

	PRODUCT SPECIFICATION 产品规格书		
	Author: Shaojian Rao 饶绍建	Document #: PS300729-100	Rev:01
Title: PRODUCT SPECIFICATION OF 37AH NMC PHEV CELL 标题: 37Ah NMC PHEV 电池规格书			Page 1 of 13

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2.0 PURPOSE 目的

The specification sheet is designed to build up and improve Wanxiang A123 Systems Asia Co., Ltd technical documentation so as to instruct production and product shipment and consequently guarantee product quality. At the same time, it is convenient for to confirm product specifications with customers and finally reach an agreement.

为建立健全的公司技术资料，确保产品质量，用于指导产品生产、出货。方便与客户确认产品规格，并达成一致，制定本产品规格书。

3.0 SCOPE 适用范围

This product specification describes the type, size, structure, electrochemistry performance, safety characteristics, warning and cautions of the cell. This specification only applies to the WX14I3737 cell that supplied by Wanxiang A123 Systems Asia Co., Ltd.

本产品规格书规定了 WX14I3737 电芯的类型、尺寸、结构、电化学性能、安全性能及注意事项，本标准仅适用于万向一二三股份公司生产的 WX14I3737 电芯。

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4.0 BATTERY DESCRIPTION 电池描述

Model: WX14I3737

型号: WX14I3737

Cell Description: Energy and power type rechargeable Lithium-ion Battery

电池类型: 能量功率兼顾型可充电锂离子电池

5.0 BATTERY SPECIFICATION 电池规格

Item 项目	Specification 标准
Nominal capacity 标称容量	37.0Ah (1.0C, 4.2-2.7V)
Minimum capacity 最小容量	37.0Ah (1.0C, 4.2-2.7V)
Charge cut-off voltage 充电截止电压	4.2V
Nominal voltage 标称电压	3.65V
Charging method 充电方式	CC-CV (first constant current then constant voltage) 恒流恒压充电 (先恒流, 后恒压)
Charge current 充电电流	Standard: 37A (1.0C) 标准: 37A (1.0C) Rapid: 74A (2.0C) 快充: 74A (2.0C)
Charge time 充电时间	Standard: 1.0 hours 标准: 1.0小时 Rapid: 0.5 hours 快充: 0.5小时
Maximum continuous charge current 最大持续充电电流	74.0A (2.0C)
Maximum pulse charge current (10s)	

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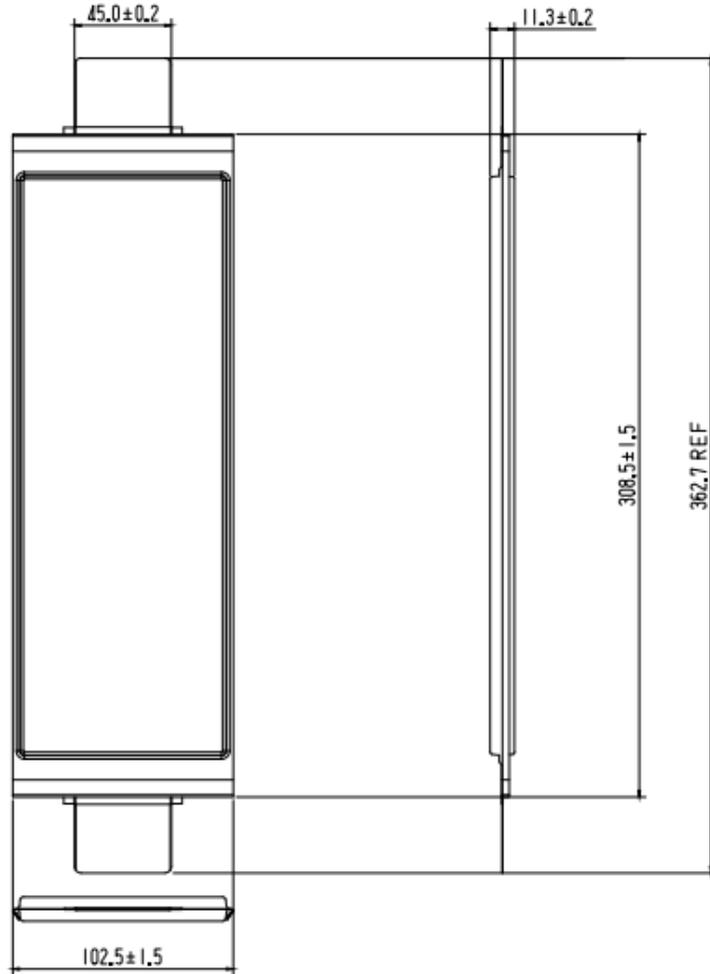
最大脉冲充电电流 (10s)	185.0A(5.0C)
Maximum continuous discharge current 最大持续放电电流	185.0A (5.0C)
Maximum pulse discharge current (10s) 最大脉冲放电电流 (10s)	370A(10.0C)
Discharge Cut-off Voltage 放电截止电压	2.7V@ (10, 55] °C 2.5V@[-10, 10] °C 2.2V@ [-30, -10)°C
Cell Weight 电池重量	723±15g
Cell Dimension 电池尺寸	Thickness: 11.3 ±0.2mm (30%SOC, 10psi) 厚度: 11.3 ±0.2mm (30%SOC, 10psi) Width: 102.5±1.5 mm 宽度: 102.5±1.5 mm Height: 308.5±1.5 mm 高度: 308.5±1.5 mm
Operating Temperature 使用温度	Charge: -20 ~ 55°C 充电: -20 ~ 55°C Discharge: -30 ~ 55°C 放电: -30 ~ 55°C
Storage Temperature 存储温度	-40 ~ 60 °C

Note: Wanxiang A123 Systems Asia Co., Ltd strongly suggests the cells should be stored where it is cool, no light and away from heat sources and hazardous chemical. We also advise the cells should have 30%~50% of SOC. If possible, please charge the cells every three months(One cycle of charge/discharge at C-rate≤1C). With proper storage and maintenance, the cells' life can be prolonged.

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备注：万向一二三股份公司强烈建议电池存储在低温环境，避免光照，远离热源和危险化学品。电池必须在 30% ~ 50% SOC 状态下存储。如果条件允许，长期存储请每三个月维护一次（≤1C 条件进行充放电一次）。适当的存储和维护方法，可以延长电池的寿命。

6.0 APPEARANCE AND DIMENSION (UNIT: MM) 电芯外观尺寸（单位：MM）



Appearance and Dimension of WX14I3737

WX14I3737 电芯的外观尺寸图

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7.0 STANDARD TEST CONDITIONS 标准测试环境

Standard environmental conditions: Unless otherwise specified, all tests stated in this specification are conducted at temperature $25 \pm 5^\circ\text{C}$, humidity 15%-90% and air pressure between 86kPa to 106kPa. RT means $25^\circ\text{C} \pm 2^\circ\text{C}$.

测试环境: 除另作说明, 所有的测试的标准测试环境是: 温度 $25 \pm 5^\circ\text{C}$, 湿度15-90%, 大气压86kPa~106kPa。室温代表 $25^\circ\text{C} \pm 2^\circ\text{C}$ 。

8.0 PERFORMANCES AND TEST METHOD 电池性能及测试方法

Explanation of terminology 术语解释

Standard Charge: Charge the cell with constant rate 1.0C to 4.2V then constant voltage until charge current to 0.05C;

标准充电方法: 电池以1.0 C的电流恒流充电至4.2V, 然后以4.2V的电压恒压充电, 直到充电电流减少到0.05C停止充电。

Standard Discharge: Discharge the cell with constant rate 1.0 C to 2.7V.

标准放电方法: 电池以1.0 C的电流恒流放电至2.7V停止。

Explosion: Battery case violent rupture, accompanied by loud noise, and a main ingredient (solids) spray out.

爆炸: 电池外壳猛烈破裂, 伴随剧烈响声, 且有主要成分(固体物质)抛射出来。

Fire: Any part of the battery is continues on fire(continues longer than 1s), spark and arc does not belong to fire

起火: 电池任何部位发生持续燃烧(持续时间长于1秒), 火花及拉弧不属于燃烧。

Leakage: The internal liquid of battery leaked to the outside of the battery case.

漏液: 电池内部液体泄漏到电池壳体外部。

9.0 ELECTRICAL PERFORMANCE 电性能参数

No 序号	Item 项目	Criteria 标准	Test Method and Condition 测试方法和环境
1	Capacity 容量	$\geq 37.0\text{Ah}$	The cell performs standard charge and discharge, calculate the discharged capacity.

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			电池按标准方法充电和放电，测量放电容量。
2	AC impedance 交流内阻	0.75 ±0.15 mΩ	AC impedance of the cell is measured at 1KHz at 30%SOC. 30%SOC 下，在 1KHz 的频率下测试
3	Rate Discharge 倍率放电	1.0C ≥ 100% 2.0C ≥ 99% 3.0C ≥ 98% 5.0C ≥ 95%	After standard charging, discharge capacity is measured with the various currents at the cut off voltage of 2.7V 标准充电后，以不同的电流放电到 2.7V，测试放电容量。
4	Discharge at high & low temperature 高低温放电	45, 55°C ≥ 100%; 25°C ≥ 100%; 10°C ≥ 95%; 0°C ≥ 90%; -10°C ≥ 85%; -20°C ≥ 80%; -30°C ≥ 70%.	After standard charging, the cell is stored in different temperature (25°C, -20°C, 0°C, 10°C, 45°C, 55°C) for 2 hours, then test the cell capacity separately in each temperature with standard discharge method. (-10, 0°C cut off at 2.5V, -20,-30°C cut off at 2.2V). 充满电的电池在不同的温度下(25°C, -20°C, -10°C, 0°C, 10°C, 45°C, 55°C)搁置 2 小时，然后用标准放电方法测试每个温度下电池的容量(-10, 0°C 放电到 2.5V, -20, -30°C 放电到 2.2V)。
5	Cycle Life 循环寿命	25°C, ≥3000 Remaining capacity ≥ 80% 容量剩余 ≥ 80%	The cell performs charge and discharge cycle at 1C current for 3000times, and between charge and discharge the cell should rest at least 10 min, then test the remaining capacity. 电池进行 1C 的充电，放电循环 3000 次，测量剩余容量。充电放电间隔至少 10 分钟。
6	Storage at 25°C 100%SOC 常温存储	Remaining capacity ≥ 95% ; Capacity recovery ≥ 98% 剩余容量	After standard charging, the cell stored at 25°C for 30 days, then measured the remaining and recovery capacity by standard discharge method. 满充电的电芯在 25°C 的环境下放置 30 天后，以标

		≥95% 恢复容量 ≥98%	准放电方法测量剩余和恢复容量。
7	50%SOC Storage at45°C 高温存储	Remaining capacity≥95% ; Capacity recovery ≥98% 剩余容量 ≥95% 恢复容量 ≥98%	After standard charging to 50%SOC, the cell stored at 45 °C for 30 days, then the cell stored at 25°Cfor 4h, measured the remaining capacity and capacity recovery by standard discharge method. 满充电的电芯在 45°C的环境下放置 30 天后, 在 25°C环境中放置 4 小时, 然后以标准放电方法测量剩余和恢复容量。

10.0 SAFETY PERFORMANCES 安全性能

No. 序号	Item 项目	Criteria 标准	Test Method and Condition 测试方法和环境
1	Nail Test 针刺测试	No explosion, no fire. 不爆炸, 不起火	After standard charging, the cell stored at 25°C±5°C for 1 hour. Then, a nail (diameter: 5~8mm, the conical angle of spike tip being 45 °~ 60 °) is penetrated vertically through the center of battery at the speed of 20mm/s~30mm/s. (the nail kept inside), observation of 1 h 按标准方法充电的电池在 25°C±5°C的温度下静置 1 小时, 然后用 5mm~8mm 直径的耐高温钢针(圆锥角 45 °~ 60 °),以 20mm/s~30mm/s 的速度,从垂直于电芯的方向贯穿电池单体。(针不拔出), 观察 1h
2	Crush Test 挤压测试	No explosion,	After standard charging, the cell shall be operated as follows:

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		no fire. 不爆炸, 不起火	Crush direction: vertical the cell surface Crush speed: (5±1) mm/s Crush extent: crushing the cell until the voltage reached 0V or the deformation reached 30% or the extrusion force reached 200KN observation of 1 h 标准方法充电的电池按以下方法操作: 挤压方向: 垂直电芯表面 挤压速度: (5±1) mm/s 挤压程度: 直到电池 0V 或者变形量达到 30% 或挤压力达到 200KN 后停止挤压 观察 1h
3	Heating Test 加热测试	No explosion, no fire. 不爆炸, 不起火	After standard charging, place the battery temperature box, box temperature according to the rate of 5 °C / min from room temperature to 130 °C, and maintain after 30 minutes. Observe for 1 h 按标准方法充电, 将电池放置温度箱中, 温度箱按照 5°C/min 的速率由室温升至 130 ±2°C, 并维持 30 分钟, 观察 1 小时。
4	Short-Circuit Test 短路测试	No explosion, no fire. 不爆炸, 不起火	After standard charging, the battery is to be short-circuited for 10min by connecting the positive and negative of the battery with copper wire having a maximum resistance load of 5mΩ, observation of 1 h. 按标准方法充电, 然后用电阻小于 5mΩ 的铜线连接电池的正负极持续 10 分钟, 观察 1h。
5	Drop Test	No explosion,	After standard charging, the battery tab down from 1.5 m high free fall to the cement ground with the

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	跌落测试	no fire. 不爆炸, 不起火	Tab towards the ground, observation of 1 h. 按标准方法充电, 然后单体电芯正负极端子向下从 1.5m 高度处自由跌落到水泥地面上。观察 1h
6	Overcharge Test 过充电测试	No explosion, no fire. 不爆炸, 不起火	After standard charging, the battery shall be charged as below: Charged with constant current 1C, stop charging while the voltage reached 6.3V or charging 60 minutes, observation of 1 h. 按标准方法将电池充满电, 然后按以下方式充电: 用 1C 的电流充电, 直到电池电压达到 6.3V, 或者充电时间达到 60min, 观察 1h。
7	Over-discharge Test 过放电测试	No explosion, no fire. 不爆炸, 不起火	After standard charging, the battery shall be discharged 90 minutes, observation of 1 h. 按标准方法将电池充满电, 然后用 1C 的电流将电池放电 90 分钟, 观察 1h。
8	Seawater immersion Test 海水浸泡	No explosion, no fire. 不爆炸, 不起火	After standard charging, Kept the cell at 3.5% NaCl solution for 120min Cell should be completely soaked in solution 按照标准方法将电池充满电, 将单体浸泡在 3.5% NaCl 溶液中保持 2h, 电池应完全浸泡于溶液中
9	Temperature cycling Test 温度循环	No explosion, no fire. 不爆炸,	After standard charging, the cell in the temperature box, according to the following five temperature cycle: 1. Keep 60 minutes -40°C, the temperature change rate

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		不起火	<p>13/12°C / min</p> <p>2. Keep 90 minutes -40°C, the temperature change rate 0°C / min</p> <p>3. Keep 60 minutes 25°C, the temperature change rate 13/12°C / min</p> <p>4. Keep 90 minutes 85°C, the temperature change rate 2/3°C / min</p> <p>5. Keep 110 minutes 85°C, the temperature change rate 0°C / min</p> <p>6. Keep 70 minutes 25°C, the temperature change rate 6/7°C / min</p> <p>Observation of 1h</p> <p>按照标准方法将电池充满电，将单体电池放入温度箱中，按照如下温度循环 5 次：</p> <p>1.-40°C保持 60 分钟，温度变化率 13/12°C/min</p> <p>2.-40°C保持 90 分钟，温度变化率 0°C/min</p> <p>3.25°C保持 60 分钟，温度变化率 13/12°C/min</p> <p>4.85°C保持 90 分钟，温度变化率 2/3°C/min</p> <p>5. 85°C保持 110 分钟，温度变化率 0°C/min</p> <p>6. 25°C保持 70 分钟，温度变化率 6/7°C/min</p> <p>观察 1h.</p>
10	Low-pressure	No explosion,	After standard charging, put the battery in low pressure box, adjust air pressure in the test

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	Test 低气压测试	no fire. 不爆炸， 不起火	chamber to 11.6 kPa for 6 h, observation of 1h 按照标准方法将电池充满电，将电池放入低气压箱中，调节试验箱中气压为 11.6kPa，温度为室温，静置 6h 观察 1h
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11.0 SHIPMENT 运输

Cells should be shipped at about 30~ 50% of SOC.

电池应该在30~50%的荷电状态下运输。

12.0 WARNING AND CAUTIONS 警告及注意事项

Cells must be applied in strict accordance with the specification of Wanxiang A123 Systems Asia Co., Ltd. Abuse of a battery may cause the battery to get heat, ignite, or explode and cause serious injury. Wanxiang A123 Systems Asia Co., Ltd has no legal liability on any overheat, fire, explosion or other situations when the cells are used not according to the specifications. Be sure to abide by the safety rules as following

消费者必须严格按照万向一二三股份公司的规格书要求使用电池，避免充放电方法或储存维护不当而影响电池使用寿命和安全性。由于误用会引起电池过热，发生火灾，或爆炸以及其他没有按照规格书进行操作所造成的任何意外事故，万向一二三股份公司不负任何责任。请严格遵守以下安全条款：

- **Do not disassemble cells; Do not put cells in water or fire;**
不要拆解电池，不要把电池放到火中或者水中。
- **Please charge the cells with specified charger and follow the specifications. The cells can only be used in the specified equipment. It's not allowed for other applications.**
请用指定充电器按标准充电。电池只能在指定设备上使用，不要在其他设备上使用。
- **If the battery 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 battery charger and stop using it.**

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

- **Battery cell operating temperature shall be maintained below 40°C for most of the time to keep a good battery life. The operating hours over 45°C shall be limited within 100hrs/year.**

正常使用时电池的绝大部分工作温度应保持在 40°C 以下，以保持电池良好的寿命。超过 45°C 的使用时间一年累积不能超过 100 小时。

- **Cell can't be placed or used near fire or where it is over 60°C or stored in such area.**

电池不能在靠近火源或者超过 60°C 的环境中使用、放置和存储。

- **Do not connect the positive (+) and negative (-) terminals with a metal object; Do not put the cells together with necklace, hairpin, coins or screws or other metal.**

不要使用金属导体短路电池的正负极；也不要将电池同项链、发夹、硬币或镙钉等金属品一起放在兜里或包中，也不要将电池同上述物品一起储存。

- **Please be careful and not damage the cells with sharp objects.**

不要使用锐利的物品刺穿电池。

- **Please read the operation manual carefully. Any improper operation may lead to overheat, fire, explosion, damage or loss of capacity.**

请仔细阅读操作说明书，任何不恰当的操作可能导致过热、着火、爆炸、电池损伤或者容量衰减。

REVISION HISTORY

Rev	Effective Date	Rev Author	Description of Revision
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01	3/27/2018	Shaojian Rao	Initial Release
Reason for Revision: Release to Production for use			EC:

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