

Spec. No.	ICR18650-26F	Version No.	0.0
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# SPECIFICATION OF PRODUCT

**for Lithium-ion Rechargeable Cell**

**Model : ICR18650-26F**

**May, 2009**

**Samsung SDI Co.,Ltd.  
Energy Business Division**

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### 1. Scope

This product specification has been prepared to specify the rechargeable lithium-ion cell ('cell') to be supplied to the customer by Samsung SDI Co., Ltd.

### 2. Description and Model

2.1 Description            Cell (lithium-ion rechargeable cell)

2.2 Model                 ICR18650-26F

### 3. Nominal Specifications

Item	Specification
3.1 Nominal Capacity	2600mAh (0.2C, 2.75V discharge)
3.2 Minimum Capacity	2550mAh(0.2C, 2.75V discharge)
3.3 Charging Voltage	4.2 ±0.05 V
3.4 Nominal Voltage	3.7V
3.5 Charging Method	CC-CV (constant voltage with limited current)
3.6 Charging Current	Standard charge: 1300mA Rapid charge : 2600mA
3.7 Charging Time	Standard charge : 3hours Rapid charge : 2.5hours
3.8 Max. Charge Current	2600mA(ambient temperature 25℃)
3.9 Max. Discharge Current	5200mA(ambient temperature 25℃)
3.10 Discharge Cut-off Voltage	2.75V
3.11 Cell Weight	47.0g max
3.12 Cell Dimension	Height : 65.00mm max Diameter : 18.40mm max
3.13 Operating Temperature	Charge : 0 to 45℃ Discharge: -20 to 60℃
3.14 Storage Temperature	1 year    : -20~25℃(1*) 3 months : -20~45℃(1*) 1 month  : -20~60℃(1*)

Note (1): If the cell is kept as ex-factory status (50% of charge),  
the capacity recovery rate is more than 80%.

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**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  $25\pm 5^{\circ}\text{C}$  and humidity  $65\pm 20\%$ .

**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 1kHz should be used.

**7. Characteristics**

**7.1 Standard Charge**

This "Standard Charge" means charging the cell with charge current 1300mA and constant voltage 4.2V at  $25^{\circ}\text{C}$  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 520mA with 2.75V cut-off at  $25^{\circ}\text{C}$  within 1hour after the standard charge.

$$\text{Standard Discharge Capacity} \geq 2550\text{mAh}$$

**7.3 Initial internal impedance**

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

$$\text{Initial internal impedance} \leq 100\text{m}\Omega$$

**7.4 Temperature Dependence of Discharge Capacity**

Capacity comparison at each temperature, measured with discharge constant current 520mA and 2.75V cut-off after the standard charge is as follows.

Charge Temperature	Discharge temperature			
	-10 $^{\circ}\text{C}$	0 $^{\circ}\text{C}$	25 $^{\circ}\text{C}$	40 $^{\circ}\text{C}$
Relative Capacity	50%	80%	100%	80%

Note: If charge temperature and discharge temperature is not the same,

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the interval for temperature change is 3 hours.  
 Percentage as an index of the capacity at 25°C (=2550mAh) is 100%.

**7.5 Temperature Dependence of Charge Capacity**

Capacity comparison at each temperature, measured with discharge constant current 520mA and 2.75V cut-off after the standard charge is as follows.

	Charge temperature			Discharge temperature 25°C
	0°C	25°C	45°C	
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°C (=2550mAh) is 100%.

**7.6 Charge Rate Capabilities**

Discharge capacity is measured with constant current 520mA and 2.75V cut-off after the cell is charged with 4.2V as follows.

	Charge Condition			
Current	0.2C (520mA)	0.5C (1300mA)	1.0C (2600mA)	2.0C (5200mA)
Cut-off	7h or 0.05C	2.5h or 0.05C	2.5h or 0.05C	2.5h or 0.05C
Relative Capacity	100%	95%	90%	80%

Note: Percentage as an index of the capacity at 25°C (=2550mAh) 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 (520mA)	0.5C (1300mA)	1.0C (2600mA)	2.0C (5200mA)
Relative Capacity	100%	95%	90%	80%

Note: Percentage as an index of the capacity at 25°C (=2550mAh) is 100%.

**7.8 Cycle Life**

Each cycle is an interval between the charge (charge current 1300mA) with 2.5h or

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0.05C cut-off and the discharge (discharge current 1500mA) with 2.75V cut-off.  
Capacity after 299cycles and plus 1 day, measured under the same condition  
in 7.2

Capacity  $\geq$  1785mAh(70% of the capacity at 25°C)

#### 7.9 Storage Characteristics

Capacity after storage for 30days at 25°C from the standard charge,  
measured with discharge current 1300mA with 2.75V cut-off at 25°C.

Capacity retention(after the storage)  $\geq$  2040mAh (80% of the capacity at 25°C)

#### 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:  $\geq$  30mm) from 1.5m 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 2.6A at 25°C  
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 50m $\Omega$  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 2.6A  
By -12V for 2.5 hours.

Criteria: No fire, and no explosion.

#### 9.4 Heating Test

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Test method: To heat up the standard charged cell at heating rate 5°C per minute up to 130°C and keep the cell in oven for 60 minutes.  
Criteria: No fire, and no explosion.

### 10. Warranty

Samsung SDI will be responsible for replacing the cell against defects or poor workmanship for 15 months from the date of shipping. Any other problem caused by malfunction of the equipment or mix-use of the cell is not under this warranty.

The warranty set forth in proper using and handling conditions described above and excludes in the case of a defect which is not related to manufacturing of the cell.

### 11. Others

#### 11.1 Storage for a long time

If the cell is kept for a long time (3 months 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.

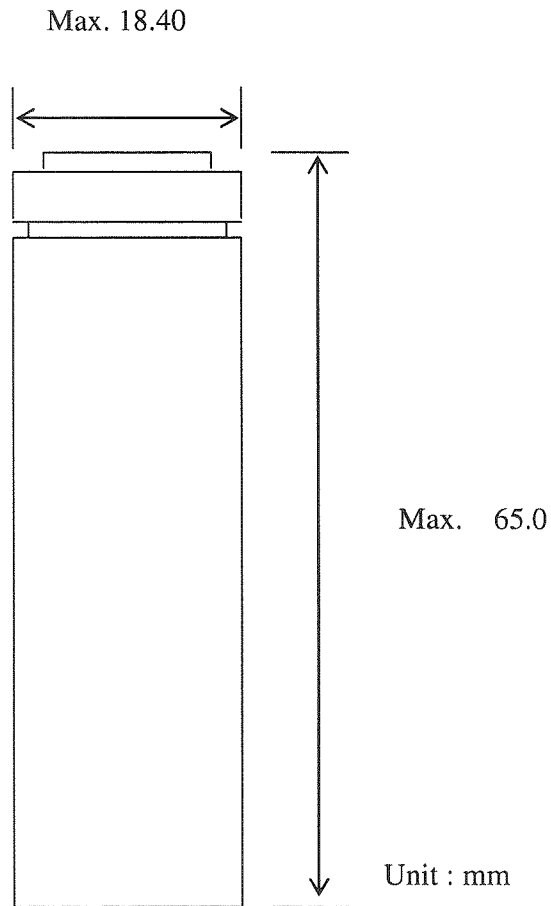
#### 11.3 PTC Specification

	PTC Specification (in the Cell)			
Item	Hold Current	Resistance	Power Dissipation	Resistance After Trip
Spec.	2.7A	9~18mΩ	Max. 2.5W	Max. 33mΩ

### 12. Packing

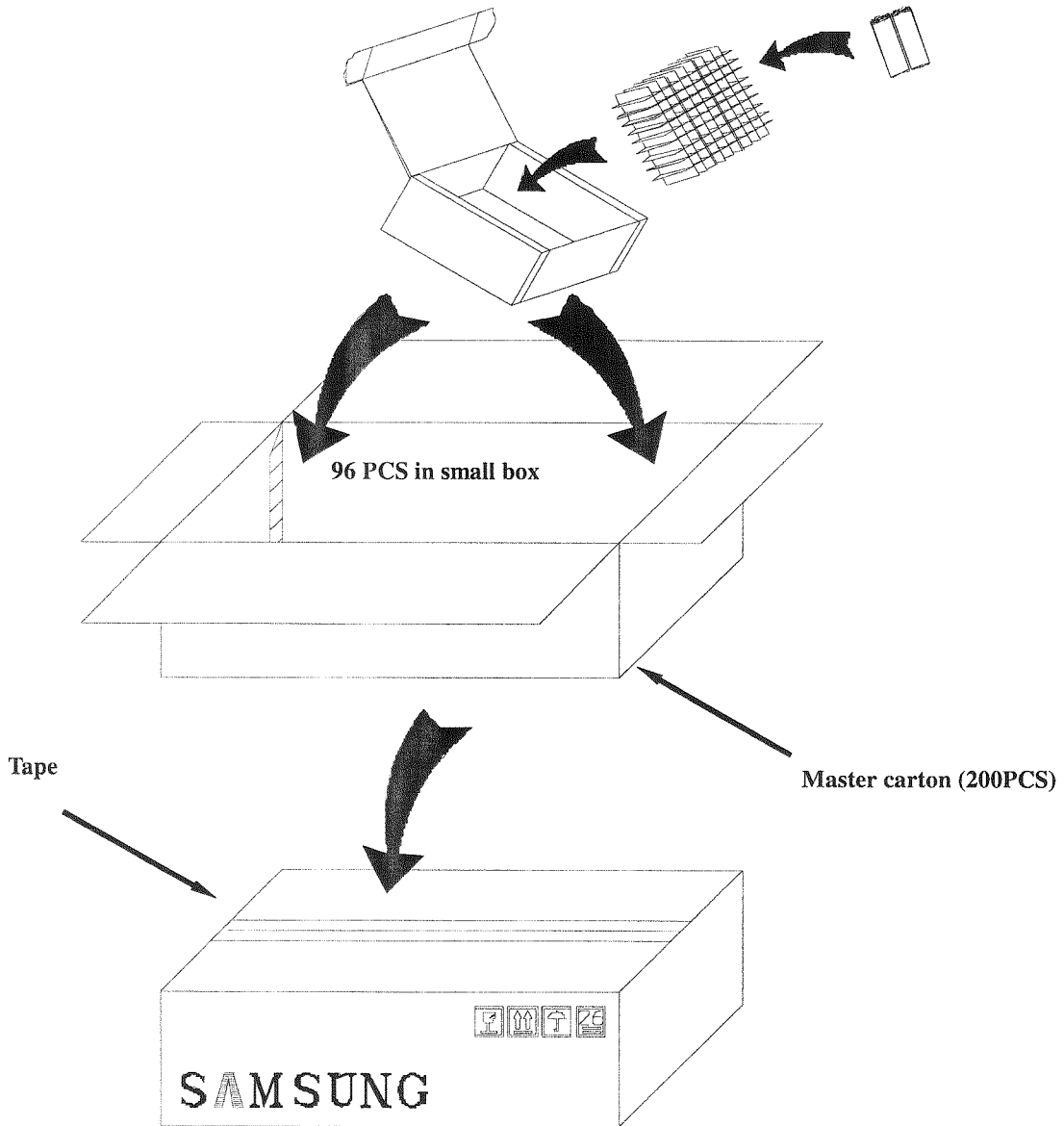
See Fig.2,  
Package Drawing

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**Fig.1. Outline Dimensions of ICR18650-26F**

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**Fig.2. Package Drawing**