



## Specification Approval Sheet

Name: Li-ion Polymer Battery Pack

Model: 30540-0

SPEC: 3.7V 120mAh

Approved By	Checkup	Make

Customer Confirmation	Signature	Date
	Company Name :	
	Stamp :	

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## Content

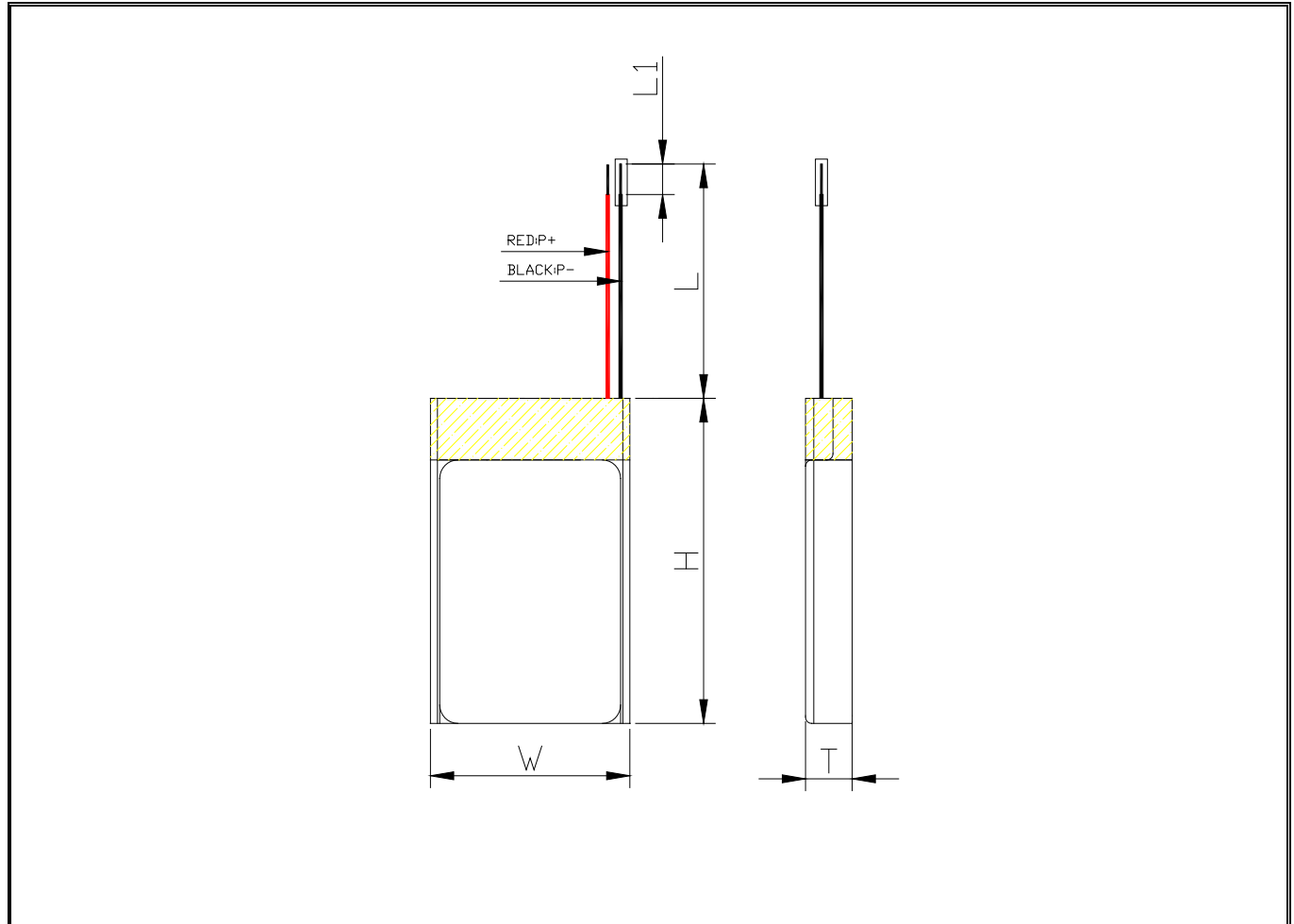
1. MODIFIED LIST .....	3
2. Scope.....	4
3. Initial Dimension .....	4
4. Specification .....	5
5 General Performance .....	6
6 Environment Performance .....	6
7 Safe Characteristic .....	7
8. Battery Protection .....	7
9. Warnings .....	7
10. Cautions .....	8
11. Handling of Cells .....	9
12. Period of Warranty .....	11
13. Others.....	11



## 2 .Scope

This specification describes the basic performance, technical requirement, testing method ,warning and caution of the Li-ion Polymer rechargeable battery pack, the pack defined in this documentation is an assembly which include battery, PCM and wire, the specification only applies to Tenergy Corporation.

## 3. Initial Dimension



Unit (mm)

T Max	3.2	W Max	20.5	H Max	32
L	12 ± 2	L1	1~3	Wire	1571/30#



**4.Specification**

NO.	Item	Specifications							
4.0	Nominal capacity	120mAh							
4.1	Min capacity	115mAh 0.2C Discharge							
4.2	Initial Impedance	≤150mΩ							
4.3	Weight	Approx: 5g							
4.4	Nominal voltage Fully charge voltage(FC) Fully discharge voltage(FD)	3.7 V 4.2 V Defined in this DOC: FC = 4.2 V 3.0 V Defined in this DOC: FD = 3.0 V							
4.5	Standard charge current	0.5 C							
4.6	Standard charging method	0.5C CC ( constant current ) charge to FC, then CV(constant voltage FC)charge till charge current decline to ≤0. 01C							
4.7	Charging time	Standard Charging Approx 3 hours							
4.8	Max. charge current	Constant Current 1C Constant Voltage FC 0.01 C cut-off							
4.9	Max. discharge current	Constant current 1C end voltage FD							
4.10	Standard Discharge Current	Constant current 0.2 C end voltage FD							
4.11	Charge cut-off voltage	FC							
4.12	Discharge cut-off Voltage	FD							
4.13	Storage temperature	<table border="1"> <tr> <td>-20°C~60°C</td> <td>≤1 month</td> <td rowspan="3">Percentage of recoverable capacity no less than 80% of the initial capacities</td> </tr> <tr> <td>-20°C~45°C</td> <td>≤3 month</td> </tr> <tr> <td>-20°C~28°C</td> <td>≤1 year</td> </tr> </table>	-20°C~60°C	≤1 month	Percentage of recoverable capacity no less than 80% of the initial capacities	-20°C~45°C	≤3 month	-20°C~28°C	≤1 year
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4.14	Recoverable capacity	Constant current 0.5C charge to FC, then constant voltage FC charge to current declines to 0.01C, rest for 10min, constant current 0.5C discharge to FD, rest for 10min.Repeat above steps 3 times, recording the maximum capacity							
4.15	Storage Humidity	≤75% RH							
4.16	Appearance	Without distortion and leakage							
4.17	Standard testing condition	Temperature: 23±5°C Humidity: ≤75%RH Atmospheric Pressure: 86-106 Kpa							

Remark: 1.From 4.1 to 4.12, the testing condition is following 4.17 (standard testing condition)

2.Operating temperature: charging: 0°C~45°C ; Discharging: -10°C~60°C

If the working condition is out of 4.17 , the performance will be some shift.



**5 General Performance**

No.	Item	Test Methods and Condition	Criteria
5.1	0.2C Capacity	At standard testing condition, after standard charging, rest battery for 10min, then discharging at 0.2C to voltage FD, recording the discharging time.	$\geq 300\text{min}$
5.2	1C Capacity	At standard testing condition, after standard charging, rest battery for 10min, then discharging at 1C to voltage FD, recording the discharging Capacity	$\geq 54\text{min}$
5.3	Cycle Life	At standard testing condition, constant current 0.5C charge to FC, then constant voltage charge to current declines to 0.01C, rest 10min, constant current 0.5C discharge to FD, rest 10min. Repeat above steps till continuously discharging capacity Higher than 80% of the Initial Capacities of the Cells	$\geq 300$ times
5.4	Capability of keeping electricity	At standard testing condition, After standard charging, no outer loading circuit, rest the pack 28days, discharging at 0.2C to voltage FD, recording the discharging time.	$\geq 240\text{min}$

**6 Environment Performance**

No.	Item	Test Methods and Condition	Criteria
6.1	Discharge at high temperature	At standard testing condition, after standard charging, rest the Cells 4h at $60 \pm 2^\circ\text{C}$ , then discharging at 1C to voltage FD, recording the discharging time.	$\geq 54\text{min}$
6.2	Discharge at low temperature	At standard testing condition, after standard charging, rest the Cells 16h at $-20 \pm 2^\circ\text{C}$ , then discharging at 0.2C to voltage FD, recording the discharging time.	$\geq 210\text{min}$
6.3	Thermal shock	After standard charging, put the pack in the oven. The temperature of the oven is to be raised at $5 \pm 2^\circ\text{C}$ per minute to a temperature of $130 \pm 2^\circ\text{C}$ and remains 30 minutes.	No fire, no smoke



**7 Safe Characteristic**

No.	Item	Test Methods and Condition	Criteria
7.1	Overcharge testing (NO PCM)	At standard testing condition , charging pack with constant current 3C to voltage 4.6V, then with constant voltage 4.6V till current decline to 0. Stop test till cells temperature 10°C lower than max temperature.	No smoke or fire
7.2	Over-discharge testing/ (NO PCM)	At standard testing condition, the pack be discharge to cut-off voltage, then connect with external load of 30 ohm for 24 hours.	No fire, no smoke, no leakage.
7.3	Short-circuit testing (NO PCM)	At standard testing condition, after standard charging, connect pack anode and cathode by wire which impedance less than 50mΩ , keep 6h.	No smoke or fire

※ Above testing of safe characteristic must be with protective equipment.

**8. Battery Protection**

The battery shall be with the over-charging prevention, over-discharging prevention, and over-current prevention during use. Protective circuit shall have protective functions as follows:

1) Over-charging protection

Overcharging prevention stops charging if any cell of the battery pack reaches 4.25V.

2) Over-discharging protection

The Over-discharging protection monitors the voltage of every cell in the pack and works to avoid a drop in the cell voltage to 2.8V or less.

3) Over-current protection

The cell shall be discharged at less than the maximum discharge current specified in the Specification Approval Sheet. A high discharging current may reduce the discharge capacity significantly or cause overheating.

**9. Warnings**

Load circuit may cause voltage and current, and the voltage or current may add to pack, the voltage or current must be controlled as lower than RWV and RWI, larger voltage or current may damage the PCM of pack.

To prevent the possibility of the pack from leaking, heating, fire ,please observe the following precautions:



- ☆ The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles .Do not strike at pack with any sharp edge parts.
- ☆ Do not immerse the pack in water and seawater
- ☆ Do not use and leave the pack near a heat source as fire or heater
- ☆ When recharging, use the battery charger specifically for that purpose
- ☆ Do not reverse the position and negative terminals
- ☆ Do not connect the pack to an electrical outlet
- ☆ Do not discard the pack in fire or heat it
- ☆ Do not short-circuit the pack by directly connecting the positive and negative terminal with metal object such wire
- ☆ Do not transport and store the battery together with metal objects such as necklaces, hairpins etc.
- ☆ Do not strike or throw the pack.
- ☆ Do not directly solder the pack or battery and pierce the battery with a nail or other sharp object.

#### **10. Cautions**

- Do not use or leave the pack at very high temperature (for example, at strong direct sunlight or a vehicle in extremely hot conditions).Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
- Do not use it in a location where static electricity is great, otherwise, the safety devices in the pack may be damaged, which will cause hidden trouble of safety.
- If the pack leaks and the electrolyte get into the eyes, do not rub eyes, instead, rinse the eyes, with clean running water, and immediately seek medical attention. Otherwise, eye injury can result.
- If the pack takes off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charge and stop using it.
- In case the pack terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.



- Be aware discharged battery may cause fire or smoke, tape the terminals to insulate them.
- The pack should be stored at room temperature, charged to about 40% to 60% of capacity. In case of over-discharge, pack should be charged for one time every 3 months while storing and batteries should be discharge and charge after being stored more than a year in order to activate it and restore energy.

### 11. Handling of Cells

#### 1 Soft Aluminum foil

Easily damaged by sharp edge parts such as pins and needles, Ni-tabs, comparing with metal-can-cased LIB.

- △Don't strike battery with any sharp edge parts
- △Trim your nail or wear glove before taking battery
- △Clean worktable to make sure no any sharp particle



2 Sealed edge may be damaged by heat above 100°C, bend or fold sealed edge.



#### 3 Prohibition short circuit

Never make short pack circuit. It generates very high current which causes heating of the cells and may cause electrolyte leakage, gassing or explosion that are very dangerous. The LIP tabs may be easily short-circuited by putting them on conductive surface. Such outer short circuit may lead to heat generation and damage of the cell.

#### 4 .Mechanical shock

ΔLIP cells have less mechanical endurance than metal-can-cased LIB.

ΔFalling, hitting, bending, etc. may cause degradation of LIP characteristics.



#### 12.Period of Warranty

The period of warranty is one year from the date of shipment. Tenergy guarantees to give a replacement in case of battery with defects proven due to manufacturing process instead of the customer abuse and misuse.

#### 13. Others

1.The customer is requested to contact Tenergy in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

2. Tenergy will take no responsibility for any accident when the battery is used under other conditions than those described in this Document.

3. Tenergy will inform, in a written form, the customer of improvement(s) regarding proper use and handing of the battery, if it is deemed necessary.

4. Any matters that this specification does not cover should be conferred between the customer and Tenergy.