



Specification Approval Sheet

Name: Li-ion Battery

Item#: 30281

SPEC: 3.6V 650mAh Li-ion Battery with PCM and Button Top

File Number: 8117017031001

Project: /

Approved By	Checkup	Make
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2016-01-29		2016-01-29

Customer Confirmation	Signature	Date
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1 Scope

This document describes the performance characteristics and testing methods for Li-ion battery produced by Tenergy Corporation.

2 Product type and model number

2.1 Product type: Li-ion Battery

2.2 Model number

3 Rated performance

Form 1: Battery rated performance

No	Item	Rated performance	Remark
1	Rated capacity	Nominal 650mAh Min 620mAh	Standard discharge after standard charge
2	Nominal voltage	3.7V	Mean operation voltage during standard discharge after standard charge
3	Voltage at end of discharge	3.0V	Discharge cut-off voltage
4	Charging voltage	4.2V	
5	Impedance	≤125 mΩ	
6	Standard charge	Constant current 0.2C ₅ A Constant voltage 4.2V Cut-off current ≤0.02C ₅ A	
7	Standard discharge	Constant current 0.2C ₅ A End voltage 3.0V	
8	Fast charge	Constant current 0.5C ₅ A Constant voltage 4.2V Cut-off current ≤0.02C ₅ A	
9	Fast discharge	Constant current 0.5C ₅ A End voltage 3.0V	
10	Maximum continuous charge current	0°C~15°C: 0.2C	
		15°C~45°C: 1.0C	
11	Max. Continuous Discharge Current	-20°C~60°C: 2.0C	
12	Operation temperature range	Charge: 10~45°C	60±25% R.H
		Discharge: -20~60°C	
13	Cycle life	>300cycles	Charging/discharging in the below condition: Charge: standard charge Discharge: 0.2C ₅ A to 3.0V Rest time between charge/discharge: 30min Until the discharge capacity <80% of NC
14	Storage temperature	≤1 month: -20 ~ 45°C	60±25% R.H, Best 10~25°C for long-time storage
		≤3 months: -10 ~ 25°C	
		≤1 year: 0 ~ 30°C	
15	Weight	Approx: ≈18g	
16	Dimension(mm)	Thickness*Width*Height(Max)	16.85*34mm (Cap: 1.2±0.3)

4 Electrical performances

Form 2: Battery electrical performances

No	Items	Test procedure	Requirements
1	Nominal voltage	The average value of the working voltage during the whole discharge process.	3.7V
2	Discharge performance	The discharge capacity of the battery, measured with 0.2C ₅ A down to 3.0V within 1 hour after a standard charge at 25±5°C	Discharge ≥Minimum capacity
3	Capacity retention	After 28 days storage at 25±5°C, after having been standard charged and discharged at 0.2C ₅ A to 3.0V (the residual capacity is above 85% of nominal capacity)	Discharge time ≥4.25h
4	Cycle life	Charging/discharging in the below condition: Charge: standard charge at 25±5°C Discharge: 0.2C ₅ A to 3.0V Rest time between charge/discharge: 30min Until the discharge capacity <80% of NC	>300cycles
5	Storage	(Within 3 months after manufactured) The battery is charged with 0.2C ₅ A to 40-50% capacity and stored at ambient temperature 25±5°C, 65±20%RH for 12 months. After the 12 months storage period the cell is fully charged and discharged to 3.0V with 0.2C ₅ A	Discharge time ≥4h

5 Standard test conditions

Test should be conducted with new batteries within one week after shipment from our factory and the batteries shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of 20±5°C and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature 15~30°C and humidity 25~85%RH.

6 Cautions in use

To ensure proper use of the battery please read the manual carefully before using it.

6.1 Handling

Do not expose to, dispose of the battery in fire.

Do not put the battery in a charger or equipment with wrong terminals connected.

Avoid shorting the battery.

Avoid excessive physical shock or vibration.

Do not disassemble or deform the battery.

Do not immerse in water.

Do not use the battery mixed with other different make, type, or model batteries.

Keep out of the reach of children.

6.2 Charge and discharge

Battery must be charged in appropriate charger only.

Never use a modified or damaged charger.

Do not leave battery in charge over 24 hours.

6.3 Storage

Store the battery in a cool, dry and well-ventilated area.

6.4 Disposal

Regulations vary for different countries, Dispose of in accordance with local regulations.

7 Battery operation instruction

7.1 Charging

Charging current: Cannot surpass the biggest charging current which in this specification book stipulated.

Charging voltage: Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

Charging temperature: The battery must charge in the ambient temperature scope which this specification book stipulated. Use the constant electric current and constant voltage to charge. Do not reverse charge. When the positive electrode and the cathode meet together, damage can be made for the battery.

7.2 Discharging current

The discharging current shall not surpass the biggest discharging current stipulated in this specification book. The oversized electric current discharge can lower the battery storage capacity and cause battery to generate heat.

7.3 Electric discharge temperature

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

7.4 Over-discharge

Short time of excessively discharge will not affect the usage. But the long time excess discharge can damage the battery performance and cause the function losing. When the battery is not used for a long time, because of its automatic flashover characteristic, it may excessively discharges. To prevent excessively discharge occur, the battery should maintain certain electric quantity.

7.5 Storage of battery

The battery should be stored within the temperature range which stipulated in the specification book. If the storage time surpasses six months, you should carry on additional charge to the battery.

8 Other chemical reaction

Because batteries utilize chemical reactions, battery performance will deteriorate over time even only store there for a long period of time but without being used. In addition, if the using conditions, such as charge, discharge, ambient temperature etc. are not maintained within the specified ranges, the battery life expectancy may be shortened or the device which the battery is applied for could be damaged because of electrolyte leakage. If the battery can not sustain for a relatively long period of time at one charge, even if it is charged correctly, this may indicate it is time to change the battery.

9 Note

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

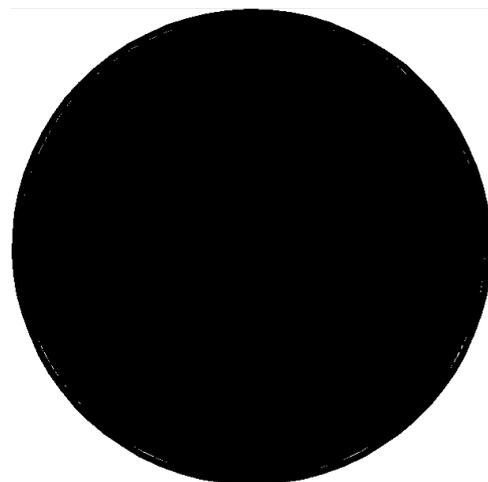
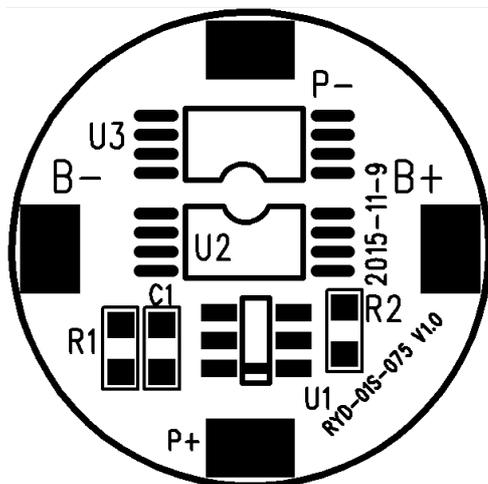
10 PCM performance (customer supply)

10.1 Electrical characteristics

Form 3: PCB electrical characteristics

Item	Content	Criterion
Over charge Protection	Over charge detection voltage	4.280±0.025V
	Over charge Detection delay time	1 ± 0.3s
	Over charge release voltage	4.080±0.050V
Over discharge protection	Over discharge detection voltage	2.90±0.073V
	Over discharge Detection delay time	20 ± 6ms
	Over discharge release voltage	3.10±0.078V
	Rated operational current	2A
Over current protection	Over current detection current	2~4.5A
	Release condition	Cut load
	Detection delay time	12 ± 4mS
Short protection	Detection condition	Exterior short circuit
	Release condition	Cut short circuit
Interior resistance	Main loop electrify resistance	$R_{DS} \leq 65m\Omega$
Current consumption	Current consume in normal operation	8.0µA Max
PCB Dimension(L*W*H)	16.2*2mm	

10.2 PCB Layout



11. Battery pack drawing

Drawing 1: Battery pack drawings

