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TECHNICAL SPECIFICATION

Lithium Manganese Dioxide Battery

Model: CR2032

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Edit Record

Edition	Editor	Edit page	Established Date	Edit Cause
A	Zhen Xuehong	All	2005.06.18	First edition
A1	Xie Yuanchao	All	2008.09.10	Format changed
B	Liao Hai	—	2010.05.01	Logo changed
C	Long Peiying	All	2014.09.09	1) Format changed 2) For the chapter 9 Incoming inspection, add the table 1 and table 2; 3) Add chapter 11 and 12 content.
A	Li Sihan	—	2015.12.15	Nominal capacity and fast discharge duration changed
B	Diao xiulan	—	2018.08.13	1) Note of 2-8 changed; 2) 4.3.10 changed, batteries meet the weight loss requirement of UL1642. 3) 6.3 Mark changed; 4) For the chapter 7 Incoming inspection, the AQL of table 1 changed. 5) Logo changed.
C	Wang Qian	Page 3	2019.09.12	Change the number of digits after the decimal point of OCV and CCV in article 3 to 3 digits.

1. Scope

The document applies to CR2032 (Li/MnO₂) battery supplied by EVE Energy Co., Ltd. Specify quality, test method, performance, quality assurance and matters need attention etc..

2. Nominal specification

2-1 Model	CR2032
2-2 Nominal Voltage	3.0 V
2-3 Normal Capacity	225mAh (15KΩ to cut-off voltage 2.0V at 20±3°C)
2-4 Maximum Continuous Discharge Current	3mA
2-5 Dimensions	See the attaching drawing
2-6 Approx. Weight	3.2g
2-7 Appearance	No noticeable deformation
2-8 Temperature	Operating: -20~70°C (Note: Consult EVE when using batteries at temperatures exceeding the -10°C to +60°C range)
2-9 Recommendable Storage Condition	Temperature: 5°C~35°C Humidity: Less than 70%RH
2-10 Battery Composition	Lithium primary battery composed of cathode from manganese dioxide, anode from lithium, and electrolyte from organic solvent and lithium salt.

3. Battery characteristics

NO.	Item	Test method	Test temperature	Initial Value
3-1	Open circuit voltage	Voltage between two terminals (min.)	20°C±3°C	3.100V
3-2	Internal resistance	1 kHz sine wave method (max.)	20°C±3°C	25Ω
3-3	Load voltage	15kΩ, during 2s(Min.)	20°C±3°C	2.800V
3-4	Nominal capacity	15kΩ Continuous discharge to 2.0V	20°C±3°C	990h
	Fast discharge duration	1kΩ Continuous discharge to 2.0V		50h

4. Test

4.1 Test condition

The test normal condition is as follow (unless otherwise specified)

Temperature: $20\pm3^{\circ}\text{C}$, Relative Humidity: $65\pm10\%$, Pressure: 1.0atm.

4.2 Test Instrument

- 4.2.1 Dimension measurement: Caliper with accuracy of $\pm0.02\text{mm}$, or other gauges with the same accuracy.
- 4.2.2 Voltmeter: The tolerance shall be $\pm0.010\text{V}$ and the input resistance rating shall be $10\text{M}\Omega$ or more.
- 4.2.3 Exactitude resistance: accuracy of $\pm0.5\%$.
- 4.2.4 Resistance meter: accuracy of $\pm0.5\%$.
- 4.2.5 Constant temperature oven: accuracy of $\pm2^{\circ}\text{C}$.
- 4.2.6 Electronic scale: tolerance shall be $\pm0.01\text{g}$.

4.3 Initial test

Batteries should be tested in the first 1 month after delivery.

4.3.1 Outside dimensions

The gauge as specified in 4.2 is used. The result should meet the requirement of 2-5.

4.3.2 Weight

The gauge as specified in 4.2 is used. The result should meet the requirement of 2-6.

4.3.3 Open circuit voltage

Batteries should be stored for 24 hours at the normal conditions. Then at the same circumstance use voltmeter, specified in 4.2 to measure voltage between "+" and "-". Results should meet the requirement of 3-1.

4.3.4 Internal resistance

Measure the internal resistance with the resistance meter specified in 4.2 after keeping the battery for 2 hours at least in measurement environment. Internal resistance should meet the requirement of 3-2.

4.3.5 Load voltage

Batteries should be stored for 12 hours at the normal conditions. Then at the same circumstance,

parallel connect voltmeter and 15kΩ resistance specified in 4.2 to measure voltage between "+" and"-". Result should meet the requirement of 3-3.

4.3.6 Nominal capacity

Batteries should be stored for not less than 24 hours at the normal conditions. Then at the same circumstance continually discharge at 15kΩ resistance specified in 4.2 to cut-off voltage 2.0V. Results should meet the requirement of 3-4.

4.3.7 Fast discharge duration

Batteries should be stored for not less than 24 hours at the normal conditions. Then at the same circumstance continually discharge at 1kΩ resistance specified in 4.2 to cut-off voltage 2.0V. Results should meet the requirement of 3-4.

4.3.8 Appearance

No scathe, no crackle, no rust, no dirty spots or leakage, mark clear.

4.3.9 Terminal

Good conduction performance, no deformation

4.3.10 Temperature cycling test

The batteries are to be placed in a test chamber and subjected to the following cycles: raising the chamber temperature to $70 \pm 3^\circ\text{C}$ within 30min and maintaining for 4h, then reducing the chamber temperature to $20 \pm 3^\circ\text{C}$ and maintaining for 2h, then reducing to $-40 \pm 3^\circ\text{C}$ and keep it for 4h, at last, raising to $20 \pm 3^\circ\text{C}$ with 30min. Repeat the sequence for a further 10 cycles. Batteries meet the weight loss requirement of UL1642.

5. Safety

UL1642 recognized component: file No.MH28717.

6. Mark

6.1 Battery type : CR2032

6.2 Battery brand name: EVE

6.3 Mark: "YM" stand for "year" and "month", 1~9 stand for January to September, 0,Y,Z stand for October, November and December (Note: When the customer required.)

6.4 Polarity: +

7. Incoming inspection

Before shipping, EVE will 100% check open circuit voltage of the battery (OCV) and the load voltage.

Also EVE will sampling tests the battery capacity, visual appearance and size.

As for the customer's incoming inspection, EVE recommended sampling according to GB2828.1-2012, GB2829-2002 standard.

Table 1 Acceptability quality level

No	Item	Technical request	Check level	AQL
1	Dimension	2-6	II	1.0
2	Appearance	2-8	II	1.0
3	Open circuit voltage	3-1	II	0.65

Table 2 Sampling amount

Lot size	sampling amount
≤3200	32
3200~10 000	50
>10 000	80

8. Package

The batteries are packed as the agreement of the customer and supplier. The box should have the eligible identifiers and QC PASS mark.

9. Transportation

The battery out of factory is full of electric power, so avoid fierce shake, strike and squeeze. Avoid the direct sunshine and raining.

10. Warnings and Cautions

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

- Do not short circuit, charge or make the anode and the cathode reversed.
- Do not force-discharge, squeeze, puncture or burn the battery.

- Do not dissemble the battery.
- The battery should be taken off from instrument when it is consumed to cut-off voltage, and dispose according to local laws, or hand it to professional recycle institution.
- Do not mix different types of batteries.
- Do not expose the battery in the environment of over 85°C.
- Do not solder directly onto battery, please use wire or nickel sheet by spot welding.
- Store the battery by original pack to avoid any possibility of external short circuit.
- Do not store the battery in ESD bag and foam.
- Do not store battery in electric metal surface.
- Do not stack or jumble batteries.
- Do not pack battery connected with any kinds of lead random in paper box or pack belt.
- Batteries shall be far away from children, and take measures to prevent the swallow as much as possible.

11. Modification of this specification

Modification must be carried out after the prior mutual agreement. All accident or issues caused by any events that are neither defined nor described in this specification, mutual discussion shall take place for the resolution.

12. Important notes

- 1) The batteries are warranted to conform to the description contained in this specification for a period of twelve [12] months from the ex-factory date without use, any claim by customer (apparatus manufacturer or distributor) must be pointed out within such period. During that warranty period, if the batteries are proved to become defective under proper stored and handled, EVE will replace the batteries for free.
- 2) Customers are responsible to confirm and assure the matching and reliability of batteries under actual application.
- 3) EVE shall not warrant or be responsible in any case where customers fail to carry out proper handling, operating, installation, testing and maintaining batteries, or don't follow the instruction, cautions, warnings, notes provided in this specification and other EVE's reasonable instructions or advises.
- 4) This product specification will be validated assuming that it is accepted when it is not returned within

six months from the date of issue.

Fig1. Structure of CR2032

- (1) gasket (2) negative cap (3) Lithium anode
(4) positive can (5) MnO₂ cathode (6) separator

