

Tohoku Murata Manufacturing Co., Ltd.

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SAFETY DATA SHEET

1. Product and Company Identification

Product Information

Product Category : Lithium Ion Polymer Rechargeable Battery Cell
 Model Name : UQ50DCSA10SCSY6 OR US501424A10S
 Nominal Capacity : 134 mAh (0.50 Wh)
 Rated Capacity : 126 mAh (0.47 Wh)
 Average Operating Voltage : 3.70 V

Company Identification

Supplier's Name : Tohoku Murata Manufacturing Co., Ltd.
 Supplier's Address : 1-1 Shimosugishita, Takakura, Hiwada-machi, Koriyama-shi, Fukushima,
 963-0531 Japan
 Information Telephone : +81-24-955-7770
 Date Prepared : Apr. 20, 2020
 Signature of Paper :



2. Hazard Identification

Class Name : Not applicable for regulated class
 Hazard : It may cause heat generation or electrolyte leakage if battery terminals contact with other metals. Electrolyte is flammable. In case of electrolyte leakage, move the battery from fire immediately.
 Toxicity : Vapor generated from burning batteries, may make eyes, skin and throat irritate.

3. Composition / Information on Ingredients

IMPORTANT NOTE:

The battery should not be opened or burned since the following ingredients contained within the battery that could be harmful under some circumstance if exposed or misused.

The cell contains neither metallic lithium nor lithium alloy.

Common chemical name / General name	CAS number	Concentration / Concentration range
Lithium Cobalt Oxides (active material)	12190-79-3	32%
Polyvinylidene Fluoride(binder)	24937-79-9	1%
Carbon(active material)	7440-44-0	15%
Phosphate(1-), hexafluoro-, lithium	21324-40-3	2%
Ethylene carbonate	96-49-1	5%
Propylene carbonate	108-32-7	5%
Aluminum	7429-90-5	10%
Copper	7440-50-8	15%
Polyethylene	9002-88-4	15%

Others : Heavy metals such as Mercury, Cadmium, Lead, and Chromium are not used in the battery.
 UN number : UN3480
 Watt-hour rating : 0.50 Wh / 0.47 Wh (Nominal / Rated)

4. First Aid Measures

The product contains organic electrolyte. In case of electrolyte leakage from the battery, actions described below are required.

- Eye contact : Flush the eyes with plenty of clean water for at least 15 minutes immediately, without rubbing, and call a doctor. If appropriate procedures are not taken, this may cause an eye irritation.
- Skin contact : Wash the contact areas off immediately with plenty of water and soap. If appropriate procedures are not taken, this may cause sores on the skin.
- Inhalation : Remove to fresh air immediately, and call a doctor.

5. Fire Fighting Measures

- Use specified extinguishers (gas, foam, powder) and extinguishing system under the Fire Defense Law.
- Since corrosive gas may be produced at the time of fire extinguishing, use an air inhalator when danger is predicted.
- Use a large amount of water as a supportive measure in order to get cooling effect if needed. (Indoor/outdoor fire hydrant)
- Carry away flammable materials immediately in case of fire.
- Move batteries to a safer place immediately in case of fire.

6. Accidental Release Measures

- Wipe off with dry cloth
- Keep away from fire
- Wear safety goggles, safety gloves as needed

7. Precautions for Safe Handling and Use

- Storage : Store within the recommended limit of -20°C to 45°C (-4°F to 113°F), well-ventilated area. Do not expose to high temperature (60°C/140°F). Since short circuit can cause burn hazard or gas release, do not store with metal jewelry, metal covered tables, or metal belt.
- Handling : Do not disassemble, remodel, or solder. Do not short + and - terminals with a metal. Do not open the battery.
- Charging : Charge within the limits of 0°C to 45°C (32°F to 113°F) temperature. Charge with specified charger designed for this battery.
- Discharging : Discharge within the limits of -20°C to 60°C (-4°F to 140°F) temperature.
- Disposal : Dispose in accordance with applicable federal, state and local regulations.
- Caution : Fire, Explosion, and Severe Burn Hazard. Do not Crush, Disassemble, Heat Above 100°C/212°F, or Incinerate.

8. Exposure Controls/Personal protection (In case electrolyte is leaked from battery)

- Acceptable concentration : Not specified in ACGIH.
- Facilities : Provide appropriate ventilation such as local ventilation system in the storage.
- Protective clothing : Gas mask for organic gases, safety goggle, safety glove.

9. Physical and chemical Properties

- Appearance : Lithium Ion Polymer Rechargeable Cells.
- Average Operating Voltage : 3.70 V

10. Stability and Reactivity

External short-circuit, deformation by crush, high temperature (over 100°C) exposure of a battery cause generation of heat and ignition.

11. Toxicological Information

- Acute toxicity : No information as a battery
- Local effects : No information as a battery

12. Ecological Information

When exhausted battery is buried in the ground, corrosion may be caused on the outer case of battery and electrolyte may be oozed. There is no information on environmental influence.

13. Disposal considerations

When battery is disposed, isolate positive (+) and negative (-) terminals of the battery to avoid those terminals from touching each other. Batteries may be short-circuited when piled up or mixed with the other batteries in disorder. Dispose in accordance with applicable federal, state and local regulations

14. Transport information

- When a number of batteries are transported by ship, vehicle and railroad, avoid high temperature and dew condensation.
- Avoid transportation which may cause damage of package.
- Lithium ion batteries are not subject to dangerous goods regulation for the purpose of transportation by the International Maritime Dangerous Goods regulations(IMDG). For Lithium ion batteries, the Watt-hour rating is no more than 20Wh/cell and 100Wh/battery pack can be treated as “non-dangerous goods” by the United Nations Recommendations on the Transport of Dangerous Goods/Special Provision 188, provided that the products are prevented from being short-circuited with each other and are packaged in an appropriate condition which satisfies Packing Group II performance level.

• IATA (International Air Transport Association): Dangerous Goods Regulation

Packing Instruction 965 (Lithium ion or lithium polymer cells and batteries without electronic equipment)

With effect 1 April 2016: Lithium ion cells and batteries must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity. UN 3480, PI 965, Section IA and IB and II will be restricted to carriage on cargo aircraft. All packages must bear the Cargo Aircraft Only label in addition to the other marks and labels required by the Regulations.

Section II requirements apply to lithium ion cells with a Watt-hour rating not exceeding 20Wh and lithium ion batteries with a Watt-hour rating not exceeding 100Wh packed in quantities that within the allowance permitted in Section II, Table 965-II.

TABLE 965-II

Contents	Lithium ion cells and/or batteries with a Watt-hour rating of 2.7Wh or less	Lithium ion cells with a Watt-hour rating of more than 2.7Wh but not more than 20Wh	Lithium ion batteries with a Watt-hour rating of more than 2.7Wh but not more than 100Wh
Maximum number of cells/batteries per package	No limit	8 cells	2 Batteries
Maximum net quantity per package	2.5 kg	N/A	N/A

Lithium ion cells and batteries meeting the requirements in this section are not subject to other additional requirements of these Regulations except for:

- each cell and battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;
- cells and batteries must be manufactured under a quality management program;
- for batteries, The Watt-hour rating must be marked on the outside of the battery case;
- Each package must be capable of withstanding a 1.2m drop test in any orientation without:
 - damage to cells or batteries contained therein;
 - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
 - release of contents.
- Each package must be marked with the lithium battery mark and the cargo aircraft only Label.
- A shipper is not permitted to offer for transport more than one package prepared according to Section II in any single consignment.

Section IB requirements apply to lithium ion cells with a Watt-hour rating not exceeding 20Wh and lithium ion batteries with a Watt-hour rating not exceeding 100Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II.

Quantities of lithium ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II must be assigned to Class 9 and are subject to all of the applicable provisions of Regulation.

Even classified as lithium batteries packed with equipment (UN3481), IATA Dangerous Goods Regulations packing instruction 966 is applied.

Even classified as lithium batteries installed in equipment (UN3481), IATA Dangerous Goods Regulations packing instruction 967 is applied.

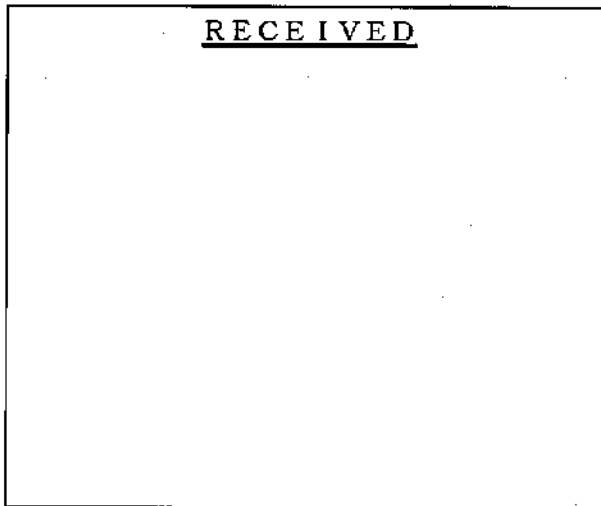
15. Regulatory information

- IMDG Code: International Maritime Dangerous Goods (IMDG) Code 2018 Edition
- ICAO TI: International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air 2019-2020 Edition
- IATA DGR: International Air Transport Association (IATA) Dangerous Goods Regulations 61st Edition

16. Other Information

The information contained within is provided for your information only. The information and recommendations set forth herein are made in good faith and are believed to be accurate as of the date of preparation. However, Tohoku Murata Manufacturing MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THIS INFORMATION AND DISCLAIMS ALL LIABILITY FROM RELIANCE ON IT.

SPECIFICATION FOR
ALKALINE BATTERY
Type: LR14GCNN



April 24, 2015

TOSHIBA HOME APPLIANCES CORPORATION
Battery Business Div.

G. Manager	Manager	Issued by



PRODUCT SPECIFICATION

1. Applicability

This specification is applicable to the following product.

Product : Alkaline Manganese Dioxide Battery LR14GCNN

Country of origin: China

Related standards: IEC 60086-1, IEC 60086-2

2. Ratings:

2. 1 Battery type: LR14

2. 2 Nominal voltage: 1.5V

2. 3 Shape and dimensions: See Fig. 1, Battery Dimensions.

2. 4 Standard weight: 72g

2. 5 Terminals: Positive electrode — cap terminal

Negative electrode — base terminal

2. 6 Operating temperature: $-10\sim 45^{\circ}\text{C}$ (If the operating temperature exceeds 40°C , the operating time shall be within 30 days.)

3. Quality requirements:

3. 1 Dimensions: Battery dimensions shall be as shown in Fig. 1, Battery Dimensions.

3. 2 Appearance: Batteries shall have no stain, flaw or deformation which may adversely affect their performance and actual use and shall have clearly visible markings.

3. 3 Quality characteristics: Requirements of Table 1 have to be satisfied.

(Table 1)

Items		Requirements		Conditions
Electrical characteristics	Off-load voltage (V)	Initial	1.50 ~ 1.65	DC voltmeter: The tolerances shall be not more than 0.25% of nominal voltage and the input resistance shall be not less than $1\text{M}\Omega$.
		After 12 months	1.45 ~ 1.65	
	On-load voltage (V)	Initial	1.35 or higher	Load resistance of $3.9\pm 0.0195\Omega$ shall be connected and the voltage shall be measured with the above voltmeter 0.8 second after the circuit is closed.
		After 12 months	1.30 or higher	
Minimum average duration	3.9-ohm continuous discharge (h)	Initial	13.0 or longer	Load resistance: $3.9\pm 0.0195\Omega$ Discharge time: 24 hours/day End-point voltage: 0.9V
		After 12 months	11.7 or longer	
	3.9-ohm intermittent discharge (h)	Initial	15.0 or longer	Load resistance: $3.9\pm 0.0195\Omega$ Discharge time: 1 hour/day End-point voltage: 0.8V
		After 12 months	13.5 or longer	

Items		Requirements		Conditions
Minimum average Duration	20-ohm intermittent discharge (h)	Initial	85.0 or longer	Load resistance: $20 \pm 0.1 \Omega$
		After 12 months	78.5 or longer	Discharge time: 4 hours/day End-point voltage: 0.9V

NOTE 1. The requirements of Table 1 represent values measured or obtained at the ambient temperature of $20 \pm 2^\circ\text{C}$ and at the relative humidity of $(60 \pm 15)\%$.

NOTE 2. Test specimen batteries shall be stored at the ambient temperature of $20 \pm 2^\circ\text{C}$ and at the relative humidity of $(60 \pm 15)\%$.

NOTE 3. As for the average duration, the average value has to satisfy, initial and after 12 months, the requirement of Table 1, when tested with $n=9$ for each testing condition.

The test of average duration and its judgment shall be as follows.

① If the average value is equal to or more than the value of Table 1, and if the number of batteries showing a value less than 80% of the value of Table 1 is or less, these batteries are considered to conform to the requirement.

② If the average value is less than the value of Table 1, or if the number of batteries showing a value less than 80% of the value of Table 1 is 2 or more, the test shall be repeated with other 9 pieces.

At the second test, if the average value is equal to or more than the value of Table 1, and if the number of batteries showing a value less than 80% of the value of Table 1 is 1 or less, these batteries are considered to conform to the requirement.

③ At the above second test, if the average value is less than the value of Table 1, or if the number of batteries showing a value less than 80% of the value of Table 1 is 2 or more, the batteries are considered not to conform to the requirement. A third test shall not be performed.

NOTE 4. Either during storage or during duration tests, there shall be no leakage or deformation which can be noticed visually.

3. 4 Leakage characteristics: Requirements of Table 2 have to be satisfied.

(Table 2)

Test items	Requirements		Test conditions
Electrolyte leakage on over discharge	Initial	No electrolyte leakage or deformation findable by visual check.	Temperature, humidity: $20 \pm 2^\circ\text{C}$, $(60 \pm 15)\% \text{RH}$ Load resistance: $3.9 \pm 0.0195 \Omega$ Completion of test: The instant when the on-load voltage decreases below 40% of the nominal voltage for the first time.
Electrolyte leakage at high temperature			Temperature: $45 \pm 2^\circ\text{C}$ Humidity: 70%RH or below Store time: To be kept standing open for 30 days.

4. Markings: Marking shall be as shown in Fig. 2, Battery Label.

5. Expiry date of use:

The date shall be indicated on the battery body with following symbols.

(The expiry date shall be 60 months after the manufacturing date.)

BEST BEFORE

○○-○○○○

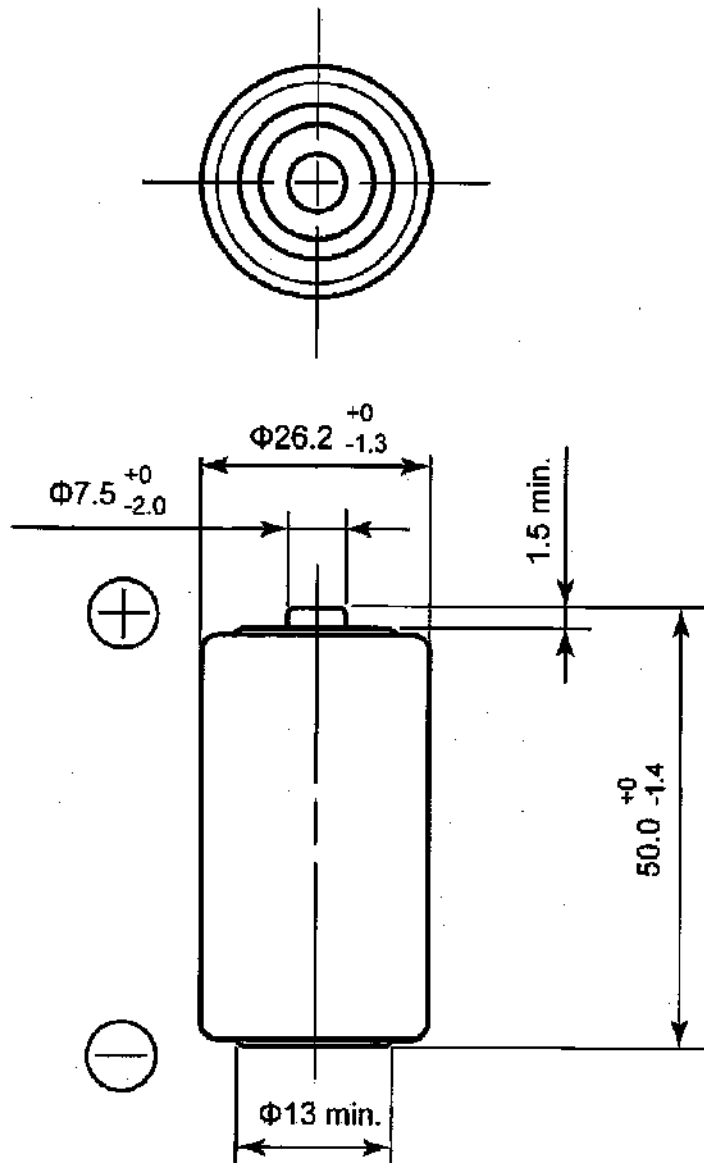
Christian ear (4 figures)
 Month (2 figures)

[Example 1] 08-2013 : Expiry date of use, August 2013

[Example 2] 12-2013 : Expiry date of use, December 2013

6. Warranty term: 12 months after delivery.

(Fig. 1) BATTERY DIMENSIONS

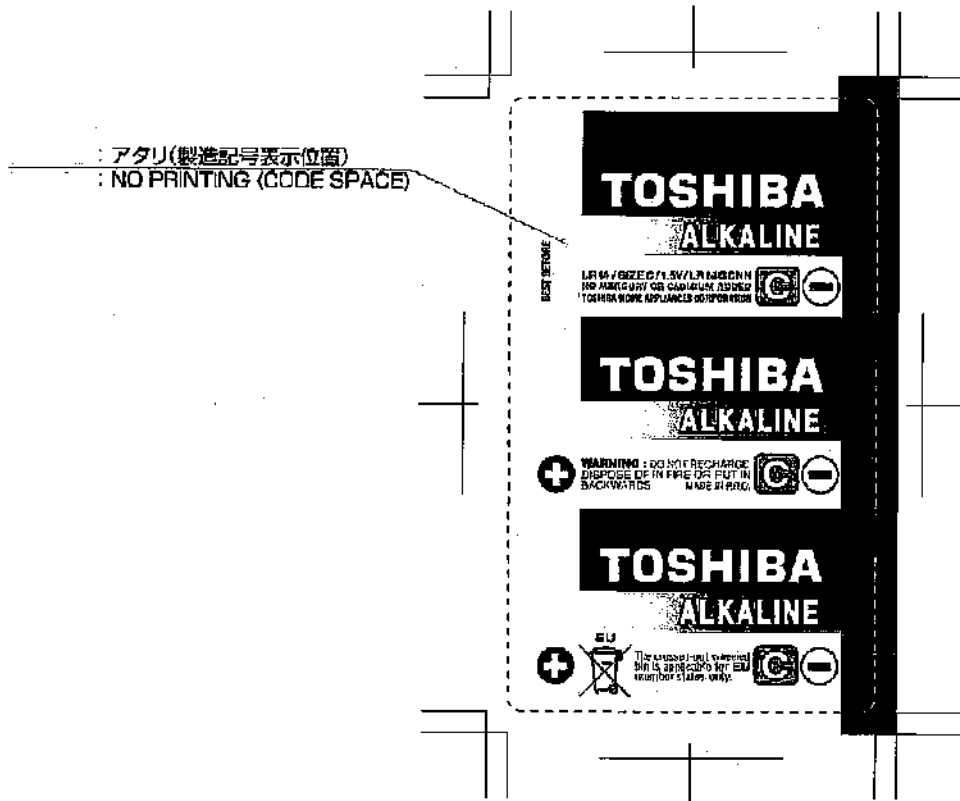


Unit: millimeter

Terminals: Positive-cap terminal, Negative-base terminal

Outer shell: Label

(Fig. 2) BATTERY LABEL



Precautions when using Alkaline manganese batteries

1. Precautions when designing battery appliances.

If the batteries are improperly used, leakage, heat, explosion, etc. may happen. Pay attention to the following matters at the designing of appliances.

(1) Precautions when designing battery compartment.

- ① The battery compartment should be made so that replacing of batteries is easy, while after loading of batteries easy release should be avoided.
- ② About the battery loading parts of battery compartment, pay attention for instance to the cover fixing method of the battery compartment so that the babies and little children cannot touch or take out batteries easily, to prevent swallowing by babies and little children or their injuries.
Besides, make known to everyone about "Keep batteries out of reach of babies and little children" with operating instructions or other ways.
- ③ When designing the dimensions and shapes of the battery compartment and the contacts, consider the dimensions and the tolerances of the batteries and their $\oplus\ominus$ terminals to prevent contact failure or reverse insertion and to assure the adaptation of batteries put on the market.
The dimensions of the battery compartment should conform to IEC(International standards) and JIS(Japanese industrial standards) are adaptable.
- ④ Indicate clearly on the battery compartment, the type of the battery which suits the apparatus and the correct direction of insertion(polarity).
If the space for indication is not available, indicate them clearly in the operating instruction.
- ⑤ The electric circuit inside the battery compartment should be limited to the circuit connected to battery contacts; except contact section, the circuit should be completely isolated from the other electric circuits.
- ⑥ To minimize the damage of apparatus caused by leakage from the battery, if any, pay attention to the construction and arrangement of the battery compartment such as to detach completely the battery compartment from the mechanism compartment.
- ⑦ The battery compartment should maintain permeability for heat radiated from the compartment and for gas escaped from the batteries.
If complete airtight is unavoidable, pay attention to give a function such as safety vent for gas escape.
- ⑧ When there is a heat source in the apparatus, set the battery compartment away from the heat source, as much as possible.

- ⑨ When choosing the material for the battery compartment, shocks and environment should be considered.

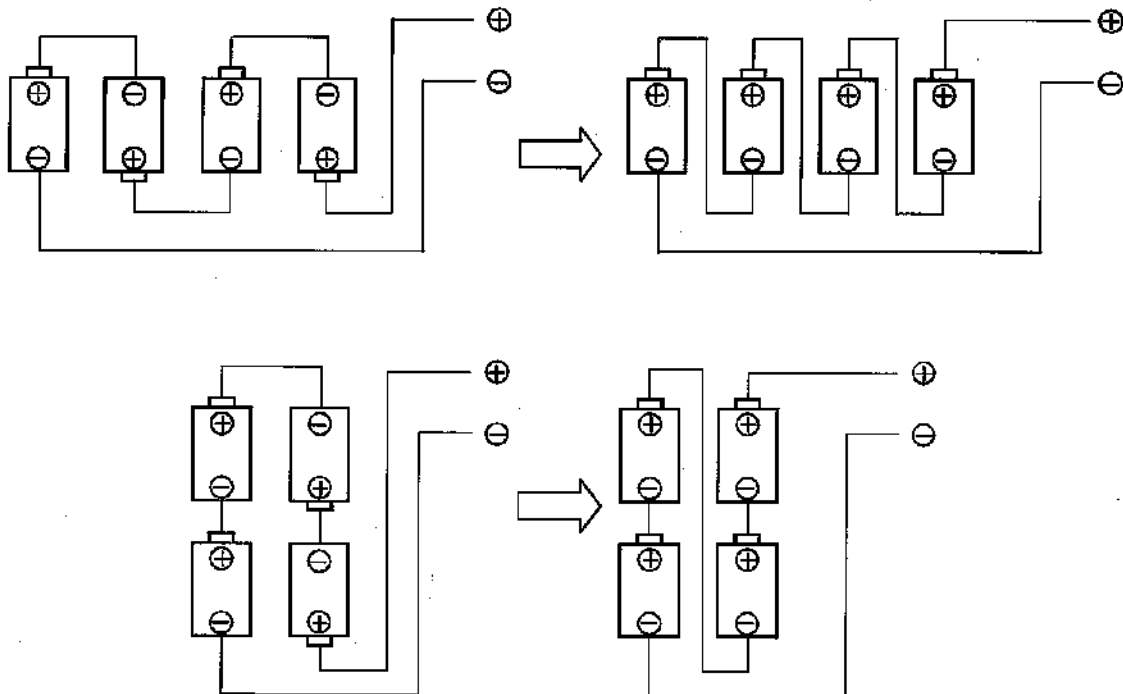
If vibration or shocks can be estimated, take a measure so that the construction of the compartment can absorb it.

- ⑩ Avoid the connection of batteries in serial-parallel or in parallel, as much as possible.

Pay attention, especially for serial-parallel or parallel connection because if the arrangement is mistaken, the batteries may continue to discharge or may be recharged even if the switch is off.

In case of series connection, the arrangements of batteries as indicated on reference figure with an arrow are recommended to minimize reverse insertion.

Reference figure series connection of batteries



- ⑪ Pay attention to the material and the shape of the battery contacts so that the electric contact will be perfect even by use of batteries having the dimensions prescribed by JIS.

The material of the contact should be chosen among nickel-plated iron, nickel-plated stainless steel or the like. If an especially low contact resistance is required, adopt gold-plating or the like.

- ⑫ The desirable battery contact pressure of the apparatuses is at minimum 10N (1 kg f) and at maximum 30N (3 kg f).
- ⑬ The circuit in the apparatus should not make electric contact with the batteries except at terminal contact point.

- ⑭ To avoid reverse insertion of batteries, the form of the contact point should make use of the shape difference of $\oplus\ominus$ battery terminals, as much as possible.
- ⑮ When the external substitute electric source is used, the circuit should be designed to avoid charging or forced discharging of batteries.
- ⑯ To ensure the prevention of charging batteries, a protective circuit should be installed.

(2) Precautions at apparatus manufacturing

- ① Do not give ultrasonic vibration to the batteries.
By ultrasonic vibration, the contents of batteries will be finely powdered, which may cause internal short-circuit resulting in leakage, heat or explosion of batteries.
- ② These batteries are allowed to be disposed as general incombustible refuse. However if rules for battery disposal exist, such as regulations of local government, dispose of the batteries in accordance with the rules.
If the batteries are improperly disposed, they may be short-circuited causing leakage, heat or explosion; as a result, injuries or burns may happen. Besides, do not dispose of batteries in fire. If the batteries are put in fire, they will be heated rapidly, which may cause explosion, etc.
- ③ Wipe clean with a cloth or the like the terminals of the apparatus and the batteries before the insertion of the batteries in the apparatus.
If the terminals are soiled, the apparatus may not operate normally due to contact failure.
- ④ To measure voltage of the batteries, use a voltmeter having high internal resistance.
The tolerance of the voltmeter shall be not more than 0.25% of nominal voltage.
Use voltmeter with an input resistance shall be not less than $1M\Omega$.

(3) Precautions against transport, display and storage.

- ① For the storage of batteries, avoid high temperature and high humidity; and to prevent dew condensation choose a well ventilated dry place where the temperature is not so high.
For store the batteries, a place having a normal temperature ($20\pm 15^{\circ}\text{C}$), little temperature fluctuation and a relative humidity of 70% and less is required. Storage of the batteries at high temperature or high humidity may increase their performance deterioration or leakage.

② For storage in warehouse or display in shopwindow, keep the batteries away from long duration direct sunlight and from rain water.

The exposition of the batteries to high temperature may increase their deterioration or induce leakage.

Besides, if the batteries get wet, the insulation will decrease and rust gathering or leakage will occur more easily.

Besides, batteries stocked by families are increasing; in this case, the matters that require attention are as mentioned above.

③ Avoid rough handling during transport.

Rough handling may cause dent or deformation, which can bring decrease of performance or leakage.

Moreover, the battery compartment may be damaged, causing the batteries in disorder; if $\oplus\ominus$ are short-circuited the batteries may be damaged by heating, and moreover leakage, explosion, fire, etc. may happen.

④ When piling up the outer packages of batteries, the number of tiers should be limited to the amount indicated on the outer-package.

If the packages are excessively piled up, the batteries in the lower layer may be deformed or leakage may be accelerated.

⑤ As for the distribution, such as transport, display, storage and others, observe strictly the first-in, first-out method and pay attention to avoid long-term stock.

The batteries have enough storage property at normal temperature and humidity conditions (normal temperature: $20 \pm 15^\circ\text{C}$, relative humidity: 70% and less); however since the long-term stock may deteriorate their performance, observe strictly the appropriate volume of inventories and the first-in, first-out method.

2. Warning notices to the customers regarding battery handling.

For the correct use of batteries when the apparatuses are used by the customers, the operating instructions of the apparatuses should contain the following warning statement regarding batteries.

(Warning notices regarding battery handling, to be contained in the operating instructions of the apparatuses)

○ If the batteries are improperly used, they may leak, heat or explode, bringing about injury or device failure.

Therefore observe strictly the following matters.

⚠ DANGER

If the alkaline solution of the batteries touches the eyes, injury such as loss of eyesight may be caused.

Do not rub the eyes, but flush the eyes amply with abundant clean water such as city water and then receive medical treatment without delay.

⚠ WARNING

- ① Keep batteries out of reach of babies and little children.

If by any chance, the batteries are swallowed, consult the doctor without delay. ... (An object of indication: LR03·LR1)

- ② Do not incinerate, heat, disassemble or remodel the batteries.

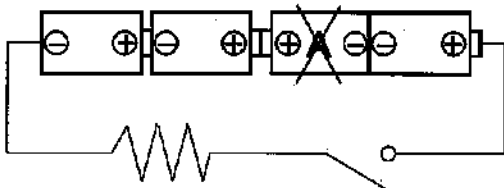
The insulator and the vent for gas escape and so on will be damaged, and the batteries may leak, heat or explode.

- ③ Do not insert batteries in reverse polarity.

By charging, short-circuiting or the like, the batteries may show abnormal reactions, and may leak, heat or explode.

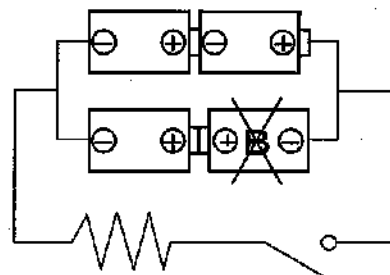
Reference figure 1

Wrong series connection of batteries



Reference figure 2

Wrong serial-parallel connection of batteries



- ④ If the alkaline solution of the batteries is licked, rinse out the mouth and consult the doctor without delay.

- ⑤ If the alkaline solution of the batteries adheres to skin or clothes, skin injury may be caused. Wash liquid away immediately with abundant clean water such as city water.

- ⑥ Do not connect $\oplus\ominus$ of the batteries with wire and do not carry or keep metallic necklace, hairpin, etc. together with batteries.

The batteries may be short-circuited, causing over-current and they may leak, heat or explode.

- ⑦ Do not mix and use "different types or brands of batteries" nor "used and new batteries" together.

The difference of characteristics may cause leakage, heat or explosion.

- ⑧ These batteries are not designed to be recharged.

If recharged, the insulator or the inside structure may be damaged, and the batteries may leak, heat or explode.

- ⑨ Remove promptly the used batteries from the apparatus.

If the used batteries are left in the apparatus, connected for long, gas will be formed in the batteries, which may cause battery leakage, heat or explosion and may cause damage of apparatus.

- ⑩ When not using the apparatus for a long period, remove the batteries from the apparatus.

Gas formed in the batteries may cause battery leakage or may damage the apparatus.



CAUTION

- ① Do not peel off or damage the outer label of the batteries.

The batteries may be short-circuited, they may leak, heat or explode.

- ② Do not expose batteries to strong impact by dropping or throwing the batteries. The batteries may leak, heat or explode.

- ③ Do not deform the batteries.

The insulator and the vent for gas escape, etc. may be damaged and the batteries may leak, heat or explode.

- ④ When using the batteries in complete airtight apparatus, follow the indications of the operating instructions of the apparatus.

- ⑤ Do not solder anything directly to the batteries.

The insulator and the vent for gas escape, etc. may be damaged by heat and the batteries may leak, heat or explode.

- ⑥ Do not use nor keep batteries at places exposed to strong direct sunlight or in cars under burning sun, etc. The batteries may leak, heat or explode.

- ⑦ At the storage or disposal of the batteries, insulate the terminal parts with tape or the like.

If the batteries are mixed with other batteries or metallic objects, the batteries may be short-circuited, and may leak, heat or explode.

- ⑧ Keep the batteries away from water. The batteries may heat.
- ⑨ The specification or the performance of the batteries may be sometimes not appropriate, depending on applications or apparatus; use correctly the appropriate batteries in accordance with the operating instructions and notices of the apparatus.
- ⑩ At the storage of batteries, avoid direct sunlight, high temperature and high humidity places. Leakage may happen. Beside, the performance and the life of the batteries may decrease.
- ⑪ These batteries are allowed to be disposed as general incombustible refuse. However if rules for battery disposal exist, such as regulations of local government, dispose of the batteries in accordance with the rules.
- ⑫ Do not forget to turn off the switch of the apparatus.
- ⑬ To keep the batteries taken out from packages, or to stock the batteries by families, pay attention to avoid contact between batteries and to keep out of short-circuit.

SPECIFICATION FOR
ALKALINE BATTERY
Type: LR20GCNN

RECEIVED

April 24,2015

TOSHIBA HOME APPLIANCES CORPORATION
Battery Business Div.

G. Manager	Manager	Issued by



PRODUCT SPECIFICATION

1. Applicability

This specification is applicable to the following product.

Product : Alkaline Manganese Dioxide Battery LR20GCNN

Country of origin: China

Related standards: IEC 60086-1, IEC 60086-2

2. Ratings

2. 1 Battery type: LR20
2. 2 Nominal voltage: 1.5V
2. 3 Shape and dimensions: See Fig. 1, Battery Dimensions.
2. 4 Standard weight: 140 g
2. 5 Terminals: Positive electrode — cap terminal
Negative electrode — base terminal
2. 6 Operating temperature: $-10\sim 45^{\circ}\text{C}$ (If the operating temperature exceeds 40°C , the operating time shall be within 30 days.)

3. Quality requirements

3. 1 Dimensions: Battery dimensions shall be as shown in Fig. 1, Battery Dimensions.
3. 2 Appearance: Batteries shall have no stain, flaw or deformation which may adversely affect their performance and actual use and shall have clearly visible markings.
3. 3 Quality characteristics: Requirements of Table 1 have to be satisfied.

(Table 1)

Items		Requirements		Conditions	
Electrical characteristics	Off-load voltage (V)	Initial	1.50 ~ 1.65	DC voltmeter: The tolerances shall be not more than 0.25% of nominal voltage and the input resistance shall be not less than $1\text{M}\Omega$.	
		After 12 months	1.45 ~ 1.65		
	On-load voltage (V)	Initial	1.35 or higher		Load resistance of $2\pm 0.01\Omega$ shall be connected and the voltage shall be measured with the above voltmeter 0.8 second after the circuit is closed.
		After 12 months	1.30 or higher		
Minimum average duration	3.9-ohm continuous discharge (h)	Initial	26.0 or longer	Load resistance: $3.9\pm 0.0195\Omega$ Discharge time: 24 hours/day End-point voltage: 0.9V	
		After 12 months	23.0 or longer		
	2.2-ohm intermittent Discharge (h)	Initial	17.0 or longer	Load resistance: $2.2\pm 0.011\Omega$ Discharge time: 1 hour/day End-point voltage: 0.8V	
		After 12 months	15.5 or longer		

Items		Requirements		Conditions
Minimum average Duration	10-ohm intermittent Discharge (h)	Initial	95.0 or longer	Load resistance: $10 \pm 0.05 \Omega$
		After 12 months	87.0 or longer	Discharge time: 4 hour/day End-point voltage: 0.9V

NOTE 1. The requirements of Table 1 represent values measured or obtained at the ambient temperature of $20 \pm 2^\circ\text{C}$ and at the relative humidity of $(60 \pm 15)\%$.

NOTE 2. Test specimen batteries shall be stored at the ambient temperature of $20 \pm 2^\circ\text{C}$ and at the relative humidity of $(60 \pm 15)\%$.

NOTE 3. As for the average duration, the average value has to satisfy, initial and after 12 months, the requirement of Table 1, when tested with $n=9$ for each testing condition.

The test of average duration and its judgment shall be as follows.

① If the average value is equal to or more than the value of Table 1, and if the number of batteries showing a value less than 80% of the value of Table 1 is 0 or less, these batteries are considered to conform to the requirement.

② If the average value is less than the value of Table 1, or if the number of batteries showing a value less than 80% of the value of Table 1 is 2 or more, the test shall be repeated with other 9 pieces.

At the second test, if the average value is equal to or more than the value of Table 1, and if the number of batteries showing a value less than 80% of the value of Table 1 is 1 or less, these batteries are considered to conform to the requirement.

③ At the above second test, if the average value is less than the value of Table 1, or if the number of batteries showing a value less than 80% of the value of Table 1 is 2 or more, the batteries are considered not to conform to the requirement. A third test shall not be performed.

NOTE 4. Either during storage or during duration tests, there shall be no leakage or deformation which can be noticed visually.

3. 4 Leakage characteristics: Requirements of Table 2 have to be satisfied.

(Table 2)

Test items	Requirements		Test conditions
Electrolyte leakage on over discharge	Initial	No electrolyte leakage or deformation findable by visual check.	Temperature, humidity: $20\pm 2^{\circ}\text{C}$, $(60\pm 15)\% \text{RH}$ Load resistance: $2.2\pm 0.011\Omega$ Completion of test: The instant when the on-load voltage decreases below 40% of the nominal voltage for the first time.
Electrolyte leakage at high temperature			Temperature: $45\pm 2^{\circ}\text{C}$ Humidity: 70%RH or below Store time: To be kept standing open for 30 days.

4. Markings

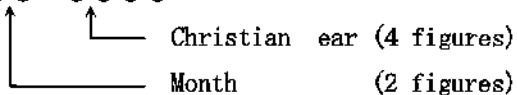
Marking shall be as shown in Fig. 2, Battery Label.

5. Expiry date markings of use

The date shall be indicated on the battery body with following symbols.
(The expiry date shall be 60 months after the manufacturing date.)

BEST BEFORE

○○-○○○○



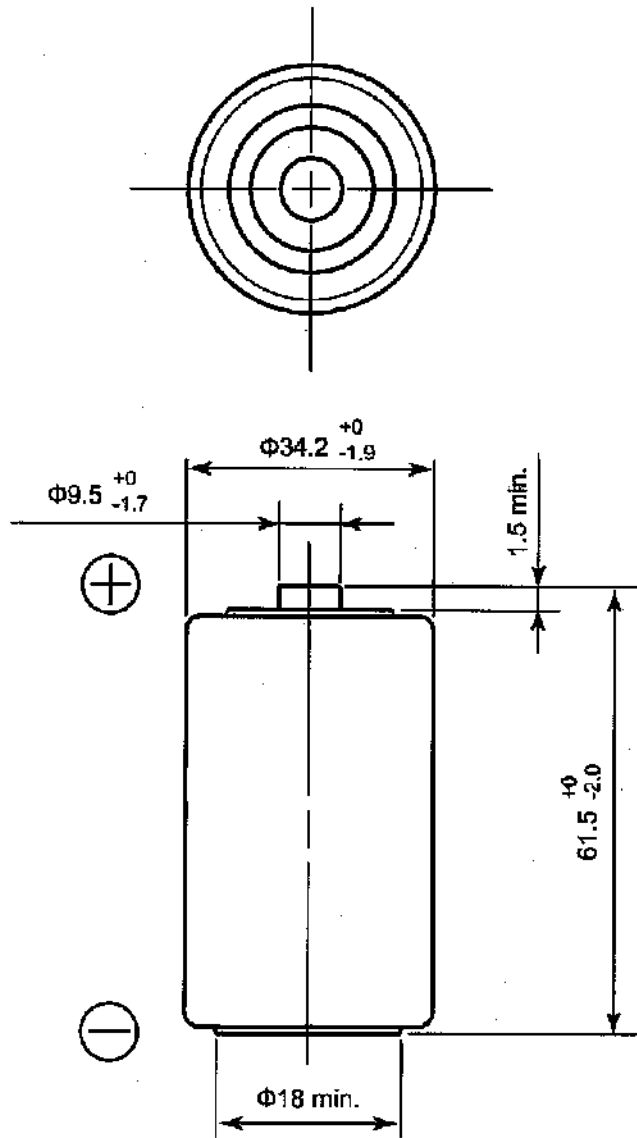
[Example 1] 08-2013 : Expiry date of use, August 2013

[Example 2] 12-2013 : Expiry date of use, December 2013

6. Warranty term

The warranty term shall be 12 months after delivery.

(Fig. 1) BATTERY DIMENSIONS

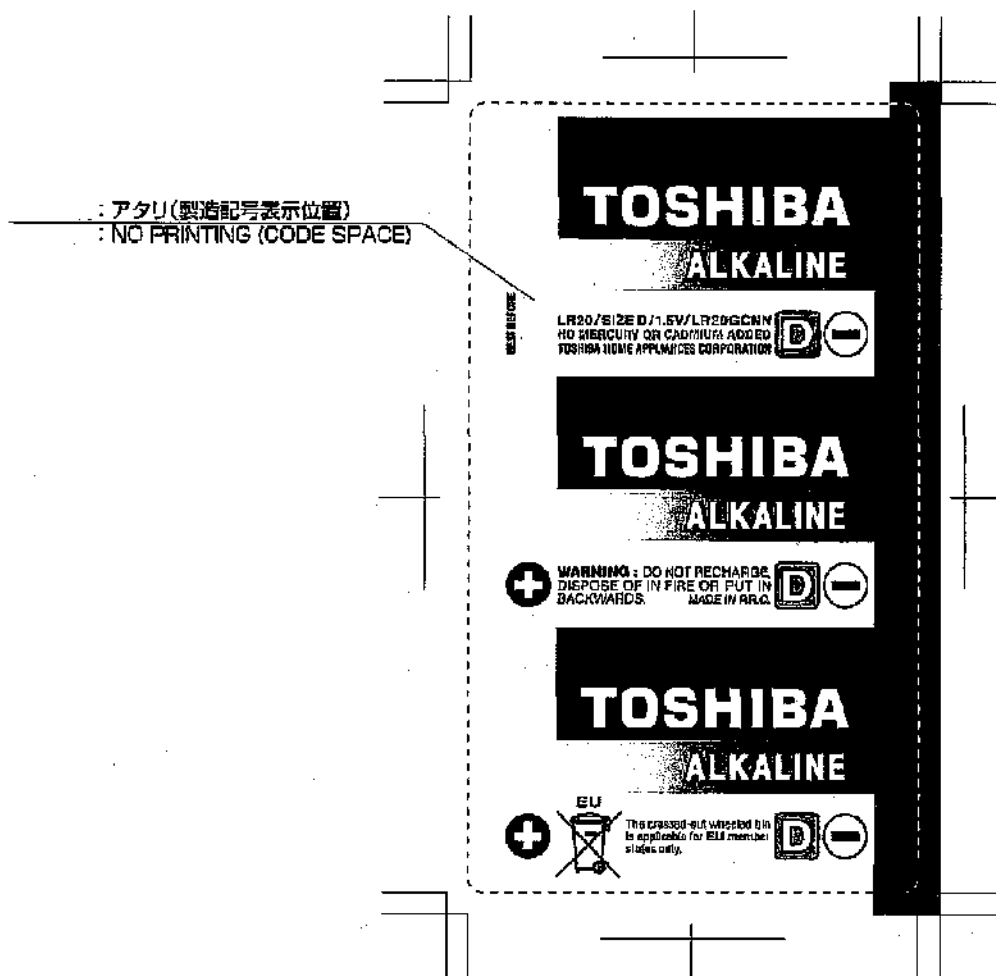


Unit: millimeter

Terminals: Positive-cap terminal, Negative-base terminal

Outer shell: Label

(Fig. 2) BATTERY LABEL



Precautions when using Alkaline manganese batteries

1. Precautions when designing battery appliances.

If the batteries are improperly used, leakage, heat, explosion, etc. may happen. Pay attention to the following matters at the designing of appliances.

(1) Precautions when designing battery compartment.

- ① The battery compartment should be made so that replacing of batteries is easy, while after loading of batteries easy release should be avoided.
- ② About the battery loading parts of battery compartment, pay attention for instance to the cover fixing method of the battery compartment so that the babies and little children cannot touch or take out batteries easily, to prevent swallowing by babies and little children or their injuries.
Besides, make known to everyone about "Keep batteries out of reach of babies and little children" with operating instructions or other ways.
- ③ When designing the dimensions and shapes of the battery compartment and the contacts, consider the dimensions and the tolerances of the batteries and their $\oplus\ominus$ terminals to prevent contact failure or reverse insertion and to assure the adaptation of batteries put on the market.
The dimensions of the battery compartment should conform to IEC(International standards) and JIS(Japanese industrial standards) are adaptable.
- ④ Indicate clearly on the battery compartment, the type of the battery which suits the apparatus and the correct direction of insertion(polarity).
If the space for indication is not available, indicate them clearly in the operating instruction.
- ⑤ The electric circuit inside the battery compartment should be limited to the circuit connected to battery contacts; except contact section, the circuit should be completely isolated from the other electric circuits.
- ⑥ To minimize the damage of apparatus caused by leakage from the battery, if any, pay attention to the construction and arrangement of the battery compartment such as to detach completely the battery compartment from the mechanism compartment.
- ⑦ The battery compartment should maintain permeability for heat radiated from the compartment and for gas escaped from the batteries.
If complete airtight is unavoidable, pay attention to give a function such as safety vent for gas escape.
- ⑧ When there is a heat source in the apparatus, set the battery compartment away from the heat source, as much as possible.

- ⑨ When choosing the material for the battery compartment, shocks and environment should be considered.

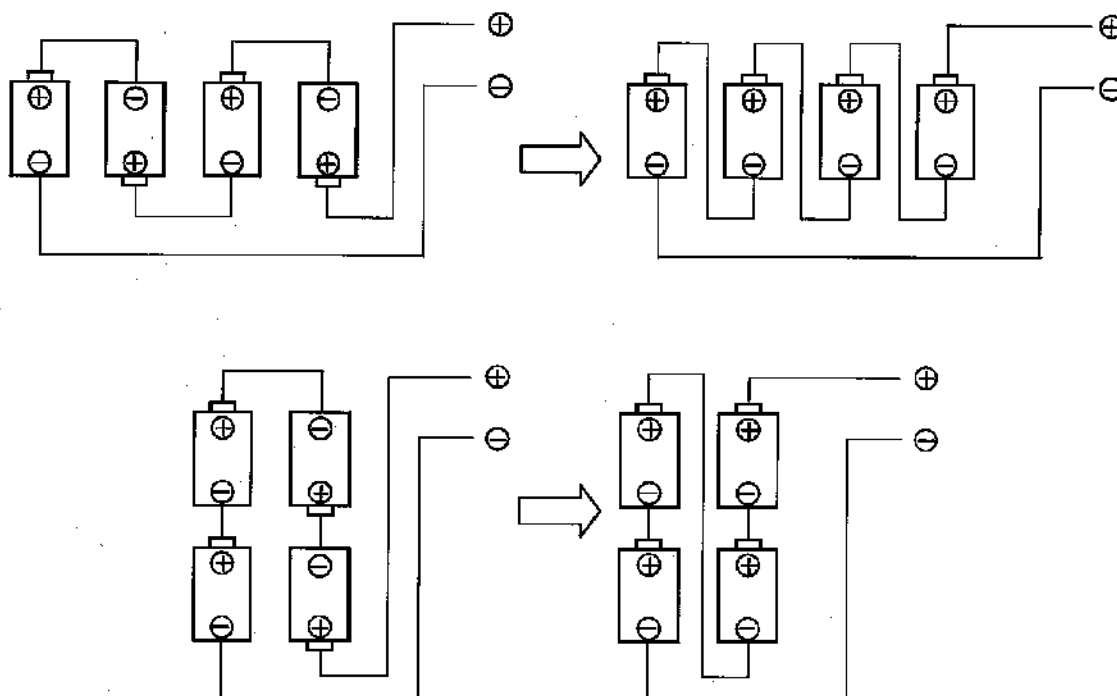
If vibration or shocks can be estimated, take a measure so that the construction of the compartment can absorb it.

- ⑩ Avoid the connection of batteries in serial-parallel or in parallel, as much as possible.

Pay attention especially for serial-parallel or parallel connection because if the arrangement is mistaken, the batteries may continue to discharge or may be recharged even if the switch is off.

In case of series connection, the arrangements of batteries as indicated on reference figure with an arrow are recommended to minimize reverse insertion.

Reference figure series connection of batteries



- ⑪ Pay attention to the material and the shape of the battery contacts so that the electric contact will be perfect even by use of batteries having the dimensions prescribed by JIS.

The material of the contact should be chosen among nickel-plated iron, nickel-plated stainless steel or the like. If an especially low contact resistance is required, adopt gold-plating or the like.

- ⑫ The desirable battery contact pressure of the apparatuses is at minimum 10N (1 kg f) and at maximum 30N (3 kg f).

- ⑬ The circuit in the apparatus should not make electric contact with the batteries except at terminal contact point.

- ⑭ To avoid reverse insertion of batteries, the form of the contact point should make use of the shape difference of $\oplus\ominus$ battery terminals, as much as possible.
- ⑮ When the external substitute electric source is used, the circuit should be designed to avoid charging or forced discharging of batteries.
- ⑯ To ensure the prevention of charging batteries, a protective circuit should be installed.

(2) Precautions at apparatus manufacturing

- ① Do not give ultrasonic vibration to the batteries.
By ultrasonic vibration, the contents of batteries will be finely powdered, which may cause internal short-circuit resulting in leakage, heat or explosion of batteries.
- ② These batteries are allowed to be disposed as general incombustible refuse. However, if rules for battery disposal exist, such as regulations of local government, dispose of the batteries in accordance with the rules.
If the batteries are improperly disposed, they may be short-circuited causing leakage, heat or explosion; as a result, injuries or burns may happen. Besides, do not dispose of batteries in fire. If the batteries are put in fire, they will be heated rapidly, which may cause explosion, etc.
- ③ Wipe clean with a cloth or the like the terminals of the apparatus and the batteries before the insertion of the batteries in the apparatus.
If the terminals are soiled, the apparatus may not operate normally due to contact failure.
- ④ To measure voltage of the batteries, use a voltmeter having high internal resistance.
The tolerance of the voltmeter shall be not more than 0.25% of nominal voltage.
Use voltmeter with an input resistance shall be not less than $1M\Omega$.

(3) Precautions against transport, display and storage.

- ① For the storage of batteries, avoid high temperature and high humidity; and to prevent dew condensation choose a well ventilated dry place where the temperature is not so high.
For store the batteries, a place having a normal temperature ($20\pm 15^{\circ}\text{C}$), little temperature fluctuation and a relative humidity of 70% and less is required. Storage of the batteries at high temperature or high humidity may increase their performance deterioration or leakage.

② For storage in warehouse or display in shopwindow, keep the batteries away from long duration direct sunlight and from rain water.

The exposition of the batteries to high temperature may increase their deterioration or induce leakage.

Besides, if the batteries get wet, the insulation will decrease and rust gathering or leakage will occur more easily.

Besides, batteries stocked by families are increasing; in this case, the matters that require attention are as mentioned above.

③ Avoid rough handling during transport.

Rough handling may cause dent or deformation, which can bring decrease of performance or leakage.

Moreover, the battery compartment may be damaged, causing the batteries in disorder; if $\oplus\ominus$ are short-circuited the batteries may be damaged by heating, and moreover leakage, explosion, fire, etc. may happen.

④ When piling up the outer packages of batteries, the number of tiers should be limited to the amount indicated on the outer-package.

If the packages are excessively piled up, the batteries in the lower layer may be deformed or leakage may be accelerated.

⑤ As for the distribution, such as transport, display, storage and others, observe strictly the first-in, first-out method and pay attention to avoid long-term stock.

The batteries have enough storage property at normal temperature and humidity conditions (normal temperature: $20\pm 15^{\circ}\text{C}$, relative humidity: 70% and less); however since the long-term stock may deteriorate their performance, observe strictly the appropriate volume of inventories and the first-in, first-out method.

2. Warning notices to the customers regarding battery handling.

For the correct use of batteries when the apparatuses are used by the customers, the operating instructions of the apparatuses should contain the following warning statement regarding batteries.

(Warning notices regarding battery handling, to be contained in the operating instructions of the apparatuses)

○If the batteries are improperly used, they may leak, heat or explode, bringing about injury or device failure.

Therefore observe strictly the following matters.

⚠ DANGER

If the alkaline solution of the batteries touches the eyes, injury such as loss of eyesight may be caused.

Do not rub the eyes, but flush the eyes amply with abundant clean water such as city water and then receive medical treatment without delay.

⚠ WARNING

- ① Keep batteries out of reach of babies and little children.

If by any chance, the batteries are swallowed, consult the doctor without delay. ---(An object of indication: LR03·LR1)

- ② Do not incinerate, heat, disassemble or remodel the batteries.

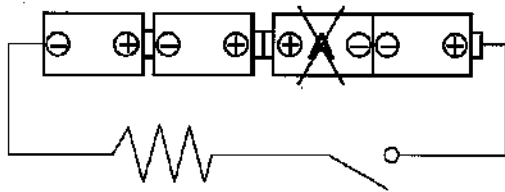
The insulator and the vent for gas escape and so on will be damaged, and the batteries may leak, heat or explode.

- ③ Do not insert batteries in reverse polarity.

By charging, short-circuiting or the like, the batteries may show abnormal reactions, and may leak, heat or explode.

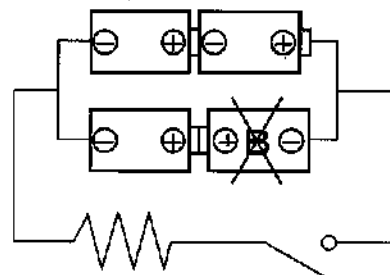
Reference figure 1

Wrong series connection of batteries



Reference figure 2

Wrong serial-parallel connection of batteries



- ④ If the alkaline solution of the batteries is licked, rinse out the mouth and consult the doctor without delay.

- ⑤ If the alkaline solution of the batteries adheres to skin or clothes, skin injury may be caused. Wash liquid away immediately with abundant clean water such as city water.

- ⑥ Do not connect $\oplus\ominus$ of the batteries with wire and do not carry or keep metallic necklace, hairpin, etc. together with batteries.

The batteries may be short-circuited, causing over-current and they may leak, heat or explode.

- ⑦ Do not mix and use "different types or brands of batteries" nor "used and new batteries" together.

The difference of characteristics may cause leakage, heat or explosion.

- ⑧ These batteries are not designed to be recharged.

If recharged, the insulator or the inside structure may be damaged, and the batteries may leak, heat or explode.

- ⑨ Remove promptly the used batteries from the apparatus.

If the used batteries are left in the apparatus, connected for long, gas will be formed in the batteries, which may cause battery leakage, heat or explosion and may cause damage of apparatus.

- ⑩ When not using the apparatus for a long period, remove the batteries from the apparatus.

Gas formed in the batteries may cause battery leakage or may damage the apparatus.

 **CAUTION**

- ① Do not peel off or damage the outer label of the batteries.

The batteries may be short-circuited, they may leak, heat or explode.

- ② Do not expose batteries to strong impact by dropping or throwing the batteries. The batteries may leak, heat or explode.

- ③ Do not deform the batteries.

The insulator and the vent for gas escape, etc. may be damaged and the batteries may leak, heat or explode.

- ④ When using the batteries in complete airtight apparatus, follow the indications of the operating instructions of the apparatus.

- ⑤ Do not solder anything directly to the batteries.

The insulator and the vent for gas escape, etc. may be damaged by heat and the batteries may leak, heat or explode.

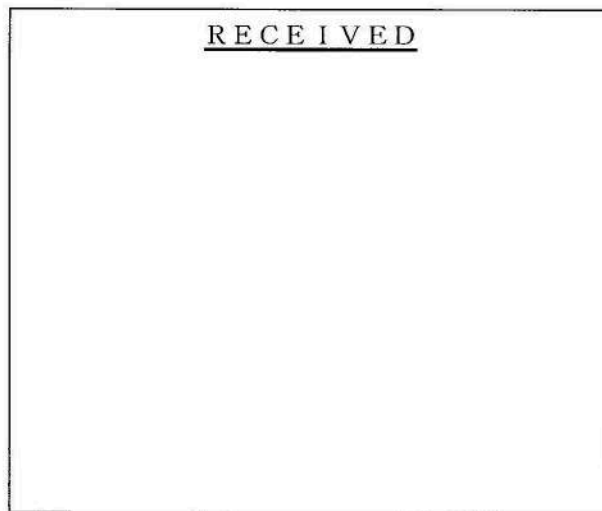
- ⑥ Do not use nor keep batteries at places exposed to strong direct sunlight or in cars under burning sun, etc. The batteries may leak, heat or explode.

- ⑦ At the storage or disposal of the batteries, insulate the terminal parts with tape or the like.

If the batteries are mixed with other batteries or metallic objects, the batteries may be short-circuited, and may leak, heat or explode.

- ⑧ Keep the batteries away from water. The batteries may heat.
- ⑨ The specification or the performance of the batteries may be sometimes not appropriate, depending on applications or apparatus; use correctly the appropriate batteries in accordance with the operating instructions and notices of the apparatus.
- ⑩ At the storage of batteries, avoid direct sunlight, high temperature and high humidity places. Leakage may happen. Beside, the performance and the life of the batteries may decrease.
- ⑪ These batteries are allowed to be disposed as general incombustible refuse. However if rules for battery disposal exist, such as regulations of local government, dispose of the batteries in accordance with the rules.
- ⑫ Do not forget to turn off the switch of the apparatus.
- ⑬ To keep the batteries taken out from packages, or to stock the batteries by families, pay attention to avoid contact between batteries and to keep out of short-circuit.

SPECIFICATION FOR
ALKALINE MANGANESE DIOXIDE BATTERY
Type: LR6GCL [TOSHIBA Brand]



April 08,2019

TOSHIBA HOME APPLIANCES CORPORATION
Battery Business Div.

G. Manager	Manager	Issued by

PRODUCT SPECIFICATION

1. Applicability: This specification is applicable to the following product:

Alkaline Manganese Dioxide Battery L R 6 G C L

2. Ratings:

2.1 Battery type: L R 6 G C L [LR6 under IEC standard]

2.2 Nominal voltage: 1.5V

2.3 Shape and dimensions: See Fig. 1, Battery Dimensions.

2.4 Standard weight: 23 g

2.5 Terminals: Positive electrode — cap terminal
Negative electrode — base terminal

3. Quality requirements:

3.1 Dimensions: Battery dimensions shall be as shown in Fig. 1, Battery Dimensions.

3.2 Appearance: Batteries shall have no stain, flaw or deformation which may adversely affect their performance and actual use and shall have clearly visible markings.

3.3 Quality characteristics: Requirements of Table 1 have to be satisfied.

(Table 1)

Items		Requirements		Conditions
Electrical characteristics	Off-load voltage (V)	Initial	1.50 ~ 1.65	DC voltmeter: The tolerances shall be not more than 0.25% of nominal voltage and the input resistance shall be not less than 1MΩ.
		After 12 months	1.45 ~ 1.65	
	On-load voltage (V)	Initial	1.45 or higher	DC voltmeter: Same as above. Load resistance: 10±0.05Ω
		After 12 months	1.40 or higher	
Minimum average duration	10-ohm continuous discharge (h)	Initial	13.5 or longer	Load resistance: 10±0.05Ω Discharge time: 24 hours/day End-point voltage: 0.9V
		After 12 months	11.0 or longer	
	3.9-ohm intermittent discharge (h)	Initial	4.5 or longer	Load resistance: 3.9±0.0195Ω Discharge time: 1 hour/day End-point voltage: 0.8V
		After 12 months	3.5 or longer	

Items		Requirements		Conditions
Minimum average duration	10-ohm intermittent discharge (h)	Initial	13.5 or longer	Load resistance: $10 \pm 0.05 \Omega$ Discharge time: 1 hour/day End-point voltage: 0.9V
		After 12 months	11.0 or longer	
	43-ohm intermittent discharge (h)	Initial	59.0 or longer	Load resistance: $43 \pm 0.215 \Omega$ Discharge time: 4 hours/day End-point voltage: 0.9V
		After 12 months	48.0 or longer	

NOTE 1. The requirements of Table 1 represent values measured or obtained at the ambient temperature of $20 \pm 2^\circ\text{C}$ and at the relative humidity of $(60 \pm 15)\%$.

NOTE 2. Test specimen batteries shall be stored at the ambient temperature of $20 \pm 2^\circ\text{C}$ and at the relative humidity of $(60 \pm 15)\%$.

NOTE 3. As for the average duration, the average value has to satisfy, initial and after 12 months, the requirement of Table 1, when tested with $n=9$ for each testing condition.

The test of average duration and its judgment shall be as follows.

- ① If the average value is equal to or more than the value of Table 1, and if the number of batteries showing a value less than 80% of the value of Table 1 is 0 or less, these batteries are considered to conform to the requirement.
- ② If the average value is less than the value of Table 1, or if the number of batteries showing a value less than 80% of the value of Table 1 is 2 or more, the test shall be repeated with other 9 pieces.
At the second test, if the average value is equal to or more than the value of Table 1, and if the number of batteries showing a value less than 80% of the value of Table 1 is 1 or less, these batteries are considered to conform to the requirement.
- ③ At the above second test, if the average value is less than the value of Table 1, or if the number of batteries showing a value less than 80% of the value of Table 1 is 2 or more, the batteries are considered not to conform to the requirement. A third test shall not be performed.

NOTE 4. Either during storage or during duration tests, there shall be no leakage or deformation which can be noticed visually.

3.4 Leakage characteristics: Requirements of Table 2 have to be satisfied.

(Table 2)

Test items	Requirements		Test conditions
Electrolyte leakage on over discharge	Initial	No electrolyte leakage or deformation findable by visual check.	Temperature, humidity: $20 \pm 2^\circ\text{C}$, $(60 \pm 15)\% \text{RH}$ Load resistance: $10 \pm 0.05 \Omega$ Completion of test: The instant when the on-load voltage decreases below 40% of the nominal voltage for the first time.
Electrolyte leakage at high temperature			Temperature: $45 \pm 2^\circ\text{C}$ Humidity: 70%RH or below Store time: To be kept standing open for 30 days.

4. Markings: Marking shall be as shown in Fig. 2, Battery Label Marking.

5. Expiry date of use:

BEST BEFORR (Month-Christian ear)

(The expiry date shall be 60 months after the manufacturing date.)

The date shall be indicated on the battery body with following symbols.

○○-○○○○

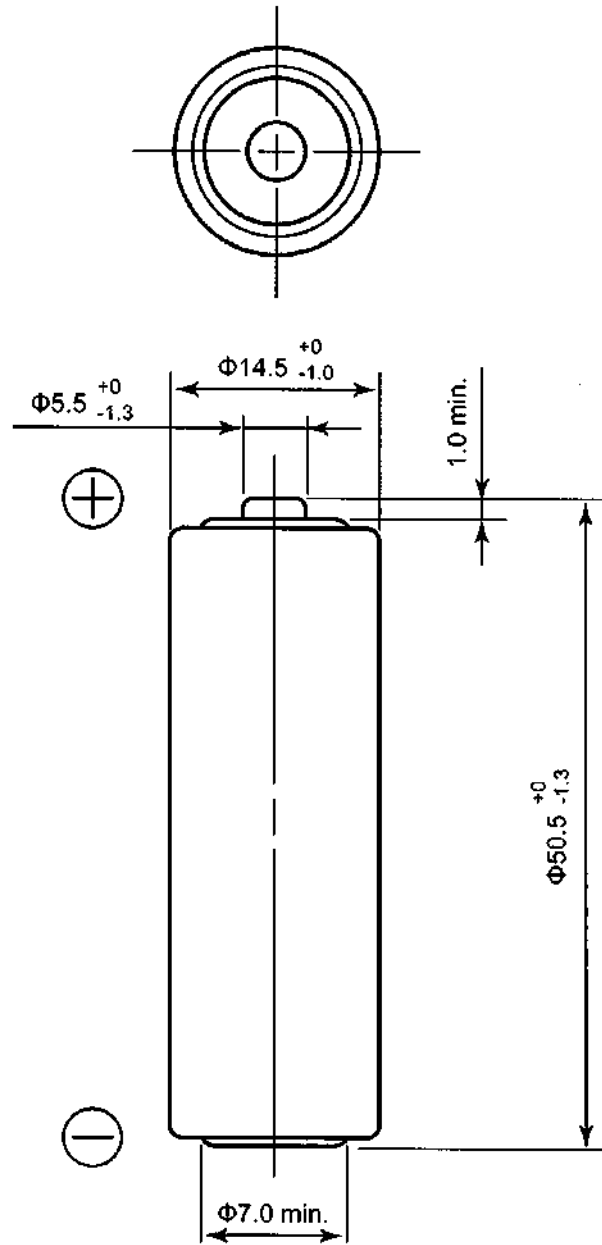
Christian ear (4 figures)
 Month (2 figures)

[Example 1] 08-2013 : Expiry date of use, August 2013

[Example 2] 12-2013 : Expiry date of use, December 2013

6. Warranty term: 12 months after delivery.

(Fig. 1) BATTERY DIMENSIONS



Unit: mm

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CELL image



CELL image



LR6GCL



LR03GCL

Precautions when using Alkaline manganese batteries

1. Precautions when designing battery appliances.

If the batteries are improperly used, leakage, heat, explosion, etc. may happen. Pay attention to the following matters at the designing of appliances.

(1) Precautions when designing battery compartment.

- ① The battery compartment should be made so that replacing of batteries is easy, while after loading of batteries easy release should be avoided.
- ② About the battery loading parts of battery compartment, pay attention for instance to the cover fixing method of the battery compartment so that the babies and little children cannot touch or take out batteries easily, to prevent swallowing by babies and little children or their injuries.
Besides, make known to everyone about "Keep batteries out of reach of babies and little children" with operating instructions or other ways.
- ③ When designing the dimensions and shapes of the battery compartment and the contacts, consider the dimensions and the tolerances of the batteries and their $\oplus\ominus$ terminals to prevent contact failure or reverse insertion and to assure the adaptation of batteries put on the market.
The dimensions of the battery compartment should conform to IEC(International standards) and JIS(Japanese industrial standards) are adaptable.
- ④ Indicate clearly on the battery compartment, the type of the battery which suits the apparatus and the correct direction of insertion(polarity).
If the space for indication is not available, indicate them clearly in the operating instruction.
- ⑤ The electric circuit inside the battery compartment should be limited to the circuit connected to battery contacts; except contact section, the circuit should be completely isolated from the other electric circuits.
- ⑥ To minimize the damage of apparatus caused by leakage from the battery, if any, pay attention to the construction and arrangement of the battery compartment such as to detach completely the battery compartment from the mechanism compartment.
- ⑦ The battery compartment should maintain permeability for heat radiated from the compartment and for gas escaped from the batteries.
If complete airtight is unavoidable, pay attention to give a function such as safety vent for gas escape.
- ⑧ When there is a heat source in the apparatus, set the battery compartment away from the heat source, as much as possible.

- ⑨ When choosing the material for the battery compartment, shocks and environment should be considered.

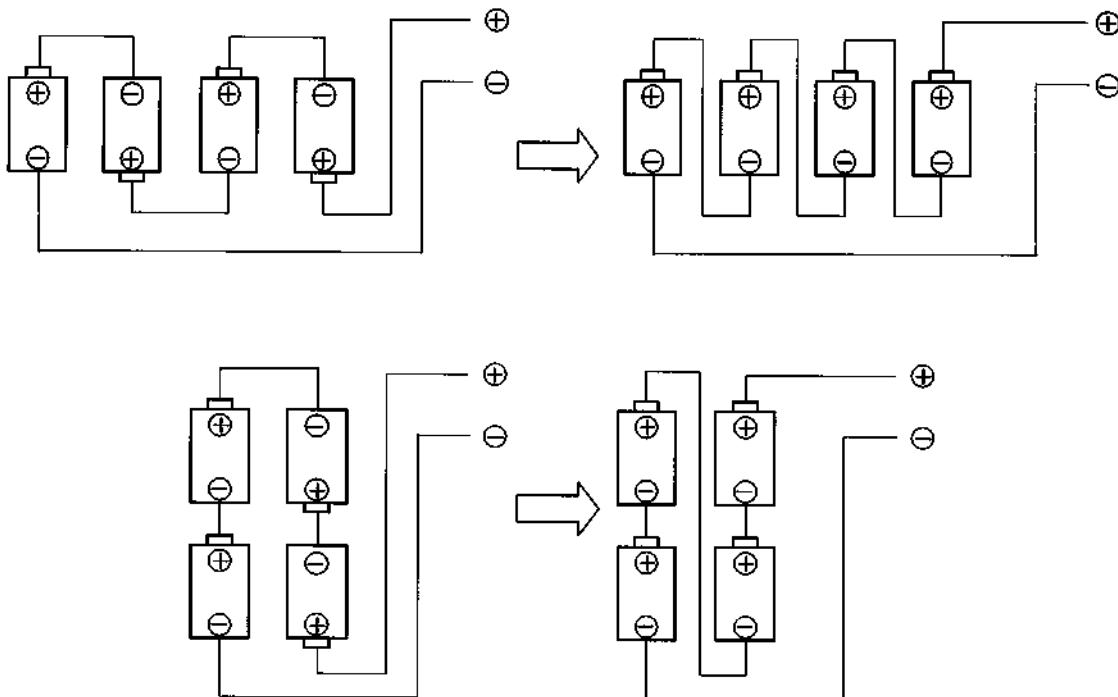
If vibration or shocks can be estimated, take a measure so that the construction of the compartment can absorb it.

- ⑩ Avoid the connection of batteries in serial-parallel or in parallel, as much as possible.

Pay attention especially for serial-parallel or parallel connection because if the arrangement is mistaken, the batteries may continue to discharge or may be recharged even if the switch is off.

In case of series connection, the arrangements of batteries as indicated on reference figure with an arrow are recommended to minimize reverse insertion.

Reference figure series connection of batteries



- ⑪ Pay attention to the material and the shape of the battery contacts so that the electric contact will be perfect even by use of batteries having the dimensions prescribed by JIS.

The material of the contact should be chosen among nickel-plated iron, nickel-plated stainless steel or the like. If an especially low contact resistance is required, adopt gold-plating or the like.

- ⑫ The desirable battery contact pressure of the apparatuses is at minimum 10N (1 kg f) and at maximum 30N (3 kg f).

- ⑬ The circuit in the apparatus should not make electric contact with the batteries except at terminal contact point.

- ⑭ To avoid reverse insertion of batteries, the form of the contact point should make use of the shape difference of $\oplus\ominus$ battery terminals, as much as possible.
- ⑮ When the external substitute electric source is used, the circuit should be designed to avoid charging or forced discharging of batteries.
- ⑯ To ensure the prevention of charging batteries, a protective circuit should be installed.

(2) Precautions at apparatus manufacturing

- ① Do not give ultrasonic vibration to the batteries.
By ultrasonic vibration, the contents of batteries will be finely powdered, which may cause internal short-circuit resulting in leakage, heat or explosion of batteries.
- ② These batteries are allowed to be disposed as general incombustible refuse. However if rules for battery disposal exist, such as regulations of local government, dispose of the batteries in accordance with the rules.
If the batteries are improperly disposed, they may be short-circuited causing leakage, heat or explosion; as a result, injuries or burns may happen. Besides, do not dispose of batteries in fire. If the batteries are put in fire, they will be heated rapidly, which may cause explosion, etc.
- ③ Wipe clean with a cloth or the like the terminals of the apparatus and the batteries before the insertion of the batteries in the apparatus.
If the terminals are soiled, the apparatus may not operate normally due to contact failure.
- ④ To measure voltage of the batteries, use a voltmeter having high internal resistance.
The tolerance of the voltmeter shall be not more than 0.25% of nominal voltage.
Use voltmeter with an input resistance shall be not less than $1M\Omega$.

(3) Precautions against transport, display and storage.

- ① For the storage of batteries, avoid high temperature and high humidity; and to prevent dew condensation choose a well ventilated dry place where the temperature is not so high.
For store the batteries, a place having a normal temperature ($20\pm 15^{\circ}\text{C}$), little temperature fluctuation and a relative humidity of 70% and less is required. Storage of the batteries at high temperature or high humidity may increase their performance deterioration or leakage.

② For storage in warehouse or display in shopwindow, keep the batteries away from long duration direct sunlight and from rain water.

The exposition of the batteries to high temperature may increase their deterioration or induce leakage.

Besides, if the batteries get wet, the insulation will decrease and rust gathering or leakage will occur more easily.

Besides, batteries stocked by families are increasing; in this case, the matters that require attention are as mentioned above.

③ Avoid rough handling during transport.

Rough handling may cause dent or deformation, which can bring decrease of performance or leakage.

Moreover, the battery compartment may be damaged, causing the batteries in disorder; if $\oplus\ominus$ are short-circuited the batteries may be damaged by heating, and moreover leakage, explosion, fire, etc. may happen.

④ When piling up the outer packages of batteries, the number of tiers should be limited to the amount indicated on the outer-package.

If the packages are excessively piled up, the batteries in the lower layer may be deformed or leakage may be accelerated.

⑤ As for the distribution, such as transport, display, storage and others, observe strictly the first-in, first-out method and pay attention to avoid long-term stock.

The batteries have enough storage property at normal temperature and humidity conditions(normal temperature: $20\pm 15^{\circ}\text{C}$, relative humidity: 70% and less); however since the long-term stock may deteriorate their performance, observe strictly the appropriate volume of inventories and the first-in, first-out method.

2. Warning notices to the customers regarding battery handling.

For the correct use of batteries when the apparatuses are used by the customers, the operating instructions of the apparatuses should contain the following warning statement regarding batteries.

〈Warning notices regarding battery handling, to be contained in the operating instructions of the apparatuses〉

○If the batteries are improperly used, they may leak, heat or explode, bringing about injury or device failure.

Therefore observe strictly the following matters.

! DANGER

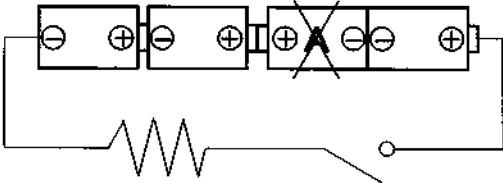
If the alkaline solution of the batteries touches the eyes, injury such as loss of eyesight may be caused.
Do not rub the eyes, but flush the eyes amply with abundant clean water such as city water and then receive medical treatment without delay.

! WARNING

- ① Keep batteries out of reach of babies and little children.
If by any chance, the batteries are swallowed, consult the doctor without delay. ... (An object of indication: LR03·LR1)
- ② Do not incinerate, heat, disassemble or remodel the batteries.
The insulator and the vent for gas escape and so on will be damaged, and the batteries may leak, heat or explode.
- ③ Do not insert batteries in reverse polarity.
By charging, short-circuiting or the like, the batteries may show abnormal reactions, and may leak, heat or explode.

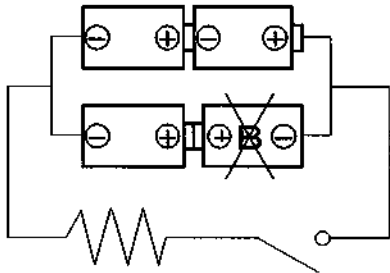
Reference figure 1

Wrong series connection of batteries



Reference figure 2

Wrong serial-parallel connection of batteries



- ④ If the alkaline solution of the batteries is licked, rinse out the mouth and consult the doctor without delay.
- ⑤ If the alkaline solution of the batteries adheres to skin or clothes, skin injury may be caused. Wash liquid away immediately with abundant clean water such as city water.
- ⑥ Do not connect $\oplus\ominus$ of the batteries with wire and do not carry or keep metallic necklace, hairpin, etc. together with batteries.
The batteries may be short-circuited, causing over-current and they may leak, heat or explode.

- ⑦ Do not mix and use "different types or brands of batteries" nor "used and new batteries" together.

The difference of characteristics may cause leakage, heat or explosion.

- ⑧ These batteries are not designed to be recharged.

If recharged, the insulator or the inside structure may be damaged, and the batteries may leak, heat or explode.

- ⑨ Remove promptly the used batteries from the apparatus.

If the used batteries are left in the apparatus, connected for long, gas will be formed in the batteries, which may cause battery leakage, heat or explosion and may cause damage of apparatus.

- ⑩ When not using the apparatus for a long period, remove the batteries from the apparatus.

Gas formed in the batteries may cause battery leakage or may damage the apparatus.



CAUTION

- ① Do not peel off or damage the outer label of the batteries.

The batteries may be short-circuited, they may leak, heat or explode.

- ② Do not expose batteries to strong impact by dropping or throwing the batteries. The batteries may leak, heat or explode.

- ③ Do not deform the batteries.

The insulator and the vent for gas escape, etc. may be damaged and the batteries may leak, heat or explode.

- ④ When using the batteries in complete airtight apparatus, follow the indications of the operating instructions of the apparatus.

- ⑤ Do not solder anything directly to the batteries.

The insulator and the vent for gas escape, etc. may be damaged by heat and the batteries may leak, heat or explode.

- ⑥ Do not use nor keep batteries at places exposed to strong direct sunlight or in cars under burning sun, etc. The batteries may leak, heat or explode.

- ⑦ At the storage or disposal of the batteries, insulate the terminal parts with tape or the like.

If the batteries are mixed with other batteries or metallic objects, the batteries may be short-circuited, and may leak, heat or explode.

- ⑧ Keep the batteries away from water. The batteries may heat.
- ⑨ The specification or the performance of the batteries may be sometimes not appropriate, depending on applications or apparatus; use correctly the appropriate batteries in accordance with the operating instructions and notices of the apparatus.
- ⑩ At the storage of batteries, avoid direct sunlight, high temperature and high humidity places. Leakage may happen. Beside, the performance and the life of the batteries may decrease.
- ⑪ These batteries are allowed to be disposed as general incombustible refuse. However if rules for battery disposal exist, such as regulations of local government, dispose of the batteries in accordance with the rules.
- ⑫ Do not forget to turn off the switch of the apparatus.
- ⑬ To keep the batteries taken out from packages, or to stock the batteries by families, pay attention to avoid contact between batteries and to keep out of short-circuit.

Technical Data for Alkaline Dry Battery

Type: LR6

<Made in China>

2019/04/08

TOSHIBA HOME APPLIANCES CORPORATION

Battery Business Div.

Ratings

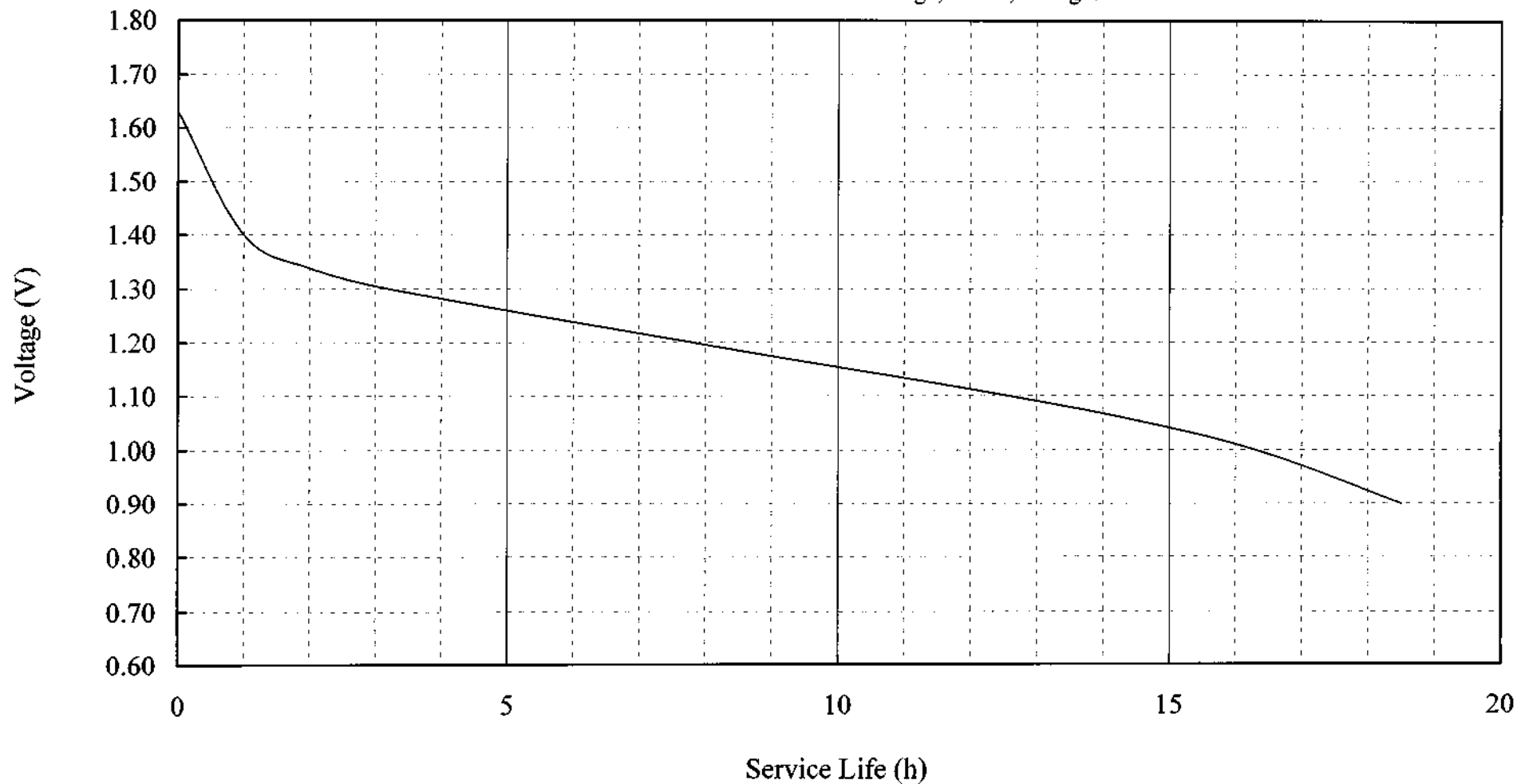
Battery system		Alkaline Dry Battery	
Item			
Battery type		LR6	
Nominal Voltage		1.5V	
Standard Capacity (Service Life)		Discharge condition	Service Life
		(1) 10Ω Continuous (End-Voltage:0.9V)	: 18.5 hours.
		(2) 10Ω 1h/Day (End-Voltage:0.9V)	: 18.5 hours.
		(3) 3.9Ω 1h/Day (End-Voltage:0.8V)	: 7.0 hours.
		(4) 43Ω 4h/Day (End-Voltage:0.9V)	: 88.0 hours.
Standard Weight		23g	
Terminals	Cap Terminals	Fe + Ni plate	
	Base Terminals	Fe + Ni plate	
Outer dimensions	Overall height	50.5(0/-1.3)mm	
	Diameter	φ14.5(0/-1.0)mm	
Usable temperature range		-10 ~ 45deg.C	

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Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR6 Discharge Characteristics

Test condition : 10Ω cotinuous discharge, Initial, 20deg.C

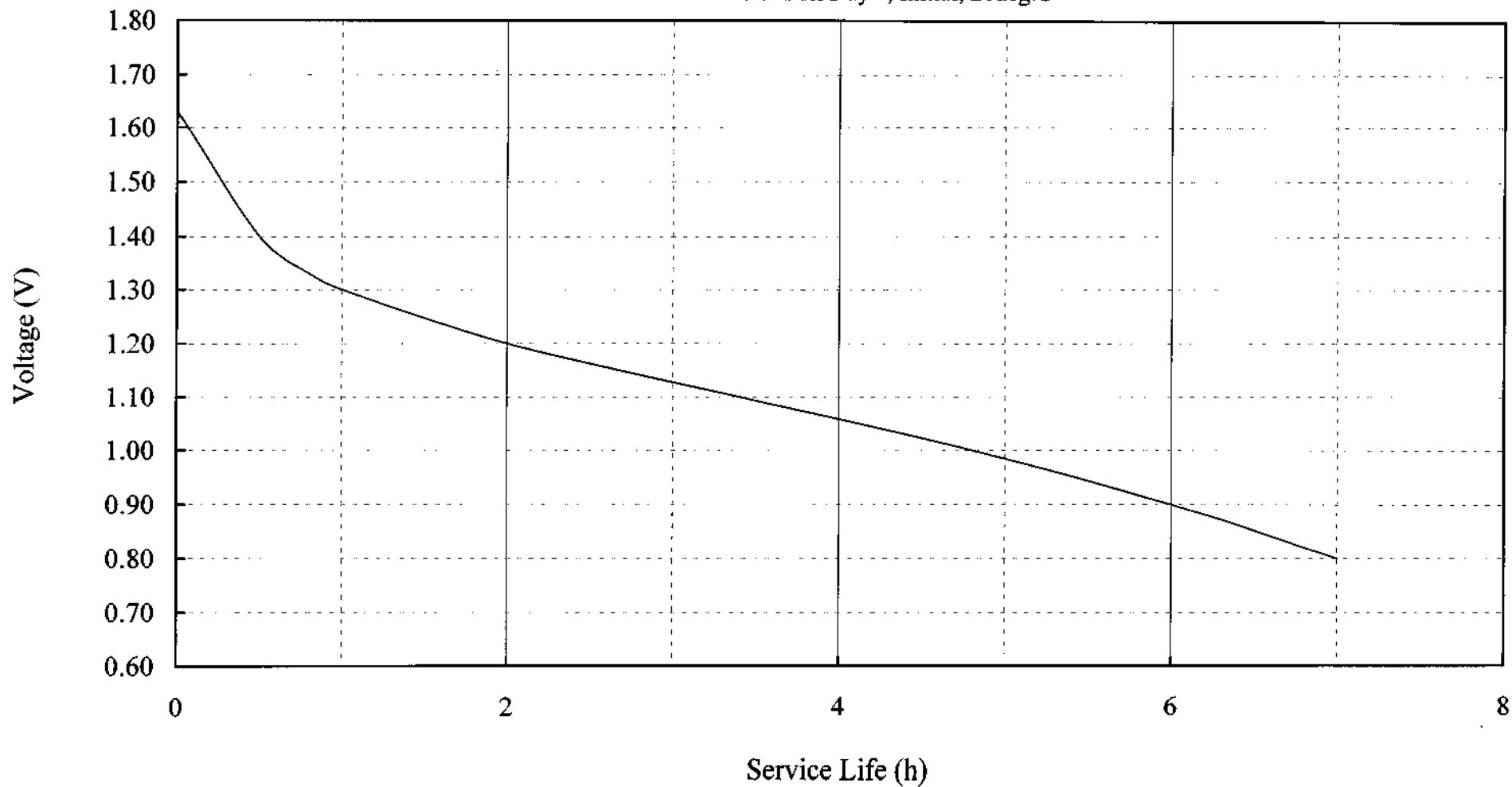


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Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR6 Discharge Characteristics

Test condition : 3.9Ω 1h/Day , Initial, 20deg.C

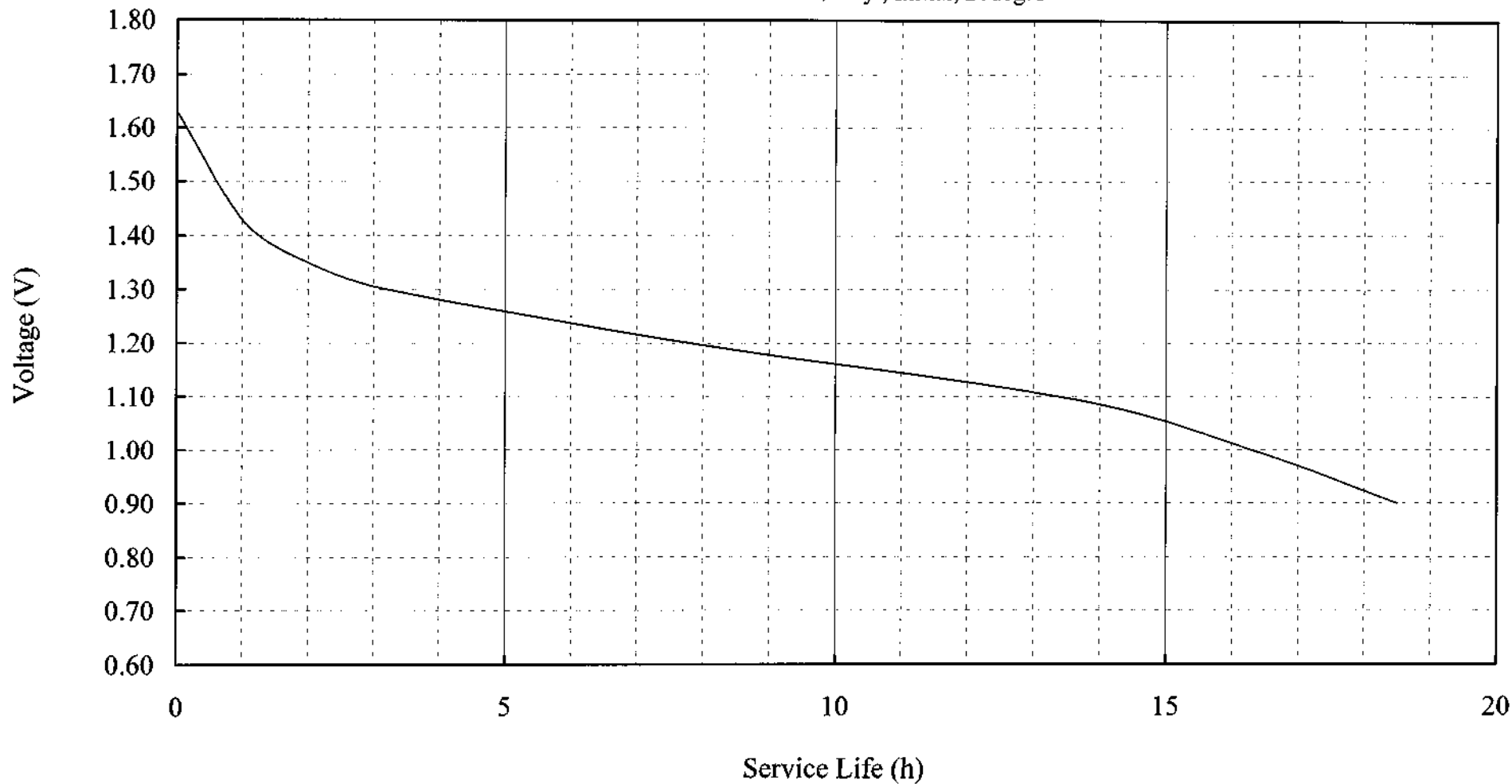


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Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR6 Discharge Characteristics

Test condition : 10Ω 1h/Day , Initial, 20deg.C



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Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR6 Discharge Characteristics

Test condition : 43Ω 4h/Day , Initial, 20deg.C

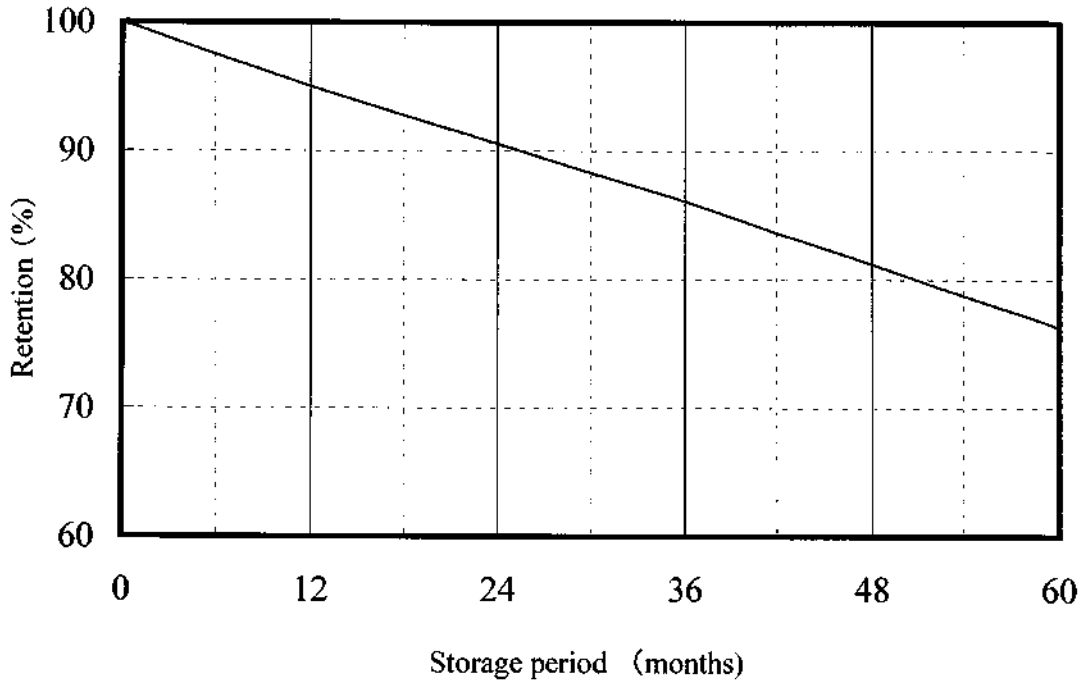


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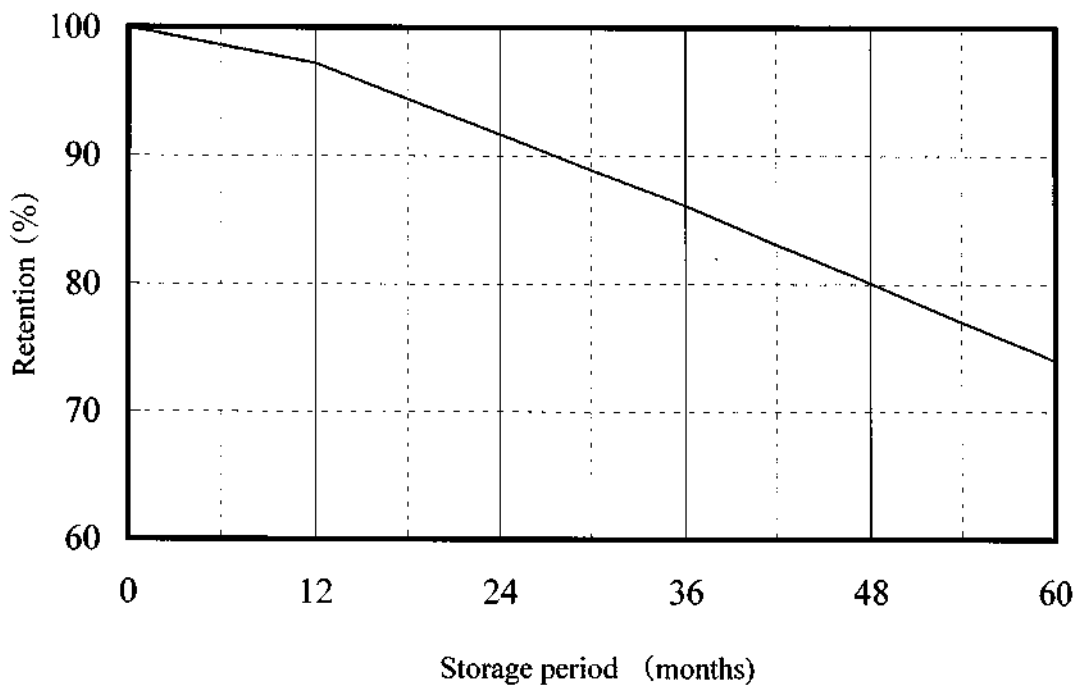
Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR6 Storage Characteristics

[①Discharge condition : 10Ω 1h/Day End-voltage 0.9V]



[②Discharge condition : 43Ω 4h/day End-voltage 0.9V]



- [Note]
1. Discharge temperature, relative humidity: 20±2°C, (65±20)%RH
 2. Storage temperature, relative humidity: 20±2°C, (65±20)%RH
 3. Retention: Self-discharge rate

This is only for reference.(not guaranteed.) This information contained herein may be changed without prior notice.

LR6 Leakage Performance

Test items		Electrolyte Leakage (%)					
		20days	40days	60days	90days	1year	2year
Test condition	Storage period						
	Room condition	Room temperature	0	0	0	0	0
Storage at high temperature and high humidity	45deg.C-70%RH	0	0	0	-	-	-
	60deg.C-90%RH	0	0	-	-	-	-

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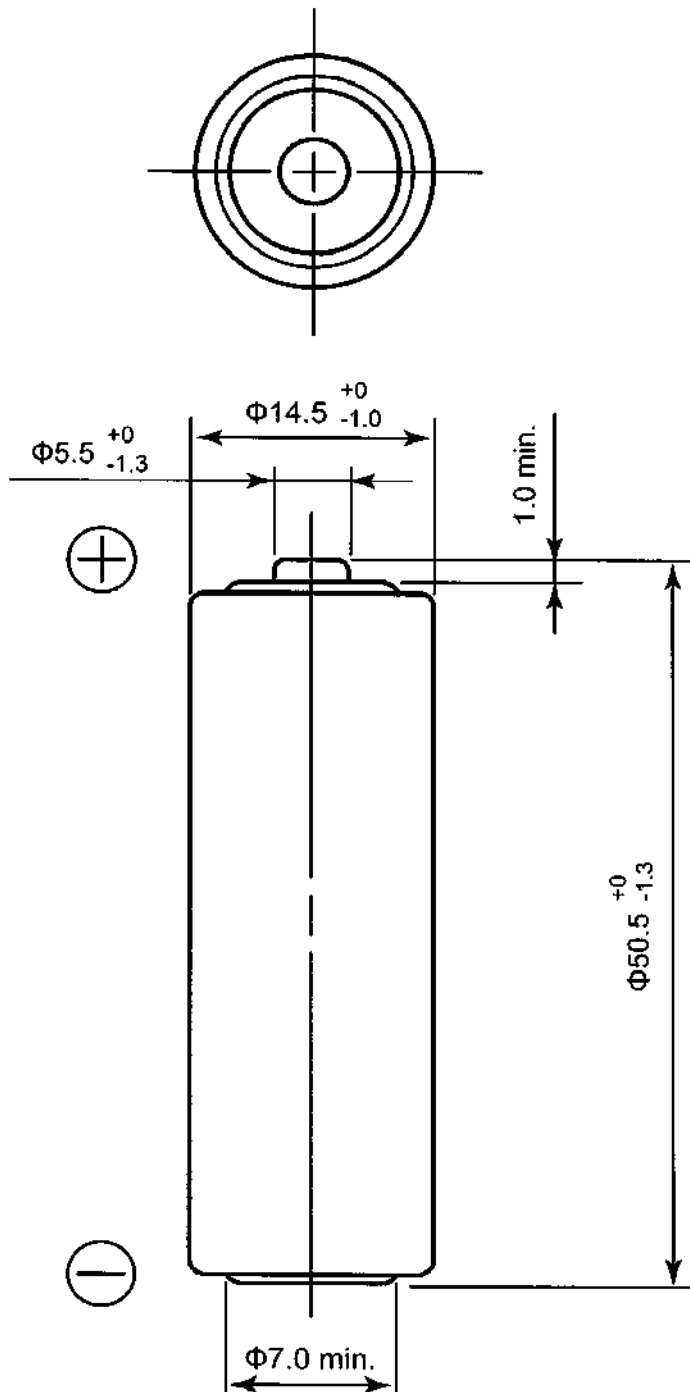
Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

5year
0
-
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Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR6 Battery Dimensions

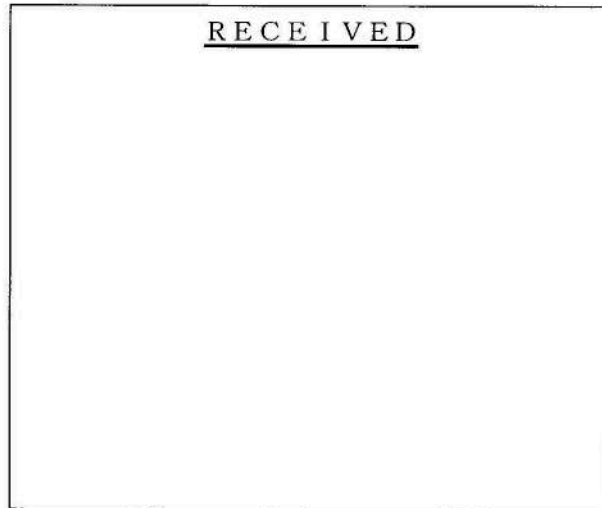


Unit: mm
Terminals: Positive-cap terminal
 Negative-base terminal
Outer shell: Shrink-label

This is only for reference.(not guaranteed.) This information contained herein may be changed without prior notice.

Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

SPECIFICATION FOR
ALKALINE MANGANESE DIOXIDE BATTERY
Type: LR03 GCL[TOSHIBA Brand]



April 08,2019

TOSHIBA HOME APPLIANCES CORPORATION
Battery Business Div.

G. Manager	Manager	Issued by

PRODUCT SPECIFICATION

1. Applicability: This specification is applicable to the following product:

Alkaline Manganese Dioxide Battery L R 0 3 G C L

2. Ratings:

2.1 Battery type: L R 0 3 G C L [LR03 under IEC standard]

2.2 Nominal voltage: 1.5V

2.3 Shape and dimensions: See Fig. 1, Battery Dimensions.

2.4 Standard weight: 11.4 g

2.5 Terminals: Positive electrode — cap terminal
Negative electrode — base terminal

3. Quality requirements:

3.1 Dimensions: Battery dimensions shall be as shown in Fig. 1, Battery Dimensions.

3.2 Appearance: Batteries shall have no stain, flaw or deformation which may adversely affect their performance and actual use and shall have clearly visible markings.

3.3 Quality characteristics: Requirements of Table 1 have to be satisfied.

(Table 1)

Test items		Requirements		Conditions
Electrical characteristics	Off-load voltage (V)	Initial	1.50 ~ 1.65	DC voltmeter: The tolerances shall be not more than 0.25% of nominal voltage and the input resistance shall be not less than 1MΩ.
		After 12 months	1.45 ~ 1.65	
	On-load voltage (V)	Initial	1.45 or higher	DC voltmeter: Same as above. Load resistance: 20±0.1Ω
		After 12 months	1.40 or higher	
Minimum average duration	20-ohm continuous discharge (h)	Initial	12.0 or longer	Load resistance: 20±0.1Ω Discharge time: 24 hours/day End-point voltage: 0.9V
		After 12 months	10.0 or longer	
	10-ohm intermittent discharge (h)	Initial	5.5 or longer	Load resistance: 10±0.05Ω Discharge time: 1 hour/day End-point voltage: 0.9V
		After 12 months	4.5 or longer	

Test items		Requirements		Conditions
Minimum average duration	75-ohm intermittent discharge (h)	Initial	45.0 or longer	Load resistance: $75 \pm 0.375 \Omega$ Discharge time: 4 hours/day End-point voltage: 0.9V
		After 12 months	38.5 or longer	

NOTE 1. The requirements of Table 1 represent values measured or obtained at the ambient temperature of $20 \pm 2^\circ\text{C}$ and at the relative humidity of $(60 \pm 15)\%$.

NOTE 2. Test specimen batteries shall be stored at the ambient temperature of $20 \pm 2^\circ\text{C}$ and at the relative humidity of $(60 \pm 15)\%$.

NOTE 3. As for the average duration, the average value has to satisfy, initial and after 12 months, the requirement of Table 1, when tested with $n=9$ for each testing condition.

The test of average duration and its judgment shall be as follows.

① If the average value is equal to or more than the value of Table 1, and if the number of batteries showing a value less than 80% of the value of Table 1 is or less, these batteries are considered to conform to the requirement.

② If the average value is less than the value of Table 1, or if the number of batteries showing a value less than 80% of the value of Table 1 is 2 or more, the test shall be repeated with other 9 pieces.

At the second test, if the average value is equal to or more than the value of Table 1, and if the number of batteries showing a value less than 80% of the value of Table 1 is 1 or less, these batteries are considered to conform to the requirement.

③ At the above second test, if the average value is less than the value of Table 1, or if the number of batteries showing a value less than 80% of the value of Table 1 is 2 or more, the batteries are considered not to conform to the requirement. A third test shall not be performed.

NOTE 4. Either during storage or during duration tests, there shall be no leakage or deformation which can be noticed visually.

3.4 Leakage characteristics: Requirements of Table 2 have to be satisfied.

(Table 2)

Items	Requirements		Conditions
Electrolyte leakage on over discharge	Initial	No electrolyte leakage or deformation findable by visual check.	Temperature, humidity: $20 \pm 2^\circ\text{C}$, $(60 \pm 15)\% \text{RH}$ Load resistance: $20 \pm 0.1 \Omega$ Completion of test: The instant when the on-load voltage decreases below 40% of the nominal voltage for the first time.
Electrolyte leakage at high temperature			Temperature: $45 \pm 2^\circ\text{C}$ Humidity: 70%RH or below Store time: To be kept standing open for 30 days.

4. Markings: Marking shall be as shown in Fig. 2, Battery Label Marking.

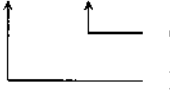
5. Expiry date of use:

BEST BEFORR (Month-Christian ear)

(The expiry date shall be 60 months after the manufacturing date.)

The date shall be indicated on the battery body with following symbols.

○○-○○○○

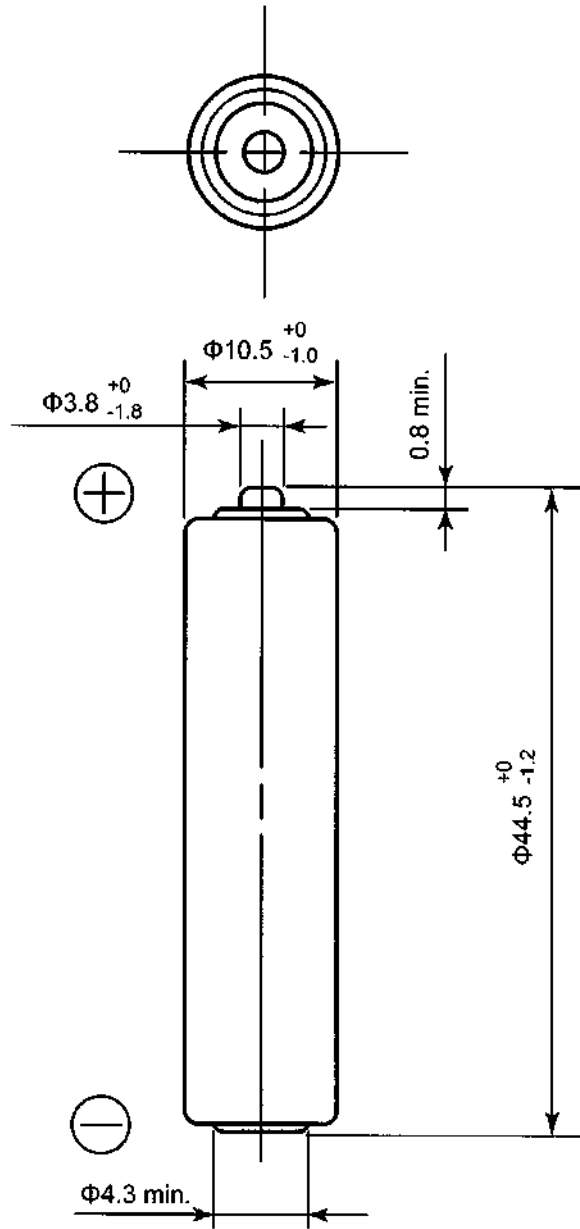

 Christian ear (4 figures)
 Month (2 figures)

[Example 1] 08-2013 : Expiry date of use, August 2013

[Example 2] 12-2013 : Expiry date of use, December 2013

6. Warranty term: 12 months after delivery.

(F i g. 1) BATTERY DIMENSIONS



Unit: mm

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LR6GCL



LR03GCL

P r e c a u t i o n s w h e n u s i n g A l k a l i n e m a n g a n e s e b a t t e r i e s

1. Precautions when designing battery appliances.

If the batteries are improperly used, leakage, heat, explosion, etc. may happen. Pay attention to the following matters at the designing of appliances.

(1) Precautions when designing battery compartment.

- ① The battery compartment should be made so that replacing of batteries is easy, while after loading of batteries easy release should be avoided.
- ② About the battery loading parts of battery compartment, pay attention for instance to the cover fixing method of the battery compartment so that the babies and little children cannot touch or take out batteries easily, to prevent swallowing by babies and little children or their injuries.
Besides, make known to everyone about "Keep batteries out of reach of babies and little children" with operating instructions or other ways.
- ③ When designing the dimensions and shapes of the battery compartment and the contacts, consider the dimensions and the tolerances of the batteries and their \oplus \ominus terminals to prevent contact failure or reverse insertion and to assure the adaptation of batteries put on the market.
The dimensions of the battery compartment should conform to IEC(International standards) and JIS(Japanese industrial standards) are adaptable.
- ④ Indicate clearly on the battery compartment, the type of the battery which suits the apparatus and the correct direction of insertion(polarity).
If the space for indication is not available, indicate them clearly in the operating instruction.
- ⑤ The electric circuit inside the battery compartment should be limited to the circuit connected to battery contacts; except contact section, the circuit should be completely isolated from the other electric circuits.
- ⑥ To minimize the damage of apparatus caused by leakage from the battery, if any, pay attention to the construction and arrangement of the battery compartment such as to detach completely the battery compartment from the mechanism compartment.
- ⑦ The battery compartment should maintain permeability for heat radiated from the compartment and for gas escaped from the batteries.
If complete airtight is unavoidable, pay attention to give a function such as safety vent for gas escape.
- ⑧ When there is a heat source in the apparatus, set the battery compartment away from the heat source, as much as possible.

- ⑨ When choosing the material for the battery compartment, shocks and environment should be considered.

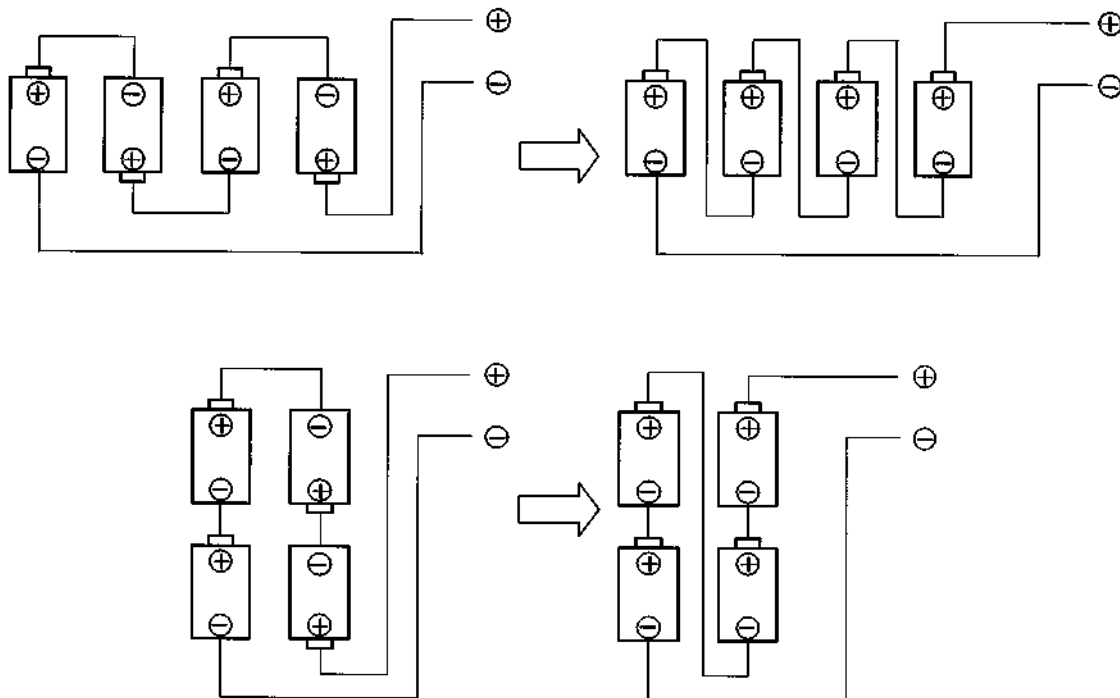
If vibration or shocks can be estimated, take a measure so that the construction of the compartment can absorb it.

- ⑩ Avoid the connection of batteries in serial-parallel or in parallel, as much as possible.

Pay attention especially for serial-parallel or parallel connection because if the arrangement is mistaken, the batteries may continue to discharge or may be recharged even if the switch is off.

In case of series connection, the arrangements of batteries as indicated on reference figure with an arrow are recommended to minimize reverse insertion.

Reference figure series connection of batteries



- ⑪ Pay attention to the material and the shape of the battery contacts so that the electric contact will be perfect even by use of batteries having the dimensions prescribed by JIS.

The material of the contact should be chosen among nickel-plated iron, nickel-plated stainless steel or the like. If an especially low contact resistance is required, adopt gold-plating or the like.

- ⑫ The desirable battery contact pressure of the apparatuses is at minimum 10N (1 kg f) and at maximum 30N (3 kg f).

- ⑬ The circuit in the apparatus should not make electric contact with the batteries except at terminal contact point.

- ⑭ To avoid reverse insertion of batteries, the form of the contact point should make use of the shape difference of $\oplus\ominus$ battery terminals, as much as possible.
- ⑮ When the external substitute electric source is used, the circuit should be designed to avoid charging or forced discharging of batteries.
- ⑯ To ensure the prevention of charging batteries, a protective circuit should be installed.

(2)Precautions at apparatus manufacturing

- ① Do not give ultrasonic vibration to the batteries.
By ultrasonic vibration, the contents of batteries will be finely powdered, which may cause internal short-circuit resulting in leakage, heat or explosion of batteries.
- ② These batteries are allowed to be disposed as general incombustible refuse. However if rules for battery disposal exist, such as regulations of local government, dispose of the batteries in accordance with the rules.
If the batteries are improperly disposed, they may be short-circuited causing leakage, heat or explosion; as a result, injuries or burns may happen. Besides, do not dispose of batteries in fire. If the batteries are put in fire, they will be heated rapidly, which may cause explosion, etc.
- ③ Wipe clean with a cloth or the like the terminals of the apparatus and the batteries before the insertion of the batteries in the apparatus.
If the terminals are soiled, the apparatus may not operate normally due to contact failure.
- ④ To measure voltage of the batteries, use a voltmeter having high internal resistance.
The tolerance of the voltmeter shall be not more than 0.25% of nominal voltage.
Use voltmeter with an input resistance shall be not less than $1M\Omega$.

(3)Precautions against transport, display and storage.

- ① For the storage of batteries, avoid high temperature and high humidity; and to prevent dew condensation choose a well ventilated dry place where the temperature is not so high.
For store the batteries, a place having a normal temperature($20\pm 15^{\circ}\text{C}$), little temperature fluctuation and a relative humidity of 70% and less is required. Storage of the batteries at high temperature or high humidity may increase their performance deterioration or leakage.

② For storage in warehouse or display in shopwindow, keep the batteries away from long duration direct sunlight and from rain water.

The exposition of the batteries to high temperature may increase their deterioration or induce leakage.

Besides, if the batteries get wet, the insulation will decrease and rust gathering or leakage will occur more easily.

Besides, batteries stocked by families are increasing; in this case, the matters that require attention are as mentioned above.

③ Avoid rough handling during transport.

Rough handling may cause dent or deformation, which can bring decrease of performance or leakage.

Moreover, the battery compartment may be damaged, causing the batteries in disorder; if $\oplus\ominus$ are short-circuited the batteries may be damaged by heating, and moreover leakage, explosion, fire, etc. may happen.

④ When piling up the outer packages of batteries, the number of tiers should be limited to the amount indicated on the outer-package.

If the packages are excessively piled up, the batteries in the lower layer may be deformed or leakage may be accelerated.

⑤ As for the distribution, such as transport, display, storage and others, observe strictly the first-in, first-out method and pay attention to avoid long-term stock.

The batteries have enough storage property at normal temperature and humidity conditions(normal temperature: $20\pm 15^{\circ}\text{C}$, relative humidity: 70% and less); however since the long-term stock may deteriorate their performance, observe strictly the appropriate volume of inventories and the first-in, first-out method.

2. Warning notices to the customers regarding battery handling.

For the correct use of batteries when the apparatuses are used by the customers, the operating instructions of the apparatuses should contain the following warning statement regarding batteries.

(Warning notices regarding battery handling, to be contained in the operating instructions of the apparatuses)

○If the batteries are improperly used, they may leak, heat or explode, bringing about injury or device failure.

Therefore observe strictly the following matters.

! DANGER

If the alkaline solution of the batteries touches the eyes, injury such as loss of eyesight may be caused.

Do not rub the eyes, but flush the eyes amply with abundant clean water such as city water and then receive medical treatment without delay.

! WARNING

- ① Keep batteries out of reach of babies and little children.

If by any chance, the batteries are swallowed, consult the doctor without delay. ... (An object of indication: LR03-LR1)

- ② Do not incinerate, heat, disassemble or remodel the batteries.

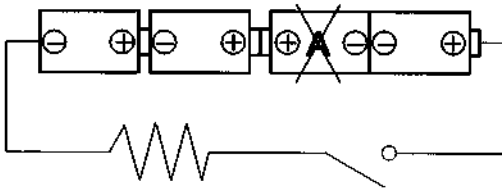
The insulator and the vent for gas escape and so on will be damaged, and the batteries may leak, heat or explode.

- ③ Do not insert batteries in reverse polarity.

By charging, short-circuiting or the like, the batteries may show abnormal reactions, and may leak, heat or explode.

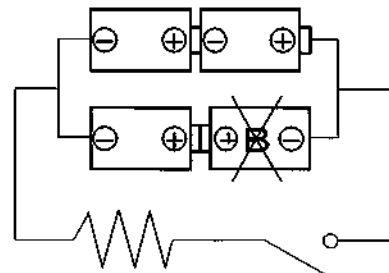
Reference figure 1

Wrong series connection of batteries



Reference figure 2

Wrong serial-parallel connection of batteries



- ④ If the alkaline solution of the batteries is licked, rinse out the mouth and consult the doctor without delay.

- ⑤ If the alkaline solution of the batteries adheres to skin or clothes, skin injury may be caused. Wash liquid away immediately with abundant clean water such as city water.

- ⑥ Do not connect $\oplus\ominus$ of the batteries with wire and do not carry or keep metallic necklace, hairpin, etc. together with batteries.

The batteries may be short-circuited, causing over-current and they may leak, heat or explode.

- ⑦ Do not mix and use "different types or brands of batteries" nor "used and new batteries" together.

The difference of characteristics may cause leakage, heat or explosion.

- ⑧ These batteries are not designed to be recharged.

If recharged, the insulator or the inside structure may be damaged, and the batteries may leak, heat or explode.

- ⑨ Remove promptly the used batteries from the apparatus.

If the used batteries are left in the apparatus, connected for long, gas will be formed in the batteries, which may cause battery leakage, heat or explosion and may cause damage of apparatus.

- ⑩ When not using the apparatus for a long period, remove the batteries from the apparatus.

Gas formed in the batteries may cause battery leakage or may damage the apparatus.

 **CAUTION**

- ① Do not peel off or damage the outer label of the batteries.

The batteries may be short-circuited, they may leak, heat or explode.

- ② Do not expose batteries to strong impact by dropping or throwing the batteries. The batteries may leak, heat or explode.

- ③ Do not deform the batteries.

The insulator and the vent for gas escape, etc. may be damaged and the batteries may leak, heat or explode.

- ④ When using the batteries in complete airtight apparatus, follow the indications of the operating instructions of the apparatus.

- ⑤ Do not solder anything directly to the batteries.

The insulator and the vent for gas escape, etc. may be damaged by heat and the batteries may leak, heat or explode.

- ⑥ Do not use nor keep batteries at places exposed to strong direct sunlight or in cars under burning sun, etc. The batteries may leak, heat or explode.

- ⑦ At the storage or disposal of the batteries, insulate the terminal parts with tape or the like.

If the batteries are mixed with other batteries or metallic objects, the batteries may be short-circuited, and may leak, heat or explode.

- ⑧ Keep the batteries away from water. The batteries may heat.
- ⑨ The specification or the performance of the batteries may be sometimes not appropriate, depending on applications or apparatus; use correctly the appropriate batteries in accordance with the operating instructions and notices of the apparatus.
- ⑩ At the storage of batteries, avoid direct sunlight, high temperature and high humidity places. Leakage may happen. Beside, the performance and the life of the batteries may decrease.
- ⑪ These batteries are allowed to be disposed as general incombustible refuse. However if rules for battery disposal exist, such as regulations of local government, dispose of the batteries in accordance with the rules.
- ⑫ Do not forget to turn off the switch of the apparatus.
- ⑬ To keep the batteries taken out from packages, or to stock the batteries by families, pay attention to avoid contact between batteries and to keep out of short-circuit.

Technical Data for Alkaline Dry Battery

Type: LR03 GCL
<Made in China>

2011/04/08

TOSHIBA HOME APPLIANCES CORPORATION
Battery Business Div.

Ratings

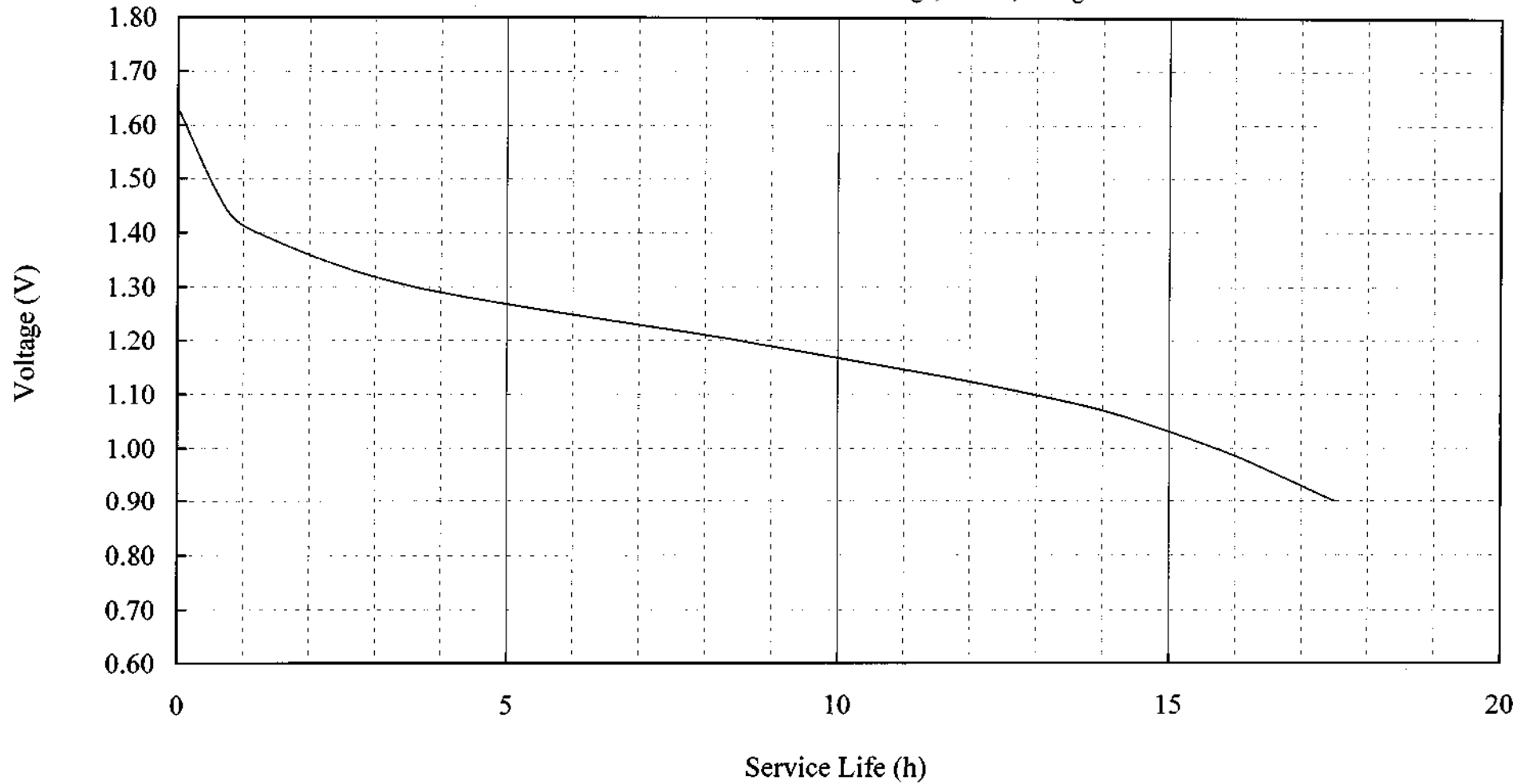
Battery system		Alkaline Dry Battery	
Item			
Battery type	LR03 GCL		
Nominal Voltage	1.5V		
Standard Capacity (Service Life)	Discharge condition	Service Life	
	(1) 20Ω Continuous (End-Voltage:0.9V)	:	17.5 hours.
	(2) 10Ω 1h/day (End-Voltage:0.9V)	:	8.0 hours.
	(3) 75Ω 4h/Day (End-Voltage:0.9V)	:	70.0 hours.
Standard Weight	11.4 g		
Terminals	Cap Terminals	Fe + Ni plate	
	Base Terminals	Fe + Ni plate	
Outer dimensions	Overall height	44.5(0/-1.2)mm	
	Diameter	φ10.5(0/-1.0)mm	
Usable temperature range		-10 ~ 45deg.C	

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LR03 Discharge Characteristics

Test condition : 20Ω cotinuous discharge, Initial, 20deg.C

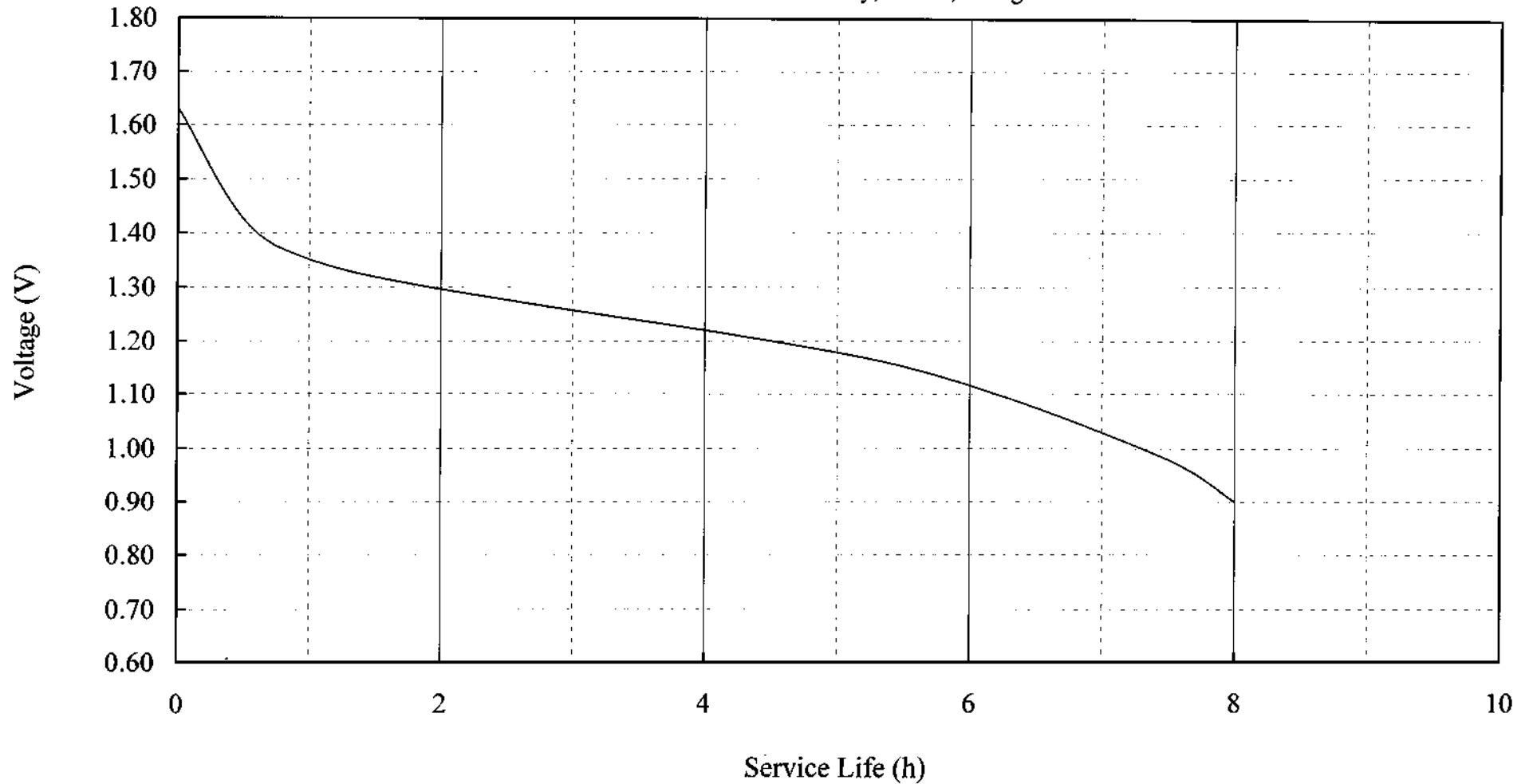


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Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR03 Discharge Characteristics

Test condition : 10Ω 1h/Day, Initial, 20deg.C

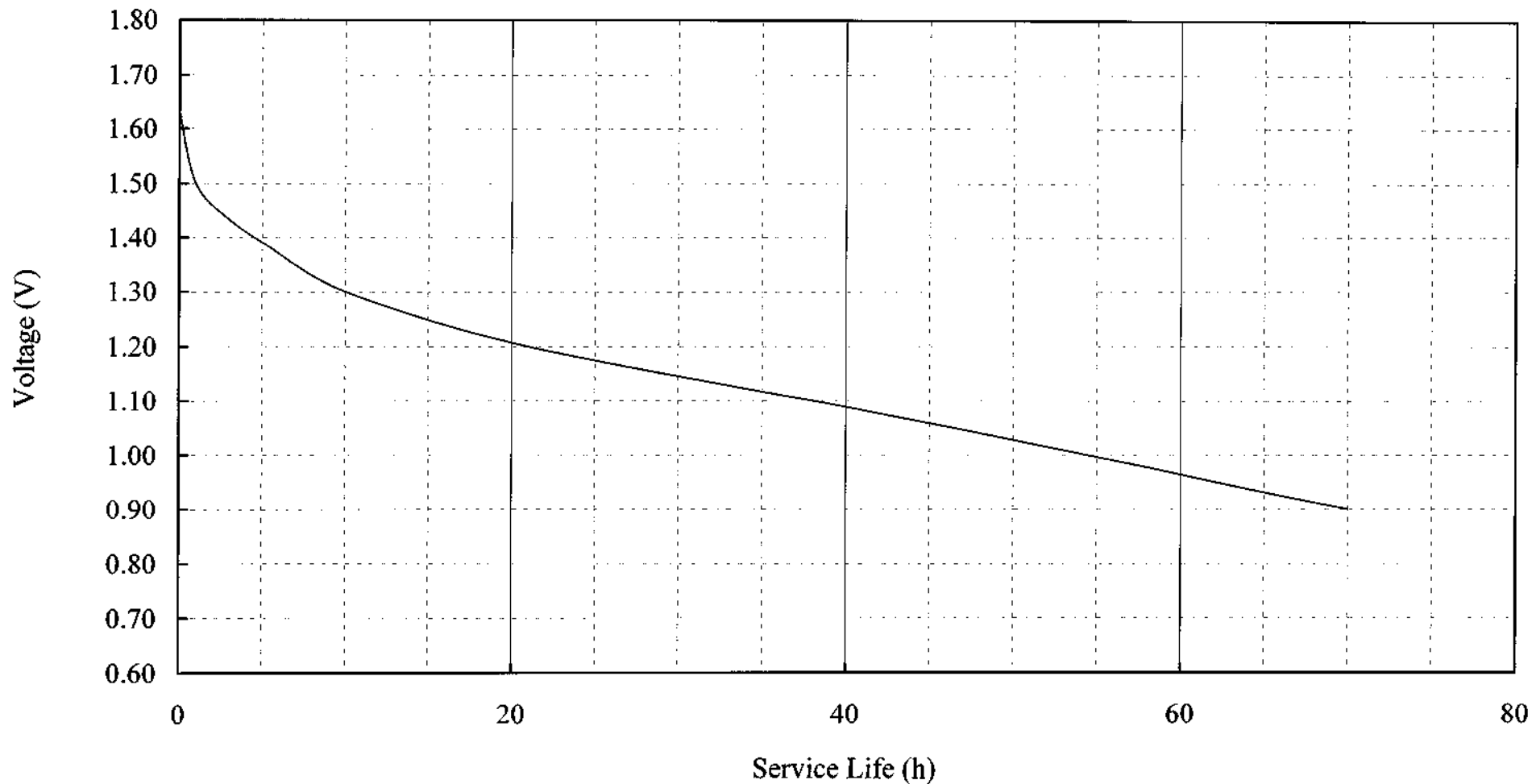


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Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR03 Discharge Characteristics

Test condition : 75Ω 4h/Day, Initial, 20deg.C

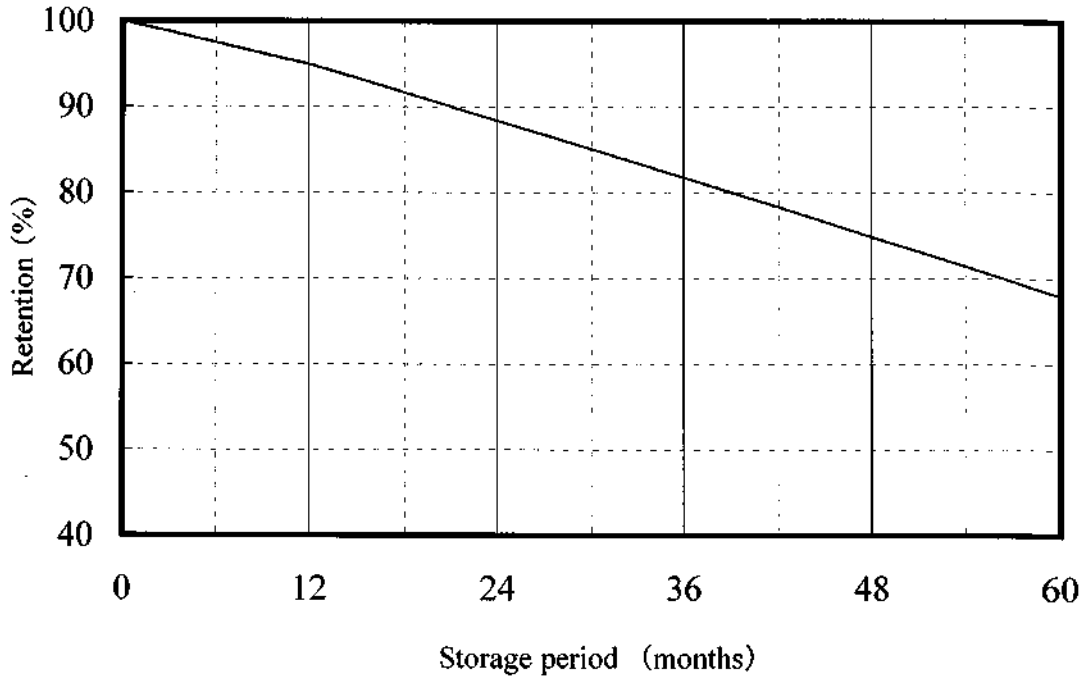


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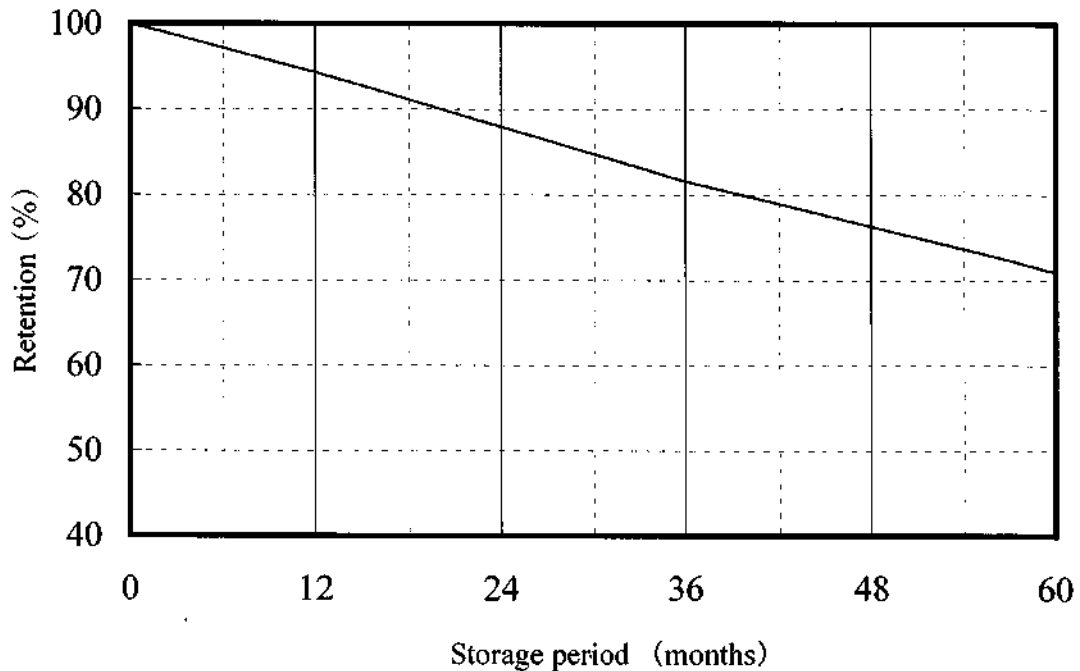
Proprietary materials of TOSHIBA HOME APPLIANCES CORPORATION

LR03 Storage Characteristics

[①Discharge condition: 10Ω 1h/Day End-voltage 0.9V]



[②Discharge condition: 75Ω 4h/Day End-voltage 0.9V]



- [Note] 1. Discharge temperature, relative humidity: 20±2°C, (65±20)%RH
2. Storage temperature, relative humidity: 20±2°C, (65±20)%RH
3. Retention: Self-discharge rate

This is only for reference.(not guaranteed.) This information contained herein may be changed without prior notice.

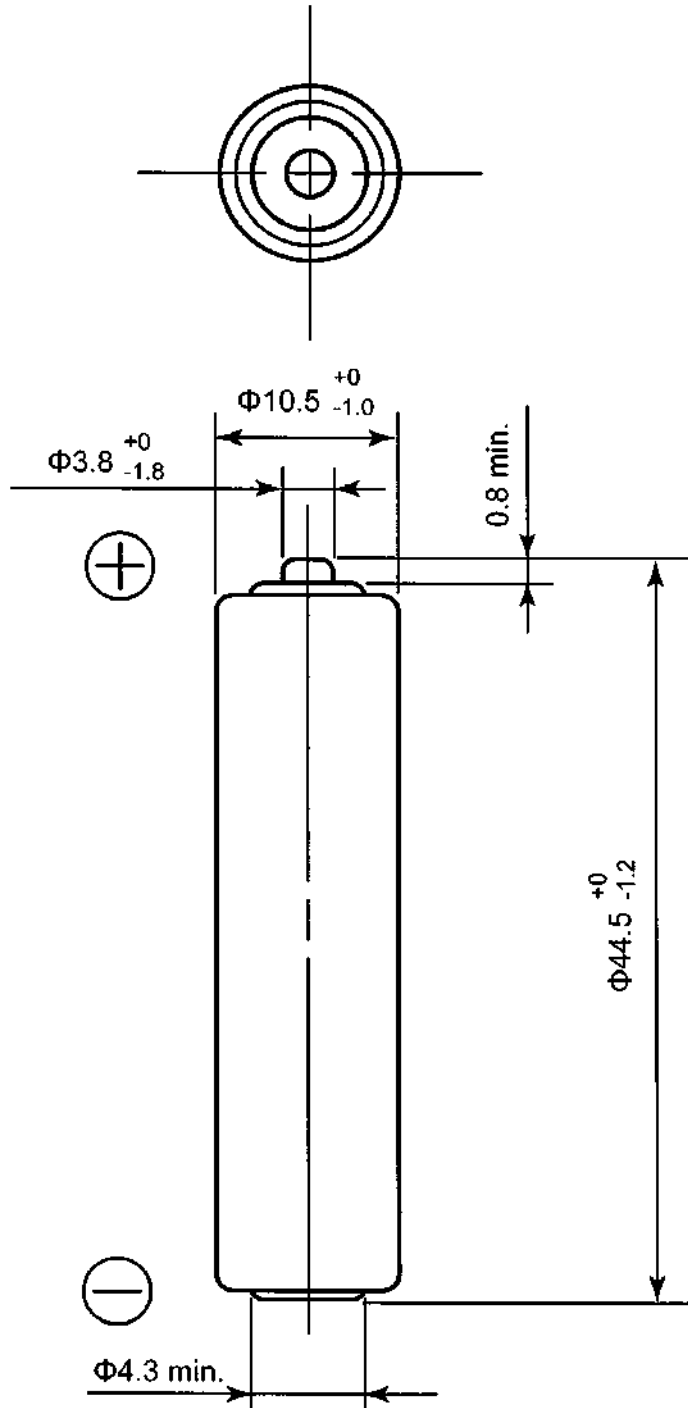
LR03 Leakage Performance

Test items		Electrolyte Leakage (%)						
		Storage period	20days	40days	60days	90days	1year	2year
Test condition								
Room condition	Room temperature	0	0	0	0	0	0	0
Storage at high temperature and high humidity	45deg.C-70%RH	0	0	0	-	-	-	-
	60deg.C-90%RH	0	0	-	-	-	-	-

This is only for reference.(not guaranteed.) This information contained herein may be changed without prior notice.

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LR03 Battery Dimensions



Unit: mm
Terminals: Positive-cap terminal
 Negative-base terminal
Outer shell: Shrink-label

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