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LP105080-CI • Polymer Lithium-ion battery

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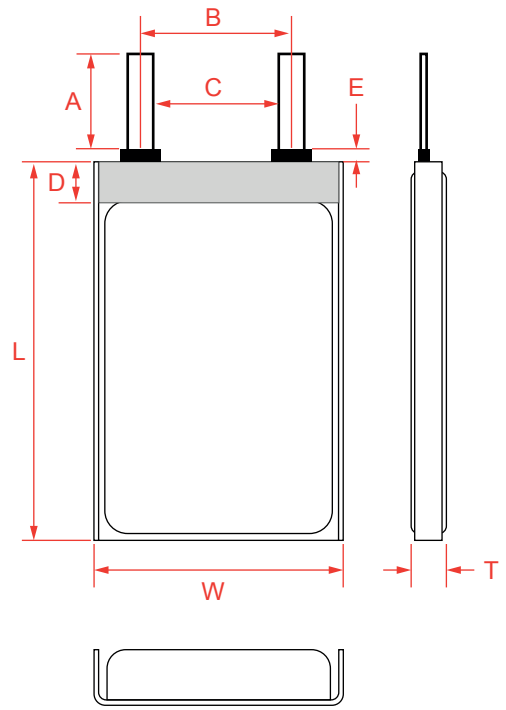
1. Scope

This specification is applied to the reference battery in this specification.

2. Drawing of cell



Items	Description	Dimension and Spec
T	Thickness	10.0 ± 0.2
W	Width	50.0 ± 0.3
L	Length	80.0 ± 0.5
A	Tab length	7.0 ± 1.0
B	Distance between 2 tabs	19.0 ± 1.0
C	Tab width	15.0 ± 0.2
D	Top sealing Width	3.5 ± 0.5
E	Sealant Length	1.0 ± 0.5

units: mm

3. Product specification (Table 1)

No.	Item	General Parameter	Remark
1	Rated Capacity	5000mAh	Standarddischarge 0.2C_5A after Standard charge.
2	Nominal Voltage	3.7V	
3	Battery limit voltage	4.2V	
4	Internal Impedance	≤80mΩ	Internal resistance measured at AC 1KHZ after 50% charge. The measure must uses the new batteries that within one week after shipment and cycles less than 5 times.
5	Standard charge	Constant Current 0.2C_5A Constant Voltage 4.2V 0.01 C_5A cut-off	Charge time : Approx 3.0h
6	Standard discharge	Constant current 0.2 C_5A end voltage 2.75V	Discharge time : Approx 2.0h
7	Fast charge	Constant Current0.5C_5A Constant Voltage 4.2V 0.01 C_5A cut-off	Charge time : Approx 2.0h
8	Maximum Continuous Charge Current	0.5C_5A	2.5A
9	MaximumContinuous Discharge Current	0.5C_5A	2.5A
10	Operation Temperature Range	Charge: 0~45ºC	60±25%R.H. Bare Cell
		Discharge: -20~50ºC	
11	Storage Temperature	Less than 1 months -20~50ºC	60±15%R.H. at the shipment state
		less than 6 months: -20~30ºC	
		Charge quantity50%~60%	
12	Weight	About 0.1kg.	

4. Performance and test conditions

4.1 Standard test conditions

Test should be conducted with new batteries within one week after shipment from our factory and the cells shall not be cycled more than five times before the test. Unless otherwise specified, test and measurement shall be done under temperature of 20±5ºC and relative humidity of 45~75%. If it is judged that the test results are not affected by suchconditions, the tests may be conducted at temperature 15~30ºC and humidity 25~75%RH.

4.2 Measuring instrument or apparatus

Dimension measuring instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance more than 10kΩ/V

Ammeter

Standard class specifiedGB/T18287-2000 in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω.

Impedance meter

Impedance shall be measured by a sinusoidal alternating current method (1kHz LCR meter).

4.3 Standard charge\discharge

Standard charging: the test process and standards are as follows:

0.2C_5A: Charging shall consist of charging at a 0.2C_5A constant current rate until the cell reaches 4.2V.

The cell shall then be charged at constant voltage of 4.2V volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 0.02C_5A . Charge time : Approx 3h, The cell shall demonstrate no permanent degradation when charged between 0 ºC and 45 ºC.

Standard discharge

0.2C_5A: Cells shall be discharged at a constant current of 0.2C_5A to 2.75 volts @ 20±5ºC

If no otherwise specified, the rest time between Charge and Discharge amount to 30min.

4.4 Appearance

There shall be no such defect as flaw, crack, rust, leakage, which may adverselyaffectcommercial value of battery.

4.5 Initial performance test (Table 2)

Item	Test method and condition	Requirements
Cell Voltage	As of shipment	3.8V~4V
Open-Circuit Voltage	The open-circuit voltage shall be measured within 24 hours after standard charge.	≥4V
Internal impedance	Internal resistance measured at AC 1KHz after 50% charge.	≤100mΩ
Minimal Rated Capacity	The capacity on 0.2C5A discharge till the voltage tapered to2.75V shall be measured after rested for 30min then finish standard charge.	≥4800mAh

4.6 Temperature dependence of discharge capacity

Cells shall be charged per 3.3.1 and discharged.Except to be discharged at temperatures 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 temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 23ºC and the percentage shall be calculated. Each cell shall meet or exceed the requirements of Table 3.

Table 3

Discharge Temperature	-20ºC	-10ºC	0ºC	23ºC	-20ºC
Discharge Capacity ($0.2C_5A$)	60%	80%	90%	100%	90%

4.7 Cycle life and leakage-proof (Table 4)

No.	Item	Criteria	Temperature:20±5ºC Test Conditions
1	Cycle Life $0.2C_5A$	Higher than 70% of the initial capacities of the cells	Carry out 300cycle Charging/Discharging in the below condition. • Charge:Standard Charge, per 4.3.1 • Discharge: Standard discharge, per 4.3.2 • Rest Time between charge/discharge:30min. • Charging: Standard charging, according to 4.3.1 • Discharge: Standard discharge, according to 4.3.2 • Shelve: 30min • Temperature: 20±5ºC

5. Mechanical characteristics and safety test

Table 5 - Mechanical characteristics

No.	Items	Test Method and Condition	Criteria
1	Vibration Test	After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency 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 30 minutes per axis of XYZ axes.	No leakage No fire
2	Drop Test	The cell is to be dropped from a height of 1 meter twice onto concrete ground.	No explosion, No fire, no leakage.
3	Collisions	After the vibration test, according to X.Y.Z each battery average three vertical pulse peak acceleration, the setting for the 100m/s2, every minute, 40 ~ 80 collision frequency, pulse duration 16ms collision frequency ± 10 thousand.	No explosion, No fire, no leakage.

Table 6

No.	Items	Battery condition	Test Method	Requirements
9	High temperature performance	Fresh, fully charged	After charging Will a battery into 55±2ºC In the case of high temperature 2h Batteries in 55±2ºC 0.5C_5A discharge current to the termination voltage, discharge time should not below 108min,Battery will in environmental temperature 20±5ºC place 2h.	No explosion, No fire
10	Low temperature performance	Fresh, fully charged	After charging, will be a battery into -20± 2ºC degrees Celsius in the box, then 16h constant 24h ~ 0.2 C_5A with discharge current to the termination voltage, discharge time should not below 3h. After the experiment, the battery will in environmental temperature of 20 ± 5ºC condition 2h aside	No deformation and burst
11	Charged	Fresh, fully charged	A full battery, at ambient temperature 20 ±5ºC under the conditions of the battery will be open to 28d aside, 0.2 C_5A to terminate discharge current voltage,	the discharge time not below
12	Constant damp performance	Fresh, fully charged	Standard after the battery, Will a battery into 40±2ºC, Relative humidity 90~95% At constant temperature and humidity box after 48h Battery will in environmental temperature 20±5ºC Aside 2h, 0.5 C_5A to terminate discharge current voltage,	No obvious deformation, hands rust,smoke, explosion, discharge time not less than 72 min

6. PCB specification

6.1 Electrical Characteristics

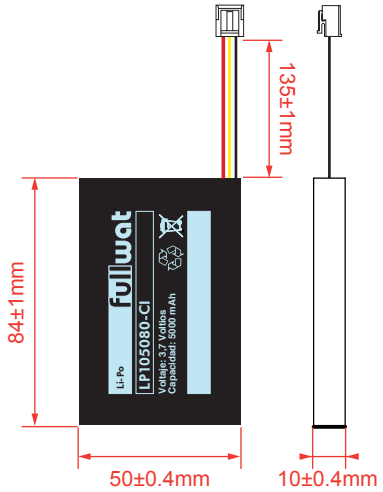
Topt=25ºC

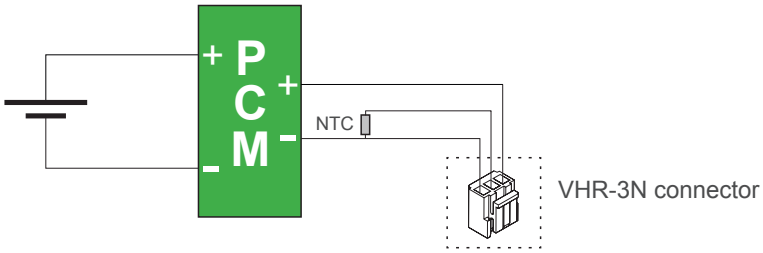
Item	Symbol	Content	Criterion
Over charge protection	$V_{DET}1$	Over charge detection voltage	4.25±0.05V
	$tV_{DET}1$	Over charge detection delay time	0.5~1.5s
	$V_{REL}1$	Over charge release voltage	4.05±0.05V
Over discharge protection	$V_{DET}2$	Over discharge detection voltage	2.5±0.1V
	$tV_{DET}2$	Over discharge detection delay time	10~100ms
	$V_{REL}2$	Over discharge release voltage	3.2±0.1V
Over-current protection	$V_{DET}3$	Over current detection voltage	0.15±0.015V
	I_{DP}	Over current detection current	3.5±1A
	$tV_{DET}3$	Detection delay time	2~11ms
		Release condition	Cut load
Short Circuit Protection		Detection condition	Exterior short circuit
	T_{SHORT}	Detection delay time	500μs (Max.)
		Release condition	Remove short circuit
Thermistor	NTC	Release condition	10kΩ±1%
Interior resistance	Rss	Main loop electrify resistance	R_{SS}≤60mΩ
Current consumption	I_{DD}	Current consumption in normal operation	3.0~9.0μA

6.2 PCB parts list

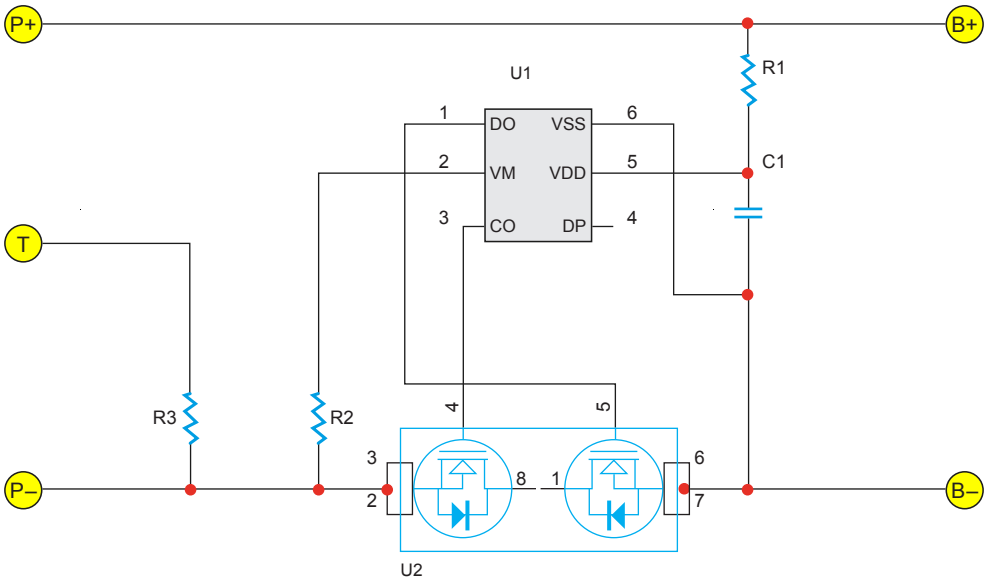
No.	Location	Part name	Specification	Pack type	Quantity	Marker/Remark
1	U1	Battery protection IC	S-8261DAA-M6T1U	SOT-23-6	1	
2	U2	Dual Silicon MOSFET	8205A	TSSOP-8	1	
3	R1	Resistance	SMD 100Ω±5%	0603	1	
4	R2	Resistance	SMD 1K±5%	0603	1	
5	R3	NTC	SMD 10K±1% 3435	0603	1	
6	C1	Capacitor	SMD 0.1μF	0603	1	
7	PCB	Print circuit board	2536-1S (28±0.15)*(3.5± 0.1)*(2.5+0.1)		1	

6.3. Drawing of battery pack





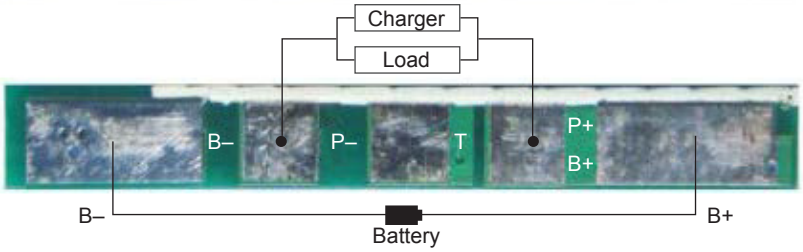
6.4. Application circuit



6.5. PCB layout

P+ = B+ = Charge+ / Discharge+

P– = Charge– / Discharge–



7. Handling of cells

7.1 Prohibition short circuit

Never make short circuit cell. It generates very high current which causes heating of the cells and may cause electrolyte leakage, gassing or explosion that are very dangerous.The LI tabs may be easily short-circuited by putting them on conductive surface.Such outershort circuit may lead to heat generation and damage of the cell. An appropriate circuitry with PCB shall be employed to protect accidental short circuit of the battery pack.

7.2 Mechanical shock

Falling, hitting, bending, etc. may cause degradation of LI characteristics.

8. Notice for designing battery pack

8.1 Pack toughness

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

8.2 Cell fixing

The LI cell should be fixed to the battery pack by its large surface area. No cell movement in the battery pack should be allowed.

8.3 Inside design

No sharp edge components should be insides the pack containing the LI cell.

9. Notice for assembling battery pack

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

10. Others

10.1 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.

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

10.3 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 prohibited.

10.4 Prohibition of cells immersion into liquid such as water

The cells shall never be soaked with liquids such as water, seawater,drinks such as soft drinks, juices, coffee or others.

10.5 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.

11. 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 3 months to prevent over discharge.

12. 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.

13. Note

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