

USB 可充鋰離子電池規格書
SPECIFICATIONS
FOR USB LITHIUM-ION RECHARGEABLE
BATTERY

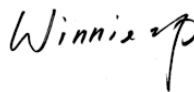
CP4 D-USB
(Micro)

接收人 RECEIVED BY :

制作人 Prepared by



核準人 Approved by



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松柏電池廠有限公司

CHUNG PAK BATTERY WORKS LIMITED

香港寫字樓:香港九龍油塘灣草園街四號華順工業大廈二樓B室

Unit B, 2/F., Wah Shun Industrial Building, 4 Cho Yuen Street, Yau Tong Bay,
Kowloon, Hong Kong

電話 TEL : (852) 27171338

傳真 FAX: (852) 27727727

電子郵件 E-MAIL: cpgsales@chungpak.com

網址 Website: www.vinnic.com

松柏(廣東)電池工業有限公司

CHUNG PAK (GUANG DONG) BATTERY INDUSTRIAL CO.,LTD

廠址: 中國廣東省佛山市順德區陳村鎮佛陳公路紺村路段

Gan Cun Section, Fo Chen Road, Chen Cun County, Shun De District, Fo Shan City, Guang Dong
Province, China

電話 TEL: (86 757) 23312338

傳真 FAX: (86 757) 23312339

電子郵件 E-MAIL: cpgsales@chungpak.com

網址 Website: www.vinnic.com

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USB 可充鋰離子電池 USB Lithium-ion Rechargeable Battery CP4 D-USB

1、範圍 Scope

該規格書適用於由松柏(廣東)電池工業有限公司提供之“Vinnic”商標 CP4 D-USB 可充鋰離子電池。

This specification is applicable to the “Vinnic” brand USB Lithium-ion Rechargeable Battery CP4 D-USB supplied by CHUNG PAK BATTERY WORKS LTD.

2、產品類型 Kind of Products Specified

Vinnic	IEC	ANSI	JIS	其他/Others
CP4 D-USB	R20P, LR20	13A, 13AC	R20P, LR20	D, E95, AM1, MN1300

3、規範性引用文件 / Normative references

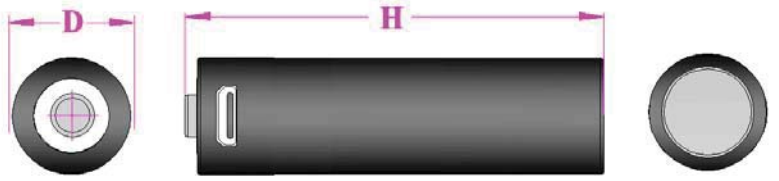
GB31241-2014 《便攜式電子產品用鋰離子電池和電池組安全要求》；

符合 2006/66/EC(EEC)環保要求。

GB31241-2014 《Portable electronic products using lithium-ion batteries and battery packs Safety requirement》

Conform to Directive 2006/66/EC.

4、產品描述 Product description

名稱 Designation	鋰離子電池 Lithium-ion Battery	
型號 Type	CP4	
電池 Battery Pack	D-USB/1.5V	
電芯 Cell	PL17430/1300mAh/3.7V	
保質期限 Shelf period	1 Year	
電芯使用壽命 Shelf life of Cell	1000~3000 次 times	
電池結構 Structure Drawing	D 直徑 Diameter:	$34.20^{+0}_{-1.90}$ mm
	H 高度 Height:	$61.50^{+0}_{-2.00}$ mm
		

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5、技術參數 Technology Parameters

No.	項目 Item	特性 Characteristics	備註 Remark
電芯 Internal Battery Cell			
5.1	標稱容量 Nominal Capacity	1300mAh	0.2C 放電截止電壓 3.0V 0.2C discharge to 3.0V
	最小容量 Minimum Capacity	1300mAh	
5.2	標稱電壓 Nominal Voltage	3.7V	工作電壓 Mean Operation Voltage
5.3	交貨電壓 Delivery voltage	3.75~3.95V	在出廠 10 天內 Within 10 days from Factory
5.4	電池內阻 Cell Internal Impedance	$\leq 70\text{m}\Omega$	半電態下用 1KHZ 交流法測量阻抗 Internal resistance measured at AC 1KHZ after 50% charge
5.5	充電截止電壓 Charge cut-off Voltage	4.20V	標準充電方式 By standard charge method
5.6	放電截止電壓 Discharge cut-off voltage	3.0V	標準放電方式 By standard discharge method
5.7	標準充電方式 Standard charging method	0.2C 恒流到 4.20V, 4.20V 恒壓充至電流 $\leq 0.02\text{C}$, 時間 6.5h(供參考) 0.2C constant current charge to 4.20V, 4.20V constant voltage continue charging till current decline to $\leq 0.02\text{C}$, charge time: 6.5h(Ref)	/
5.8	標準放電方式 Standard discharging method	0.2C 恒流放電至 3.0V 0.2C constant current discharge to 3.0V	/
5.9	最大持續充電電流 Max continuous charge current	0.5C	充電時間 2.5h(供參考) Standard charge, charge time: 2.5h(Ref)
5.10	最大放電持續電流 Max continuous discharge current	0.5C	連續放電模式 For continuous discharge mod
5.11	瞬間放電電流 Instantaneous discharge current	2C	持續 3 秒以內 Last within 3s
5.12	電芯重量(約) Weight(Approx.)	22.5g	/

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(續上表 Continuous)

No.	項目 Item	特性 Characteristics	備註 Remark
電池 Battery Pack			
5.13	標稱容量 Nominal Capacity	3000mAh	放電電流 Discharge resistance: 0.2C 截止電壓 Cut-off voltage: 0.9V
	最小容量 Minimum Capacity	3000mAh	
5.14	標稱電壓 Nominal Voltage	1.5V	
5.15	額定能量 Nominal Energy	4500mWh	
5.16	標準充電方式 Standard discharging method	Micro USB 輸入 5V Micro USB input 5V	
5.17	最高充電電流 Max charge current	500mA	
5.18	最高充電電壓 Max charge voltage	5.5V	
5.19	充電截止電壓 Charge cut-off Voltage	5.5V	
5.20	充電時間 Charge Time	約 2h About 2h	
5.21	最大放電電流 Max discharge current	1.5A	瞬間電流可達 3.6A Instantaneous current to 3.6A
5.22	不同放電方法 Different Discharge Method	≥300min(3000mAh)	恆流放電 Constant current discharge : 0.2C(相當于 2.5Ω/ Equal to 2.5Ω), 24h/d, EV0.9V
5.23	自放電 Self-discharge	≤8%	在 20±2℃ 環境中存放 30 天 Store at 20±2℃ for 30 days
5.24	工作環境溫度 Operation Temperature	充電 Charge : 0~45℃ 放電 Discharge : -10~45℃	濕度 Humidity : 60±25% RH (不建議在超出此溫濕度範圍充放電 Charging and discharging beyond this temperature and humidity range is not recommend)
5.25	儲存溫度 Storage Temperature	小於 1 年 Less than 1 Year: 0~25℃ 小於 3 個月 Less than 3moths: -10~30℃ 小於 1 個月 Less than 1moths: -20~35℃	濕度 Humidity: 60±25% RH
5.26	電池重量(大約) Weight(Approx.)	77.4g	

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6、電池組成 Battery configuration

No.	項目 Item	標準 Standard	備註 Remark
6.1	電芯 Cell	Vinnic PL17430/1300mAh/3.7V	鋰離子電池 Li-ion Battery
6.2	保護板 PCM	D-USB	GTB
6.2	包裝 Package	復合收縮不干膠標籤 Composite shrinkage self-adhesive label	/

7、電池性能測試 Battery Performance Test

7.1 標準測試條件 Standard Testing Condition

測試電池必須是本公司出廠時間不超過 1 個月的電池，且電池未進行過五次以上充放電循環。除非另有規定，本產品規格書規定的測試環境應在以下條件進行：

Test should be conducted with new batteries within one month after shipment from our factory and the cells shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under condition as follows:

溫度 Temperature: $20\pm 5^{\circ}\text{C}$

相對濕度 Relative humidity: $60\pm 25\%\text{RH}$

大氣壓 Atmospheric pressure: 86kPa~106kPa

7.2 測試設備要求 Measuring instruments Requirement

(1) 尺寸測量設備：測量尺寸的儀器精度應不小於 0.01mm。

Dimension Measuring Instrument: The dimension measurement shall be implemented by instruments with accuracy no less than 0.01mm.

(2) 電壓表：國家標準式更靈敏等級，內阻不小於 10KΩ/V。

Voltmeter: Class with national standard or more sensitive class with inner impedance not Less than 10KΩ/V.

(3) 電流表：國家標準式更靈敏等級，外部總體內阻包括電流表和導線應小於 0.01Ω。

Ampere meter: Class with national standard or more sensitive class. Total external resistance Including ammeter and wire is less than 0.01Ω.

(4) 內阻測試方法：採用交流阻抗法(AC 1KHz LCR)；

Internal Impedance Measurement: AC impedance method and the frequency of equipment is (AC 1KHz LCR)；

(5) 所有測試設備，測量儀器需經檢定機構檢驗合格；

Measurement apparatus and instrument shall pass the inspection by Inspection Organization；

(6) 電池測試系統：電流精度應在 $\pm 0.1\%$ 以內，恆壓精度 $\pm 0.5\%$ 以內，計時精度 $\pm 0.1\%$ 以內。

Battery Test system； Current accuracy should be within $\pm 0.1\%$, constant voltage accuracy $\pm 0.5\%$, timing accuracy $\pm 0.1\%$.

(7) 測試溫度：儀表精確度應不低於 $\pm 0.5^{\circ}\text{C}$ 。

Measuring Temperature: Instrument accuracy should not less than $\pm 0.5^{\circ}\text{C}$.

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7.3 標準充放電 Standard charge and discharge

7.3.1 標準充電 Standard Charging (電芯 Cell)

在 $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ ，電池以 0.2C 電流充電，直到電壓至 4.2V，再以 4.2V 恒壓充至電流 $\leq 0.02\text{C}$ ，時間約 6h。
The charger supplies 0.2C current until the voltage down to 4.2V at $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$, and then charged at 4.2V constant voltage until the current $\leq 0.02\text{C}$ for about 6h.

7.3.2 標準放電/ Standard Discharging (電芯 Cell)

在 $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ ，電池以 0.2C 恆流放電至 3.0V。

The discharge supplies 0.2C current until the voltage down to 3.0V at $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$.

7.3.3 標準充電 Standard Charging (電池 Battery)

在 $20\pm 5^{\circ}\text{C}$ ，電池通過 Micro USB 進行充電，充至電池指示燈由紅色閃爍轉為綠色長亮，充電時間大約為 2h。

The battery is charged through Micro USB until the battery indicator changes from blinking red to long green, and the charging time is about 2h at $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$.

7.3.4 標準放電 Standard Discharging (電池 / Battery)

電池通過 0.2C 放電，連續放電至 0.9V，放電時間為 $\geq 300\text{min}$ 。

The discharge supplies 0.2C current and continuous discharged to 0.9V, the discharge time is $\geq 300\text{min}$.

7.4 外觀 Appearance

電池外表面清潔，無電液泄漏，無明顯的刮痕及機械損傷，無變形，無影響電池價值的其他外觀缺陷。

The battery should be clean, no electrolyte leakage, no obvious scratch and technical damages, no deformation, no other appearance defect which may affect value of battery.

8、常規性能測試 Common Performance Test

No.	項目 Item	測試方法和條件 Test Method and Condition	標準 Criteria
8.1	0.2C 容量 0.2C Capacity	在標準測試環境下，即應在 $23\pm 2^{\circ}\text{C}$ 的環境溫度下進行，標準充滿電后，擱置 30 分鐘，然後用 0.2C 電流放電至 0.9V 即電池自行保護，所記錄放電容量；上述實驗可以重複循環 5 次，當有一次達到標準，即達到標準要求。 In the standard test environment, it should be carried out at $23\pm 2^{\circ}\text{C}$ environmental temperature, after the standard fully charged, standby 30 minutes, and then use 0.2C current discharge to 0.9V the battery self-protection, then recorded discharge capacity. The above experiments can be repeated for 5 times, when one reaches the standard, the standard requirements have been met.	$\geq 3000\text{mAh}$

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No.	項目 Item	測試方法和條件 Test Method and Condition	標準 Criteria
8.2	循環壽命 Cycle Performance	在標準測試環境下，即應在 $23\pm 2^{\circ}\text{C}$ 的環境溫度下進行，實驗過程中，每 50 次循環做一次容量檢查，電池或電池組的壽命以 50 的倍數表示；按標準充放電進行循環測試，重複進行 1 次~50 次循環，充放電之間擱置 30 分鐘，直至任一個第 50 次循環放電容量低於 70% 時，按照第 50 次循環的規定在進行一次循環，如果放電容量仍低於 70%，則認為壽命終止。 In the standard test environment, it should be carried out at the ambient temperature of $23 \pm 2^{\circ}\text{C}$. During the experiment, the capacity is checked every 50 times. The life of the cell or battery pack is expressed in multiples of 50. According to the standard charge and discharge cycle test, repeat 1 ~50 cycles, between charge and discharge standby 30 minutes, until the 50th cycle discharge capacity is lower than 70%. According to the the 50th cycle in a cycle, if the discharge capacity is still lower than 70%, it is considered that the end of life.	≥ 500 次 Times
8.3	荷電保持能力 Charged storage Characteristics	在標準測試環境下，即應在 $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 的環境下進行，標準充滿電后，將電池或電池組開路擱置 28d 后，在 $23\pm 2^{\circ}\text{C}$ 的環境下以 0.2C 放電進行放電至終止電壓 0.9V，記錄放電容量。 In the standard test environment, should be carried out in the environment of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$. After the standard fully charged, the cell or battery pack is standby 28 day, and the discharge is carried out at 0.2C discharge at $23 \pm 2^{\circ}\text{C}$ until the end voltage is 0.9V. And recorded the discharge capacity.	放電容量 $\geq 85\%$ 最小容量 Discharge capacity $\geq 85\%$ of Min. Capacity
8.4	溫度特性 Temperature Characteristics	在 $23\pm 2^{\circ}\text{C}$ 的環境溫度下進行標準充電后，在不同溫度，0.2C 恆流放電至 0.9V 測試容量，高溫 55°C 將電池或電池組放入高溫箱中恒 2h，低溫 -10°C 將電池或電池組放入低溫箱中恒溫 4h。 After standard charging at $23 \pm 2^{\circ}\text{C}$, the constant current discharge is 0.2C to 0.9V at different temperatures. And the cell or battery pack is placed in the high temperature box for 2h at 55°C, and the cell or battery pack is placed in the low temperature box for 4h at -10°C.	$-10^{\circ}\text{C} \geq 60\%$ 最小容量 $-10^{\circ}\text{C} \geq 60\%$ of Min. Capacity $25^{\circ}\text{C} \geq 100\%$ 最小容量 $25^{\circ}\text{C} \geq 100\%$ of Min. Capacity $55^{\circ}\text{C} \geq 95\%$ 最小容量 $55^{\circ}\text{C} \geq 95\%$ of Min. Capacity

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9、產品安全測試及機械性(電芯) Safety Test and Mechanical characteristics

No	項目 Item	測試方法及條件 Test Method and Condition	標準 Criteria
1	自由跌落測試 Free fall test	電池按照標準充電條件充滿電，然後從 1m 高度跌落電池到一個木板，隨機跌落三次。 The battery to be fully charged in accordance with standard charge condition, then drop the battery three times from a height of 1m onto a Board. The batteries are dropped so as to obtain impacts in random orientations.	不起火，不泄漏，不爆炸 No Fire, No leakage, No Explosion
2	振動測試 Vibration test	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。 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 and 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes.	不起火，不泄漏，不爆炸 No Fire, No leakage, No Explosion
3	擠壓測試 Crush test	電池按標準充電條件充滿電，放置在兩塊平面金屬板間，持續施加 13KN(17.2Mpa)的壓力，直到液壓油缸施加的壓力達到 13KN(17.2Mpa)時停止。 Fully charged the battery in accordance with standard charge condition, the battery is to be crushed between two flat plates. Continuous to applied force on battery of 13kN(17.2Mpa), stopped until a pressure reading of 17.2Mpa is reached on the hydraulic ram.	不起火，不爆炸 No Fire, No Explosion
4	過充測試 Overcharge test	測試方法：標準充電后，750mA 恆流恆壓將電池充電至 4.6V，時間限制 2.5 小時。 Test method: To charge the standard charged cell with 750mA constant current until cell voltage reaches 4.6V, then be charged at constant voltage of 4.6V while tapering the charge current at 25°C for 2.5hrs.	不起火，不爆炸 No Fire, No Explosion

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10、產品可靠性 Safety Performance For Cell

No	項目 Item	測試方法和判定標準 Test Method and determinant standard
1	High Temperature Characteristics 高溫性能	在 $20\pm5^{\circ}\text{C}$ 條件下，電池按標準充電結束後，將電池放入 $55\pm2^{\circ}\text{C}$ 的恒溫恒濕箱中恒溫 2h 後，然後以 0.2C 電流放電至 0.9V,要求放電時間 $\geq 285\text{min}$ ，且電池外觀無變形、冒煙。 Under the temperature of $20\pm5^{\circ}\text{C}$, after standard charging the battery then put the battery into the constant temperature and humidity oven with $55\pm2^{\circ}\text{C}$ for 2h, then discharge with 0.2C to 0.9V. The discharge time is required $\geq 285\text{min}$ and the battery should no deformation and smoking.
2	Low Temperature Characteristics 低溫性能	在 $20\pm5^{\circ}\text{C}$ 條件下，電池按標準充電結束後，將電池放入 $-10\pm2^{\circ}\text{C}$ 的低溫箱中恒溫 16~24h，然後以 0.2C 電流放電至 0.9V,要求放電時間 $\geq 180\text{min}$ ，且電池外觀無變形、冒煙。 Under the temperature of $20\pm5^{\circ}\text{C}$, after standard charging the battery, then put the battery into the constant temperature and humidity oven with $-10\pm2^{\circ}\text{C}$ for 16~24h, then discharge with 0.2C to 0.9V. The discharge time is required $\geq 180\text{min}$ and the battery should no deformation and smoking.
3	Overcharge Protection Characteristics 過充電保護性能	電池按標準充電充滿電後，再將恒流恒壓源設定為 2 倍標稱電壓、電流，然後加載於電池上 8h,要求試驗過程中電池不漏液、變形、冒煙和爆炸。 After standard full-charging the battery and set 2 times of the nominal voltage and current as constant current and voltage supply, then load it to the battery for 8h. It is required the battery should be no leakage, deformation, smoking and explosion during the test processes.
4	Over-discharge Protection Characteristics 過放電保護性能	在 $20\pm5^{\circ}\text{C}$ 條件下，電池按標準充電充滿電后外接 0.2C 電流負載再放電 24h,要求實驗過程中電池不漏液、起火、冒煙和爆炸 Under the temperature of $20\pm5^{\circ}\text{C}$, after standard charging the battery to 4.20V, then connect the load with 0.2C and discharge for 24h. It is required the battery should be no leakage, fire, smoking and explosion during the test processes.
5	Short-circuit Protection Characteristics 短路保護性能	在 $20\pm5^{\circ}\text{C}$ 條件下，電池按標準充電充滿電後，將電池正負極短路(外接電阻小於 $100\text{m}\Omega$)持續 1h，再將電池正負極斷開，電池進行 USB 且試驗過程中電池不漏液、變形、冒煙和爆炸。 Under the temperature of $20\pm5^{\circ}\text{C}$, after standard full-charging the battery, then make the battery's anode and cathode short-circuit for 1h (the connecting resistance is smaller than $100\text{m}\Omega$) then cut the anode and cathode, after the battery moment are charge with USB, and there should be no leakage, deformation, smoking and explosion during the test processes.
6	Constant Humidity and Temperature Characteristics 恒定濕熱性能	在 $20\pm5^{\circ}\text{C}$ 條件下，電池按標準充電充電結束後，放入 $40\pm2^{\circ}\text{C}$ ，濕度 90~95% 的恒溫恒濕箱內 48h，電池應無明顯變形、漏液、生鏽、冒煙或爆炸，試驗結束後將電池取出擱置 2h 在 $20\pm5^{\circ}\text{C}$ 條件下，以 0.2C 放電至 0.9V，要求放電時間 $\geq 276\text{min}$ 。 Under the temperature of $20\pm5^{\circ}\text{C}$, after standard charging the battery, then put the battery into the constant temperature and humidity oven with $40\pm2^{\circ}\text{C}$ and 90~95% for 48h, the battery should be no obvious deformation, leakage, rust, smoking and explosion. After testing take out the battery the rest for 2h under the temperature of $20\pm5^{\circ}\text{C}$, discharge with 0.2C to 0.9V. The discharge time is required $\geq 276\text{min}$.

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(續上表 Continuous)

No	項目 Item	測試方法和判定標準 Test Method and determinant standard
7	Drop Test 跌落實驗	在 $20\pm5^{\circ}\text{C}$ 條件下，電池按標準充電充滿電後，將電池從 1 米高度自由跌落至厚度為 18~20mm 的硬木板上（X、Y、Z 正負方向 6 個方向每個方向分別朝下跌落一次）電池應不冒煙、爆炸，試驗結束後，將電池進行 0.2C 放電性能測試，要求放電時間 $\geq 300\text{min}$（最多可進行 3 次循環，其中任何一次合格即可停止）。 Under the temperature of $20\pm5^{\circ}\text{C}$, after standard full-charging the battery with 0.2C, then drop it freely from 1 meter height onto the hard board which 18~20mm thick (6 times each of X, Y, Z with positive and negative directions). The battery should be no smoking and explosion, After test discharge the battery with 0.2C, and the discharge time is required $\geq 300\text{min}$ (The battery should be cycled no more than 3 times, among them if one time is passed then stop.).

注：擱置時間如無特殊要求，電池充放電間隔為 30min。

Remark: If there are no special requirements for standby time, the battery charging and discharging interval is 30 minutes.

11、PCM 參數 PCM Parameter

No	項目 Item	標準 Criteria
1	過充電保護電壓 Over-charge Protection Voltage	$4.28\pm 0.025\text{V}$
2	過放保護電壓 Over-discharge protection Voltage	$3.00\pm 0.05\text{V}$
3	放電過流保護電流 Over current protection current	2~6A
4	休眠時消耗電流 Current consumption in sleep mode	$\leq 6.0\mu\text{A}$
5	內阻 Inner resistance	$\leq 80\text{m}\Omega$

12、操作指示及注意事項 Handling Precautions and Guideline

12.1 充電 Charging

12.1.1 充電電流 Charging current

充電電流不得超過本規格書中規定的最大充電電流。使用高於推薦值電流充電將可能引起電池的充放電性能、機械性能和安全性能的問題，並可能會導致發熱或洩漏。

Charging current should be less than maximum charge current specified in the Product Specification. Charging with higher current than recommended value may cause damage to cell electrical, mechanical, and safety performance and could lead to heat generation or leakage.

12.1.2 充電電壓 Charging voltage

充電電壓不得超過本規格書中規定的額定電壓（4.20V/電芯）。4.25V 為充電電壓最高極限，充電器的設計應滿足此條件。

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Charging shall be done by voltage less than that specified in the Product Specification (4.20V/cell). Charging beyond 4.25V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition.

12.1.3 充電溫度 Charging temperature

電池必須在 0℃~45℃ 的環境溫度範圍內進行充電。

The cell shall be charged within 0℃~45℃ range in the Product Specification.

12.1.4 禁止反向充電 Prohibition of reverse charging

正確連接電池的正負極，嚴禁反向充電。若電池正負極接反，將無法對電池進行充電。同時，反向充電會降低電池的充放電性能、安全性，並會導致發熱、洩漏。

Reverse charging is prohibited. The cell shall be connected correctly. The polarity has to be confirmed before wiring. In case of the cell is connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause damaging to the cell which may lead to degradation of cell performance and damage the cell safety, and could cause heat generation or leakage.

12.2 放電 Discharging

12.2.1 放電電流 Discharging current

放電電流不得超過本規格書規定的最大放電電流，大電流放電會導致電芯容量劇減並導致過熱。

The cell shall be discharged at less than the maximum discharge current specified in the Product Specification. High discharging current may reduce the discharging capacity significantly or cause over-heat.

12.2.2 放電溫度 Discharging temperature

電池必須在 -10℃~45℃ 的環境溫度範圍內進行放電。

The cell shall be discharged within -10℃~45℃ range specified in the Product Specification.

12.2.3 過放電 Over-discharging

需要注意的是，在電池長期未使用期間，它可能會因其自放電特性而處於某種過放電狀態。為防止過放電的發生，電池應定期充電，如長期保存建議每三個月充一次電，將其電芯電壓維持在 3.60V~3.70V 之間，以防止電池過放電。

It should be noted that the cell would be at an over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the cell shall be charged every three months to maintain between 3.60V ~3.70V .

過放電會導致電芯性能、電池功能的喪失。

Over-discharging may causes loss of cell performance, characteristics, or battery functions.

充電器應有裝路來防止電池放電至低於本規格書規定的截止電壓。此外，充電器還應有裝路以防止重複充電，步驟如下：電池在快速充電之前，應先以一小電流 (65mA) 預充電 15~30 分鐘，以使電池的電壓達到 3.0V 以上，再進行快速充電。可用一計時器來實現該預充電步驟。如果在預充電規定時間內，電池的電壓仍未升到 3.0V 以上，充電器應能夠停止下一步快速充電，並顯示該電芯/電池正處於非正常狀態。

The charger shall be equipped with a device to prevent further discharging exceeding a cut-off voyage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows: The cell battery pack shall start with a low current (65mA) for 15~30 minutes, i.e. pre-charging, before rapid charging starts. The

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rapid charging shall be started after the (individual) cell voltage has been reached above 3.0V within 15-30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) cell voltage does not rise to 3.0V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

12.3 保護電路模塊 Protection Circuit Module

電芯/電池包裝應配有 PCM 板以正確保護電芯/電池。PCM 板應具有以下功能以保證安全並防止損壞電池性能：(1)過充保護功能 (2)過放保護功能 (3)過流保護功能。

The charger shall be equipped with a device to prevent further discharging exceeding a cut-off voltage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows: The cell battery pack shall start with a low current (65mA) for 15–30 minutes, i.e. pre-charging, before rapid charging starts. The rapid charging shall be started after the (individual) cell voltage has been reached above 3.0V within 15-30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) cell voltage does not rise to 3.0V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

過充保護電壓 Overcharging protection:

當電池中任一電芯的電壓達到 $4.30\pm0.05V$ 時，過充電保護功能應立即啟動並停止充電。

Overcharging protection function shall stop charging if any one of the cells of the battery pack reaches $4.30\pm0.05V$;

過放電保護 Over-discharging protection:

當電池中任一電芯的電壓降至 $2.75\pm0.05V$ 以下時，過放保護功能應起保護作用以避免電芯的深度放電。推薦 PCM 板的靜態電流小於 $0.5\mu A$ ，並具有過放保護功能。該保護功能應即時監控所有電芯；

Over-discharging prevention function shall work to avoid further drop in cell voltage of $2.75\pm0.05V$.

Or less per cell in any cell of the battery pack. It is recommended that the dissipation current of PCM Shall be minimized to $0.5\mu A$ or less with the over-discharging prevention, the protection function shall monitor each bank of the battery pack and control the current all the time.

12.4 貯存 Storage

電池儲存溫度必須在 $-10^{\circ}C \sim 45^{\circ}C$ 的範圍內。

The battery shall be storied within $-10^{\circ}C \sim 45^{\circ}C$ range environmental condition.

長期存儲電池 (超過 3 個月) 須於溫度為 $23\pm5^{\circ}C$ 、濕度為 $65\pm20\%RH$ 的環境中。

The voltage for a long time storage shall be $3.60V \sim 3.70V$ range.

If the battery has to be storied for a long time (Over 3 months), the environmental condition should be: Temperature: $23\pm5^{\circ}C$, Humidity: $65\pm20\%RH$.

貯存電壓為 $3.60V \sim 3.70V$ 。

The voltage for a long time storage shall be $3.60V \sim 3.70V$ range.

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12.5 其他事項 Other Instructions

- 12.5.1 客戶若需要將電池用於超出文件規定以外的設備，或在文件規定以外的使用條件下使用電池，應事先聯繫本公司，因為需要進行特定的實驗測試以核實電池在該使用條件下的性能及安全性。
If the customer needs to use the battery for equipment beyond the provisions of the document, or use the battery under the service conditions beyond the provisions of the document. The company should be contacted in advance because specific experimental tests are required to verify the performance and safety of the battery under such service conditions.
- 12.5.2 對於在超出文件規定以外的條件下使用電池而造成的任何以外事故，本公司概不負責。
The company shall not be responsible for any accident caused by using the battery under conditions beyond those specified in the documents.

12.6 電池注意事項 Handling Instructions

認真閱讀下面的注意事項，確保正確使用鋰離子電池。

Read and observe the following warnings and precautions to ensure correct and safe use of Li-ion batteries.

Caution!

①如果電池漏液後電解液進入眼睛，不要擦拭，應用水沖洗，立即尋求醫療救助。如不及時處理，眼睛將會受到傷害。

If the battery leaks and electrolyte gets in your eyes, do not rub them. Instead, rinse them with clean running water and immediately seek medical attention. If left as is, electrolyte can cause eye injury.

②只能在下述條件下使用電池，否則將會降低電池的性能或縮短電池的使用壽命。

Use the battery only under the following environmental conditions. Failure to do so can result in reduced performance or a shorten service life. Recharging the battery outside of these temperatures can cause the battery to overheat, explode or catch fire.

工作環境 Operating environment:

充電 When charging the battery: 0°C~45°C

放電 When discharging the battery: -10°C~45°C

儲存 30 天 When stored up to 30 days : -20°C~35°C

儲存 90 天 When stored up to 90 days: -10°C~30°C

③在測試或使用電池之前，請仔細閱讀本規格書，以防因操作不當引起電池功能失效、發熱、漏液、起火甚至爆炸。

Please read this specification carefully before testing or using the battery to avoid the battery from failure, over-heat, electrolyte leakage, setting fire or explosion;

④對電池進行充放電測試時，請使用鋰離子電池專用測試設備，嚴禁使用普通恆流恆壓源等不能精確限壓、限流設備對電池進行充放電，以避免電池被過充過放而引起電池功能失效或發生危險；

In charging or discharging, please apply professional testing equipment; no use of general constant current and constant voltage power which is not able to restrict current and voltage to avoid battery failure and dangers;

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⑤對電池充放電或電池裝入設備時，注意不要將電池正負極反置，否則將會使電池發生過充或過放，導致電池嚴重失效甚至發生爆炸等危險。

Please do not put the battery with false direction of "+" "-" when charging or connecting with the equipment; otherwise the product will suffer from over-charging or over-discharging, and will cause battery failure or explosion;

⑥不要直接對電池正負極兩端進行錫焊焊接，嚴禁對電池進行分解；

Don't weld the battery directly, no opening of the battery.

⑦不要把電池同項鍊、髮夾、硬幣或螺絲等金屬品一起放在兜中或包中，也不要將電池同上述物品一起儲存，嚴禁用金屬等導電材料直接連接電池正負極而使電池發生短路；

In order to avoid short circuit, please don't put and store the battery with metal stuff in bag or pocket, for instance, necklaces, coins, barrettes, screws, no connecting directly the "+" and "-" together with metal or other conductive materials.

⑧禁止敲擊、拋或踩踏電池，更不要將電池放入洗衣機或高壓容器內；

No knocking, throwing or trampling the battery, not to mention put the battery in washing machines or high compress vessels.

⑨請勿將電池靠近熱源，如火、加熱器等，不要在烈日下或在溫度超過 60℃ 的條件下使用或存放電池，否則可能會引起電池發熱、起火、爆炸及功能失效等；

Please keep the battery far away from heat source, such as fire, heater; do not store or use the Battery under strong sunshine or high ambient temperature above 60℃, otherwise the battery will set fire, be over heated or failure.

⑩不要將電池弄濕或將電池投入水中，暫不使用時，請放置在低溫乾燥的環境中；

Please do not damp the battery or put it into water; please keep the battery dry and be of low temperature in storage.

⑪使用、測試或存放電池時，如發現電池有變熱、散發氣味、變色、變形或其它反常時，請立即停止使用或測試，設法隔離電池并遠離；

During the period of using, testing or storage, if the battery has been found got hot, expiring abnormal odors, changed color, transformed or in other unusual states, please stop relative handling at once, isolate the battery and keep away from it.

⑫如電池漏液并不慎將電解液濺入眼睛，不要揉擦你的眼睛，立刻用乾淨的水進行沖洗，嚴重情況下請去醫院就醫，如皮膚或衣物濺上電解液，則需馬上用清水沖洗乾淨。

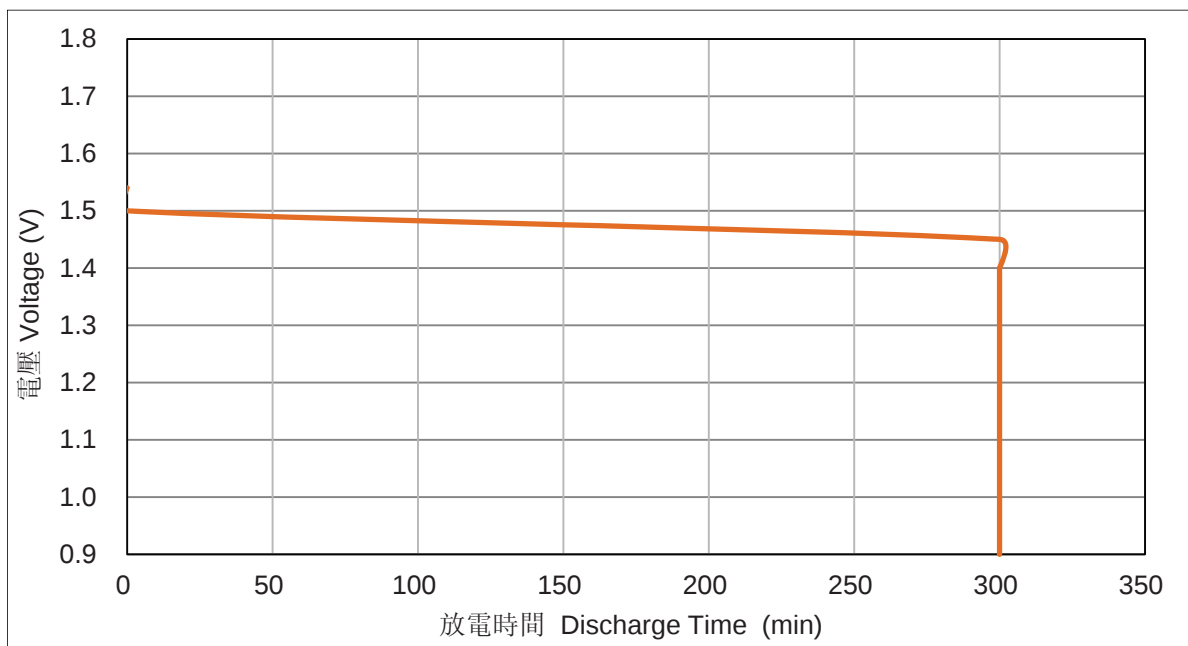
If the battery leaked and the electrolyte split into your eye, don't knead you eye, flush it with clean water at once, go to see a doctor in the case of seriousness; if electrolyte spattered on your skin or clothes, please flush it with clean water.

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13、放電特性曲線圖 Discharge Curve

放電條件 0.2C(相當于 2.5Ω), 終止電壓 0.90V; 測試環境: 20±2℃, 55±20%RH
Discharge Condition: 0.2C (equal to 2.5Ω), EV0.90V; Test Environment: 20±2℃, 55±20%RH

13.1 電池放電 Battery Discharge :



13.2 電芯放電 Cell Discharge:

