



## FOR MANGANESE DIOXIDE LITHIUM BATTERY

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CHUNG PAK

( DATE : AUG 2006 )



## Manganese Dioxide Lithium Battery CR2032

### 1 、 Scope

This specification is applicable to the “ VINNIC” brand Coin Type Manganese Dioxide Lithium Battery CR2032 supplied by CHUNG PAK BATTERY WORKS LTD.

### 2 、 Technology Parameters

2.1 Model No.: CR2032

2.2 Nominal Voltage: 3.0V

2.3 Dimension :

Height (H)  $3.2^{+0}_{-0.20}$  mm

Diameter ( $\phi$ )  $20.0^{+0}_{-0.20}$  mm

2.4 Nominal weight: 2.9 g

2.5 Nominal capacity: 210 mAh (Continuously discharged under 15K $\Omega$  load till 2.0 V end voltage at temperature of  $20 \pm 2^{\circ}\text{C}$ .)

2.6 Standard discharge current: 0.2 mA

2.7 Typical discharge duration: 1000 hrs (Continuously discharged under 15K $\Omega$  load till 2.0 V end voltage at temperature of  $20 \pm 2^{\circ}\text{C}$ .)

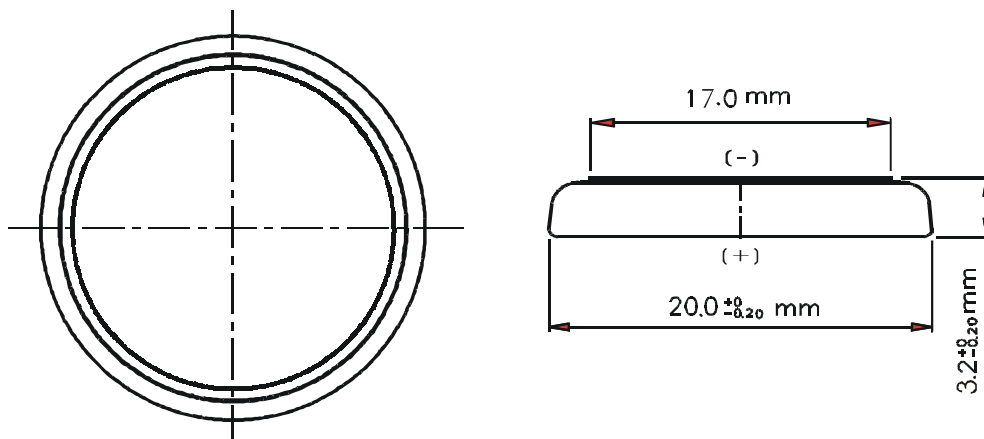
2.8 Usable temperature rang:  $0^{\circ}\text{C} \sim 60^{\circ}\text{C}$

2.9 Storage conditions:

Temperature range:  $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$

Relative humidity range: 45%~85%

2.10 Outline shape dimensions and terminals:





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### 3 Performance

#### 3.1 Off-load voltage & On-load voltage

Test items	Temperature	Characteristics		Remarks
		Initial	After 12 months	
Off-load voltage	20±2℃	3.13V~3.50V	3.10V~3.40V	Off-load
	0±2℃	3.05V~3.50V	3.05V~3.40V	
On-load voltage	20±2℃	3.00V~3.35V	3.00V~3.35V	15KΩ load after 0.8sec.
	0±2℃	3.00V~3.35V	3.00V~3.35V	

#### 3.2 Service output

Test items	Temperature	Characteristics		Remarks
Service life	20±2℃	Standard	1000 hrs	Continuously discharged at 20±2℃ under 15KΩ till 2.0V.
		Min value	850 hrs	
	0±2℃	Standard	850 hrs	
		Min value	750 hrs	

#### 3.3 Self-discharge characteristic

Test items	Temperature	Storage period	Characteristics		Remarks
Thermal durability	60±2℃	20 Days	Standard	930 hrs	Continuously discharged at 20±2℃ under 15KΩ till 2.0V.
			Min value	750 hrs	
Self-discharge	20±2℃	12 Months	Less than 5%		

#### 3.4 Resistance to leakage

Test items	Condition	Storage period	Requirement	Remarks
High temp.	60±2℃	30 Days	No leakage	After storage, the battery should be kept at 20±2℃ for 8hrs. (shall be inspected by visual means)
High humidity	60±2℃ 93%RH	30 Days		
Overdischarge	20±2℃	/	No leakage, no deformation	Continuously discharged under 15KΩ till 1.2V.



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### 3.5 External short circuit

The test batteries shall be stabilized at  $55\pm 2^{\circ}\text{C}$  and then subjected to a short-circuit condition with a total external resistance of less than  $0.1\Omega$  at  $55\pm 2^{\circ}\text{C}$ . This short condition is continued for at least 1 hrs after the battery case temperature has returned to  $55\pm 2^{\circ}\text{C}$ .

There is no explosion, no fire.

## 4 、 *Brand and packaging*

Both OEM and ODM orders are welcome. Any specific design and packing requirements will be accommodated as required.

## 5 、 *Testing*

### 5.1 Initial test

Means the test begin in three months or less after production.

### 5.2 Test conditions for Samples

Unless otherwise specified, the test conditions for samples shall be, as a general rule, at the temperature of  $20\pm 2^{\circ}\text{C}$  and the relative humidity of  $65\pm 20\%$ .

### 5.3 Measuring instruments

5.3.1 Voltmeter : The accuracy of the voltmeter shall be within 0.005V for each 1.5V. The resistance of the measuring instrument shall be at least 10 times the discharge resistance but with a minimum of 1 M ohms per volt of the scale.

5.3.2 Load resistance : The load resistance shall include all of the external circuit, and its allowance shall be within  $\pm 0.5\%$ .

5.3.3 Caliper : The caliper shall be the one having precision of 0.02mm or the one having the same or superior precision to this.

5.3.4 Electrical drying box: Tolerance shall be  $\pm 2^{\circ}\text{C}$  or below.

### 5.4 Test methods

#### 5.4.1 Dimensions :

Dimension shall be measured with instruments specified in subparagraph 5.3.3 above, provided that either one or both side of such instruments shall be insulated in measuring the overall height of the batteries.

5.4.2 Appearance : Examination shall be carried out by visual inspection .



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### 5.4.3 Off-load Voltage :

The specimen batteries shall be kept for 8 hours or longer at the ambient temperature specified in 5.2, and then the voltage between both terminals shall be measured at the same ambient temperature with a voltmeter as specified in subparagraph 5.3.1.

### 5.4.4 On-load voltage :

The specimen batteries shall be kept for 8 hours or longer at the ambient temperature specified in 5.2, and then the voltage between both terminals shall be measured with a voltmeter as specified in subparagraph 5.3.1 while the specified load is connected between both terminals at the same ambient temperature as specified above; provided that the measured value shall be based on meter reading taken 0.8 seconds after the circuit is closed.

### 5.5.5 Service life :

Test specimen batteries shall be kept for 8 hours or longer at the ambient temperature specified in 5.2, and shall then be continuously discharged at same ambient temperature and through the specified load resistance. The discharge shall be continued until the terminal voltage of 2.0V, and the time during which the terminal voltage has been maintained equal to and above the discharge end-point voltage shall be taken as the service life.

### 5.5.6 Service life after high-temperature storage :

Test specimen batteries, after having been stored at the temperature and period specified in 3.3, shall be kept for 12 hours or longer at ordinary temperature ( $20\pm 2^{\circ}\text{C}$ ) and at ordinary humidity ( $65\pm 20\%\text{RH}$ ) and shall then be continuously discharged through the load resistance  $15\text{K}\Omega$  at ambient temperature of  $20\pm 2^{\circ}\text{C}$ . The discharge shall be continued until the voltage falls below the discharge end-point voltage of 2.0V, and the time during which the voltage has been maintained equal to and above the discharge end-point voltage shall be taken as the service life.

### 5.5.7 Self-discharge :

Test specimen batteries which have been stored for 12 months at the ambient temperature of  $20\pm 2^{\circ}\text{C}$  and at the relative humidity of  $65\pm 5\%$  shall be tested for service life in accordance with the method specified in subparagraph 5.5.5.

Self discharge shall be determined in the following manner:

$$\text{Self-discharge rate(\%)} = \frac{X_1 - X_2}{X_1} \times 100\%$$

$X_1$ : Average initial discharge life of batteries of the same lot.

$X_2$ : Average discharge life after storage



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### 6. Safety instructions

Warning	Danger
Don't throw the batteries into fire or heat the batteries	This may cause the batteries to ignite or disrupt
Don't directly solder the batteries	This may damage their insulating tapes and protective installation
Don't use the batteries with the $\oplus$ and the $\ominus$ electrode inverse	This can damage the batteries for being over-charged or over-discharged, even may cause leakage, heat generation, disrupt, or ignition
Don't expose the batteries to water	This can cause heat generation or rust
Don't charge batteries	This may result in venting, leakage, explosion and/or possibly fire
Don't disassemble or damage the external tubes of the batteries or modify the batteries (stack-up batteries) etc.	This easily results in short-circuit, leakage, even ignition
Immediately stop using the batteries if leakage, discolor or etc. with them are detected	This may cause accidents to occur
Don't drop or strongly strike the batteries	This may result in leakage, heat generation, disrupt, even ignition
Be sure to use the batteries within a temperature range from 0°C to 40°C	Charge the batteries beyond the temperature range may cause leakage, heat, generation, impaired performance, and shortening of service life of the batteries
Don't use old batteries with new ones	This may cause short-circuit or heat generation
Don't use our batteries with any other type or brand of batteries	Mixed-matching of batteries may result in leakage, heat generation and bursting
Keep the batteries out of the reach of children	To avoid being swallowed. If swallowed, please see doctor immediately



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### *Appendix: Discharge Characteristics*

