

Address: No. 6, Wadian South Road, Fucheng District,
Mianyang, Sichuan, China.

Tel: +86 0816 6103333

Website: <http://www.cham.com.cn>

E-mail: info@cham.com.cn



Mianyang Cham Intelligent Battery Co., Ltd.

Lithium-ion Rechargeable Cell Specification

Model: CMCBR32140S15E

Rated Capacity: 15Ah

Prepared by	Checked by	Discussed with	Approved by
Zenhua Ma	Yang Huang	Guoshuai Xing	Youman Zhao

Publication Date: 2024-06-25

Effective Date: 2024-06-25

Revision History

Edition	Modified Content	Draftsman	Reviser	Date
A0	First edition	Zenhua Ma	/	2024-06-25

Contents

1. Scope	1
2. Product Specification	1
3. Basic Characteristics	1
3.1 Capacity.....	1
3.2 Nominal Voltage	1
3.3 AC internal impedance	1
3.4 Standard Charge	1
3.5 Rapid Charge	1
3.6 Standard Discharge.....	1
3.7 Max. Continuous Discharge Current	1
3.8 Weight	1
3.9 Max. Dimension.....	1
3.10 Operating Temperature (Charge).....	1
3.11 Operating Temperature (Discharge)	1
3.12 Storage Humidity.....	2
3.13 Storage Temperature	2
4. Standard Conditions for Test	2
5. Characteristics.....	2
5.1 Electrical Characteristics	2
5.2 Electrical Tests	4
5.3 Mechanical Tests.....	4
5.4 Environmental Tests.....	5
6. Outline Dimensions.....	6
7. Cautions	6
7.1 Caution in Use	6
7.2 Safety Caution.....	7
8. Packing.....	8
9. Transportation.....	8
10. Long-term Storage.....	8
11. Warranty.....	8
12. Exclusion of Liability.....	8
13. Statements.....	8

1. Scope

This specification describes technical parameters and test standards for the lithium-ion rechargeable cell CMCBR32140S15E, manufactured and supplied by Mianyang Cham Intelligent Battery Co., Ltd.

2. Product Specification

2.1 Type: Cylindrical Lithium-ion Rechargeable Cell

2.2 Model: CMCBR32140S15E

3. Basic Characteristics

Technical Parameters	Specification		Condition/Note
3.1 Capacity	Rated	15Ah	Standard charge/discharge (Refer to 4.1 and 4.2)
	Minimum	14.5Ah	
3.2 Nominal Voltage	3.2V		
3.3 AC internal impedance	≤3mΩ		AC 1kHz, 30%SOC
3.4 Standard Charge (Refer to 4.1)	0.5C(7.5A) 3.65V 0.05C(750mA)		Constant current Constant voltage End condition(Cut off)
3.5 Rapid Charge	1C (15A) 3.65V 0.05C(750mA)		Constant current Constant voltage End condition(Cut off)
3.6 Standard Discharge	0.5C (7.5A) 2.0V		Constant current Cut-off voltage
3.7 Max. Continuous Discharge Current	2C(30A)		
3.8 Weight	295 ± 10g		
3.9 Max. Dimension	Diameter (Φ)	33.4mm	
	Height (H)	140.3mm	
3.10 Operating Temperature (Charge)	0°C ≤ T ≤ 10°C	≤ 4.5A	
	10°C < T ≤ 20°C	≤ 7.5A	
	20°C < T ≤ 45°C	≤ 15A	
	45°C < T ≤ 55°C	≤ 7.5A	
	55°C < T ≤ 60°C	≤ 4.5A	
3.11 Operating Temperature (Discharge)	-20°C ~ 60°C		
3.12 Storage Humidity	≤ 70% R.H.		

3.13 Storage Temperature	One month	-20°C ~ 50°C	
	Three months	-20°C ~ 45°C	
	One year	-20°C ~ 20°C	

4. Standard Conditions for Test

1. Without stating specifically, all the electrical characteristics are obtained under the following conditions: Ambient temperature: $25 \pm 2^\circ\text{C}$; Relative humidity: $65\% \pm 20\%$.

2. Without stating specifically, all the safety tests are conducted under the following conditions: Ambient temperature: $25 \pm 2^\circ\text{C}$; Relative humidity: $65\% \pm 20\%$.

4.1 Standard Charge	0.5C(7.5A), CC-CV to 3.65V, 0.05C(750mA) cut off
4.2 Standard Discharge	0.5C(7.5A), CC to 2.0V

5. Characteristics

5.1 Electrical Characteristics

Items	Test Procedure	Requirements
5.1.1 Nominal Voltage	Charge as described in 4.1, and discharge as described in 4.2. Calculate the average working voltage during discharge process.	3.2V
5.1.2 Capacity	Charge as described in 4.1, rest less than 1h, and discharge as described in 4.2.	$\geq 14.5\text{Ah}$
5.1.3 Cycle Life at room temperature	Cycling temperature: $25 \pm 2^\circ\text{C}$. Charge as described in 4.1, rest for 20min, and discharge to 2.0V with current of 1C and then rest for 20min. Repeat cycling till discharge capacity in 2 successive cycles is less than 80% of the initial capacity.	≥ 3500 cycles

5.1.4 Cycle Life at 45°C	<p>Cycling temperature: 45 ± 2°C. Charge as described in 4.1, rest for 20min, and discharge to 2.0V with current of 1C and then rest for 20min. Repeat cycling till discharge capacity in 2 successive cycles is less than 80% of the initial capacity.</p>	≥ 2000 cycles		
5.1.5 Rate Performance	<p>Fully charge as described in 4.1, rest for 30min, and discharge with different constant currents and cut off at 2.0V. Calculate the ratio of above capacities to the typical capacity.</p>	0.5C	≥ 100%	
		1C	≥ 98%	
		2C	≥ 96%	
5.1.6 Discharge at High / Low Temperature	<p>Charge as described in 4.1, discharge to 2.0V with current of 1C, and record the initial capacity at 25°C±2°C. Charge as described in 4.1, rest for 6h in the environment with different temperatures (Rest for 12h when temperature ≤ 0°C), and discharge to 2.0V with the current of 1C. Calculate the ratio of above discharge capacities to the initial capacity.</p>	-10°C	≥ 80%	
		0°C	≥ 85%	
		25°C	≥ 100%	
		45°C	≥ 100%	
		60°C	≥ 95%	
5.1.7 100% SOC Capacity Retention and Recovery	<p>Charge and discharge as described in 4.1 and 4.2, respectively, record the initial capacity; charge as described in 4.1, store in the environment at certain temperature, discharge as described in 4.2 after rest for 5h at temperature of 25 ± 2°C and calculate the retention ratio of capacity; then charge and discharge as described in 4.1 and 4.2 respectively for 3 times, and calculate the recovery ratio of capacity.</p>	Condition	Retention ratio	Recovery ratio
		25°C 28D	96%	97%
		60°C 7D	94%	96%
		60°C 28D	88%	90%

5.2 Electrical Tests

Items	Test Procedure	Requirements
5.2.1 External Short Circuit	The sample cell should be fully charged as described in 4.1, and short-circuited by connecting positive and negative terminals with a circuit load having a resistance $\leq 5\text{m}\Omega$. The temperature of the case should be measured during the test. The cell should remain on test for 10 minutes or until the temperature of the case declines by 20% of the maximum temperature.	No fire , no explosion
5.2.2 Abnormal Charge	The sample cell should be charged as described in 4.1, and subjected to the charging process with the current of 1C until voltage reaches 1.5 times of charging cut-off voltage or the charging time reaches 1.5h.	No fire, no explosion
5.2.3 Forced-Discharge	The sample cell should be charged as described in 4.1, and subjected to the forced discharge process with the reverse current of 1C. The test time is 90 min, and observe for 1h.	No fire, no explosion

5.3 Mechanical Tests

Items	Test Procedure	Requirements
5.3.1 Drop	The cell should be fully charged as described in 4.1, and dropped onto a flat concrete floor from height of 1.5m. The positive and negative electrode side should be dropped once, respectively. Observe for at least 1h.	No fire, no explosion, and no leakage.
5.3.2 Crush	The cell should be fully charged as described in 4.1, placed between two flat surfaces and crushed with its longitudinal axis parallel to the flat surfaces. Crush the cell until the voltage reaches 0V, or the deformation reaches 15%, or the squeezing force reaches 100KN or 1000 times of cell weight.	No fire, no explosion.

<p>5.3.3 Vibration</p>	<p>The cell should be fully charged as described in 4.1, and firmly secured to the platform of the vibration machine. Test conditions are: The cell is to be subjected to simple harmonic motion with an amplitude of 0.8 mm (1.6 mm total maximum excursion). The frequency is to be varied at the rate of 1 Hz/min between 10 and 55 Hz, and return in not less than 90 nor more than 100 min.</p> <p>The battery is to be tested in three mutually perpendicular directions.</p>	<p>No fire, no explosion, and no leakage.</p>
------------------------	---	---

5.4 Environmental Tests

Items	Test Procedure	Requirements
<p>5.4.1 Heating</p>	<p>The cell should be fully charged as described in 4.1, and placed in a test oven. Raise the oven temperature at a rate of $(5 \pm 2)^{\circ}\text{C}/\text{min}$ to the test temperature of $(130 \pm 2)^{\circ}\text{C}$ and remain at this temperature for 30 min. Observe for 1h.</p>	<p>No fire, No explosion.</p>
<p>5.4.3 Seawater Immersion</p>	<p>The cell should be fully charged as described in 4.1, and immersed in 3.5 wt% NaCl solution (mass fraction, simulation of seawater composition at normal temperature) for 2h.</p>	<p>No fire, No explosion.</p>
<p>5.4.3 Low Pressure</p>	<p>The cell should be fully charged as described in 4.1, stored for 6 hours in the environment with the absolute pressure of 11.6kPa (1.68psi) and the temperature of $(25 \pm 2)^{\circ}\text{C}$, and observed for 1h.</p>	<p>No fire, no explosion, and no leakage</p>
<p>5.4.4 Temperature Cycling</p>	<p>The fully charged cells (as described in 4.1) should be stored in a test chamber. Test conditions are:</p> <ul style="list-style-type: none"> a) Reduce the temperature to -40°C within 60 min and maintain at this temperature for 90 min; b) Raise the temperature to 25°C within 60min; c) Raise the chamber temperature to 85°C within 90 min maintain this temperature for 110 min; d) Reduce the temperature to 25°C within 70 min. <p>Repeat above steps 5 times and observe for 1h.</p>	<p>No fire, no explosion and no leakage</p>

6. Outline Dimensions



Fig.1 Outline Dimensions of CMCBR32140S15E (with tube)

7. Cautions

Please read this specification carefully before testing or using the cells because improper handling of the Li-ion cells may lead to efficiency loss, heating, electrolyte leakage, ignition or even explosion.

7.1 Caution in Use

7.1.1 Abnormal operations such as overcharge (voltage > 3.65V), over discharge (voltage < 2.0V) and overcurrent charge-discharge (maximum current allowed at present temperature) should be prohibited during cell using. It is strictly prohibited to use the cell in the environment easily causing problems, such as static electricity and poor sealing (water and dust entering).

7.1.2 Charging with the current more than 0.5C (7.5A), using in the high-temperature/low-temperature, vibration, or humid environment, and matching unstable cells will reduce the cycle life of the cell. It is not recommended to charge batteries with current more than 1C.

7.1.3 The cell shall not be used in the environment of high frequency microwave or ultrasonic wave. When using in series and parallel, it is recommended to coat the high-voltage wire with electromagnetic insulation cover to prevent the electromagnetic wave from damaging adjacent devices and human body.

7.1.4 Avoid overlapping or contact between the positive and negative terminal wires of the battery to reduce the risk of short circuit.

7.1.5 The battery should be charged and discharged in strict accordance with this specification to ensure the battery's cycle life and safety.

7.1.6 When the batteries are assembled in a module for use, the cells with the same capacity, internal resistance, batch and charged state shall be used. The packing standard of the batteries should be strictly in accordance with the technical agreement. The temperature difference inside the battery pack should be less than 5°C when the pack is working.

7.2 Safety Caution

7.2.1 The battery should be placed away from babies and children. If there is any emergency such as deglutition, scald or explosion, please go to the hospital immediately.

7.2.2 When charging or discharging the battery, please use professional test equipment designed for Li-ion batteries. Do not use ordinary constant current or constant voltage (CC/CV) power chargers without limitation of current or voltage. These chargers do not protect the battery from being overcharged and over-discharged, and may lead to function failure and be dangerous.

7.2.3 When charging, discharging, or assembling the battery, avoid reversing the positive and negative terminals. Or it would lead to overcharge and over-discharge of the battery, causing serious failure, or even explosion.

7.2.4 Do not solder the battery directly. Do not disassemble the battery.

7.2.5 Do not put the battery in pockets or bags with metal objects, such as necklaces, hairpins, coins, screws, etc. Neither store the battery without proper isolation, nor connect the positive and negative electrodes directly with conductive materials. Or the battery may be short-circuited.

7.2.6 Do not hammer, throw or trample the battery. Do not put the battery into washing machines or high-pressure containers.

7.2.7 Keep the battery away from heat sources, such as fires, heaters, etc. Do not use or store the battery in direct sunlight or at places where temperature could exceed 60°C. Or the battery may generate excessive heat, ignite and fail.

7.2.8 Do not get the battery wet or throw it into water. When the battery is not in use, place it in a dry environment with relatively low temperature.

7.2.9 If the battery becomes abnormally hot, give out smell, change color, deform or show any other abnormalities during using, testing or storing, please stop using or testing immediately. Attempt to isolate the battery and stay away.

7.2.10 If the leaking electrolyte from the battery gets into your eyes, do not rub your eyes. Rinse the eyes with clean water and seek medical attention if problems remain. If the electrolyte gets onto the skin or clothing, wash with clean water immediately.

8. Packing

Cells need to be at 30% state-of-charge (SOC) when packed. The surface of the packing boxes shall contain the following information: product name, type, nominal voltage, quantity, gross weight, date, capacity and impedance.

9. Transportation

During transportation, do not subject the cells or the boxes to violent shaking, bumps, rain or direct sunlight. Cells can be transported by truck, train, ship and airplane, etc.

10. Long-term Storage

When delivered, cells are charged to 30% SOC. Cells may have lower capacity than they are expected due to the self-discharge.

Do not use or store the cells when the voltage is less than 2.0V.

11. Warranty

The warranty period of this product is 12 months from the ex-factory date. This warranty will be void if the cells are used in ways that deviate from this specification.

12. Exclusion of Liability

The company is not liable for any problems arising from non-compliance with this specification.

The company is not liable for any problems arising from the use of electrical circuits, battery packs and chargers.

The company does not guarantee the quality of the defective batteries caused by customers in the battery assembly process after shipment.

13. Statements

The information in this specification is subjected to change without prior notice.

For those applications not described here, please consult your nearest CHAM Sales Office or Distributors.