Model ： LiFePO4 18650

Capacity ： 1500mAh

Voltage ： 3.2V

1 Scope

This specification is applied to the battery in this Specification.

2 Product Specification

Table 1

No.	Item	General Parameter		Remark
1	Rated Capacity	Typical	1500mAh	Standard discharge（0.2C_5A）after standard charge
		Minimum	1430mAh	
2	Nominal Voltage	3.2V		Operation Voltage
3	Voltage at end of Dischargr	2.0V		Discharge Cut-off Voltage
4	Charging at end of Voltage	3.65V		
5	Standard charge	Constant Current 0.2C_5A Constant Voltage 3.65V 0.02C_5A cut-off		Charge time：Approx 6.0h
6	Standard discharge	Constant Current 0.2C_5A end Voltage 2.0V		

No.	Item	General Parameter	Remark
7	Fast charge	Constant Current 1C_5A Constant Voltage 3.65V 0.01C_5A cut-off	Charge time：Approx 2.5h
8	Fast discharge	Constant Current 1C_5A end Voltage 2.0V	
9	Maximum Continuous Charge Current	1C_5A	
10	Maximum Continuous Discharge Current	3C_5A	
11	Operation Temperature Range	Charge：0~45℃	60±25%R.H.
		Discharge：-10~60℃	
12	Storage Temperature Range	Less than 1 year：-20~25℃	60±25%R.H.
		Less then 3 months：-20~40℃	
13	Weight	Approx：40g	
14	Pack Dimension	Height：(h) 65.0±0.3mm）	
		Width：(d) 18.1±0.3mm）	

3 Performance And Test Conditions

Standard Test Conditions

Test should be conducted with new batteries within one week after shipment and the cell shall not be cyded more than five times before the test. Unless otherwise specified,test and measurement shall be done under temperature of 20±5℃ and relative humidity of 45~48%.if it is judged that the test results are not affected by such conditions,the tests may be conducted at temperature 15~30℃ and humidity 25-85%R.H.

Appearance

There shall be no sucu defect as flaw,crack,rust,leakage,which may adversely affect commercial value of battery.

Initial Performance Test

Item		Test Method Condition	Requirements
（1）	Open-circuit Voltage	The open-circuit voltage shall be measured within 24 hours after standard charge.	
（2）	Intermal impedance	Intermal resistance measured at AC 1KHz after 50% charge	
（3）	Minimal Rated Capacity	The capacity on 0.2 C_5A discharge till the voltage tapered to 2.0V shall be measured after rested for 30min then finish standard charge.	Discharge Capacity

Temperature Dependence of discharge capacity

Cells shall be charged Standard and discharged @0.2 C_5A to 2.0 volts.Except to be discharged at temperaures per Table 3. Cells shall be stored for 3 hours at the test temperature prior to discharging and then shall be discharged at the test temperture.The capacity of a cell at each temperture shall be compared to the capacity achieved at 23℃ and the percentage shall be calculated.Each cell shall meet or exceed the requirements of Table 3.

Table 3

Discharge Temperature	-10℃	0℃	23℃	60℃
Discharge Capacity(0.2 C_5A)	50%	80%	100%	95%

Cycle Life and Leakage-Proof

Table 4

No.	Item	Criteria	Test Conditions
1	Cycle Life （0.5 C_5A）	Higher than 80% of the Initial Capacities of the Cells	Carry out 1000 cycle Charging/Discharging in the below condition. ◆ Charge:Standard Charge, ◆ Discharge:0.5 C_5A to 2.0V ◆ Rest Time belween charge/discharge:30min. ◆ Temperayure:20±5℃
2	Leakage-Proof	No leakage (visual inspection)	After full charge with standard charge,store at 60±3℃,60±10%RH for 1 month.

4．Mechanical characteristies and Safety Test

Table5 （Mechanical characteristies）

No.	Item	Test Method and Condition	Criteria
1	Vibration Test	After standard charging,fixed the cell to vibration table and subjection cycling that the frequeney is to be varied at the rate of 1Hz per minute between 10Hz an 55Hz,the excursion of the vibration is 1.6mm.The cell shall be vibrated for 30minutes per axis of XYZ axes.	No leakage No fire
2	Drop Test	The cdll is to be dropped from a height of 1 meter twice conto concrete ground.	No explosion, No fire,no leakage.

Table 6

Item	Battery Condition	Test Method	Requirements
Crush	Fresh,Fully charged	Crush between two flat plates.Applied force is about 13kN(1.72Mpa) for 30min.	No explosion,No fire
Short Circuit	Fresh,Fully charged	Each test sample battery,in turn,is to be short-circuited by conneting the (＋)and (－) terminals of the battery with a Cu wire having a maximum resistance load of 0.1Ω. Test are to be conducted at room temperature (20℃±2℃).	No explosion,No fire.The Temperature of the surface of the Cells are lower than 150℃
Short Circuit	Fresh,Fully charged	Each test sample battery,in turn,is to be short-circuited by connecting the (＋)and (－) terminals of the battery with a Cu wire having a maximum resistance load of 0.1Ω. Test are to be conducted at temperature (60℃±2℃).	No explosion,No fire.The Temperature of the surface of the Cells are lower than 150℃
Impact	Fresh,Fully charged	A 56mm diameter bar is inlayed into the bottom of a 10Kg weight.And the weight is to be dropped from a height of 1m onto a sample battery and then the bar will be across the center of the sample.	No explosion,No fire
Forced Discharge	Fresh,Fully charged	Discharge at a current of 1 C_5A for 2.5h.	No explosion,No fire
Nail Pricking 3mm	Fresh,Fully charged	Prick through the sample battery with a nail having a diameter of 3mm and remain 2h.	No explosion,No fire

5．Handling of Cells

Prohibition short circuit

Never short circuit cell. It generates very high current which causes heating of the cells and may cause electrolyte leakage are very dangerous.

The Li-Fe 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.

An appropriate circuitry with PCM shall be employed to protect accidental short circuit of the battery pack.

6．Notice for Designing Battery Pack

6.1 Pack toughness

Battery pack should have sufficient strength and the Li-Fe cell inside should be protected from mechanical shocks.

6.2 Cell fixing

The Li-Fe cell should be fixed to the battery pack by its large surface area.

No cell movement in the battery pack should be allowed.

6.3 Inside design

No sharp edge components should be insides the pack containing the Li-Fe cell.

6.4 Tab connection

Spot welding is recommended for Li-Fe tab connection method.

Battery pack should be designed that shear force are not applied to the Li-Fe tabs.

If apply manual solder,to connect tab with PCM.below notice is very important to ensure battery

◆ • performance：

◆ • The solder iron should be temperature controlled;

◆ • Soldering temperature should not exceed 350℃;

◆ • Soldering time should not be longer than 3s;

◆ • Soldering times should not exceed 5 times,Keep battery tab cold down before next time soldrictly g;

◆ • Directly heat cell body is strictly prohibited,Battery may damaged by heat above approx.100℃.

6.5 For accident.

Battery pack should be designed not to generate heat even when leakage occurs due to mishaps.

1）Isolate PCM (Protection Circuit Module) form leaked electrolyte as perfectly as perfectly as possible.

2）Avoid narrow spacing between bare circuit patterns with different voltage.(Including around connector)

3）Li-Fe battery should not have liquid from electrolyte,but in case if leaked electrolyte as possible touch bare circuit patterns,higher potential terminal material may dissolve and precipitate at the lower potential terminal,and may cause short circuit,The design of the PCM must have this covered.

7．Notice for Assembling Battery Pack

Shocks,high temperature,or contacts of sharp edge components should not be allowed in battery pack assembling process.

8．Others

8.1 Cell connection

1）Direct soldering of wire leads or devices to the cell is strictly prohibited.

2) Lead tabs with pre-soldering may cause damage of components,such as separator and insulator.by heat generation.

8.2 Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection.

The battery pack shall be structured with no short circuit within the battery pack ,which may cause generation of smoke or firing.

8.3 Prohibition of disassembly

1）Never disassemble the cells

The disassembling may generate internal short circuit in the cell,which may cause gassing,firing,explosion,or other problems.

2) Electrolyte is harmful

Li-Fe battery should not have liquid from electrolyte flowing,but in case the electrolyte come into contace with the skin,or eyes,physicians shall slush the electrolyte immediately with fresh water and medical advice is to be sought.

8.4 Prohibition of dumping of cells into fire

Never incinerate nor dispose the cells in fire.These may cause explosion of the cells,which is very dangerous and is prohibition.

8.5 Battery cells replacement

The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.

8.6 Prohibition of use of damaged cells

The cells might be damaged during shipping by shock.If any abnormal features of the cells are found such as damages in a plastic envelop of the cell,deformation of the cell package,smelling of an electrolyte ,an electrolyte leakage and others,the cells shall never be used any more.

The cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing or explosion.

9．Period of　Warranty

The period of warranty is a year from the date of shipment.

10．Storing the Batteries

The batteries should be stored at room temperature,charged to about 30% to 50% of capacity.

We recommend that batteries be charged about once per half a year to orevent over discharge.