力 臻 股 份 有 限 公 司
LJ DEVICE CO., LTD.

零 件 規 格 書 / 承 認 書
SPECIFICATION FOR APPROVAL

CUSTOMER : _____

DESCRIPTION : _____

MODEL : **LP2770134-20Ah**

CUSTOMER PART NO : _____

APPROVED SIGNATURES

Rev	Date	Description	Designed	Checked	Approved
A	2021/7/30	Release		Po Chen	

臺北市北投區吉利街 131 號 2 樓
2F, NO. 131, JILI ST., PEITOU, TAIPEI, TAIWAN, R.O.C.
TEL : 886-2-2827-0158 · FAX : 886-2-2827-0348

产品规格书

锂离子动力电池 LP2770134-20Ah

产品规格书

1 适用范围

本规格书适用于力神动力电池系统有限公司生产的 LP2770134 锂离子电池。

2 常规指标

2.1 符号与缩略语说明

C_1——1h 率额定容量(Ah);

I_1——1h 率放电电流，其数值等于 C_1(A);

本规格书中 $1I_1$(A)=20A。

SOC——荷电状态

DOD——放电深度

2.2 该产品常规指标

表 1

序号	项目	规格
1	电池种类	动力型锂离子电池
2	电池型号	LP2770134
3	标称容量☆	20Ah(最小容量 19.5Ah)
4	标称电压☆	3.2 V
5	内阻☆	≤6mΩ
6	重量	494±15g
7	最大充电电流	$0.5I_1$ (连续) $1I_1$ (30s)
8	低温最大充电电流	
	0℃≤T≤5℃	$0.2I_1$
9	充电电压	3.65 V
10	最大放电电流	$1I_1$ (连续) $1.5I_1$ (30s)
11	放电终止电压	2.0V
12	最大工作温度范围：	
	充电	0℃～45℃
	放电	-20℃～55℃
13	最佳工作温度范围：	

	充电	15℃～35℃
	放电	15℃～35℃
14	储藏温度：	
	1 个月内	-40℃～45 ℃
	6 个月内	-20℃～35 ℃
*电池处于 30%SOC 或电压为 3.275V～3.304V 状态下保存		

3 外观和尺寸

外观和尺寸见图 1。

4 性能

4.1 测试条件

进货一个月内进行测试，测试前循环充放电次数不得超过五次。实验和测量须在标准温度（25±2）℃及标准湿度（65±20）%的条件下进行。

4.2 测量设备

a) 伏特计 内阻>1000 Ω/V

b) 游标卡尺 精度为 0.02 mm

c) 内阻表 在 AC 1kHz 条件下测量

d) 天平精度 0.001g

4.3 测试过程及其标准

4.3.1 充电制式

在环境温度（25±2）℃条件下，采用先恒流再恒压方式充电。恒流电流为以 $1/3I_1$(A)，恒压电压为 3.65V，在恒压过程中电流降到 $0.05I_1$(A)即可终止充电，静置 1 小时。

4.3.2 测试项目及标准

具体测试项目及标准见表 2。

产品规格书

表 2

序号	项目	测试程序	标准
1	外观和尺寸	目测及游标卡尺测量	无明显人为划痕、无变形、无漏液，成品电池质量检验尺寸为厚度、宽度和高度，尺寸见图纸
2	重量	电子天平	494±15g
3	开路电压☆	按 4.3.1 充电后 1 小时内测量开路电压	≥3.350V
4	标称放电容量☆	按 4.3.1 充电后 1 小时内以 1/3I_1(A)电流放电到放电终止电压 2.0V，并计量容量。上述循环可以重复 5 次，当连续 3 次试验结果的极差小于额定容量的 3%，可提前结束试验，取最后 3 次试验结果平均值。	1/3I_1(A)容量≥标称容量
5	1I_1(A)放电容量	按 4.3.1 充电后，1 小时内放电直到放电终止电压，放电电流为 1I_1(A)，并记下时间或容量。	1I_1(A)容量≥90%标称容量
6	最大充电电流	按 4.3.1 充电后，以 1/3I_1(A)电流放电到放电终止电压 2.0V，并记录容量。以 nI_1(A)恒流充至 3.65V，再以 3.65V 恒压充至 0.05I_1(A)截止。	0.5I_1(A)(连续); 1I_1(A)(30s);
7	最大放电电流	按 4.3.1 充电后，以 1/3I_1(A)电流放电到放电终止电压 2.0V，并记录容量。以 1/3I_1(A)充电，以 nI_1(A)放电至 2V。	1I_1(A)(连续); 1.5I_1(A)(30s);
8	充放电循环寿命☆	充电：使用 CC-CV 方式充电，充电电流 0.5I_1(A)，截止电压 3.65V，恒压阶段的截止电流 0.05I_1（A），搁置 1h。 放电: 0.5I_1(A)电流恒流放电，搁置 1h。 循环充放电 1500 次以上，记录容量。	剩余容量≥80%标称容量 或循环寿命≥1500 次
9	荷电保持能力☆	按 4.3.1 充电后，在环境温度（25±2）℃条件下开路搁置 28 天，再以 0.5I_1(A)电流恒流放电到放电终止电压 2.0V。 按 4.3.1 充电后，在温度（55±2）℃的高温箱中放置 7 天，然后以 0.5I_1(A)电流恒流放电至 2.0V，并记下容量。	容量≥90%标称容量
10	高温性能	按 4.3.1 充电后，在温度（55±2）℃的高温箱中放置 5h，然后以 0.5I_1(A)电流恒流放电至 2.0V，并记下容量。	容量≥95%标称容量
11	低温性能	按 4.3.1 充电后，在温度（-20±2）℃的低温箱中放置 24h，然后以 0.5I_1(A)电流恒流放电至 2.0V，并记下容量。	容量≥50%标称容量
12	短路试验★	按 4.3.1 充电后，将接有热电耦的电池放入通风厨中短路，电池经线路电阻小于 5mΩ 的外部电路短路 10min；观察 1h。	电池不起火，不爆炸

13	过充试验★	按 4.3.1 充电后，将接有热电偶的电池进行过充电试验，以下面任一种方式充电： a）以 $1I_1$(A)电流充电，到电池电压达到充电终止电压的 1.5 倍后停止实验，观察 1h。 b）以 $1I_1$(A)电流充电，充电时间到达 1h 后停止试验，观察 1h。	电池不起火，不爆炸
14	过放试验★	按 4.3.1 充电后，在（25±2）℃下以 $1I_1$(A)电流放电 90min；观察 1h。	电池不起火，不爆炸 不漏液
15	热箱试验★	将接有热电耦的电池放入恒温箱中，关闭箱门后，开启恒温箱加热，监视恒温箱内温度变化（温箱升温速度为 5℃/min），箱温达到（130±2）℃时保持 30min 后结束试验；观察 1h。	电池不起火，不爆炸
16	挤压试验★	按 4.3.1 充电后，垂直于电池极板的方向以(5±1)mm/s 的速度挤压电池，挤压板形式为半圆柱体（半径 75mm，长度大于被挤压电池的尺寸），电池电压到达 0V 或变形量达到 30%或挤压力达到 200kN 后停止挤压；观察 1h。	电池不起火，不爆炸
17	跌落试验★	按 4.3.1 充电后，在(25±2)℃下，将电池的正负极端子向下从 1.5m 高度处自由跌落到水泥地面上。	电池不起火，不爆炸 不漏液

5 注意事项

充电

a) 严禁过充，充电电压不得高于 3.65V。

b) 严禁反向充电。

c) 建议最佳充电温度为 15℃-35℃。

放电

a)严禁短路。

b)放电电压不得低于 2.0 V。

c) 建议最佳放电温度为 15℃-35℃。

将电芯放置在远离儿童的地方

储存

短时储存（1 个月内）要将电池放置于清洁、湿度低于 65%RH、温度-40℃-45℃的环境及半充满状态。

长期储存（6 个月内）要将电池放置于清洁、湿度低于 65%RH、温度-20℃-35℃的环境及半充满状态。

6 警示

6.1 严禁电池过热；严禁改装、拆解电池；这些行为非常危险，可能会引起电池起火、漏液、爆炸。

6.2 严禁将电芯暴露在极热环境或投入火中，不要将电池放置在太阳直射的地方。

6.3 严禁将电池正负极柱用金属或其他导线直接连在一起形成通路，这样将导致电池短路，可能引起电池起火甚至爆炸。

6.4 严禁将正负极柱颠倒使用。

6.5 严禁将电芯浸入水中或者其它导电性液体中，或者使其吸湿

6.6 严禁使电芯承受过重的机械冲击.

6.7 严禁直接焊接电池，过热可能会引起电池零部件（如垫片）变形，这将导致电池鼓胀、漏液、起火甚至爆炸。

6.8 严禁使用运输中发生挤压、跌落、短路、漏液及其他不正常问题的电池。

6.9 在使用过程中严禁各电池之间外壳直接接触或通过导体连接在一起形成通路。

7 运输

运输过程中应防止剧烈振动、冲击、日晒雨淋。

运输过程中应使电池处于半充满状态。

8 其它

如果客户需要将电芯在该文件之外的条件下操作或应用，请先咨询力神公司相关事宜。在该文件说明的条件之外使用该电芯而产生的事故，公司不承担任何责任。

对单体电池与电路，电池组，充电器搭配使用不当所产生的问题公司不承担任何责任。

出货后客户在电芯组装过程中，因加工产生的不良电芯不在质量保证的范围之列。

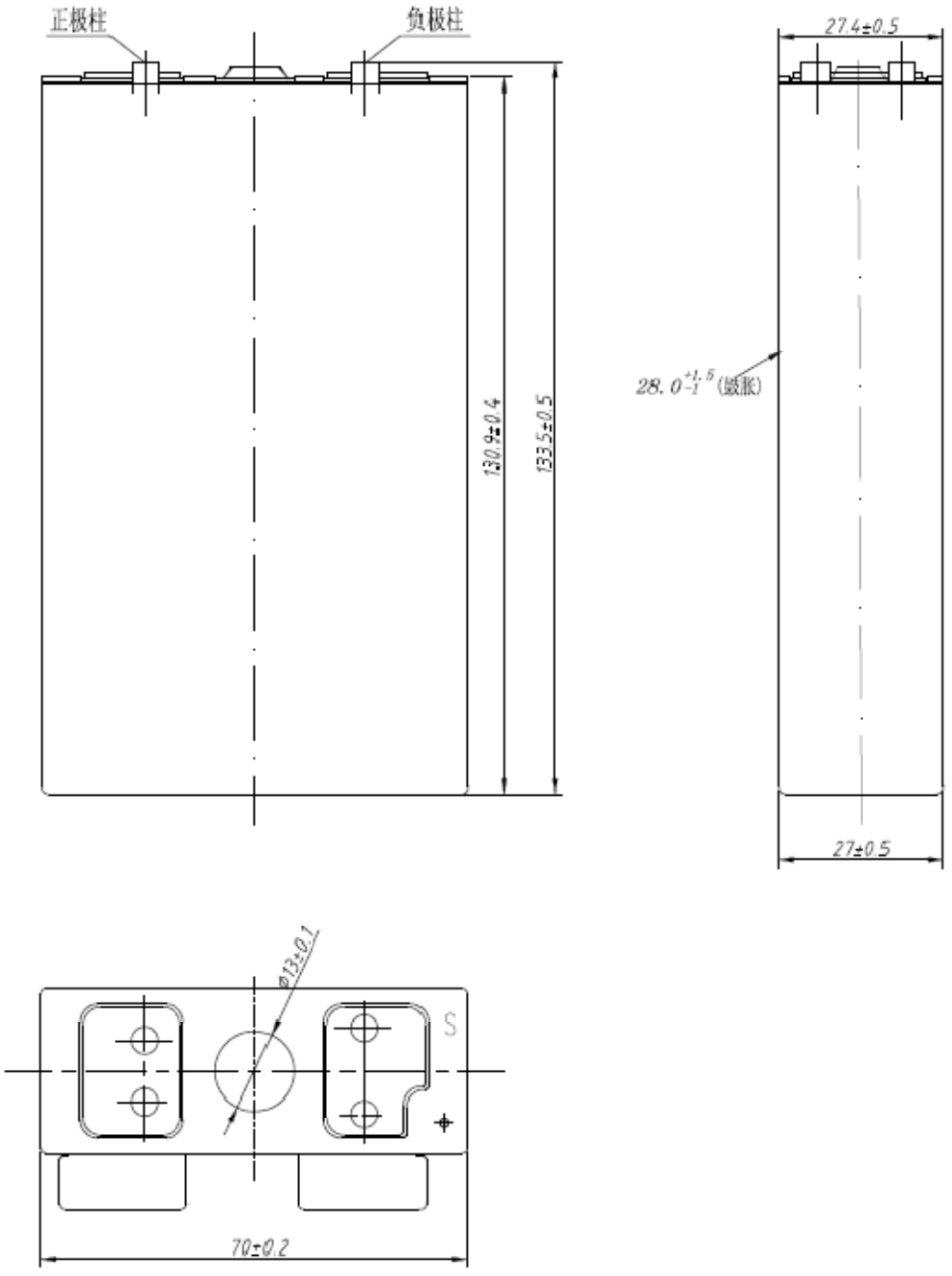


图 1 电池简易外形图

Product Specification

Lithium-ion Power Cell of LP2770134-20Ah

Lishen Power Battery System Co.,Ltd

www.lishen.co

1. Scope

The product specification describes the requirement of the Prismatic Lithium Ion Power Cell to be supplied to the customer by Lishen Power Battery System Co.,Ltd.. If there is any additional information required by the customer, customers are advised to contact Lishen PowerBattery System Co., Ltd.

2. General Specifications

2.1 Abbreviation Definitions

C_1—— the rated capacity (in ampere-hours) of the cell for a one-hour discharge.

I_1—— a current corresponding to the one-hour discharge capacity (in ampere-hours), whichisequal to, in numeral, theC_1.

In the following specification $1I_1$(A)=20A.

SOC —— the state of charge.

DOD —— the depth of discharge.

2.2 Specification

Number	Item	Specification
1	Cell Type	Lithium -ion power cell
2	Cell Model	LP2770134
3	Nominal Capacity☆	20Ah(minimum capacity 19.5Ah)
4	Average Working Voltage☆	3.2V
5	AC-impedance☆	≤6mΩ
6	Weight	494±15g
7	Maximum Charge Current	$0.5I_1$（Continuous） $1I_1$(30s)
8	Maximum Charge Current at Low Temperature	
	0℃≤T≤5℃	$0.2I_1$
9	Charging End Voltage	3.65V
10	Maximum Discharge Current	$1I_1$（Continuous）$1.5I_1$(30s)
11	Discharge End Voltage	2.0V

12	Max Operating TemperatureRange	
	Charge	0℃ ~ 45℃
	Discharge	-20℃~ 55℃
13	Optimal Operating TemperatureRange	
	Charge	15℃ ~ 35℃
	Discharge	15℃ ~ 35℃
14	Storage Temperature	
	1 month	-40℃~ 45℃
	6 months	-20℃ ~ 35°C
*Cells should be stored at the state of 30%SOC or the voltage is between 3.275V and3.304V.		

3. Appearance and Dimension

Appearance and Dimension refer to the attached drawing 1.

4. Characteristics

4.1 Test Condition

Cells should be tested within a month after purchase and the charge-discharge times of the test cells should be less than 5.Unless noted otherwise, all tests are to be conducted at standard temperature which is(25±2)℃ and standard humidity which is (65±2)%.

4.2 Test Equipment

a) VoltmeterInner impedance>1000Ω per volt.

b) Slide caliperThe slide caliper should have a minimum scale of 0.02mm.

c) Impedance meter The impedance meter should be operated at AC 1kHz.

d) ElectronicScale The electronicscale should have a minimum scale of 0.001g..

4.3 Test Process and Specification

4.3.1 Charge Method

Cells are charged with Constant Current and Constant Voltage (CC/CV) method at the environment temperature of (25±2)℃.The constant current is 1/3I_1(A)and the constant voltage is 3.65V, Charge shall be terminated when the charge current has tapered to0.05I_1(A), then store cells

for 1h.

4.3.2 Test Item and Specification

Test item and specification should refer to table 2.

Table 2

Number	Item	Test profile	Specification
1	Appearance and Dimension	1.Eyeballing 2.Test cells' dimension with slide caliper	No deep scratch, No Transformation, No leakage ,Dimension should refer to the attached drawing 1.
2	Weight	Electronic Scale	494±15g
3	Open Circuit Voltage☆	Measure the open circuit voltage within 1h after charge cells per 4.3.1.	OCV ≥3.350V
4	Rated Discharge Capacity☆	Discharge cells at a 1/3I_1(A) current to 2.0V within 1h after charging cells per 4.3.1. Record the capacity. The cycle can repeat 5 times, when the capacity difference of 3 times continuously are less than 3%, the test can be terminated. Tack the average of last 3 discharge capacity.	1/3I_1Capacity ≥ Nominal Capacity
5	Discharge Capacity at1I_1(A) Current	Discharge cells at a 1I_1(A) current to 2.0V within 1h after charging cells per 4.3.1..Record the time or capacity.	1I_1Capacity ≥ 90% of RatedCapacity.
6	Maximum Charge Current	Discharge cells at a 1/3I_1(A) current to 2.0V after charge cells per 4.3.1. And record the capacity. Charge cells to 3.65V at a nI_1(A)current, and then charge cells at constant voltage(3.65V) until the currenthas tapered to 0.05I_1(A).	0.5I_1(A)(Continuous); 1I_1(A)(30s);
7	Maximum Discharge Current	Discharge cells at a 1/3I_1(A) current to 2.0V after charge cells per 4.3.1. And record the capacity.Charge cells at 1/3I_1(A) current， and discharge to 2V at a current of nI_1(A) .	1I_1(A)(Continuous); 1.5I_1(A)(30s);
8	Cycle Life☆	Charge cells at a 0.5I_1(A) current rate until the cell	Discharge Capacity (1500th

		voltage reaches 3.65V, then charge at the voltage of 3.65V until the charging current tapered to $0.05I_1$A； Then Cells shall be discharged at a constant current of $0.5I_1$(A).Discharge capacity shall be measured after 1500cycles.	Cycle) ≥80% of Nominal Capacity
9	Capacity Retention☆	1、After charging per 4.3.1,store the testing cells for 28 days at the environment temperature of(25±2)℃,then discharge to 2.0V at a $0.5I_1$(A)currentand measure the capacity.. 2、After charging per 4.3.1,store the testing cells at (55±2)℃ for 7 days,then discharge to 2.0V at a $0.5I_1$(A) current and measure the capacity.	Residual Capacity≥90% of NominalCapacity
10	Characteristics at High Temperature	Cells shall be charged per 4.3.1 and store for 5h at (55±2)℃,then discharge to 2.0V at a $0.5I_1$(A) current and measure the capacity.	Residual Capacity≥95% of NominalCapacity
11	Characteristics at Low Temperature	Cells shallbe charged per 4.3.1 and store for 24h at (-20±2)℃,then discharge to 2.0V at a $0.5I_1$(A)current and measure the capacity.	Residual Capacity ≥ 50% ofNominalCapacity
12	Short-Circuit Test★	Cell, charged per 4.3.1, shall be short circuited by connecting the positive and negative terminals of the cell with a copper wire having a maximum resistance≤5 mΩ for 10min. Observe 1h.	No Explosion, No Fire
13	Overcharge Test★	After charged per 4.3.1, test cells (with thermocouple) shall be overcharged with a sort of method below: **1st Method:** Charge test cells at $1I_1$(A),end test when the voltage reached 1.5 times ofend voltage . Observe 1h. **2nd Method:**Charge test cells at $1I_1$(A), then stopthe test when the charge time reached 1h. Observe 1h.	No Explosion, No Fire
14	Over Discharge Test★	Cell shall be charged per 4.3.1. Discharge cells at a $1I_1$(A) current and stop the test when the discharge time reached 90 min. Observe 1h.	No Explosion, No Fire, No Leakage

15	Thermal Test★	Put cells (with thermocouple) into the oven, then close the door.The oven temperature shall be raised at a rate of 5℃/min to a temperature of (130±2)℃. The cells shall be remained at this temperature for 30 min.Then, stop the test and observe 1h.	No Explosion, No Fire
16	Crush Test★	After charged test cells per 4.3.1, crush the cells vertically at the speed of (5±1) mm/s until cells` deformation reach to 30% or the voltage tapered to 0V, or the press reach to 200kN. Observe 1h.	No Explosion, No Fire
17	Drop Test★	A cell is charged in accordance with 4.3.1, then dropped from a height of 1.5m to the concrete ground. Cells shall be dropped with the terminals down.	No Explosion, No Fire, No Leakage

5.Caution

5.1 Charge

a)NO over-charge，the charge voltage should not be over 3.65V.

b) NO reverse charging.

c) Optimal charge temperature range is 15℃ ~ 35℃. Do not charge for a long time in the temperature less than 0℃.

5.2 Discharge

a) No short circuit

b) The end of discharge voltage must be over 2.0V.

c) Optimal discharge temperature range is 15 ℃~ 35℃. Do not discharge for a long time in the temperature more than 35℃

5.3 Put cells away from children.

5.4 Storage

a) For any short time storage (in one month), cell should be in a clean and dry area （humidity ≤65% RH） and at -40℃ ~+45℃ at half charged stage.

b) For any long time storage (in 6 month), cell should be in a clean and dry area（humidity ≤65% RH） and at -20℃ ~+35℃ at half charged stage.

6. Warning

6.1 Avoid overheat in any circumstances.Don't modify or disassemble the battery. It will be dangerous, and may cause ignition, heating, leakage or explosion.

6.2 Don't put cells in overheat circumstances or disposed in fire ,don't put cells under the sunshine.

6.3 Don't short-circuit positive(+) and negative(-) terminals. Keep away from metal or other conductive materials. Jumbling the batteries of direct contact with positive(+) and negative(-) terminals or other conductive materials may cause short-circuit and may even cause fire and explosion.

6.4 Don't reverse the positive (+) and negative (-) terminals.

6.5 Don't put cells in water or other conductive liquids or let cells absorb amoisture.

6.6 Don't impact cells excessively.

6.7 Don't solder the battery directly. Excessive heating may cause deformation of the battery components such as the gasket, which may lead to the battery swelling,leakage, explosion,or ignition.

6.8 Don't use abnormal cell which has damages by shipping stress, drop, short or something else, and which gives off electrolyte odor.

6.9 Don't contact cans directly or with other conductive materails during the using process.

7. Shipping

7.1 During transportation, keep the battery from acutely vibration, impacting, insolation, drenching.

7.2 The delivery battery should be at a half charged state.

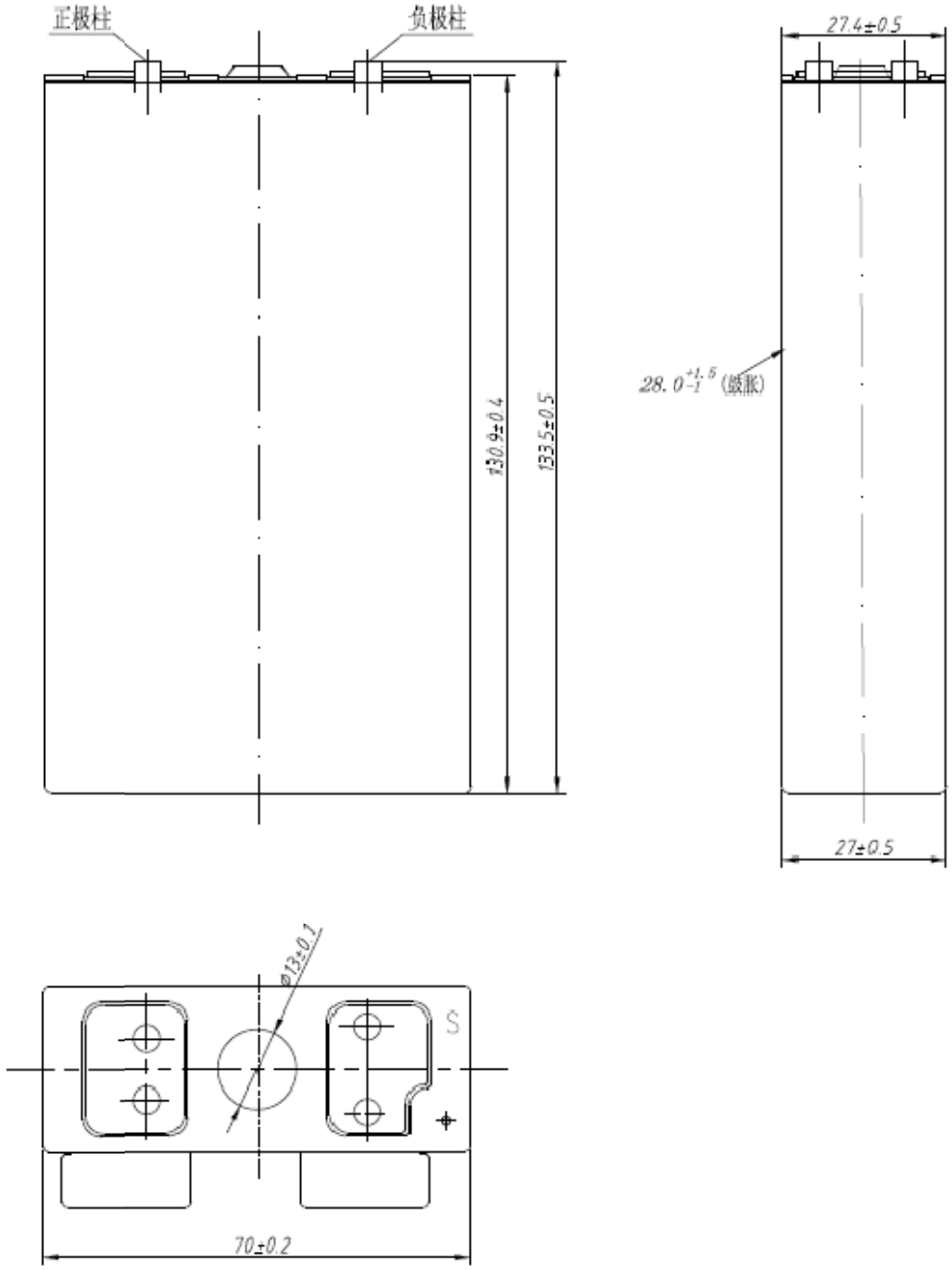
8. Others

If customers need to use or operating cells beyond the specified range of this file, please contact Tianjin Lishen Battery Joint-Stock Co., Ltd. Manufacturer will not be responsible for trouble caused by using c the specified range of this

Manufacturer will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.

Manufacturer will be exempt from warrantee any defect cells during assembling after acceptance.

Attached drawing 1



Drawing 1 Appearance and dimension of the battery