SPECIFICATION OF PRODUCT

for Lithium-ion Rechargeable Cell

Model : SAMICR18650BPCM

Feb., 2023

History of Revisions

Date (YY.MM.DD)	Rev. No	Description	Approved by		Proposed by
			Quality(CS)	Development	

1. Scope

This product specification has been prepared to specify the rechargeable lithium-ion cell ('cell') SAMICR18650BPCM

2. Description and Model

2.1 Description Cell (lithium-ion rechargeable protected cell)

2.2 Model SAMICR18650BPCM

3. Nominal Specifications

Item	Specification
3.1 Nominal Capacity	2900mAh (0.2C, 2.75V discharge)
3.2 Minimum Capacity	2850mAh (0.2C, 2.75V discharge)
3.3 Charging Voltage	4.28 ±0.05 V
3.4 Nominal Voltage	3.78V
3.5 Charging Method	CC-CV (constant voltage with limited current)
3.6 Standard Charging Current	Standard charge: 1475mA (Reconmendation)
3.7 Standard Charging Time	Standard charge : 3hours
3.8 Max. Charge Current	2950mA(ambient temperature 25℃)
3.9 Max. Discharge Current	3500mA(ambient temperature 25℃)
3.10 Discharge Cut-off Voltage	2.40V
3.11 Cell Weight	49.0g max
3.12 Cell Dimension	Height : 70.00mm max Diameter : 18.50mm max
3.13 Operating Temperature (1*) (Ambient)	Charge : 0 to 45℃ Discharge: -20 to 50℃
3.14 Storage Temperature	1 year : -20~25℃(2*) 3 months : -20~45℃(2*) 1 month : -20~50℃(2*)

Note (1): Cell is suitable for Dell product and meet Dell's operation temperature requirement.

Note (2): If the cell is kept as ex-factory status (50% of charge),
the capacity recovery rate is more than 80%.

4. Outline Dimensions

See the attachment (Fig. 1)

5. Appearance

There shall be no such defects as scratch, rust, discoloration, leakage which may adversely affect commercial value of the cell.

6. Standard Test Conditions

6.1 Environmental Conditions

Unless otherwise specified, all tests stated in this specification are conducted at temperature 25±5℃ and humidity 65±20%.

6.2 Measuring Equipment

(1) Ammeter and Voltmeter

The ammeter and voltmeter should have an accuracy of the grade 0.5 or higher.

(2) Slide caliper

The slide caliper should have 0.01 mm scale.

(3) Impedance meter

The impedance meter with AC 1 kHz should be used.

7. Characteristics

7.1 Standard Charge

This "Standard Charge" means charging the cell with charge current 1475mA and constant voltage 4.35V at 25℃ for 3hours.

7.2 Standard Discharge Capacity

The standard discharge capacity is the initial discharge capacity of the cell, which is measured with discharge current of 590mA with 2.75V cut-off at 25℃ within 1hour after the standard charge.

Standard Discharge Capacity ≥ 2850mAh

7.3 Initial internal impedance

Initial internal impedance measured at AC 1kHz after rated charge.

Initial internal impedance ≤ 100mΩ

7.4 Temperature Dependence of Discharge Capacity

Capacity comparison at each temperature, measured with discharge constant current 590mA and 2.75V cut-off after the standard charge is as follows.

Charge Temperature	Discharge temperature			
25℃	-10℃	0℃	25℃	40℃
Relative Capacity	50%	80%	100%	80%

Note: If charge temperature and discharge temperature is not the same,
the interval for temperature change is 3 hours.
Percentage as an index of the capacity at 25℃(=2850mAh) is 100%.

7.5 Temperature Dependence of Charge Capacity

Capacity comparison at each temperature, measured with discharge constant current 590mA and 2.75V cut-off after the standard charge is as follows.

	Charge temperature			Discharge temperature
	0℃	25℃	45℃	25℃
Relative Capacity	80%	100%	80%	

Note: If charge temperature and discharge temperature is not the same,
the interval for temperature change is 3 hours.
Percentage as an index of the capacity at 25℃(=2850mAh) is 100%.

7.6 Charge Rate Capabilities

Discharge capacity is measured with constant current 590mA and 2.75V cut-off after the cell is charged with 4.35V as follows.

	Charge Condition		
Current	0.2C (590mA)	0.5C (1475mA)	1.0C (2950mA)
Cut-off	7h or 0.05C	3.0h or 0.05C	2.5h or 0.05C
Relative Capacity	100%	95%	90%

Note: Percentage as an index of the capacity at 25℃(=2850mAh) is 100%.

7.7 Discharge Rate Capabilities

Discharge capacity is measured with the various currents in under table and 2.75V cut-off after the standard charge.

	Discharge Condition			
Current	0.2C (590mA)	0.5C (1475mA)	1.0C (2950mA)	2.0C (5900mA)
Relative Capacity	100%	95%	90%	80%

Note: Percentage as an index of the capacity at 25℃(=2850mAh) is 100%.

7.8 Cycle Life

Each cycle is an interval between the charge (charge current 1475mA) with 3.0h or 0.05C cut-off and the discharge (discharge current 1475mA) with 2.75V cut-off. Capacity after 299cycles and plus 1 day, measured under the same condition In 7.2

Capacity ≥ 1995mAh(70% of the capacity at 25℃)

Storage cell over a period of time (especially over 1 month) is expected to show normal low temperature cycle performance (below 10'C), after it is pre-cycled(3*) 5 times at room temperature.

(3*) Pre-cycling: Each cycle is an interval between the charges (charge current 2360mA) with 3.0h or 0.05C cut-off and the discharge (discharge current 1475mA) with 3.0V cut-off.

7.9 Storage Characteristics

Capacity after storage for 30days at 25℃ from the standard charge, measured with discharge current 590mA with 2.75V cut-off at 25℃.

Capacity retention(after the storage) ≥ 2280mAh (80% of the capacity at 25℃)

7.10 Status of the cell as of ex-factory

The cell should be shipped in 50% charged state. In this case, OCV is from 3.65V to 3.85V.

8. Mechanical Characteristics

8.1 Drop Test

Test method: Cell (as of shipment or full charged) drop onto the oak-board (thickness: ≥30mm) from 4feet height at a random direction 6 times.

Criteria: No leakage

8.2 Vibration Test

Test method: Cell (as of shipment) is vibrated along 2 mutually perpendicular axes with total excursion of 1.6mm and with frequency cycling between 10Hz and 55Hz by 1Hz/min.

Criteria: No leakage

9. Safety

9.1 Overcharge Test

Test method: To charge the standard charged cell with 12V and 2.95A at 25℃ for 2.5 hours.

Criteria: No fire, and no explosion.

9.2 External Short-circuit Test

Test method: To short-circuit the standard charged cell by connecting positive and negative terminal by less than 50mΩ wire for 3hours.

Criteria: No fire, and no explosion.

9.3 Reverse Charge Test

Test method: To charge the standard charged cell with charge current 2.95A By –12V for 2.5 hours.

Criteria: No fire, and no explosion.

9.4 Heating Test

Test method: To heat up the standard charged cell at heating rate 5℃ per minute up to 130℃ and keep the cell in oven for 60 minutes.

Criteria: No fire, and no explosion.

10. Others

11.1 Storage for a long time

If the cell is kept for a long time (3months or more), It is strongly recommended that the cell is preserved at dry and low-temperature.

11.2 Other

Any matters that specifications does not have, should be conferred with between the both parties.

11.3 PTC Specification

	PTC Specification (in the Cell)			
Item	Hold Current	Resistance	Power Dissipation	Resistance After Trip
Spec.	3.0A	6~14mΩ	Max. 2.5W	Max. 26mΩ

11. Cell dimensions

See Fig.1,

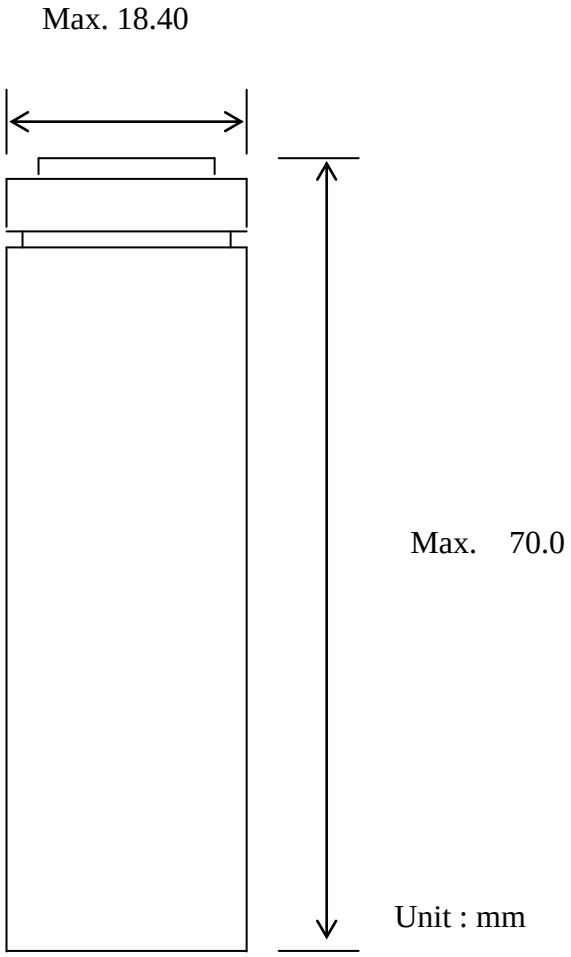

Fig.1. Outline Dimensions of SAMICR18650BPCM

Don't use seriously scared or deformed battery.

Don't put the battery into a microwave oven, dryer, or high-pressure container.

Don't use or assemble the battery with other makers' batteries, different types and/or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries.

Don't use or assemble old and new batteries together.

[Warning!]

Stop charging the battery if charging isn't completed within the specified time.

Stop using the battery if the battery becomes abnormally hot, order, discoloration, deformation, or abnormal conditions is detected during use, charge, or storage.

Keep away from fire immediately when leakage or foul odors are detected. If liquid leaks onto your skin or cloths, wash well with fresh water immediately.

If liquid leaking from the battery gets into your eyes, don't rub your eyes and wash them with clean water and go to see a doctor immediately.

If the terminals of the battery become dirty, wipe with a dry cloth before using the battery.

The battery can be used within the following temperature ranges. Don't exceed these ranges.

Charge temperature ranges : 0℃ ~ 45℃

Discharge Temperature ranges : -20℃ ~ 50℃

Store the battery at temperature below 50℃

Cover terminals with proper insulating tape before disposal.