



LR20 battery specification

1. Type designation: IEC LR20

JIS: AM-1

ANSI: D

2. Chemical system:

Electrolyte-zinc-manganese dioxide (mercury & cadmium free)

3. Dimension: Diameter: 32.3-34.2mm

Height: 59.5-61.5mm

4. Nominal voltage: 1.5Volts

5. Nominal:

The weight of each battery is approximately: $\leq 145.0g$

6. Heavy Metal content (%):

Mercury content	Cadmium	Lead
$\leq 1ppm$	$\leq 10ppm$	$\leq 40ppm$

7. Appearance and terminal:

Battery shall be clean and have no dirt, no leakage, and no deformation which may affect their performance and actual use and shall have clearly visible markings.

8. Battery capacity: (Test environment: $20^{\circ}C \pm 2, 60\% \pm 15\%R.H$)

(Load resistance: **10 ohms**, Daily period: **24h/d**, Cut off voltage:**0.9V**; According to as the above the same discharge condition, the capacity of each battery is approximately: **14800mAh**)

9. Storage characteristics:

After 12 months storage at $20^{\circ}C$, 90% capacitance of fresh cells.

After 24 months storage at $20^{\circ}C$, 85% capacitance of fresh cells.



10. Electrical characteristics:

(Test environment: 20°C ± 2, 60% ± 15% R.H) (Load resistance: **3.9ohms**, Measure time: **0.3S**)

(All samples shall be normalized for a minimum of 8 hours at the above environment prior to measurement)

	OCV (V)	CCV (V)	SCC (A)
Initial	≥1.59	≥1.50	≥10
After 12 months storage	≥1.57	≥1.45	≥8

Remark: OCV: Open Circuit Voltage; CCV: Close Circuit Voltage; SCC: Short Circuit Current

11. Discharge test (service life) (Test environment: 20°C ± 2.45%--75%R.H)

Load	2.2Ω	2.2Ω	2.2Ω	3.9Ω	10Ω
Discharge mode	24h/d	4min/h, 8h/d	1h/day	1h/day	4hrs/day
End voltage	0.9V	0.9V	0.8V	0.9V	0.9V
Initial	18.0h	20h	20h	38h	118h
After 12 months storage	17.0h	18.5h	18.5h	34.5h	110h

Remark: The initial discharge test shall commence within 30 days of manufacture.

The discharge time is the minimum average duration (MAD).

Test quantity: n=9pcs (for per discharge test)

12. Discharge curve:

- ① 2.2 ohms 24h/d to 0.9V continuous discharge curve (Appendix 1)
- ② 2.2 ohms 4min/h,8h/d to 0.9V intermittent discharge curve (Appendix 1)
- ③ 2.2 ohms, 1h/d to 0.8V intermittent discharge curve (Appendix 1)
- ④ 3.9 ohms, 1h/d to 0.9V intermittent discharge curve (Appendix 2)
- ⑤ 10 ohms, 4h/d to 0.9V intermittent discharge curve (Appendix 2)



13. Safety test (Test environment: 20°C ± 2.60% ± 15%R.H)

Test item	Test method	Test pcs	Requirements
Over-discharge leakage test	2.2 ohms (24h/d) 48hours	9pcs	No leakage
	2.2 ohms (4min/h, 8h/d) to 0.6V	9pcs	No leakage
	2.2 ohms (1h/d) to 0.6V	9pcs	No leakage
	10 ohms (4h/d) to 0.6V	9pcs	No leakage
	3.9 ohms (1h/d) to 0.6V	9pcs	No leakage
High temperature test	60 ± 2°C, RH:90 ± 5%, after 20 days storage, the cells shall be stored in an ambient temperature of 20 ± 2°C, RH:60 ± 5%, for 4-24hours.	40	No leakage
One piece of battery Short circuit test	The terminal of an un-discharged battery is connected by wire. The circuit is completely for 24hours or until the case temperature has return to environment.	10	No leakage No explosion
Reversible charge	4 pieces of battery are in series connected and one of them is under incorrect polarity for 24 hours or until the case temperature has return to environment..	40	No explosion
Over discharge	One battery discharge 20 ohms to 0.6V, then in series connect with 3 pieces of new battery with 20ohm 24h	36	No explosion
Four pieces of battery in series Short circuit test	The terminal of four pieces of battery is connected by wire. The circuit is completely for 24hours or until the case temperature has return to environment.	40	No explosion
Free fall test	The battery free drops from one-meter height for 6 times, then store for 1h	10	No explosion
Impact under high and low temperature	Un-discharged battery store in test box under 70 ± 2°C for 24h, then change to -20°C for 24h, repeat the above condition for 10 cycles.	20	No explosion
Storage after partial discharge	50% discharged battery stored under 45 ± 5°C for 30days	9	No leakage No explosion

14. Expiry period: 3 years

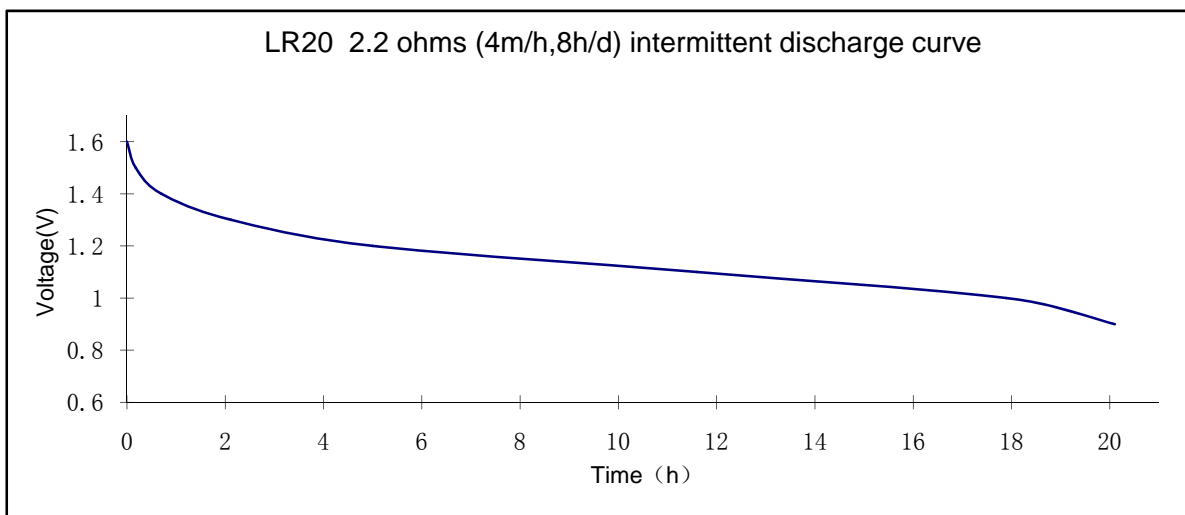
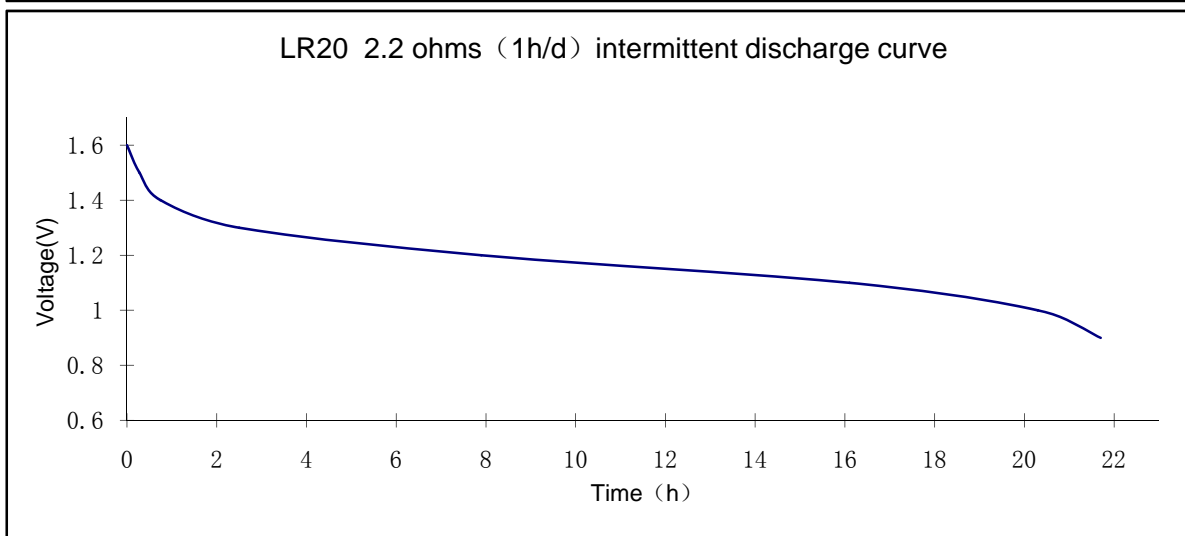
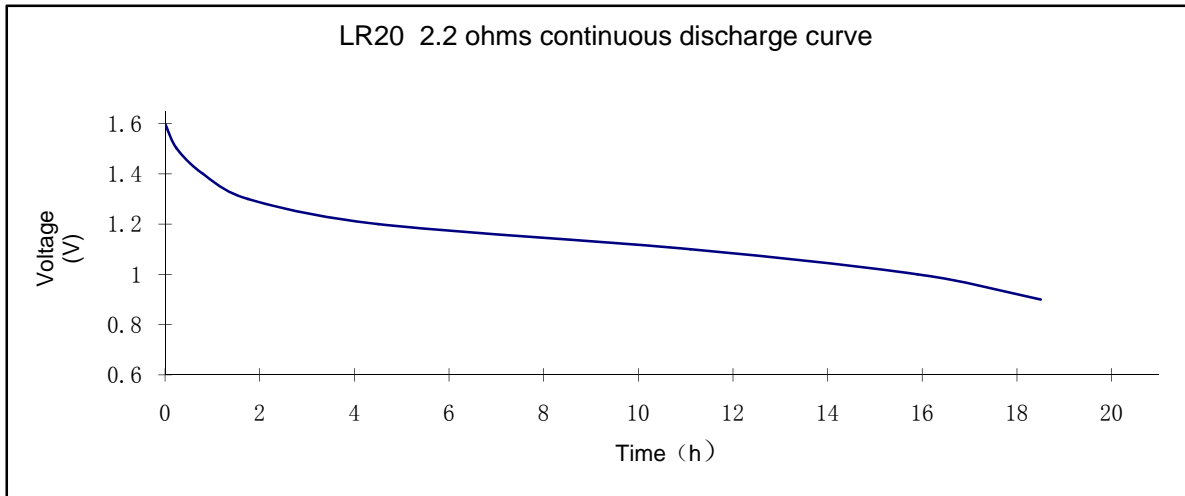
15. Expiry period marking:

① Expiry date marked on the bottom plate of finished battery . For example: 2005-08 means the production date is August 2005.

② For private label, can mark according to customer's requirement.



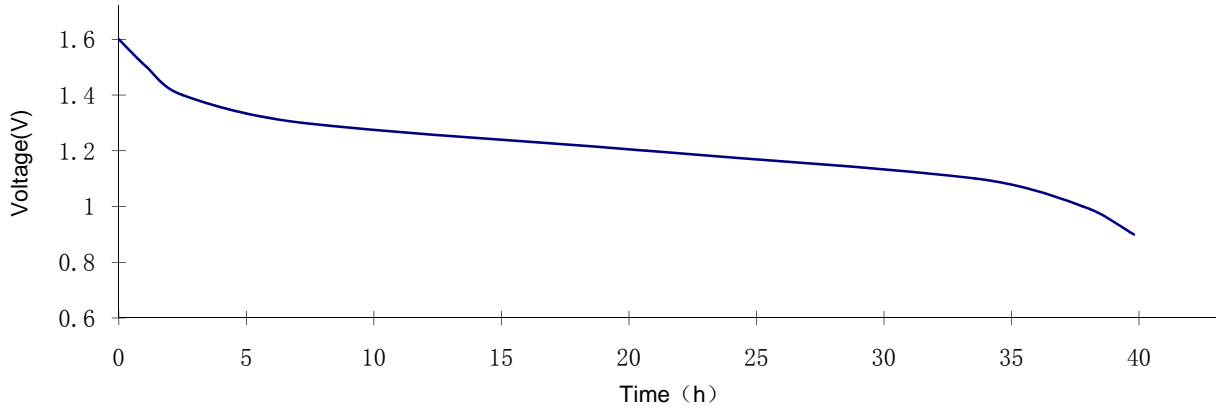
Appendix 1





Appendix 2

LR20 3.9 ohms(1h/d) intermittent discharge curve



LR20 10 ohms (4h/d) intermittent discharge curve

