



Specification Approval Sheet

Name: **Tenergy 9V 600mAh Li-ion Rechargeable Battery**

Model: **30593**

SPECS: **9V 600mAh**

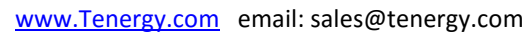
Approved By	Checkup	Make
Jay Wang		Yezi Dong

Customer Confirmation	Signature	Date
	Company Name:	
	Stamp:	

436 Kato Terrace, Fremont, CA 94539 U.S.A.

Tel: 510.687.0388 Fax: 510.687.0328

www.Tenergy.com





Tenergy Corporation

436 Kato Terrace

Fremont, CA 94539

Tel: 510.687.0388 Fax: 510.687.0328

www.Tenergy.com email: sales@tenergy.com

1. Scope

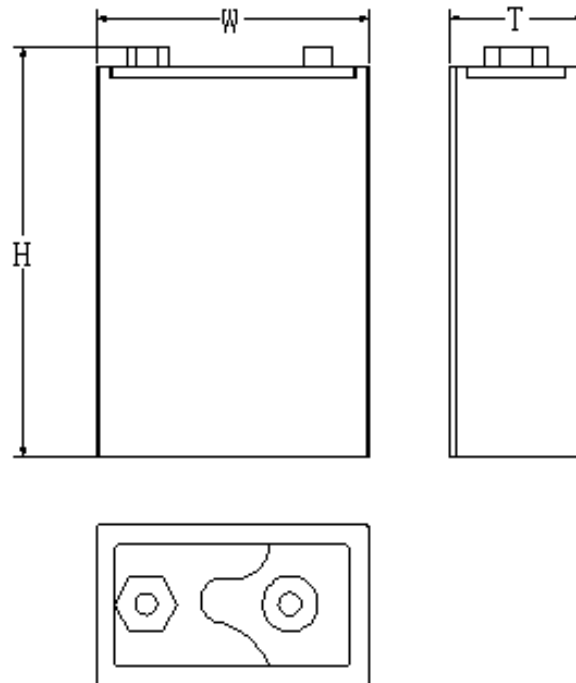
This specification describes the mechanical and electrical specification of Tenergy battery. This specification shall be applied to Li-ion polymer battery manufactured by Tenergy Corporation.

2. Product Configuration

No.	Item	Criteria	Remark
1	Li-ion polymer Battery Cell	LP-702235-3.7V	
2	PCM	PCM-F7.4V 2/4A	

3. Product Dimension

3.1 Pack Dimension



N O	Battery type	(mm)Dimensions T*W*H (max)	(mm) Lead exposure L	Terminal head direction	Immersion tin size
1	Li-ion polymer	17*28*49.5	/	/	/



4. Product Specification

No.	content	Testing method	Requirements
1	Charge cut-off voltage	$8.4 \pm 0.05V$	
2	Discharge cut-off voltage	$5.5 \pm 0.05V$	
3	Max discharge current	1.0C	
4	Rated capacity	Typical capacity : 600mAh Minimum capacity : 500mAh	standard discharge after standard charge
5	Standard charge	1. Charge the battery at constant current of 0.2C to reach 8.4V. Then charge the battery at constant 8.4V voltage until the charging current decreasing to 0.01C. 2. Charge the battery at constant current of 0.5C to reach 8.4V. Then charge the battery at constant 8.4V voltage until the charging current decreasing to 0.01C.	
6	Standard discharge	After the standard charging, rest for 1 hour then discharge to 5.5V@0.2C.	Discharging time \geq 300Min
7	Rate discharge	After the standard charging, rest for 1 hour then discharge to 5.5V@1C.	Discharging time \geq 51Min
8	High temperature characteristics	Fully charging, store them at $(60 \pm 2)^{\circ}C$ for 2 hours, then discharge to 5.5V @0.2C.	Discharging time \geq 51Min No transform No explosion, No fire, No leakage.
9	Low temperature Characteristics	Full charging, store them at $(-10 \pm 2)^{\circ}C$ for 16~24 hours, then discharge to 5.5V @0.2C.	Discharging time \geq 210 Min No transform , No explosion, No fire, No leakage.
10	Capacity retention	Fully charging, store them at $(20 \pm 2)^{\circ}C$ for 28 days, then discharge to 5.5V @0.2C.	Discharging time \geq 255Min

**Tenergy Corporation**

436 Kato Terrace

Fremont, CA 94539

Tel: 510.687.0388 Fax: 510.687.0328

www.Tenergy.com email: sales@tenergy.com

11	Cycle Life @25°C	Discharge to 5.5V @0.5C, then Charge the battery @0.5C to reach 8.4V. Then charge the battery at constant 8.4V voltage until the charging current decreasing to 0.01C. Rest for 10 min. discharge to 5.5V@ 0.5C and rest for 10 min. Continue the charge/discharge cycles until discharge capacity lower than 80% of rated capacity.	Cycle life ≥300
12	storage	Charge the battery to 40%~65% of its rated capacity using standard charging mode, then keep it in an 20°C±5°C, humidity 45%~85% room for 12 months. Discharge it @0.2C until voltage down to 5.5V. (The testing sample should be within 3 months dated from production date).	Discharge time≥240Min

5. Battery Cell Performance Criteria

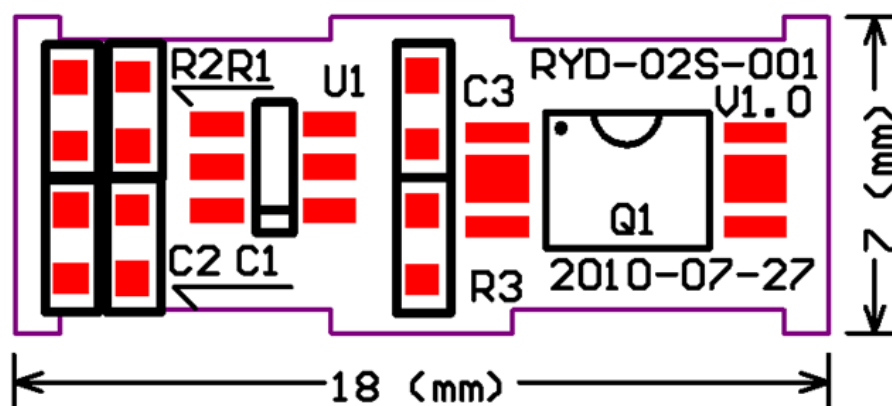
5.1 Electro chemical performance characteristics

No.	content	Testing method	Requirements
1	Hot & Humidity test	After full charging, store it at 40±2°C with 90%~95RH% for 48 hours. Then put the battery at room temperature 20±2°C for 2 hours. Then discharge to 2.75V @0.2C.	Discharging time≥36Min No explosion, No transform, No corrosion No fire, No leakage.
2	Vibration Test	After Standard Charging, fixed the battery to vibration table, then subjected to vibration test for 30 minutes per axis of XYZ axes Frequency rate :1 oct/min Vibration frequency : 10Hz-30Hz Excursion(single amplitude): 0.38mm Vibration frequency : 30Hz-55Hz Excursion(single amplitude): 0.19mm	No leaking, No fire, No explosion Voltage≥3.7V
3	Shock test	After Standard Charging, test condition: Acceleration :100m/s ² Crash time per min : 40~80 times Pulse lasting time : 16ms Shock times : 1000±10times	No leaking, No fire, No explosion Voltage≥3.7V

4	Drop Test	After standard charging, drop the battery from 1000mm height onto 18mm~20mm thick hardwood surface. Two sides of X,Y,Z directions each (total 6 times) After the drop test, discharge the battery @1C to 2.75V. Then charge it @1C to full capacity. Continue the test, within 3 times the battery should reach the target once.	No leaking, No fire, No explosion Discharging≥51min
---	-----------	---	--

6. PCM parameter

6.1 PCM Diagram



7. Safety Testing Standard

No.	content	Testing method	Requirements
1	Over charge protection test	After standard charging. Apply a 7.4V stable Voltage and 1C stable current to the battery for 8 hours.	No fire No explosion No leaking
2	Over discharge protection test	After discharged to the cut-off voltage, the battery shall be subjected to a short-circuit condition with a load of resistance less than 30Ω for 24 hours	No fire No explosion NO leaking
3	Short circuiting protection test	After standard charging, the battery shall be subjected to a short-circuit condition with a wire of resistance less than 100mΩ for 1 hour. Cut off the circuit, Charge the battery with constant current at 1.0C for 5s	No fire 、 No explosion Voltage≥3.7V



Tenergy Corporation

436 Kato Terrace

Fremont, CA 94539

Tel: 510.687.0388 Fax: 510.687.0328

www.Tenergy.com email: sales@tenergy.com

4	Impact Test	After standard charge, Place the battery on a flat surface. A 9.1 kg article is to be dropped from a height of 100cm onto the sample. The battery is allowed to transform.	No fire No explosion
5	Heating Test	After standard charging, a battery is to be heated in an oven convection or circulating air oven. The temperature of the oven is to be raised at a rate of $5\pm 2^{\circ}\text{C}/\text{min}$ to a temperature of $130\pm 2^{\circ}\text{C}$ and last for 10 minutes.	No fire No explosion
6	Over Charge	After standard charging, put the battery in fume hood. Add constant voltage & current 4.8V 3C to the battery. Charging it until the battery reaches 4.8V, charging current decreases to almost 0A. Record the temperature curve of the battery. When the battery temperature decreases to about 10°C lower after reaching the peak temperature. End the test. This test is performed without PCM	No fire No explosion
7	Short Test Circuiting	After standard charging, put the battery in fume hood. Connect the Negative Pole and Positive pole directly. (the wire's resistance should below $50\text{m}\Omega$). Record the battery's temperature curve during the test. When the battery temperature decreases to about 10°C lower after reaching the peak temperature. End the test. This test is performed without PCM	No fire No explosion Cell temperature $< 150^{\circ}\text{C}$

Remark: Standard environmental test condition

Temperature: $25\pm 2^{\circ}\text{C}$; Humidity: $45\pm 20\%\text{RH}$ unless otherwise specified

Test condition:

1. for battery with PCM, all tests are tested with PCM except 6 and 7.
2. for battery without protect PCM, all tests without PCM.

8. Storage and Transportation

8.1.1 The Li-ion polymer battery pack should be stored in a cool, dry and well-ventilated area, and should be far from the fire and the high temperature.

8.1.2 The battery should store in the product specification book stipulation temperature range, the best storage temperature is $25\pm 5^{\circ}\text{C}$. The best humidity is $60\pm 15\%$.

8.1.3 The battery should be stored within room temperature, and charged to 40%~60% electric quantity (3.85V). In order to avoid over-discharge, we suggest charge and discharge the batteries every three months, then charge to 40%~60% electric quantity (3.85V).

8.2 Transportation:

8.2.1 Do not mix the battery products with other cargos.



Tenergy Corporation

436 Kato Terrace

Fremont, CA 94539

Tel: 510.687.0388 Fax: 510.687.0328

www.Tenergy.com email: sales@tenergy.com

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

8.2.3 Do not over 7 layers staking and upside-down.

8.2.4 The highest temperature in transportation is lower than 65°C.

9. Warning

9.1 In order to ensure the safe, battery should be installed safety device, in static than manufacturing request when electrostatic when do not use, otherwise, safety device would failure, battery overheat, rupture, explosion and fire.

9.2 In the normal use of the following conditions, otherwise they will overheat and catch fire, performance and shorten the life.

Ambient condition: (T temperature)

charging: 0~+65°C

discharging: -20~+65°C

storage within 30 days: -20~+60°C

storage within 180 days: -20~+45°C

9.3 If children use the battery, you should specify them by using the instructions for use, and ensure the battery at any time must be in normal use.

9.4 If the battery leaks, electrolytes stick to the skin or clothing, wash off with water or fluid washing clothes or skin corrosion will die.

9.5 In order to not install error or loss of the battery, please carefully read the operating instructions, and follow the instructions for installation and removal (from device).

9.6 If the battery is not used, please take the battery out and placed in a dry place or electrical appliances will be corrosion of battery performance and reduce life.

9.7 If it is polluted battery terminal, please before you use it with a dry cloth to wipe clean, otherwise will result in poor contact with the device, power shortage or charge failure.

10. Others

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

11. Note:

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