



## Specification Approval Sheet

**Name:** Lithium Ion Battery

**Model:** 30016

**SPEC:** Li-18650 3.7V 2600mAh with PCM+Cap

Approved By	Checkup	Make
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2012-2-15	2012-2-15	2012-2-15

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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**

Lithium-ion Battery

**2.2 Model number**

Li-18650 3.7V 2600mAh with PCM+Cap

**3 Rated performance**

**Form 1: Battery rated performance**

No	Item	Rated performance	Remark
1	Rated capacity	Nominal capacity 2600mAh Minimum capacity 2520mAh	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	2.75V	Discharge cut-off voltage
4	Charging voltage	4.2V	
5	Impedance	<105mΩ	
6	Standard charge	Constant current 0.2C <sub>5</sub> A Constant voltage 4.2V Cut-off current ≤0.02C <sub>5</sub> A	
7	Standard discharge	Constant current 0.2 C <sub>5</sub> A End voltage 2.75V	
8	Fast charge	Constant current 0.5C <sub>5</sub> A Constant voltage 4.2V Cut-off current ≤0.02C <sub>5</sub> A	
9	Fast discharge	Constant current 0.5C <sub>5</sub> A End voltage 2.75V	
10	Maximum continuous discharge current	3.5A	
11	Operation temperature range	Charge: 0~45℃	60±25%R.H
		Discharge: -20~60℃	
12	Cycle life	>300cycles	Charging/discharging in the below condition: Charge: standard charge Discharge: 0.5C <sub>5</sub> A to 2.75V Rest time between charge/discharge: 30min Until the discharge capacity <60% of NC
13	Storage temperature	During 1 month: -5 ~ 35℃	60±25%R.H
		During 6 months: 0 ~ 35℃	
14	Weight	Approx: 50g	
15	Dimension(mm)	Diameter*Height (Max)	18.7*69.0



#### 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 <sub>5</sub> A down to 2.75V within 1 hour after a standard charge	Discharge time ≥ minimum capacity
3	Capacity retention	After 28 days storage at 25±5°C, after having been standard charged and discharged at 0.2C <sub>5</sub> A to 2.75V (the residual capacity is above 80% of nominal capacity)	Discharge time ≥ 4h
4	Cycle life	Charging/discharging in the below condition: Charge: standard charge Discharge: 0.5C <sub>5</sub> A to 2.75V Rest time between charge/discharge: 30min Until the discharge capacity < 60% of NC	> 300 cycles
5	Storage	(Within 3 months after manufactured) The cells is charged with 0.2C <sub>5</sub> 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 2.75V with 0.2C <sub>5</sub> 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.

##### 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.

##### 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.

##### storage

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

##### 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.

Charge temperature : The battery must carry on the charge in the ambient temperature scope which this specification book stipulated. Uses the constant electric current and the constant voltage way charge, the prohibition reverse charges. If the battery positive electrode and the cathode meet instead, can damage the battery.

**7.2 Discharging current**

The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery 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-discharges**

After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flashover characteristic certain excessively discharges the condition, or prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity.

**7.5 Storing the batteries**

The battery should store in the product specification book stipulation temperature range. If has surpasses above for six months the long time storage, suggested you should carry on additional charge to the battery.

**8 Period of warranty**

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

**9 Other the chemical reaction**

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.

**10 Note**

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

**11 PCM performance**

**11.1 Electrical characteristics**

**Form 3: PCM electrical characteristics**

Item	Content	Criterion
Over charge Protection	Over charge detection voltage	4.325±0.025V
	Over charge release voltage	4.075±0.025V
Over discharge protection	Over discharge detection voltage	2.5±0.05V
	Over discharge release voltage	2.9±0.05V
	Rated operational current	3.5A

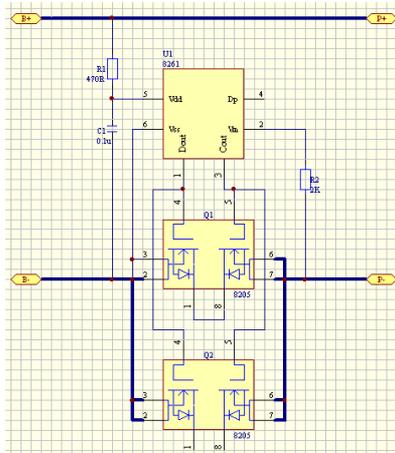
Over current protection	Over current detection current	6.5A ± 2A
	Release condition	Cut load
	Detection delay time	7.2~11.0ms
Short protection	Detection condition	Exterior short circuit
	Release condition	Cut short circuit
Interior resistance	Main loop electrify resistance	$V_C=4.2V$ ; $R_{DS} \leq 40m\Omega$
Current consumption	Current consume in normal operation	4.0μA Type 10.0μA Max
Dimension(L*W*H)	R8.65*0.5mm	

## 11.2 Parts list

**Form 4: PCM parts list**

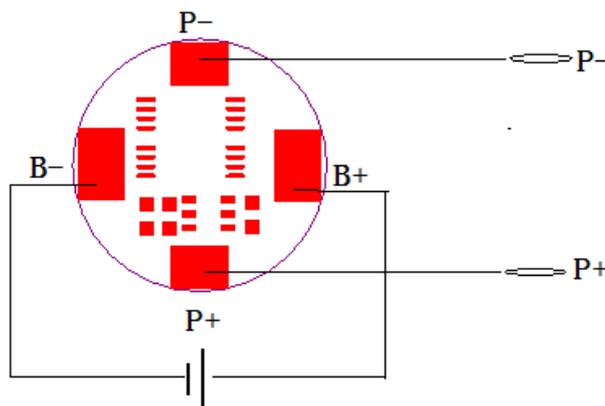
No	Location	Part name	Specification	Pack type	Q'ty
1	U1	Battery protection IC	IC-S-8261AAJMD-G2J	SOT-23-6	1
2	Q1,Q2	Silicon MOSFET	MOS-SME8205	TSSOP-8	2
3	R1	Resistance	SMD 470Ω±5%	0603	1
4	R2	Resistance	SMD 2KΩ±5%	0603	1
5	C1	Capacitance	SMD 0.1μF	0603	1

## 11.3 Application circuit



## 11.4 PCM layout

**Figure 2: PCM layout**



**11.5 Terminal explanations**

- 11.5.1 B+: Connected to the battery's positive terminal
- 11.5.2 B-: Connected to the battery's negative terminal
- 11.5.3 P+: Connected to the battery's output or the charger's positive terminal
- 11.5.4 P-: Connected to the battery's output or the charger's negative terminal

**12 Battery pack drawing**

**Drawing 1: Battery pack drawing**

