



Specification Approval Sheet

Name: **Tenergy LiFePO4 32650 3.2V Energy Cell**

Model: **30069-0**

SPECS: **3.2V 5000mAh**

| Approved By | Checkup | Make |
|-------------|---------|------|
| | | |

| 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



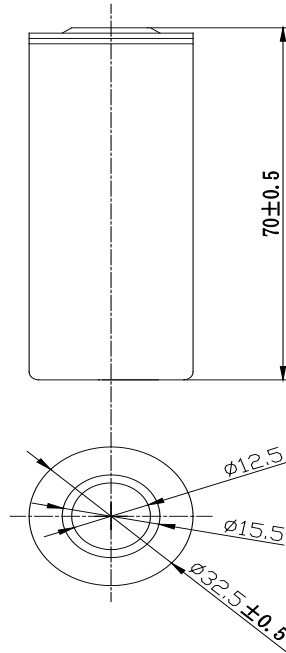
Tenergy Corporation

436 Kato Terrace
 Fremont, CA 94539
 Tel: 510.687.0388 Fax: 510.687.0328
www.Tenergy.com email: sales@tenergy.com

1、 Normal performance:

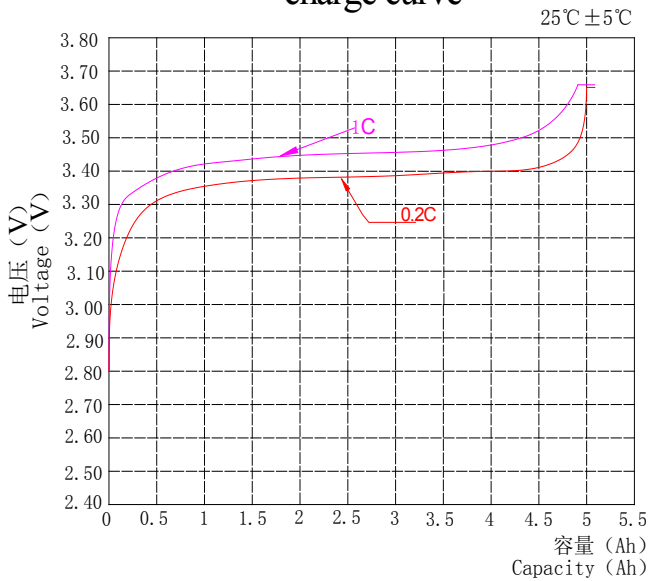
| NO. | Item | | General Parameter | | | Remark |
|-----|---|----------|-----------------------------|-------------|---------------|--------------------------|
| 1 | Model | | IFR 32650 | | | single |
| 2 | Casing material for single cell | | steel case for single cells | | | |
| 3 | Standard capacity (0.2C _{5A}) | | 5Ah | | | |
| 5 | Rated voltage | | 3.2V | | | Work voltage |
| 6 | Max.Charge voltage | | 3.65V | | | |
| 7 | Cut-off voltage | | 2.5V | | | |
| 8 | Standard charge and discharge current | | 1A | | | 0.2C |
| 9 | charging Time | | About5.0hours | | | 0.2C |
| 10 | Max Continuous discharge current | | 10A | | | 2C |
| 12 | Peak discharge current | | 25Ah | | | 5C _{5A} (5s) 5s |
| 13 | Diameter | | 32.5 ±0.5 mm | | | |
| 14 | height | | 70 ±0.5 mm | | | |
| 15 | Weight(Approx, including case) | | About 150g | | | |
| 16 | Impedance (Max, at 1000Hz.) | | ≤12mΩ | | | |
| 17 | Charge method (CC/CV) | Standard | CC | 0.2C | 3.65V cut off | |
| | | | CV | 3.65V | 0.05C cut off | |
| 18 | Operate temperature | | Charge | 0°C ~45°C | | |
| | | | Discharge | -20°C ~60°C | | |
| | | | Storage | -20°C ~45°C | | |

2.0 Drawing for single cell:

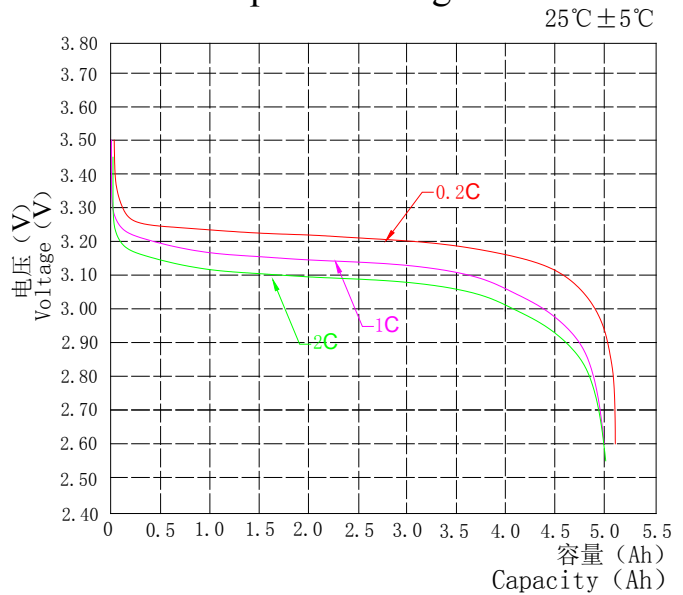


3. 0 charge and discharge curve:

充电曲线图
charge curve



放电曲线图
Diploid discharge curve





Tenergy Corporation

436 Kato Terrace
 Fremont, CA 94539
 Tel: 510.687.0388 Fax: 510.687.0328
www.Tenergy.com email: sales@tenergy.com

4.0 Performance:

4.1 electrochemistry performance:

| No. | Project | Standard | Testing method |
|-----|---|---|--|
| 1 | Discharge performance in normal temperature | Discharge capacity /standard capacity×100% (A)0.2C ₃ A ≥100% (B)1C ₃ A ≥95% | Charge with 0.2C ₅ A standard charge in the condition of temperature 25°C±5°C, relative humidity 45%~80% (if there is no especial statement , the charging way is same as this) , rest for 10min, separated discharge with 0.2C ₅ A、1C ₅ A to cut-off voltage 2.5V, cycles for three times, One cycle capacity arrive standard, that's to say it is qualified.(The below as the same) |
| 2 | Charging keep ability in normal temperature | Remain capacity ≥standard capacity *95% | After standard charged, rest it in 25°C±5°C for 1 months. Then discharge with 0.2C ₅ A to 2.5V, testing the battery capacity. |
| 3 | Cycle life | Capacity ≥ Standard capacity *80% | After 0.2C ₅ standard charged ,discharge with 0.2C ₃ A to 2.5V.rest for10min, cycles for 2000 times. |
| 4 | Storage performance | Capacity can be kept ≥ 80% Storage for 12 months. | After standard charged , rest for 12 months , discharge with 0.2C ₅ A to 2.5V , test the remain capacity; 0.2C/0.2C test the recover capacity, cycle for 3 times , One cycle capacity arrive standard, that's to say it is qualified. |

4.2 environment adaptive performance

| No. | Project | Standard | Testing method |
|-----|---------|----------|----------------|
|-----|---------|----------|----------------|



Tenergy Corporation

436 Kato Terrace
 Fremont, CA 94539
 Tel: 510.687.0388 Fax: 510.687.0328
www.Tenergy.com email: sales@tenergy.com

| | | | |
|---|--|--|--|
| 1 | Temperature Cycle performance | No smoking ,exploding, No fire | After standard charged, keep the battery for 48hrs under $60\pm 2^{\circ}\text{C}$, then rest for 6hrs under $-10^{\circ}\text{C}\pm 2^{\circ}\text{C}$, then rest for 24h under normal temperature, discharge with $0.2C_5A$ to 2.5V. with 0.2C/0.2C charge and discharge cycle for 3 times. |
| 2 | invariableness moist heat performance | Discharge capacity / standard capacity $\times 100\% > 60\%$ No exploding, No fire | After standard charged, keep in constant temperature and humidity case for 48hs under $40\pm 5^{\circ}\text{C}$, relative humidity 95%, then rest for 2h, discharge with $0.2C_5A$ to 2.5V. |
| 3 | Discharge performance in different temperature | Discharge capacity /Rated capacity $\times 100\%$ (A) $60^{\circ}\text{C} \geq 95\%$; (B) $0^{\circ}\text{C} \geq 85\%$; (C) $-10^{\circ}\text{C} \geq 60\%$; No exploding, No fire | After standard charged, constant temperature rest for 3hrs in $60\pm 2^{\circ}\text{C}$, discharge with $1C_5A$ to 2.5V, standard charge in normal temperature, separated rest for 20hrs in order $0\pm 2^{\circ}\text{C} / -10\pm 2^{\circ}\text{C}$, test the last capacity with $0.2C_5A$, Then rest 2h in the normal temperature. |
| 4 | Vibration environment adaptive performance | Remain capacity \geq original capacity*95% Voltage reducing rate $\leq 3\text{mV}$ Impedance increasing rate $\pm 3\text{m}\Omega$ No exploding, No fire | After standard charged, build battery in the vibration table-board, according to vibration frequency and relative moving to adjust the test equipment, from X、Y、Z three aspects, every aspect with 10Hz~55Hz vibrate for 30min, the speed is 1oct/min: (A)Vibration frequency: 10Hz~30Hz Moving: 0.38mm (B) Vibration frequency: 30Hz~55Hz Moving: 0.19mm. After test, $0.2C_5 / 0.2C_5$ test the remain capacity |

4.3 Safe performance

| No. | Project | Standard | Testing method |
|-----|-------------------------|--|--|
| 1 | Over-charge performance | No exploding, No fire The highest temperature $< 150^{\circ}\text{C}$ | After standard charged, Battery status should be ensure the normal (the same below), charge with $3C_5A$ to 10.0V, then change to charge with constant voltage |



Tenergy Corporation

436 Kato Terrace
Fremont, CA 94539
Tel: 510.687.0388 Fax: 510.687.0328
www.Tenergy.com email: sales@tenergy.com

| | | | |
|---|---|---|--|
| | | | and stop charge until the current is $0.05C_5A$, check the temperature and appearance of the battery. |
| 2 | Over-discharge performance | No exploding, No fire | After standard charged , discharge with $0.2C_5A$ to 2.5V, then connect the positive and negative with 10Ω resistor, rest for 60min. |
| 3 | Short-circuit performance in normal temperature | No exploding, No fire The highest temperature $<150^{\circ}C$ | After standard charged , keep the battery pack in explosion-proof box and connect positive and negative to short-circuit(the total impedance should not be over than $50m\Omega$), stop the testing when the temperature of the battery reduces $10^{\circ}C$ compare with the top one . check the temperature and appearance of the battery. |
| 4 | Acupuncture performance | .No exploding, No fire The highest temperature $<150^{\circ}C$ | After standard charged. Put the adminiculum, and connect with thermocouple. Then use the nails 3mm in diameter from the high position of battery to middle to puncture the battery completely. Check the temperature and appearance of the battery. |
| 5 | Thermal Shock safe performance | No exploding, No fire | After standard charged. put the battery to hot-box, and connect with thermocouple, the temperature from $(5^{\circ}C \pm 2^{\circ}C) /min$ to $150^{\circ}C \pm 2^{\circ}C$. And keep warm 30 Min. check the temperature and appearance of the battery. |

Remarks: the above standard professional word meaning is as below:

(1) Standard charge: with the ambient temperature $20^{\circ}C \pm 5^{\circ}C$, charge with $0.2C_5A$, When the voltage is up to the limited charging voltage 3.65V, change to constant voltage charge, stop charging until the charging current is $\leq 0.05C_5A$

(2) The Original situation: the original appearance, open voltage, Internal impedance.

(3) The last situation: the last appearance, open voltage, Internal impedance

(4) Remain capacity: The first discharge capacity after the specific inspecting process

(5) Recover capacity: The discharge capacity that through time after time cycles after the specific inspecting process.

(6) $0.2C/0.2C$ ($0.2C/1C$, $0.2C/2.5C$): Charge with $0.2C_5A$, When the voltage is up to the limited charging voltage 3.65V, change to constant voltage charge, stop charging until the charging current is $\leq 0.01C_5A$, Finish to charge, rest for 10mins, discharge with $0.2C_5A$ ($1C_5A$, $2.5C_5A$) constantly to cut-off voltage 2.5V.

5.0 The marks on package of the battery

- The warnings as following have to be indicated on the package of the battery
- Use the stated charger



- Don't throw the battery into water and fire or don't hot it up.
- Use the stated charger
- Don't break up the battery

6.0 The marks on package of the battery

In order to prevent the battery leaking, getting hot and exploding, please pay attention to preventing measure as following:

Warning !

- Never throw the battery into water, keep it under dry, shady and cool circumstance when not use.
- Never keep the battery beside high temperature source examples: fire, heating machine and ect.
- Please use the stated charger when charging.
- Never upside down the positive and negative.
- Never cut the battery in socket directly
- Never throw the battery into fire or heating machine.
- Never connect the positive and negative of battery with metal.
- Never ship or store the battery together with metal
- Never knock, throw or trample the battery.
- Never cut through the battery with nail or other edge tool.

Notices !

- Never use or keep the battery under the high temperature. Otherwise it will cause battery heat, get into fire or lose some function and reduce the life.
- Never use the battery under strong static and strong magnetic field, otherwise it will destroy the protecting device
- If battery leaked, the electrolyte get into eyes, please don't knead, please wash eyes by water and send to hospital. Otherwise it will hurt eyes
- If battery emit peculiar smell, heating, distortion or appear any unconventionality during using, storage or charging process, please take it out from device or charge and stop using.
- If the pole was duty, please clear it before using.
- Please encase the pole with isolative paper when you want to abandon the battery to prevent exploding and getting into fire.