

## 1. Precautions

### 1.1 Handling Precautions

Please read and observe the following precautions thoroughly. Coin Manganese Dioxide Lithium Batteries contain flammable materials, such as lithium and organic solvent. Improper battery handling may cause leakage, overheating, explosion or ignition of batteries, which may lead to injury or product failure.

#### **WARNING**

- Keep batteries away from children. Swallowing a battery can cause chemical burn or penetration of the mucous membrane tissue, in the worst case, may result in death.  
If infant happens to swallow a battery, seek medical attention immediately to take it out.
- Never charge batteries. Charging batteries may cause battery electrolyte to seethe or battery internal pressure to rise. Leakage, heating, explosion or ignition of batteries may result.
- Do not heat or dispose of batteries in fire. Do not modify nor disassemble batteries. This may damage gaskets, and may cause ignition, heating, leakage or explosion.
- Insert batteries (+) (–) correctly. Erroneous insertion of batteries may result in battery short-circuiting depending on types of devices. Leakage, heating, explosion or ignition of batteries may result.
- In case of eye contact with battery electrolyte, immediately flush eyes thoroughly with water, do not rub the eyes, and consult a doctor.
- In case battery electrolyte comes into contact with the mouth, gargle and rinse thoroughly and consult a doctor immediately.
- Do not connect (+) and (–) of batteries by wire. Do not carry nor store batteries with metallic necklace or hairpin. It may cause short-circuit and a large current flow into batteries, as a result, leakage, heating, explosion or ignition of batteries may result.
- Keep away from fire if batteries have leakage or odor to prevent ignition of battery electrolyte.
- Do not solder batteries directly. Excessive heating may cause deformation of battery components such as gaskets, which may lead to battery swelling, leakage, explosion or ignition.
- When batteries are stored or disposed of, isolate or cover positive (+) and negative (–) terminals. If batteries are mixed with other batteries or metals, short-circuit may be caused and leakage, heating, explosion or ignition of batteries may result.
- Do not mix the used batteries together with new batteries or different types of batteries. Leakage, heating, explosion or ignition of batteries may result due to different characteristics.
- Do not fix batteries on the skin by adhesive cellophane tape; it may cause damage on the skin.

#### **CAUTION**

- Do not drop, apply strong force to nor deform batteries. Leakage, heating, explosion or ignition may result.
- Do not store, use nor leave batteries at high-temperatures or high-humidity such as inside of cars in the sun. Avoid exposure to direct sunlight to prevent leakage, heating, explosion or ignition.
- Do not wet batteries with water. This may cause ignition of batteries.
- Depending on types of devices, batteries positive (+) and negative (–) terminals may contact with metallic part at entrance of battery compartments. Insert batteries into devices in the way not to cause short-circuit.

- Depending on types of devices, batteries may not be suitable for use on certain specification or performance. Use suitable batteries correctly on devices in accordance with devices' instruction manuals and handling precautions.
- Do not store nor use batteries in high temperature and high humidity location and where batteries are exposed to direct sunlight. Storage in high temperature and high humidity location may cause leakage, heating, explosion or ignition and in some cases, batteries' performance and life may be deteriorated.
- When abnormality such as heating or deformation is found on batteries during use or storage, stop using the batteries. This may cause leakage, heating and explosion.
- Dispose in accordance with applicable federal state and local regulations.
- Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.
- Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to human life or property.
  - ① Aircraft equipment
  - ② Aerospace equipment
  - ③ Undersea equipment
  - ④ Power plant control equipment
  - ⑤ Medical equipment
  - ⑥ Transportation equipment(vehicles, trains, ships, etc.)
  - ⑦ Traffic signal equipment
  - ⑧ Disaster prevention / crime prevention equipment
  - ⑨ Data-processing equipment
  - ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above.

## 1.2 Precautions in Designing

To use batteries efficiently, observe the following precautions.

- Do not solder batteries directly. Excessive heating may cause deformation of batteries and components such as gaskets, which may lead to swelling, leakage, explosion or ignition of batteries.
- Observe soldering conditions for tabbed batteries to be specified by manufacturers. Use tabbed batteries if soldering is required. Excessive heating may cause deformation of gaskets, leakages or performance deterioration of batteries. Be sure not to allow battery temperature to exceed 70°C during soldering.
- Use nickel-plated iron or stainless steel for the terminals that contact batteries.
- Make sure that terminal contact pressure is 100gf minimum for stable contact.
- Keep batteries and contact terminal surfaces clean and free from moisture and foreign matter.
- Before inserting batteries, check batteries' contact terminals if they are normal, not bent or damaged. Bent terminals may not make good contact with batteries or may cause short-circuit.
- Do not over discharge batteries lower than 0V. It may lead to reversed polarity and cause ignition, heating, leakage or explosion.
- Design equipment so that infants cannot easily remove batteries and swallow them.
- Consult sales representatives, when series or parallel connection of several batteries is required.

### 1.3 Precautions for Mounting

Unlike other electronic components, Coin Manganese Dioxide Lithium Batteries (Coin-type) may be externally short-circuited before and after they are installed in circuit boards and without the power being turned on. This causes power drainage. As a result, batteries may lose their capacity before the equipments are even used. As short-circuits tend to occur in the following cases, please take care when handling batteries.

#### 1. Overlapping Batteries

Coin Manganese Dioxide Lithium Batteries are shaped as shown below. They have exposed positive (+) and negative (-) metallic surfaces with a thin cylindrical seal, called the gasket, in between them. When batteries are overlapped or mixed together in a disorderly way, their positive (+) and negative (-) terminals touch each other and may result in short-circuit.

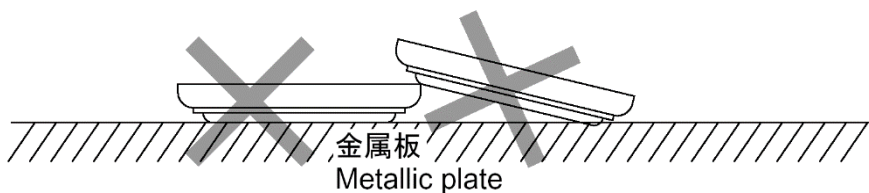


【Battery shape of Coin Manganese Dioxide Lithium Battery】

【Battery overlap】

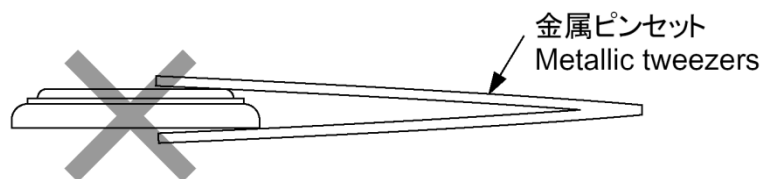
#### 2. Batteries in Metallic Container or on Metallic Plate

Similar to the overlapping battery problem, when batteries are put in a metallic container or on a metallic plate, their positive (+) and negative (-) terminals may short-circuit through the conductive surface, depending on how the batteries are positioned.



#### 3. When Held with Metallic Tweezers

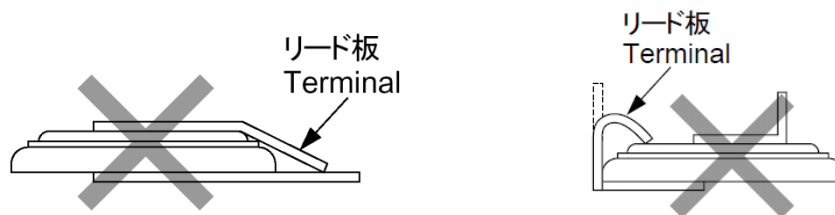
When held with a pair of metallic tweezers as shown, batteries may short-circuit through the tweezers.



#### 4. Short-circuits through Piled Circuit Boards

When circuit boards with batteries are piled on top of one another, their conductive traces may touch and form a battery discharge circuit that consumes batteries' power.

5. Discharge through Conductive Electrostatic Prevention Mats  
Conductive mats are widely used to prevent static electricity from destroying semiconductors. If a circuit board with mounted battery is put on a conductive mat, the soldered conductors may touch the mat, providing a discharge path for batteries.
6. Battery Handling by Naked Hand  
If batteries are touched by naked hand, surface resistance may be increased due to sweat or sebum; contact performance may be deteriorated.
7. Improper Battery Mounting Polarity  
When batteries' positive (+) and negative (-) terminals are reversed with respect to the battery mounting's polarity marks, batteries may be discharged, depending on the type of electric circuit.
8. Conductive Materials to prevent Static Electricity  
Various protective materials are used to prevent static electricity. Most of these protective materials consist of particular combination of carbon, aluminum and other materials; it makes conductive performance effective. If both battery's positive (+) and negative (-) terminals touch these protective materials at the same time, batteries may discharge.
9. Electrical characteristics after short-circuit  
Coin Manganese Dioxide Lithium Batteries may require considerable time to regain its normal voltage even after a slight short-circuit.  
When batteries are short-circuited, wait an adequate time for batteries to recover before measuring electrical characteristics. Use a high impedance (1M $\Omega$  or higher) voltmeter to measure battery voltage.
10. When Batteries Lead Plates Touch Each Other  
When batteries lead plates bend and touch each other or either terminal, batteries may short-circuit.



11. Solder Bridges  
Solder may bridge between circuit board conductors, causing short-circuits and draining batteries.
12. Short-circuits through Soldering Irons  
Similar to solder bridging, when circuit board wiring is short-circuited by a soldering iron for an extended period, batteries may be drained and consumed.  
Complete manual soldering within 5 seconds.