Bonrex Technology Co., LTD

Lithium Thionyl Chloride Battery Specification
Li-SOCl2

Model:	**ER14250**
Capacity:	**1200mAh**
Type:	**Bobbin**

Prepared	Checked	Approved

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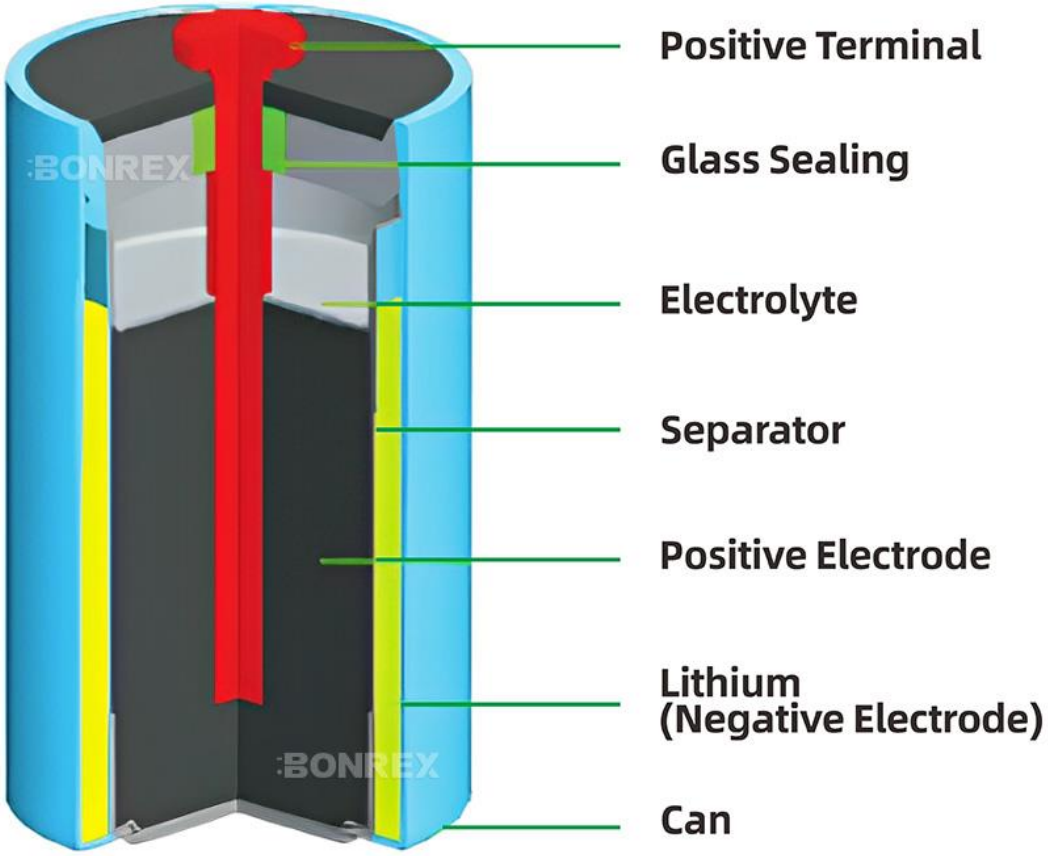
Catalogue

Battery structure



1. Overview

The specification describes standard parameters, electrical characteristics, safety performance, environmental adaptability, test and judgment, operation instructions and safety regulations of the Lithium Thionyl Chloride battery supplied by Bonrex Technology company.

2. Standard battery electrical parameters

№	Item	Parameter
2.1	Model	ER14250
2.2	Nominal voltage (open circuit)	3.6V
2.3	Nominal capacity	1.2Ah Test condition: 3.6kΩ, 1mA, +20°C, cut-off 2.0V (Note 1)
2.4	Continuous Discharge current Max.	25mA
2.5	Pulse Discharge current Max.	50mA (Note 2)
2.6	Self-discharge Rate per year	≤1% (Note 3)
2.7	Operation temperature	-55~+85°C (Note 4)
2.8	Weight	10g
2.9	Load Voltage (storage within 1 year, 10 mA, within 2 seconds)	≥3.0V

Note:

1. Battery capacity will be different according to the discharge current, environment temperature and end voltage.
2. Discharge according to pulse characteristics frequency, continue time, temperature state (storage before use), and it is different as the lowest voltage accepted by device. Bobbin type battery has very low self-discharge on the self and during operation. It is the best for low current discharge, it may require activation process before maximum current can be delivered.
3. In order to calculate precise life time under various environments, as well as use battery in a safer way, it is consult to Bonrex company recommended.
4. Capacity reduces or operation voltage is lower at the beginning of pulses according to temperature.

3. Structure and appearance

3.1 Structure: Lithium Thionyl Chloride electrolyte and cathode, the activated carbon is anode carrier, diaphragm, stainless steel (shell) and glass-insulation cover group.

3.2 Appearance: Visual battery shall not have depression, bumps, rust or leakage. Mark must be clear.

4. Battery performance

4.1 Technical index

№	Item	Test condition	Index	
4.1.1	OCV (Open circuit voltage)	Measure with a three digits voltmeter, 5% tolerance	-40±2°C	3.64~3.7V
			+23±2°C	3.64~3.7V
			+85±2°C	3.64~3.74V
4.1.2	Load voltage	330Ω@5s	-40±2°C	≥3.0V
			+23±2°C	≥3.3V
			+85±2°C	≥3.4V
4.1.3	Standard discharge	3.6kΩ, cut-off voltage 2.0V	+23±2°C	≥1100 mAh
	Quick discharge	330Ω, cut-off voltage 2.0V	+23±2°C	≥800 mAh
	Low temperature discharge	1.8kΩ, cut-off voltage 2.0V (stored in low temperature 16 hours before test)	-40±2°C	≥300 mAh
	Normal temperature discharge	1.8kΩ, cut-off voltage 2.0V	+23±2°C	≥900 mAh
	High temperature discharge	1.8kΩ, cut-off voltage 2.0V (stored in high temperature 16 hours before test)	+70±2°C	≥850 mAh
4.1.4	Minimum Value		Initial	After 1 year storage at +30°C max.
		OCV	3.6V	3.6V
		Closed Circuit Voltage (after 5 sec on 20 mA/180Ω)	3.0V	2.8V
		Capacity (on 1 mA/3.6kΩ)	1200 mAh	1100 mAh

(NOTES: The tested battery position should be vertical and positive side should be up situation)

4.2 Test criteria

№	Item	Test condition	
4.2.1	Humidity and pressure	Humidity: 45~75% Pressure: 86-106 kpa	
4.2.2	Test timing	The test shall be started within 2 weeks from manufacturing date	
4.2.3	Measurement instrument	Input impedance	≥ 10MΩ
		Measurement error	≤ 5%

4.3 Tests

№	Item	Test condition
4.3.1	Climatic tests	Test cells are to be stored for at least 16 hours at a test temperature equal to +23±2°C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (+23±5°C). Cells meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire.
		Test cells are to be stored for at least 16 hours at a test temperature equal to -40±2°C. The maximum time interval between test temperature extremes is 30

		minutes. this procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (+23±5°C). Cells meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire.
		Test cells are to be stored for at least 16 hours at a test temperature equal to +70±2°C. The maximum time interval between test temperature extremes is 30 minutes. this procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (+23±5°C). Cells meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire.
4.3.2	Appearance	Deformation, leakage or tarnish shall be checked by visual observation method.
4.3.3	OCV	This shall be measured with the voltage meter described in item 4.2.3.
4.3.4	Capacitance	This shall be measured with the voltage meter described in item 4.2.3.
4.3.5	Continuous Discharge current	This shall be measured with the voltage meter described in item 4.2.3.
4.3.5	Pulse Discharge current	This shall be measured with the voltage meter described in item 4.2.3. Max. pulse current/0.1 second pulses, drained every 2 min at +23°C from undischarged cell with 10uA base current, yield voltage readings above 3.0V. It varies according to the pulse characteristics, the temperature, and the cell's previous history. Fitting the cell with a capacitor may be recommended in severe conditions, Consult Bonrex).
4.3.6	Vibration test	Vibration on three perpendicular axes. Amplitude (Peak to peak): 1.6 mm Frequency: 10↔55 Hz Directions: X, Y, Z Duration: 90±5 minutes/axis The cell must retain its operational characteristics and normal visual aspect.
4.3.7	Free fall	2 drops per each plane (randomly oriented) onto a concrete floor from a height of 1.0m without any explosion or fire.
4.3.8	Low-pressure	Test cells shall be stored at a pressure of 11.6 kPa or less for at least 6 hours at ambient temperature (+23±5°C). Cells meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.
4.3.9	Shock test	Shock applied to each of the three perpendicular axes. - Average acceleration: 75G - Maximum acceleration: 175G The cell must retain its operational characteristics and normal visual aspect.
4.3.10	Impact test	The test sample cell or component cell is to be placed on a flat surface. A 15.8 mm diameter bar is to be placed across the center of the sample. A 9.1 kg mass is to be dropped from a height of 61 ± 2.5 cm onto the sample. Cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire within six hours of this test.
4.3.11	Short	The cell shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at +23±5°C. This short circuit condition is continued for at least one hour after the cell external case temperature has returned to +23±5°C. Cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire within six hours of this test.
4.3.12	Overcharge	- Charging current: 5mA

		- Duration time: 12 hours The cells meet this requirement if there is no disassembly and no fire within seven days of the test.
4.3.13	Forced discharge	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V D.C. up to 100% of nominal capacity. The cells meet this requirement if there is no disassembly and no fire within six hours of this test.

5. Outgoing Quality Control (OQC) inspection

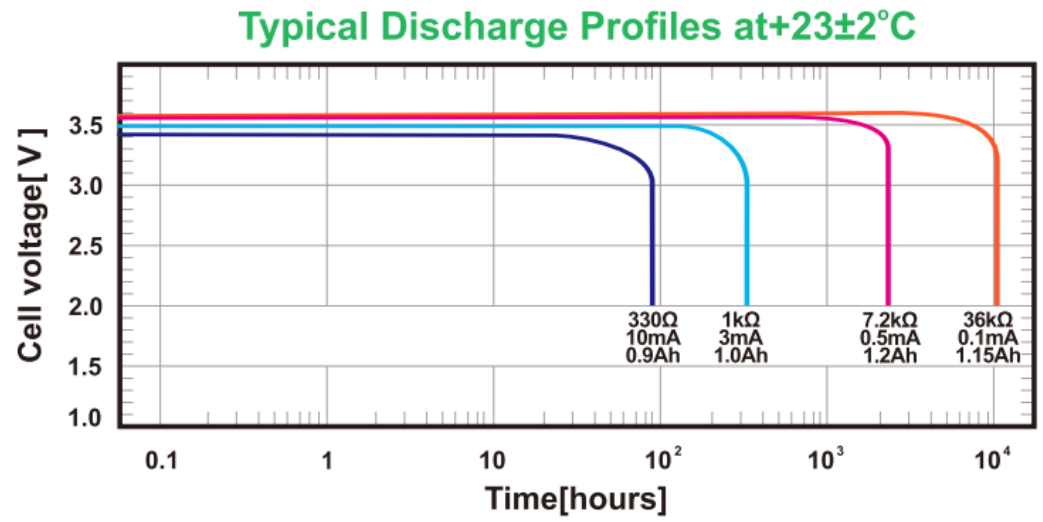
Before shipment 100% inspection to ER14250 battery open circuit voltage (OCV) and load voltage, appearance and size. Sampling inspection to battery capacity.

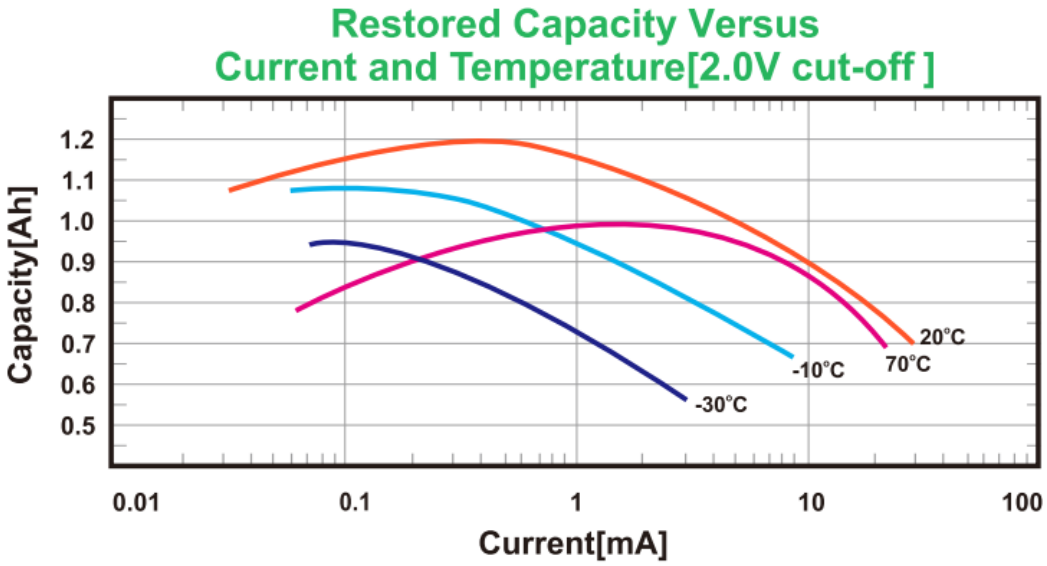
6. Structure and appearance

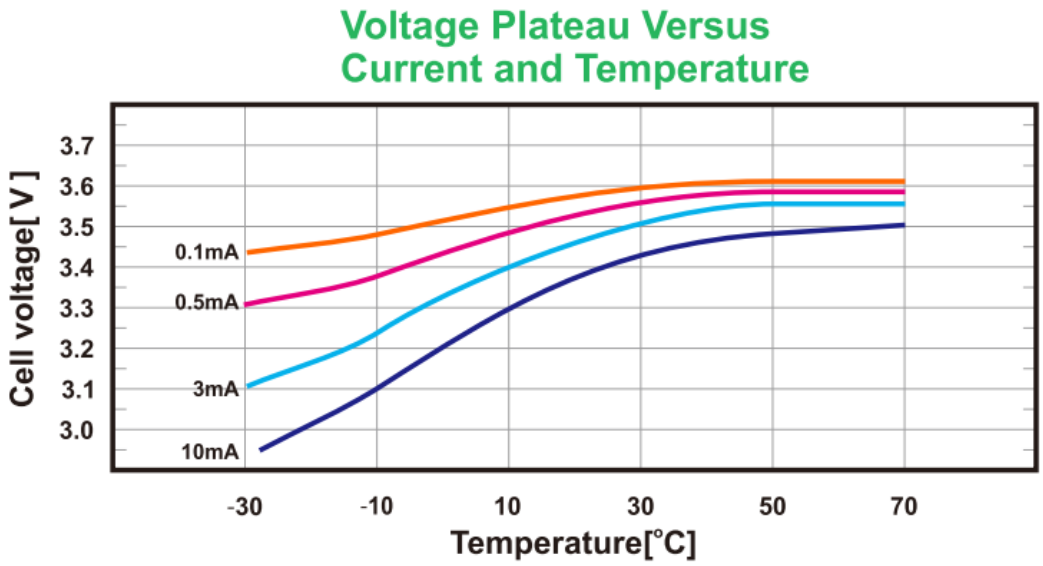
6.1 Appearance

1. The steel case without ballooning at the bottom of cell, battery (especially pay attention to the positive core and the sealing) without leakage phenomenon.
2. At the bottom of the steel case without any dimple phenomenon.
3. At the bottom of the steel case, no rust, welding scar.
4. Product identification is clear, no ghosting or blur.

7. Discharge curve

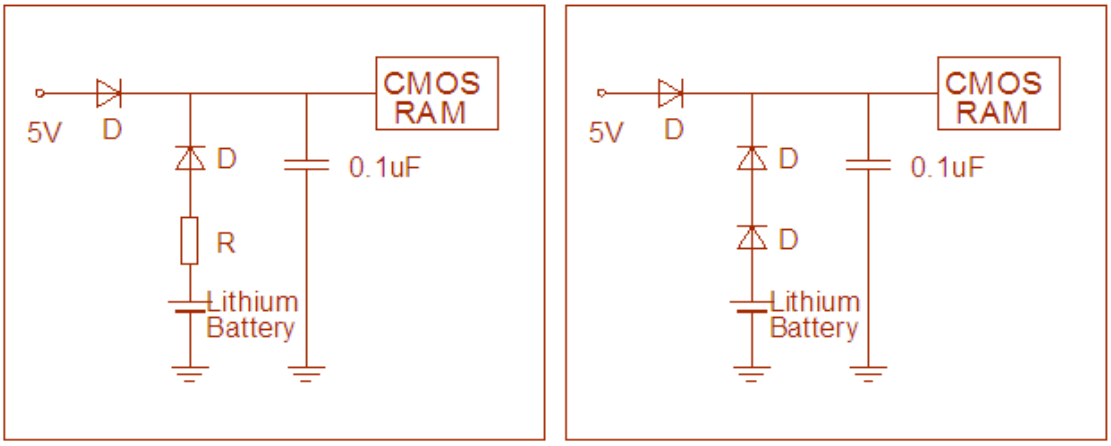






8. Memory backup circuit design suggestion

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 1% of the nominal battery capacity over the total period of use. While used for memory backup, the following circuit shall be applied:



9. Storage conditions

Should be stored in dry and cool conditions (at not exceeding +23±2°C). Storage at higher temperature may make cell capacity and initial cell voltage lower, can deform the plastic parts and may cause a leakage. To prevent self-discharge caused by corrosion or decrease of insulation, humidity during storage shall be less than 70%RH pressure: 86-106 kpa.

Recommended storage time is 6 months from production date due to the passivation characteristics of LiSOCL2 primary battery.

10. Precautions to use (Warranty)

1. Storage used recommendations.
2. The battery has an explosion resistant construction. But the following cautions should be taken, because combustible materials such as lithium metal and organic electrolyte are contained in the battery.

- Do not use except in applicable model or equipment.
- Do not connect more than two cells in series.
- Do not mix new (fresh) and old (end of life) batteries.
- Do not force-discharge.
- Do not mix different types (chemistries) of batteries.
- Do not short circuit.
- Do not dispose in fire.
- Do not charge.
- Do not disassemble.
- Do not heat up more than 100℃.
- Do not solder directly onto batteries.
- Do not soak in water.
- Do not deform.

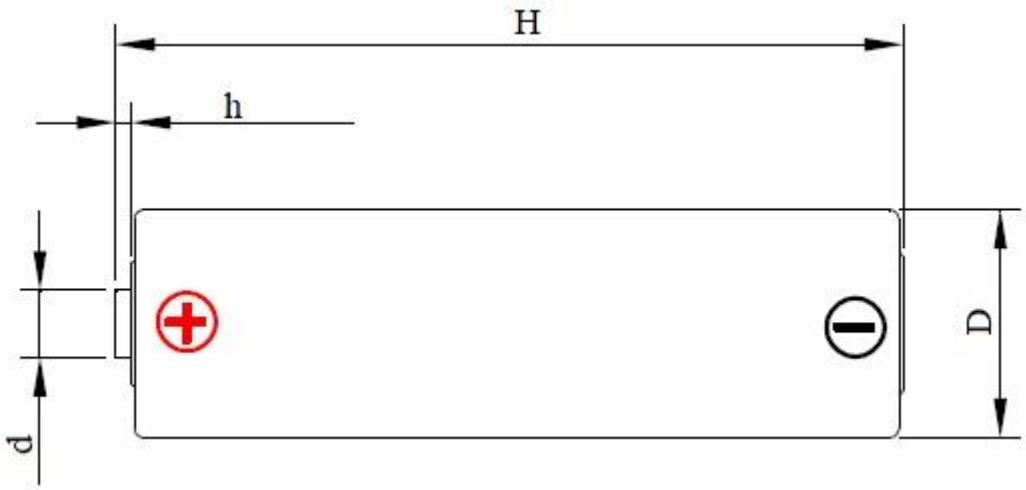
- Do not inadequacy modify and remodel for installation.
- Insert the batteries in correct polarity position.

3. Keep batteries into original package.
4. Keep away from heat source or flame.
5. The battery shall not be washed by ultrasonic wave washer.
6. Keep away from children and infants to prevent the possibility of swallowing by mistake.
7. Dispose of used batteries promptly. 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.
8. When customer does any work on the battery ignoring instructions in this specification, for example wire is soldered to the tab or battery surface directly; Bonrex Technology Co., Ltd. cannot warrant any battery performance including safety and the customer should undertake the responsibility of all damage caused by this battery.

11. Battery dimensions, pin configurations and ordering part

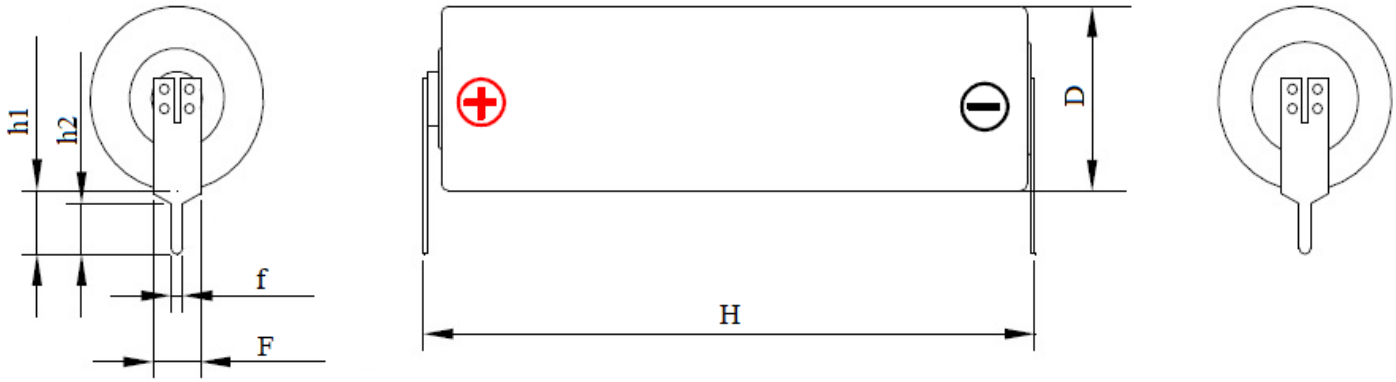
Unit: mm

Part: ER14250



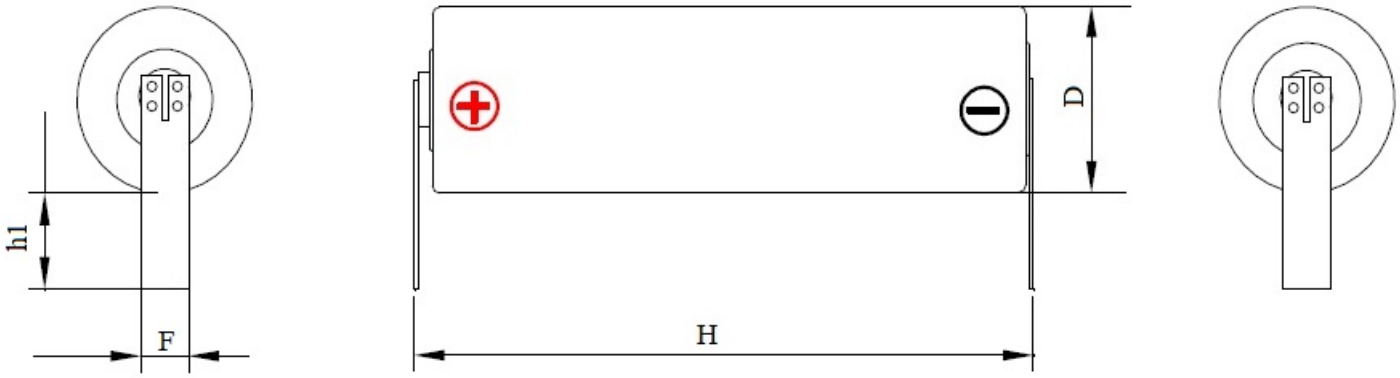
D	H	d	h
14.5±0.5	25.0±0.5	4.4±0.1	1.5±0.1

Part: ER14250-VY



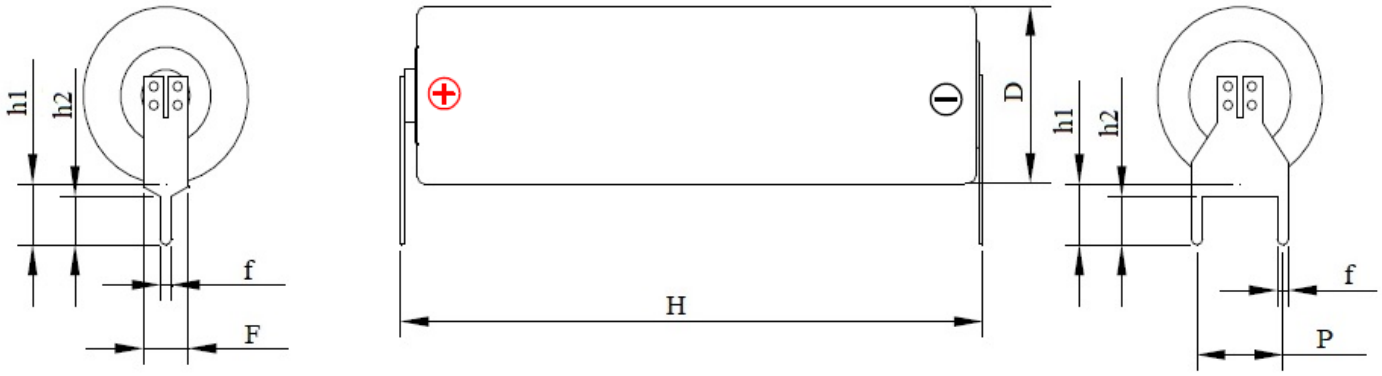
D	H	h1	h2	F	f
14.5±0.5	25.2±0.5	5.0±0.1	4.0±0.1	4.0±0.1	1.0±0.1

Part: ER14250-FT



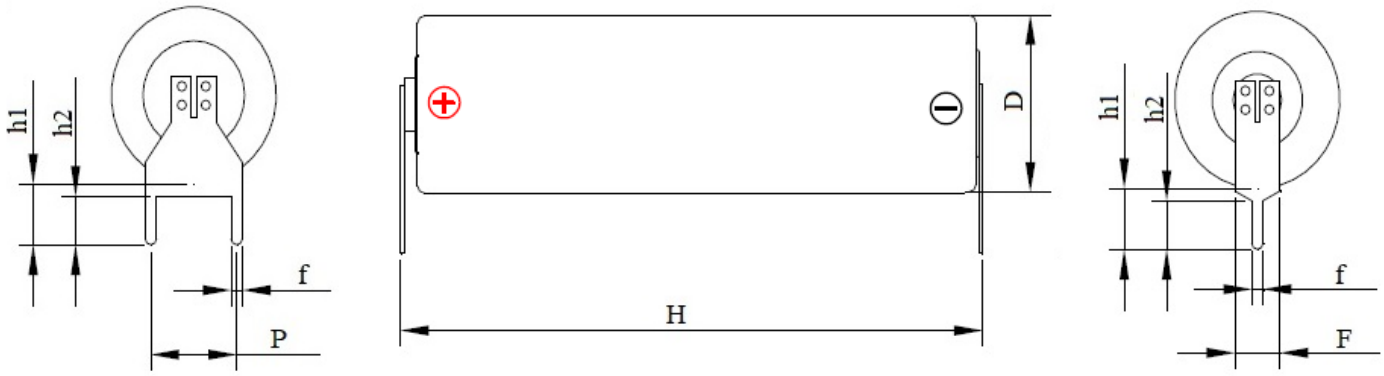
D	H	h1	F
14.5±0.5	25.2±0.5	15.0±0.5	3.0±0.1

Part: ER14250-VB



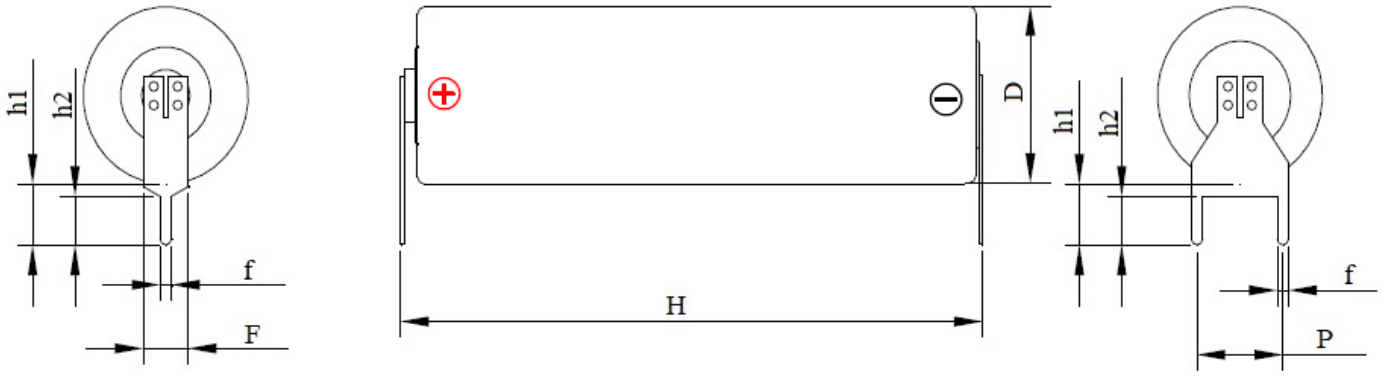
D	H	h1	h2	F	f	P
14.5±0.5	25.2±0.5	5.0±0.1	4.0±0.1	4.0±0.1	1.0±0.1	10.0±0.1

Part: ER14250-VBR



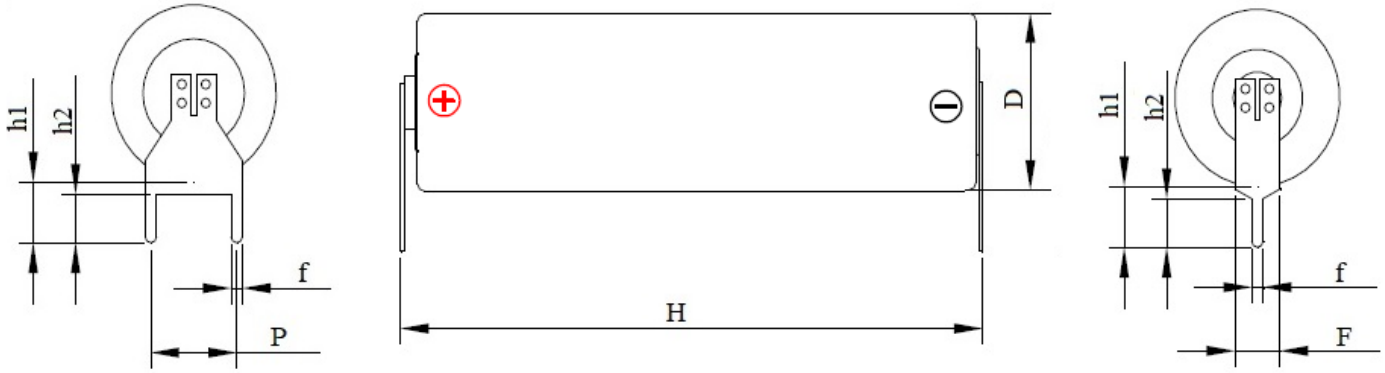
D	H	h1	h2	F	f	P
14.5±0.5	25.2±0.5	5.0±0.1	4.0±0.1	4.0±0.1	1.0±0.1	10.0±0.1

Part: ER14250-VX



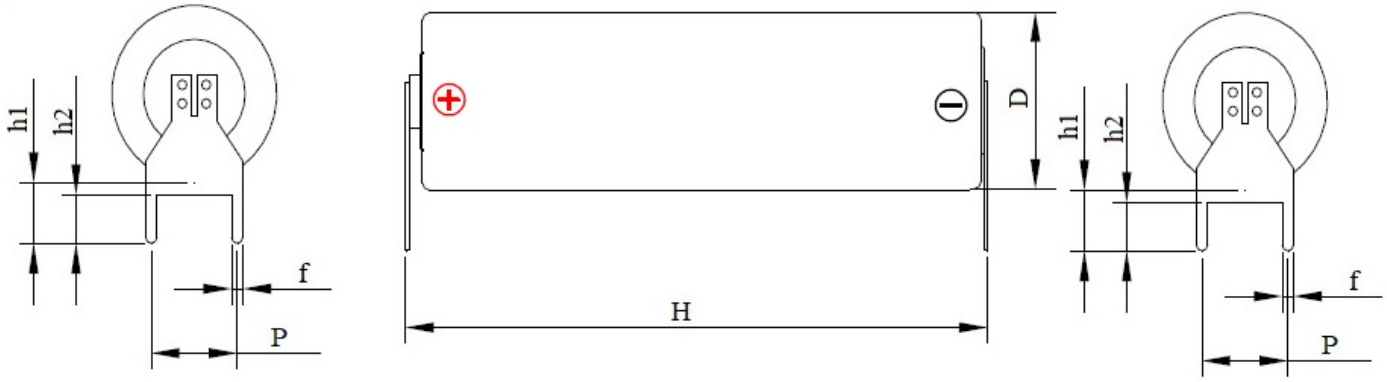
D	H	h1	h2	F	f	P
14.5±0.5	25.2±0.5	5.0±0.1	4.0±0.1	4.0±0.1	1.0±0.1	7.5±0.1

Part: ER14250-VXR



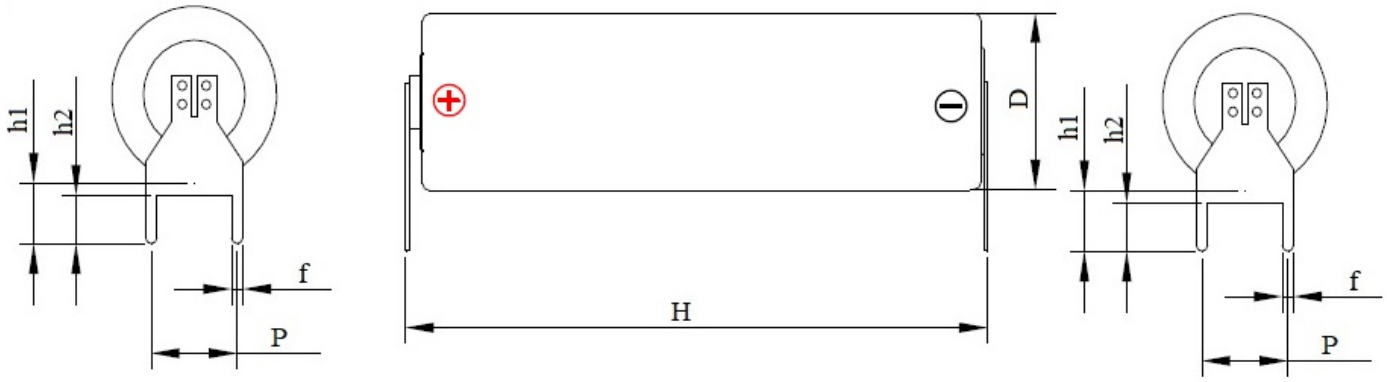
D	H	h1	h2	F	f	P
14.5±0.5	25.2±0.5	5.0±0.1	4.0±0.1	4.0±0.1	1.0±0.1	7.5±0.1

Part: ER14250-VB2



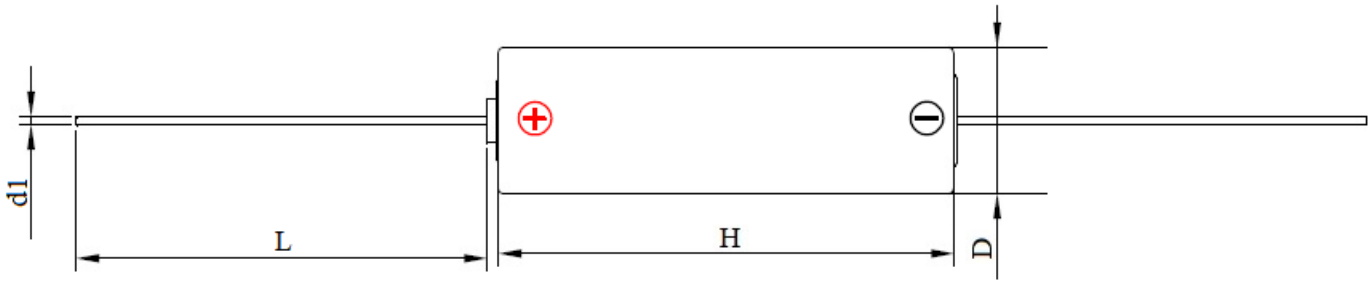
D	H	h1	h2	f	P
14.5±0.5	25.2±0.5	5.0±0.1	4.0±0.1	1.0±0.1	10.0±0.1

Part: ER14250-VX2



D	H	h1	h2	f	P
14.5±0.5	25.2±0.5	5.0±0.1	4.0±0.1	1.0±0.1	7.5±0.1

Part: ER14250-AX



D	H	L	d1
14.5±0.5	25.6±0.5	45.0±1.0	0.8±0.05