Customer/客户:_____

Rechargeable Li-ion Battery Specification
锂离子聚合物电池规格书

Model（产品型号）：792135KR 1S2P

Customer model（客户型号）：_____

	Prepared by 制作	Check up 审核	Approved by 批准
Signature 签名	陈松	Shawn 段少伟	Ivan 余小文
Date 日期	2025-05-08	2025-05-08	2025-05-08

		Check up 审核	Approved by 批准
Customer confirmation 客户确定	Signature 签名		
	Date 日期		

EVE ENERGY CO., LTD

Address: No.38, Hui Feng Road No.7,ZhongKai High Technical Industrial Zone,
Huizhou, Guangdong, China, 516006
TEL：86（0）752-2606966 FAX：86（0）752-2606033

Amendment records
修订记录

Rev No. 版本	Date 日期	Description 修订内容	Approval 批准
A	2024-09-20	First issue (第一次出版)	Ivan
B	2024-11-21	charge Change 4C level charging to 3C direct charging.（第五页充电 4C 阶充 改成 3C 直充增加预充电条件）	Ivan
C	2024-11-21	1.Updated page 7 constant power discharge standard. （更新第七页恒功率放电标准） 2. Updated page 11 Add 0V battery charge inhibition battery voltage.（更新第 11 页 增加 0V 电池充电禁止电池电压）	Ivan
D	2024-12-27	1. Update the circuit diagram printed on the protection board on page 12;（第 12 页保护板印制线路图；） 2. Update the 14-page structure chart and adjust the length, thickness and dimension information after adding trademarks. (页结构图增加商标后长度厚度尺寸信息对应调整；) 3. Update the 15-page product packaging drawing. (更新 15 页产品包装图。)	Ivan
E	2025-02-20	1. Update the size of the finished drawings of the specifications and optimize the handle of the trademark. （更新规格书成品图图尺寸，优化商标带拉手） 2. Lengthen the FPC length, lengthen the FPC softening length by 3mm, and replace the IC with SM5603.（加长 FPC 长度，FPC 软化长度加长 3mm，IC 更换为 SM5603） 3.Update the width size of double-sided tape, adjust the width from 11mm to 13mm（更新双面胶的宽度尺寸，宽度 11mm 调整为 13mm）	Ivan
F	2025-04-11	1. Update the energy from 5.66Wh to 5.65Wh,see page 5&15.（更新能量由 5.66 改为 5.65Wh，详见第 5 和 15 页。 2. Change the FPC length from 30.42 to 27.92mm, see page 13.（保护板 FPC 长度由 30.42 修改为 30.92mm，详见第 13 页）。 3. Add the FPC positioning dimensions 4±0.5mm and 30.48 ± 0.6 mm, see page 15.（增加 FPC 位置尺寸 4±0.5mm 和 30.48±0.6 mm，详见第 15 页）。	Ivan

Amendment records
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		4. Add the Label drawing & Package drawing see page15& 16. (增加商标图和包装示意图，详见第 15 、16 页）。 5. Change double-sided tape from 3M96298 to 3M9448AB, see page 15. (双面胶 3M96298 变更为 3M9448AB，详见第 15 页)。	
E	2025-05-08	Update the Label drawing,update the BSMI,BIS,KC certification number（更新商标图，更新 BSMI，BIS，KC 认证号）	Ivan

Catalogue
目录

1. Scope（适用范围）

This product specification describes the technique requirements, test procedure and precaution notes of lithium-ion polymer battery to be supplied to customer by EVE ENERGY CO., LTD

本规格书适用于本书中所提及的惠州亿纬锂能股份有限公司制造的电池。

2. Model（产品型号）

792135KR 1S2P

3. Product specification（产品技术规格）

Table 1（表 1）

No.	Item 项目	General parameter 常规参数	Note 备注
1	Typical capacity 典型容量	1500mAh	Standard capacity measure method: 0.2C_{min} constant current charge to 4.48V, then constant voltage 4.48V charge till charge current decline to 0.02C_{min}, then 0.2C_{min} discharge to 3.00V at 25±3℃. 标准容量测试方法：在 25±3℃下 0.2C_{min} 恒流恒压充电 4.48V，截止电流 0.02C_{min}。0.2C_{min} 放电至 3.00V。
	*Rated capacity(C_{min}) 额定容量 (C_{min})	1450mAh	
	Energy 能量	5.65Wh	
2	Nominal voltage 额定电压	3.89V	
3	*AC impedance resistance 内阻	≤95mΩ	
4	End of discharge voltage 放电截止电压	3.00V	
5	Limited charge voltage 充电限制电压	4.48V	
6	Standard charge current 标准充电电流	0.2C_{min}	
7	Max. charge current 最大充电电流	4.0C_{min}	
8	Max. continue discharge current 最大放电电流	4.0C_{min}	
9	Weight 重量	Approx.23.7g	

Continuous the table 1

No.	Item 项目	General parameter 常规参数	Note 备注
10	Charge method 充电方式	Operation temperature 工作温度	Charge current 充电电流
		0℃～15℃	0.2C_{min} Max. constant current charge to 4.48V, then 4.48V constant voltage charge to 0.02$C_{min.}$ 最大 0.2C_{min} 恒流充电至 4.48V，然后 4.48V 恒压充电至 0.02C_{min} 截止。
		15℃～45℃	Charge: 3.0Cmin constant current to 4.48V, 0.02Cmin cutoff. 充电： 3.0Cmin 恒流充电至 4.48V 0.02Cmin 截止
		45℃～60℃	4.0C_{min} Max. constant current charge to 4.10V, then 4.10V constant voltage charge to 0.02C_{min} 最大 4.0C_{min} 恒流充电至 4.10V 再 4.10V 恒压充电至 0.02C_{min} 截止。
11	Precharge method 预充电方式	0℃～60℃	0.02Cmin Max. constant current charge to 2.8V; 0.2Cmin Max. constant current charge to 3.0V 最大 0.02C 恒流充电到 2.8V，最大 0.2C 恒流充电到 3.0V
11	Allowable temperature and humidity range 允许温度和湿度范围	0℃～60℃	Charge temperature range 充电温度范围
		－20℃～70℃	Discharge temperature range 放电温度范围
		－5℃～45℃ Less than 1 month 少于一个月	Storage voltage 3.70~4.00V 存储电压 3.70~4.00V Storage humidity 30%~75%RH 存储湿度为 30%~75%RH
		－5℃～35℃ Less than 3 months 少于三个月	
		15~30℃ Over 3 months 三个月以上	
12	Shipment voltage 出货电压	3.80~4.00V	

4．Performance and test conditions (电池性能及测试条件)

4.1 Standard test conditions（标准测试条件）

Test should be conducted with new batteries within one week after shipment from our factory and the batteries should not be cycled more than five times before the test.

测试电池必须是本公司出厂时间不超过一个星期的新电池，且电池未进行过五次以上充放电循环。

Statement 1): Unless otherwise specified, all tests stated in this product specification are conducted at below conditions:

Temperature: 20±5℃

Humidity: 30%~75%RH

声明 1)：除非其它特殊要求，本产品规格书规定的测试条件为：温度 20±5℃，相对湿度 30%~75%。

Statement 2): Throughout this specification, numeric criteria annotated by ”*” means such criteria are only applicable to fresh unused product within 30 days manufactured by EVE. Products either have been used or stored for a period longer than 30 days by customer or its customer may exhibit an inferior numeric parameter than such criteria. Customer agrees that such occurrence does not constitute non-conformance of specification.

声明 2)：在此份规格书中，带“*”注解的数值标准表示这些标准只适用于由 EVE 生产的在 30 天以内未使用的新产品。客户或者客户的客户已经使用过或者存储超过 30 天的产品也许会出现比这些标准低的数值参数。客户同意这种情况下是不会出现与规格书参数不一致问题。

4.2 Measuring instrument or apparatus（测量器具及设备）

4.2.1 Dimension measuring instrument 尺寸测量工具

The dimension measurement shall be implemented by instruments with equal to or more precision scale than 0.02mm.

尺寸测量器具的精度等级应不小于 0.02 mm 。

4.2.2 Voltage measurement 电压测试

The voltage measurement shall be implemented by instruments with equal or more precision scale of 0.001V

测量电压的仪器精度应高于或等于 0.001V。

4.2.3 Ammeter（安培计）

Standard class specified in the national standard or more sensitive class. Total external Resistance including ammeter and wire is less than 0.01Ω.

按照国家标准指定规格等级或采用灵敏度更高的，包括电流表及电线在内的总外阻应小于 0.01Ω。

4.2.4 Impedance measurement 内阻测试

The impedance measurement shall be implemented by instruments with equal or more precision scale of 0.1mΩ.

测量内阻的仪器精度应高于或等于 0.1mΩ。

4.3 Appearance（外观）

There shall be no such defects as scratch, crack, rust, leakage, which may adversely affect commercial value of battery.

电池应无划痕、裂纹、腐蚀、泄漏等影响电池商业价值的外观缺陷。

4.4 Temperature dependence of discharge capacity（放电温度特性）

Standard charge at 25±3℃, and then cool down or heat up to test temperature within 30 minutes. Rest the battery at this temperature for 2 hours, and then use 0.2C_{min} to discharge to 5.60V at different temperature. After the test for one temperature is completed, rest the battery at room temperature for 2 hours and then conduct the standard charge(@25±3℃). The test requirement is as follows:

电池在 25±3℃标准充电，然后在 30 分钟内冷却或加热到测试温度。放电前电池在此温度下保持 2 小时，在不同温度下的放电为表格中要求功率放电至 3.00V，做完一个温度实验后，电池在室温下放置 2 小时然后进行标准充电（25±3℃），要求如下：

Table 2（表 2）

Discharge temperature（放电温度） Discharge power 放电功率	－20℃ 10W	－10℃ 10W	0℃ 18W	25℃ 18W	70℃ 10W
Requirement 要求	≥50%C_{min}	≥70%C_{min}	≥85%C_{min}	≥95%C_{min}	≥95%C_{min}

4.5 Charged storage characteristics 荷电保持能力

Table 3（表 3）

Item 项目		Test Method 测试方法	Requirement 要求
Storage characteristics 1 贮存特性 1	1	The capacity of 0.2C_{min} shall be measured after standard charge. The battery is stored at 20±5℃ for 30 days after standard charge. 标准充电后测试电池 0.2C_{min} 放电容量。然后在标准充电后，将电池在 20±5℃的环境中贮存 30 天。	Remaining capacity ≥85%C_{min} 容量保持≥85%C_{min}
	2	The remaining capacity of 0.2C_{min} shall be measured after storage, then test the max. discharge capacity with 0.2C_{min} discharge for three consecutive cycles (recovery capacity). 测试过上述条件的保持容量后，再测试电芯 0.2C_{min} 放电循环 3 次的最大放电容量（恢复容量）。	Recovery capacity ≥90%C_{min} 容量恢复≥90%C_{min}
Storage characteristics 2 贮存特性 2	1	The capacity of 0.2C_{min} shall be measured after standard charge. The battery is stored at 60±2℃ for 7 days after standard charge. 标准充电后测试电池 0.2C_{min} 放电容量。然后在标准充电后，将电池在 60±2℃的环境中贮存 7 天。	Remaining capacity ≥70%C_{min} 容量保持≥70%C_{min}

Continuous the table 3

Storage characteristics 2 贮存特性 2	2	The remaining capacity of 0.2C_{min} shall be measured after storage, then test the max. discharge capacity with 0.2C_{min} discharge for three consecutive cycles (recovery capacity). 测试过上述条件的保持容量后，再测试电芯 0.2C_{min} 放电循环 3 次的最大放电容量（恢复容量）。	Recovery capacity ≥85%C_{min} 容量恢复≥85%C_{min}
Storage Characteristics3 贮存特性 3	1	The production date of experimented battery must within 3 months. After about charging 40%～50% capacity after a period of storage at 20 ±5℃ for one year (365 days).Then 0.2C_{min} discharge three times at 25±3℃. The capacity is determined with the capacity of the by the most of preceding three cycles. 进行该项实验的电池应选生产日期到实验日期 3 个月内的电池，贮存前给电池充入 40%～50%的容量，然后在 20±5℃开路搁置 1 年（365 天），在 25±3℃的环境条件下 0.2C_{min} 循环 3 次，测试恢复容量（3 周循环的最大放电容量）	Recovery capacity ≥85%C_{min} 容量恢复≥85%C_{min}

5 Cycles life (循环寿命)

Table 4（表 4）

Item 测试项目	**Test method 测试方法**	**Requirement 要求**
Cycle test 循环测试	Charge/Discharge following the steps below. 按照以下步骤进行充放电 1Charge: 3.0Cmin constant current to 4.48V, 0.02Cmin cutoff. 充电： 3.0Cmin 恒流充电至 4.48V 0.02Cmin 截止 2）Rest for 10 minutes. 静置 10 分钟 3）Discharge: 4.0C_{min} discharge to 3.00V 放电：4.0C_{min} 至 3.00V 4）Rest for 10 minutes. 静置 10 分钟 5）Repeat from 1) to 4). 重复 1）至 4）步骤 ※ Temperature: 25±3℃. 温度 25±3℃	After 300 cycles：the Capacity Retention≥80% 300 周循环后： 容量保持率≥80%

6 Cell mechanical characteristics and safety test（电芯安全测试及机械特性）

Table 5（表 5）

No.	Item 项目	Test method 测试方法	Requirement 要求
1	Drop test 跌落测试	After standard charge, drop the battery freely from the height of 1 meter (3.28ft) onto a concrete surface, and each battery should fall once along the positive and negative directions of the three mutually perpendicular axes, 6 times in total, and then rest the battery for 1 hour. Measure the OCV and impedance, and then 0.2C_{min} discharge to 3.00V at 25±3℃. 标准充电后，电池从 1 米（3.28 英尺）的高度自由跌落到水泥地面上；每个电池将沿着三个互相垂直轴的正负方向跌落 1 次，总共跌 6 次，然后静置 1 小时，测量开路电压、内阻，然后 25±3℃下以 0.2C_{min} 恒流放电至 3.00V。	No fire, no explosion. 无起火，无爆炸
2	RT short-circuit test 常温短路测试	After standard charge, the battery is short-circuited by using the copper wire with a resistance of 80±20mΩ at 20±5℃. The test is terminated when either the battery surface temperature decreases to 20% lower than the peak value, or the short circuit time reaches to 24 hours. 电池标准充电后，在 20℃±5 ℃下用电阻为 80±20mΩ 的铜导线短接，当出现以下两种情形之一时，试验终止： a）电池表面温度下降到比峰值低 20%； b）短接时间达到 24 小时。	No explosion, no fire. 不爆炸，不起火，
3	High temperature short-circuit test 高温短路测试	After standard charge, the battery is short-circuited by using the copper wire with a resistance of 80±20mΩ at 57±4℃. The test is terminated when either the battery surface temperature decreases to 20% lower than the peak value, or the short circuit time reaches to 24 hours. 电池标准充电后，在 57℃±4 ℃下用电阻为 80±20mΩ 的铜导线短接，当出现以下两种情形之一时，试验终止： a）电池表面温度下降到比峰值低 20%； b）短接时间达到 24 小时。	
4	Heating test 热冲击测试	Put the battery into the heating chamber, in which the temperature is to rise to 130±2℃ at the rate of (5±2℃)/min and keep for 30 minutes. 电池放于热箱中，温度以（5±2℃）/min 的速率升至 130±2℃并保温 30 分钟。	No fire, no explosion. 不起火，不爆炸

Continuous the table 5

5	Over-charging test 过充电测试	After 0.2C_{min} discharge to 3.00V, the battery is connected in series to a constant current and constant voltage source. The voltage is adjusted to 4.68V, and the current is adjusted to 3.0C_{min}, and then the battery is charged for 2.5 hours. 以 0.2C_{min} 放电 3.00V 以后，电池连接上恒流恒压源，电压调节为 4.68V，电流调节为 3.0C_{min}，然后对电池充电 2.5 小时。	No fire, no explosion 不起火，不爆炸
6	Forced discharge test 强制放电测试	After 0.2C_{min} discharge to 3.00V, then 1.0C_{min} reverse charge for 90min. 以 0.2C_{min} 放电 3.00V 以后，以 1.0C_{min} 电流反向充电 90min.	No fire, no explosion 不爆炸，不起火
7	Vibration test 振动测试	After standard charge, fix the battery on a vibration table and vibrate for 90 minutes along each of the X, Y, Z directions with amplitude of 1.6mm and the vibration frequency between 10Hz and 55Hz, with a change of 1Hz per minute. 将标准充电后的电芯固定在振动台上，沿 X、Y、Z 三个方向各振动 90 分钟，振幅 1.6mm，振动频率为 10Hz~55Hz，每分钟变化 1Hz。	No fire, no explosion, no leakage 不起火，不爆炸，不漏液
8	Constant humidity and temperature characteristics test 恒定湿热测试	After standard charge, the battery is stored in a 40±2 ℃ oven with humidity of 90~95% for 48 hours. After storage, take the battery out from the oven and rest it for 2 hours, the battery should have no obvious deformation, leakage, rust, smoking and explosion , then 0.2C_{min} discharge to 3.00V at 25±3℃. 标准充电后，将电池放入 40±2℃、湿度 90～95%的恒温恒湿箱内搁置 48 小时，试验结束后将电池取出搁置 2 小时,电池应无明显变形、漏液、腐蚀、冒烟或爆炸，然后在 25±3℃条件下，以 0.2C_{min} 放电至 3.00V。	No fire, no explosion, no leakage, discharge capacity ≥60%C_{min} 不起火、不爆炸、不漏液、放电容量≥60%C_{min}
9	Low pressure test 低气压测试	The battery is stored at an atmospheric pressure of 11.6kPa and a temperature of 25±3℃ for 6 hours. 电池置于大气气压在 11.6kPa 和温度在 25±3℃中 6 小时。	No fire, no explosion, no leakage 不起火，不爆炸，不漏液

7. Protection circuit module: （保护板电性能参数） Ta =25℃

Table 6（表 6）

No.	Item 项目	Min 最小值	Typ 典型值	Max 最大值	Note 备注
1	Overcharge detection voltage 过充电检测电压(V)	4.535	4.550	4.570	
2	Overcharge detection delay time 过充检测延时时间(S)	0.80	1.00	1.20	
3	Release voltage of overcharge 过充电保护释放电压(V)	4.320	4.350	4.38	
4	Over discharge detection voltage 过放电检测电压(V)	2.450	2.500	2.550	
5	Over discharge detection delay time 过放电检测延时时间(mS)	76.8	96.0	115.2	
6	Over discharge detection release voltage 过放保护释放电压(V)	2.850	2.900	2.950	
7	Charge over current detection current 充电过流保护电流(A)	7.0	9.5	13.0	
8	Charge over current detection delay time 充电过流延时(mS)	6.4	8.0	9.4	
9	Discharge over current protection current 放电过流保护电流(A)	7.0	9.5	13.0	
10	Discharge over current detection delay time 放电过流延时(mS)	12.8	16.0	19.2	
11	Current Consumption in Normal 正常自耗电(μA)	-	150	200	
12	Current Consumption in sleep 休眠自耗电(μA)	-	55	100	
13	Current Consumption in fullsleep 深度休眠自耗电(μA)	-	25	40	
14	Short-circuit protection delay 短路保护电流(A)	20	37	50	
15	Short-circuit protection delay 短路保护延迟时间（uS）	200	350	500	
16	0V battery charge inhibition battery voltage 0V 电池充电禁止电池电压（V）	0.5	1.0	1.5	

8. Protection circuit schematic （保护板电路原理图）

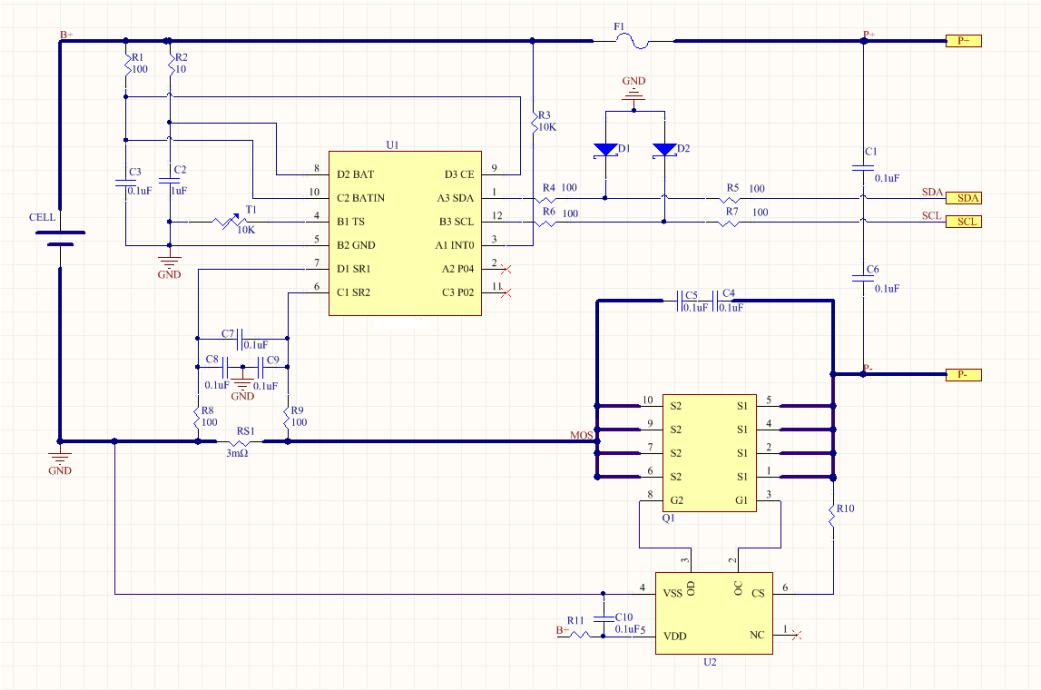


Figure 1 (图 1)

9. PCB diagram（印制线路图）

9.1 Component layout is shown in figure 2（元器件布局图，见图 2）

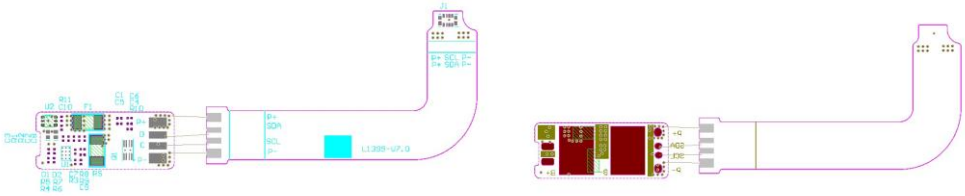
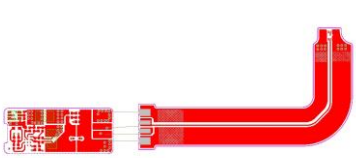


Figure 2 (图 2)

9.2 Signal layout are shown in figure 3 and figure 4(布线层如图 3 和图 4 所示)



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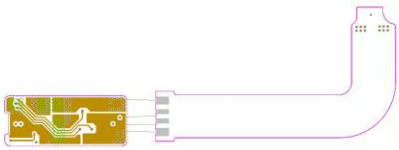
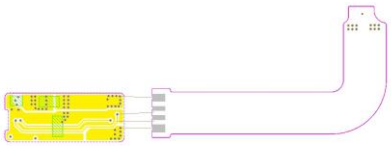
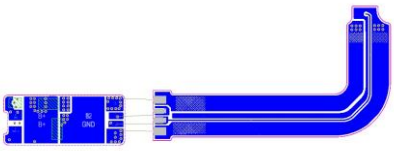


Middle 1



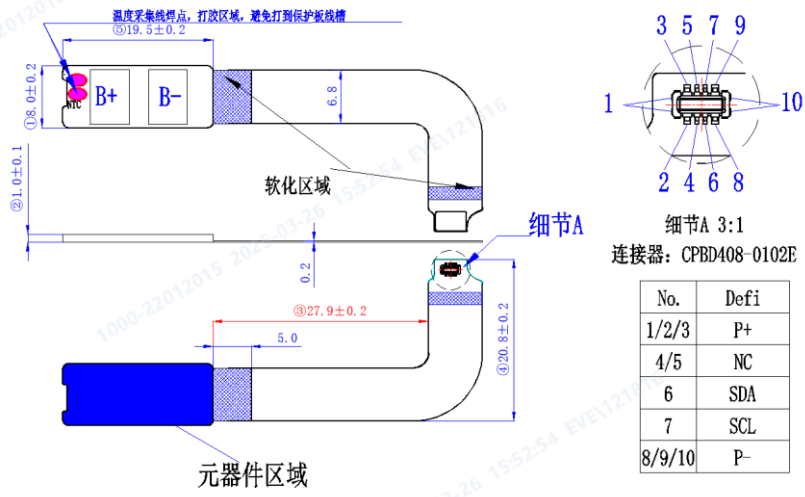
Middle 2



Bottom

10. PCB dimension drawing （PCB 尺寸结构图）

Unit（单位）：mm



No.	Defi
1/2/3	P+
4/5	NC
6	SDA
7	SCL
8/9/10	P-

Figure 5 (图 5)

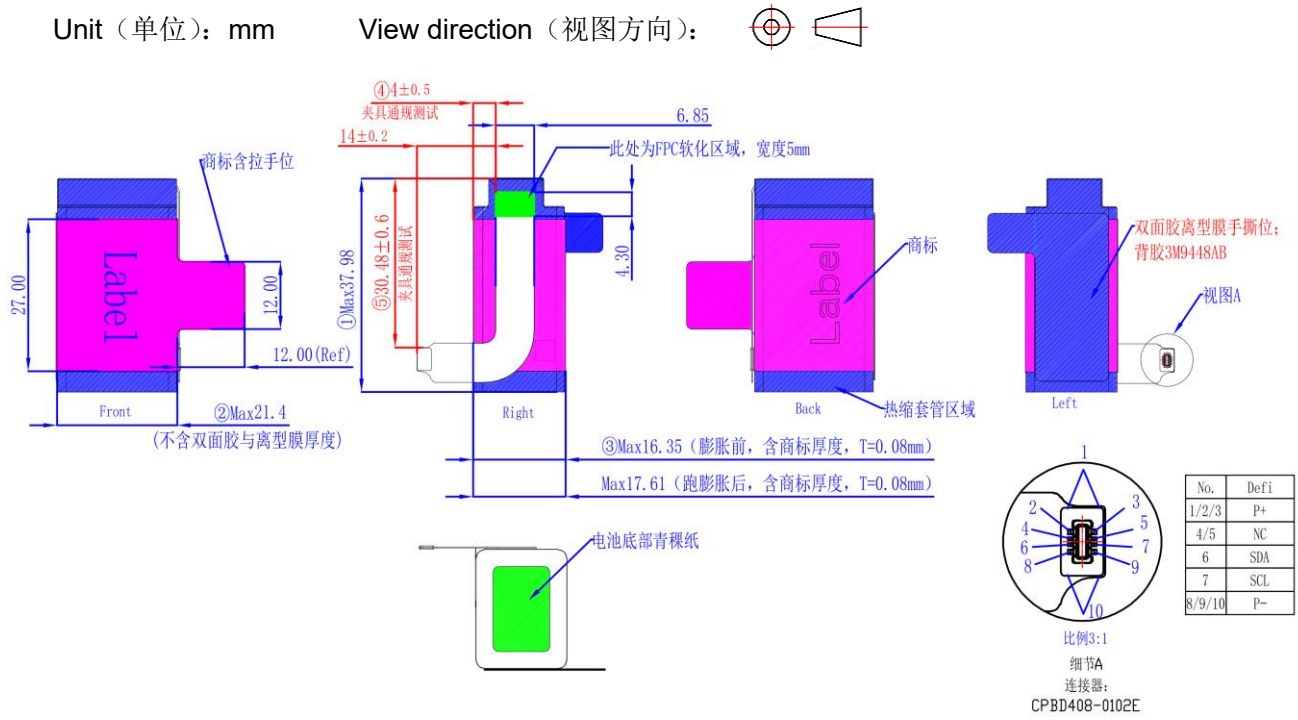
11. PCM BOM （保护板 BOM）

Table 7（表 7）

No.	Description/vendor/HSF demand （物料名称）	Model/Spec. （型号/规格）	Unit （单位）	Q'ty （用量）	Symbol （备注）
1	PCB	19.5*8.0*1.0mm,FR4,1.5OZ，4 层	PCS	1	
2	FPC	34.92*6.85*0.15, FPC	PCS	1	
3	Gauge IC 电量计 IC	SM5603, CSP12,芯迈	PCS	1	U1
4	Protection IC 保护 IC	HY2510ZB-H3G, SON-1.6*1.6-6L, HYCON	PCS	1	U2
5	MOS	CJ8208SP-A, JSCJ	PCS	1	Q1
6	Resistor 贴片电阻	100Ω ±5% ,0201	PCS	7	R1,R4-R9,R11
7	Resistor 贴片电阻	10Ω ±5% ,0201	PCS	1	R2
8	Resistor 贴片电阻	10KΩ ±5% ,0201	PCS	1	R3
9	Resistor 贴片电阻	2KΩ ±5% ,0201	PCS	1	R10
10	Resistor 合金贴片电阻	3mΩ ±1% ,1W,1206	PCS	1	Rs
11	Capacitor 贴片电容	0.1UF±20% ,10V, 0201，X7R	PCS	9	C1,C3-C10
12	Capacitor 贴片电容	1UF±10% ,16V,0201,X5R	PCS	1	C2
13	TVS 管	ESDUEL5V0B1，DFNWB1.0×0.6-2L	PCS	2	D1,D2
14	FUSE	F12T20-E，1206，竞沃	PCS	1	F1
15	NTC	蝌蚪状 NTC,10KΩ ±1% ,B=3435	PCS	1	T1
16	Nickel sheet 镍片	5.0*7.0*0.3mm,纯镍	PCS	2	B+,B-
17	连接器	CPBD408-0102E，SMK	PCS	1	J1

12. Product construct drawing: （产品结构图）

Unit（单位）：mm　　View direction（视图方向）：



No.	Defi
1/2/3	P+
4/5	NC
6	SDA
7	SCL
8/9/10	P-

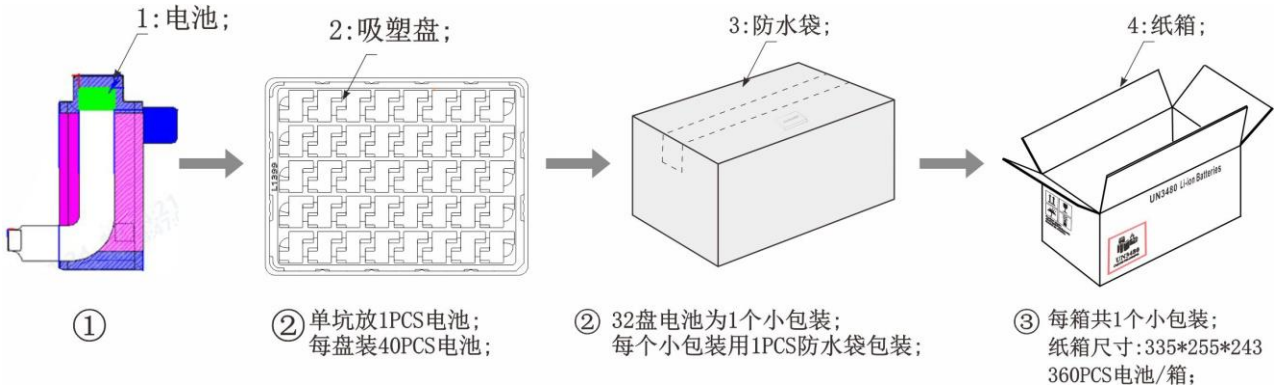
Label drawing: （标签图）

生产日期随实际变换，由PMC提供
二维码尺寸:3.5*3.5(±0.5mm)
二维码规则：

792135KR 1S2P4B2700001

- 流水号，由00001~99999递增，同一生产时间不可重码；
- 生产日期；
- 生产月份；1-9代表1月-9月，A、B、C代表10-12月；
- 生产年份，4代表2024年，5代表2025年...以此类推；
- 产品型号，固定不变；

13. Package drawing: (产品包装图)



① ②单坑放1PCS电池;
每盘装40PCS电池;
② 32盘电池为1个小包装;
每个小包装用1PCS防水袋包装;
③ 每箱共1个小包装;
纸箱尺寸:335*255*243
360PCS电池/箱;

14. Battery user instructions 电池使用指南

Read and observe the following warnings and precautions to ensure correct and safe use of Li-ion polymer batteries. EVE ENERGY CO., LTD will not be responsible for any problems caused by violating the following precautions.

认真阅读下面的警告信息和注意事项，确保正确安全使用锂离子聚合物电池。惠州亿纬锂能股份有限公司对违反下述注意事项而产生的任何问题不予负责。

Danger! 危险！

Failure to observe the following precautions may result in battery leakage, overheating, explosion or fire.

不遵守以下预防措施可能导致电池泄露、过热、爆炸或起火。

— Do not immerse the battery in water or allow it to get wet.

— 勿将电池投入水中或将其弄湿；

— Do not use or store the battery near sources of heat such as a fire or heater.

— 勿在热源（如火或加热器）附近使用或贮存电池；

— Do not use any chargers other than those recommended by EVE.

— 请不要使用 EVE 推荐以外的充电器；

— Do not reverse the positive (+) and negative (-) terminals.

— 勿将正负极接反；

— Do not connect the battery directly to wall outlets or car cigarette-lighter sockets.

— 勿将电池直接连接到墙上插座或车载点烟式插座上；

— Do not put the battery into a fire or apply direct heat to it.

— 勿将电池投入火中或给电池加热；

— Do not short-circuit the battery positive (+) and negative (-) terminals by connecting wires or other metal objects.

— 禁止用导线或其它金属物体将电池正负极短路；

— The soldering temperature must be lower than 390℃, and no longer than 3seconds.

— 焊接温度不超过 390℃，时间不超过 3 秒；

— Do not carry or put the battery together with necklaces, hairpins or other metal objects.

— 禁止将电池和项链，发夹和其它金属物品放置在一起。

— Do not put the battery near a fire or in extremely hot conditions.

— 禁止将电池置于明火附近或极热条件下。

Warning! 警告！

Failure to observe the following precautions may result in battery leakage, overheating, explosion or fire.

不遵守以下预防措施可能导致电池泄露、过热、爆炸或起火。

— Do not place the battery in a microwave oven or pressurized container.

— 禁止将电池置入微波炉或压力容器中；

— Do not use the battery in combination with primary batteries (such as dry-battery batteries) or batteries of different capacity, type or brand.

— 禁止与一次电池（如干电池）或不同容量、型号、品种的电池组合使用；

— Do not use the battery when the battery emits peculiar smell, heating and physical vibration.

— 禁止在电池发出异味、发热、物理振动情况下使用电池；

— Do not pierce the battery casing with a nail or other sharp object, break it open with a hammer, or step on it.

— 禁止用钉子或其它尖锐物体刺穿电池壳体，禁止锤击或脚踏电池；

— Do not directly solder the battery terminals.

— 禁止直接焊接电池端子；

— Do not attempt to disassemble the battery in any way.

— 禁止以任何方式分解电池；

— Do not recharge the battery when it is discolored or deformed, or appears abnormal in any way. If the battery is in use or being recharged, remove it from the device or charger immediately and discontinue the use.

— 如果电池发出变色、变形或出现其它任何异常现象时不得使用，如果电池正在使用或充电，应立即从用电器中或充电器上取出并停止使用；

— Keep the batteries out of the reach of children. If a child somehow swallows a battery, seek medical attention immediately.

— 电池应放在小孩接触不到的地方，如果小孩不小心吞咽电池 应立即寻求医疗救助；

— If the battery leaks or emits an odor, immediately remove it from the proximity of any exposed flame. The leaking electrolyte can ignite and cause a fire or explosion.

— 如果电池泄漏或发出异味，应立即将其从接近明火处移开；泄漏的电解液可能引起火灾或爆炸；

— 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.

— 如果电池漏液后电解液进入眼睛，不要擦，应用水冲洗，立即寻求医疗救助。如不及时处理，眼睛将会受到伤害。

Caution! 注意！

Do not use or store the battery where is exposed to extremely hot, such as under window of a car in direct sunlight in a hot day. Otherwise, the battery may be overheated. This can also reduce battery performance and/or shorten service life.

不要将电池放在极热的地方使用或储存，例如在炎热的天气里，在阳光直射下的车窗下。否则，电池可能过热。这也会降低电池性能和/或缩短使用寿命。

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

只能在规定的温度下使用电池。否则会导致性能降低或使用寿命缩短。在这些温度之外给电池充电会导致电池过热、爆炸或着火。

The insulating measures are needed between the battery (the bare Al layer at side and top sealing) and the PCM, and also between the battery and the electric equipment: especially pay attention to avoid the Al layer in packing foil contact to cathode or anode (including electric equipment, otherwise this can cause battery leakage or swelling.

应在电芯（侧边和极耳封边包装膜断口位置裸露的铝层）与保护板、及电芯与用电器具之间采用绝缘

结构措施：特别注意避免出现包装膜铝层与正负极（包括用电器具的带电部分）出现接触的隐患，否则可能造成电池漏液或气胀。

In case the children use the battery, please instruct them according to the user manual and keep an eye on them to ensure that the battery is used correctly.

当小孩使用电池时，需要按用户说明书的内容教他们，并密切注意他们确保正确使用电池。

If the battery leaks and electrolyte gets your skin or clothing, immediately rinse the affected area with clean running water. If left as is, skin inflammation can occur.

如果电池漏液，电解液弄到皮肤或衣服上，立即用流动的水清洗受影响区域，否则可能导致皮肤发炎。

For directions on battery installation and removal, read the instruction manual that accompanies the equipment in which the battery will be used.

阅读用电池的装置说明书，正确进行电池的安装与拆卸。

If a device is not used for an extended period, the battery should be removed and stored in a cool and dry place. Otherwise, rusting or reduced performance may occur.

如果设备长期不用，应将电池取出并放置在凉爽、干燥的地方，否则，电池可能生锈或性能变差。

If the terminals of the battery are dirty, wipe them clean with dry cloth before use. Otherwise, solid electrical contact may not be charged with the equipment, and this can cause power outages or failure to charge.

如果电池的端子变脏，使用前用干布擦干净。否则电池会接触不良，从而引起能量损耗或无法充电。

15. Period of warranty（保质期）

Our company promises that we will take the responsibility for the exchange of the product due to the quality problems on the battery itself within a year rather than the problems caused by the misuse of the customers.

本公司承诺如果在一年中由于电池本身的质量问题，本公司将负责进行调换，如果是由于用户误用而产生的问题，不予调换。

16. Battery storage （电池的存放）

The batteries should be stored in accordance with Clause 12 in table 1. For long-term storage, we recommend the batteries to be charged once per half a year to prevent over discharge.

电池应当按照表 1 中的 12 条的条件进行存放。如长时间储存，建议每半年充一次电以防止电池过放电。

17. Note: （注释）

Any other items which are not covered in this specification shall be agreed by both parties.

本说明书未包括事项应由双方协议确定。

对于任何细节和问题，请告诉我们
For any details and enquiry, please contact VDL；Tel:0755-29961201,Fax:0755-29961203

BATTERY SPECIFICATION APPROVAL SHEET

VDL 产品承认书

Customer Name 客户代码: 1277

Customer Product 客户产品: TC4

Battery Model 产品型号: 711935SM5

Product Capacity 产品容量: 500mAh

Product Code产品编码: 100400711935

Assembly Plant Code 组装厂编码: /

Terminal Code 终端编码: BT.ABE000101

ME by 结构工程师	EE by 电子工程师	Cell by 电芯工程师	ME Checked by 审核	EE Checked by 审核	Approved by 批准
李龙珠	胡继东	陈浪	刘伟	雷号	罗亚森

Approved by customer 客户承认 (Stamp) (盖章)	Tested by 测试	Checked by 审核	Approved by 批准

重 庆 市 维 都 利 新 能 源 有 限 公 司
Chongqing VDL New Energy Co.,Ltd
地址：重庆市万州区联合路 20 号附 1 号、附 2 号、附 3 号、附 4 号、附 5 号、附 6 号, 6 号 邮编:404100
Add：No.20-1, No.20-2, No.20-3, No.20-4, No.20-5, No.20-6 and No.6 LIANHE Road, Wanzhou District, Chongqing City.

销售中心地址：深圳市宝安区卓越时代广场 C2903 邮编:518100
销售中心电话(Tel):0755-2996 1201（10 线） 传真(Fax):0755-2996 1203
网址(Web)：www.gdvdl.com 邮箱(E-mail)：vdl@gdvdl.com QQ：2355313400

VDL® 业界领先的聚合物锂电池制造商

Revision History
版本履历表

Revision 版本	Description 内容描述	Modify 修改人	Approval 审批人	Date 日期
A01	First Issue 新版发行	李龙珠	刘圣军	2024-08-07
	1. 更新电芯型号、容量、尺寸 2. 更新保护板配置 3. 成品内阻 140mΩ修改为 130mΩ 4. 修改循环充放电电流 5. 增加放电要求 6. 更换主选配置与备选配置，调换 7. 增加存储时间 8. 修改 pin 角定义，与双面胶型号	李龙珠	刘圣军	2024-08-20
	1. 更新跌落参数 1m 高度改为 1.5m 2. 删除备选 IC 3. 底部带手拿位双面胶圆弧位置取消粘贴	李龙珠	刘圣军	2024-10-14
	1. 修改充电环境温度及电流要求	李龙珠	刘圣军	2024-10-25
	1.更新 FPC 结构	李龙珠	刘圣军	2024-11-12
	1. 增加 0V 禁充电压区间 2. 增加 2.8V-1.0V 储存时间	李龙珠	刘圣军	2024-11-22
	1. 更新电路原理图 2. 更新 FPC 标注尺寸	李龙珠	刘圣军	2024-12-05
	1. 更新 0V 禁充电压	李龙珠	刘圣军	2024-12-12
	1. 更新充电环境温度及电流要求 2. 增加保护板 Layout 3. 修改电芯二维码内容增加电池型号	李龙珠	陈远松	2024-12-27
	1. 取消双面胶 2. 更新成品内阻 3. 充电环境温度及电流 2.5V 改为 2.8V	李龙珠	陈远松	2024-12-31
	1. 修改出货电压 3.80V~3.95V 改为 3.68V-3.79V 2. 保护板增加 UV 胶 3. 电芯顶封位增加成型绝缘胶	李龙珠	陈远松	2025-02-19
A02	1. 更新保护板结构 PCB 板加长 0.8mm 2. FPC 长度减短 1.2mm 3. FPC 增加双面胶 4. NTC 增加独立端口 5. 增加储存定义	李龙珠	陈远松	2025-03-01
A03	1. 更新 FPC 尺寸 7.24 改为 5.24mm 2. 增加头部与电池侧边管控尺寸 3. 更新电池重量 4. 增加保护板边缘尺寸管控	李龙珠	刘伟	2025-04-16
	1.修改最大充电温度区间	李龙珠	刘伟	2025-04-21

Contents 目录

1 . Scope 概述

The specification shall be applied to Lithium-ion Polymer rechargeable battery pack manufactured by **Chongqing VDL New Energy Co.,Ltd.**It is the basis for product design, production and inspection. Its purpose is to let the customer know the quality standard and the instruction.

本产品承认书描述重庆市维都利新能源有限公司设计制造的可充电聚合物锂电池，它是产品设计、生产和检验的依据。其作用是让客户了解产品的质量标准及正确使用方法。

Reference standard 参考标准:

GB 31241-2022 中华人民共和国国家标准《便携式电子产品用锂离子电池和电池组安全技术规范》

IEC/EN61960 欧盟便携式二次电芯和电池的性能标准

UL1642 美国锂电池安全标准

2 . Product basic information 产品基本信息:

No.	Items 项 目	Parameter 参 数
1	Battery model电池型号	711935SM5
2	Design scheme保护电路设计方案	HY2510CY-H3G+SL22180+10k±1% B=3435
3	Minimal capacity最小容量/Rated Capacity额定容量	500mAh， 1.935Wh
4	Typical capacity典型容量	510mAh (0.2C Standard discharge 0.2C标准放电)
5	Nominal voltage标称电压	3.87V
6	Shipment voltage出货电压	3.68V-3.79V（SOC: 10%-30%）
7	Charge ending voltage充电限制电压(U_{cl})	4.45V
8	Discharge ending voltage放电终止电压(U_{de})	3.0V
9	Upper limited charging voltage充电上限电压(U_{up})	4.45V
10	Discharge cut-off voltage放电截止电压(U_{do})	2.45V
11	Over current protection过电流保护	3.1-5.91A
12	Short circuit protection短路保护功能	Yes/有
13	AC Impedance内阻	≤75mΩ (Detail in 9.4/详见9.4项)
14	Battery Weight电池组重量	About约：8.34g
15	Max charge current最大充电电流(I_{cm})	5.0C (For continuous charge mode连续充电模式)
16	Max discharge current最大放电电流(I_{dm})	3.5C (For continuous discharge mode连续放电模式)
17	Recommended charge current推荐充电电流(I_{cr})	0.5C
18	Recommended discharge current推荐放电电流(I_{dr})	0.2C
19	Upper limited charging temperature上限充电温度(T_{cm})	60℃
20	lower limited charging temperature下限充电温度(T_{cl})	0℃
21	Upper limited discharging temperature上限放电温度	70℃
22	lower limited discharging temperature下限放电温度	-20℃
23	Storage 存储	电池电量30%，可满足2年存储时间,到保护板保护电压； 2.8V到禁充电压1.0V，可以满足8个月储存时间 安照常温存放1年电压到2.8V定义出货电压:电池的自耗电电压区间按照3.73~3.84V，SOC区间20%~42%，最大漏电流<25u4，存储时间至2.8V>1年

3 . Battery protection characteristics 电池保护特性(Ta=25±3℃)

HY2510CY-H3G+SL22180

No.	Items 项 目	Parameter 参 数	condition 条件
1	Overcharge protection detection voltage 过充保护检测电压	(4.525±0.02)V	Battery voltage is greater than the protection voltage, and the delay time to reach, then the state of the battery into overcharge protection. 电池电压大于过充保护电压,且延时时间达到，则电池进入过充电保护状态。
2	Overcharge release voltage 过充保护恢复电压	(4.325±0.030)V	
3	Overcharge protection delay time 过充保护延迟时间	800-1200 ms	
4	Overdischarge protection detection voltage 过放保护检测电压	(2.8±0.05)V	Battery voltage is less than the protection voltage, and the delaytime to reach, then the state of the battery into overdischarge protection. 电池电压小于过放保护电压,且延时时间达到，则电池进入过放电保护状态。
5	Overdischarge release voltage 过放保护恢复电压	3.0±0.05V	
6	Over discharge protection delaytime 过放保护延迟时间	76.8-115.2 ms	
7	Overcurrent discharge protection current 放电过流保护电流	3.1-5.91A	Battery discharge current is greater than the protection current, and the delay time to reach, then the state of the battery into overcurrent protection 电池放电电流大于过流保护,且延时时间达到，则电池进入放电过流保护状态。
8	Overcurrent protection delay time 放电过流保护延时时间	12.8-19.2 ms	
9	Current consumption (Operation) of PCM 保护板的正常状态下静态电流	≤6μA	VDD= 3.9V
	Shut Down 过放状态下的静态电流	≤0.5μA	VDD= 2.0V
10	Load resistance of PCM 保护板的空载内阻	≤35mΩ	VDD= 3.9V
11	0V charge function 0V 充电功能	UnAvailable	0V 禁充电压：<1.5V 禁止
12	Charge overcurrent protection current 充电过流保护电流	3.1-5.91A	If shall stop charging for an excessive charge current at Over Current Protection current lasts for delay time 电池充电电流大于充电过流保护电流,且延时时间达到，则电池进入充电过流保护状态。
13	Charge overcurrent delay time 充电过流延迟时间	6.4-9.6 ms	
14	Short-circuit protection delay 短路保护延时	200-500uS	

4. Condition adapting characteristics 环境适应性

No.	Items 项目	Test Method 测试方法	Criteria 标准
1	High/low Temperature 高/低温性能	After the cell fully charged at 25℃±3℃, measure the discharging capacity with discharging current 0.2C till 3.0 (V) cut off voltage at different temperature. (as compared with initial capacity) 在 25℃±3℃条件下满充电后，测量电池在不同温度下用 0.2 C_5A 电流放电至 3.0 (V)所放出的容量（与初始容量作为比较）。	在-10℃时 ≥70% At -10℃: ≥70% 在 55℃时 ≥95% At 55℃:≥95%
2	Invariableness humid and hot 恒定湿热	After putting the cell in the invariableness humid and hot box of 40℃±2℃ and relative humidity of 90～95% for 48 hours. Discharge the cell to 3.0(V) cut-off voltage at 0.2C current. 将电池放入 40℃±2℃及相对湿度为 90～95%的恒温恒湿箱中 48 小时后，再以 0.2C 电流放电至 3.0(V)。	No leakage, no fire, no explosion. The discharging time ≥3h. 无泄漏，无起火，无爆炸。放电时间≥3h。
3	Vibration 振动	The fully charged cell is vibrated from 90 to 100 minutes at three mutually perpendicular planes with excursion of 0.8mm, and change the frequency from 10 to 55 HZ with 1Hz/min speed. 满充电后的电池在三个相互垂直的方向按振幅 0.8mm 的谐振形式进行振动，频率在 10-55HZ 以 1Hz/min 的速率变化，往复振动 90 至 100min.	No leakage, no fire, no explosion. 电池无漏液,无冒烟，无起火，无爆炸
4	Free fall 自由跌落	The cell free falls from a height of 1.5m into the cement floor from X,Y,Z front and opposite direction of each direction. Then discharge the cell to 3.0(V) cut-off voltage with 1.0C current. 电池将从 1.5 米高处自由跌落到水泥地板上， 从 X、Y、Z 正反方向每个方向自由跌落一次,再以 1.0C 放电至 3.0 (V)	No leakage, no fire, no explosion. 电池无漏液,无冒烟，无起火，无爆炸

5．Safety performance 安全性能

No.	Items 项目	Test Method 测试方法	Criteria 标准
1	Forced discharge 强制放电	Discharge the cell to the cut-off voltage with 0.2C current and then reverse charge the cell for more than 90 mins with 1C current.电池先以 0.2C 放电至终止电压，再以 1C 电流，对电池进行反向充电，90min 以上	No fire, no explosion 无起火，无爆炸
2	Overcharge 过充电	After discharged with 0.2C to the cut-off voltage, charge the cell with 3.0C/4.6V for 7.0hrs. 0.2C 放电至截止电压后，电池用 3C /4.6V 恒流恒压充电 7.0h	No explosion, no fire 无起火、无爆炸
3	Low pressure 低气压	Put the fully charged cell in a vacuum chamber at ambient temperature 20~25℃ for 6 hrs. The vacuum environment pressure is set to be less than 11.6kPa, simulating an altitude of 15240m. 电池放在一个模拟真空的空间放置 6 小时，环境温度为 20~25℃，真空环境压力≤11.6kpa，模拟 15240m 高空低压环境	No leakage, no fire, no explosion 无泄漏，不起火，不爆炸
4	Short test 短路测试	Short circuit the fully charged cell by connecting the positive and negative terminals with resistance load 80±20 mΩ at room temperature 20~25℃. The cell remains on test for 24 hrs or until the surface temperature declines by 20 % of the maximum temperature rise, whichever is the sooner. 在室温 20~25℃下，把充满电电池的正负极用 80±20 mΩ 的负载连接起来，使电池外部短路。结束条件：测试时间 24 小时或者表面温度下降到最高温度的 20%。	No fire, no explosion. The temperature of the cell surface not exceeds 150℃. 无起火，无爆炸 电池表面温度不超过 150℃。

5	Soak test 浸泡测试	Put the fully charged cell into pure water, soaked for 24 hours. 把满充电的电池放进清水中浸泡 24 小时	No broken, no fire 无破裂，无起火
6	Crush test 挤压测试	A fully charged cell is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram or similar force mechanism. The flat surfaces are to be brought in contact with the cell and the crushing is to be continued until an applied force of 13 ±1kN is reached. Once the maximum force has been obtained it is to be released. 满充电池，放置在两块平面金属板间，持续施压 13±1kN 的压力，直到液压油缸施加的压力达到 13KN (17.2Mpa) 时停止。	No fire, no explosion 无起火，无爆炸
7	Shock test 撞击测试	The cell is to be secured to the testing machine by means of a rigid mount which supports all mounting surfaces of the cell. Each cell shall be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of three mutually perpendicular directions unless it has only two axes of symmetry in which case only two directions shall be tested. Each shock is to be applied in a direction normal to the face of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3ms the minimum average acceleration is 75 g (where g is the local acceleration due to gravity). The peak acceleration shall be between 125 and 175 g. 在环境温度下，将电池分别按三个轴向固定在测试台面上，每个面经受等量的冲击，每一次冲击前 3ms 内平均加速度最少达到 75g（g 为重力加速度），峰值加速度达 125g 至 175g。	No leakage, no fire, no explosion 无泄漏，不起火，不爆炸

6. Testing requirements 测试要求

6.1 Battery test environment 电池试验环境（无特别注明时，试验环境应符合此项要求）

Temperature 温度：25℃±3℃

Relative humidity 相对湿度： 45～85% RH

Atmospheric pressure 大气压力： 86～106 kPa

6.2 Measuring instrumentation requirements 测量仪表要求

Voltage instrumentation requirements: Measuring the voltage meter accuracy no less than 0.5 magnitude

电压仪表要求：测量电压的仪表的精确度不低于 0.5 级

Current instrumentation requirements: Measuring the current meter accuracy no less than 0.5 magnitude

电流仪表要求：测量电流的仪表精确度不低于 0.5 级

Time instrumentation requirements: Measuring the time meter accuracy no less than 0.1%

时间仪表要求：测量时间的仪表精确度不低于 0.1%

Temperature instrumentation requirements: Measuring the temperature meter accuracy no less than 0.5 ℃

温度仪表要求：测量温度的仪表准确度不低于 0.5℃

Impedance instrumentation requirements: Measuring impedance should by sinusoidal alternating (1 KHZ) test

内阻仪表要求：测量内阻应由正弦交变(1KHZ)进行测试

7. Operation temperature and humidity range 运行温湿度范围

7.1 Charging temperature and the Current requirements 充电环境温度及电流要求:

Temperature 温度	Max charge current 允许最大充电电流	Maximum relative humidity 最大相对湿度
-10℃ < T≤0℃	0.2C(截止电压4.45V)	45～85%
0℃<T≤15℃	0.5C(截止电压4.45V)	45～85%
15℃ < T≤50℃	电压 < 2.8V 0.1C充电(截止电压2.8V)	45～85%
	电压 > 2.8V 5.0C充电(截止电压4.45V)	
50℃ < T≤60℃	电压 < 2.8V 0.1C充电(截止电压2.8V)	45～85%
	电压 > 2.8V 1.0C充电(截止电压4.45V)	

7.2 Discharge temperature 放电环境温度:

放电温度与充电电流范围
-20℃ 6W放电≧50%容量
-10℃ 6W放电≧70%容量
0℃ 6W放电≧90%容量
25℃ 6W放电≧100%容量
70℃ 6W放电≧95%容量

8．Storage temperature and humidity range(At 50% SOC)存储温湿度范围(在 50% SOC 条件下)

8.1 Environmental conditions 存放条件;

Unless otherwise specified，Cells shall to be tested within one month after shipment and not be cycled (charge/discharge) over one time before the test. All tests shall be performed at 25℃±3℃ and humidity of 65±20% RH.

The cell impedance would increase in whole storage process, while the capacity would decrease, cell would be charged in 9.1.1 and discharged in 9.1.2

除非另有规定,电池应在装运后一个月内进行测试,且在测试前一段时间内不得循环(充放电)。所有试验均在 25℃±3℃、65±20% RH 湿度下进行。电池在整个存储过程中阻抗会增大，容量会减小，电池在 9.1.1 条件下进行充电，在 9.1.2 条件下进行放电。

Storage Temperature	25℃	25℃	25℃	25℃	60℃	60℃
Storage Duration	1 Year	1 Year	90 Days	90 Days	1 Week	1 Week
Storage Charge State	As received	100%	As received	100%	As received	100%
Recovered Capacity	90%	80%	95%	90%	85%	80%
Recovered Impedance @100% Charge State	150%	150%	120%	150%	150%	160%

9．Electrical Characteristics 电气特性

9.1 Battery standard charge/discharge 电池组标准充/放电

9.1.1 standard charge 标准充电

At 25℃±3℃ conditions, CC 0.5C/CV 4.45V, when charging current drops to 0.02Ccharging is terminated, The charging time limited 4hrs.

在25℃±3℃条件下，以0.5C恒电流，4.45V恒电压充电至电流降到0.02C截止，限时4小时。

9.1.2 Standard Discharge标准放电

Standard discharge current 0.2Cfor continuous discharge, when the voltage drops to discharge ending voltage 3.0V discharge is terminated, shall be full discharged.

以标准放电电流0.2C进行持续放电，当电压降至放电终止电压3.0V时放电被终止，即为放空。

9.2 Maximum charge current 最大充电电流

At 25℃±3℃ conditions, CC 5.0C/CV 4.45V, when charging current drops to 0.02Ccharging is terminated, The charging time limited 80min.

在25℃±3℃条件下，以5.0C恒电流，4.45V恒压，充电至电流降到0.02C截止，限时80min。

9.3Maximum discharge current 最大放电电流

At 25℃±3℃ condition, discharge the cell with 3.5C.

在25℃±3℃条件下，以3.5C对电池进行放电。

9.4 Initial impedance 初始内阻

At25℃±3℃ ambient temperature, after standard charged battery pack, AC impedance tester(1KHz) measuring the initial impedance should be≤75mΩ.

在25℃±3℃环境温度下，经过标准充电的电池，使用交流阻抗测试仪（1KHz）测量初始内阻应≤75mΩ.

9.5 Initial capacity 初始容量

The initial capacity is for standard charge to full, in 1 hour, the capacity measured at 25℃±3℃ conditions with discharge current of 0.2C till 3.0V cut-off voltage.

The initial capacity≥500mAh.

电池初始容量为电池以标准充电方式满充，1 小时内，在 25℃±3℃条件下以 0.2C 电流放电至 3.0V 截止所放出的容量，初始容量≥500mAh.

9.6 Retention Capability 荷电保持能力

After full charging, storing the battery 28 days with20±5°C condition, and then discharge with discharge current of 0.2C till 3.0V cut-off voltage, discharge time should be≥255min

电池满充电后，在 20±5℃的环境条件下存放 28 天，然后以 0.2C 电流连续放电至 3.0V 终止电压，放电时间≥255min

9.7 Cycle life 循环寿命

Battery cycle life is tested at 25℃±3℃. For each cycle test, battery is charged using5.0C constant current until battery voltage meet 4.45V. Then, battery is charged by constant voltage until battery charging current drop to 0.02C. After that, battery is discharged by 3.5C constant current until battery voltage drop to 3.0V. Repeat until each 50th cycle.

At each 50 cycle, battery capacity will be tested. The test condition is that the battery is charged using 0.5C constant current until the battery voltage meet 4.45V. Then, battery is charged by constant voltage until the charging current drop to 0.02C. After that, battery is discharged by 0.2C constant current until battery voltage drop to 3.0V.

If the discharge time is more than or equal to 4hours (80% of initial battery capacity), battery need to repeat above 50cycles charge/discharge test. If not, cycle life test is completed.

Cycle life should be 300cycles or above. the thickness after swelling will be less than 108%.

电池在温度 25℃±3℃条件下循环测试，以 5.0C 恒流充电到电压 4.45V，然后恒压充电到截止电流 0.02C。再以 3.5C 恒流放电到 3.0V，为 1 个循环周期。这样重复 50 次。

每 50 次做一次容量检测。以 0.5C 恒流充电到 4.45V，然后恒压充电到截止电流 0.02C。再以 0.2C 恒流放电到 3.0V。

如果放电时间大于等于 4 小时（80%初始容量），电池必须再重复 50 次充放电测试。否则，循环寿命测试结束。

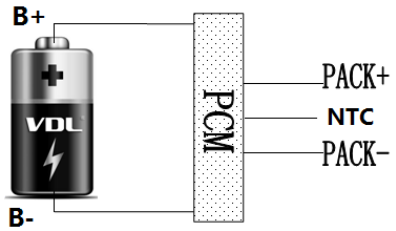
循环寿命应该大于等于 300 次。膨胀后厚度≤108%。

9.8 Agency approvals 承认机构

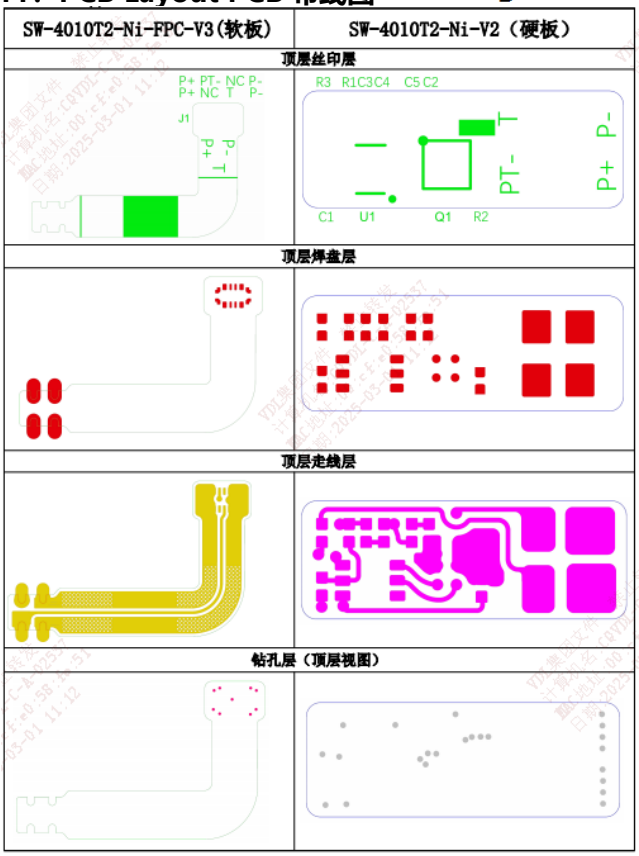
VDL battery safety performance is designed according to UL1642 standard and CE Directive requirement, the product’ s safety performance is conforming to UL1642 standard and CE Directive requirement.

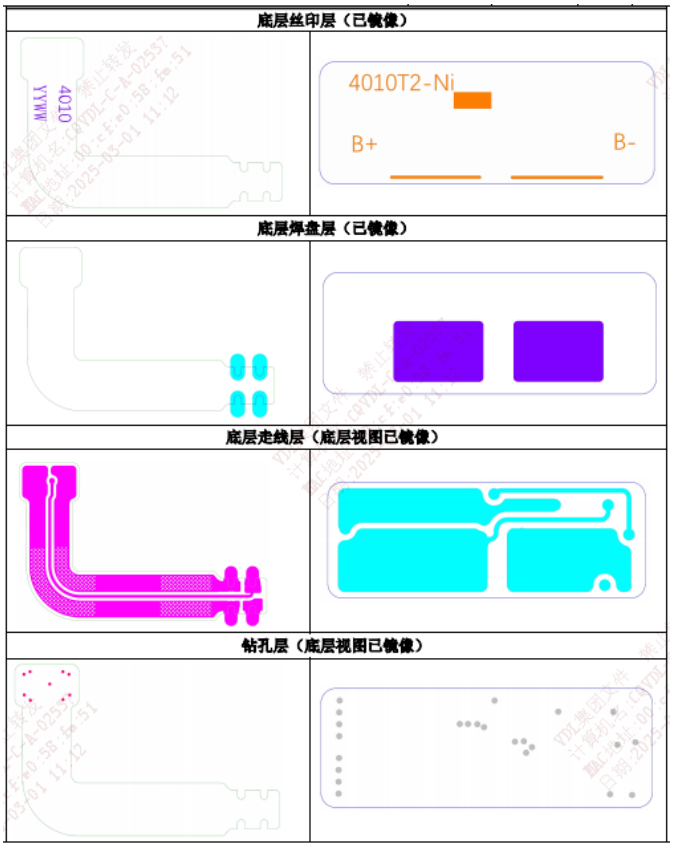
VDL 电池的安全性能是根据 UL1642 标准和 CE 指令要求制定.产品的安全特性与 UL1642 标准和 CE 指令的要求是一致的.

10. Battery structure diagram 电池架构图(Sketch map 示意图) (以下按实际选)

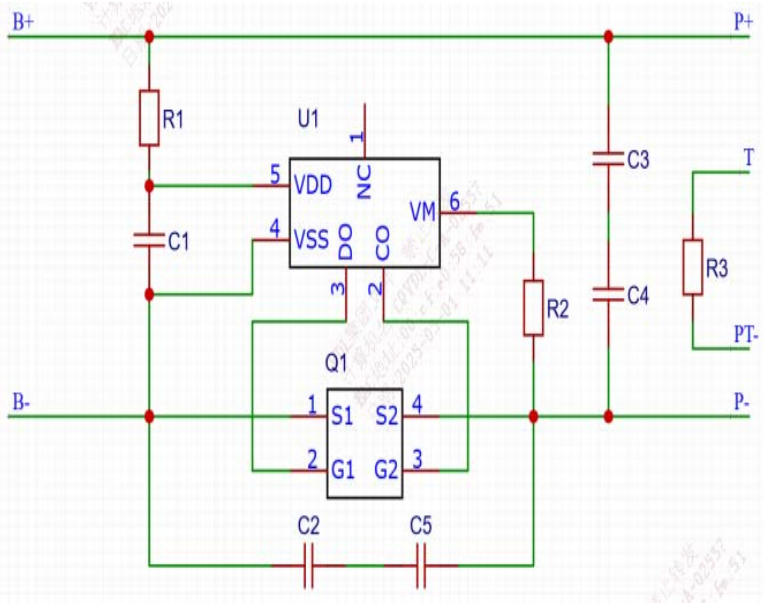


11. PCB Layout PCB 布线图

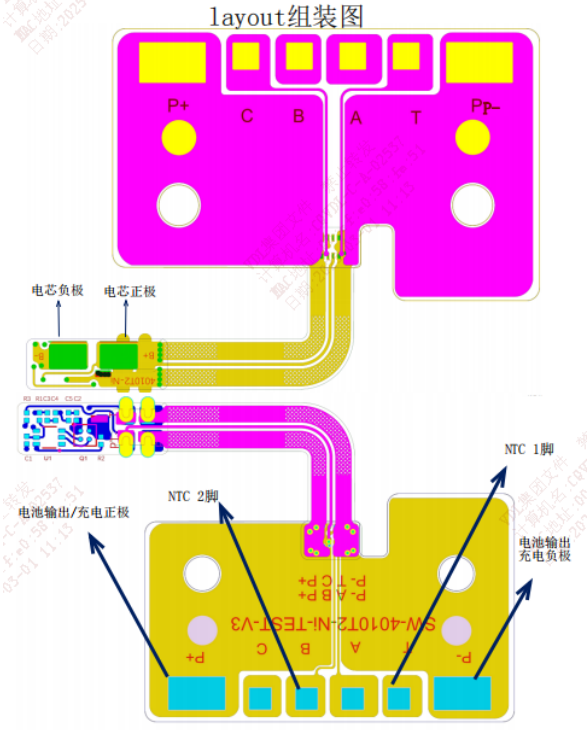




12. Schematic circuit diagram 电路原理图



layout组装图

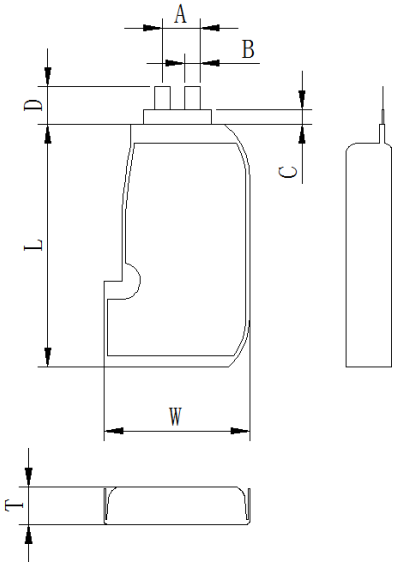


13.

13.1 Performance parameters 电芯性能参数

编号	项目		规格	备注
1	Nominal voltage 标称电压		3.87V	/
2	Dimensions 外形尺寸	T	7.1 mm Max	Thickness 厚度(受 600gf 力测量)
		W	19.15mm Max	Width 宽度(受 300gf 力测量)
		L	35.0 mm Max	length(not include Tab sealant) 电芯长度(不含极耳胶) (受 300gf 力测量)
		A	4.0±1.0 mm	Tab center distance极耳中心距
		B	2.0±0.2 mm	Tab width 极耳宽度
		C	0.2~2.0 mm	Tab exposed size 极耳胶外露尺寸

13.2 outline drawing 电芯外形尺寸(Not In Scale 未按比例，带*为重点尺寸，其它为参考尺寸)



13.3 Spray Content 电池喷码：

正面喷码： (电芯喷码)

- VDL 711935SM5 3.87V
500mAh 1.935Wh
+ YMDDLLLXXXXX

背面喷码： (电池喷码)

VDL 711935SM5
3.87V 500mAh
1.935Wh YMDDLLL
充电限制电压：4.45V
可充式锂离子电池组

二维码内容：711935SM5/YMDDLLLXXXXX
711935SM5/：代表电池型号
Remark: YMDD (Date 日期).LLL(批次)，XXXXX(流水码)
例：3C1900100001 代表 23 年 12 月 19 日 001 批次第 1 个电池
YMDD 为生产日期，Y 取 1~9 代表 2021~2029 年，A~X 代表 2030~2053 年(字母 I 和 O 不使用)；M 取 1~9 代表 1~9 月、A~C 代表 10~12 月；DD 取 01~31 代表 01~31 日
二维码内容共：22 位
VDL 代表生产厂 "重庆市紫建电子股份有限公司"
由于喷码内容为多次喷码而成，存在间距和对齐度不一致现象属于正常情况

15．Reminder 关于电池折边面注意事项的温馨提示

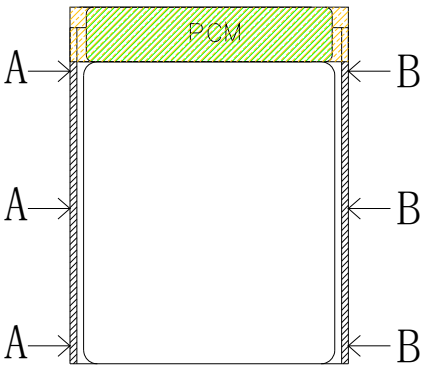


示意图 Sketch Map

温馨提示客户：

电池折边面(图示A&B指示填充区域)严禁与导体接触；电池包边若已绝缘，此点可忽略。

Caution:

The folded edge surface of the battery (the filling area indicated by A & B in the figure) is strictly prohibited from contacting with the conductor; If the battery edge is insulated, this point can be ignored.

16．BOM 1(Bill of materials)电池物料清单

NO.(项次)	Material Name (零件名称)	Specification(规格型号)	Qty (用量)
1	Cell 电芯	711935SM5/500mAh	1
2	Protection board 保护板	HF4011T-Ni	1
3	泡棉	2*4*11mm	1
4	哑黑胶	0.05mm	若干
5	双面胶	0.1*20*28.5mm	1
6	成型哑黑胶	0.05mm	1

PCM BOM

Material Name (零件名称)	Specification (规格型号)	Position (零件位置)	Qty (用量)
PCBA	TBD	/	1
PCB	TBD	/	1
IC	HY2510CY-H3G	U1	1
MOSFET	SL22180	Q1	1
贴片电阻 Chip resistor	100Ω±5%,	R1	1
贴片电阻 Chip resistor	2KΩ±5%,	R2	1
贴片电容 Chip capacitors	0.1μF/-20%~+80%/16V	C1C2C3C4C5	5
镍片	TBD	B+, B-	2
NTC	10K±1% B=3435K	R3	1
连接器	SMK,CPBD408-0102E	/	1

Tote：The battery of materials should be consistent with the requirements of the RoHS

注：电池组所使用的材料应符合RoHS的要求.

17．Battery Precautions and Safety Instructions 电池组使用注意事项及安全说明

Please be sure to comply with the specifications and the following precautions to use with batteries. For any accident caused by operation not following the specifications, Chongqing VDL New Energy Co.,Ltd. will not take any responsibility

请您务必需遵守本规格书和以下使用注意事项使用电池，对于没有按照规格书进行操作所造成的任何意外事故，重庆市维都利新能源有限公司将不承担任何责任.

- Warranty period is 12 months after shipment date.
- 从出厂代码日起 12 个月内保修.
- When the battery is stored for 3 months, it should be charged with 0.5C current to 50% SOC.
- 电池每放置三个月,请预先以 0.5C 充电 1 次,即让电池具备 50%以上的电量.
- Before using the battery, carefully read the instruction manual and battery labels on the surface.
- 使用电池前，请仔细阅读使用说明书和电池表面标识.
- Please use the original battery charger. The battery should be placed in a dry and ventilated place.
- 电池需使用原装充电器充电，并应放置在干燥通风场所.
- If the battery is not used for a long time, please charge the battery to 50% SOC status. Remove the battery from the device and place it separately, to avoid the short-circuit and damage caused by contacting metal.
- 如长期不使用时，请将电池充电至半满电荷状态，把电池从设备中拆除并分开放置，避免金属接触电池，造成短路或损坏现象.
- When using or during storage, if the battery is hot, with leakage, odor, distortion or other anomalies, please stop using it immediately and stay away from the battery.
- 在使用或储存期间，如发现电池有出现高温发热、漏液、散发异味、变形及其它异常现象时，请立即停止使用并远离电池.
- Do not short-circuit the battery positive and negative terminals. Do not damp the battery to avoid any danger.
- 切勿将电池正负极短路，并注意不可让电池受潮，以免发生危险.
- Please keep the battery away from heat, high voltage place. Please do not beat or hit the battery.
- 使用过程中，应远离热源、高压场所，并勿摔打、撞击电池.
- Remove the battery immediately from the device when the battery life ends. Please dispose the waste battery properly. Do not put it into fire or water.
- 电池寿命终止应立刻从设备中取出,废弃电池请安全妥善处理，切勿投入火中或水中.
- Do not allow children to replace batteries without adult supervision,
  Keep small cells and batteries which are considered swallowable out of the reach of children.
- 不允许儿童在没有成人监督的情况下更换电池，将可被吞咽的小电芯和电池放在儿童取不到的地方。
- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h o f ingestion.In case of ingestion of a cell or battery, seek medical assistance promptly.
- 如果吞咽了电池，应迅速送医院处理，吞咽有可能导致烧伤、软组织穿孔和死亡，摄入后 2 小时内可能发生严重烧伤.
- In case of ingestion of a cell or battery, seek medical assistance promptly.
  如果摄入电芯或电池，应立即寻求医疗援助。

18．Customer Inquiry
客户要求

Model 型号：**711935SM5**

1.If the customer approves the specification and samples, please sign the specification back to VDL within 1 week. It is invalid when expires.

如果客户认可本承认书和样品，请于 7 天内回签本承认书给重庆市维都利新能源有限公司，过期视为无效。

2. If the customer requires more explanation or the operating conditions are different from the specification content, please write down your information and contact Chongqing VDL New Energy Co.,Ltd. in advance. Chongqing VDL New Energy Co.,Ltd. could design and build products according to your special request.

如果客户需要其他方面的说明或工作条件与规格书内容不一致,请客户提前和重庆市维都利新能源有限公司联系. 重庆市维都利新能源有限公司将按照贵公司特殊要求设计和开发产品.特殊要求标准:

项　目 序号	Special Request 特殊要求	Criteria 标准
1		
2		
3		
4		
5		
6		