广东安电能源科技有限公司
GUANGDONG AN-ENERGY TECHNOLOGY C0.,LTD.

锂离子电池规格书

Specification of Lithium ion Battery

客户代码 Customer Code:	SAMK
评审单号 Review No. :	AET-PS-PACK-202011-3501
客户项目型号 Customer Model:	NA
电池型号 Battery Model：	901-818475-3S1P
产品规格 Product Specification：	11.1V 4500mAh 49.95Wh
文件编号 File No.:	PS-RD-787
版本 Rev：	A/0
日期 Date：	2020.11.20

拟制/日期 Prepared/Date	审核/日期 Reviewed/Date	核准/日期 Ratify/Date

客户确认 Customer Approval	签字/日期 Signature/Date	
	公司印章 Company Stamp	

厂址：东莞市石排镇下沙第三工业区中龙一路一号
ADD：No．1,1nd Zhonglong Road, Xiasha 3rd Industry District, Shipai Town, Dongguan, China
电话（TEL）：+86-769-38936868　　传真（FAX）：+86-755-38936870

规格书修订履历表

History of Specification

版本 Rev.	描述 Description	编制 Prepared	审核 Reviewed	核准 Ratify	日期 Date
A0	First issue	Amos Guo	Hailei Peng	Xiaohui Liu	2020-11-20

目录

Table of Content

1 适用范围 Scope

本规格书适用于广东安电能源科技有限公司生产的锂离子电池，它描述了锂离子电池的产品性能和使用条件。

This specification shall be applied to Li-ion battery manufactured by GUANGDONG AN-ENERGY TECHOLOGY CO.,LTD. It describes the product specification and using condition of the lithium ion battery.

2 产品 Product

2.1 产品名称 Product Name：锂离子可充电电池 Lithium-ion rechargeable battery

2.2 执行标准 Executive Standard : GB 31241-2014

2.3 电池型号 Battery Model：901-818475-3S1P

2.4 产品规格 Product Specification：11.1V 4500mAh 49.95Wh

3 基本参数 Key parameters

序	内容 Content	参数 Parameters	备注 Remark
1	标称电压 Nominal voltage	11.1V	
2	容量 capacity	4550mAh（Typ）	0.2C 放电，9V 截止
		4500mAh（Min）	
3	内阻 Impedance	200 mΩ（Max）	
4	标准充电电流 Nominal Charge current	1A	
5	最大充电电流 Charge current max	2A	
6	标准放电电流 Nominal discharge current	1 A	
7	最大放电电流 Discharge current max	2A	
8	充电截止电压 Charge cut-off voltage	12.6V	
9	放电截止电压 Discharge cut-off voltage	9V	
10	过充电保护电压 Overcharge detection vo□tage	4.28±0.035V	单串过充保护
11	过充电恢复电压 Overcharge release voltage	4.13±0.05V	单串过充恢复
12	过放电保护电压 Overdischarge detection voltage	3.0±0.08V	单串过放保护
13	过放电恢复电压 Overdischarge release voltage	3.0±0.1V	单串过放恢复
14	放电过电流保护 Over current discharge protection	4.5-7.5A	

22	短路保护	有	断开短路负载恢复或充电恢复 Disconnect the short-circuit load
23	工作温度 Operating Temperature	10~45℃	充电 Charge
		0~55℃	放电 Discharge
24	贮存(半电) Storage(50%SOC)	-20℃～+30℃	小于一年 Less than 1 year
		+30℃~+45℃	小于三个月 Less than 3 months
		+45℃～+60℃	小于一个月 Less than 1 month

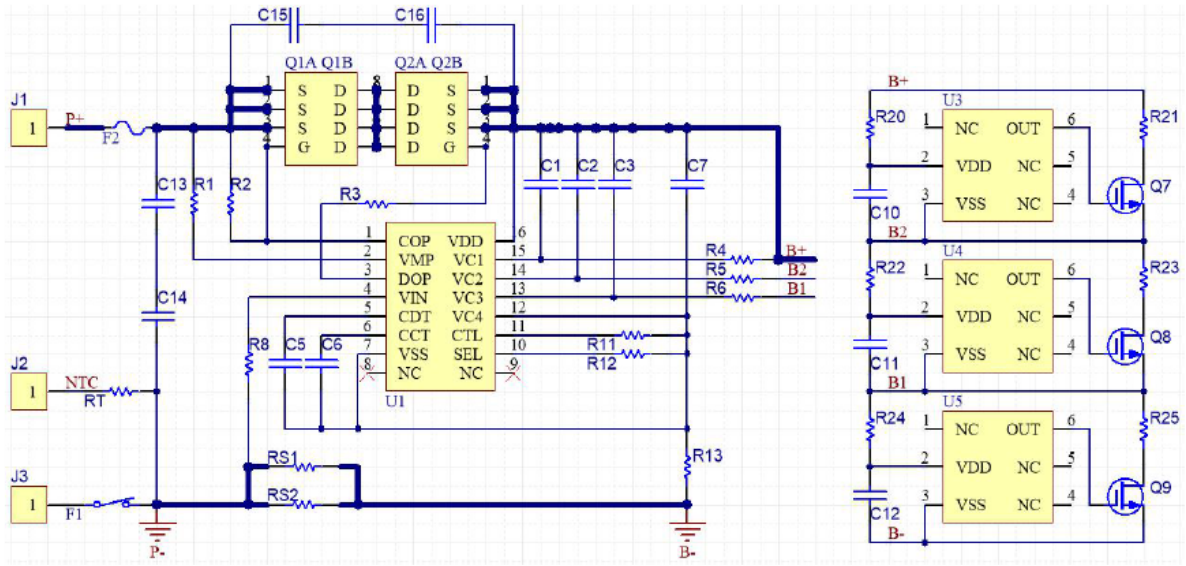
4. 保护板规格与特性 PCM Specification and characteristic

4.1 PCM 规格（at 25℃）

PCM specification（at 25℃）

参数 Parameter	参数值(常温25℃) Parameter value(General temperature 25℃)			
项目 Item	最小值 Min	典型值 Type	最大值 Max	单位 Unit
正常工作电压 Operating voltage	2		24	V
过充检测电压 Overcharge testing voltage	4.245	4.28	4.315	V
过充恢复电压 Overcharge renew voltage	4.08	4.13	4.18	V
过充保护延迟时间 Overcharge protect time	0.5	1	1.5	S
过充电保护恢复方式 Over charge protect renew mode	自动恢复			
充电过流检测电压 Charge over current detect voltage	/	/	/	V
充电过流保护延迟时间 Charge over current protect delay time	/	/	/	mS
充电过流 Charge current	/	/	/	A
过放检测电压 Overdischarge testing voltage	2.92	3	3.08	V
过放恢复电压 Overdischarge renew voltage	2.9	3	3.1	V
过放保护延迟时间 Overdischarge protect delay time	50	100	150	mS
过放电保护恢复方式 Over discharge protect renew mode	充电恢复			
放电过流保护检测电压 Overcurrent protect voltage	0.14	0.15	0.16	V
放电过流保护延迟时间 Overcurrent protect delay time	5	10	15	mS
放电过流 Over current	4.5	6	7.5	A
短路保护检测电压 Short protect testing voltage	0.9	1.2	1.5	V
短路保护延迟时间 Short protect delay time	100	300	600	μS
均衡启动电压 Battery balance start voltage	4.15	4.2	4.25	V
均衡释放电压 Battery balance release voltage	4.14	4.19	4.24	V
均衡电流 Battery balance current	35	45	50	mA
自耗电 Power consumption			35	μA
内阻 Internal resistance	20	35	50	mΩ
工作温度 Operating temperature	-30		80	℃
存储温度 Storage temperature	-40		125	℃
0V充电功能 0V battery charge function	0.000			
最大持续放电电流 Maximum constant discharge current			3.0	A
最大持续充电电流 Maximum constant charge current			3.0	A
充电高温保护温度 Charging High Temperature Protection	50	55	60	℃
放电高温保护温度 Discharge High Temperature Protection	50	55	60	℃
充电低温保护温度 Charging Low Temperature Protection Temperature	/	/	/	℃
放电低温保护温度 Discharge Low Temperature Protection	/	/	/	℃

4.2 电路原理图 Circuit Diagram

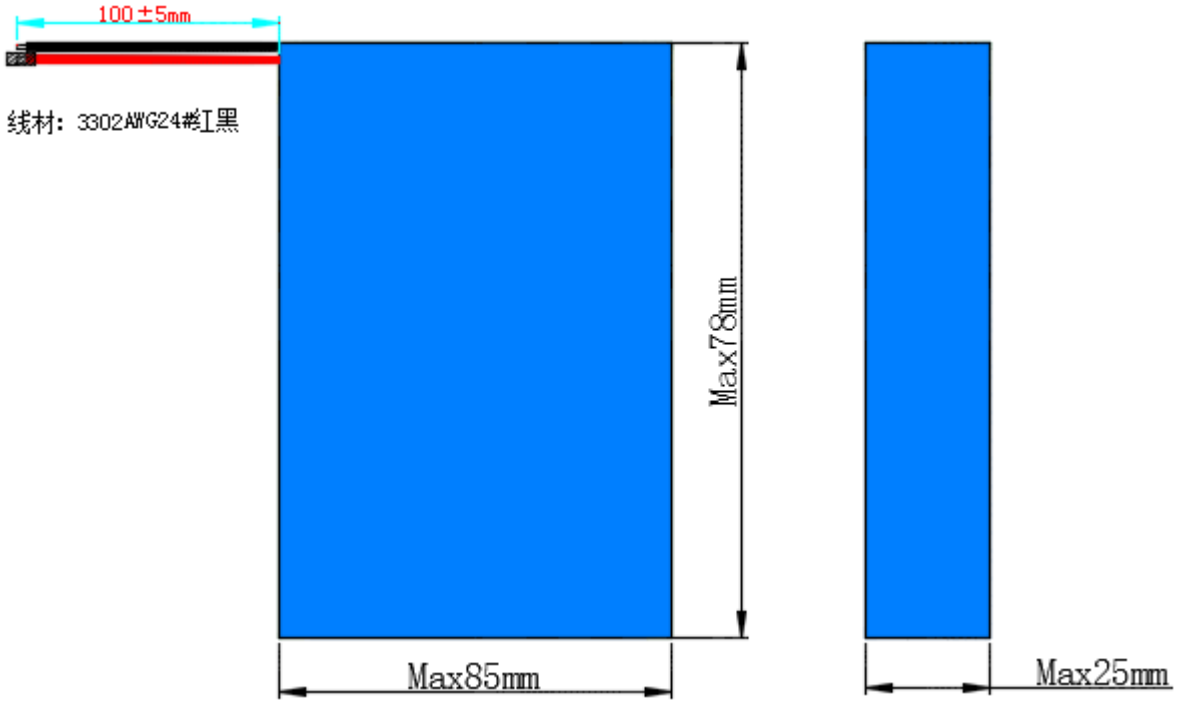


4.3 保护板主要零件清单 PCM key component list

序号	物料名称	位号	型号参数	封装	数量	单位/属性	品牌
1	PCB	48±0.2 *20±0.2 * 1.0±0.1 (mm) FR-4, 94V-0, 耐火温度 265℃, 双层玻纤板/无铅喷锡/蓝油/白字			1	YZC-3S2048-V1.2-S8254-BL	路通达
2	保护IC	U1	S-8254AAP	TSSOP16	1	PCS	精工
3	MOSFET	Q1B, Q2B	AO4407	SOP-8	2	PCS	AOS
4	均衡IC	U3-5	HY2213-BB3A	SOT-23-6	3	PCS	宏康
5	贴片MOSFET	Q7-9	AO3400	SOT23	3	PCS	AOS
6	贴片电容	C1-3, C5-6, C10-12	0.1UF/50V ±10% X7R	C0603	8	PCS	国巨
7	贴片电容	C7	2.2UF/25V ±10% X7R	C0805	1	PCS	国巨
8	贴片电阻	R13	51R±5%	R0805	1	PCS	国巨
9	贴片电阻	R20, R22, R24	100R±5%	R0603	3	PCS	国巨
10	贴片电阻	R21, R23, R25	100R±5%	R1206	3	PCS	国巨
11	贴片电阻	R4-6, R8, R11-12	1K±5%	R0603	6	PCS	国巨
12	贴片电阻	R1, R3	5.1K±5%	R0603	2	PCS	国巨
13	贴片电阻	R2	1M±5%	R0603	1	PCS	国巨
14	合金电阻	RS2	0.025R/2W-1%	R2512	1	PCS	大毅/旺诠
15	PTC	F2	SMD1812P260SF/16	R1812	1	PCS	聚鼎
16	温度开关	F1（向板外焊接）	JP02-BB8D-55℃ (55度常闭型), 线长L=60mm, 焊点剥皮2mm	DIP-2	1	PCS	晶品
17	UV胶	打在F1位置用来固定F1（如样品打）	蓝色UV胶	/	/	/	/

5. 电池外观结构

5.1 电池尺寸图 （单位 mm） Dimension (Unit :mm)



5.2 电池主要零件清单

序号	名称	规格描述	用量
1	电芯	501-8184754500mAh	3pcs
2	保护板	YZC-3S2048-V1.2-S8254-BL	1 pcs
3	导线	UL3302#20AWG 红黑线	1 套

6.包装说明 Packing Instruction

标志的图形、尺寸、颜色应符合 GP/T 191-2000 的要求

The photo, size and color of the mark are all comply with the requirement of GP/T 191-2000.

7.技术指标 Technical indicators

7.1 常规电性能 Conventional electrical properties

序号 No.	检验项目 Test item	检验方法 Test method	判定标准 Criteria
7.1.1	循环寿命 Cycle life	在环境温度为 23℃±2℃条件下，以 0.5C 充电，当电池端电压达到 12.6V 时，改为恒压充电，截止电流为 0.02C，总时间不大于 5h，搁置 0.5h，然后以 0.5C 电流放电到终止电压，放电结束后，搁置 15min，再进行下一个充放电循环。 Charge the battery at 0.5C at ambient temperature of 23℃ ±2 ℃ until voltage reaches 12.6V, and then charge at	300 个循环后，容量保持率在 80%以上。 Capacity retention

		constant current to current less than or equal to 0.02C.Total charging time should not be more than 5 hours. After that, store the battery for 0.5 hour and discharge at 0.5C to the cut-off voltage. When the discharge is finished, store the battery for 15 minutes before proceeding to the next charge and discharge cycle.	rate after 300 cycles should be more than 80%
7.1.2	高温性能 High temperature performance	电池标准充电方式充满电后，放入 60℃±2℃的高温箱中恒温 2h，然后以 0.2C 电流放电至终止电压，放电时间应符合判定标准。 该试验结束后，将电池取出在环境温度 20℃±5℃的条件下搁置 2h，然后目测电池外观，应符合判定标准。 Fully charge after standard charge, then the battery is to be placed in 60℃±2℃ high temperature chamber and keep at that temperature for 2 hours and discharge at 0.2C to the cut-off voltage. The discharging time should meet the criteria. After the test, take out the battery and place at ambient temperature of 20℃±5℃ for 2 hours. Visually inspect the battery and the battery should meet the criteria.	放电时间应不低于 285min。电池外观应无变形、无爆裂。 The discharging time should not be less than 285 min. No cosmetic deformation , no rupture
7.1.3	低温性能 Low temperature performance	电池标准充电方式充满电后，放入-10℃±2℃的低温箱中恒温 4h，然后以 0.2C 电流放电至终止电压，放电时间应符合判定标准。 该试验结束后，将电池取出在环境温度 20℃±5℃的条件下搁置 2h，然后目测电池外观，应符合判定标准。 Fully charge after standard charge, then the battery is to be placed in -10℃±2℃low temperature chamber and keep at that temperature for 4 hours and discharge at 0.2 C to the cut-off voltage. The discharging time should meet the criteria. After the test, take out the battery and place at ambient temperature of 20℃±5℃ for 2 hours. Visually inspect the battery and the battery should meet the criteria	放电时间不低于 180min。电池外观应无变形、无爆裂。 The discharging time should not be less than 180 min. No cosmetic deformation ,no rupture.

7.2 安全性能

（注：以下安全性能试验应在有保护措施的条件下进行。）

序号 No.	检验项目 Test item	检验方法 Test method	判定标准 Criteria
7.2.1	热滥用 Thermal abuse	电池按标准充电模式充电后，将电池放置于热箱中，温度以（5℃±2℃）/min 的速率升温至 130℃±2℃，并保温 10min 然后取出。 After standard charging, place the battery in an oven, ramp the temperature at （5℃±1℃）/min to 130℃±2℃, maintain the temperature for 10 minutes and take out the battery.	电池应不起火和不爆炸。 No fire and no explosion

7.2.2	过充电保护 Overcharge protection	电池按标准充电模式充电后，将电池以 2 倍标称电压、2C 电流恒流恒压充电 7h，电池应符合判定标准。 After standard charging, and then charge the battery at constant voltage of 2 times of the nominal voltage and at constant current of 2 C for 7 hours. After the test. The battery should meet the criteria.	电池应不泄漏、不泄气、不破裂、不起火和不爆炸。 No leak, no venting, no rupture, no fire and no explosion.
7.2.3	过放电保护 Over discharge protection	电池在环境温度为 20℃±5℃条件下，以 0.2C 放电至终止电压后，外接 n×30Ω 负载放电 7h，电池应符合判定标准。 Discharge the battery at 0.2 C to the cut-off voltage at ambient temperature of 20℃±5℃. And then discharge the battery by connecting the battery to a load of n×30Ω for 7 hours. After the test, the battery should meet the criteria.	电池应不泄漏、不泄气、不破裂、不起火和不爆炸。 No leak, no venting, no rupture, no fire and no explosion.
7.2.4	短路保护 Shot-circuit protection	电池按标准充电模式充电后，将正负极用 80mΩ±20 mΩ 电阻器短路 1h 后，电池应符合判定标准； After standard charging, and then short-circuit the battery for 1 hour by connecting the positive and negative terminals with a resistor of 80±20mΩ. After the test, the battery should meet the criteria.	电池应不泄漏、不泄气、不破裂、不起火和不爆炸。No leak, no venting, no rupture, no fire and no explosion.
7.2.5	过充电 Over charge	电芯按 0.2C 放电至终止电压，接有热电偶的电芯置于通风橱中，连接正负极于一恒流恒压电源，调节电流至 3 C 电流，电压为 n×4.6V，然后对电芯以 3C 电流充电，直到电芯电压为 n×4.6V，电流将到接近 0A。试验过程中监视电芯温度变化，当电芯持续充电时间达到 7h 或电芯温度下降到比峰值低 10℃，结束试验。 ***本实验是在无电芯外保护线路的情况下进行的。*** discharge at constant current of 0.2C to the cut-off voltage, put the cell in fume hood. Add constant voltage & current n×4.6V 3C to the cell. Charging it until the cell reaches n×4.6V, charging current decreases to almost 0A. Record the temperature curve of the cell. When the cell temperature decreases to about 10 ℃ lower after reaching the peak temperature. End the test. ***This test is performed without PCM***	电芯不起火、不爆炸 No fire 、 no explosion
7.2.6	短路 Short circuit Test	以标准充电方式满充后，将接有热电偶的电池置于通风橱中，短路其正负极(线路总电阻 80 mΩ±20mΩ)。试验过程中监视电池温度变化，当短路时间达到 24h 或电池温度下降到比峰值低 20%时，结束试验。 ***本实验是在无电芯外保护线路的情况下进行的。*** Fully charge after standard discharge, the battery is to be short-circuited by connecting the positive and negative terminals of the battery with wire having a resistance load of 80 mΩ±20mΩ. Monitor its temperature while testing, until that last 24h or the temperature is less than 20% of	电池不起火、不爆炸，外部温度不得高于 150℃ No fire、no explosion and high temperature is less than 150℃

		peak temperature. ***This test is performed without PCM***	
7.2.7	强制放电 Forced discharge	将电池以标准放电方式放电至终止电压，然后以 1.0C 的电流对电池反向充电 Discharge to the cut-off voltage, then a current of 1.0C reverse charge battery	充电时间不低于 90min，电池不起火、不爆炸 Charging time is not less than 90min, no fire, no explosion

8.测试方法和定义 Test methods and definitions

8.1 测试条件 Test conditions

除非另有规定，本规格书中各项试验应在以下大气条件下进行：

Unless otherwise specified, tests in this specification should be conducted at the following atmospheric conditions:

温度：20℃±5℃；

Temperature: 20℃±5℃;

相对湿度：不大于 75%；

Relative humidity: no greater than 75%;

大气压力：86 kPa～106 kPa

Atmospheric pressure：86 kPa-106 kPa

8.2 测量仪表与设备要求 Test instruments requirements

测量电压的仪表准确度应不低于±0.5%。

The precision of voltage measuring instrument should not be lower than ±0.5%.

测量电流的仪表准确度应不低于±0.5％。

The precision of current measuring instrument should not be lower than±0.5％

测量时间用的仪表准确度应不低于±0.1％。

The precision of time measuring instrument should not be lower than ±0.1％

测量温度的仪表准确度应不低于±0.5℃。

The precision of temperature measuring instrument should not be lower than ±0.5℃

恒流源的电流可调，在恒流充电或放电过程中，其电流的相对变化应在±1% 范围内。

The current of the constant current power supply can be adjusted; the relative variation of its current should be

In the range of ±1% at constant charge or discharge

恒压源的电压可调，在恒压充电过程中，其电压变化应在±1%范围内。

The voltage of the constant current power supply can be adjusted; the relative variation of its voltage should be

In the range of ±1% at constant charge

测量重量用的仪器准确度应不低于 1％。

The precision of weight measuring instrument should not be lower than 1％

9.外观 Inspection

电池表面平整、清洁、无机械损伤、间隙均匀、无明显溢胶；喷涂效果均匀、无色差；标签内容正确、字迹清晰、无遗漏、有相关标识，五金端子无锈蚀、镀金良好、无划伤变形，电芯无划痕、裂纹、气胀、泄漏。

Cell surface smooth, clean, no mechanical damage, uniform clearance and no obvious overflow; spraying

effect uniform, free of chromatic aberration; label content is correct, clear and exhaustive, related hardware terminal logo, no corrosion, no scratch, gold good electric core deformation, no scratches, cracks, flatulence, leakage.

10.品质保证 Warranty

产品保质期: 自交货期开始算起后的 12 个月；

Period of warranty: 12 months after shipment;

保 质 范 围: 在规格书规定的充放电电压范围、电流范围、工作温度等正常使用及存放条件下电池可进行充放电，无气鼓、零电压、漏液等不良现象。不当使用或存放造成电池不良不在保质范围内。当循环寿命达到规格书中要求后，电池提前过保质期。

Range of warranty: Operating within the specified current , voltage ranges and working temperature range, the battery performs normally without swelling, 0V and electrolyte-leaking. Battery damage caused by misuse. or incorrect storage cannot apply the Warranty. If the life cycle meets the requirement of the Specification, the battery is invalid in advance.

11.运输、贮存 Transportation and storage

11.1 运输 Transportation

电池应包装成箱进行运输，在运输过程中应防止剧烈振动、冲击或挤压，防止日晒雨淋，严禁与易燃、易爆、易腐蚀的物品同车装运，可使用汽车、火车、轮船、飞机等交通工具进行运输。

The battery should be packaged into boxes for transportation. Excess vibration, shock, crush, direct sunlight and drenching should be avoided in transit. The battery must not ship together with things that are flammable, explosive or corrosive on the same vehicle. The battery can be transported on trucks, trains, ships, aircraft or other transportation vehicles.

11.2 贮存 Storage

电池贮存应保持原有包装，存放产品仓库环境温度为-5℃～+35℃，相对湿度不大于 75%的清洁、干燥、通风并设有防潮、防尘、防震、防腐蚀措施的室内，避免与腐蚀性物质接触，应远离火源及热源。

The battery should be kept in their original package and stored in a warehouse with ambient temperature in the range between -5℃ and +35℃，and relative humidity no more than 75%. The battery should be kept indoors in a place that is clean, dry, ventilated and equipped with measures against moisture, dust, vibration and corrosion, and kept from contact with corrosive substance and sources of ignition and heating.

12.安全注意事项 Safety precautions

12.1 请在正常的环境中使用电池：温度：-10℃～+40℃，相对湿度：65±5%。

Please use batteries in normal indoor environment with temperature of -10℃ - + 40℃ and relative humidity of 65% ±5%.

12.2 在使用过程中，应远离热源、高压，避免儿童玩弄电池，切勿摔打电池。

Stay away from heating sources, high pressure when using the battery. Keep the battery out of reach of children. Do not strike the battery.

12.3 本电池只能使用配套充电器充电。

Charge the battery with the specified charger only.

12.4 长期不用时，请将电池储存完好。让电池处于半荷电状态，即不充满，也别放完。

Store the battery in a good condition when do not use for an extended period of time. Store the battery in a half charged state. This means do not completely charge and discharge the battery.

12.5 请用不导电材料包裹电池，以避免金属直接接触电池，造成电池损坏。将电池保存在阴凉干燥处。

Package the battery with non-conductive material to avoid direct contact with metal objects and resultant damage. Store the battery in a cool and dry place

12.6 废弃电池请安全妥当处理，不要投入火中或水中。

Please dispose of depleted batteries in a safe and proper way. Do not throw the battery into fire or water.

12.7 禁止拆装电电池。

内部具有保护结构和保护电路可以避免发生危险。不合适的拆装将会损坏保护功能，会造成电池发热、冒烟、变形或燃烧。

Do not dissemble or assemble the battery

Protection structures and circuits contained in the battery can prevent occurrence of dangers. Incorrect dissembling and assembling will damage the protection functions and cause heat generation, smoking, deformation or burning

12.8 禁止让电池短路。

不要将电池的正负极用金属连接，也不要将电池与金属放在一起存贮移动。如果电池被短路，将会有超大电流流过，将会损坏电池，造成电池发热、冒烟、变形或燃烧。

Do not short-circuit the battery

Do not connect the positive and negative terminals of the battery with metal object. Do not store and carry the battery together with metal objects. If the battery is short-circuited, the generated excessively large current may damage the battery and the short-circuit may also cause heat generation, smoking, deformation or burning.

12.9 严禁加热和焚烧电池

加热和焚烧电池将会造成电池隔离物的熔化，安全功能丧失或电解质燃烧。过热就会使电池发热、冒烟、变形或燃烧。

Do not heat or burn the battery

Heating or burning the battery will result in the melting of the battery separator, loss of safety protection functions or burning of electrolyte. Over-heat may lead to the battery heating, smoking, deformation or burning.

12.10 避免在热源附近使用电池

不要在火源，烤炉附近或超过 80℃的环境中使用电池 ，过热将会导致电池内部短路，使电池发热、冒烟、变形或燃烧。

Do not use the battery near a heat source Do not use the battery near fire or an oven, or in an ambient temperature exceeding 80℃. Over-heat may cause internal short-circuit, heat generation, smoking, deformation or burning

12.11 禁止弄湿电池

不要弄湿电池，更不能将电池投入水中。否则会造成电池内部保护电路功能丧失和发生不正常的化学反应，电池有可能发热、冒烟、变形或燃烧。

Do not wet the battery

Do not wet the battery and do not throw it into water. Otherwise, it may damage the battery's circuit protection function, create abnormal chemical reaction, and even cause heating, smoking, deformation or burning.

12.12 禁止破坏电池

禁止用金属凿入电池，锤打或摔打电池，或其它方法破坏电池，否则会造成电池发热、冒烟、变形或燃烧，甚至会发生危险。

Do not damage batteries

Do not damage the battery by driving in a piece a metal, hammering, striking or by other means, otherwise it can result in heat generation, smoking, deformation or burning.

12.13 不可将电池用于其它设备

不合适的使用条件会损坏电池的性能，降低寿命，甚至会使电池发热、冒烟、变形或燃烧。

Do not use batteries to power other devices

Unusual operating conditions may damage the battery performance, reduce life cycle and even cause heat generation, smoking, deformation or burning.

12.14 不可置于微波炉或其它压力容器中

瞬间加热后结构损坏会使电池发热、冒烟、变形或燃烧。

Do not put the battery into a micro-wave oven or other pressure vessels

Doing so, the structural damages from instantaneous heating may cause heat generation, smoking, deformation or burning.

12.15 不可使用不正常电池

假如发现电池有异味、变形、变色或扭曲，应让电池离开手机或充电器并弃用。使用不正常的电池会发热、冒烟、变形或燃烧。

Do not use abnormal batteries

Remove the battery from mobile phone or charger and dispose the battery if it has odor, deformation, color change or distortion. Using abnormal battery can cause heat generation, smoking, deformation or burning.

12.16 防静电

电池中装有保护电路可以避免各种意外情况的发生。不要在产生静电的场所使用电池，因为静电容易损坏保护板，而导致电池工作不正常，发热、变形、冒烟或起火燃烧。

Electric static discharge (ESD) Prevention

The protection circuits installed in batteries can prevent accidents. Do not use the battery near a place that can generate static. Static may easily damage the protection circuits and subsequently lead to abnormal working order, heat generation, deformation, smoking or inflammation.

12.17 注意漏液

假如电池漏液粘在皮肤或衣物上，请用清水冲洗，以免造成皮肤不适。

Be cautious of leakage

If battery leakage gets into contact with your skin or clothes, please rinse with fresh water otherwise it may cause skin irritation.

13 其他事项 Miscellaneous

以上所述，可以作为供需双方对电池产品性能和检验规则的约定框架。如果没有新的书面约定或更改通知，即可按此执行。

The aforementioned could be used as agreed framework by both parties for battery performance and inspection specifications. It should be implemented if there is no new written agreement or change notice。