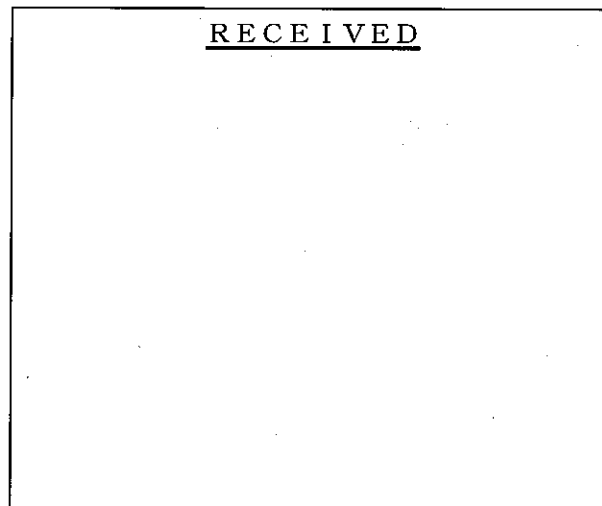


SPECIFICATION FOR
CARBON ZINC BATTERY (T)
Type: R03KG (JE) [TOSHIBA Brand]



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TOSHIBA LIFESTYLE PRODUCTS & SERVICES CORPORATIN

G. Manager	Manager	Issued by

PRODUCT SPECIFICATION

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

Carbon zinc battery **R 0 3 K G (J E)**

2. Ratings:

2.1 Battery type: **R 0 3 K G (J E)** [R03KG(JE) confirms IEC/JIS standard.]

2.2 Nominal voltage: 1.5V

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

2.4 Standard weight: 8.4 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)

Items		Requirements		Conditions
Electrical characteristics	Open-circuit voltage (V)	Initial	1.600 ~ 1.730	DC voltmeter: The tolerances shall be not more than 0.25% of nominal voltage and the input resistance shall be not less than 1M Ω .
		After 12 months	1.500 ~ 1.730	
	Closed-circuit voltage (V)	Initial	1.500 or higher	Load resistance of 15 Ω $\pm$ 0.5% shall be connected and the voltage shall be measured with the above voltmeter 0.8 second after the circuit is closed.
		After 12 months	1.400 or higher	
Minimum average duration	15-ohm continuous discharge (min.)	Initial	190 or longer	Load resistance: 15 Ω $\pm$ 0.5% Discharge time: 24 hours/day End-point voltage: 0.9V
		After 12 months	170 or longer	
	10-ohm intermittent discharge (h)	Initial	1.5 or longer	Load resistance: 10 Ω $\pm$ 0.5% Discharge time: 1 hour/day End-point voltage: 0.9V
		After 12 months	1.2 or longer	

Items		Requirements		Conditions
Minimum average duration	5.1-ohm intermittent discharge (min.)	Initial	50 or longer	Load resistance: $5.1\Omega \pm 0.5\%$
		After 12 months	40 or longer	Discharge time: 1 hour/day End-point voltage: 0.9V
	24-ohm intermittent discharge (h)	Initial	4.0 or longer	Load resistance: $24\Omega \pm 0.5\%$
		After 12 months	3.2 or longer	Discharge time: (15s/min)- 8h/day End-point voltage: 1.0V
	75-ohm intermittent discharge (h)	Initial	20.0 or longer	Load resistance: $75\Omega \pm 0.5\%$
		After 12 months	16.0 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: $15\Omega \pm 0.5\%$ 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 :

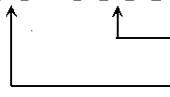
Marking shall be as shown in Fig. 2, Battery Label.

5. Expiry date of use :

The expiry date shall be 24 months after the manufacturing date.

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

○ ○ - ○ ○ ○ ○


 Christian era (4 figures)
 Month (2 figures)

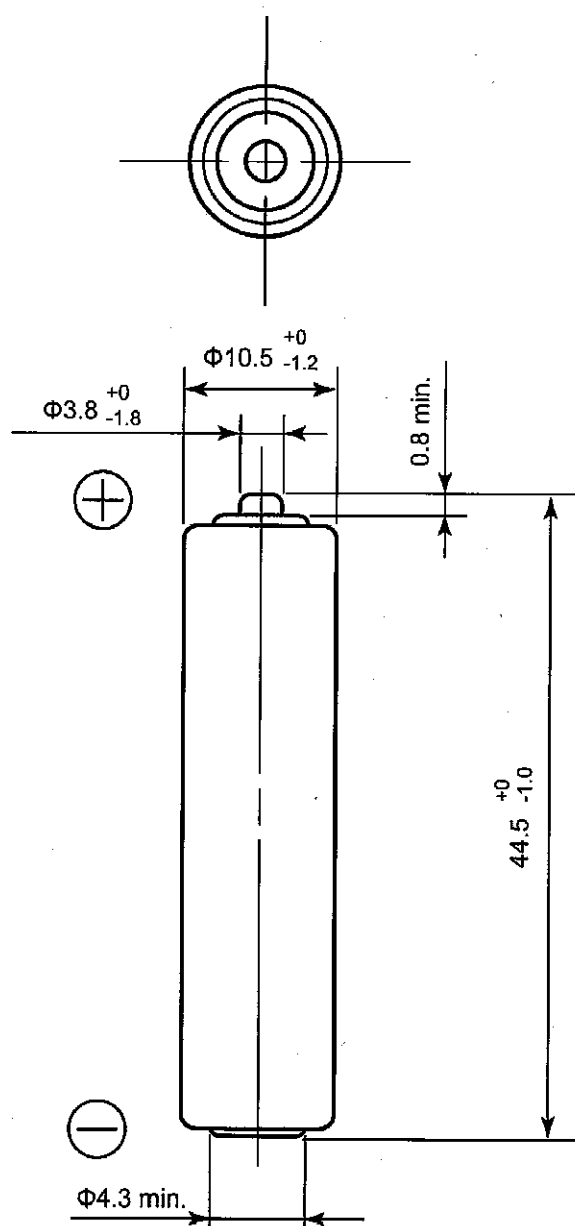
[Example 1] 06-2013: Expiry date of use, June 2013

[Example 2] 12-2015: Expiry date of use, December 2015

6. Warranty term:

The warranty term shall be 12 months after delivery.

(Fig. 1) BATTERY DIMENSIONS



Unit: millimeters

Terminal: Positive-cap terminal

Negative-base terminal

Outer shell: Shrinkable Tube

(Fig. 2) BATTERY LABEL



Precautions When Using Carbon Zinc Batteries

1. Precautions when designing battery appliances.

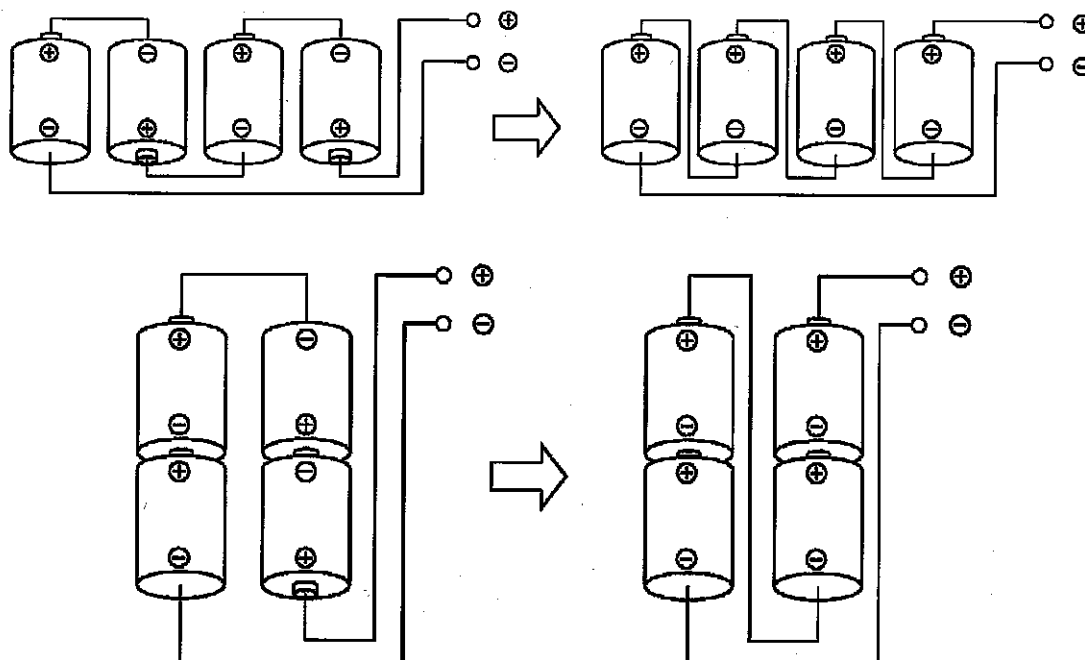
If the batteries are improperly used, leakage, heat, explosion, etc. may happen.

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.
- 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(1kgf) and at maximum 30N(3kgf).
- 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 To dispose of the batteries, bring the batteries to the store or supplier where they were purchased.
Put the batteries in the "Button batteries collecting boxes" which are kept in each store.
At the storage or disposal of the batteries, insulate the terminal parts with tape or the like.
If the batteries are mixed up together or mixed with other metallic objects, the batteries may be short-circuited and may leak, heat or explode.
As a result, injury or fire may happen. Besides, do not dispose of batteries in fire. If the batteries are put in fire, they may explode by rapid heating.

- 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 $1\text{M}\Omega$

(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, the temperature should be between 10°C and 25°C and never exceed 30°C . Extremes of humidity (over 95% and below 40% relative humidity) for sustained periods should be avoided. 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 shop window, 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 (temperature: $10^{\circ}\text{C}\sim 25^{\circ}\text{C}$, relative humidity: 40~95%); 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.



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



- 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: R03 · R1)

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

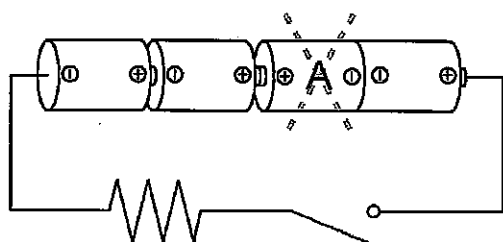
The insulator and the vent for gas escape and so on will be damaged, and the batteries may leak, heat or explode.

- ③ Do not insert batteries in reserve polarity.

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

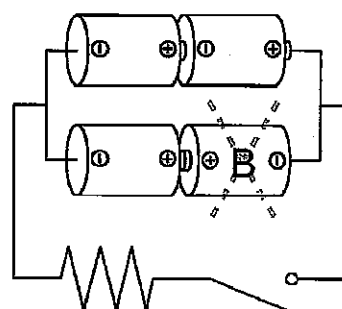
(Reference figure 1)

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.