EEMB CO., LTD

Lithium Thionyl Chloride Battery Specification

Energy Type (T-Top)

Model:	**ER34615**
Capacity:	**19Ah**

Prepared	Checked	Approved

Customer：

Customer Approval (Customer confirmation):		
Signature	**Checked**	**Approved**

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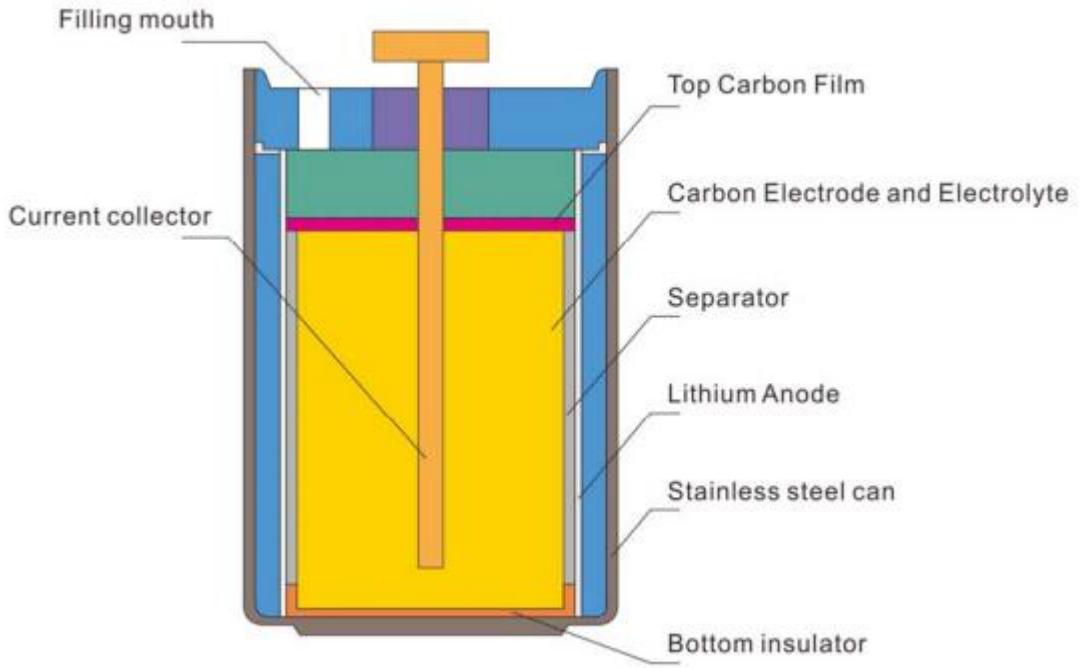
Battery Structure



Catalog

1. Scope

This product specification defines the requirements of the Lithium Thionyl Chloride battery supplied to the customer by EEMB Co., Ltd.

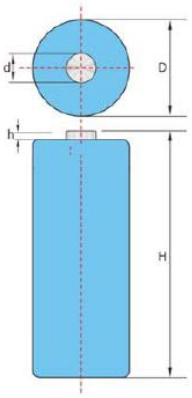
2. Battery Basic Characteristics

No.	Item	Characteristics
2.1	Model	ER34615
2.2	Nominal Capacity	19Ah
2.3	Open Circuit Voltage	3.60V
2.4	Max. Continuous Discharge Current	150mA
2.5	Max. Pulse Discharge Current	300mA
2.6	Weight	Approx. 105g
2.7	Self-discharge Rate	≤ 2%
2.8	Operating Temperature	-55~85℃
2.9	Storage (recommended)	≤ 30℃
2.10	Storage Life	10 years

Note: 1. For high rate discharge, the maximum operational temperature has to be lowered.
2. Battery potential and battery capacity is function of both current drain, temperature and cut off voltage.
3. Energy Type (bobbin structure) battery has very low self discharge on the shelf and during operation. It is best suited for low current discharges. It may require depassivation before medium currents can be delivered.
4. In order to calculate precise life time under various environments, as well as use battery in a safer way, we recommend you to consult EEMB.

3. Dimension (Unit: mm)

Item	Specification
D	32.9
H	61.5
d	4±0.5
h	2.2±0.5



4. Appearance

It shall be free from any defects such as remarkable scratches, breaks, cracks, discoloration, leakage, or middle deformation.

5. Battery performance

5.1 Electrical Characteristics

No.	Item	Criteria	Test Instructions	
5.1.1	Open circuit voltage	3.65~3.70V (23±2℃)	The test data is the typical voltage.	Measure with a three and a half digits voltmeter.
		3.65~3.74V (-40±2℃)		
		3.63~3.70V (85±2℃)		
5.1.2	Operation voltage	≥3.40V (23±2℃)		Discharge with a 1.2kΩ load.
		≥3.0V (-40±2℃)		
		≥3.40V (85℃±2℃)		
5.1.3	On-load voltage	≥3.30V (23±2℃)		Measure with a three and a half digits voltmeter. Load is 62Ω, time ≤ 10S.
5.1.4	Low speed discharging	≥19Ah	1.2kΩ, 23±2℃, continuous discharge to 2.0V.	
5.1.5	Rapid discharging	≥13.5Ah, ≥135h	33Ω, 23±2℃, continuous discharge to 2.0V.	
5.1.6	Standard discharging	≥15.5Ah, ≥900h	200Ω, 23±2℃, continuous discharge to 2.0V.	
5.1.7	Discharge in high temperature	≥15.0Ah	200Ω, 55±2℃, continuous discharge to 2.0V. Discharge after the battery is stored at 55±2℃ for 16h.	
5.1.8	Discharge in low temperature	≥6.0Ah	200Ω, -40±2℃, continuous discharge to 1.8V. Discharge after the battery is stored at -40±2℃ for 16h.	

5.2 Acclimatization Characteristics

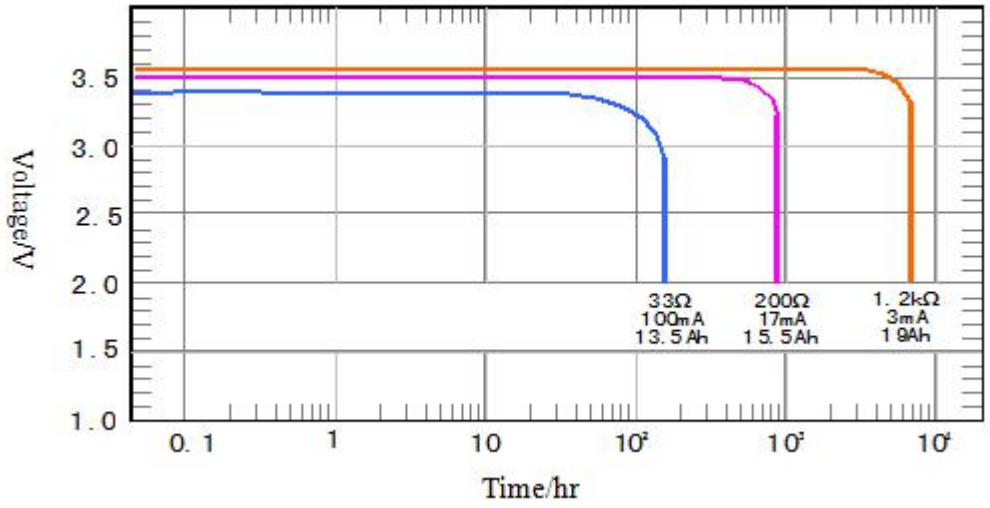
No.	Item	Criteria	Test Instructions
5.2.1	Temperature shock	Open circuit voltage is in accordance with 5.1. No deformation, no rust, no fire or explosion.	1. Put the battery into testing case, set the inside temperature as -40℃±3℃, keep at least for 4h; 2. Move the battery to another testing case of 70℃±3℃ within 5 min. 3. Keep at 70℃±3℃ for at least for 4h; 4. Move the battery to another testing case of -40℃±3℃ within 5 min. 5. Keep at -40℃±3℃ for at least for 4h; 6. Repeat from step2 to step5 or three times; 7. Move the battery to another testing case of 70℃±3℃ within 5 min. 8. Keep at 70℃±3℃ for at least for 4h; 9. Keep the battery at 20℃±5℃, 45%~75%RH for at least 4h. Then test the appearance and open circuit voltage of the battery.
5.2.2	Vibration	Open circuit voltage is in accordance with 5.1. No deformation, no rust, no fire or explosion.	Batteries are vibrated 90~100 min in three mutually perpendicular directions with amplitude of 0.8mm and the scanning rate of 1oct per min.
5.2.3	Drop	Open circuit voltage is in accordance with 5.1. No deformation, no rust, no fire or explosion.	Batteries are dropped onto a hard board with the thickness of 18~20mm from 0.76 meter from X, Y, Z direction of the positive and negative (six directions), repeat 6 times.
5.2.4	Low-pressure	Open circuit voltage is in accordance with 5.1. No deformation, no rust, no fire or explosion.	Put the batteries in a sealed vacuum and reduce internal pressure gradually to lower than 11.6 kpa. Keep for 6h.
5.2.5	Shock	Open circuit voltage is in accordance with 5.1. No deformation, no rust, no fire or explosion.	Fix the battery on the testing table firmly and start shock test form axial and radial directions. Within the beginning 3mS, the average lowest accelerated velocity reaches 735m/S^2, peak accelerated velocity is 1255m/S^2~1715m/S^2.

5.3 Safety Characteristics

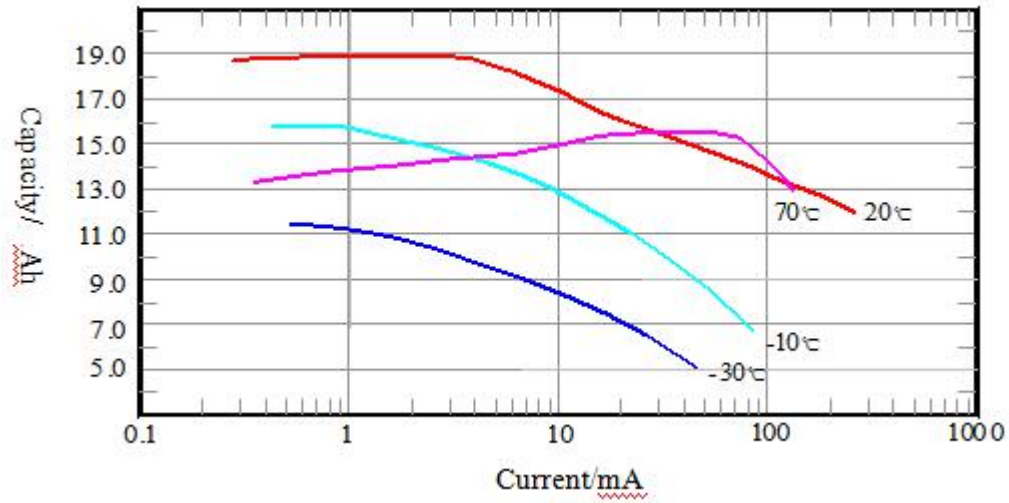
No.	Item	Criteria	Test Instructions
5.3.1	Overcharge	Allow leakage, no fire or explosion.	Connect the battery reversely to a 12V DC power source, and connect a resistance with proper value in serial, making the current as 0.15A, charge for 12h.
5.3.2	Short-Circuit	Allow leakage, no fire or explosion.	At room temperature, short-circuit by connecting the positive and negative terminals (resistance load of 0.1Ω), monitoring the battery temperature changes in the course of test. End the test when fire or explosion occurs or the ascended temperature of battery surface has lowered down to the environment temperature.
5.3.3	Thermal abuse	Allow leakage, no fire or explosion.	Cell is heated in a circulating air oven at a rate of (5±2)℃ per minute to130±2℃, and then placed for 10 minutes at 130±2℃.
5.3.4	Forced discharge	Allow leakage, no fire or explosion.	Discharge the battery with a 200Ω resistance to 0V. (discharge voltage ≤ 0.2V) Then at environmental temperature, connect to a 12V DC power source in serial, and add a 140 Ω resistance in serial. Forced discharge for 12h.
Note: Unless otherwise specified, all tests stated in this specification are conducted at the following conditions: Temp. : 20±5℃; Relative Humidity: 45%～75%.			

6. Characteristics Curve

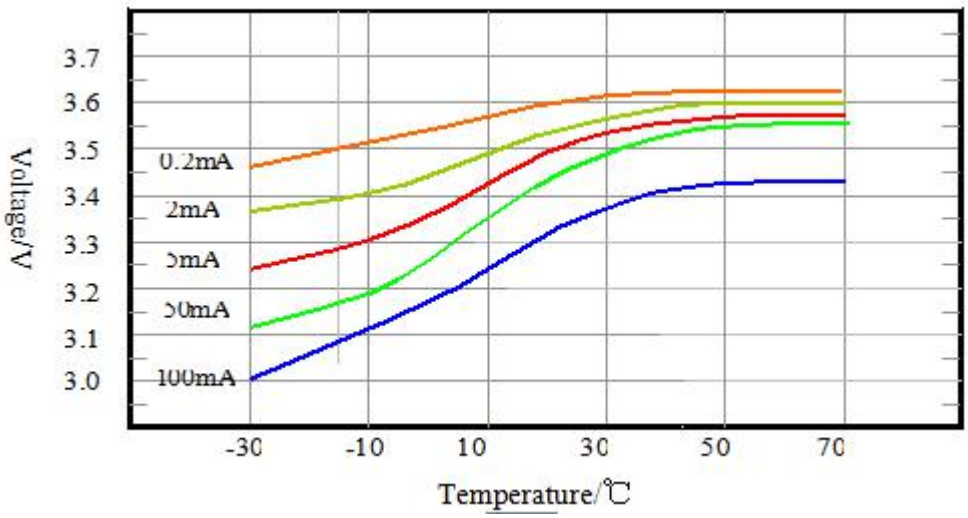
Discharge characteristics with different loads in normal temperature



Discharge capacity performance at different discharge current



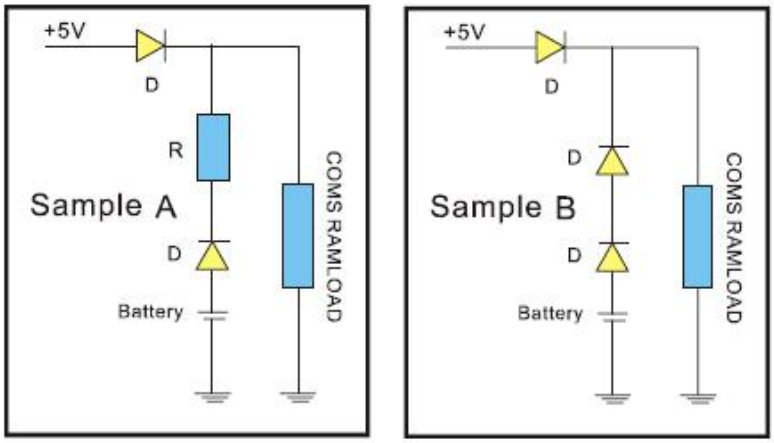
Voltage performance at different temperature



7. Memory Backup Circuit Design Suggestion

A primary lithium battery is not rechargeable, when used for memory backup in combination with another power source; current may flow into the battery from the other source. A protection diode and resistor into the circuit is needed to avoid battery charging or over discharging. Select a silicon diode or a diode with minimum leakage current, and design the circuit so that the amount of charging due to leakage current will not exceed 2% of the nominal battery capacity over the total period of use.

While used for memory backup, the following circuit shall be applied:



8. Matters Needing Attention

Strictly observes the following needing attention. EEMB will not be responsible for any accident occurred by handling outside of the precautions in this specification.

! Caution

- Use Nickel-plated iron or Nickel-plated stainless steel for the terminals that contact the battery.
- Make sure that terminal contact pressure is 50g minimum, for a stable contact.
- Keep the battery and contact terminal surfaces clean and free from moisture and foreign matter.
- Before inserting the battery, check the battery contact terminals to make sure they are normal, not bent or damaged. (Bent terminals may not make good contact with the battery or may cause short circuit.)
- When the batteries are piled up in a disorderly way, their positive and negative terminals may short-circuit, consuming some batteries while charging others, causing explosion.
- Lithium batteries that are almost exhausted can output a voltage that is almost the same as that of a new battery: Please does not judge a battery only with a Voltmeter. We are well informed that battery pack should be assembled with single batteries of similar voltage, capacity and inner resistance.
- Lithium batteries need a period of time to recover their normal voltage after even a slight short circuit. Therefore, if the battery is short-circuited, wait an adequate long time for batteries to recover before measuring their electrical characteristics.
- Use a high impedance (1M or higher) voltmeter to measure battery voltage.
- Add fuse between negative and connector. Once short circuit, it will cut immediately and permanently.

- Do not contact terminals with conductive i.e. metal, goods. Keep batteries in non-conductive, i.e. plastic, trays.
- Reduce impact to insulation layer from vibration, but the dimension will enlarge.
- Strictly prohibits use battery with other primary batteries, or new and old battery or batteries of a different package, type, or brand.

! Danger

- DO NOT recharge, short-circuit, disassemble, deform, heat or place the battery near a direct flame. This battery contains flammable materials such as lithium and organic solvent and performing any of the above actions could cause it to ignite explode or become damaged.
- DO NOT over-discharge the battery. In case the battery is over-discharged battery has potential of explosion. In case battery is over discharged, when connected with exterior power source or connected with other batteries in series, explosion may occur.
- Keep this battery out of the reach of children. If it is swallowed, contact a physician immediately.
- When storing a battery or throwing it away, be sure to cover it with tape. If the battery is contacted with other metal objects, it could cause fire or become damaged.

! Warning

- Thoroughly read the user's manual before use, inaccurate handling may cause leakage, heat, smoke, explosion, or fire, causing device trouble or injury.
- Insert the battery with the "+" and "-" ends correctly oriented.
- Do not solder the battery directly. Protect the welding point and connector.
- The battery should be preferably stored in dry and cool conditions. Avoid storing the battery in direct sunlight, or in excessively hot and humid place. Storage at high temperature must be avoided to preserve the battery life time.