，记录放电时间。	0.2C: ≥300min (100%) 0.5C: ≥114min (95%) 1C: ≥54min (90%) 100%=1.0Ch
4.2	Temperature Characteristics 温度特性	At item 3.17 condition, charge the battery as per Item 3.7. Stored the recharged battery for 3 hrs at 40± 2℃, 25±2℃, 0±2℃, -10±2℃ and discharged at 0.2C to FD Voltage at the same temp., record the discharge time.. 在 3.17 条件下，按 3.7 方式满充电池后，分别在 40 ± 2℃、25±2℃、0±2℃、-10±2℃下储存电池 3hrs，然后在相同温度下用 0.2C 将电池放电至 FD 电压，记录放电时间。	40℃:≥285min (95%) 25℃:≥300min (100%) 0℃:≥ 270min (90%) -10°C:≥ 210min (70%)
4.3	Cycle Life (25℃) 循环性能(25℃)	At item 3.17 condition, constant current0.5C charge to FC Voltage, then constant voltage FC Voltage charge to current declines to 0.02C, rest for 30min, constant current 1C discharge to FD Voltage, rest for 30min. Repeat above steps till continuously discharge capacity higher than 70% of the initial capacity of the battery. 在 3.17 条件下，先用 0.5C 将电池恒流充电至 FC 电压，再 FC 电压恒压充电直至充电电流下降至≤0.02C；搁置 30 分钟，再用 1C 电流恒流放电至 FD 电压；搁置 30 分钟，重复以上步骤，直到放电容量降低至初始容量的 70%。	Cycle times:≥500 times 循环次数：≥500 次
4.4	Store Characteristics 储存特性	At item 3.17 condition, charge the battery as per Item 3.7. No outer loading circuit, store the battery 28 days, discharge at 0.2C to FD Voltage, record the discharge time. 在 3.17 条件下，按 3.7 方式满充电池后，无外接负载线路，电池搁置 20 天，然后用 0.2C 恒流放电至 FD 电压，记录放电时间。	≥240min (80%)
4.5	Temperature cycle 温度循环	For the battery pack after full charge, the composite temperature test shall be carried out under following conditions. Then discharging time of the battery pack until reaching a discharge cut-off voltage shall be measured at a constant current of 0.2C. 75° C （6hours） ←0.5 hours→ -40℃(6 hours), 10 cycles 电池组完全充电后，温度循环测试应当在以下条件下进行。电池测试后以 0.2C 的恒定电流进行放电直到放电截止电压即可；75° C(6 小时) ← 0.5 小时 → -40℃(6 小时)，循环十次。	No fire, no smoke, no leakage 不起火，不冒烟，不漏液

5. Safety Performance 安全性能

No. 序号	Items 项目	Test Methods and Condition 测试方法与条件	Criteria 标准
5.1	Overcharge Test 过充测试	At item 3.17condition, constant current 0.2C discharge to FD Voltage, continue to charge at a constant current of maximum charging current to n*6.0V or the highest possible voltage value (whichever is higher), and keep this voltage for constant voltage charging. Charge the battery pack with the protection circuit removed or without the protection circuit for 1h, and charge the battery pack with the protection circuit until the protection circuit operates. 在 3.17 条件下，用 0.2C 电流恒流放电至 FD 电压，继续以最大充电电流恒流充电至 n*6.0V 或者可能承受的最高电压值（两者取较高者），并保持该电压进行恒压充电。对于移除保护电路或者没有保护电路的电池组充电 1h，对于保留保护电路的电池组充电至保护电路动作。	No fire, No explosion 不起火，不爆炸
5.2	Short-Circuit Test 短路测试	At item 3.17 condition, charge the pack as per Item 3.7, then connecting the positive and negative terminals of the pack with a circuit load having a resistance load of 80 ±20mΩ. The temperature of the pack case is to be recorded during the test. Stop the test until the pack surface temperature lower 10℃ than the maximum temperature. 在 3.17 条件下，按 3.7 方式满充电池后，用内阻为 80 ±20mΩ 的导线连接电池正负极，测试过程中监测电池温度，直到电池表面温度低于峰值温度 10℃，停止实验。	No fire, No explosion 不起火，不爆炸
5.3	Drop Test 跌落测试	At item3.17 condition, charge the battery as per Item 3.7. Then batteries were dropped from a height of 1m (3.28ft) to a concrete surface, Each battery is to be dropped once in the positive and negative directions of three mutually perpendicular mounting positions for a total of 6 times, then rest for 1 hr at 25±2℃. 在 3.17 条件下，按 3.7 方式满充电池后，电池从 1m (3.28 英尺) 的高度自由跌落到混凝土板上；每个电池将沿着三个互相垂直轴的正负方向跌落 1 次，总共跌 6 次，然后 25±2℃静置观察 1hr。	No fire, No explosion 不起火，不爆炸

5.4	Vibration Test 振动测试	At item3.17 condition, charge the battery as per Item 3.7. batteries are firmly secured to the platform of the vibration machine without distorting the batteries in such a manner as to faithfully transmit the vibration. The battery is to be subjected to simple harmonic motion with the amplitude for 0.8 mm (0.03 inch) [1.6 mm (0.06 inch) total maximum excursion]. The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, and return in not less than 90 no more than 100 minutes. The battery is to be tested in three mutually perpendicular directions. For a battery that has only two axes of symmetry, the sample is to be tested perpendicular to each axis. 在 3.17 条件下，按 3.7 方式满充电池后，将电池稳固地、有保护地固定在振动平台上，不要扭曲电池，以便振动能很好的传送。每个电池经受简单的调谐振动，振幅为 0.8mm(0.03 英寸)[最大双振幅 1.6mm(0.06 英寸)]。振动的频率在 10-55Hz 范围内以 1Hz/min 的速率变化，在 90-100min 内恢复回来，电池沿 3 个互相垂直的方向振动。对于只有两个对称轴向的电池，样品应沿垂直于每个轴的方向测试。	No leakage, no fire and no explosion 不漏液，不起火，不爆炸
5.5	Low Pressure Test 高空模拟测试	At item3.17 condition, charge the battery as per Item 3.7. After standard charge ,store for 6h at a absolute pressure of 11.6KPa, next rest for 2hrs at 25±2℃. 在 3.17 条件下，按 3.7 方式满充电池后，在绝对压强为 11.6KPa 下放置 6h，然后 25±2℃搁置观察 2hrs。	No leakage, no fire and no explosion 不漏液，不起火，不爆炸
5.6	Over discharge 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 n*30Ω* for 24hour. 放电至截止电压后，外接小于 n*30Ω*的负载电阻放电 24 小时。	No fire, No explosion 不起火，不爆炸
5.7	ESD Test 静电放电测试	Under the condition of 3.17, 4KV contact discharge test (± 4KV each 5 times) and 8KV air discharge test (± 8KV each 5 times) were conducted on each terminal of battery pack or output terminal of circuit board, and the interval between the two discharge tests was 1min. 在 3.17 条件下，对电池组每个端子或者电路板的输出端子进行 4KV 接触放电测试（±4KV 各 5 次）和 8KV 空气放电测试（±8KV 各 5 次），每两次放电测试之间间隔 1min。	No fire, No explosion, if there is a protection circuit, its protection function shall not fail 电池组应不起火、不爆炸，如有保护电路其保护功能不应失效

Remark: Above safety characteristics must be tested with protective equipment.
注意：以上安全性能测试应在有保护措施下进行。

6. Protective Circuit 保护电路

PCM Parameter PCM 参数@25℃

6.1 充电保护在3.17条件下(Charge Protection at item 3.17 condition)

Name 名称	Item 项目		Value 值	Range 调节范围	Unit 单位
Over-voltage for single cell 过电压-单体电芯	Over-voltage Protection 过充电压保护		**4225**	±25	mV
	Delay Time 延迟		**1**	-0.5/+3	s
	Recovery voltage 恢复电压		**4100**	±25	mV
	Recovery Condition 恢复条件		Release from the threshold voltage or discharge, automatically recover. 单体电芯电压达到释放值或者放电，自动恢复。		
Charge Over-current 充电过电流	First Over-Current Charge Protection (OCC1) 一级充电过流保护		**6**	±0.5	A
	Delay Time 过流延迟		**1**	-0.5/+3	s
	OCC1 & OCC2 Recovery Condition OCC1 & OCC2 恢复条件		1.Charge Current< 0.1A， 2.Delay about 60s automatically recover. 1、充电电流小于 0.1A， 2、延迟约 60 秒自动恢复。		
Temperature protection 温度保护	Not Charging (TS1 For cell)	Under -temperature Protection (UTC1)	-21	±3	℃
		Recovery Condition	-16	±3	℃
		Over-temperature Protection (OTC1)	65	±3	℃
		Recovery Condition	60	±3	℃
	In Charging (TS1 For cell)	Under -temperature Protection (UTC2)	-1	±3	℃
		Recovery Condition	2	±3	℃
		Over-temperature Protection (OTC2)	50	±3	℃
		Recovery Condition	45	±3	℃
Charge current threshold 最小充电电流阀值			40	±8	mA
Balance current 均衡电流			13	-3~+12	mA
Charge time out protection time 充电超时保护时间			12.5H/0.5A		
Charge time out protection recovery condition 充电超时保护恢复条件			Discharge capacity＞2mAh		
0V charging function 0V 充电功能			Yes		
Full charge condition: 1.Average Charge Current < Taper Current (250mA); 2. Max (Cell Voltage) + Taper Voltage(100mV) > Charging Voltage / number of cells. 3.The accumulated change in capacity >0.25 mAh					
Recommended by slow charging method：(Trickle Charge: Under 6.0V with 0.5A) / (constant current: 2.5A / (constant voltage:8.4V with 100mA cut off current). 建议的慢速充电方法: （涓流：6.0V 以下用 0.5A 充电） / （恒流：2.5A ）/ （恒压：8.4V，电流 100mA 截止）。					
Recommended by fast charging method：(Trickle Charge: Under 6.0V with 0.5A) / (constant current: ≤1.2A (0 ~ 25℃) 4.7A (25 ~ 45℃）)/ (constant voltage:8.3V with 100mA cut off current). 建议的快速充电方法: （涓流：6.0V 以下用 0.5A 充电） / （恒流：1.2A (0 ~ 25℃) 4.7A (25 ~ 45℃）/ （恒压：8.3V，电流 100mA 截止）。					

6.2 放电保护在3.17条件下 (Discharge Protection at item 3.17 condition)

Name 名称	Item 项目		Value 值	Range 调节范围	Unit 单位
Under-voltage for single cell 欠电压-单电芯	Under-voltage Protection 欠电压保护		**2800**	±25	mV
	Delay Time 延迟		**2**	-1/+2	s
	Recovery Voltage 恢复电压		**3000**	±25	mV
	Recovery Condition 恢复条件		Release from the threshold voltage or charge. 单体电芯电压达到释放值或充电。		
Discharge Over-Current & ASCD Protection 放电过流&短路保护	First Over-Current Discharge Protection (OCD1) 一级放电过流		**18**	±1	A
	Delay Time 过流延迟		**1**	-0.5/+3	s
	OCD1&OCD2 Recovery Condition OCD1&OCD2 恢复条件		1. Discharge Current < 0.1A; 2.Delay about 15s automatically recover. 1、放电电流小于 0.1A; 2、延迟约 15 秒自动恢复。		
	Third Over-Current Discharge Protection (AOLD) 三级放电过流保护		≥25A±3A /17ms±10ms		
	Short-circuit protection (ASCD) 短路保护		25A≤Current≤200A		
	Recovery of AOLD & ASCD AOLD & ASCD 恢复		Delay about 60s automatically recover 延迟约 60 秒自动恢复		
Discharge Temperature protection 放电温度保护	CELL (TS1 For cell)	Under-temperature Protection (UTD)	-21	±3	℃
		Recovery Condition	-16	±3	℃
		Over-temperature Protection (OTD)	65	±3	℃
		Recovery Condition	60	±3	℃
Discharge current threshold 最小放电电流阀值			40	±8	mA
Working status 工作状态			≤350		uA
Sleep 休眠			≤150		uA
Shutdown 关机			≤10		uA

6.3 电流、FCC和 RSOC说明在3.17条件下 (Current ,FCC and RSOC instructions at item 3.17 condition)

1、倍数关系 (Multiple relationship)

Load current = current current (BQ28Z610)*1；

Charging current = current current (BQ28Z610)*1；

PACK FCC = FCC (BQ28Z610)*1 ；

PACK RSOC= RSOC (BQ28Z610) *1；

PACK Voltage=PACK Voltage (BQ28Z610) *1；

2、误差关系 (Tolerance relationship)

Note:

1. After a quiet place for a long time not to use batteries, RSOC error will be bigger, the battery needs a full charge (then relax for 2 hours) and full discharge (then relax for 5 hours). After 1~2 cycle, fuel gauge will reach the normal RSOC error range.

2. If the customer is shallow charge and shallow discharge, that is, not fully charged, not fully discharged, RSOC error will become larger. It is recommended that after every 10 shallow charge and shallow discharge cycles, then need 1 to 2 fully charge and fully discharge cycles, after full charge (then relax for 2 hours) and full discharge (then relax for 5 hours), the fuel gauge will reach the normal RSOC error range.

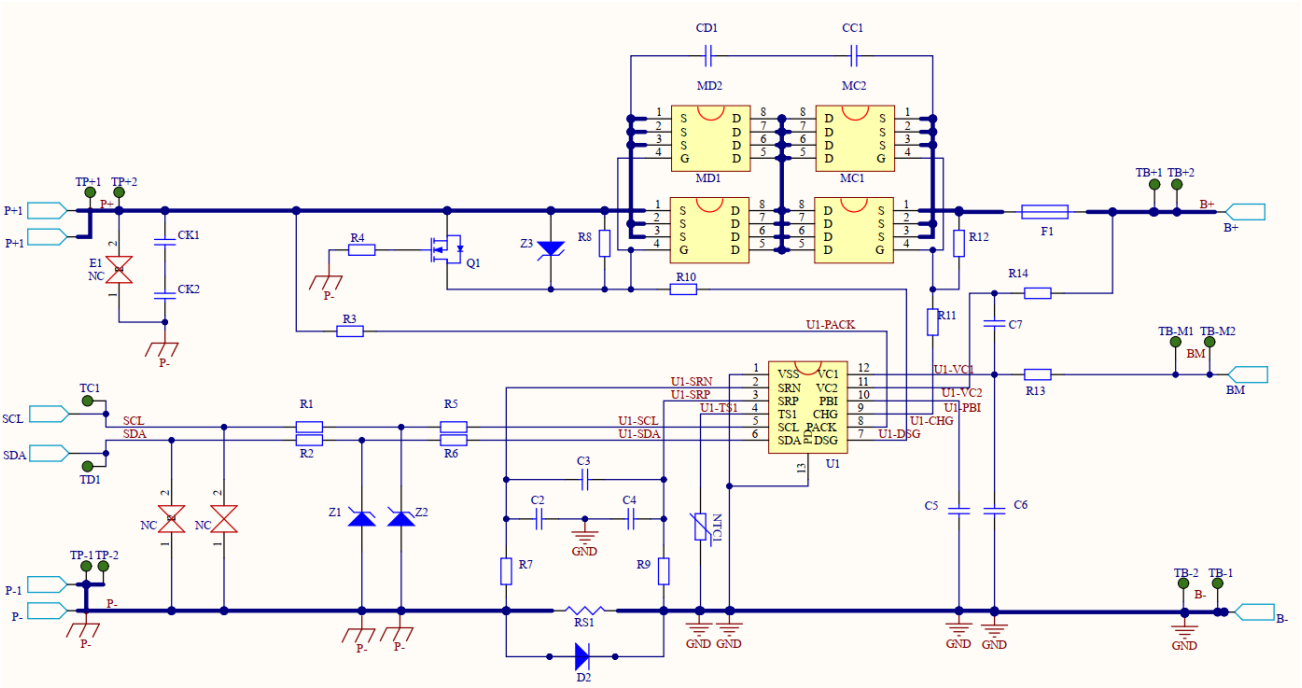
备注：

1. 电池在长时间静置不使用后，RSOC 误差会变大，电池需要 1~2 个循环，满充后（静置 2 个小时）和满放后（静置 5 个小时），电量计才会达到正常的 RSOC 误差范围。

	Pack (Battery)	BQ28Z610	
	Value 值	Value 值	Range 调节范围
Load current	1.0A	1.0A	±8%
Charging current	1.0A	1.0A	±8%
Pack FCC	9.4Ah	9.4Ah	±10%
Pack RSOC	50%	50%	±10%
Pack voltage	7.20V	7.20V	±0.1V

2. 如果客户是浅充和浅放，即没有完全充满，没有完全放空的情况，RSOC 误差会变大，建议每隔 10 个浅充和浅放循环后，再进行 1~2 个满充和满放循环，满充后（静置 2 个小时）和满放后（静置 5 个小时），电量计才会达到正常的 RSOC 误差范围。

6.4 Schematic diagram保护板原理框图



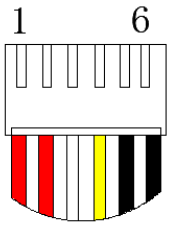
6.5 Parts list(主要元件清单)

NO. 序号	Symbol 符号	Material Name 物料名称	Material Specification 物料规格	Qty. 数量	Manufacturer 制造厂商
1	U1	控制 IC Control IC	BQ28Z610DRZR VSON (12) (主选)	1	TI
			SH366003 VSON(12) (备选)		SINO WEALTH
2	F1	FUSE	S1206-FA-15A	1	Sart
3	MC1,MC2 MD1,MD2	MOS	CJAB55N03S PDFNWB3.3×3.3-8L (主选)	4	JSCJ
			LT7904FL-Y PDFNWB3.3×3.3-8L (备选)		LEADTECK
4	NTC	NTC	10KNTC,B=3435, 1%,L=30mm 黑色头 (主选)	1	AMPRON
			10KNTC,B=3435, 1%,L=30mm 黑色头 (备选)		时恒
5	RS1	电阻 Resistance	2512 1mR 1% 2W	1	RALEC
6	PCB	Printed circuit board	TBD	1	SUNKING CIRCUITS ELECTRONIC A CO LTD

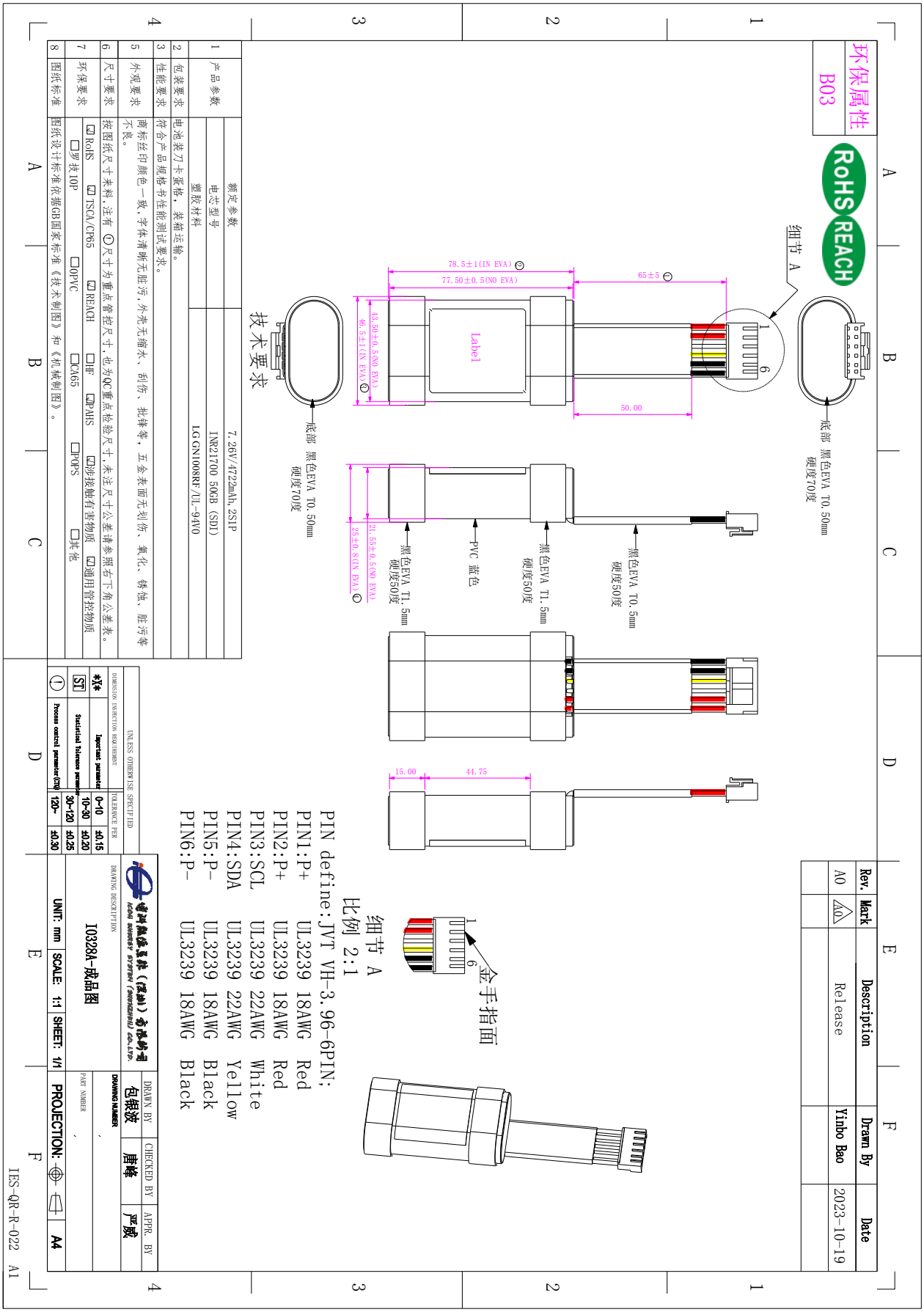
7. Main Parts List 电池主要零部件

NO. 序号	Item 项目	Material Name 物料名称	Material Specification 物料规格	Qty. 数量
1	Cell 电芯	(SDI)	INR21700 50GB	2PCS
2	PCM 电路保护板	FR4	/	1PCS
3	面壳	LG 5001RFG	/	1PCS
4	底壳	LG 5001RGF	/	1PCS
5	连接器	母座连接器	2.5PH 6PIN	1PCS

8. Battery Output Definition 电池输出端口定义

Connector model 连接器型号		VH3.96 6PIN 公座连接器		Manufacturer 制造厂商	JVT
PIN 引脚	PIN Name 名称	Color 颜色	Line type 线型	Function 功能	Note 备注
1	P+	红	UL3239 18AWG	Charge and discharge port(positive) 充放电端口（正极）	PIN1 → PIN6
2	P+	红	UL3239 18AWG	Charge and discharge port(positive) 充放电端口（正极）	
3	SCL	白	UL3239 22AWG	Communication port (clock) 通讯端口（时钟）	
4	SDA	黄	UL3239 22AWG	Communication port (data) 通讯端口（数据）	
5	P-	黑	UL3239 18AWG	Charge and discharge port(negative) 充放电端口（负极）	
6	P-	黑	UL3239 18AWG	Charge and discharge port(negative) 充放电端口（负极）	

9. Battery Dimension 电池尺寸



10. Label 标贴

TBD

11. Packing and Transportation 包装运输

TBD

12. Warning 警告

◇ Load circuit may cause voltage and current, and the voltage or current may add to pack, the voltage or current must be controlled as lower than RWV and RWI, larger voltage or current may damage the PCM of pack.

负载可能产生电压和电流,该电压和电流会反加在电池组合（含 PCM）上，该电压和电流不能超过保护板自身反向耐压耐流值，过高电压或电流会损坏电池组合中的保护板。

◇ Do not immerse the battery in liquid such as water, beverages, or other fluids.
禁止将电池浸入如水、饮料或其它液体中。

◇ Do not use or place the battery near an fire, heater or high temperature environment (above 80℃).
禁止在靠近火、加热器或高温(>80℃)环境中使用或搁置电池。

◇ Do not attach or insert battery with polarity reversed.
禁止将电池极性反转连接。

◇ Do not use batteries in series or in parallel.
禁止将电池串联或并联使用。

◇ Do not connect the battery to an AC outlet or DC automotive plug.
禁止将电池连接到 AC 插座或 DC 的汽车充电插座。

◇ Do not use the battery in equipment for which it was not intended.
禁止将电池使用在其它装置或设备中。

◇ Do not incineration the battery in fire or heat it.
禁止焚烧电池或对其进行加热。

◇ Do not short-circuit the battery by directly connecting the positive and negative terminal with metal object such as wire.
禁止使用导线等金属物体直接连接电池正负极短路电池。

◇ Do not excessive impact to the battery such as striking, throwing, trampling, etc.
禁止撞击、抛掷、践踏等对电池的过度机械冲击。

◇ Do not penetrate the battery with a nail or other sharp object.
禁止使用钉子或其它尖锐物体刺穿电池。

◇ Do not disassemble the battery.
禁止拆解电池。

◇ Do not connect the pack to an electrical outlet.
禁止将电池组合直接接入电源插座。

◇ 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 charge the battery at high temperature or discharge it at high temperature, which can not exceed the operating temperature range of 3.12.
禁止在高温下对电池充电和放电，不能超过 3.12 的操作温度范围。

◇ Stop charging if the charge process cannot be finished within the specified time.
如果充电不能在规定的时间内完成，停止充电。

◇ Keep the battery away from small children. If the battery or any of its component parts is swallowed, seek medical attention immediately.
将电池放在小孩够不到的地方。如果电池或者电池任意部件被小孩吞食，必需立刻就医。

◇ Do not place the battery in or near a microwave or other cooking appliances. If subjected to heat or strong electro magnetic radiation, the battery may leak, generate heat, smoke, catch fire, or explode.
禁止将电池放在靠近微波设备或其它烹饪装置附近，如果电池被加热或受到强电磁辐射，可能发生漏液、发热、冒烟、着火等。

◇ Do not mix with other batteries. The battery should not be used with other batteries having a different capacity, chemistry, or manufacturer. Doing so could cause the battery to generate heat, smoke, catch fire, or explode.
禁止与其它电池混用。因与其它电池有不同的容量、化学成分、制造工艺等，相互混用可能会发热、冒烟、着火等。

◇ Immediately remove it from the device or charger, and stop using it, if there are noticeable abnormalities, such as smell, heat, discoloration, or deformity. The battery may be defective and could generate heat, smoke, catch fire, or explode with continued use.
如果电池在使用或贮存中有明显异常，如发出异味、发热、变色、变形，或者是在充电过程中出现任何异常现象，立即将电池从使用装置或充电器中移开，并停止使用。电池可能有缺陷，继续使用可能导致发热、冒烟、着火等。

◇ Do not use a leaking battery near open flame.
禁止将漏液电池靠近火源。

◇ Do not touch a leaking battery. If liquid leaking from the battery gets into your eyes, immediately flush your eyes with clean water and seek medical attention. If left untreated, it will cause significant eye damage.
禁止触摸漏液电池。如果电解液不小心进入眼睛，请不要揉擦，应马上用清水冲洗眼睛，并立即送医院治疗，否则会伤害眼睛。

◇ To prevent short-circuit or damage during transport or store, securely pack the battery in a case or carton. Do not transport and store the battery together with metal objects such as necklaces, hairpins, etc.
防止在运输和存放过程中短路或损坏电池，必需将电池安全包装在盒子或纸箱中。不要与金属物体如项链、发夹等一起运输和存储。

◇ Spent batteries should not be thrown away.
用完的电池不要随意丢弃。

◇ Do not burn or throw used batteries when a fire, because heat may explode or fire.
废弃电池时不要烧毁或扔到火中，因热量有可能会发生爆炸或火灾。

◇ Do not discard batteries together with household waste Please recycle as a separate discharge.
电池不要和家庭垃圾一起丢弃，请作为回收利用分离排出。

◇ When disposing of secondary rechargeable single cells or batteries of different electrochemical systems single cell or battery to be isolated from each other.
废弃 2 次充电单电池或电池时，不同电气化学体系的单电池或电池，要互相隔离。

◇ To prevent a short circuit caused by battery heat, when discarded to keep the discharge state.
为了防止短路引起的电池发热，废弃时要保持放电状态。

13. Caution 注意

◇ Read the manual before use. Keep for future reference.
电池使用前注意阅读使用手册，并保存手册便于以后查阅。

◇ The plug wire withstands the tension limited, excessive pulling force causes battery damage.

插头线承受拉力有限，拉力过大会造成电池损坏。

◇ After the battery is loaded into the machine, make sure that the battery and the plug line are not swayed at will.
将电池装入机器后，确保电池和插头线不会随意摇摆。

◇ Do not use or leave the battery at very high temperature (which can not exceed the operating temperature range of 3.12., 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(不能超过 3.12 的操作温度范围，如直射的阳光下或很热的汽车中)使用或搁置电池，否则可能会引起电池过热、起火或功能失效，或者导致电池寿命减短或损坏电池。

◇ Do not use the battery where static electricity in excess of 1000V is generated as it may damage the protection circuit, and cause hidden trouble of safety.
禁止在发电超过 1000V 的静电环境使用电池，否则可能破坏电池保护电路，导致不安全的隐患发生。

◇ Only charge the battery between at the operating temperature range of 3.12. Charging outside of this temperature range may cause the battery to leak, generate heat, or result in serious damage. It may also cause the battery's performance and life to deteriorate.
电池只能在 3.12 的操作温度范围充电。超出此温度范围可能导致电池漏液、发热，或导致电池严重的损坏。它也可能导致电池的性能和寿命的恶化。

◇ Prismatic Cell potential swelling range： 以下使用可能导致聚合物电芯鼓包：

①Cell over discharge mode: Voltage 2.0V or lower.

电池过放状况：电压 2.0V 或更低。

②High temperature（≥40℃）： Voltage≥ 4.1V/cell or higher for longer period storage.

高温（≥40℃）：单节电压≥ 4.1V 长时间存储。

③Floating charging with the trickle current.

电池持续以涓流充电（浮充）。

◇ It is forbidden to store batteries at high temperature and high voltage (Voltage≥ 4.1V/cell, temperature greater than 40℃) for a long time, and there is a risk of CID disconnection in Cylindrical battery and swelling in Prismatic battery. If has a special long-term high-temperature use, it must to communicate with Highpower.
禁止在高温高压（单节电压≥ 4.1V，温度大于 40 度）下长时间存放电池，圆柱电池存在 CID 断开风险，软包电池存在鼓胀风险。若有特殊的长时间高温使用的需与 Highpower 沟通。

◇ Read the charger's manual before use for proper charge method.
在充电前仔细阅读充电器使用说明，使用正确的充电方法。

◇ Please contact the supplier if the battery gives off an unusual odor, generates heat, or shows signs of rust prior to its initial use.
在首次使用前，如果电池发出明显的异味、发热或锈蚀迹象，请联系电池供应商。

◇ Parents must explain how to use the system and the battery. Please check back periodically to ensure children are using the system and the battery correctly.
给小孩使用前大人必须讲解清楚如何使用设备和电池，并定期跟踪确认，以确保小孩正确使用。

◇ Do not charge or discharge near flammable materials. Doing so could result in fire.
请不要靠近易燃材料充放电电池，否则可能产生起火隐患。

◇ If electrolyte leaks from the battery and comes into contact with skin or clothing, immediately flush with

water. Otherwise, it may cause skin irritation.
如果电解液从电池漏出并接触到皮肤或衣服，立即用水冲洗，否则导致刺激皮肤。

◇ If the battery pack have a system interface consisting of stripped lead wires or exposed contact plates, handle with due care. Temporarily insulate exposed contacts and conductors with an insulator such as polypropylene tape or polyvinylchloride tape. Failure to do so could result in an electrical shock, a short circuit causing the battery to generate heat, smoke, catch fire, or the combustion of other materials.
如果电池组有一个由剥离导线或暴露的接触板组成的系统接口，应谨慎操作。可暂时用聚丙烯胶带或聚氯乙烯胶带隔离暴露接触导体与绝缘体。不这样做可能会导致触电，短路造成电池发热、冒烟、着火，或其它材料的燃烧。

◇ When disposing of the battery, be aware discharged battery may cause fire, tape the terminals to insulate them. Recycle it according to local rules and regulations.
处理电池时，注意带电的电池可能会造成火灾，应该用胶带将电路端子隔离。根据当地法规回收。

◇ 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.
如果电池电路端子弄脏，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。

◇ It should be noted that the battery would be at over-discharged state by it's self-discharge characteristics in the case the cell is not used for a long time.in order to prevent over-discharging ,the cell shall be charged periodically to maintain between n*3.6 V and n* 3.8 V.
在电池长期未使用器件，它可能会因其自放电特性而处于过放电状态。为防止过放电的发生，电池应定期充电，将其电池电压维持在 n*3.6V 至 n*3.8V 之间。过放电会导致电芯性能、电池功能的丧失。

◇ The batteries should be stored at room temperature, charged to about 30% to 60% of capacity. In case of over-discharge, batteries must be charged to n*3.8 V with standard charge method for one time every 3 months while storing and batteries should be charge-discharged with standard method for one time after being stored more than one year in order to activate it and restore energy.
电池应当在室温下存放，应充电到 30%~60%的电量。为防止电池过放，必须每 3 个月按标准充电方式进行充电至 n*3.8V。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。

14. Handling of Cells 电池操作注意事项

(1) Prohibition short circuit（禁止电池短路）

Never make short circuit cell. It generates very high current which causes heating of the cells, and may cause electrolyte leakage, gassing or explosion that is very dangerous.
避免电池短路。短路会产生很大的电流而使电池发热以及电解液泄漏，产生有毒气体或燃烧，是非常危险的。

(2) Mechanical shock（机械撞击）

The actions such as Falling, hitting may cause degradation of Li-ion battery characteristics.
跌落、碰撞等等都可能会降低聚合物电池的性能。

15. Guarantee Period of Quality 保质期

Guarantee period of quality is one year from the date of shipment. Iconergy guarantees to give a replacement in case of cell 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 1 年。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。

16. Others 其它事项

(1) The customer is requested to contact Iconergy in advance, if the customer needs other applications or operating conditions out of those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

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，应事先联系博科，因为需要进行特定的实验测试以验证电池在该使用条件下的性能及安全性。

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

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，博科概不负责。

(3) Iconergy will inform the customer in a written form regarding proper use and handing of the cell, if it is necessary.

如有必要，博科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。

(4) Any matters that this specification does not cover should be conferred between the customer and Iconergy.

任何本说明书中未提及的事项，须经双方协商确定。

(5) Product comply with 《Hazardous substances control standards of Highpower Green Product 》.

产品符合《豪鹏集团绿色产品有害物质管制标准》。