



# Lithium-ion Battery

## DATA SHEET

Battery Model: [LIR18650](#)

| Prepared | Authorized | Approved |
|----------|------------|----------|
|          |            |          |

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

**SCOPE**

This Specification describes the requirements of the lithium ion battery with Lithium iron rechargeable battery supplied by EEMB Co., Ltd.

**1.0 BASIC CHARACTERISTICS**

|             |                                    |                                    |
|-------------|------------------------------------|------------------------------------|
| <b>1.1</b>  | Battery Type                       | LIR18650                           |
| <b>1.2</b>  | Nominal Capacity                   | 2600mAh (0.2C discharge at 25°C)   |
|             | Minimum Capacity                   | 2500mAh (0.2C discharge at 25°C)   |
| <b>1.3</b>  | Nominal Voltage                    | 3.7V                               |
| <b>1.4</b>  | Internal resistance                | ≤60mΩ                              |
| <b>1.5</b>  | Maximum charging voltage           | 4.2±0.02V                          |
| <b>1.6</b>  | Standard charge Current            | 0.2C                               |
| <b>1.7</b>  | Fast charge Current                | 0.5C                               |
| <b>1.8</b>  | Standard discharge Current         | 0.2C                               |
| <b>1.9</b>  | Rapid Discharge Current            | 0.5C                               |
| <b>1.10</b> | Maximum constant Discharge Current | 2.0C                               |
| <b>1.11</b> | End of Discharge Voltage           | 3.0V                               |
| <b>1.10</b> | Weight                             | Approx. 45.5±1g                    |
| <b>1.11</b> | Operating Temperature              | Charge: 0~45°C                     |
|             |                                    | Discharge: -20°C ~ 60°C            |
| <b>1.12</b> | Storage Temperature                | -5°C ~ 35°C (1 month)              |
|             |                                    | 0°C ~ 35°C (6 months)              |
| <b>1.13</b> | Maximum size                       | Diameter(Φ):18.55mm<br>High:65.2mm |

**2.0 TECHNICAL REQUIREMENTS AND CHARACTERISTICS**
**2.1 Testing Conditions (unless otherwise specified)**

|                    |                                                                                                                                                             |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard Charge    | Constant Current and Constant Voltage(CC/CV)<br>Current=520mA<br>Final charge voltage=4.2V<br>Final charge current=52mA<br>The temperature is around 25±3°C |
| Standard Discharge | Constant Current(CC)<br>Current=520mA<br>EndVoltage=3.0V<br>The temperature is around 25±3°C                                                                |

**2.2 Electrical Characteristics**

| No.   | Item                                         | Criteria          | Test Instructions                                                                                                                                                                                                                                        |
|-------|----------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.2.1 | Nominal voltage                              | 3.7V              | The average value of the working voltage during the whole 0.2C discharge process.                                                                                                                                                                        |
| 2.2.2 | Discharge Rate Performance                   | Capacity=100%     | The discharge capacity of the cell measured with 0.2C down to 3.0V within 1 hour after a completed charge.                                                                                                                                               |
|       |                                              | Capacity=96%      | The discharge capacity of the cell measured with 0.5C down to 3.0V within 1 hour after a completed charge.                                                                                                                                               |
|       |                                              | Capacity=92%      | The discharge capacity of the cell measured with 1C down to 3.0V within 1 hour after a completed charge.                                                                                                                                                 |
|       |                                              | Capacity=85%      | The discharge capacity of the cell measured with 2C down to 3.0V within 1 hour after a completed charge.                                                                                                                                                 |
| 2.2.3 | Cycle Life                                   | ≥300Cycles        | After 300 cycles at 100% DOD Charge and discharge at 0.5CA, the residual discharge capacity is above 80% of nominal capacity.                                                                                                                            |
| 2.2.4 | Capacity Retention                           | ≥2080mAh          | After 28 days storage at 25±5°C, after having been completely charged and discharged at 0.2C, discharge to 3.0V, the residual capacity is above 80%                                                                                                      |
| 2.2.5 | Storage                                      | Discharge Time≥4h | (Within 3 months after manufactured) The cells is charged with 0.5CA to 40-50% capacity and stored at ambient temperature 25±3°C, 65±20%RH for 12 months. After the 12 months storage period the cell is fully charged and discharged to 3.0V with 0.2CA |
| 2.2.6 | Temperature dependence of Discharge capacity | Capacity=85%      | The cells charged at standard condition, and discharge with 0.2C current at 0°C, the relative capacity                                                                                                                                                   |
|       |                                              | Capacity=70%      | The cells charged at standard condition, and discharge with 0.2C current at -20°C, the relative capacity                                                                                                                                                 |
|       |                                              | Capacity=100%     | The cells charged at standard condition, and discharge with 0.2C current at 25°C, the relative capacity                                                                                                                                                  |

**2.3 Acclimatization Characteristics**

| No.   | Item                         | Criteria         | Test Instructions                                                                                       |
|-------|------------------------------|------------------|---------------------------------------------------------------------------------------------------------|
| 2.3.1 | High Temperature Performance | Capacity≥2080mAh | Full charge at 20±5°C, store at 55±2°C for 2h, then discharge at the same temperature with 1CA to 2.75V |

|       |                             |                                                                                                              |                                                                                                                                                                                                                                                                             |
|-------|-----------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.3.2 | Low Temperature Performance | Capacity $\geq$ 1800mAh                                                                                      | Full charge at 20 $\pm$ 5 $^{\circ}$ C, store at -20 $\pm$ 2 $^{\circ}$ C for 16-24h, then discharge at the same temperature with 0.2CA to 2.75V                                                                                                                            |
| 2.3.3 | Vibration                   | No deformation should be visible.<br>No leak, smoke and/or explode.<br>Voltage should be not less than 3.6V. | The fully charged cell is fixed on a platform and vibrated in the X, Y and Z directions for 30 minutes at the speed 10ct/min<br>Frequency:10~30Hz,<br>Vibration amplitude: 0.38mm.<br>Frequency: 30~55Hz,<br>Vibration amplitude: 0.19mm.                                   |
| 2.3.4 | Drop                        | No fire, no explosion.                                                                                       | The fully charged cell is dropped from a height of 1m onto a 15~20mm hard board in X, Y and Z directions once for all axis. Then the cell is discharged at 1CA current rate to 3.0V followed by 3 or more cycles with the standard charge rate and a discharge rate of 1CA. |

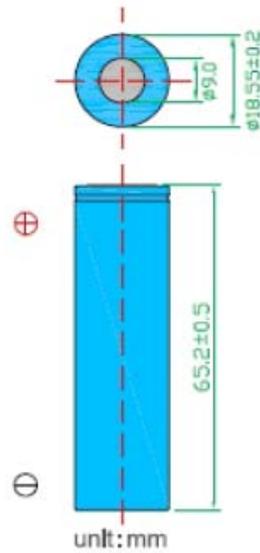
## 2.4 Safety Characteristics

| No.   | Item                | Criteria              | Test Instructions                                                                                                                                                                                                                                                                                                                                                                     |
|-------|---------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.4.1 | Overcharge (3C/10V) | No fire no explosion  | The cell is connected with a thermocouple and put in a fume hood. The positive and negative terminals are connected to a DC power supply set at 3CA and 10V until the cell reaches 10V and the current drops to approximately 0A. Monitor the temperature of cell. When the temperature of the cell is approximately 10 $^{\circ}$ C less than the peak value, the test is completed. |
| 2.4.2 | Short-Circuit       | No fire no explosion; | The cell is to be short-circuited by connecting the positive and negative terminals of the cell directly with copper wire with a resistance of less than 0.05 $\Omega$ .                                                                                                                                                                                                              |
| 2.4.3 | Impact Test         | No fire no explosion  | The cell, placed on hard surface, receives impact from a hammer of 10Kg in free fall from 1m height                                                                                                                                                                                                                                                                                   |
| 2.4.4 | Therma shock        | No fire no explosion  | After standard charging, heat the cell to 130 $\pm$ 2 $^{\circ}$ C at a rate of 5 $\pm$ 2 $^{\circ}$ C/min and keep it at this temperature during 30 minutes.                                                                                                                                                                                                                         |

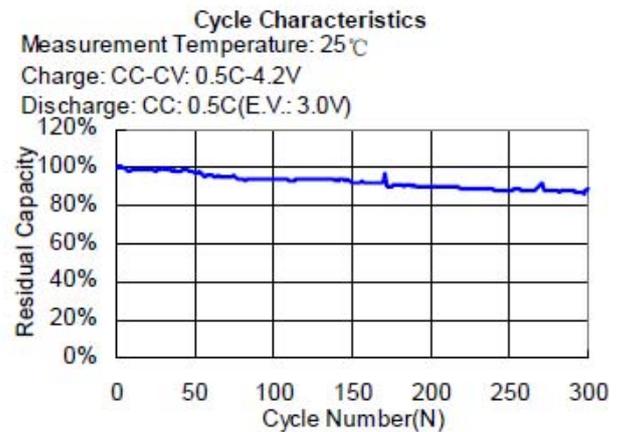
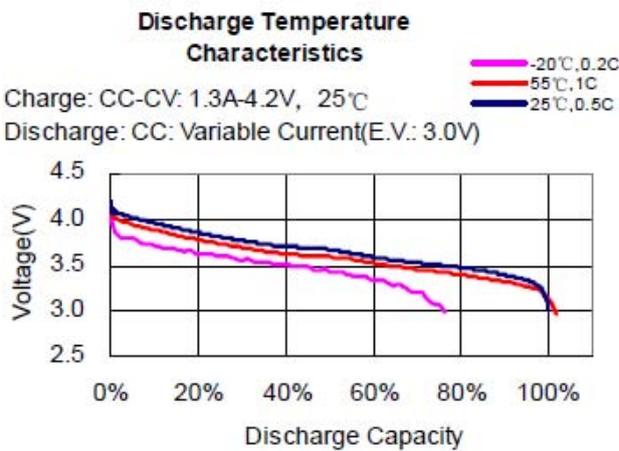
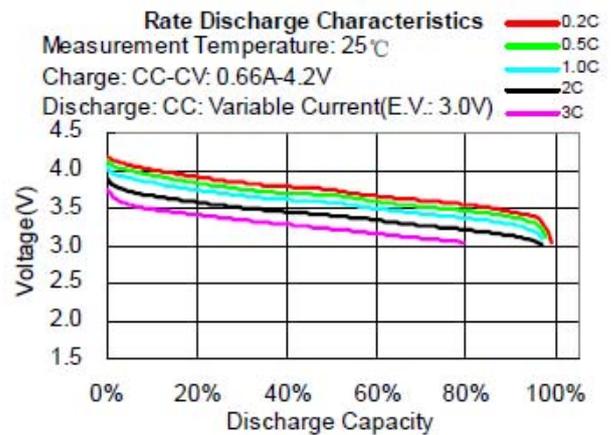
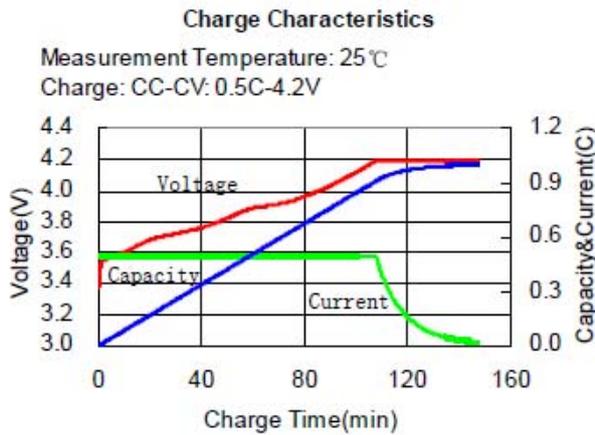
## 3.0 APPEARANCE

All surfaces must be clean, without damages, leakage and corrosion. Each product will have a product label identifying the model

**4.0 BATTERY DIMENSION**



**5.0 BATTERY CHARACTERISTICS.**



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## 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.