

	Shenzhen Cottcell Technology Co., Ltd	VER: A
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磷酸铁锂电池产品规格书

LiFePO₄ Battery SpecifiCtion

型

Model: _____

客户名称: _____

Customer: _____

客户确认: _____

Customer approval: _____

日

批准 (Approval)	审核 (Check)	拟定 (Prepare)

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版本	章节	修改内容	修改日期	修改人

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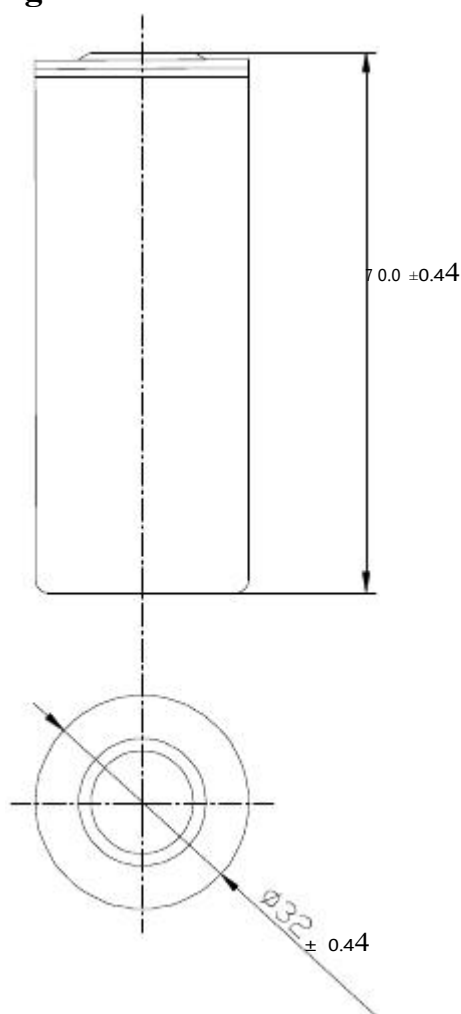
1、基本特性(Normal performance)

序号 N	项目 Item	常用参数 General Parameter	备注 Remark
1	型号 (Model)	IFR 32700	(单体) single
2	单体外壳材质 Casing material for single cell	镀镍钢 steel Cse for single cells	
3	标称容量 (0.2C) Standard Capacity (0.2C)	6.0Ah	
4	最小容量 (1C) Minimum Capacity (1C)	5.8Ah	
5	额定电压 Rated voltage	3.2V	(即工作电压) Work voltage
6	最大充电电压 Max.Charge voltage	3.65V	
7	放电截至电压 Cut-off voltage	2.0V	
8	标准充放电电流 Standard charge and discharge current	1.2A	0.2C
9	充电时间 charging Time	6 hours	
10	最大持续放电电流 Max Continuous discharge current	18A	3C
11	直径 (Diameter)	32. ±0.4mm	
12	高度 (height)	70.0 ±0.4 mm	
13	电池重量 (Approx.) Weight(Approx,including Cse)	About 150g	
14	内阻 (Max, at 1000Hz.) Impedance (Max, at 1000Hz.)	≤ 12mΩ	

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15	充电方法(CC/CV) Charge method (CC/CV)	标准 Standard	C	0.2C	3.65V 截止 3.65V cut
			C	3.65	0.02C 截止 0.02C cut
16	工作温度 Operate temperature		充电 Charge		0°C ~ 45°C
			放电 discharge		-20°C ~ 65°C
			贮存 storage		-20°C ~ 45°C

2、单体电池规格 (Drawing for single cell)



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3、电池性能 (Performance)

3.1 电化学性能 (electrochemistry performance)

序号	项目 Project	标准 Standard	测试方法 Testing method
1	常温放电性能 Discharge performance in normal temperature	放电容量/标称容量×100% (A) 0.2C ≥100% (B) 1C≥95% Discharge Capacity /standard Capacity×100% (A)0.2C ≥100% (B)1C ≥95%	在 1 标准大气压, 环境温度 25°C±5°C, 相对湿度为 45% ~ 80%的条件下, 电池 0.2C 标准充电后 (以下若没有特别说明, 均在此条件下放置, 皆按此充电方式), 搁置 10min, 分别以 0.2C、1C 进行放电至下限电压 2.0V, 循环三次, 当有一次达到标准, 即达到标准要求 (下同)。 Charge with 0.2C standard charge in the condition of temperature 25°C±5°C, relative humidity 45 % ~ 80% (if there is no especial statement, the charging way is same as this), rest for 10min, separated discharge with 0.2C、1C to cut-off voltage 2.0V, cycles for three times, One cycle Capacity arrive standard, that's to say it is qualified.(The below as the same)
2	常温荷电保持能力 Charging keep ability in normal temperature	剩余容量≥标称容量*90% Remain Capacity≥standard Capacity*90%	电池标准充电后, 在 25°C±5°C贮存 1 个月, 储存期满后, 以 0.2C 放电至终止电压 2.0V, 测量电池容量。 After standard charged, rest it in 25°C±5°C for 1 months. Then discharge with 0.2C to 2.0V, testing the battery Capacity.
3	循环寿命 Cycle life	容量≥标称容量*80% Capacity ≥ Standard Capacity*80%	0.2C 标准充电后,以 0.2C 放电至终止电压 2.0V 搁置 10min, 以此模式循环 2000 次。 After 0.2C standard charged ,discharge with 0.2C to 2.0V.rest for10min, cycles for 2000 times.

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4	贮存 12 个月的电池容量保持率 $\geq 80\%$ Capacity can be kept $\geq 80\%$	with 0.2C to 2.0V, test the remain Capacity; 0.2C/0.2C test the recover Capacity, cycle for 3 times, One cycle Capacity arrive standard, that's to say it is qualified.
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3.2 环境适应性能(environment adaptive performance)

序号 Project	项目 Project	标准 Standard	测试方法 Testing method
1	温度循环性能 Temperature Cycle performance	电池不冒烟、不起火、不爆炸 No smoking, exploding, No fire	电池标准充电后, 在环境温度为 $60 \pm 2^\circ\text{C}$ 的条件下开路放置 48h, 然后在 $-10^\circ\text{C} \pm 2^\circ\text{C}$ 条件下开路放置 6h 后在室温条件下开路放置 24h, 然后 0.2C 进行放电至 2.0V。以 0.2C/0.2C 连续做 3 次充放电循环。 After standard charged, keep the battery for 48hrs under $60 \pm 2^\circ\text{C}$, then rest for 6hrs under $-10^\circ\text{C} \pm 2^\circ\text{C}$, then rest for 24h under normal temperature, discharge with 0.2C to 2.0V。with 0.2C/0.2C charge and discharge cycle for 3 times.
2	恒定湿热性能 invariableness moist heat performance	搁置后放电容量/标称容量 $\times 100\% > 60\%$ Discharge Capacity / standard Capacity $\times 100\% > 60\%$ 电池外观无明显变形、不冒烟、不爆炸 No exploding, No fire	电池标准充电后, 置于温度为 $40 \pm 5^\circ\text{C}$, 相对湿度为 90% 的恒温恒湿箱中, 搁置 48h 后, 取出电池搁置 2h, 以 0.2C 放电至 2.0V。 After standard charged, keep in constant temperature and humidity Cse for 48hrs under $40 \pm 5^\circ\text{C}$, relative humidity 95%, then rest for 2h, discharge with 0.2C to 2.0V.
3	不同温度下的放电性能 Discharge performance in different temperature	搁置后放电容量 / 标称容量 $\times 100\%$ Discharge Capacity / Rated Capacity $\times 100\%$ $60^\circ\text{C} \geq 95\%$; $0^\circ\text{C} \geq 80\%$; $-10^\circ\text{C} \geq 50\%$; 电池不冒烟、不爆炸、不起火 No exploding, No fire	电池标准充电后, 在 $60 \pm 2^\circ\text{C}$ 条件下恒温搁置 3h、以 1C 放电至 2.0, 然后在室温条件下标准充电, 依此按照 $0 \pm 2^\circ\text{C} / -10 \pm 2^\circ\text{C}$ 的顺序在相应的恒温条件下搁置 20h, 以 0.2C 测量电池对应的终止容量, 最后在室温状态下搁置 2h。 After standard charged, constant temperature rest for 3hrs in $60 \pm 2^\circ\text{C}$ 、discharge with 1C to 2.0, standard charge in normal temperature, separated rest for 20hrs in order $0 \pm 2^\circ\text{C} / -10 \pm 2^\circ\text{C}$, test the last Capacity with 0.2C, Then rest 2h in the normal temperature.

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4	振动环境适应性表现	适应 剩余容量≥初始容量*95% Remain Ccapacity ≥original	<p>电池标准充电后，建立电池振动台板根据震动频率和相关移动距离来调节测试仪。从 X、Y、Z 三个方向。每个方向在 10Hz~55Hz 震动 30 分钟。速度是</p> <p>(A)震动频率: 10Hz~30Hz 移动距离: 0.38mm</p> <p>is1oct/min:</p> <p>(A)Vibration frequency: 10Hz~30Hz Moving: 0.38mm</p> <p>(B) Vibration frequency: 30Hz~55Hz</p> <p>After test, 0.2C/0.2C test the remain Ccapacity.</p>
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3.3 安全性能(Safe performance)

序号	项目 Project	标准 Standard	测试方法 Testing method
1	过充性能 Over-charge performance	不爆炸、不起火最高温度 <150℃ No exploding, No fire The highest temperature <150℃	<p>电池标准充电后，保证电池状态正常（下同），以 3C 电流充电至 10V，然后转恒压充电至截至电流 0.02A 时终止，观察电池的温度及外观变化。</p> <p>After standard charged, Battery status should be ensure the normal (the same below), charge with 3C to 10V, then change to charge with constant voltage and stop charge until the current is 0.02A, check the temperature and appearance of the battery.</p>
2	过放性能 Over-discharge performance	不起火、不爆炸 No exploding, No fire	<p>电池标准充电后，以 0.2C 进行放电至 2.0V，然后用 10Ω 的电阻将电池正负极相连，搁置 60min。</p> <p>After standard charged, discharge with 0.2C to 2. V, then connect the positive and negative with 10Ω resistor, rest for 60min.</p>

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3	常温短路性能 Short-circuit performance in normal temperature	不爆炸、不起火最高温度 $<150^{\circ}\text{C}$ No exploding, No fire The highest temperature $<150^{\circ}\text{C}$	电池标准充电后，置于防爆玻璃罩中直接短路其正负极（线路总电阻不大于 $50\text{m}\Omega$ ），当电池温度下降到比峰值约低 10°C 时试验结束。观察电池的温度及外观变化。 After standard charged, keep the battery pack in explosion-proof box and connect positive and negative to short-circuit(the total impedance should not be over than $50\text{m}\Omega$), stop the testing when the temperature of the battery reduces 10°C compare with the top one。Check the temperature and appearance of the battery.
4	热冲击安全性能 Thermal Shock safe performance	不爆炸、不起火 No exploding, No fire	电池标准充电后，放置于热箱中，并与热电偶相连，温度以 $(5^{\circ}\text{C}\pm 2^{\circ}\text{C})/\text{min}$ 的速率升至 $150^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 并保温 30Min。观察电池温度外观变化。 After standard charged. put the battery to hot-box, and connect with thermocouple, the temperature from $(5^{\circ}\text{C}\pm 2^{\circ}\text{C})/\text{min}$ to $150^{\circ}\text{C}\pm 2^{\circ}\text{C}$. And keep warm 30 Min.check the temperature and appearance of the battery.

备注：以上标准中的一些术语的定义；

Remarks: the above standard professional word meaning is as below:

(1)标准充电：在环境温度 $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 的条件下，以 0.2C 充电，当电池端电压达到充电限制电压 3.65V 时，改为恒压充电，直到充电电流小于或等于 0.02A 后停止充电

(1) Standard charge: with the ambient temperature $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$, charge with 0.2C , When the voltage is up to the limited charging voltage 3.65V , change to constant voltage charge, stop charging until the charging current is $\leq 0.02\text{A}$.

(2)初始状态：电池的初始外观、开路电压、交流内阻。

(2) The Original situation: The original appearance, open voltage, internal impedance.

(3)最终状态：电池的最终外观、开路电压、交流内阻。

(3) The last situation: The last appearance, open voltage, internal impedance.

(4)剩余容量：电池经过特定的检测程序后的首次放电容量。

(4) Remain Capacity: The first discharge Capacity after the specific inspecting process.

(5)恢复容量：电池经过特定的检测程序后，通过反复充放电使状态恢复后的放电容量。

(5) Recover Capacity: The discharge Capacity that through time after time cycles after the specific inspecting process.

(6) 0.2C/0.2C (0.2C/1C): 以 0.2C 充电, 当电池端电压达到充电限制电压 3.65V 时, 转为恒压充电, 直到充电电流小于或等于 0.05A 停止充电, 充电完成后, 搁置 10min, 再以 0.2C (1C) 恒流放电至终止电压 2.0V.

(6)0.2C/0.2C (0.2C/1C): Charge with 0.2C, When the voltage is up to the limited charging voltage 3.65V, change to constant voltage charge, stop charging until the charging current is $\leq 0.02A$, Finish to charge, rest for 10mins, discharge with 0.2C (1C) constantly to cut-off voltage 2.0V.

4、包装电池上的标识(The marks on package of the battery)

- 以下警告应注明在包装后的电池上
- The warnings as following have to be indicated on the package of the battery
- 使用规定的充电器
- Use the stated charger
- 不要将电池投入火中或加热
- Don't throw the battery into water and fire or don't hot it up
- 不要将电池两端短路
- Use the stated charger
- 不要将电池分解拆散
- Don't break up the battery

5、电池使用时警告事项及注意事项 (The marks on package of the battery)

为防止电池可能发生泄漏,发热、爆炸,请注意以下预防措施:

In order to prevent the battery leaking, getting hot and exploding, please pay attention to preventing measure as following:

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警告！（Warning！）

- 严禁将电池浸入海水或水中,保存不用时,应放置于阴凉干燥的环境中;
- Never throw the battery into water, keep it under dry, shady and cool circumstance when not use.
- 禁止将电池在热高温源旁,如火、加热器等使用和留置;
- Never keep the battery beside high temperature source examples: fire, heating machine and ect.
- 充电时请选用锂离子电池专用充电器;
- Please use the stated charger when charging.
- 严禁颠倒正负极使用电池;
- Never upside down the positive and negative.

- 严禁将电池直接插入电源插座;
- Never cut the battery in socket directly
- 禁止将电池丢于火或加热器中;
- Never throw the battery into fire or heating machine.
- 禁止用金属直接连接电池正负极短路;
- Never connect the positive and negative of battery with metal.
- 禁止将电池与金属,如发夹、项链等一起运输或贮存;
- Never ship or store the battery together with metal
- 禁止敲击或抛掷、踩踏电池等;
- Never knock, throw or trample the battery.
- 禁止直接焊接电池和用钉子或其它利器刺穿电池;
- Never cut through the battery with nail or other edge tool.

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注意！（Warning！）

- 禁止在高温下（炙热的阳光下或很热的汽车中）使用或放置电池,否则可能会引起电池过热、起火或功能失效、寿命减短。
- Never use or keep the battery under the high temperature. Otherwise it will Cuse battery heat, get into fire or lose some function and reduce the life.
- 禁止在强静电和强磁场的地方使用,否则易破坏电池安全保护装置,带来不安全的隐患。
- Never use the battery under strong static and strong magnetic field, otherwise it will destroy the protecting device
- 如果电池发生泄露,电解液进入眼睛,请不要揉擦,应用清水冲洗眼睛,并立即送医治疗,否则会伤害眼睛。
- If battery leaked, the electrolyte get into eyes, please don't knead, please wash eyes by water and send to hospital. Otherwise it will hurt eyes
- 如果电池发出异味,发热、变色、变形或使用、贮存、充电过程中出现任何异常,立即将电池从装置或充电器中移离并停用。
- If battery emit peculiar smell, heating, distortion or appear any unconventionality during using, storage or charging process, please take it out from device or charge and stop using.
- 如果电极弄脏,使用前应用干布抹净,否则可能会导致接触不良功能失效。
- If the pole was duty, please clear it before using.
- 废弃之电池应用绝缘纸包住电极,以防起火、爆炸。
- Please enCse the pole with isolative paper when you want to abandon the battery to prevent exploding and getting into fire.