



# Lithium-ion Battery

## DATA SHEET

Battery Model: [LIR18650](#)

Prepared	Authorized	Approved

UL Certified MH20555  
Manufacturer: EEMB Co., Ltd.  
Website: <http://eemb.com>

This Specification describes the requirements of the lithium ion battery with Lithium nickel manganese cobalt material supplied by EEMB Co., Ltd.

## 1.0 BASIC CHARACTERISTICS

1.1	Battery Type	LIR18650
1.2	Nominal Capacity	3000mAh (0.2C, 2.75V discharge))
	Minimum Capacity	2850mAh (0.2C, 2.75V discharge))
1.3	Max Charging Voltage	4.35±0.03 V
1.4	Nominal Voltage	3.78V
1.5	Charging Method	CC-CV (constant voltage with limited current)
1.6	Charging Current	Standard charge: 1475mA Rapid charge : 2950mA
1.7	Charging Time	Standard charge : 3hours Rapid charge : 2.5hours
1.8	Max. Charge Current	2950mA(ambient temperature 25°C
1.9	Max. Discharge Current	5900mA(ambient temperature 25°C
2.0	Discharge Cut-off Voltage	2.75V
2.1	Cell Weight	48.0g max
2.2	Cell Dimension	Height : 65.00mm max Diameter : 18.40mm max
2.3	Operating Temperature	Charge: 0 ~ 45°C Discharge: -20°C ~ 60°C
2.4	Storage Temperature	1 year: -20~25°C 3 months: -20~25°C 1 month: -20~50°C

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

## 2.0 Appearance

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

## 3.0 Standard Testing Conditions

### 3.1 Environmental Conditions

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

### 3.2 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.

### 4.0 Electrical Characteristics

#### 4.1 Standard Charge

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

#### 4.2 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°C within 1hour after the standard charge.

Standard Discharge Capacity $\geq$ 2850mAh

#### 4.3 Initial internal impedance

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

Initial internal impedance $\leq$ 100m $\Omega$

#### 4.4 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			
	-10°C	0°C	25°C	40°C
25°C				
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°C(=2850mAh) is 100%.

#### 4.5 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°C	25°C	45°C	
Relative Capacity	80%	100%	80%	25°C

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(=2850mAh) is 100%.

#### 4.6 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.

Current	Charge Condition			
	0.2C (590mA)	0.5C (1475mA)	1.0C (2950mA)	2.0C (5900mA)
Cut-off	7h or 0.05C	3.0h or 0.05C	2.5h or 0.05C	2.5h or 0.05C
Relative Capacity	100%	95%	90%	80%

#### 4.7 Discharge Rate Capabilities

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

Current	Discharge Condition			
	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°C(=2850mAh) is 100%.

#### 4.8 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 $\geq$ 1995mAh(70% of the capacity at 25°C)

#### 4.9 Storage Characteristics

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

Capacity retention(after the storage) $\geq$ 2280mAh (80% of the capacity at 25°C)

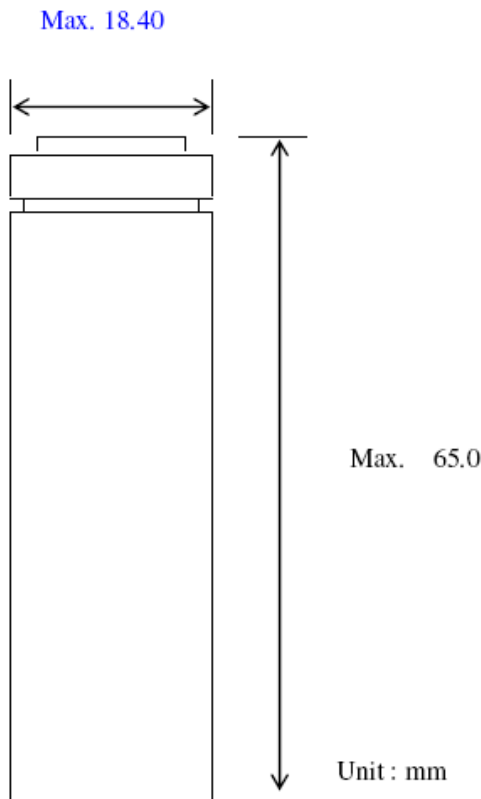
#### 5.0 Mechanical Characteristics

No.	Item	Criteria	Test Instructions
5.1	Drop	No leakage	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.
5.2	Vibration	No leakage,	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.

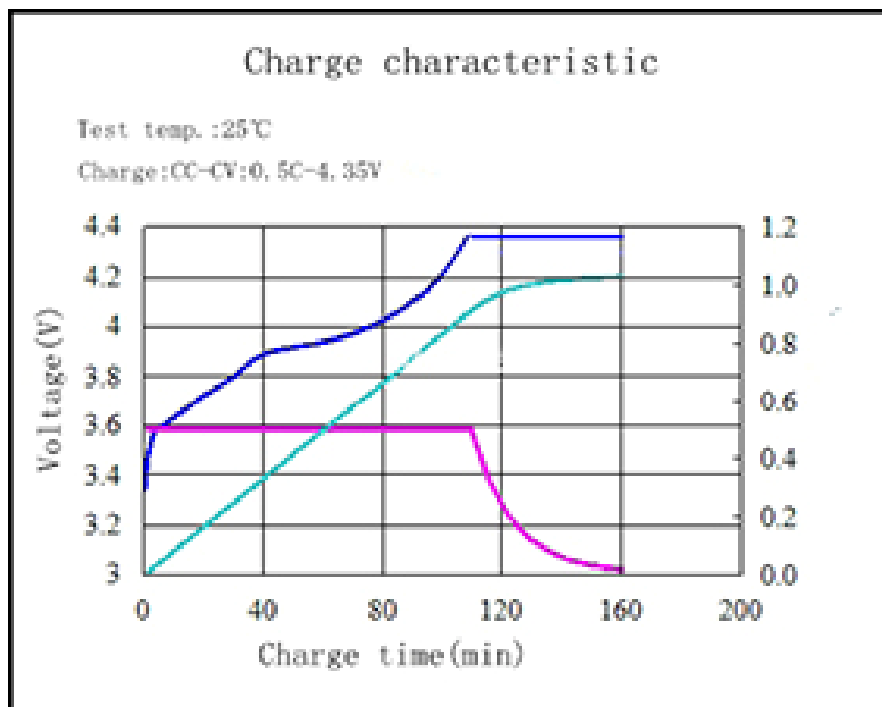
## 6.0 Safety Characteristics

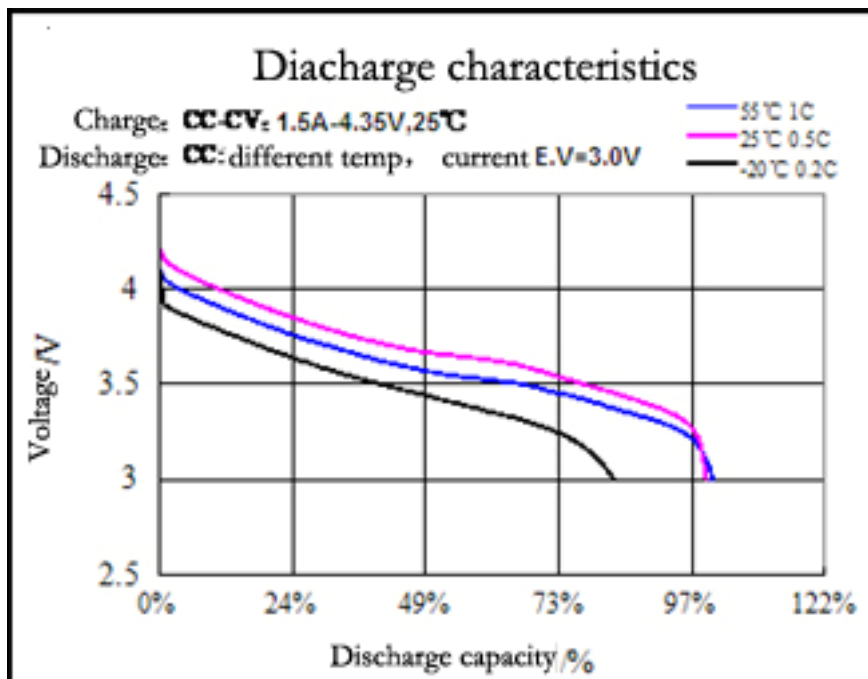
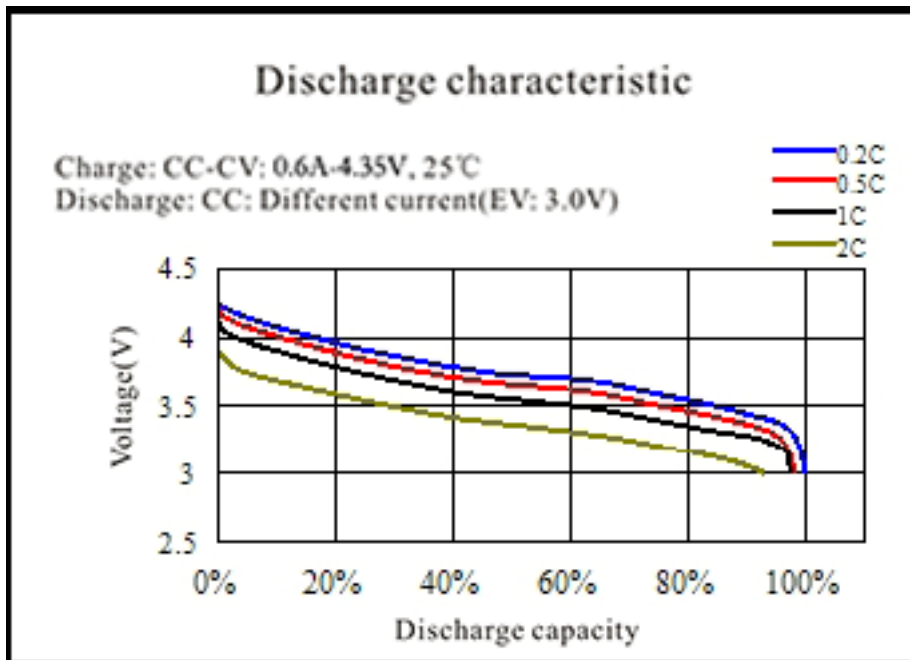
No.	Item	Criteria	Test Instructions
6.1	Overcharge	No fire or explosion	To charge the standard charged cell with 12V and 2.95A at 25°C for 2.5 hours.
6.2	Short-Circuit	No fire or explosion;	To short-circuit the standard charged cell by connecting positive and negative terminal by less than 50mΩ wire for 3hours.
6.3	Reverse Charge	No fire or explosion;	To charge the standard charged cell with charge current 2.95A By -12V for 2.5 hours.
6.4	Heating	No fire or explosion	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.

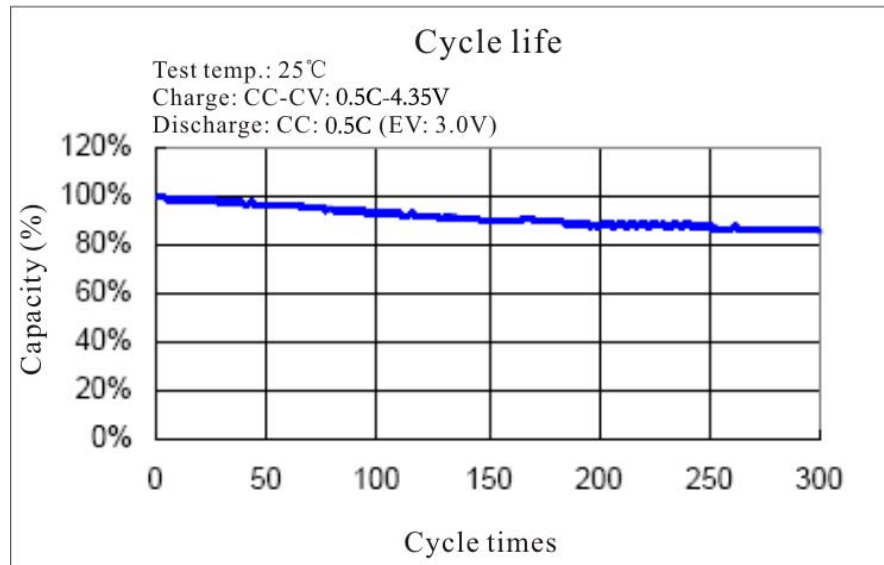
### 7.0 Outline Dimensions (Unit: mm)



### 8.0 DISCHARGE CHARACTERISTICS.







## 6.0 Protection

When Li-ion rechargeable battery is used over the permitted voltage or current, electrolyte may disassemble, and this case will affect safety performance of Li-ion rechargeable battery. So protection circuit module were used in order to prevent overcharge, over discharge and over current.

### WARNINGS!

- 1) Do not immerse the battery in water or seawater, and keep the battery in a cool dry surrounding if it stands by.
- 2) Do not use or leave the battery near a heat source as fire or heater
- 3) When recharging, use the battery charger specifically for that purpose
- 4) Do not reverse the position (+) and negative (-) terminals
- 5) Do not connect the battery to an electrical outlet
- 6) Do not discard the battery in fire or heat it
- 7) Do not short-circuit the battery by directly connecting the positive (+) and negative (-) terminal with metal objects such as wire.
- 8) Do not transport or store the battery together with metal objects such as necklaces, hairpins etc.
- 9) Do not strike or throw the battery
- 10) Do not directly solder the battery and pierce the battery with a nail or other sharp object.

### CAUTIONS!

- 1) Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or in a vehicle in extremely hot weather). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
- 2) Do not use it in a location where static electricity is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety.
- 3) If the battery leaks, and the electrolyte get into the eyes. Do not rub eyes, instead, rinse the eyes with



clean running water, and immediately seek medical attention. Otherwise, it may injure eyes or cause a loss of sight.

- 4) If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and stop using it.
- 5) In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
- 6) Be aware discarded batteries may cause fire, tape the battery terminals to insulate them.

**Special notice!**

Keep the cells in **50% charged state** during long period storage. We recommend to charge the battery up to 50% of the total capacity every 3 months after receipt of the battery and maintain the voltage 3.6~4.2V. And store the battery in cool and dry place.

Note: Any representations in this brochure concerning performance, are for informational purposes only and are not construed as warranties either expressed or implied, of future performance.