

Control  
number

02020-10E-015-1

REFERENCE

Specification	
Lithium Primary Battery	
Ordering code	CR-2032L/BE
Model code	CR2032

This is the PROVISIONAL SPECIFICATION just only for the engineering review on our product herein. Also, this is a reference documents for reviewing characteristics of our product, which is for prevention any trouble or misuse. Since this is just for customer's reference, the description for warranty herein shall be handled with the formal specification, which shall be agreed upon between the customer and IS Company of Panasonic Corporation. Please note that all descriptions specify this product maybe possibly changed without notification if we decide it is required.

Approved by

Division/Department

Name

Signature/date

Date of Issue : Oct.21,2020  
Industrial Solutions Company  
Panasonic Corporation

Drafted

*T. Ueda*

T.Ueda  
SE

1. Applicable range

This specification applies to manganese dioxide lithium batteries, CR-2032L/BE (the Products) which are manufactured by Industrial Solutions (IS) Company, Panasonic Corporation.

2. Nominal specification

- 2.1. Model code CR2032
- 2.2. Nominal voltage 3V
- 2.3. Nominal capacity 225 mAh
- 2.4. Operation temperature From -30°C to 85 °C  
(Note: Cumulative exposure time between 70°C and 85°C should be less than 240 hours.)
- 2.5. Storage Condition (Recommendable) Temperature : 5°C to 35°C, Humidity : 45% to 85% R.H.
- 2.6. Mass(bare cell) Refer to drawing 1
- 2.7. Dimension Refer to drawing 1
- 2.8. Battery composition Lithium primary battery composed of cathode from manganese dioxide anode from lithium and electrolyte from organic solvent and lithium salt.

3. Characteristics

Table 1. CR2032 characteristics

	Items	Test method	Temperature	Discharge conditions	initial	After 1 year in room temperature
1	Open circuit voltage	Refer to item 5.2(Min.)	20 ± 2°C		3.1 V	3.1 V
2	Internal resistance	Refer to item 5.3(Max.)	20 ± 2°C		20 Ω	-
3	Discharge duration	Refer to item 5.4(Std.)	20 ± 2°C	Load : 15 kΩ cut offV : 2.0V	1183 h	1133 h
		Refer to item 5.4(Min.)			1041 h	1019 h

4. Indication

4.1. Below items are indicated on battery or its package

- Model code CR2032
- Nominal voltage 3V
- Plus polarity +
- Manufacturer or its brand Panasonic
- Production country and Classification : Made in Indonesia

\*There may be a case that design of indication is changed and in this case, Panasonic will inform it in advance.

4.2. Production date code

(Battery assemble date.)

Battery assembling date is expressed by two digit code and is stamped on the negative case

First digit: The last digit of dominical year;

Second digit; Month (January=1, February=2, ...October=0, November=Y, December=Z)

Example : 03 ⇒ (March 2020)

4.3. UL

This battery is certificate by UL and listed on file number MH12210

4.4 Production Site

PT. Panasonic Gobel Energy Indonesia, Jl. Teuku Umar Km. 44, Cikarang Barat Bekasi, Jawa Barat Indonesia

4.5 RoHS comply

The battery herein complies with EU battery directive (2006/66/EC and 2013/56/EU).

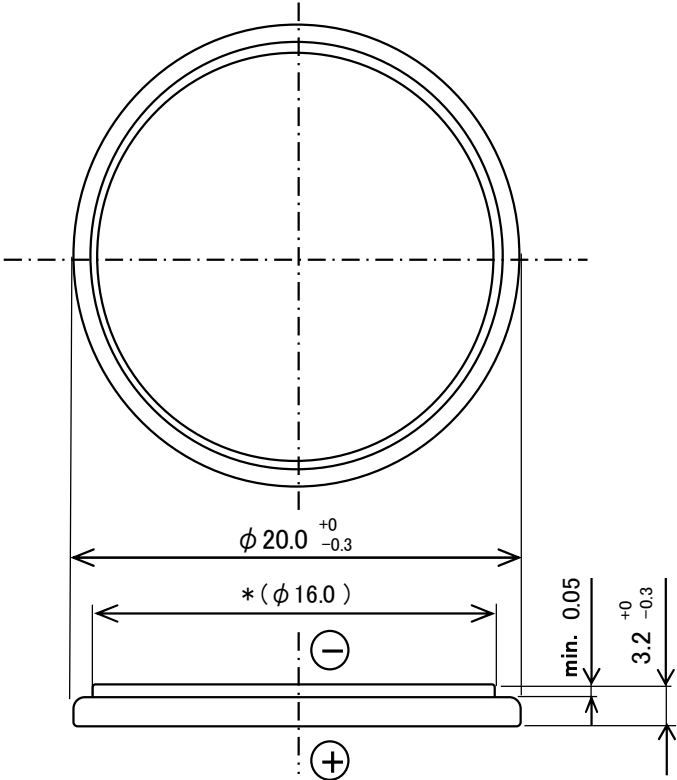
Since the batteries shall comply with EU battery directive, RoHS directive does not cover batteries.

However, this battery does not use the 10 substances restricted by RoHS directive.

Each content of 10 restricted substances is less than the maximum amount regulated by RoHS.

Drawing 1. Dimensions

Model code : CR2032



\* ( ) is for reference purpose only

Terminal : Plus terminal material : Stainless steel / Ni plating  
Minus terminal material : Stainless steel / Ni plating

Mass(bare cell) : Approx. 2.8 g

5. Test condition and performance

5.1. External dimensions

Measured with caliper described in item 6.3.(1) herein without making short-circuit.

Dimensions should confirm to drawing 1 herein.

5.2. Open circuit voltage

Measure the open circuit voltage with the voltage meter described in item 6.3.(2) herein after keeping the battery for 4 hours at least in measurement environment. Open circuit voltage shall conform to table 1-1 herein.

5.3 Internal resistance

Measure the internal resistance with the resistance meter described in item 6.3.(3) herein after keeping the battery for 4 hours at least in measurement environment. Internal resistance shall conform to table 1-2 herein.

5.4. Discharge duration

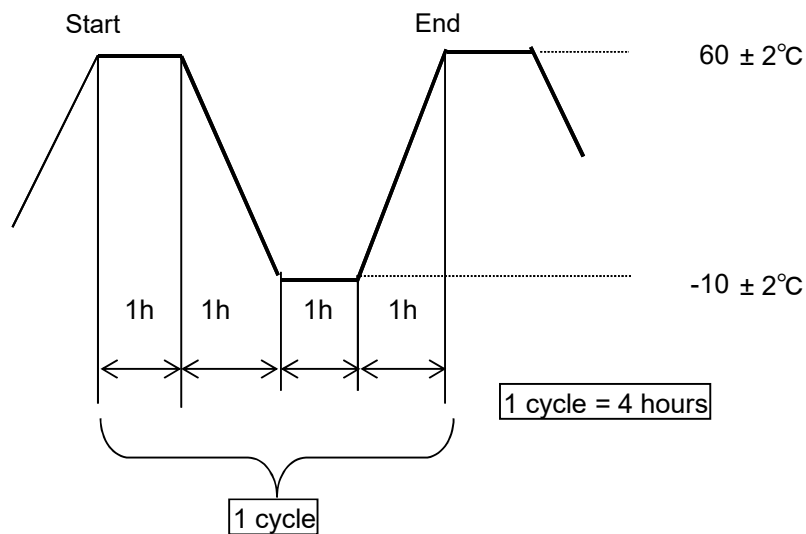
Discharge the battery with the load resistance specified in table 1-3 herein after keeping the battery in measurement environment for 4 hours at least. The discharge duration is determined as an operation time that the operation voltage reaches to the cut off voltage specified in the table 1-3 herein. Discharge duration shall conform to table 1-3 herein.

5.5. Anti-leakage

Appearance check after 42 cycles of thermal cycle by the condition showing below. Battery shall not have deformation or leakage.

\* This test should start from high temperature (60°C) position.

\* No humidifying to ambient temperature and humidity.



- 5.6. Storage characteristics
- (1) Open circuit voltage After storage term described on table 1 herein, keep the battery for 4 hours at least in measurement environment, then measure the open circuit voltage with the voltage meter described in item 6.3.(2) herein.  
Open circuit voltage shall conform to table 1-1 herein.
  - (2) Internal resistance After storage term described on table 1 herein, keep the battery for 4 hours at least in measurement environment, then measure the internal resistance with the resistance meter described in item 6.3.(3) herein. Internal resistance shall conform to table 1-2
  - (3) Discharge duration After storage term described on table 1 herein, keep the battery for 4 hours at least in measurement environment, then discharge the battery with the load resistance specified in table 1 herein. The discharge duration is determined as an operation time that the operation voltage reaches to the cut off voltage specified in the table 1 herein. Discharge duration shall conform to values described in table 1-3 herein.
- 5.7. Appearance No deformation, bruise and stain which cause practical interference.
6. Test environment and methods
- 6.1. Initial test Initial test must be done within 2 months from delivery.
  - 6.2. Temperature and humidity Unless otherwise specified, test should be carried out in room temperature ( $20 \pm 2^{\circ}\text{C}$ ) and room humidity ( $65 \pm 20\%$  R.H.)
  - 6.3. Measuring equipment
    - (1) Dimension Micrometer defined by JIS B7502 or equivalent or more accurate one must be used for dimension measurement.  
For one digit decimals tolerance, caliper with 0.05mm accuracy which is defined JIS B7507 or higher accuracy equipment must be used.
    - (2) Voltage Voltage meter defined by JIS C1102 class 0.2 or higher, and more than 10Mohm impedance must be used.
    - (3) Internal resistance It should be measured by sinusoidal current method (1kHz).  
Measurement should be finished within 5 seconds.  
(As a general rule, HIOKI LCR meter IM3523 with DC BAIS VOLTAGE UNIT 9268-10 or equivalent should be used.)
    - (4) Load resistance Load resistance includes all resistance of discharge circuit, and its tolerance shall be less than 0.5%.
    - (5) Visual inspection Appearance check is observed by human eyes.

7. Revision and modification of this specification

Revision and modification must be carried out after the prior mutual agreement.  
All accidents or issues caused by any events that are neither defined nor described in this specification, mutual discussion shall take place for the resolution.  
If the customer fails to sign and return this specification, this specification will be automatically deemed to be accepted by the customer upon the earlier of (a) six (6) months from the issue date of this specification or (b) the issue date of the first P/O for the Products from the customer.

## 8. Important Notes (Warranty)

- (1) The Products are warranted to conform to the description contained in this specifications for a period of twelve [12] months from the ex-factory date the Products is shipped and any claim by the customer (apparatus manufacturer or distributor) must be made within such period. During that warranty period, if the customer finds a non-conformity of the Products and presents sufficient evidence that (i) such defect was caused by Panasonic's negligence, and (ii) the usage and handling of the Products were appropriate, Panasonic will independently analyze the cause of such non-conformity in the Products. If Panasonic's analysis confirms the non-conformity is solely attributable to the negligence of Panasonic, Panasonic agrees to supply conforming Products as a replacement at its sole expense. The customer agrees that the rights and remedies of the customer will be strictly limited to those contained in this warranty with respect to any matter relating to the use of the Products and this specification. To the maximum extent permitted by law, the customer waives all other rights and remedies with respect to any matter in any way relating to the use of the Products and this specification.
- (2) Confirm and assure the matching and reliability of the Products on actual set or unit application with the customer's responsibility.
- (3) Panasonic shall not warrant or be responsible in any case where the customer fails to carry out proper handling, operating, installation, testing, service and checkout of the Products and/or to follow the instruction, cautions, warnings, notes provided in this specifications, or other Panasonic's reasonable instructions or advise.
- (4) Panasonic will not be held responsible for any issues caused by modifications to the Products taken place after that the Products are delivered to the customer.
- (5) If the customer intends to use or incorporate the Products for or into devices for which failure or malfunction of the Products may directly jeopardize life or cause threat of personal injury, such as for medical equipment, vehicle equipment, aircraft and aerospace equipment, aircraft electronics equipment, explosion-proof equipment or any other similar equipment ("Specific Application Devices"), the customer agrees to obtain prior written approval from Panasonic. Unless otherwise approved by Panasonic in advance, Panasonic shall not take any responsibility for the use or incorporation of the Products for or into any Specific Application Devices.
- (6) To the maximum extent permitted by applicable law, irrespective of whether the said prior written approval from Panasonic is obtained, Panasonic shall not be liable for any claims from third parties arising from, or in connection with the use of the Products and this specification.

## 9. Precautions for use

### 9.1 Cautions for storage

- Store the battery at a constant temperature of 5°C to 35 °C in order to prevent deteriorations from heat.
- Keep the battery away from high humidity such as 85% R.H. or higher in order to prevent dew condensations on the battery that may cause to electrical leakage.
- Keep the battery away from heat sources i.e., boiler, radiator and etc., and from . direct sunlight.

### 9.2 Warning for safety

Following cautions should be taken into consideration in order to use this battery in safe, since the battery contains combustible materials such as Lithium metal and organic electrolyte.

- Do not use except in applicable model or equipment.
- Do not mix fresh and used batteries.
- Do not mix different types (chemistries) of batteries.
- Do not short circuit.
- Do not charge.
- If multiple batteries are kept in contact with each other. The (+) and (-) terminals may short-circuit, and/or the charging possibly happen by other adjacent batteries, which may cause of shorten service life, significant damages and catching fire.
- Do not dispose into fire.
- Do not heat up higher than 100°C.
- Do not solder direct to battery.
- Do not disassemble.
- Do not soak in water.
- Do not deform.
- Do not apply inadequacy modifications or remodeling on the batteries.
- Insert the batteries in the correct polarity position.

#### Warning for prevention of ingestion accident

- Small-sized batteries can easily be swallowed. They must be kept out of the reach of small children.
- Also, in the design of equipment using batteries, the care should be taken to ensure that batteries are NOT easy removable for children.

### 9.3 Caution for better usage

- Use gold-plated or nickel-plated steel or stainless steel strips for terminals in order to keep good conductivity with the battery surface. Terminals made of gold-plated phosphor bronze will ensure stable conductivity.
- Y-shaped terminals (double contacts) for both the anode and cathode offer very stable contact. Each contact on the Y-shaped terminals should have range of 2N to 10N contact pressure in order to ensure stable contact.
- Before inserting batteries, check the terminal contact surfaces on both the equipment and the batteries are clean, and also check that they are not deformed. If the contact surfaces are dirty, clean up and dry them thoroughly before inserting batteries.
- If there is a sliding between the equipment terminal and the battery terminal, the surface condition of the terminal may change and the contact resistance may increase. Please design the equipment which does not cause a sliding. Depending on the usage environment, if using conductive lubricant at the contact point, there may be the effect of delaying the change of the surface condition of the terminal.
- Even if batteries of the same size or same shape, they may differ in type or grade. When replacing batteries, confirm that they are correct type by checking the identification symbol (designated by I.E.C. standards) which is marked on the battery and its packages.
- Lithium primary batteries continuously indicate high voltage even toward the end of their service life. As such, they may be mistakenly judged as yet being strong. In case of multiple batteries are used in an application or equipment, all batteries should be replaced at the same time when the one of those batteries shows it has totally consumed even other batteries seems still operating, since the remaining capacity in other batteries must be also quite little at the time.
- When multiple batteries are used in series in applications or equipments, it may occur that the one battery has a polarity inversion at the end of operation life. That behavior happen when the battery had consumed its capacity earlier than other batteries. Therefore, that is not failure of battery.
- When the Lithium battery has short-circuit, even slightly. A certain amount of time is required for recovering its voltage completely. If the electrical characteristics of the battery are measured at a time before a sufficient time has passed, it may indicate unstable values due to the battery was in recovering mode.
- If the battery touch with any antistatic conductive materials include packing bags, trays, mats, sheets, films and resin cases, sheets, it may cause of short-circuit since both the positive and the negative terminal of the battery may contact with those materials. In order to prevent short circuit, special attention may apply when handle batteries or battery attached PCB in close to those materials.

### Notice for equipment design

- Keep batteries away from heat source or flame, and water.
- Please contact us in case of using multiple batteries.



# Packaging Specification

Drawing Number

232-CN1-001G\_A

Lithium battery coin type  
 Tray for 20pcs.×Shrink Packing for 200pcs.×Outer Carton for 4000pcs.

## 1-Product

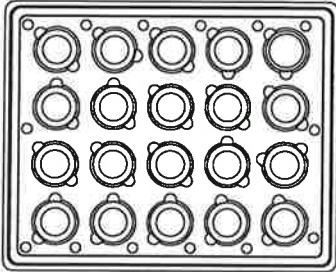
Refer to the product drawing

- ① This packaging specification is possibly modified if Panasonic decides it is required.
- ② The shape and dimensions of the tray may have varieties among molding dies or suppliers.
- ③ Please consult Panasonic if any detail information are required for handling battery with automatic insertion machine.

## 2-Tray for 20pcs.

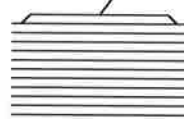
\*The battery shape is different by product number

Cells arranged negative side up

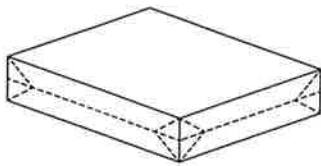


×10

Empty tray as lid 1pc.



## 3-Shrink Packing for 200pcs.

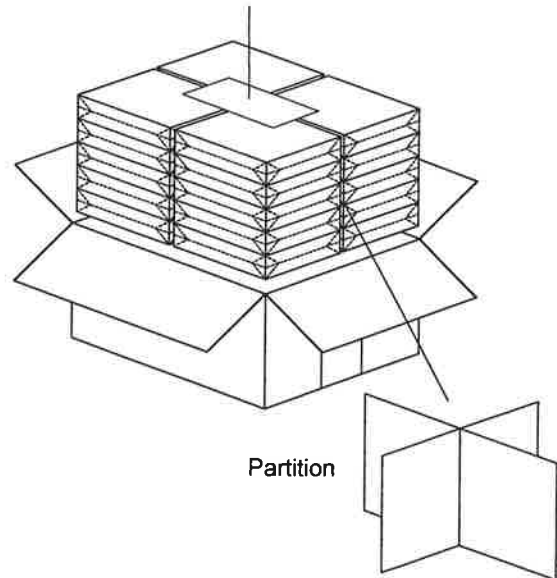


×20

### Alignment

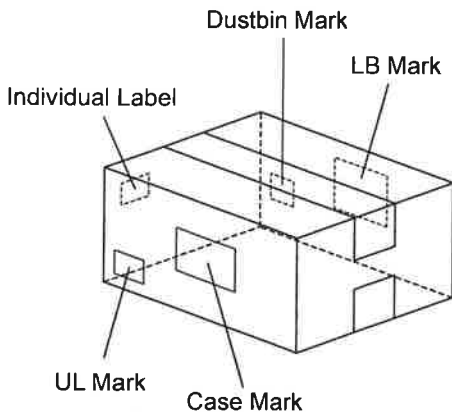
Internal management label

(This label is intended for Panasonic's internal management only and is not necessarily included with the products.)



Partition

## 4-Outer Carton for 4000pcs.



### Packing List

Dimension : 295×360×237mm  
 M3 : 0.0251m<sup>3</sup>  
 Net : 11.4kg  
 Gross : 13.7kg

Designed		Checked		Checked		Approved	
	S.Araki		T.Ishimaru		S.Yamamoto		T.Yamashita
	2019.10.31						

# Reference

Safety precautions and precautions for use, equipment design, and storage are not included in the specifications. Please read the safety and quality issues and make sure that they are thoroughly understood by the relevant departments.

## Safety precautions

Lithium batteries contain flammable substances such as lithium and organic solvents. Improper handling may cause (heat generation, rupture, ignition). Please observe the attached prohibitions.

## Precautions for use, equipment design and storage

To properly maintain the battery's electrical characteristics and liquid leakage resistance, and to prevent problems in the market and in the equipment manufacturing process, be sure to observe the attached precautions in addition to "Safety Precautions".

# Safety precautions

Please reflect the following "Safety Precautions" on the display of the device design, product and instruction manual.



## warning

1. Do not charge, short, disassemble, deform, heat, or put into fire.  
(Excluding short circuit when passing solder dip)  
\* This battery contains flammable substances such as lithium and organic solvents, and mishandling may cause heat generation, rupture or ignition.
2. When disposing of batteries, wrap tape around the terminals to insulate them.  
Mixing with other metals or batteries may cause heat generation, rupture, or ignition.



## caution

Incorrect use of batteries can cause leakage or rupture, which can lead to crisis breakdown or injury.

1. Connect the positive and negative electrodes of the battery correctly.
2. Do not mix new and used batteries or other types of batteries.
3. Do not solder directly to the battery.
4. Keep away from direct sunlight, high temperature and high humidity.
5. Keep batteries out of the reach of children to prevent accidental ingestion.  
(If swallowed, consult a doctor immediately.)

When handling lithium primary batteries (batteries with coin-type BR and CR terminals), care must be taken to ensure safety. Even if your company, please observe the items that correspond to the above "safety precautions"

# Precautions for use, equipment design and storage

## Caution for better usage

- Use gold-plated or nickel-plated steel or stainless steel strips for terminals in order to keep good conductivity with the battery surface. Terminals made of gold-plated phosphor bronze will ensure stable conductivity.
- Y-shaped terminals (double contacts) for both the anode and cathode offer very stable contact. Each contact on the Y-shaped terminals should have range of 2N to 10N contact pressure in order to ensure stable contact.
- Before inserting batteries, check the terminal contact surfaces on both the equipment and the batteries are clean, and also check that they are not deformed. If the contact surfaces are dirty, clean up and dry them thoroughly before inserting batteries.
- If there is a sliding between the equipment terminal and the battery terminal, the surface condition of the terminal may change and the contact resistance may increase. Please design the equipment which does not cause a sliding. Depending on the usage environment, if using conductive lubricant at the contact point, there may be the effect of delaying the change of the surface condition of the terminal.
- Even if batteries of the same size or same shape, they may differ in type or grade. When replacing batteries, confirm that they are correct type by checking the identification symbol (designated by I.E.C. standards) which is marked on the battery and its packages.
- Lithium primary batteries continuously indicate high voltage even toward the end of their service life. As such, they may be mistakenly judged as yet being strong. In case of multiple batteries are used in an application or equipment, all batteries should be replaced at the same time when the one of those batteries shows it has totally consumed even other batteries seems still operating, since the remaining capacity in other batteries must be also quite little at the time.
- When multiple batteries are used in series in applications or equipments, it may occur that the one battery has a polarity inversion at the end of operation life. That behavior happen when the battery had consumed its capacity earlier than other batteries. Therefore, that is not failure of battery.
- When the Lithium battery has short-circuit, even slightly. A certain amount of time is required for recovering its voltage completely. If the electrical characteristics of the battery are measured at a time before a sufficient time has passed, it may indicate unstable values due to the battery was in recovering mode.
- If the battery touch with any antistatic conductive materials include packing bags, trays, mats, sheets, films and resin cases, sheets, it may cause of short-circuit since both the positive and the negative terminal of the battery may contact with those materials. In order to prevent short circuit, special attention may apply when handle batteries or battery attached PCB in close to those materials.

## Cautions for storage

- Store the battery at a constant temperature of 5°C to 35°C in order to prevent deteriorations from heat.
- Keep the battery away from high humidity such as 85% R.H. or higher in order to prevent dew condensations on the battery that may cause to electrical leakage.
- Keep the battery away from heat sources i.e., boiler, radiator and etc., and from direct sunlight.

## Notice for equipment design

- Keep batteries away from heat source or flame, and water.
- Please contact us in case of using multiple batteries.

# Battery Safety Practices

## Avoiding hazards in lithium battery handling

**Warning** Mishandling batteries can cause battery leakage, heat generation, rupture, ignition etc., that can lead to possible fire or injury.

Both of coin type and cylinder type of lithium batteries contain flammable materials such as lithium, organic solvent and other chemical ingredients. Improper handling of lithium batteries may result in heat generation, fire or explosion, with a risk of personal injury or damage. To prevent these accidents in battery handling, be sure to observe the following precautions.

### 1. Do not Short circuit

Direct connection of plus(+) and minus(-) poles may result in leakage, heat generation, explosion and/or fire. Do not store and/or carry batteries with metallic product such as necklace. (Refer fig.1)

### 2. Do not stack and/or jumble batteries

Stacked and/or jumbled batteries may cause short circuit and/or forced discharge by the contact of other batteries. This may result in leakage, heat generation, explosion and/or fire. Especially, a connection with the 006P(9V) type batteries may have a high risk of leakage, heat generation, explosion and/or fire. (Refer fig.2 & 3)

### 3. Do not make forced discharge batteries

Forced discharge by external power source, the battery voltage goes to negative and this cause gas generation in inside of the battery. This may result in leakage, heat generation, explosion and/or fire. (Refer fig.3)

- \* In your disposal and/or storage of the batteries, please isolate plus and minus poles by adhesive tape.
- A connection with other metals and/or batteries may result in leakage, heat generation, explosion and/or fire.(Refer fig.4)
- \* When using the stored battery, please remove the tape perfectly to avoid high contact resistance problem.

### 4. Do not dispose of batteries in fire

Disposal of batteries in fire is extremely dangerous with a risk of explosion and violent flaring.

### 5. Do not heat batteries

Heating batteries above 100°C (212°F) may damage the resin in crimping, separator and other parts, causing electrolyte leak, internal short circuit, fire and explosion.

### 6. Do not solder directly onto batteries

Direct soldering onto batteries may damage the resin in crimping, separator and other parts, causing electrolyte leak, internal short circuit, fire and explosion.

### 7. Do not charge batteries

Charging of primary batteries may result internal gas generation, causing electrolyte leak, battery swelling, fire and explosion.

### 8. Do not disassemble batteries

Disassembly batteries may cause gas generation that may irritate your throat. Lithium may also react with moisture to generate heat and fire.

### 9. Do not deform batteries

Applying extreme pressure to batteries may cause deformation of the crimping and internal short circuit, causing electrolyte leak, battery swelling, fire and explosion.

### 10. Do not mix different type batteries

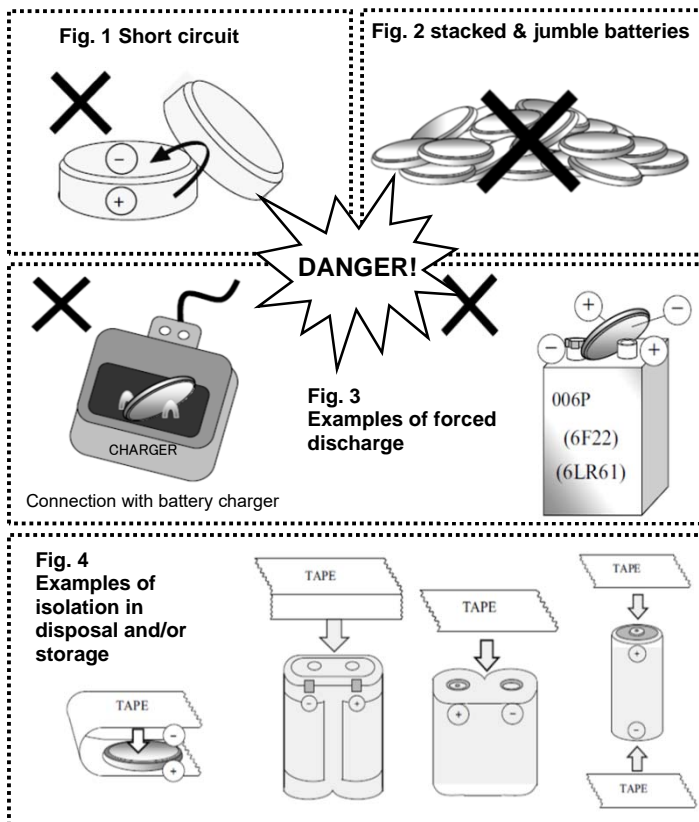
For some applications, mixing of different type batteries, or new and old batteries, can cause over discharge due to differences in voltage and discharge capacities. This may lead to the risk of swelling and/or explosion.

### 11. Do not insert batteries with opposite polarity

For some applications, battery insertion with opposite polarity (reverse insertion of plus and minus) may result in leakage, heat generation, explosion

Please ensure the above precautions are strictly observed by related divisions including production departments, sales departments and external subcontractors.

For additional details and information, please contact our sales representatives.



# To prevent unexpected capacity loss

## Beware of Antistatic Materials

We have been informed some incidents of battery voltage drop and unexpectedly capacity loss occurred due to batteries contacted antistatic materials that are used to protect semiconductor devices such as IC and LSI from static damage. Many of antistatic materials contain carbon, aluminum foil or other metallic materials so that they can remove static electricity.

Antistatic materials used for packing bags, trays, mats, sheets, film and resin cases and etc. have a conductivity of  $10^3 \Omega/\text{cm}$  to  $10^6 \Omega/\text{cm}$ , which means that when they contact the positive and negative terminals of a battery at the same time, the battery discharges at a load depending the conductivity of the material, and it causes the battery to have lower voltage and capacity loss. It is highly recommended to consider the battery not to have such unexpected deterioration.



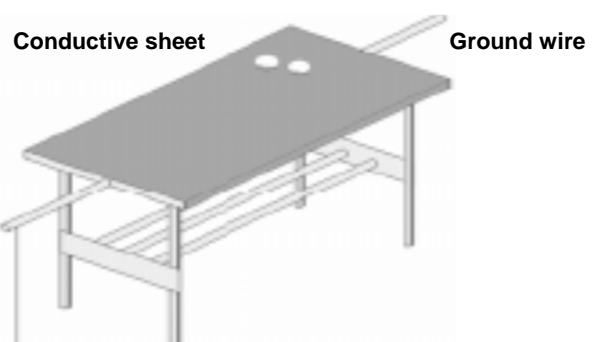
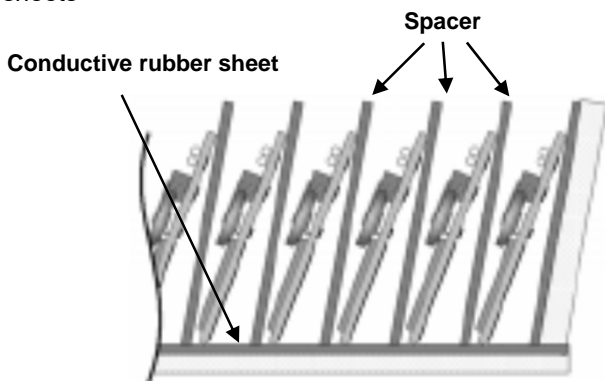
Terminal attached battery installed into a conductive mat had been completely discharged after several days



**Conductive resin case**

PCB-mounted battery had been completely discharged by contact with the conductive resin case

PCB-mounted batteries are discharged by contact with spacer and conductive rubber sheets



Batteries left on a work desk having conductive rubber sheet had been completely discharged due to both positive and negative poles contacted with the rubber sheet.

Please share those precautions among all relevant parties/departments including manufacturing and sales department or subcontractors.  
For more information, please contact your local dealer or the sales department in charge.

# To maintain good contact with the battery

## Beware unexpected memory erasure

Coin-type Lithium batteries are widely used for memory backup purposes. However, incidents of accidental memory erasure due to inadequate connecting to batteries have been informed to us. To prevent unexpected memory erasure, consider the following tips for proper use.

### <In case of long-term use>

- Highly recommended to use a battery with tab terminals for soldering, so that the battery can keep stable connection on the circuit board. (Fig. 1)
- In case of periodical battery replacement is required, installing into a battery holder or using lead wire and connector attached battery are recommended. (Fig. 3) Panasonic has battery holders which is available for 2032 size of batteries. (Fig. 2)

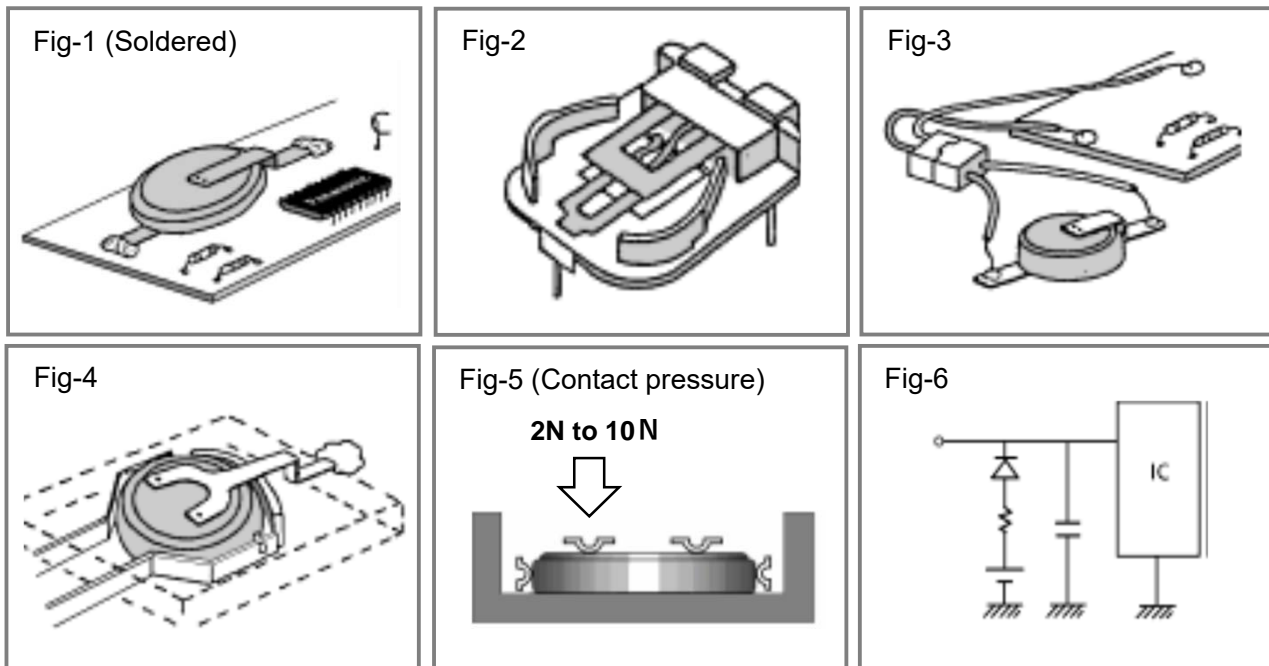
### <In case of short-term periodical replacement required>

(for batteries without tab terminals or lead connectors)

- Gold or Nickel-plated steel or Au or Ni-plated stainless-steel strips is recommended for battery terminal contacts. Especially, gold-plating is highly recommended to ensure the contact in stable for long-term.
- Y-shaped terminals (double contacts) for both the positive and negative surface offer higher stability in contact (Fig. 4) Each contact on the Y-shaped terminals requires contact pressure which should be 2N to 10N {approximately 0.2kgf to 1kgf} (Fig. 5)
- To protect IC chip against a few milliseconds momentary contact failures, tantalum capacitor-diode-resistor circuit shown in Fig. 6 can be solution.

\* Note: Touching the battery surface with bare hand might cause the contact resistance to be increased due to salt from sweat. Do not touch the contact surfaces of the battery with bare hands. Please consider to keep the battery surface clean in assembling process.

**Figure 1 through 6 show examples of how to ensure proper battery contact.**



Please share those precautions among all relevant parties/departments including manufacturing and sales department or subcontractors.

For more information, please contact your local dealer or the sales department in charge.

# Precautions for Soldering I

When lithium batteries (with terminals for soldering) are soldered to a PC board, over heat by soldering may cause the battery to have damage on the sealing gasket which poses electrolyte leakage. To prevent such a problem, please refer precautions as follows:

## Precautions for Soldering

### **1. Do not use reflow soldering**

Reflow soldering heats the battery to extremely high temperature, and it causes electrolyte leakage, lower performance, or in the worst case, explosion or catching fire.

Please do not solder by reflow.

### **2. Tab terminal soldering with a soldering iron:**

Please keep the soldering iron not to touch the battery body directly. The temperature of the soldering iron should be around 350°C, and should be done by within 5 seconds. Please beware the battery surface does not exceed the specified temperature range in this specification during the process.

### **3. Solder bath, Dip soldering, Flow soldering, Wave soldering:**

Solder bath, Dip soldering, Flow soldering, Wave soldering are available to attach tab terminal attached batteries on the PCB. However, the battery surface temperature must be kept equal of less than the specified maximum temperature in this specification during the whole process.

Basic Condition	
Temp of soldering bath	260°C or less than
Dipping time	5 seconds or less than
Number of times	2 times as maximum

(If the battery temperature is expected to exceed the specified maximum temperature, please consult us.)

## Other cautions

- Please do not solder directly on the battery body.
- Please consider to use high temperature coin battery models in case of the temperature condition is sever for normal coin battery models. .

Gasket and separator used for lithium batteries are made of plastics which have low softening temperature. Also, the electrolyte is organic solvent having low boiling point. Therefore, if the battery is heated beyond a certain threshold, deteriorated performance, electrolyte leakage, and explosion or catching fire because of excessive inner pressure may happen.

Please share those precautions among all relevant parties/departments including manufacturing and sales department or subcontractors.

For more information, please contact the sales department in charge.



# Precautions for Soldering II

Beware not to make any damages on the battery by overheating with solder iron or hot air where removing the battery from PCB.

Some incidents have been reported which external heat elements affected on gasket then making deformation of sealing condition which caused electrolyte leakage or evaporation makes batteries to have deteriorated performances.

Gasket and separator used for lithium batteries are made of plastics which have low softening temperature. Also, the electrolyte is organic solvent having low boiling point. Therefore, if the battery is heated beyond a certain threshold, deteriorated performance and electrolyte leakage may happen.

Sometimes, detaching electric devices from PCB are required after soldering by some reasons. Heated air blowing is generally used as a method of removing IC chips having multiple terminals, but it may also heat a battery placed near from the IC chip and make it damaged by extreme high temperature.

Not only heated air blowing, but in case of removing and re-soldering devices with solder iron also requires special handling not to make any damages on the battery by overheating.

## **Incident examples:**

### **Case 1: Leakage happened in field**

Cause: A battery had a leakage of electrolyte was found due to the heat damage on the gasket, because the PCB with IC chip was once failed in inspection and had a removing and a reattaching IC chip by heated air blowing, and the battery placed next to the IC chip also received the heated air.

### **Case 2: Memory disappearing from IC chip in field**

Cause: During the solder process, the battery was partially overheated by solder iron and then had a deformation of the gasket caused sealing problem posed electrolyte evaporation and deteriorated performance of the battery.

## **Preventive measures:**

- 1) Remove the battery first by soldering iron in case of using heated air blowing to remove the devices.
- 2) Please beware not to overheat the battery even when using soldering iron.
- 3) Please remove the battery first where the battery is attached by a battery holder.

## **Other caution and information**

- Please do not solder directly on the battery body.
- Please consider to use high temperature coin battery models in case of the temperature condition is sever for normal coin battery models. .

Please share those precautions among all relevant parties/departments including manufacturing and sales department or subcontractors.

For more information, please contact the sales department in charge.