

TECHNICAL INFORMATION

Manganese Dioxide Lithium Primary Battery

CR2/3 6·L

FDK CORPORATION

FDK ENERGY CO., LTD.

The data in this document are for descriptive purposes only and are not intended to make or imply any guarantee or warranty.

1. Service out-put (Load characteristics)

Continuous discharge, E.P.V. = 2.0V Temp. : $20 \pm 2^\circ\text{C}$

Load	
1k Ω	3k Ω
450 hours	1200 hours

Average of 5 batteries

2. Service out-put (Temperature characteristics)

1k Ω continuous discharge, E.P.V. = 2.0V

Temperature		
-20 $^\circ\text{C}$	20 $^\circ\text{C}$	60 $^\circ\text{C}$
400 hours	450 hours	435 hours

Average of 5 batteries

3. Storage characteristics at high temperature (70 $^\circ\text{C}$, ordinary humidity)

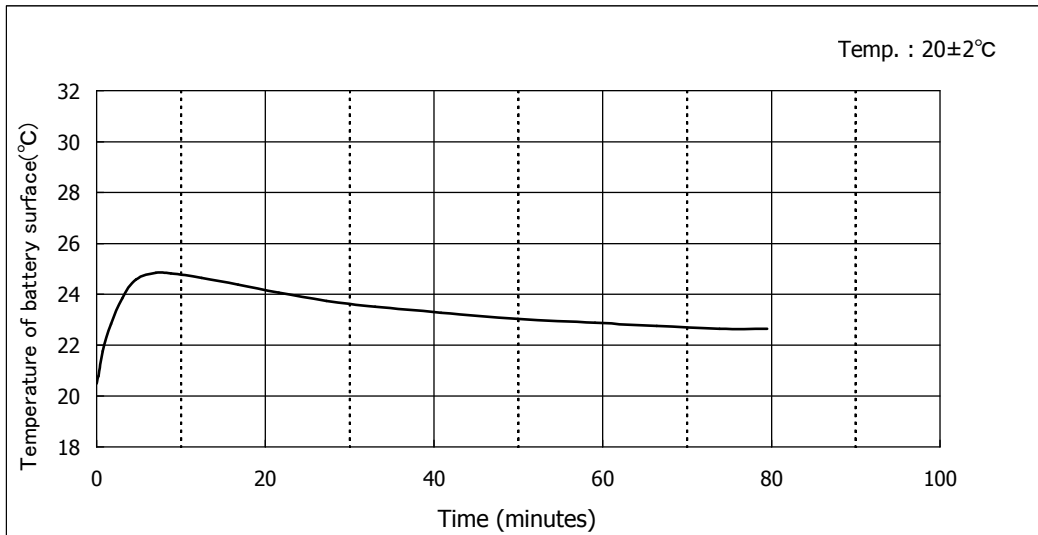
Item	Storage periods		
	Initial	After 40 days	After 80 days
Off-load-voltage (V)	3.23	3.24	3.24
Internal resistance (Ω)	4.0	9.3	9.8
Leakage (pcs)	----	0	0
Service out-put at 3k Ω continuous discharge (hours) E.P.V. = 2.0V	1200	1176	1152

Test temp. : $20 \pm 2^\circ\text{C}$, Average of 5 batteries

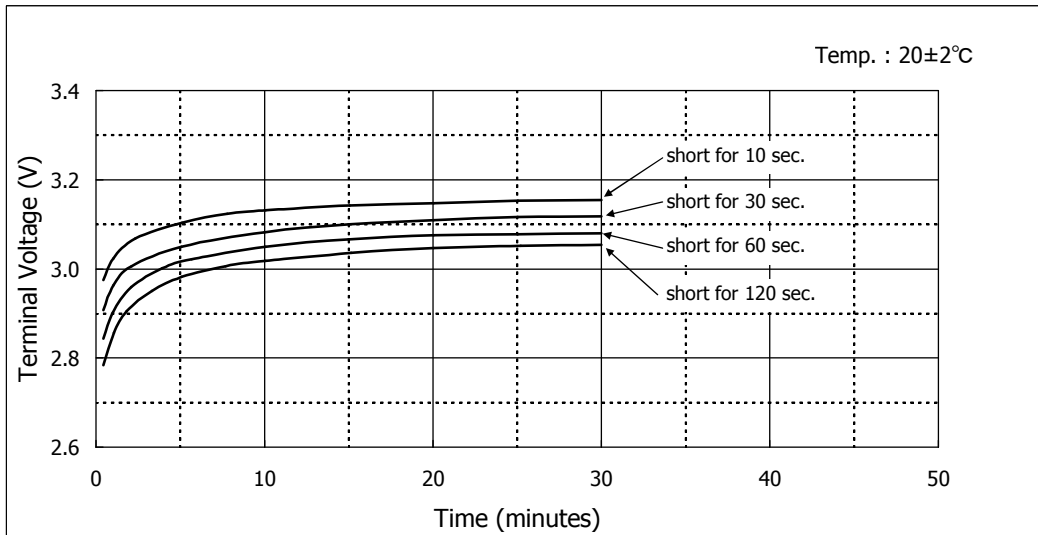
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4. Short circuit characteristics for single cell

(1) Temperature of battery surface



(2) Change of off-load voltage after short circuit



(3) Shape, Dimension, Appearance

No change is recognized for 80 minutes. (Temp. : 20±2°C)

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5. Over-discharge characteristics

Test temp. : $20 \pm 2^{\circ}\text{C}$

Test method	Test result
The discharge is further continued for 20 days at $1\text{k}\Omega$ load after the voltage has become less than the end-point voltage (2.0V)	Appearance : No change

10 batteries are tested.

6. Charge characteristics

Test temp. : $20 \pm 2^{\circ}\text{C}$

Charge current	Charging time	Test result
1.69 mA	24 hours	Appearance : No change

10 batteries are tested.

7. Heat shock test

Range of temperature : $-10 \sim +60^{\circ}\text{C}$, Time : each for 1 hour

Item	Initial	After 100 cycles
Off-load-voltage (V)	3.23	3.24
Internal resistance (Ω)	4.0	8.0
Leakage (pcs)	---	0

Measuring temp. : $20 \pm 2^{\circ}\text{C}$, Average of 10 batteries

Measurement of internal resistance is done by 1kHz alternating current.

Leakage proof is done by visual check.

8. Vibration test

Amplitude : 1.5mm, Frequency : 10 ~ 55Hz

Time : X, Y, Z direction, each for 90 minutes

Item	Initial	After test
Off-load-voltage (V)	3.23	3.23
Internal resistance (Ω)	4.0	4.0
Leakage (pcs)	---	0

Average of 10 batteries

Measurement of internal resistance is done by 1kHz alternating current.

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Table 1. Testing items and results for safety

No.	Testing Items	Number of Samples	Battery condition	Temp. °C	Duration hours	Testing conditions	Requirement Note 1)	Results
1	Internal Short circuit	5	Undercharged	Ambient	----	A nail, whose diameter is 2.5mm and length is 40~70mm, is to be drilled and penetrated through center of the battery.	NE NF	0/5
2	External Short circuit	5	Undercharged	Ambient	24	Resistance for short circuit : below 0.02 Ω	NE NF	0/5
3	Free fall	5	Undercharged	Ambient	----	Height : 1.9m (on to concrete floor) Number of times : randomly 10 times	NV·NE·NF	0/5
4	Vibration	5	Undercharged	Ambient	1.5	Amplitude : 0.8mm, Frequency : 10~55~10Hz (1Hz/min : 2 (X-Y) mutually perpendicular directions for 90 minutes, respectively)	NV NE NF	0/5
5	Shock	5	Undercharged	Ambient	----	Shock : 150G 6msec Number of times : 5 times respectively, in 2(X-Y) Mutually perpendicular directions	NV NE NF	0/5
6	Heating	5	Undercharged	100 70	5 720	In a oven In a oven	NE·NF NV·NE·NF	0/5
		5	Undercharged	----	18	Thermal shock : -40°C(1Hr) ⇔ 85°C(1Hr) 9cycles	NV·NE·NF	0/5
7	Charge	5	Undercharged	Ambient	24	Charging up to 3% of nominal capacity	NE·NF	0/5

Note 1) : Requirement)
 NE = No explosion
 NF = No fire
 NV = No venting