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IFP24.8256106A-91.5Ah 锂离子电池 样件规格书 Lithium-ion Rechargeable Cell Sample Specification Model: IFP24.8256106A-91.5Ah																				
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Published date				Implementation date																

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前言 PREFACE 本标准是公司统一执行的企业标准。 This modular is the enterprise standard for the unified execution of the company 本标准编写格式符合 GB/T 1.1-2009 《标准化工作导则 第 1 部分：标准的结构和编写》的规定。 The format of this standard complies with the requirements of GB/T 1.1-2009, "standardization work guideline Part 1: Structure and Compilation of Standards". 本标准在参照 GB/T 31484-2015 《电动汽车用动力蓄电池循环寿命要求及试验方法》、GB 38031-2020 《电动汽车用动力蓄电池安全要求》、GB/T 31486-2015 《电动汽车用动力蓄电池电性能要求及试验方法》、Q/GX 60013-2020 《电动汽车用锂离子动力电池单体电性能测试方法》、PV8450-2021 的基础上, 结合我公司产品实际和试验条件, 特制定 Q/GX 0 -2023 《IFP24.8256106A-91.5Ah 锂离子动力电池产品规格书》标准, 并对试验方法、判定标准内容进行了修订和补充, 以指导 IFP24.8256106A-91.5Ah 锂离子电池产品的制造和验收。 This standard is referred to GB/T 31484-2015 "<i>cycle life requirements and test methods for power cell for electric vehicles</i>", GB/T 38031-2020 "<i>Electric vehicles traction battery safety requirements</i>", GB/T 31486-2015 "<i>Electrical performance requirements and test methods for power cell for electric vehicles</i> ", Q/GX 60013-2020 "<i>Electrical performance test method of lithium ion power cell for electric vehicles</i>", "PV8450-2021", Combined with the actual and experimental conditions of our company's products, the standard of Q/GX ***-2023 "<i>Sample Specification for IFP24.8256106A-91.5Ah Lithium ion rechargeable cell</i>" was qualified. The test method and criteria were revised and supplemented to guide the manufacturing and approving of IFP24.8256106A-91.5Ah Lithium ion cell. 本标准由 UC 铁锂电芯部提出并起草。 This standard is proposed and drafted by the UC Cell Research Institute. 本标准由标准法规部管理。 This standard is administrated by standard code department. 本标准起草人:李强、陈伟、王丰。 The main drafters of this standard: Qiang Li , Wei Chen, Feng Wang,.		

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修订记录 Modification Record			
版本号 Version Number	修订描述 Description of Change	修订日期 Revision date	修订者 Reviser
Q/GX ***-2023.06	首次发布 Initial Launch		Qiang Li Wei Chen
Q/GX ***-2023.08	更新 9.1&9.2 Power _{max} Update 9.1&9.2 Power _{max}		Qiang Li
Q/GX ***-2023.12	更新 10.1&10.2 OCV Update 10.1&10.2 OCV		Qiang Li
Q/GX ***-2024.10	更新 9.1&9.2 Power _{max} Update 9.1&9.2 Power _{max}		Qiang Li

 国轩高科 GUOXUAN HIGH-TECH		合肥国轩高科动力能源有限公司 HEFEI GUOXUAN HIGH-TECH POWER ENERGY Co.,Ltd		No. Q/GX ***-2023	
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1. 基本信息 General Information 1.1 适用范围 Scope 本产品规格书规定了 IFP24.8256106A-91.5Ah 型锂离子电池的性能要求、试验方法、检验规定、标记、包装、运输和存储要求。 The specification of this product stipulates the performance requirements, testing methods, inspection regulations, markings, packaging, transportation and storage requirements for IFP24.8256106A-91.5Ah lithium ion batteries. 本产品规格书适用于公司生产的 IFP24.8256106A-91.5Ah 型锂离子电池。 This product specification is applicable to IFP24.8256106A-91.5Ah lithium ion batteries produced by our company. 1.2 应用范围 Application: 电动汽车 Application: Electric vehicle 1.3 产品类型 Product classification: 锂离子二次电池 Rechargeable lithium ion battery					

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2. 规范性引用文件 Normative Reference Files 下列文件中的条款通过本标准的引用而成为本标准的条款。然而，鼓励根据本标准达成协议的各方研究是否可使用这些文件的最新版本。凡是不注日期的引用文件，其最新版本适用于本标准。 The clauses of the following documents are adopted as the references to this standard. However, the parties who have reached an agreement under this standard are encouraged to study whether the latest version of these documents can be used. The latest version of any un-dated reference document is applicable to this standard. - GB/T 2900.41 电工术语原电池和蓄电池 - GB/T 2900.41 electro technical terms for primary battery and storage battery - GB/T 19596 电动汽车术语 - GB/T 19596 electric vehicle terminology - GB/T 31484-2015 电动汽车用动力蓄电池循环寿命要求及试验方法 - GB/T 31484-2015 cycle life requirements and test methods for traction battery -for electric vehicles - GB 38031-2020 电动汽车用动力蓄电池安全要求 - GB 38031-2020 Electric vehicles traction battery safety requirements - GB/T 31486-2015 电动汽车用动力蓄电池电性能要求及试验方法 - GB/T 31486-2015 Electrical performance requirements and test methods for traction battery for electric vehicles - Q/GX 60013-2020 电动汽车用锂离子动力电池单体电性能测试方法 - Q/GX 60013-2020 Electrical performance test method of lithium ion power cell for electric vehicles - PV8450-2021 汽车用锂离子电芯		

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3. 术语和定义 Terms and Definitions 3.1 倍率电流， Rate current: 缩写符号 C，1C 表示电池以 1 小时率充放电的电流，3C 表示电池以 1/3 小时率充放电的电流。 The abbreviation symbol C, 1C indicates current that the cell charge/discharge at the rate of 1 hour, and 3C represents the current at which the cell charge/discharge at 1/3 hourly rate. 3.2 直流内阻， DCH internal resistance (DCR) 电池在室温（25°C±2°C）、50%SOC 条件下，以最大脉冲电流（1.5C）放电 10s，计算放电前后的电压(ΔV) 和电流(ΔI)变化，然后将电压变化(ΔV)的差值除以电流变化(ΔI)的差值，即为直流内阻。 DCH internal resistance (DCR): The cell is discharged at the maximum pulse current（with 1.5C）for 10s at room temperature conditions (25°C±2°C) at 50% SOC, and the changes of voltage (ΔV) and current (ΔI) are calculated before and after discharging. The difference of the voltage change (ΔV) is divided by the current change (ΔI). The resulted is known as the DCH internal resistance. 3.3 恒流充电容量比例， Constant current charge capacity ratio 电池在室温 0%SOC 条件下，在某一倍率下恒流充电至 3.8V 截止的充电容量与标准充电方法下的充电容量的比值。 Constant current charge capacity ratio, at room temperature and 0%SOC, the ratio of the charge capacity at the constant current charge to the cut-off voltage 3.8V and the charge capacity under the standard charging method. 3.4 最大持续充电电流， Maximum Continuous Charge Current 电池在指定温度下，保证电池正常工作所允许进行持续充电的最大电流 The maximum current that the cell is allowed to charge continuously at the specified temperature to ensure proper operation of the cell. 3.5 最大持续放电电流, Maximum Continuous Discharge Current, 电池在指定温度下，保证电池正常工作所允许进行持续放电的最大电流。 The maximum discharging current allowed by the cell to operate continuously at the specified temperature.					

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4. 外观 Appearance 4.1 外观 Appearance 不能有影响电池外观的深划痕、裂纹、锈蚀、污点或渗漏等缺陷。 There shall be no such defects as deep scratch, crack, rust, discoloration or leakage, which may adversely affect the commercial value of the cell. 4.2 尺寸（详见附录 A） Dimension (See appendix A for details) 厚度: 25.0mm±0.4mm Thickness: 25.0mm±0.4mm 宽度: 106mm±0.4mm Width: 106mm±0.4mm 长度: 256mm±0.5mm（不含极柱） Length: Nom. 256mm±0.5mm (w/o terminals) 4.3 含义 The meaning <u>IF P 24.8 256 106 A-91.5Ah</u> - Indicates rated capacity of the cell 额定容量 - Indicates the material of the cell shell is aluminum 外壳材料为铝 - Indicates the width of the cell 电池宽度 - Indicates the length of the cell 电池长度（不包含极柱，w/o terminals） - Indicates the thickness of the cell 电池厚度 - Indicates the shape of the cell, and P defines the prismatic 电池形状，P 指方形 - Indicates cathode material of the cell is the lithium iron phosphate 正极材料是磷酸铁锂		

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5. 规格 Specification					
5.1 基本信息 Nominal Information					
项目 Item		条件/注释 Condition/Note		规格 Specification	
5.1.1 容量*, 0.33C/0.33C Capacity*,0.33C/0.33C		标准充电/放电, Std. charge/discharge		最低容量 91.5Ah Minimum 91.5Ah (C _{min})	
5.1.2 标称电压, Nominal voltage		0.33C		3.20V	
5.1.3 工作电压, Operating voltage		持续充电/放电 Continuous charge/discharge		2.5V~3.8V	
		脉冲充电/放电 Peak charge/discharge		2.0V~3.8V ≤0℃ 2.3V~3.8V >0℃	
5.1.4 ACR* (交流内阻)		25℃±2℃ ,17.0%SOC,1KHz		0.3mΩ~0.6mΩ	
5.1.5 DCR* (直流内阻)		25℃±2℃ ,50%SOC,1.5C,10s		<1.1mΩ	
5.1.6 Standard charge 标准充电		Constant current 恒流		0.33C	
		Up limited voltage 上限电压		3.8V	
		Cut-off current 截至电流		0.05C	
		Temperature 温度		25℃±2℃	
5.1.7 Standard discharge 标准放电		Constant current 恒流		0.33C	
		Cut-off voltage 截止电压		2.5V	
		Temperature 温度		25℃±2℃	
5.1.8 Temperature sensitivity 温度特性		Storage allowable temperature 存储温度范围		-40℃≤T≤60℃	
		Operating allowable temperature 运行温度范围		-30℃≤T≤55℃	
5.1.9 Weight 重量		包含外包膜 w/ bule film		1542±15g	
5.1.10 最大厚度* Maximum Cell thickness		0.15Mpa @ 30s, 30%SOC		25.0±0.4mm	
备注:*生产日期后 15 天内测量 Remark: *measured within 15 days after the production date.					
5.2 推荐充电规格 Recommended Charge Specification					
Item 项目		Condition/Note 条件/注释		Specification 参数	
5.2.1 Normal charge 标准充电		Charge mode 充电模式		CC-CV CHA	
		Constant current 恒流		30.195A	
		Constant voltage 恒压		3.8V	
		Cut-off current 截止电流		4.575A	
		Temperature 温度		10℃~45℃	
5.2.2 Fast charge 快速充电		0℃~40℃		See the content 14.	
5.2.3 Maximum allowable constant charging current 最大允许持续充电电流		Charge mode 充电模式		Step fast charging	
		Constant current 恒流		183A	
		Constant voltage 恒压		3.8V	

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		Cut-off current 截止电流 Temperature 温度	4.575A 20°C~30°C		
5.2.4 Maximum allowable charge temperature range* 最大允许充电温度范围			0°C~60°C		
5.2.5 Optimum charge temperature range 最佳充电温度范围			20°C~35°C		
5.2.6 Constant current charging capacity ratio 恒流充电容量比例		2C charge at 25°C±2°C	>80% C _{min} (CC-CV CHA)		

5.3 推荐放电规格 Recommended Discharge Specification

Item	Condition/Note 条件/注释	Specification 规格
5.3.1 标准放电 Normal discharge	恒流 Constant current 截止电压 Cut-off voltage 温度 Temperature	30.195A 2.5V 10°C~45°C
5.3.2 快速放电 Fast discharge	恒流 Constant current 截止电压 Cut-off voltage 温度 Temperature	91.5A 2.5V 15°C~35°C
5.3.3 最大允许持续放电电流 Maximum allowable constant discharging current	恒流 Constant current 截止电压 Cut-off voltage 温度 Temperature	274.5A 2.5V 15°C~35°C
5.3.4 最大允许放电温度范围 Maximum allowable discharge temperature range*	-	-30°C~55°C
5.3.5 最佳放电温度范围 Optimum discharge temperature range	-	15°C~35°C
5.3.6 倍率放电容量保持率 C-rate discharge Capacity retention rate	25°C±2°C, 3C 放电 3C discharge at 25°C±2°C	≥90%*C _{min}

5.4 保护限制规格 Protection limit specification

项目 Item	条件/注释 Condition/Note	规格 Specification
5.4.1 第一超压限制 1 st over voltage limit	在极少的条件下电池可能会经历这种电压。当电池电压达到这个极限时, 充电功率应为零。The battery may experience this voltage on an infrequent basis. When the battery’s voltage reaches this limit, the charging power shall be to zero.	3.9V
5.4.2 第二超压限制 2 nd over voltage limit	电池超过这个规格不能被使用 The battery shall not be used over this limit.	4.1V
5.4.3 电压下限限制 Under voltage limit	电池不能在低于这个限制下使用 The battery shall not be used below this limit.	2.5V, 0°C~60°C 2.0V,-30°C~0°C

6. 性能规格 Performance Specification

6.1 电性能 Electrical properties

Item 项目	Condition 条件		Specification 规格			
6.1.1 初始容量* Initial capacity	电池应按照 8.2 方法充电，在满电状态下按照 8.3 方法放电 3h。 Cells shall be charged (see 8.2 method) and discharged (see 8.3 method) within 3h after full charge		≥91.5Ah（C _{min} ）			
6.1.2 容量与温度相关性 Temperature dependency of capacity*	电池应参照 8.2 方法在 25±2℃充电和参照 8.3 方法在以下温度放电。 Cells shall be charged (see 8.2 method) at 25℃±2℃ and discharged (see 8.3 method) at the following temperatures.					
	充电 Charge		放电 Discharge		容量 Capacity	
	放电 Discharge	高温 High temperature (HT)	60℃, 0.33C,cut off voltage 2.5V	≥100% *C _{min}		
			40℃, 0.33C,cut off voltage 2.5V	≥100% *C _{min}		
		室温 Room temperature (R.T)	25℃, 0.33C,cut off voltage 2.5V	≥100% *C _{min}		
			低温 Low temperature (L.T)	0℃, 0.33C,cut off voltage 2.5V	≥85% * C _{min}	
		-10℃, 0.33C,cut off voltage 2.5V		≥75% *C _{min}		
		-25℃, 0.33C,cut off voltage 2.5V		≥58% *C _{min}		
6.1.3 室温 SOC-OCV 表 SOC-OCV Table at R.T*	See 8.4		SOC	OCV/V	SOC	OCV/V
			100%	3.364	45%	3.287
			95%	3.333	40%	3.286
			90%	3.332	35%	3.286
			85%	3.330	30%	3.283
			80%	3.329	25%	3.265
			75%	3.328	20%	3.250
			70%	3.328	15%	3.224
			65%	3.327	10%	3.203
			60%	3.321	5%	3.166
			55%	3.293	2%	3.028
			50%	3.289	0%	2.784
6.1.4 40℃	See 8.4		SOC	OCV	SOC	OCV

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SOC-OCV 表 SOC-OCV Table at 40°C*		100%	3.360	45%	3.293		
		95%	3.336	40%	3.292		
		90%	3.334	35%	3.292		
		85%	3.333	30%	3.285		
		80%	3.332	25%	3.268		
		75%	3.331	20%	3.252		
		70%	3.331	15%	3.227		
		65%	3.330	10%	3.205		
		60%	3.326	5%	3.167		
		55%	3.298	2%	3.025		
		50%	3.295	0%	2.782		
6.1.5 室温放电/ 充电直流内阻 Discharge Resistance (DCR) at R.T*	1. 25°C, 0.33C/0.33C, 2.5V~3.8V, 循环 3 周, 计算放电容量 C ₀ ; 25°C, 0.33C/0.33C, 2.5V~3.8V, 3cycles, calibrated capacity C ₀ , 25°C, 0.33C 恒流恒压充电至 3.8V, 截止电流 0.05C. 25°C, 0.33C CC-CV CHA, cut-off voltage 3.8V, cut-off current 0.05C. 3. 搁置 30min, 1.5C 放电 10s. Rest 30min, 1.5C CC DCH 10s. 4. 搁置 300s, 1.5C 充电 10s. Rest 300s, 1.5C CC CHA 10s. 5. 调整 SOC (0.33C 放电) 80%/50%/20%/5%SOC 重复步骤 3~4 循环 4 次. Adjust SOC (0.33C CC DCH): 80%/50%/20%/5%SOC repeat 3~4 4 cycles.	SOC	DCH /mΩ	SOC	CHA/ mΩ		
		80	1.04	80	1.05		
		50	1.05	50	1.05		
		20	1.32	20	1.07		
		5	1.70	5	1.10		
6.1.6 室温放电反 馈功率 Discharge and regen power at R.T*	1. 25°C, 0.33C/0.33C, 2.5V~3.8V, 循环 3 周, 计算放电容量 C ₀ , 25°C, 0.33C/0.33C, 2.5V~3.8V, 3cycles, calibrated capacity C ₀ , 2. 25°C, 0.33C 恒流恒压充电至 3.8V, 截止 电流 0.05C, 25°C, 0.33C CC-CV CHA, cut-off voltage 3.8V, cut-off current 0.05C, 3. 搁置 30min,1.5C 放电 10s, Rest 30min, 1.5C CC DCH 10s. 4. 搁置 300s, 1.5C CC CHA 10s, Rest 300s, 1.5C CC CAH 10s. 5. 调整 SOC (0.33C 放电) 80%/50%/20%/5%SOC 重复步骤 3~5 循环 4 次, Adjust SOC (0.33C CC DCH): 80%/50%/20%/5%SOC repeat 3~5 steps 4cycles.	SOC	Power /W	SOC	Power/ W		
		80	436	80	476		
		50	431	50	471		
		20	423	20	467		
		5	408	5	459		

备注:*电池开始使用时(从生产数据起 1 个月内)/此值为标称值。

Remark:*Determined using Begin-of batteries (within 1 months from the production data)/This value is a nominal value.

备注:*电池开始使用时(从生产数据起 1 个月内)/此值为标称值。

Remark:*Determined using Begin-of batteries (within 1 months from the production data)/This value is a nominal value.



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6.2 循环寿命 Cycle life

Item 项目	Condition/Note 条件/注释	Specification 规格
6.2.1 标准循环 Standard cycle life	25°C, 0.33C/0.5C, see 8.8	≥1000 cys, SOH ≥ 90%
6.2.2 快充循环 Fast charge cycle life	0N1Q, see 8.9	≥800 cys, SOH ≥ 90%
	1N1Q, see 8.10	≥900 cys, SOH ≥ 90%
	2N1Q, see 8.11	≥1000 cys, SOH ≥ 90%

6.3 存储性能 Storage performance

Item 项目	Condition/Note 条件/注释	Specification 规格
6.3.1 最佳存储温度范围 Optimum storage temperature range		10°C ~ 35°C
6.3.2 高温容量恢复率 High temperature capacity recovery rate	40°C, 28days, 100%SOC	Capacity recovery > 98% 容量恢复率 > 98%
6.3.3 高温容量恢复率 High temperature capacity recovery rate	50°C, 28days, 100%SOC	Capacity recovery > 97% 容量恢复率 > 97%
6.3.4 高温容量恢复率 High temperature capacity recovery rate	60°C, 28days, 100%SOC	Capacity recovery > 94.5% 容量恢复率 > 94.5%

7. 安全性能 Safety performance

项目 Item	条件 Condition	规格 Specification
7.1 过充 Over-charge	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.2 短路 Short circuit	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.3 针刺 Nail penetration	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.4 挤压 Crush	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.5 热稳定 Thermal stability	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.6 循环过充 Cyclical overcharging	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.7 循环过放 Cyclical exhaustive discharge	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.8 析锂测试 Li plating test	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.9 气体收集 Gas analysis during thermal runaway	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.10 交变热冲击试验 Alternating thermal shock test	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.11 蒸汽热循环 Steam-heat cycling	PV8450:2021-11	只允许在防爆阀处开阀 Cell must open at the designated burst opening
7.12 机械冲击 50g, 70g, 90g, 150g Mechanical shock at 50g, 70g, 90g, 150g	PV8450:2021-11	HL=0
7.13 振动 Vibration test	PV8450:2021-11	HL=0

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8. 测试方法 Testing Methods 8.1 测试条件 Test Conditions 除本标准另有规定外，电池应在室温 25°C±2°C、相对湿度 15%~90%、大气压 86kPa~106kPa 的条件下进行测试；充电方式参考 8.2，放电方式参考 8.3 Unless otherwise stated in this standard, the cell shall be tested at the room temperature of 25°C±2°C , relative humidity of 15%~90%, and atmospheric pressure of 86kPa~106kPa; Charging method refers to 8.2 and discharging method refers to 8.3; 8.2 标准充电 Standard Charging 在 25°C±2°C 室温条件下，单电池以 0.33C 电流放电到电压 2.5V，静置 30min，0.33C 充电到 3.8V，恒压充电到电流降到 0.05C，静置 30min。 At room temperature conditions 25°C±2°C, the single cell discharges at 0.33C current to a voltage of 2.5V, rest for 30min, charge with a current of 0.33C to a voltage of 3.8 V, again with constant voltage of 3.8 V charges until the charge current drops to 0.05C and rest for 30min. 8.3 标准放电 Standard discharge 在 25°C±2°C 室温条件下，首先按照 8.2 充电，然后按 0.33C 电流放电到电压到 2.5V。 At room temperature conditions 25°C±2 °C , first fully charge the single cell in accordance with 8.2 method, then 0.33C current discharges to a voltage of 2.5V. 8.4 SOC-OCV 放电端的 OCV 特性可按照以下步骤测试： OCV characteristic be measured from charge and from discharge side by using following procedures: (1) 给电池充电到 100%SOC（参照 8.2 方法） Charge battery to 100% SOC (see 8.2 method); (2) 给电池放电到 0%SOC（参照 8.3 方法） Discharge battery to 0% SOC (see 8.3 method); (3) 重复步骤 1 和 2 循环三次 Repeat step 1 and 2 three cycles; (4) 容量确定基于循环 3 周放电容量的平均值 Capacity determination based on measured average capacity of 3 steps; (5). 给电池充电到 100%SOC（参照 8.2 方法） Charge battery to 100% SOC (see 8.2 method); (6). 调节温箱温度至目标温度点（温度序列 25/40/10/0/-10/-25℃，100%SOC）		

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Adjust the box temperature to the target temperature point (temperature sequence 25/40/10/0/-10/-25℃, 100%SOC). (7). 测试温度下搁置, 并记录电压 (建议搁置总时间: 25℃ 1.5h; 40℃ 2.5h; 10℃ 2.5h; 0℃ 2h; -10℃ 2.5h; -25℃ 2.5h, 具体搁置时间根据温箱功率大小调整, 保证 1h 内电芯表面温度和目标温度 < 2℃, 且电压变化 < 5mV/10min) Test the temperature under rest, and record the voltage (recommended total rest time: 25℃ 1.5h; 40℃ for 2.5h; 10℃ for 2.5h; 0℃ for 2h; -10℃ for 2.5h; -25℃ for 2.5h, the specific standing time is adjusted according to the power of the temperature chamber, and the surface temperature of the cell and the target temperature are less than 2℃, and the voltage change is less than 5mV/10min within 1 hour) (8). 调节温箱温度至 25℃; 搁置 6H 达到热平衡 Adjust the box temperature to 25℃, Rest 6h to reach thermal equilibrium. (9). C/3 恒流恒压放电 5h, 调节 SOC (SOC 范围: 95%-0%) C / 3 constant current constant voltage discharge 5 h, adjust the SOC (range of SOC: 95%-0%) (10). 搁置 240 分钟后, 调节温箱温度至目标温度点 Rest 240 minutes, adjust the box temperature to the target temperature point. (11). 目标温度下搁置并记录电压 Set and record voltage at target temperature (12). 循环 6-11 步骤 n 次,至 0%SOC Repeat step 6-11 until battery is completely discharged. 8.5 DCH 内阻 (DCR) DCH internal resistance (DCR) 按照 8.2 方法在室温下给电池充电, 然后分别将 SOC 调节在 80%-5%, 并在所需 SOC 状态下以 1.5C 电流放电 10s, 直流内阻由 $\Delta V / \Delta I$ 计算, 其中 ΔV 和 ΔI 分别为放电前后的电压和电流差值。 Charge the single cell according to 8.2 method at R.T, then adjust the SOC state from 80%SOC to 5%SOC respectively, and discharge the cells with the current of 1.5C for 10s at the required SOC state. The DCH internal resistance could be determined by the $\Delta V / \Delta I$, where the ΔV and ΔI are the voltages and currents respectively before and after the discharging. 8.6 不同温度/不同倍率放电容量 Room temperature C-rate charge/discharge capacity 在室温下, 根据 8.2 方法给电池充电, 以不同温度/不同倍率给电池放电到 2.5V, 计算不同温度/不同倍率下放电容量。 At room temperature, cell shall be charged according to 8.2, with different temperature/different current rate discharging to 2.5 V, calculate the discharge capacity for different temperature/different rate. 8.7 容量保持率, 自放电率和容量恢复率 Capacity retention rate, Self-discharge rate and Capacity recovery rate		

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根据 8.2 给电池充电，在 40℃/50℃/60℃ 下 100%SOC 存储 30 天，以 0.33C 电流放电到 2.5V 得到放电容量，放电容量与初始容量的比值叫容量保持率。 Charge the cell according to 8.2, storage at 40℃/50℃/60℃ for 30 days, discharge with 0.33C current to a voltage of 2.5V to get the discharge capacity, the ratio of the discharge capacity to the initial capacity is called the charge retention rate. 再一次给电池按照 8.2 充电以及按照 8.3 放电计算恢复容量，这个恢复容量与初始容量的比值叫容量恢复率。容量恢复率和电荷保持率之间的差异是电池的自放电率。 Recharge the cell according to 8.2 and discharge according to 8.3 to calculate recovery capacity, the ratio of the recovery capacity to the initial capacity is the capacity recovery rate. The difference between room temperature capacity recovery rate and room temperature charge retention rate is the cell self-discharge rate. 8.8 标准循环寿命 Standard Cycle Life 在室温条件下，给电池以 0.33C 恒流充电到 3.8V，接着以 3.8V 恒压充电，直至充电电流降至 0.05C，静置 10min，然后 0.5C 放电到 2.5V，1000 周循环后，放电容量不能低于额定容量的 90%。 At room temperature conditions, charge the cell with 0.33C constant current to 3.8 V, charge with constant voltage 3.8 V until the charge current drops to 0.05C, rest 10 min; Then with discharge current of 0.5C till 2.5 V. After 1000 cycles, the discharge capacity should not be less than 90 % of the normal capacity. 8.9 快充寿命① Fast charge cycle life 在环境温度 25℃下，电池以 0.33C 恒流充电至 8%SOC，2C 恒流充电至 40%SOC，1.72C 充电至 60%SOC，1.44C 充电至 80%SOC，最后以 0.33C 恒流充电到 3.8V，接着以 3.8V 恒压充电，直至充电电流降至 0.05C，静置 10min；0.5C 放电至 2.5V，800 周循环后，放电容量不能低于额定容量的 90%。 At ambient temperature of 45℃, the cell is charged with 0.33C constant current to 8%SOC, 2C charge constant to 40%SOC, 1.72C charge constant to 60%SOC, 1.44C charge constant to 80%SOC, 0.33C charge with constant voltage 3.8 V until the charge current drops to 0.05C, rest 10 min; again with discharge current of 0.5C till 2.5 V, after 800cycles, the discharge capacity should not be less than 90% of the rated capacity. 8.10 快充寿命② Fast charge cycle life 在室温条件下，执行一次 8.8 章节，再执行一次 8.9 章节，往复循环执行，900 周循环后，放电容量不能低于额定容量的 90% At room temperature, Chapter 8.8 and Chapter 8.9 are executed again and again, after 900 cycles, the discharge capacity should not be less than 90% of the rated capacity. 8.11 快充寿命③ Fast charge cycle life 在室温条件下，执行两次 8.8 章节，再执行一次 8.9 章节，往复循环执行，1000 周循环后，放电容量不能低于额定容量的 90% At room temperature, Chapter 8.8 is executed twice and Chapter 8.9 is executed again, after 1000 cycles, the discharge capacity should not be less than 90% of the rated capacity.		

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9. 功率矩阵 Power Matrix

9.1 30s 放电功率, 30s discharge power

 1. 放电截止电压: $\leq 0^{\circ}\text{C}$, 2.0V; $> 0^{\circ}\text{C}$, 2.5V ; discharge cut-off voltage, $\leq 0^{\circ}\text{C}$, 2.0V; $> 0^{\circ}\text{C}$, 2.5V

SOC/%	-25°C	-20°C	-10°C	0°C	10°C	25°C	40°C	50°C	55°C
Power/W	Cut of 2.0V				Cut of 2.5V				
98%	346	514	1084	1753	1754	2098	2209	2195	2181
95%	337	495	1059	1713	1710	2089	2203	2190	2177
80%	309	464	962	1643	1614	2071	2188	2176	2164
65%	275	427	866	1597	1558	2056	2175	2144	2133
50%	270	380	788	1488	1441	2030	2150	2121	2110
35%	247	335	677	1315	1279	1651	1838	1814	1807
20%	174	258	537	1064	1037	1535	1702	1351	1287
15%	146	235	470	894	875	1165	1280	1158	1129
10%	126	189	400	724	754	890	991	1004	1005
5%	110	167	317	559	558	745	868	872	864
1%	26	26	28	28	28	38	44	50	52

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9.2 180s 放电功率, 180s discharge power

1. 放电截止电压: 所有温度 2.5V ; discharge cut-off voltage, all temperature at 2.5V

SOC/%	-25℃	-20℃	-10℃	0℃	10℃	25℃	40℃	50℃	55℃
Power/W	Cut of 2.0V				Cut of 2.5V				
98%	251	370	720	1355	1142	1207	1268	1187	1136
95%	243	361	705	1329	1138	1204	1266	1185	1135
80%	233	347	674	1226	1120	1190	1253	1176	1126
65%	198	334	535	1100	1043	1118	1187	1114	1065
50%	187	269	488	899	1001	1096	1168	1100	1052
35%	170	242	357	679	831	1045	1141	1081	1035
20%	114	169	258	456	595	767	805	776	751
15%	94	137	221	366	454	592	629	647	625
10%	80	110	180	271	363	316	329	299	283
5%	59	43	125	210	182	192	212	206	193
1%	15	5	5	9	14	9	13	14	16

10. OCV-SOC

10.1 放电方向 Discharge direction:

OCV/V						
SOC	25°C	40°C	10°C	0°C	-10°C	-25°C
100%	3.364	3.360	3.355	3.354	3.352	3.351
95%	3.333	3.336	3.335	3.334	3.334	3.333
90%	3.332	3.334	3.333	3.333	3.333	3.332
85%	3.330	3.333	3.332	3.332	3.332	3.331
80%	3.329	3.332	3.332	3.331	3.331	3.331
75%	3.328	3.331	3.331	3.331	3.331	3.330
70%	3.328	3.331	3.331	3.331	3.330	3.330
65%	3.327	3.330	3.330	3.330	3.330	3.330
60%	3.321	3.326	3.326	3.325	3.325	3.324
55%	3.293	3.298	3.294	3.292	3.291	3.288
50%	3.289	3.295	3.290	3.288	3.286	3.284
45%	3.287	3.293	3.288	3.287	3.285	3.283
40%	3.286	3.292	3.288	3.286	3.284	3.283
35%	3.286	3.292	3.288	3.286	3.285	3.284
30%	3.283	3.285	3.285	3.285	3.285	3.285
25%	3.265	3.268	3.269	3.270	3.271	3.272
20%	3.250	3.252	3.255	3.255	3.256	3.258
15%	3.224	3.227	3.230	3.231	3.232	3.235
10%	3.203	3.205	3.208	3.209	3.210	3.212
5%	3.166	3.167	3.180	3.183	3.187	3.193
2%	3.028	3.025	3.038	3.043	3.047	3.054
0%	2.784	2.782	2.798	2.803	2.809	2.817



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10.2 充电方向 Charge direction:

OCV/V						
SOC	25°C	40°C	10°C	0°C	-10°C	-25°C
0%	2.784	2.782	2.798	2.803	2.809	2.817
2%	3.044	3.035	3.048	3.052	3.057	3.063
5%	3.195	3.187	3.198	3.202	3.205	3.210
10%	3.224	3.220	3.223	3.224	3.225	3.226
15%	3.252	3.248	3.250	3.251	3.252	3.253
20%	3.282	3.278	3.279	3.280	3.280	3.282
25%	3.301	3.298	3.298	3.298	3.298	3.298
30%	3.307	3.305	3.302	3.301	3.299	3.298
35%	3.308	3.307	3.303	3.302	3.300	3.298
40%	3.309	3.308	3.304	3.302	3.301	3.299
45%	3.310	3.309	3.305	3.303	3.302	3.300
50%	3.311	3.311	3.306	3.305	3.304	3.301
55%	3.315	3.314	3.309	3.308	3.307	3.305
60%	3.343	3.340	3.340	3.339	3.339	3.338
65%	3.344	3.341	3.341	3.341	3.341	3.340
70%	3.344	3.341	3.341	3.341	3.341	3.340
75%	3.344	3.341	3.341	3.341	3.341	3.340
80%	3.344	3.341	3.341	3.340	3.340	3.339
85%	3.343	3.341	3.340	3.340	3.340	3.339
90%	3.342	3.340	3.340	3.339	3.339	3.338
95%	3.341	3.340	3.338	3.338	3.337	3.336
100%	3.348	3.348	3.345	3.344	3.343	3.341

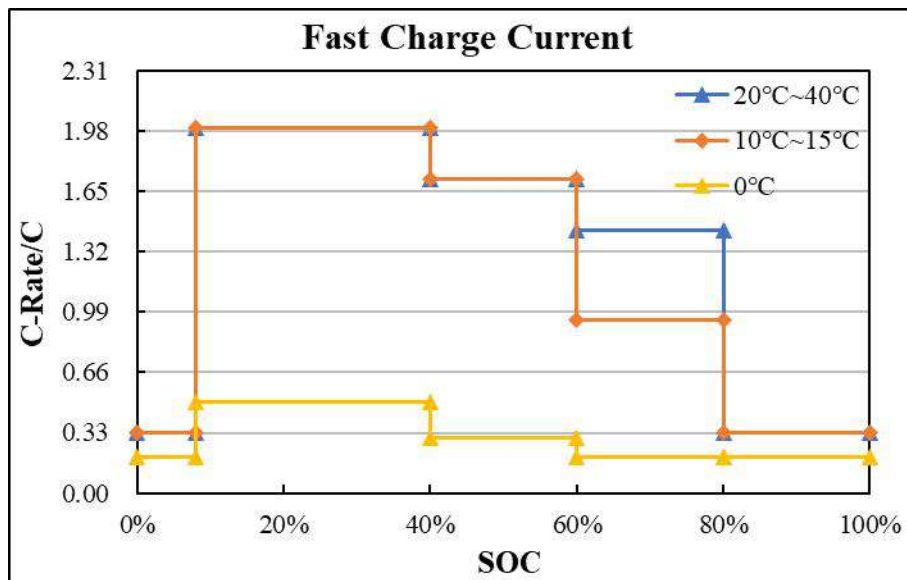
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11. 快充策略 Fast charge profile

参考下表， refer the follow table



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12. 交货检验标准规则 Criterion rule of delivery inspection															
12.1 工厂检验规则 Inspection rules for factory inspection															
<table><tr><td>Cell Levels 电池等级</td><td>Indicator Requirement 指标要求</td></tr><tr><td>A</td><td>TBD</td></tr><tr><td>B</td><td>TBD</td></tr><tr><td>C</td><td>TBD</td></tr><tr><td>D</td><td>TBD</td></tr></table>						Cell Levels 电池等级	Indicator Requirement 指标要求	A	TBD	B	TBD	C	TBD	D	TBD
Cell Levels 电池等级	Indicator Requirement 指标要求														
A	TBD														
B	TBD														
C	TBD														
D	TBD														
12.2 检验形式 Type inspection															
产品应在下列情况之一时进行型式检验 Products should be type inspected in one of the following situations:															
(a) 新产品的生产和老产品的转移 Production of new products and transfer of old products;															
(b) 转移工厂 Transfer Plant;															
(c) 停产一年多后恢复生产 Return to production after halt production for more than one year;															
(d) 材料的结构和工艺的主要变化 Major changes in the structure and process of the material.															
12.3 标准规则 Criterion rule															
在检验过程中，如有一项不符合要求，应判定为不合格															
During inspection process, if one of items do not meet the requirements, it should be judged as unqualified.															

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13. 标识, 包装, 运输, 存储 Markings, Package, Transport, Storage 13.1 标识 Markings 每个产品都应该有清晰的条形码 Every product should have a clear bar code. 13.2 包装 Package 产品都应有外包装, 保证产品在运输、装卸、堆放过程中不受机械损伤。 All products should have external packaging to ensure that the product is not mechanically damaged during transportation, handling (loading or unloading) and stacking. 13.3 运输 Transport 在运输过程中应严禁暴力装卸, 防止剧烈振动、冲击或挤压, 防止日晒雨淋。 During the transportation, the violent loading and unloading is strictly prohibited, avoid the strong vibrations, shocks or extrusions, and keep away from sunshine and rain. 13.4 存储 Storage 不打开包装的产品应贮存在环境温度为-10℃~30℃, 相对湿度≤75%的清洁、干燥、通风的库房内, 库房内不应含有腐蚀性气体; 产品应远离火源和热源; 应定期进行充电周期不超过 2 个月。 Unopened Product should be stored in a clean, dry, ventilated warehouses with an ambient temperature - of -10℃~30℃,relative humidity ≤75%RH that do not contain corrosive gases; Keep away from fire and heat source. The charging cycle of the product should not be more than 2 months at regular intervals.					

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14. 警示和禁止处理 Caution and Prohibition in Handling 锂离子充电电池的使用警告。操作不当可能会造成电池发热、起火和性能劣化，务必认真阅读以下条款。 Warning for using the lithium ion rechargeable battery. Mishandling of the battery may cause heat, deterioration in performance. Be sure to observe the following. 注意事项 Caution ● 应用配有电池的设备时，使用前请参阅用户手册。 ● When using the application equipped with the battery, refer to the user's manual before usage. ● 充电前请阅读充电器说明书。 ● Please read the specific charger manual before charging. ● 当电池长时间连接在充电器上不充电时，请停止充电。 ● When the cell is not charged after long exposure to the charger, discontinue charging. ● 包装前请检查正极(+)和负极(-)端子的方向。 ● Please check the positive (+) and negative (-) direction before packing. ● 端子或导线与电池模块相连，注意绝缘防止短路。 ● When a lead plate or wire is connected to the cell for packing, check out insulation not to short-circuit. ● 电池必须分开存放。 ● Battery must be stored separately. ● 长期不用时，电池要存放于阴凉干燥处 ($\leq 25^{\circ}\text{C}$)。 ● Battery must be stored in a dry area with low temperature ($\leq 25^{\circ}\text{C}$) for long-term storage. ● 请勿将电池放置于阳光直射处或热源下。 ● Do not place the battery in direct sunlight or heat. ● 请勿在会导致保护装置损伤的高静态能量环境下使用电池。 ● Do not use the battery in high static energy environment where the protection device can be damaged. ● 第一次使用时如发现锈蚀或异味，请更换新电池。 ● When rust or smell is detected on the first usage, please exchange to new cells.		

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● 处理电池单元时请勿穿戴金属饰品（如戒指，手表，饰件等）。 ● Do not wear metallic objects (ex. ring, watch, accessory, etc.) while handling battery cells. ● 当将电池装配模块或包裹时，应采用“先入先出”(FIFO)原则。 ● When use cells for an assembly of module or pack, the “firs-in, first-out” (FIFO) principle should be applied. ● 充电时间不应超过说明书规定的时间。 ● Charge time should not be longer than specified in the manual. ● 请勿将电池放置在本文件规定的使用温度范围之外的地方。 ● Do not expose the battery to the outside of the operating temperature range specified in the document. 禁止 Prohibitions ● 请勿使用不同充电器 ● Do not use different charger. ● 请勿超过最大充电倍率充电 ● Do not charge with more than maximum charge rate. ● 请勿拆解或改装电池 ● Do not disassemble or reconstruct the battery. ● 请勿投掷或撞击电池 ● Do not throw or cause impact. ● 请勿用锐器刺穿电池。（例如钉子，刀子，笔，电钻） ● Do not pierce a hole in the battery with sharp things.(such as nail, knife, pencil, drill) ● 请勿与其它型号电池或模块单元混用。 ● Do not use with other batteries or cells. ● 请勿直接焊接电池 ● Do not solder on battery directly. ● 使用过程中请勿过度挤压电池。		

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● Do not press the battery with overload in manufacturing process. ● 请勿将新、旧电池在 PACK 中同时使用。 ● Do not use old and new cells together for packing. ● 请勿将电池暴露在高温下。（如火源附件） ● Do not expose the battery to high heat.(such as fire) ● 请勿将电池放入微波炉或高压容器中。 ● Do not put the battery into a microwave or high pressure container. ● 请勿将电池倒置使用 ● Do not use the battery reversed. ● 请勿用导电材料连接正（+）和负（-）。（如金属，电线） ● Do not connect positive (+) and negative (-) with conductive materials. (such as metal, wire) ● 不允许淋湿或将电池浸入水或海水中。 ● Do not allow the battery to be immersed in or wetted with water or sea-water. ● 请勿以制造商书面协议之外的方式使用电池 。 ● Do not use the cell in any way other than the manufacturer's written agreement.					

