

MATERIAL SAFETY DATA SHEET

Product Name: Li-MnO₂ Button Cell (Lithium Metal Battery)

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Li-MnO₂ Button Cell(Lithium Metal Battery)

Applicable Models/Sizes: CR2477 3V 1050mAh

2.HAZARDS IDENTIFICATION

Classification: The lithium content of the product is 0.28g, it is belong to the lithium metal battery.
The product is tested according to Section 38.3 of the Manual of Tests and Criteria, the test report number is: RZUN2022-6541-M1.

Other information Caution! Avoid short circuit place in high temperature environment, put into water, or damage the shell.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Information about the chemical nature of product:

Ingredient Name	CAS No.	Concentration	Weight
Stainless Steel	12597-68-1	34.739%	3.057g
Polypropylene	9003-07-0	2.557%	0.225g
Manganese dioxide	1313-13-9	45.591%	4.012g
Lithium Sheet	7439-93-2	3.409%	0.28g
Lithium Perchlorate	7791-03-9	7.978%	0.702g
Polypropylene	9003-07-0	0.227%	0.20g
Teflon	9002-84-0	1.545%	0.136g
Graphite	7782-42-5	1.545%	0.136g
Propylene Carbonate	108-32-7	2.409%	0.212g

Independent Certification of Lithium-Manganese Button Cell Battery UN Transportation Model Regulation

No	Test Item	Criteria	Result	Remark
T1	Altitude Simulation	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	
T2	Thermal Test	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	0.225g
T3	Vibration	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	4.012g
T4	Shock	No mass loss, leakage, venting, disassembly, rupture, and fire. OCV should not be less than 90% before testing.	Passed	0.28g
T5	External Short Circuit	External temperature should not exceed 170 degC. No disassembly, rupture, and fire within six hours of this test.	Passed	0.702g
T6	Impact	External temperature should not exceed 170 degC. No disassembly, and fire within six hours of this test.	Passed	0.20g
T7	Overcharge	No disassembly, and fire within seven days of this test.	Passed	Battery only
T8	Forced Discharge	No disassembly, and fire within seven days of this test.	Passed	0.136g

We confirmed the test results based on the UN manual of tests and criteria 38.3.

4. FIRST-AID MEASURES

- ▶ Eyes: Flush with water for at least 15 minutes. If irritation occurs and persists, contact a medical doctor.
- ▶ Skin: Remove contaminated clothing and thoroughly wash with soap and plenty of water. If irritation persists, contact a medical doctor.
- ▶ Inhalation: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, see a medical doctor. If breathing has stopped, give artificial respiration and see a medical doctor IMMEDIATELY.

5. FIRE-FIGHTING MEASURE

- ▶ Hazardous Combustion Products: When burned, hazardous products of combustion including fumes of carbon monoxide, carbon dioxide, and fluorine can occur
 - ▶ Extinguishing Media: Carbondioxide, dry chemical, orfoam.
 - ▶ Basic Fire Fighting Procedures: Wear NIOSH/MSHA approved positive pressure selfcontained breathing apparatus and protective clothing to prevent contact with skin and eyes.
 - ▶ Unusual Fire & Explosion Hazards: This material does not represent an unusual fire or explosion hazard.
- Flash Point: Not available
Auto-ignition Temperature: No Data.
Flammability Limits in Air, Lower, % by Volume: 1.4
Flammability Limits in Air, Upper, % by Volume: 11

6. ACCIDENTAL RELEASE MEASURES

- ▶ Procedure for Release and Spill: Sweep up and place in a suitable container, dispose or waste according to all local, state and Federal Laws and Regulations.
- ▶ Before cleanup measures begin, review the entire MSDS with particular attention Potential Health Effects; and on Recommended Personal Protective Equipment.

7. HANDLING AND STORAGE

- ▶ Handling
Specific safe handling advice: Never throw out cells in a fire or expose to high temperatures. Do not soak cells in water and seawater. Do not expose to strong oxidizers. Do not give a strong mechanical shock or throw down. Never disassemble, modify or deform. Do not connect the positive terminal to the negative terminal with electrically conductive material.
- ▶ Storage conditions (suitable, to be avoided): Do not place the battery cell near heating equipment, nor expose to direct sunlight for long periods. Elevated temperatures can result in shortened battery cell life and degrade performance. Store in cool place (temperature: -20-45°C, humidity: 45-75%).
- Incompatible products: Conductive materials, water, seawater, strong oxidizers and strong acids
- Packing material (recommended, not suitable): Insulative and tearproof materials are recommended.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

- ▶ Engineering controls: Investigate engineering techniques to reduce exposures use with adequate ventilation and recommended personal protective equipment.
- ▶ Eye/Face protection: Use good industrial practice to avoid eye contact. Processing of this product releases vapors or fumes which may cause eye irritation. Where eye contact may be likely wear chemical goggles and have eye flushing equipment available
- ▶ Skin protection: Minimize skin contamination by following good industrial hygiene practices. Wearing protective gloves is recommended. Wash hands and contaminated skin thoroughly after handling.
- ▶ Respiratory protection: Avoid breathing dust and processing vapors. When adequate ventilation is not available, wear a NIOSH/MSHA respirator approved for protection against inorganic dusts.
- ▶ Special clothing: Rubber gloves.

9. Physical / Chemical Characteristics

Physical state: Solid
Form: Geometric solid
Color: Metallic color (without outer PVC cover)
Odor: No odor
pH: Not Applicable
Flash point: Not Applicable
Explosion properties: Not Applicable
Density: Not Applicable
Solubility: Not Soluble

10. STABILITY AND REACTIVITY

Hazardous reactions may occur under some specific conditions.

- ▶ Conditions to avoid: When a battery cell is exposed to an external short-circuit, crushes, modification, high temperature above 100 degree C, it will be the cause of heat generation and ignition. Avoid to be exposed to direct sunlight and high humidity.
- ▶ Materials to avoid: Conductive materials, water, seawater, strong oxidizers and strong acids.
- ▶ Hazardous decomposition products: Acrid or harmful gas is emitted during fire.

11. TOXICOLOGICAL INFORMATION

Acute toxicity: No data available.
Skin corrosion/irritation: No irritant effect.
Serious eye damage/irritation: Cause serious eye irritation.
Respiratory or skin sensitization: No sensitizing effects known.
Specific target organ system toxicity: No information available.
Note: The internal battery materials may cause irritation to eyes and skin.

12. ECOLOGICAL INFORMATION

Toxicity: No further relevant information available.
Persistence and degradability: No further relevant information available.
Bioaccumulative potential: No further relevant information available.
Mobility in soil: No further relevant information available.
Results of PBT and vPvB assessment: PBT: Not applicable. VPVB: Not applicable.
Other adverse effects: No information available.

13. DISPOSAL INFORMATION

Waste disposal must be in accordance with the applicable regulations. Disposal of the lithium-manganese button cell battery cells should be performed by permitted, professional disposal Page:

firms knowledgeable in State or Local requirements of hazardous waste treatment and hazardous waste transportation. Incineration should never be performed by battery but users, eventually by trained professional in authorized facility with proper gas and fume treatment.

14. TRANSPORTATION/SHIPPING INFORMATION

▶ US DOT, All batteries are not subject to the requirements of the Department of Transportation (DOT) subchapter C, Hazardous Material Regulations since each battery meets the exceptions under 173.185 (b). The batteries are exempted from the US DOT regulations as long as they are separated to prevent short circuits and packed in strong packing for conditions normally encountered in transportation.

UN Number: UN3090/UN3091

▶ ICAO and IATA, all batteries are regulated as Hazardous Material by the International Civil Aviation Organization (ICAO), the International Air Transport Association (IATA) and International Maritime Dangerous Goods Regulations (IMDG).

The only DOT requirement for shipping these batteries is special provision 130 which states: "Batteries, dry are not subject.

They must be transported according to Section 38.3 of the Seventh Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.7/Section 38.3) and Drop test of Section 1B of Packing

Instructions 968~970 of 65th DGR Manual of IATA .

The lithium cell(CR2477)has passed the test UN38.3,according to the report ID:

RZUN2022-6541-M1.

▶ IMO, all batteries are regulated as Hazardous Material by the International Maritime Organization (IMO) when transporting more than 24 batteries or 12 batteries in a single package. These must be transported according to the requirement in Special Provisions "188" and "230".

Batteries are as per IMDG SP:188 and tested as NON DG.

Package complies with the special provision 188 of IMDG CODE(Amdt.41-22)2022 Edition.

▶ ADR, RID, all batteries are regulated as Hazardous Material by the ADR (road) and RID (rail) when transporting more than 24 batteries or 12 batteries in a single package. These must be transported according to the requirement in Special Provisions "188" and "230".

▶ BUILDING OF NEW BATTERY PACK- if you build any of lithium batteries into battery pack, you must assure that they are being tested in accordance.

15. REGULATORY INFORMATION

International Regulation:

Globally Harmonized System of Classification and Labeling of Chemicals

Recommendations on the Transport of Dangerous Goods Model Regulations IATA

Dangerous Goods Regulations(DGR)

International Maritime Dangerous Goods (IMDG CODE)

EU Regulation:

EU regulation (EC)1272/2008 on „Classification,Labeling and Packaging of Substances and Mixtures“(CLP)

Registration,Evaluation and Authorization of Chemicals (REACH)

Agreement concerning the International Carriage of Dangerous Goods by Road(ADR)

US Regulation:

American National Standard for Hazardous Workplace Chemicals -Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation.