



Product Specification Sheet 產品規格書

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SPECIFICATION AMENDMENT RECORDS
(規格變更記錄)

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1. Apply for Scope

適用範圍

This specification describes the function of chargeable Li-ion polymer battery that made in GIANTSUN POWER CORPORATION.

本規格說明書描述了湖南炬神電子有限公司生產的可充電鋰電池產品性能指標。

2. Battery Specification

電池規格：尺寸：67.85X38.25X38.25mm 7.2V/6700mAh（鋰電芯：LG 18650 3.6V/3350mAh 2S2P）。

2.1 Shape Picture Content

電池外觀圖

2.1.1 Battery Appearance

電池外觀。

正面圖



背面圖





湖南炬神電子有限公司

HU NAN GIANTSUN POWER ELECTRONICS CO., LTD

2.2 Battery Specification Parameter:

電池參數規格

表一

No. 序號	Items 項目	Specifications 規格	
1	Appearance 外觀	The surface is clear and no scratch, no mechanical abrasion, match well with the main machine 電池外表面清潔，無擦傷，無機械損傷，與主機配合良好	
2	Nominal Voltage 標稱電壓	7.2V	
3	Nominal Capacity 標稱容量	6700mAh @0.2C	
4	Minimum Capacity 最小容量	6500mAh @0.2C	
5	Charge Voltage 充電電壓	8.40V	
6	Discharge Cut-off Voltage 放電截止電壓	5.0V	
7	Over-Charging Protection Voltage 過充保護電壓	8.56±0.05V	
8	Over-Discharging Protection Voltage 過放保護電壓	5.6±0.16V	
9	Charge current 充電電流	Standard charge: 0.3C 標準充電: 0.3C Rapid charge: 0.5C 快速充電: 0.5C	
10	Standard Charging method 標準充電方法	0.3C CC (constant current) charge to 8.4V, then CV (constant voltage 8.4V) charge till charge current decline to 0.05C 0.3C CC (恒流) 充電至8.4V, 再CV (恒壓8.4V) 充電直至充電電流 0.05C	
11	Charging time 充電時間	Standard charge: 5.0~6.0 hours (Ref.) 標準充電: 5.0~6.0 小時(參考值) Rapid charge: 3.0 hours (Ref.) 快速充電: 3.0 小時(參考值)	
12	Max. Charge Current 最大充電電流	0.5C	@ 25° C
13	Max. Discharge Current 最大放電電流	1.5C	@ 25° C
14	Operating Temperature 工作溫度	Charging: 0° C ~ 45° C 充電: 0° C ~ 45° C Discharging: -20° C ~ 50° C 放電: -20° C ~ 50° C	



湖南炬神電子有限公司

HU NAN GIANTSUN POWER ELECTRONICS CO., LTD

No. 序號	Items 項目	Specifications 規格		
15	Impedance 內阻	≤300mΩ. The impedance shall be measured at AC 1000 Hz initially.		
16	Cycle Life 循环寿命	After 300 Cycles recoverable capacity ≥ 75%	Charge the battery at 0.2C under 15°C~35°C until the battery voltage reaches 8.40V, and then charge it under the constant voltage until the current ≤0.02C. Stay it for 0.5h-1h, and then discharge it at 0.2C, until the voltage drops to 5.6V. Stay for 0.5h -1h again.	
17	Pack Dimension 電池尺寸	Length: 電池本体 67.85±0.1mm; Width: 38.25±0.1mm Thickness: 38.25±0.1mm		
18	Storage (At 50% SOC and specified temp , recoverable capacity in % vs time) 儲存	-20°C~20°C, 12months		
		-20°C~45°C, 3months		
		-20°C~50°C, 1month		
19	Warranty Time 質量保證期	15 Months		
20	Battery Weight 電池重量	Approx 198g		
21	Delivery voltage 出貨電壓	≥7.9V (容量≥85%)		
22	Capacity Ratio At The Different Temperature 不同溫度下容量比值	Charge Conditions 充電條件	Discharge Conditions 放電條件	Reference To Capacity Ratio 參考容量比值
		Temperature: 23 °C 溫度: 23 °C Charge Current: 0.2C 充電電流: 0.2C	Temperature: 50±3 °C 溫度: 50±3 °C Discharge Current: 0.2C 放電電流: 0.2C	≥95%
			Temperature: 24 °C 溫度: 24 °C Discharge Current: 0.2C 放電電流: 0.2C	≥100%
			Temperature: 0 °C 溫度: 0 °C Discharge Current: 0.2C 放電電流: 0.2C	≥80%
			Temperature: -10 °C 溫度: -10 °C Discharge Current: 0.2C 放電電流: 0.2C	≥70%
容量比值=各溫度下0.2C放電容量/24°C下0.2C放電容量 Capacity Ratio= 0.2C discharge capacity at different temperature/0.2C discharge capacity at 24 °C				



2.3 Safety Performance 安全性能

表二

No. 序號	Items 項目	Test Method and Condition 測試方法與條件	Criteria 標準
1	Over-Charge Protection 過充保護	<p>At $20\pm 5^{\circ}\text{C}$ conditions, after fast-charging, use an external 10V power to load the battery and last for 8 hours, then check the appearance of battery.</p> <p>在環境溫度 $(20\pm 5)^{\circ}\text{C}$ 下，電池快速充電結束後，用電壓為 10V 外接電源持續給電池載入 8 小時，再檢查電池外觀。</p>	<p>The appearance is normal, no explosion, no fire, no smoking, no leakage.</p> <p>電池外觀正常、不爆炸、不起火、不冒煙或不漏液。</p>
2	Over-Discharge Protection 過放保護	<p>At $20\pm 5^{\circ}\text{C}$ conditions, discharge battery to 5.6V with 0.2C constant current, then discharge with 30Ω loading for 24 hours. Check the appearance of battery.</p> <p>在環境溫度 $(20\pm 5)^{\circ}\text{C}$，以 0.2C 恒流放電至 5.6V，再外接 30Ω 負載放電 24h，然後檢查電池外觀。</p>	<p>The appearance is normal, no explosion, no fire, no smoking, no leakage.</p> <p>電池外觀正常、不爆炸、不起火、不冒煙或不漏液。</p>
3	Short-Circuit Protection 短路保護	<p>After fast-charging, use a cable of 0.1Ω resistance to short the battery for 1 hour. Then check the appearance of battery. Cut circuit of resistance; test the battery's voltage after charging with 1C constant current for 5 seconds.</p> <p>電池快速充電結束後，將正負極用 0.1Ω 電阻短路 1h 後，檢查電池外觀。將正負極連接電阻斷開，電池以 1C 恒流充電 5S 後，用電壓表測量電池開路電壓。</p>	<p>The appearance is normal, no explosion, no fire, no smoking, no leakage.</p> <p>電池外觀正常、不爆炸、不起火、不冒煙或不漏液。</p>



3. PCM Specification

保護板規格

3.1 Electrical Characteristics (at RT=25°C)

電氣性能 (在環境溫度：25°C)

A). Protection Criteria

保護規格

- | | |
|---|------------|
| a). Over-Charging Protection Voltage:
過充保護電壓: | 8.56±0.05V |
| b). Over-Charging Protection Delay Time:
過充電保護延時: | 0.7~1.3S |
| c). Over-Discharging Protection Voltage:
過放保護電壓: | 5.6 ±0.16V |
| d). Over-Discharging Protection Delay Time
過放電保護延時 | 70~150ms |
| e). Over-Charge Current Protection :
過充電流保護: | 5~8A |
| f). Over-Discharge Current Protection :
過放電流保護: | 4~8A |
| g). Over Current Protection Delay Time:
過電流保護延時: | 6~14ms |
| f). Short-Circuit Protection Delay Time | 150~400us |
| B). Impedance:
內阻: | < 60mΩ |
| C). Current Consumption.
電流損耗: | |
| a). Operation:
工作: | 30uA |
| b). Static State:
靜態: | ≅0.3uA |



3.2 Environmental Condition

環境條件

A). Operating Temperature Range:

充放电温度范围:

Charge 充电:

0°C ~ +45°C

Discharge 放电:

-20°C ~ +50°C

B). Storage Temperature Range:

存储温度范围:

-20°C ~ +50°C

3.3 At -20~50°C(Discharge) and 0°C~+45°C (Charge) conditions Battery protection performance shall be normal.

電池在-20~50°C（放电），0°C~+45°C（充电）环境温度內，電池保护性能是正常的。

3.4 Parts list

主要元件清單

Item	Designator	Comment	Quantity
1	B+, VM1, B-	镍砖 4x4x0.3mm	3
2	C1, C2, C4, C5, C6, C7, C9, C10, C11, C12	0.1uF X7R 50V 0402C	10
3	C3, C8	0.47uF X7R 10V 0402C	2
4	Q1	BLM8205B TSS0P8	1
5	R1	10K NTC 0603R	1
6	R2, R7	2M 1% 0402R	2
7	R3, R4, R5, R8, R9, R10, R11	100R 1% 0402R	7
8	R6	10R 1% 0402R	1
9	R12, R13	330R 1% 0402R	2
10	R14	0.01 1% 1W 1206R	1
11	R15	2.2K 1% 0402R	1
12	U5	SGM8210-1AXN5G/TR SOT23-5	1
13	U2	TI BQ27542 SON-12	1
14	U3	HY2120-NB SOT-23-6	1
15	PTC	PTC 50A 12V Itrip=7A 1206	1

3.5 Temperature Applicability

溫度適應性

3.5.1 Discharge Performance at High Temperature

高溫放電性能

At 55±2°C conditions, keep the battery for 2hrs, discharge the battery to 5.6V with 0.2C constant current, After keep the battery 2hrs at 20±5°C, then check the appearance of battery. 電池置於 55±2°C 環溫下 2 小時後，以 0.2C 電流恒流放電至 5.6V，再放在 20±5°C 環溫下 2 小時後，確認電池外觀。

---The discharge capacity is above 80% of original capacity. The appearance is no distortion, no explosion, no leakage.

---放電容量是原始容量的 80% 以上。外觀應無變形、無爆炸、無漏液。

3.5.2 Discharge Performance at Low Temperature

低溫放電性能

At $-10 \pm 2^\circ\text{C}$ conditions, keep the battery for 2hrs, discharge the battery to 5.6V with 0.2C constant current, After keep the battery 2hrs at $20 \pm 5^\circ\text{C}$, then check the appearance of battery.

電池置於 $-10 \pm 2^\circ\text{C}$ 環溫下 2 小時，然後以 0.2C 電流恒流放電至 5.60V，再放在 $20 \pm 5^\circ\text{C}$ 環溫下 2 小時後，確認電池外觀。

--- The discharge capacity is above 80% of original capacity. The appearance is no distortion, no explosion, no leakage.

---放電容量是原始容量的 80%以上。外觀應無變形、無爆炸、無漏液。

3.6 ESD

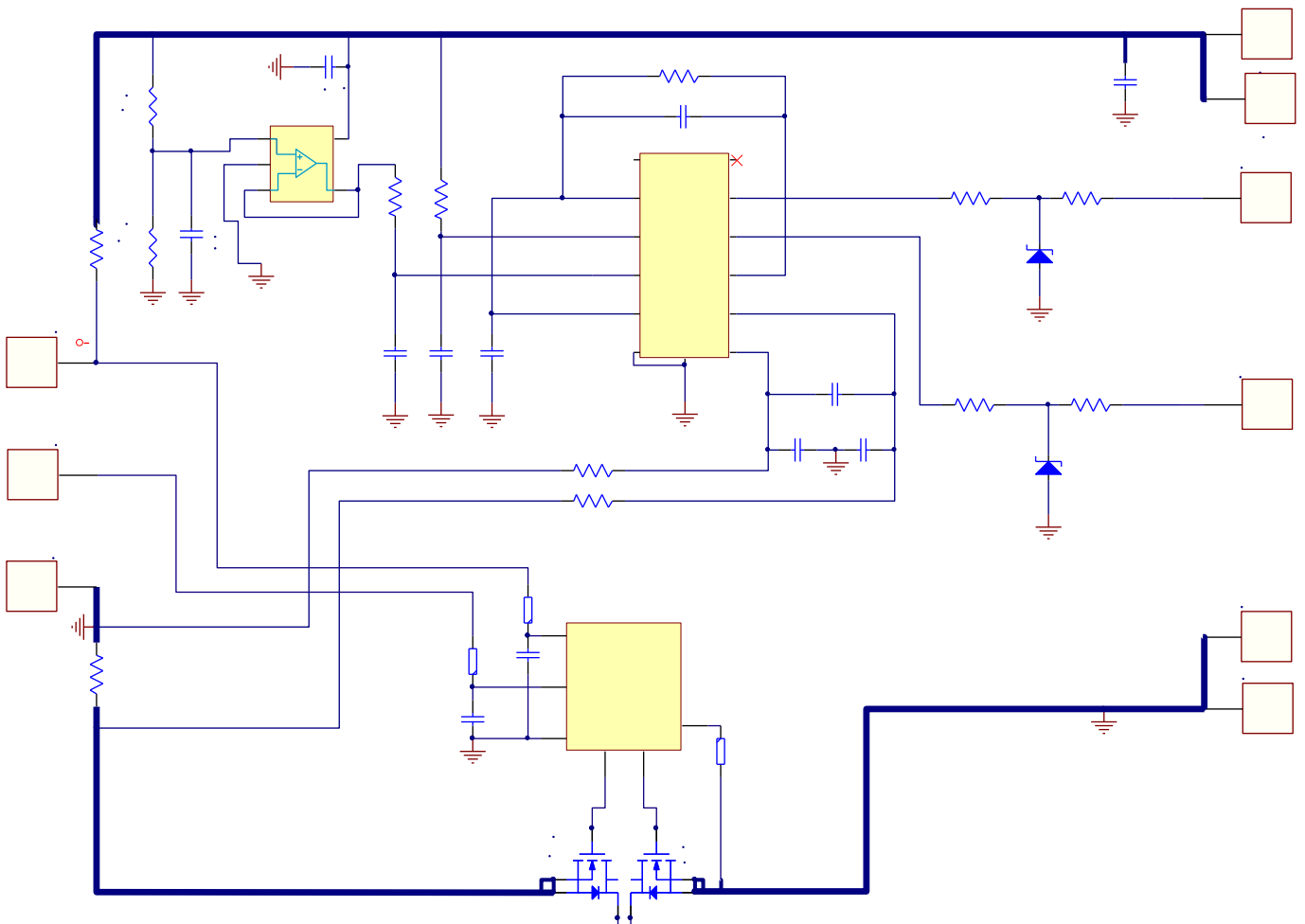
靜電保護

At direct discharge against the pins with $\pm 4\text{kv}$ and over the housing with $\pm 8\text{kv}$. No damages are allowed.

在直接探針接觸放電為 $\pm 4\text{kv}$ ，在空氣中為 $\pm 8\text{kv}$ 。不應有損壞。

3.7 Electric Principle Drawing

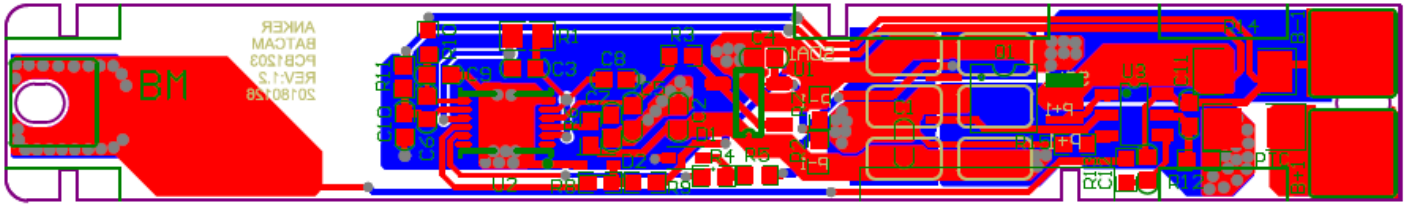
電氣原理圖



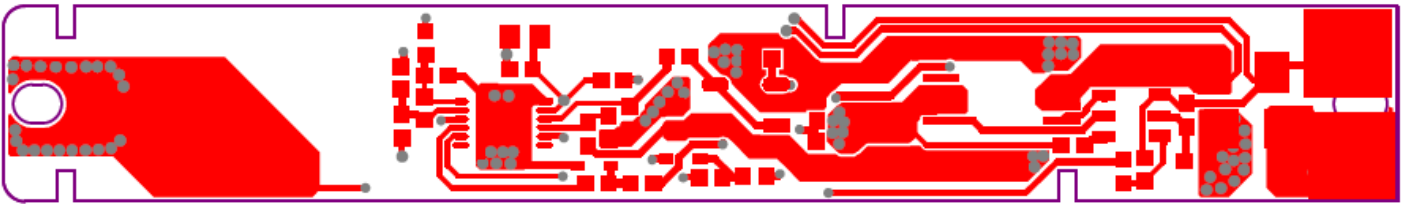
3.8 PCB description

線路板描述

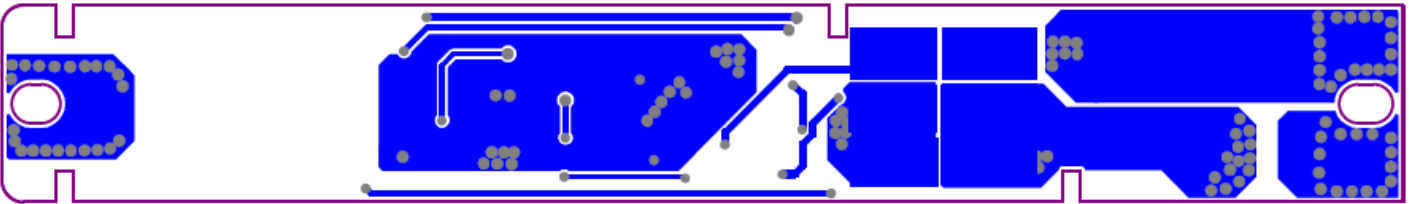
3.8.1 布局图



3.8.2 顶层走线



3.8.3 底层走线





4. Cell Specification

電芯規格: LG 3.63V/3350mAh

4.1 Model: LG LGABF1L1865 3350mAh PB

型號: LG LGABF1L1865 3350mAh PB

4.2 Cell Specification 電芯規格

表三

No. 序號	Items 項目	Specifications 規格	
1	Charge Voltage 充電電壓	4.2V	
2	Nominal Voltage 標稱電壓	3.6V	
3	Nominal Capacity 標稱容量	3350mAh @0.2C Discharge (放電)	
4	Minimum Capacity 最小容量	3250mAh @0.2C Discharge (放電)	
5	Charge Current 充電電流	Standard charge: 0.3C 標準充電: 0.3C Rapid charge: 0.5C 快速充電: 0.5C	
6	Standard Charging Method 標準充電方法	0.3C CC(constant current) charge to 4.2V, then CV(constant voltage 4.2V) charge till charge current decline to $\leq 0.05C$ 0.3C CC (恒流) 充電至 4.2V, 再 CV (恒壓 4.2V) 充電直至充電電流 $\leq 50mA$.	
7	Charging Time 充電時間	Standard charge: 6.0 hours (Ref.) 標準充電: 6.0 小時(參考值) Rapid charge: 3.0 hours (Ref.) 快速充電: 3.0 小時(參考值)	
8	Max. Charge Current 最大充電電流	0.5C	25°C
9	Max. Discharge Current 最大放電電流(連續放電)	1.5C	25°C
10	Discharge Cut-off Voltage 放電截止電壓	2.5V	
11	Operating Temperature 工作溫度	Charging: 0°C ~ 45°C 充電: 0°C ~ 45°C Discharging: -20°C ~ 50°C 放電: -20°C ~ 50°C	
12	Storage Temperature 儲存溫度	-20°C~50°C, 1month	
		-20°C~45°C, 3months	
		-20°C~20°C, 1year	
13	Cell Dimension 電芯尺寸	Diameter: 18.29±0.11mm Height: $\leq 65.05mm$	



4.3 Battery Cell Performance Criteria

電芯性能檢查及測試

4.3.1 Electrical characteristics

電氣性能

表四

No. 序號	Items 項目	Test Method and Condition 測試方法與條件	Criteria 標準
1	Standard Charge 標準充電	Charging the cell initially with constant current at 0.2C and then with constant voltage at 4.2V till charge current declines to 50mA. 先用 0.2C 恒流充電至 4.2V，再恒壓 4.2V 充電直至充電電流 ≤ 50mA。	N. A.
2	Initial Capacity 初始容量	The capacity means the discharge capacity of the cell, which is measured with discharge current of 0.2C with 2.5V cut-off voltage after the standard charge. 該容量是指標準充電後，0.2C 放電至 2.5V 截止電壓所放出的容量。	≧ 3350mAh
3	Cycle Life 循環壽命	Test condition: Charge: 0.3C to 4.2V Discharge: 0.2C to 2.5V 80% or more of 1 st cycle capacity at 0.2C discharge of Operation 測試條件: 充電: 0.2C 充電到 4.2V 放電: 0.2C 放電到 2.5V 當放電容量降至初始容量的 75% 時，所完成的循環次數定義為該電芯的循環壽命	300cycles: ≥ 75%
4	Self-discharge 自放電	After the standard charging, storied the cells under the condition as No.4.3.4 for 30days, then measured the capacity with 0.2C till 3.0V 標準充電後，在 No.4.3.4 條件下貯存 30 天，再以 0.2C 放電至 2.5V 所放出的容量。	Residual capacity > 90% 剩餘容量 > 90%
5	Initial Impedance 初始內阻	Internal resistance measured at AC 1KHz after 50% charge 半充狀態下，測量其 AC 1KHz 下的交流阻抗	≤ 70mΩ (Cell only) (單電芯)
6	Cell Voltage 電芯電壓	As Shipping Status 運輸狀態	3.5V~3.7V



4.3.2 reliability 可靠性

表五

1	Vibration Test 振動測試	After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz an 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes. 將標準充電後的電芯固定在振動臺上，沿 X、Y、Z 三個方向各振動 30 分鐘，振幅 1.6mm，振動頻率為 10Hz~55Hz，每分鐘變化 1Hz。	No leakage、, No fire 無洩漏、不起火
2	Drop Test 跌落測試	The cell is to be dropped from a height of 1.0 meter twice onto wooden concrete ground. 將標準充電後的電芯從 1.0 米高度跌落至木板地面 2 次	No explosion, no fire, no leakage. 無爆炸、起火、洩漏
3	pressure test 挤压测试	When the battery is fully charged, the battery will be placed in the two plane perpendicular to the direction of plate extrusion, extrusion pressure between two plates applied 13.0 kN + 078kN. Once the pressure reaches the maximum value to stop the extrusion experiment, external short-circuit the battery can not be in the process of the experiment. 電池充滿電後，將電池置于兩個平面內，垂直於極板方向進行擠壓，兩平板間施加 13.0 kN± 078kN 的擠壓力。一旦壓力達到最大值即可停止擠壓試驗，試驗過程中電池不能發生外部短路。	The battery should be no fire, no explosion. 電池應不起火、不爆炸。
4	External Short 外部短路	When the battery is fully charged, the battery negative pole terminal short circuit, external short circuit for total resistance (80 + 20) m, the battery short circuit 24h. 電池充滿電後，短路電池組的正負極端子，外部短路總電阻為(80± 20)mΩ，對電池組短路 24h。	The battery should be no fire, no explosion, no leakage. 電池組應不起火、不爆炸、不漏液。
5	重物冲击	將電池組按照 4.3.1 規定的試驗方法充滿電後，將電池置于平台表面，將直徑為 158mm± 02mm 的金屬棒橫置在電池幾何中心上表面，採用質量為 91kg± 01kg 的重物從 610mm± 25mm 的高處自由落體狀態撞擊放有金屬棒的電池表面，並觀察 6h。要求電池沖擊試驗時使其縱軸向與重物表面平行，金屬棒與電池縱軸向垂直。1 個樣品只做一次沖擊試驗。	電池應不起火、不爆炸。
6	温度循环	將電池組按照 4.3.1 規定的試驗方法充滿電後，將電池放置在溫度為 20℃ ±5℃ 的可控溫的箱體中進行如下步驟： a) 將樣品放入溫度為 75℃ ±2℃ 的實驗箱中保持 6h； b) 後將實驗箱溫度降為-40℃ ±2℃，並保持 6h；	電池應不起火、不爆炸、不漏液。



		温度转换时间不大于 30min; c) 再次将实验箱温度升为 75°C ±2°C , 温度转换时间不大于 30min; d) 重复步骤 a~c, 共循环 10 次。	
7	过压充电	将电池组按照 4.3.1 规定的试验方法充满电后, 继续以最大充电电流 3350mAh 恒流充电至 12V, 并保持该电压进行恒压充电 1H。	电池组应不起火、不爆炸、不漏液。
8	欠压放电	将电池组按照 4.3.1 规定的试验方法充满电后, 以其最大放电电流 3350mAh 恒流放电。电池组放电至保护电路动作。放电后静置 10min, 并继续按照 4.3.1 规定的试验方法充满电。	电池组应不起火、不爆炸、不漏液。

4.3.3 Visual Inspection

外觀檢查

There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of the cell.

不允許有任何影響電芯性能的外觀缺陷，諸如裂紋、裂縫、洩漏等。

4.3.4 Standard Environmental Test Condition

標準測試環境

Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition:

Temperature : 20 ± 5° C

Humidity : 65 ± 20% RH

除非特別說明，本標準書中所有測試均在以下環境條件下進行：

溫度： 20° C ± 5° C

濕度： 65 ± 20% RH

4.4 Storage and Others

貯存及其它事項

4.4.1 Long Time Storage

長期貯存

If the Cell is stored for a long time, the cell's storage voltage should be 3.7~4.0V and the cell is to be stored in a condition as No. 4.3.4.

長期貯存的電池(超過3個月)須置於乾燥、涼爽處, 貯存電壓為 3.7~4.0V 且貯存環境要求如 4.3.4

4.4.2 Others

其他事項

Any matters that this specification does not cover should be conferred between the customer and M-POWER.

任何本說明書中未提及的事項，須經雙方協商確定。



6. Safety warning/安全警告

a) Do not dismantle, open or shred secondary cells or batteries.

不要拆卸、打开或粉碎二级电池或电池。

b) In the event of a cell leaking, do not allow the liquid to come into contact with the skin or

eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.

在发生细胞泄漏时，不要让液体接触到皮肤或眼睛。如果已经进行了接触，用大量的水清洗受影响的区域，并寻求医疗建议。

c) Equipment should be designed to prohibit the incorrect insertion of cells or batteries and

should have clear polarity marks. Always observe the polarity marks on the cell, battery and equipment and ensure correct use.

设备的设计应该禁止不正确的插入电池或电池，并且应该有明确的极性标记。始终观察电池、电池和设备的

极性标记，确保正确使用

d) Do not mix cells of different manufacture, capacity, size or type within a battery.

不要在电池中混合不同的制造、容量、大小或类型的电芯。

e) Seek medical advice immediately if a cell or battery has been swallowed.

如果一个电芯或电池被吞下，应立即寻求医疗。