



DATA SHEET

MODEL: 18650-2S2P-52M

DESCRIPTION: BATTERY PACK

1. Scope

This data sheet shows the essential conditions of the rechargeable Lithium-ion battery pack . The battery pack contains lithium-ion cells, safety devices and protection circuit units. All tests are made at 25°C.

2. Cell Basic Information

Description	Rechargeable Lithium Ion Battery Pack
Cell configuration	2P-2S
Model name	18650
Normal Voltage	7.4V
Normal Capacity	5200mAh
Min Capacity	5100mAh
Internal Resistance	<300 m Ω

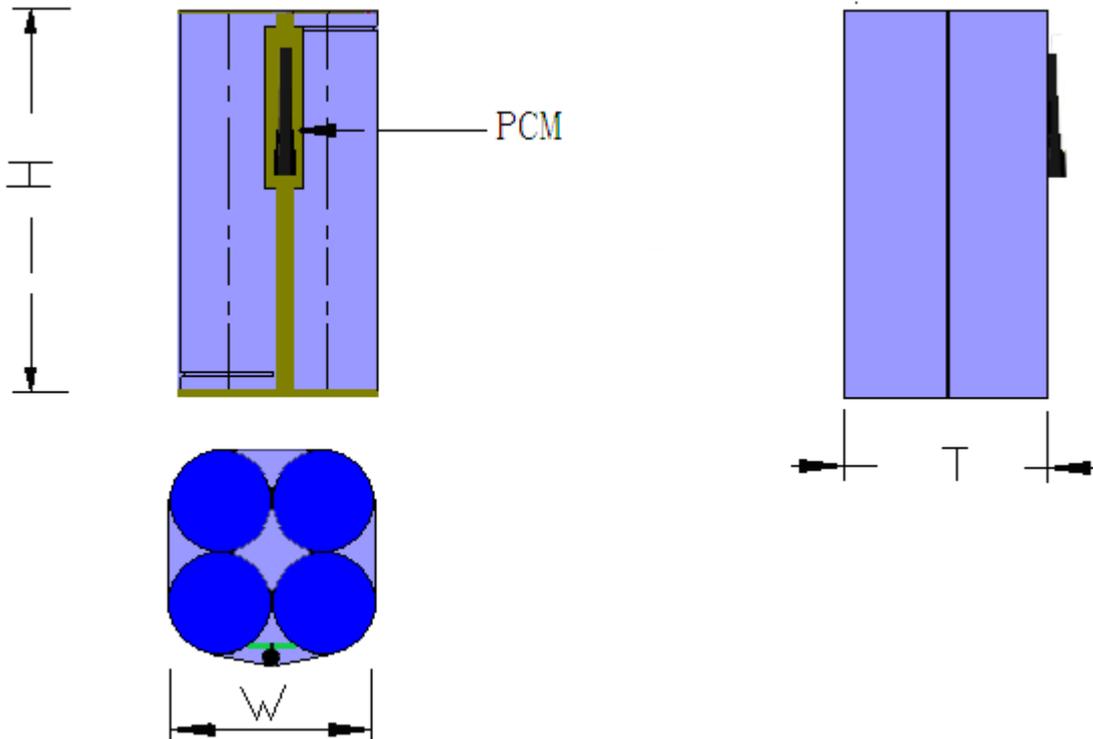
1. Battery Specifications

3-1. Electrical specifications

(1) Voltage	Normal	7.4V
(2) Capacity	Normal	5200mAh (by standard charge and discharge)
(3) Charge	Voltage	4.20+/- 0.05V
	Current	2600mA (0.5C Quick Charge) 1040mA (0.2C Continuous Charge)
	Method	CC/CV
	Finish	< 44mA
(4) Discharge	Current	2600mA (Continuous) 1040mA (Standard) 5200mA (Max)
	Empty	4.6V

3-2. Physical specifications

Size



H: 66.5 ± 0.5 mm

W: 38.0 ± 0.5 mm

T: $38.5+0/-0.5$ mm

WL:200mm

Connector:DC35135(3.5mm 1.35mm) TBD

Marking:

18650 7.4V

5200mAh 38.48Wh

3-3 Using conditions

(1) Temperature	Charge	0 ~ 45°C
	Discharge	-10 ~ 60°C
	Storage	-20 ~ 25°C (< 1 year) -20 ~ 40°C (< 3 months) -20 ~ 50°C (< 1 month)
(2) Humidity	Operation	20 ~ 85%RH (not condensed)
	Storage	40 ~ 85%RH (not condensed)

3-4. Safety specifications

(1)

Over Charge Prohibition: Shut down the circuitry and stop charge if one of cell's voltage exceeds more than $4.20 \pm 0.05V$ momentarily or continuously.(Meanwhile, it is able to discharge)

Delay Time: 1.5s(Typ.),1.7s(Max.)

(2)

Over Charge Release: In case of the cell voltage which has detected charge prohibition mode. If all of cells are less than: $4.15V \pm 0.05V$ prohibition mode would be reset.

(3)

Over Discharge Prohibition: Shut down circuitry and stop discharge if one of cell's voltage becomes less than $2.40V \pm 0.1V$ momentary or continuously.(Meanwhile, it is able to discharge)

Delay Time: 180ms(Typ.), 210ms(Max.)

(4)

Over Discharge Release: Recover when the voltage of cells reach above: $2.5V \pm 0.1V$. If battery pack is no voltage, please connect the power supply, and the voltage will recover.

(5)

Short circuit protection: When protection IC detects the voltage drop on MOS exceeds the specified voltage ($1.2V$ (Min.), $1.25V$ (Typ.), $1.3V$ (Max.)), it shall shut the circuit and stop discharge.

Delay time: 600us(Max.)

(6)

Excess current protection: When the protection IC detects the current exceeds the specified current($5.04A < I < 6.56A$, typ= $5.8A$), it shall shut the circuit and stop discharge.

Delay time: 4.48ms(Typ.), 13.5ms(Max.)

4. Performance and Tests

4-1. Test sampling and environmental conditions

(1) Test sample condition

The battery used for the test shall be manufactured and delivered no later than one month before.

(2) Environmental condition

$23 \pm 2^\circ C$ and $65 \pm 20\%RH$

The test shall be performed at $23 \pm 2^\circ C$ and $65 \pm 20\%RH$.

(3) Test equipment condition

The grade of Voltmeter and Ammeter used in the test shall be higher than class 0.5, a high impedance type.

4-2. Standard test conditions

(1) Standard Charge

"Standard Charge" means charging the pack with a Charge Current 0.2C with constant Voltage of 8.4V at 23±2°C for about 4 hours until the current <0.01c.

(2) Standard Discharge

"Standard discharge" means charging the pack with a Discharge Current 0.2C with constant Voltage down to 5.5V at 23±2°C.

4-3. General performance

(1) Initial capacity

Perform the Standard Charge and Discharge cycling for 3 times, and measure the last Discharge Capacity.

* The initial capacity shall be higher than minimum capacity

(2) Cycle life

After 300 cycles of Standard Charge and Discharge under conditions mentioned below, the pack is measured for Discharge Capacity.

* Each charge and discharge process includes 10 minutes rest time.

* Last Discharge Capacity after 300th cycle shall be higher than 80% of minimum capacity.

(3) Discharge Capacity with temperature

This means the relative value of Discharge Capacity at various temperatures compared with the Standard Discharge Capacity as 100%.

* Pack is charged under Standard Charge conditions.

* Pack is discharged under Standard Discharge conditions at various temperatures.

Relative capacity	70%	80%	100%	95%
At	-10°C	0°C	23°C	60°C

(4) Storage

A fully charged pack under Standard Charge condition is stored at 23±2°C for 30 days and the capacity is measured for the standard discharge condition.

* Remaining capacity shall be higher than 90% of the minimum capacity.

4-4. Mechanical performance

(1) Drop test

Test method :Dropping the battery pack freely on the hard board 18mm~20mm thickness at 1000mm height on 6 bearings of X、 Y、 Z freely each time.

(2) Vibration test

Test method:

This is to test the endurance of the pack against vibration.

Frequency and Amplitude: 10Hz → 55Hz → 10Hz / 0.8mm

Sweep speed: 1 ±0.055Hz/min

Criteria:., No damage such as leakage, flame, or fire is allowed.

5. Caution and prohibition

Before using and handling the pack, see attached "Handling instructions for Rechargeable Lithium IonBattery Pack".

For safety reasons Rechargeable Batteries are shipped in a low capacity state.

Charge battery pack before using.

New pack is the initialied. But if used over a period of time without fully charging and discharging, a loss in capacity accuracy may occur. Recover such packs to original performance through repeating several cycles of full charging and discharging.

6. Storage for a long term

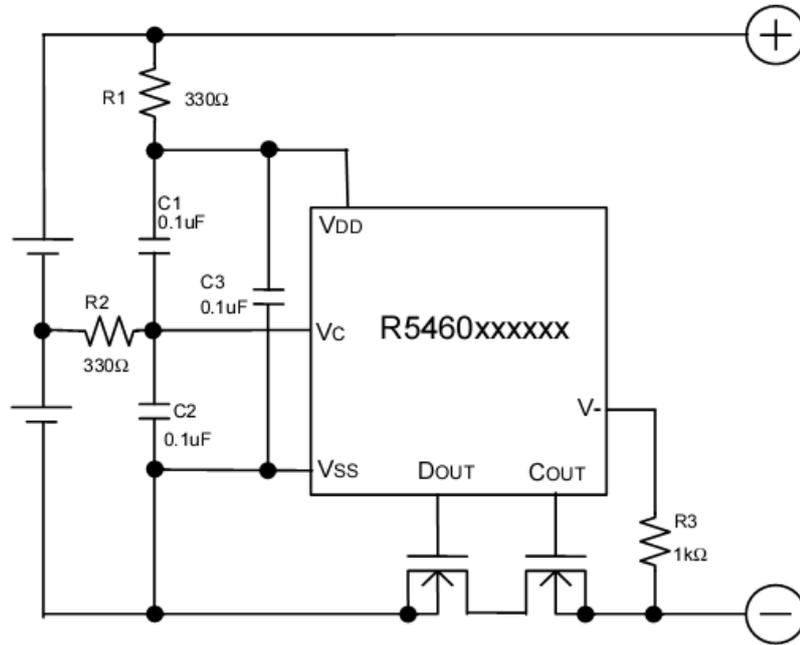
If the pack is kept in storage for a long term (3 months or more), it is strongly recommended that the pack be preserved in a dry and low temperature atmosphere.

7. Warranty

Manufacturer will be responsible for replacing the pack against defects or poor workmanship for 6 months from the date of shipping. Any other problem caused by malfunction of the equipment or misuse of the battery is not covered under this Warranty.

8. Appendix

8-1 PCM Diagram and Part list



Part list:

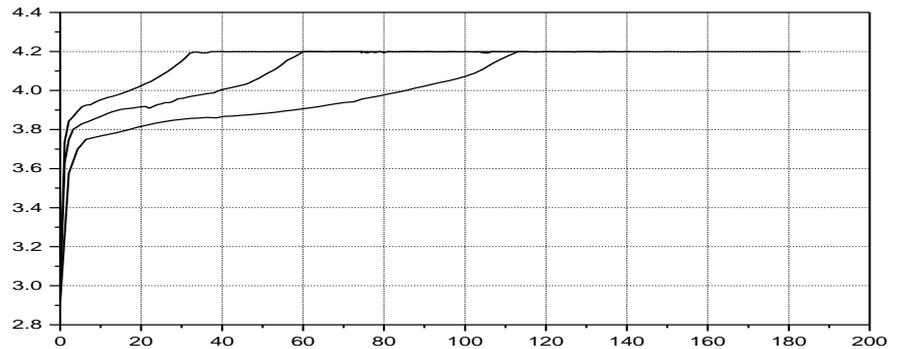
No.	Symbol	Description	Model/Spec.				Unit	Q'ty
1	U1	IC	R5460NK212	SOT-23-6		pcs	1	
2	U2, U3	MOSFET	f8205	TSSOP-8		pcs	2	
3	R1, R2	RES	331	5%	1/16W 0402	pcs	2	
4	R3	RES	102	5%	1/16W 0603	pcs	1	
5	C1-C3	CAP	104	5%	25V 0402	pcs	3	
6	PCB	PCB					pcs	1

8.2 Charge Rate

Characteristics

Charge:CC/CV,4.2V

Temperature: 25°C



8.3 Discharge Rate

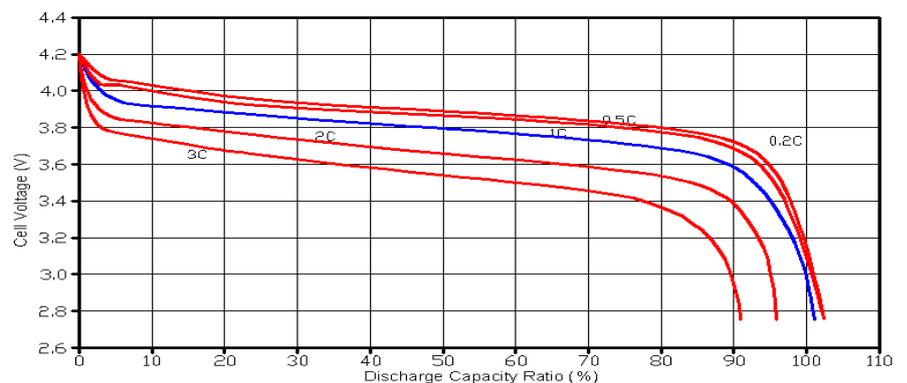
Characteristics

Charge:CC/CV,4.2V,

1C×2.5hrs

Temperature:25°C

Discharge: Constant current
to 2.75V



8-4 Handling instructions guide for Rechargeable Li-ion Battery Pack

1. General

Battery packs have to be handled carefully according to the specifications. Here are some more to be followed.

2. Storage of pack

a.

The packs are requested to be stored under the following conditions:

b.

Indoor storage in cool conditions without direct sun light on the packs or cartons.

c.

Store batteries in a dry location with low humidity, and a temperature range of -20°C to $+30^{\circ}\text{C}$

Instructions for 'long term storage':

d. Long-term storage can accelerate battery self-discharge and lead to the deactivation of the batteries. To minimize the deactivation effect, store battery packs in a temperature range of $+10^{\circ}\text{C}$ to $+30^{\circ}\text{C}$.

e.

When charging for the first time after long-term storage, deactivation of the packs may have led to decreased capacity. Recover such packs to original performance through repeating several cycles of fully charging and discharging.

f.

When storing packs for more than 6 month, charge at least once every 6 months to prevent leakage and deterioration in performance due to self-discharging.

3. Charging the pack

Use suitable Charger with the specified Voltage and Current.

b.

Never attempt Reverse Charging. Charging with polarity reversed can cause a reversal in battery polarity, causing gas pressure inside of the battery to rise, which can lead to leakage of the batteries in the pack.

c.

Avoid overcharging. Repeated overcharging can lead to deterioration in pack performance and the battery pack may get over heated.

d.

Charging efficiency drops at temperatures above 40°C.

2. Protection from unexpected damaged to pack

a. (+) and/or (-) terminals must not be connected in metal wire, necklace, chasing.

B .Do not drop packs from height in order to prevent them from possible malfunction or damage.

c. Do not twist or bend packs in order to prevent possible damage.

3. For Safety

a. Do not disassemble packs.

b. Do not use the pack if an abnormality is detected such as foul odor, deformation, discoloration, and so on.

c. Do not re-use Li-ion Polymer cells or other parts after removing from the packs.

d. Do not touch the liquid if there is an electrolyte leakage.

e., Once watered, packs may have potential malfunctions. Do not use those packs.

f. Do not keep packs in hot temperature (60°C or more) conditions.

g. Do not put packs into fire.

h. Do not crush/nail packs.

i.. Do not apply solder directly to packs.