

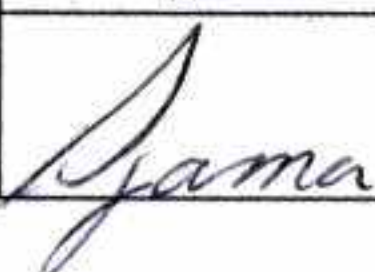

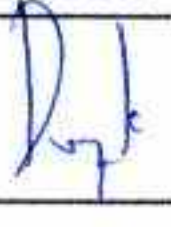

Document no	SP/L-TQ/EC/01/A-05/03
Revision no	4
Issued of Doc	October 04, 2006

SPECIFICATION	
LITHIUM BATTERY	
Ordering Code	: CR-2032N/BN
Model Code	: CR2032

Customer	: PSI - HK
Sent No	: QA/B/09.02/02/01-01

Approved by	:	_____
Division/Department	:	_____
Name	:	_____
Title	:	_____
Signature/date	:	_____

Issued date : February 16, 2009  
Lithium Coin Division  
PT. Panasonic Gobel Energy Indonesia

Approved	Checked	Drafted	Prepared
			

## Change Record

No	Date	Revision
1	October 04 <sup>th</sup> ,2006	Issued
2	December 31 <sup>st</sup> , 2006	Add Perchlorate warning distributed ONLY in California USA on carton box
3	April 1 <sup>st</sup> ,2008	Put EU mark on an carton box
4	October 1 <sup>st</sup> ,2008	Company name is changed from PT.PGBI to PECGI
5	January 5 <sup>th</sup> ,2009	Ordering code is changed from CR-2032L/NB to CR-2032N/BN
		Packaging specification is changed to meet new IATA regulations.
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### 1. Applicable range

This specification applies to manganese dioxide lithium batteries which are delivered from PT. Panasonic Gobel Energy Indonesia (PECGI)

### 2. Nominal specification

2.1. Ordering code CR-2032N/BN

2.2. Nominal voltage 3V

2.3. Nominal capacity 225 mAh

2.4. Operation temperature From -30 to 60 °C

(consult Panasonic in case continuous high-temperature usage conditions)

2.5. Mass Approx. 2.9 g

2.6. Dimension Refer to drawing 1

2.7. Terminal Plus Terminal material : Nickel Plated Stainless Steel

Minus terminal material : Nickel Plated Stainless Steel

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. Battery characteristics

Table 1. CR2032 characteristics

	Items	Test method	Temperature		initial	After 1 year in room temperature
1	Open circuit voltage	Voltage between terminals (Min)	20 +/- 2°C		3.1V	3.1V
2	Internal resistance	1kHz sine wave method (Max.)	20 +/- 2°C		20Ω	-
3	Discharge duration	Continuous discharge (Std.)	20 +/- 2°C	Load : 15kΩ cut offV : 2.0V	1183h	1133h
		Continuous discharge (Min.)			1041h	1019h

### 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 : No Brand

Production country : INDONESIA

(Design of indication can be changed without notice)

#### 4.2. Production date

Stated on minus side of battery

First digit: End digit of dominical year; Second digit; Month (October=O, November=Y, December=Z)

Example : 91 (January/2009) refer to drawing 2

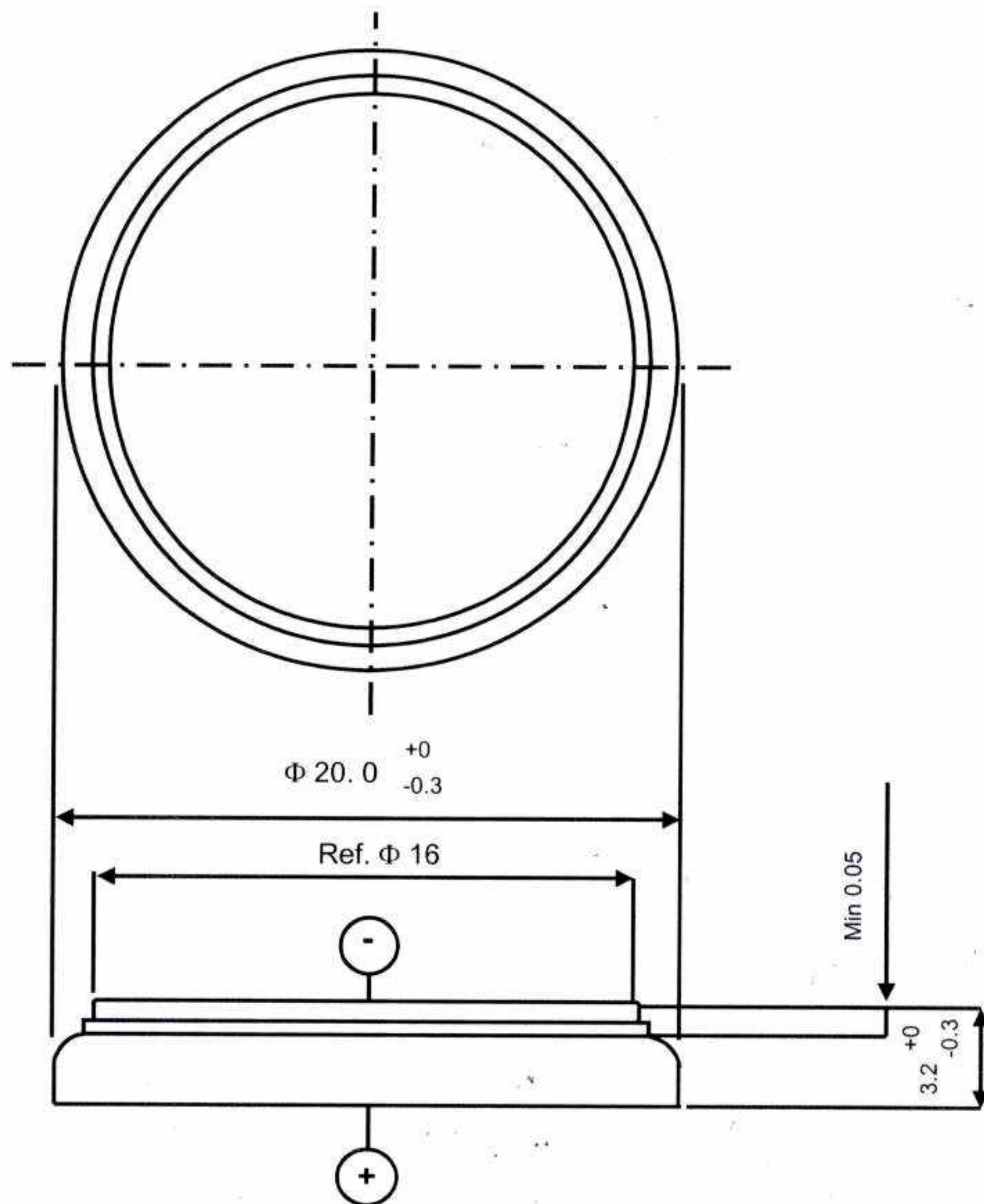
#### 4.3. Production Site

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



## Drawing 1. Dimensions

Ordering code : CR-2032N/BN



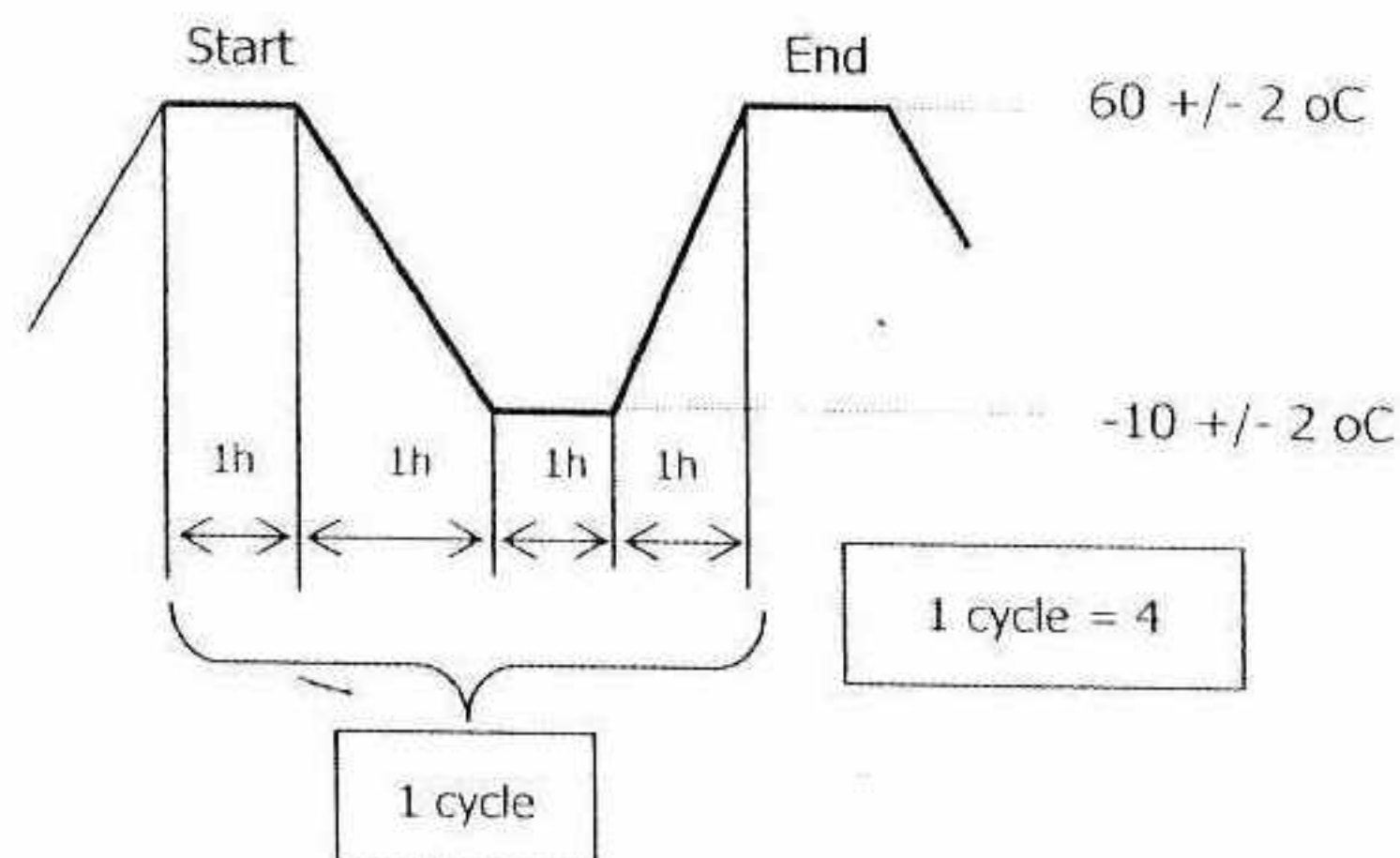
Terminal : Plus terminal material : Nickel Plated Stainless Steel  
Minus terminal material : Nickel Plated Stainless Steel

Mass : Approx. 2.9 g



## 5. Test condition and performance

- 5.1. External dimensions This shall be measured with caliper described in item 6.3.(1). Do not short by caliper. Dimension should conform to drawing 1.
- 5.2. Open circuit voltage After storage in measuring atmosphere at least 2 hours. This shall be measured with voltage meter described in item 6.3.(2). Open circuit voltage should conform to table 1.
- 5.3. Internal resistance After storage in measuring atmosphere at least 2 hours, this shall be measured with resistance meter described in item 6.3.(3). Internal resistance should conform to table 1.
- 5.4. Discharge duration After storage in measuring atmosphere at least 8 hours, batteries are discharge by load resistance described in table 1. Discharge duration is time from initial until reaching closed circuit voltage described in table 1. Discharge duration should conform to table 1.
- 5.5. Anti-leakage After 42 cycles of thermal cycle test by below condition, battery should not have deformation or leakage by visual inspection.
- This test should start from high temperature (60°C) position.
  - No moisture should be added to room temperature and humidity environment.



## 5.6. Storage characteristics

- (1) Open circuit voltage After storage term described on table 1, sample batteries should be stored in measuring atmosphere at least 4 hours. Then open circuit voltage should be measured with voltage meter described in item 6.3.(2). This should conform to table 1.
- (2) Internal resistance After storage term described on table 1, sample batteries should be stored in measuring atmosphere at least 4 hours. Then internal resistance should be measured with resistance meter described in item 6.3.(3). This should conform to table 1.
- (3) Discharge duration After storage term described on table 1, sample batteries should be stored in measuring atmosphere at least 8 hours. Then batteries are discharge by load resistance described in table 1. Discharge duration is time from initial until reaching closed circuit voltage described in table 1. Discharge duration should conform to values described in table 1.

## 5.7. Appearance

No deformation, bruise and stain which cause practical interference.



## 6. Test Conditions

### 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 +/- 15°C) and room humidity (65 +/- 20% RH).

### 6.3. Measuring equipment's

#### (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 0.05 mm 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 10M ohm 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, Agilent Technologies LCR meter 4263B or equivalent should be used).

#### (4) Load resistance includes all resistance of discharge circuit and tolerance is less than 0.5%.

#### (5) Visual inspection is carried out by naked eyes.

## 7. Operation and modification of this specification

Modification must be carried out under mutual agreement.

Any accidents caused by non described items in this specification must be discussed and solved mutually.

## 8. Important Notes (Warranty)

- 1) The batteries are warranted to conform to the description contained in this specifications for a period of twelve [12] months from the ex-factory date and any claim by customer (apparatus manufacturer or distributor) must be made within such period. During that warranty period, if the batteries are proved to become defective, non-defective and conforming batteries will be supplied in due course at sole expense of PECGI upon PECGI's own determination that this apparently caused by negligence of PECGI.
- 2) Confirm and assure the matching and reliability of batteries on actual set or unit application with customer's responsibility.
- 3) PECGI shall not warrant or be responsible in any case where customer fails to carry out proper handling, operating, installation, testing, service and check out of the batteries and/or to follow the instruction, caution, warnings, notes provided in this specifications or other PECGI's reasonable instructions or advise.
- 4) This product specification will be validated assuming that it is accepted when it is not returned within six month from the date issue.



## 9. Precautions for use

### 9.1 Caution for storage

- A battery shall not be stored at temperatures in excess of 45°C. Storage at less than 35°C is recommended.
- Storage at less than -20°C 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 85%RH without dewing on battery.
- Do not place near the boiler or radiator, nor expose to the direct sunlight.

### 9.2 Warning for safety

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 mix fresh and used batteries.
- Do not mix different types (chemistries) of batteries.
- Do not short circuit.
- Do not charge.
- If button-type batteries are kept in contact with each other. The (+) and (-) terminals may short-circuit. Greatly shortening their serviceable life.
- Do not dispose in fire.
- Do not heat up more than 100°C
- Do not solder direct to battery.
- Do not disassemble.
- Do not soak in water.
- Do not deform.
- Does not inadequacy modify and remodel for installation.
- Insert the batteries in correct polarity position.

Warning for prevention of accidental ingestion

- Small-sized batteries can easily be swallowed. They must be kept out of the reach of small children. Also in the design of battery powered equipment. Care should be taken to ensure that batteries couldn't be easily removed by children.

### 9.3 Caution for better usage

- Use gold-plated or nickel-plated steel or stainless steel strips for battery terminal contacts. Terminals made of gold-plated phosphor bronze will ensure contact with long-term stability.
- Keep contact pressure more than 2N for stable contact resistance.
- Before inserting batteries, check to confirm that the terminal contact surfaces on both the equipment and the batteries are clean and that they are not deformed. If the contact surfaces are dirty, clean and dry them thoroughly before inserting batteries.
- Batteries of the same size and shape may differ in type and grade. When exchanging batteries, confirm that they are the correct types by checking the identification symbol (designated by I.E.C. standards) provided on the battery.
- Alkaline primary batteries continue to register high voltage even toward the end of their serviceable life. As such they may be mistakenly judged as yet being strong. If one of several batteries being used in a set is found to be exhausted. It can be assumed that there is very little life remaining in the other even though they may continue to register high voltage. It is therefore advisable to exchange all of the batteries at the same time.
- The direction of polarity in a battery may reverse as it nears the end of its serviceable life. This occurs when it is the first among several batteries being used in a set to be exhausted. It is not due to an abnormality in the battery it self.



- When a lithium battery is short-circuited, even slightly. A certain amount of time is required for its voltage output to recover completely. If the electrical characteristics of the battery are measured before a sufficient amount of time has passed, the battery may appear to be malfunctioning when actually it is merely in a state of recovery.
- Antistatic conductive materials include packing bags, trays, mats, sheets, film and resin cases. Sheets, for example, have a resistance of  $10^3$  to  $10^6 \Omega$ , which means that when they contact the positive and negative terminals of a battery, they will discharge the battery. In a lithium battery, a current flow of several  $\mu\text{A}$  to several  $\text{mA}$  reduces its voltage and electrical capacity. We recommend constant attention when using batteries around protective materials.

Notice for equipment design

- Keep away from heat source or flame, water.
- Please contact us in case of plurality cells use.



# Case Marking

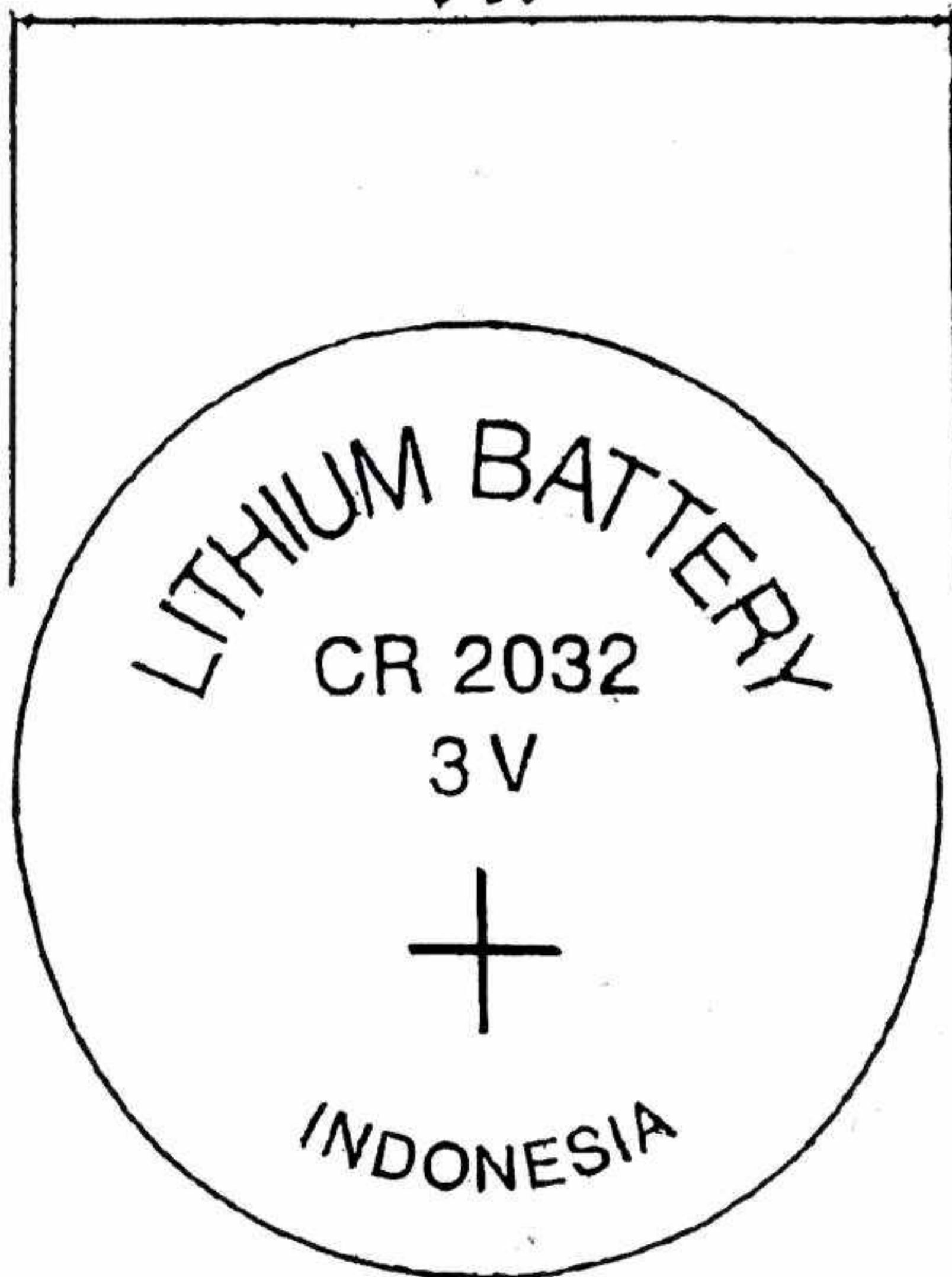
Model No :

CR-2032N/BN

(Lithium Coin Battery)

13-3231-10-03

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Scale 5 : 1

3					
2					
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Sym	Date of Revision	Remarks			
Date of stipulation		Approved	Checked	Drafted	Prepared
OCT 04 <sup>th</sup> , 2006		<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>



<h2 style="margin: 0;">Date Code Marking</h2>	<p>Model No : <b>CR-2032N/BN</b> (Lithium Coin Battery )</p>
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**LOT NUMBER**

TWO DIGITS WILL BE PRINTED IN BLACK ON BATTERY NEGATIVE TOP  
<PLEASE SEE BELOW DETAIL>

**Ex. 91 (=JANUARY 2009)**

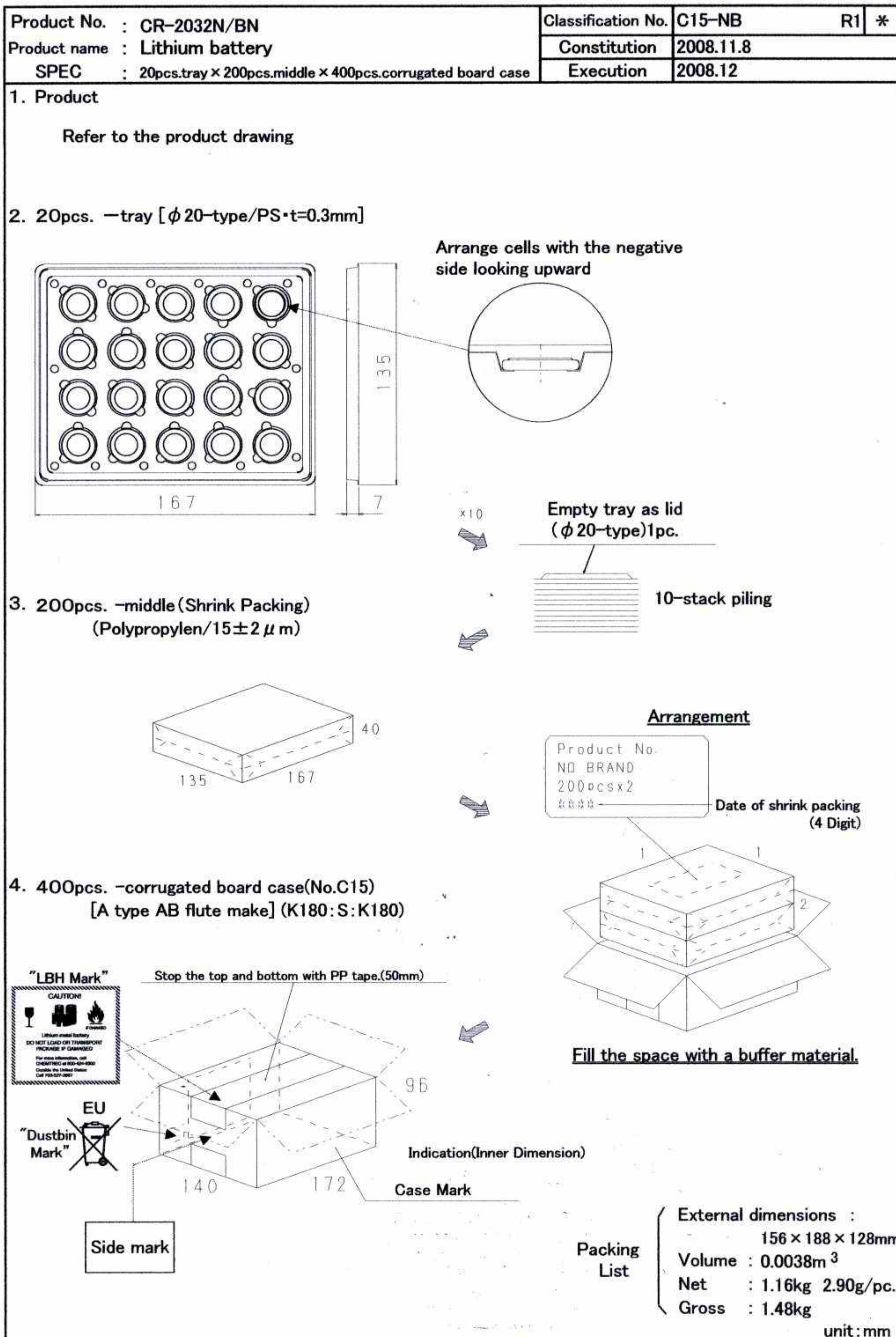
\* Meaning of two - digit code.  
(ONE 10 - YEAR CYCLE)

MONTH /YEAR		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
JAN	1	91	01	11	21	31	41	51	61	71	81
FEB	2	92	02	12	22	32	42	52	62	72	82
MAR	3	93	03	13	23	33	43	53	63	73	83
APR	4	94	04	14	24	34	44	54	64	74	84
MAY	5	95	05	15	25	35	45	55	65	75	85
JUN	6	96	06	16	26	36	46	56	66	76	86
JUL	7	97	07	17	27	37	47	57	67	77	87
AUG	8	98	08	18	28	38	48	58	68	78	88
SEP	9	99	09	19	29	39	49	59	69	79	89
OCT	0	90	00	10	20	30	40	50	60	70	80
NOV	Y	9Y	0Y	1Y	2Y	3Y	4Y	5Y	6Y	7Y	8Y
DEC	Z	9Z	0Z	1Z	2Z	3Z	4Z	5Z	6Z	7Z	8Z

Unit : mm

3										
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Sym.	Date of Revision	Remarks								
Date of stipulation :  JAN 5 <sup>th</sup> , 2009		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center;">Approved</td> <td style="width: 25%; text-align: center;">Checked</td> <td style="width: 25%; text-align: center;">Drafted</td> <td style="width: 25%; text-align: center;">Prepared</td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"></td> <td style="text-align: center;"></td> <td style="text-align: center;"></td> </tr> </table>	Approved	Checked	Drafted	Prepared				
Approved	Checked	Drafted	Prepared							







## Battery Safety Practices

### Avoid danger when handling batteries

Lithium batteries contain volatile materials such as lithium, organic solvents and other chemical ingredients. Incorrect handling of lithium batteries may result in heat generation, fire or explosion, with the risk of personal injury or damage. To prevent accidents when handling batteries, be sure to observe the following precautions.

#### 1. Do not stack or jumble batteries

Avoid contact between positive (+) and negative (-) battery poles, and contact with other metal surfaces, as this can cause short circuit with intense current flows and heat. Stacking or jumbling batteries, as shown at right, may cause short circuits, heat generation, fire or explosion.

Example of stacked and jumbled batteries



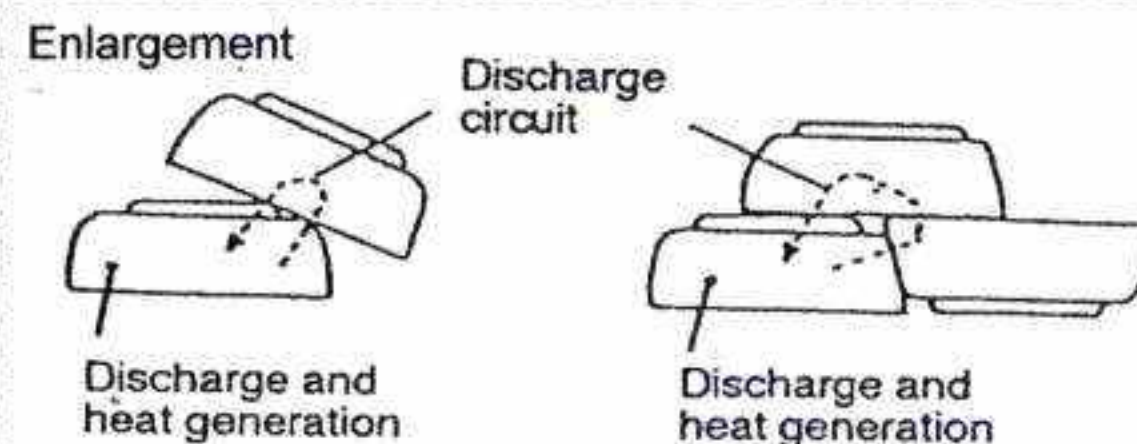
\* Contact between battery poles may form a discharge circuit and lead to heat generation, fire or explosion.

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

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

#### 3. Do not heat batteries

When lithium batteries are heated above 100°C (212°F), the resin used in seals, separators and other parts may be damaged, causing electrolyte leaks and internal short circuits which may lead to fire or explosion.



#### 4. Do not solder directly onto batteries

Heat from soldering may damage seals, separators and other parts, causing electrolyte leaks and internal short circuit which may lead to fire or explosion.

#### 5. Do not recharge batteries

Attempting to recharge batteries may result in internal generation of gases, which may lead to swelling, fire or explosion.

#### 6. Do not disassemble batteries

Do not disassemble lithium batteries as this can generate a gas that may irritate the throat. Lithium may also react with moisture to generate heat and fire.

#### 7. Do not deform batteries

When extreme pressure is applied to batteries, seals may be deformed or damaged, causing electrolyte leaks or internal short circuits. This may lead to the risk of heat generation, fire or explosion.

#### 8. Do not mix different types of batteries

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

#### 9. Insert batteries correctly

Depending on the application device, incorrect insertion of batteries, with positive (+) and negative (-) poles reversed, may result in circuit and the risk of heat generation, fire or explosion.

Please ensure the above precautions are strictly observed by related division including production departments, sales departments and external subcontractors. For additional details and information, please contact our sales representatives.



### Preventing Accidental Memory Erasure

Coin-type Lithium batteries are widely used for memory backup purposes. However, there have been an increasing number of cases of accidental memory erasure due to inadequate battery contact. To prevent unexpected memory erasure, consider the following tips for proper use.

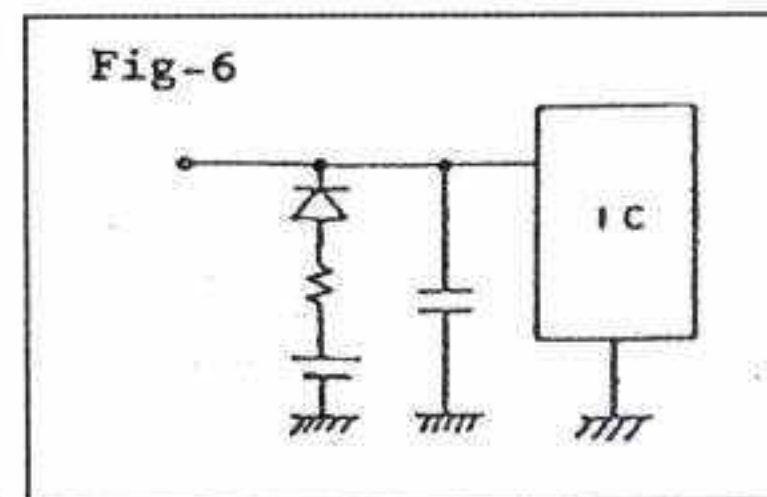
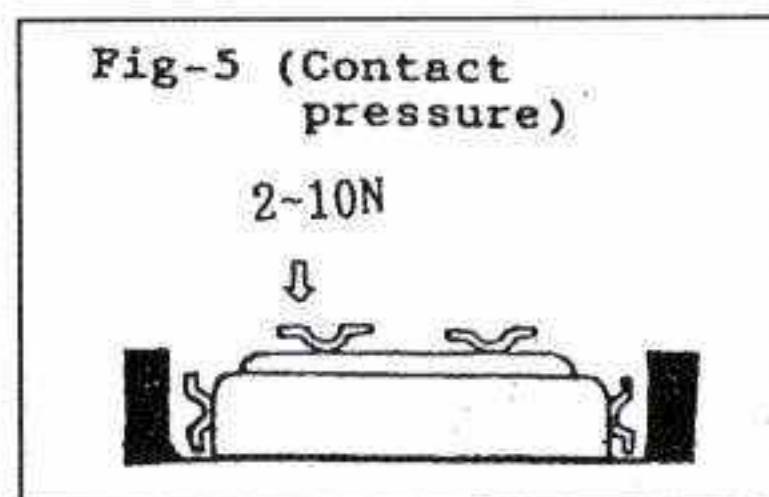
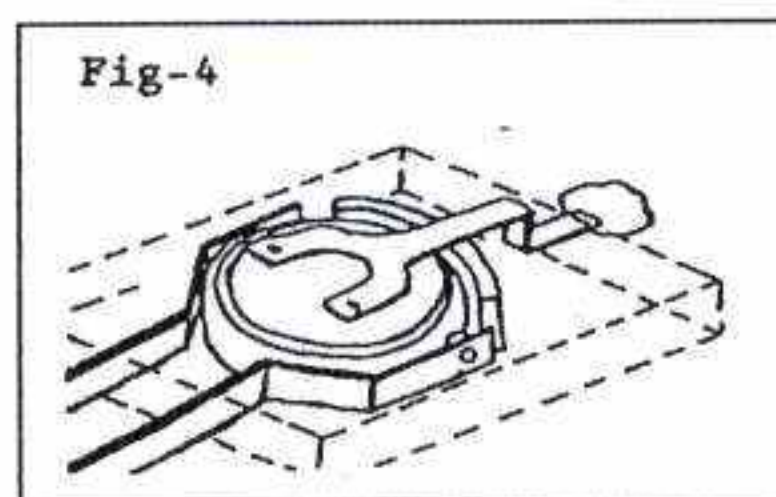
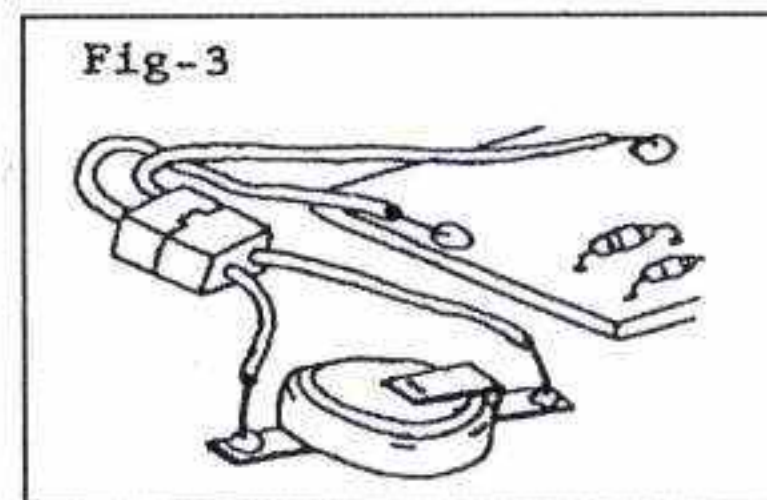
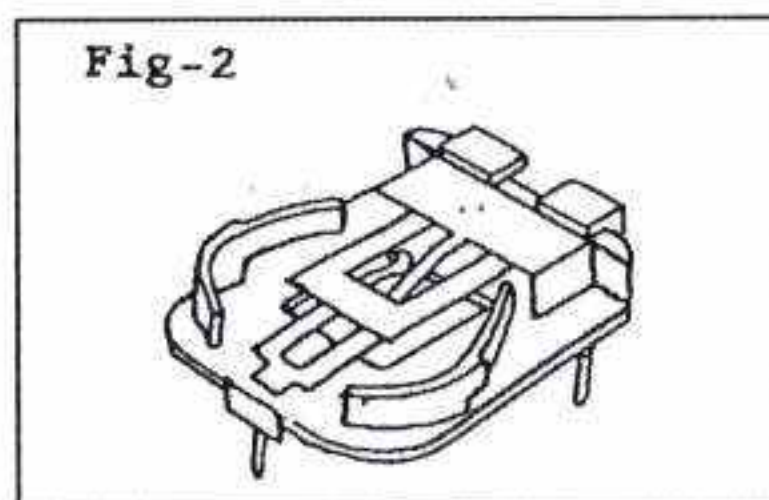
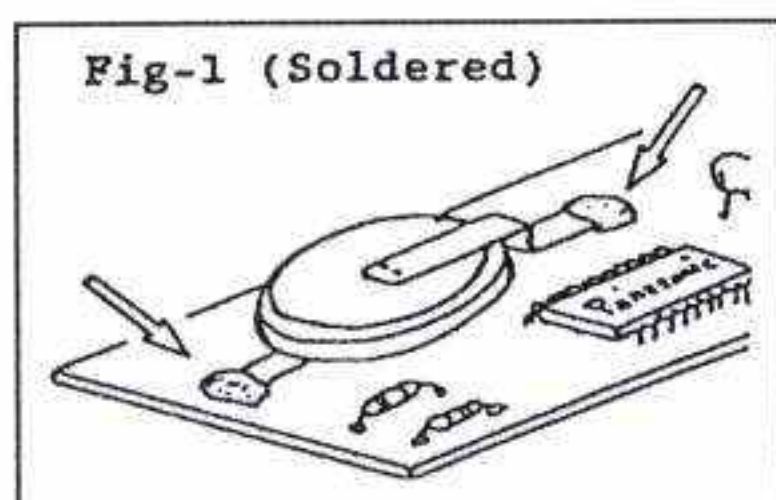
#### <Long-term Continuous Battery Use>

- Use a battery with solderable tab terminals, so that the battery can be permanently soldered to terminal pads on the circuit board (Fig.1).
  - If the battery requires periodic replacement, use a battery holder (Fig.2) or a battery with in-line lead connectors (Fig.3).
- The battery holder can be adjusted to suit any Matsushita lithium battery (Fig.2).

#### <Batteries Requiring Short-Term Periodic Replacement --- Using batteries without solderable tab terminals or lead connectors>

- Use gold- or nickel-plated steel or stainless-steel strips for battery terminal contacts. Terminals made of gold-plated phosphor bronze will ensure contact with long-term stability.
  - Y-shaped terminals (double contacts) for both the anode and cathode offer very stable contact (fig.4).  
Each contact on the Y-shaped terminals requires a minimum contact pressure of 2~10 N (approximately 200~1000gf) (fig.5).
  - To guard against momentary contact failures of a few milliseconds in duration, use the tantalum capacitor-diode-resistor circuit shown in fig.6.
- \* Do not touch the contact surfaces of the battery with bare hands, as this will increase the contact resistance and impair proper contact.

Figures 1 through 6 show example of how to ensure proper battery contact.



For more information, please make contact with your local dealer.



## Beware of Antistatic Conductive Materials

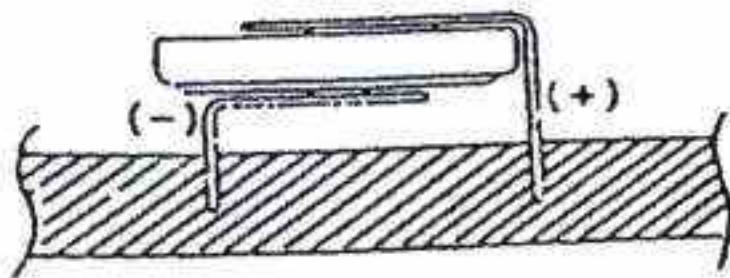
Whenever terminal-mounted backup batteries or coin-type lithium batteries contact conductive materials, they discharge. Measures to semiconductor parts from static damage have been implemented in plants that use such ICs and LSIs. A number of protective materials are presently being used, and all contain blends of carbon, aluminum and other metals that make them conduct.

Antistatic conductive materials include packing bags, trays, mats, sheets, film and resin cases. Sheets, for example, have a resistance of  $10^3$  to  $10^6 \Omega$ , which means that when they contact the positive and negative terminals of a battery, they will discharge the battery.

In a lithium battery, a current flow of several  $\mu A$  to several  $\mu A$  reduces its voltage and electrical capacity. We recommend constant attention when using batteries around protective materials.

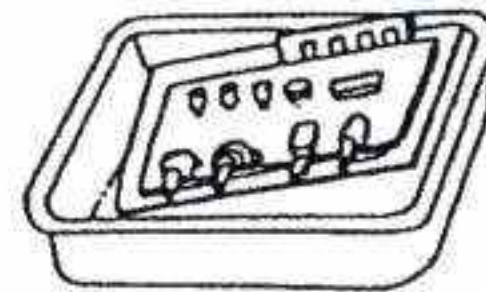
### Examples.

A terminal-mounted battery with its terminals inserted into a conductive mat is completely discharged after several days.



Conductive mat

A PCB-mounted battery is completely discharged by contact with the conductive resin case.

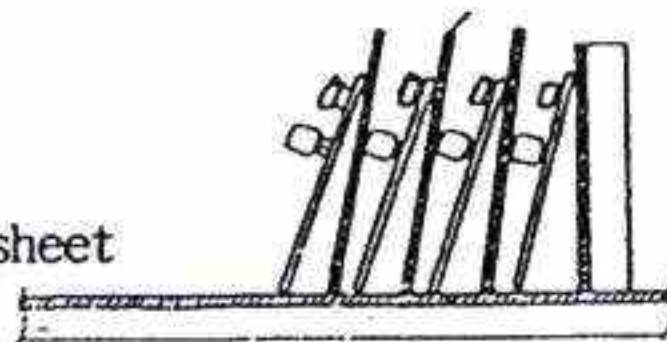


Conductive resin case

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

Spacer

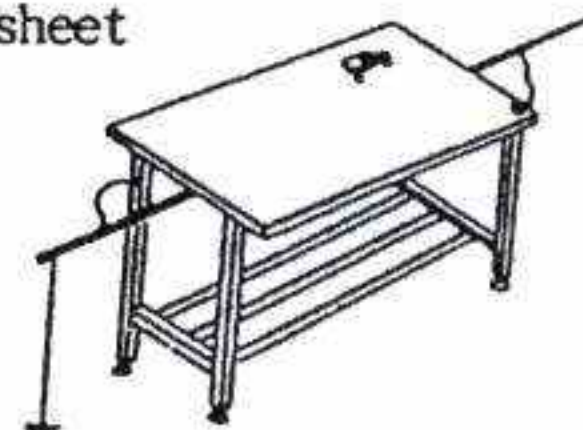
Conductive rubber sheet



Batteries left on a work bench with positive and negative terminals in direct contact with the grounded rubber sheet cover are completely discharged.

Ground wire

Conductive sheet



**For more information, please make contact with your local dealer.**