

POWERHOUSE TWO

Technical Specification

XP Alkaline Manganese Dioxide Battery



Power XP Alkaline

PH-AA-XP

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1. Scope

This specification is applicable to Powerhouse Two's XP Super Alkaline Battery.

1.1 Designations

PH-AA-XP GSLR6A LR6 AM-3 15A AA E91

1.2 Reference Document

IEC 60086-1 (2006-12) – Primary Batteries – Part 1: General

IEC 60086-2 (2006-12) – Primary Batteries – Part 2: Physical and Electrical Specifications

IEC 60086-5 (2006-12) – Primary Batteries – Part 5: Safety of batteries with aqueous electrolyte

2. Chemical System Alkaline Manganese Dioxide

- Mercury and Cadmium are not added

3. Nominal Voltage 1.5 volt

4. Average Weight 23.5g

5. Nominal Capacity 2950 mAh

Condition: Continuous discharge at $20 \pm 2^\circ$ C under 75Ω load for 24 hours per day to EPV

0.8V.

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6. Electrical Characteristics

Test Conditions: Tested within 30 days after delivery

Load resistance: 3.9 ohms \pm 0.5%

Temperature: 20 \pm 2 ° C

Measuring time: 0.3 seconds

	Off-Load Voltage OCV (V)	On-Load Voltage CCV (V)	Test Specification
New Battery	1.58	1.45	MIL-STD-105E Class II Double Sampling, AQL=0.4
After 3 months at Temp. 45° -C	1.56	1.40	
After 12 months at Room temperature	1.56	1.40	

7. Service Output

Test Conditions: Tested within 30 days after delivery

Temperature: 20 \pm 2 degrees C

Standard	Discharge Condition			Average Minimum Discharge Time		
	Discharge Load	Daily Discharge Time	EPV (V)	New Battery	After 3 Months at 45 C	After 12 Months at Room Temp
IEC	43 Ω	4 h/d	0.9 V	94.7 h	94.7 h	85.7 h
IEC	3.9 Ω	1h/d	0.8 V	8.4 h	8.4 h	7.56 h
IEC	10 Ω	1h/d	0.9 V	20.4 h	20.4 h	18.36 h
IEC	250 mA	1 h/d	0.9 V	8.36 h	8.36 h	7.52 h
IEC	1000 mA	10 s/m, 1 h/d	0.9 V	512 cycles	512 cycles	461 cycles
IEC	24 Ω	15 s/m, 8 h/d	1.0 0.9 V	47.6 h	47.6 h	42.84 h
REF	10 Ω	24 h/d	0.9 V	20.4 h	20.4 h	18.36 h

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Acceptance Criteria

1. Nine (9) pieces of battery product will be tested for each discharging standard
2. The result of the average discharging time from each discharging standard shall be equal to or more than the average minimum time requirement: and no more than one battery has a service output less than 80% of the specified requirement.
3. One re-test is allowed to confirm the previous result

8. Electrolyte Leakage Proof Characteristics

Item	Condition	Period	Requirements	Acceptance Standard
Over-discharge Characteristics	<ol style="list-style-type: none"> 1. 10 Ω continuous discharge 2. Storage Temp – 20 ± 2 ° C 3. Relative Humidity $90 \pm 20\%$ RH 	48 Hrs.	There shall be no deformation exceeding the specified dimensions, nor leakage recognized by the human eye.	N=30 Ac=1 Re=2
Storage Characteristics	<ol style="list-style-type: none"> 1. Storage Temp 60 ± 2 ° C 2. Relative Humidity $90 \pm 5\%$ RH 	30 Days		N=9 Ac=0 Re=2

9. Safety Characteristics

Item	Condition	Period	Requirements	Acceptance Standard
Short Circuit Characteristics	Temp 20 ± 2 ° C	24 Hrs.	There shall be no explosion of the battery	N=9 Ac=0 Re=1
Abusive Characteristics	Charging current 80 mA Temp 20 ± 2 ° C	24 Hrs.		

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10. Marking

The following markings will be printed, stamped, or impressed on the body of the battery.

1. Designation	PH-AA-XP Alkaline
2. Polarity	“+” & “-” Located on cathode can
3. Others	3.1 1.5V GSLR6A AM3 LR6 3.2 AA Size 0.00% Mercury & Cadmium 3.3 Made in China 3.4 Marking of separate collection (Logo)
4. Warning	Do not dispose of in fire, recharge, put in backwards, or mix with used or other battery types. May explode or leak and cause personal injury.

11. Caution for Use

1. Since the battery is not manufactured for recharging, there are risks of electrolyte leakage causing damage to the device if the battery is recharged.
2. The battery shall be installed with its “+” and “-” polarity in the correct position, otherwise it might cause a short circuit.
3. Short circuiting, heating, or disposing into fire and disassembling is prohibited.
4. Battery cannot be subjected to a forced discharge, which can lead to internal gas generation which may result in bulging, leakage, and de-crimping of cap.
5. New and used batteries cannot be used at the same time. When replacing batteries, replace all batteries together with the same type.
6. Exhausted batteries should be removed from compartment to prevent over-discharge, which causes leakage and damage to the device
7. Direct soldering will cause damage to the battery
8. Battery should be kept out of the reach of children to prevent swallowing. In case of accident, contact physician immediately.
9. The battery should never be dismantled or deformed.



12. Shelf Life

10 Years after delivery under proper storage conditions. (90% original charge)

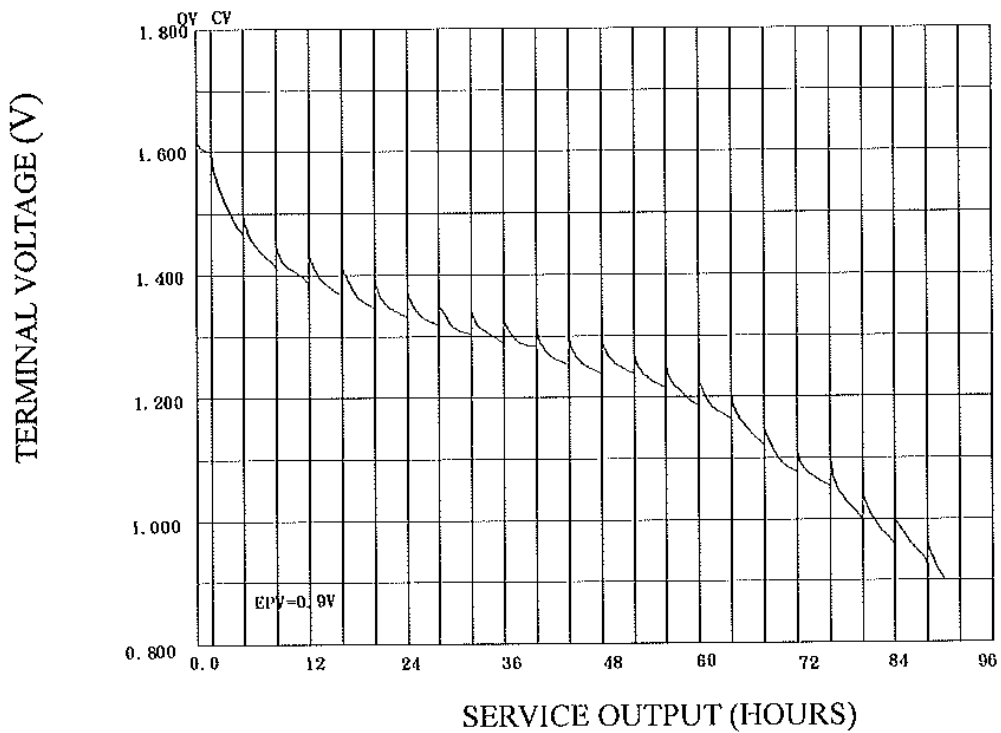
Storage Conditions

Temperature $20 \pm 2^\circ \text{C}$

Relative Humidity $65 \pm 20\% \text{RH}$

13. Discharge Curves

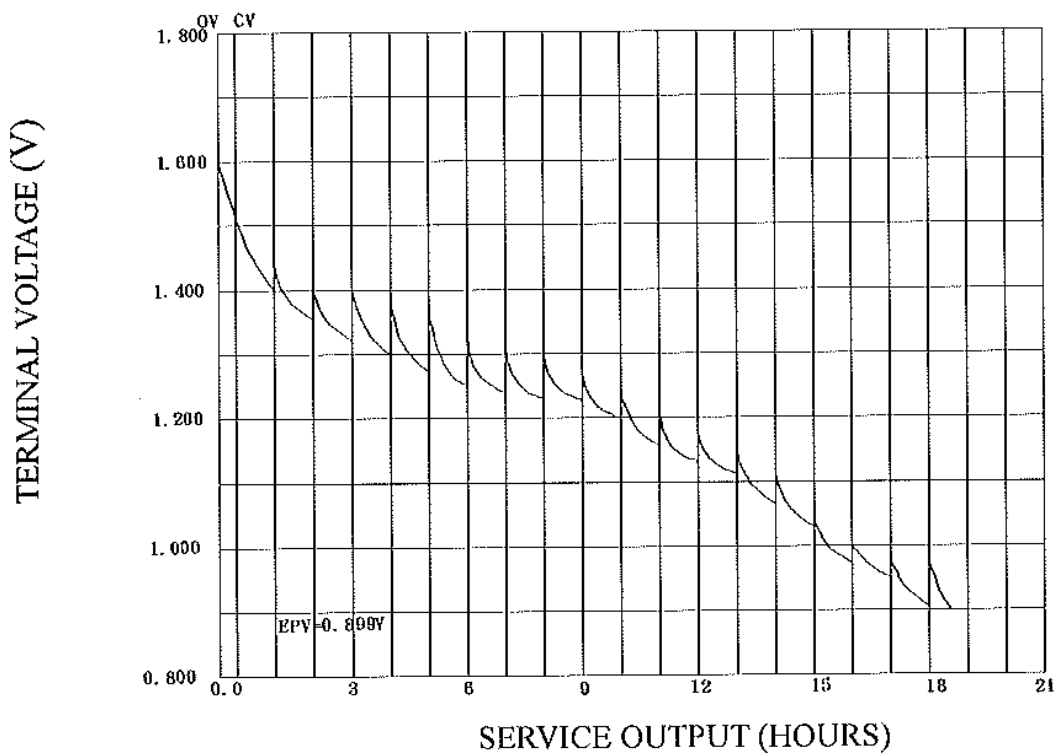
Fig. 1 Test Temperature - $20 \pm 2^\circ \text{C}$
Discharge Method - 43Ω 4 hr/day





Discharge Curves

Fig. 2 Test Temperature - $20 \pm 2^\circ \text{C}$
Discharge Method - 10Ω 1 Hr/day



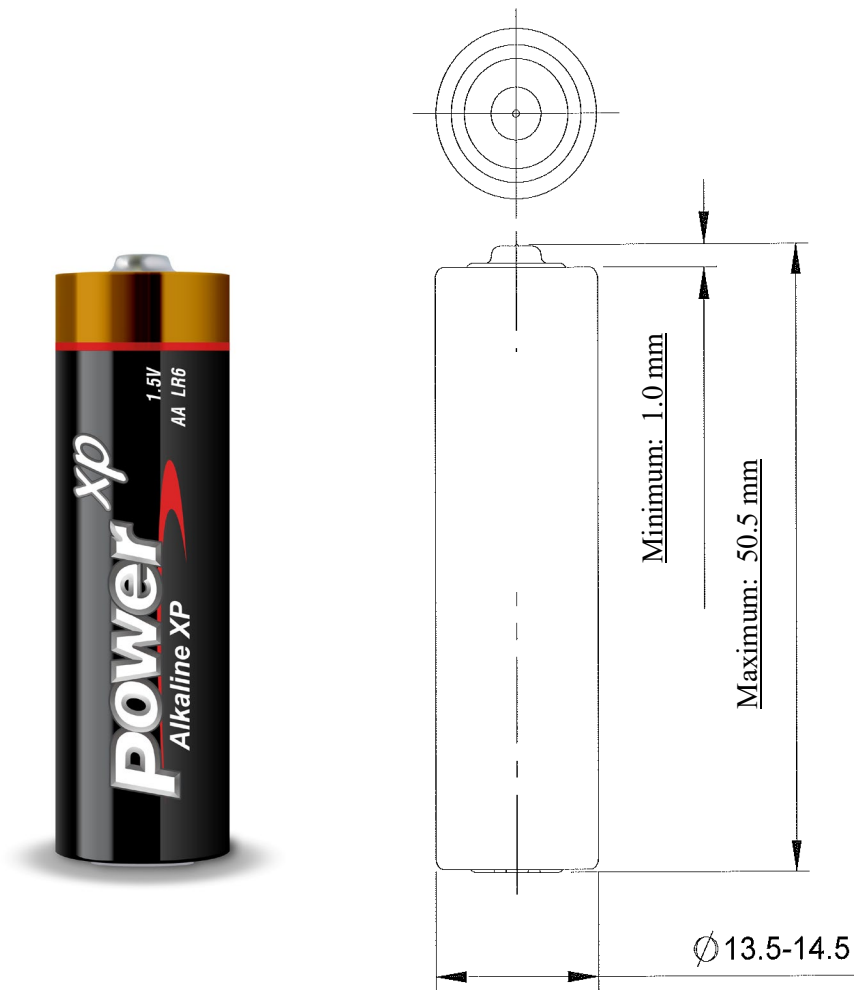
14. Compliance & Environmental Information

This product complies with the EU RoHS Directive 2002/95/EC and Battery Directive 2006/66/EC and meets all US standards set by the EPA for Alkaline Manganese batteries. MSDS available upon request.



15. Battery Dimension

PH-AA-XP Battery Dimensions and Structure



Powerhouse Two Inc.		
Model: PH-AA-XP	Drawing number: DWG-S-001	
Scale: NTS	Dim: mm	Approved by:
Date: 01/21/2010	Drawn by: Kelvin	G. Halteman - C. Chu
Tolerances: Linear ± 1 Angular $\pm \frac{1}{4}$ 3 rd angle projection		

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16. Independent Intertek Labs Testing – Report # 17040851HKG-001

Testing conducted June 2017 Criteria – IEC 60086-2:2015

Test results - (Original report available upon request)

Condition 1: Digital Still Camera

Sample Number	Power xp	Energizer	Fujitsu	Duracell Coppertop	Rayovac	Varta	Duracell Quantum	Rayovac Fusion	Panasonic
1	109	87	89	86	88	109	57	89	108
2	109	87	88	97	89	126	58	77	109
3	108	79	89	96	96	109	48	96	106
4	118	87	89	97	89	117	58	99	107
Result (Average)	111	85	88.8	94	90.5	115.3	55.25	90.25	107.5

Unit in number of pulses

Condition 2: Toy, Non-Motorized

Sample Number	Power xp	Energizer	Fujitsu	Duracell Coppertop	Rayovac	Varta	Duracell Quantum	Rayovac Fusion	Panasonic
1	9.39	7.65	7.88	8.53	8.76	8.90	8.99	8.99	8.89
2	9.46	7.76	8.38	8.62	8.79	8.95	9.27	8.99	8.75
3	9.46	7.90	7.85	8.54	8.84	8.91	9.27	8.99	8.88
4	9.45	7.93	7.95	8.72	8.80	8.89	9.33	9.35	8.87
Result (Average)	9.44	7.81	8.02	8.60	8.80	8.91	9.22	9.08	8.85

Unit in hour

Condition 3: CD, Digital Audio, Wireless gaming And Accessories

Sample Number	Power xp	Energizer	Fujitsu	Duracell Coppertop	Rayovac	Varta	Duracell Quantum	Rayovac Fusion	Panasonic
1	26.56	23.81	21.47	25.84	25.56	26.25	27.68	26.28	25.67
2	25.84	23.52	21.53	25.97	25.62	26.47	27.64	26.3	25.68
3	26.44	23.57	21.64	26.33	25.98	26.17	27.69	26.34	25.75
4	26.65	23.63	21.76	25.99	25.67	26.17	26.9	26.18	25.76
Result (Average)	26.37	23.63	21.60	26.03	25.71	26.27	27.48	26.28	25.72

Unit in hour

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Test Results continued

Condition 4: Radio / Clock / Remote Control

Sample Number	Power xp	Energizer	Fujitsu	Duracell Coppertop	Rayovac	Varta	Duracell Quantum	Rayovac Fusion	Panasonic
1	54.98	50.60	46.75	51.87	51.47	51.72	56.57	52.83	52.45
2	54.88	50.88	46.85	51.98	51.44	53.38	55.73	52.75	52.72
3	55.48	50.87	46.50	52.56	51.56	53.50	55.64	52.49	53.47
4	54.99	51.73	46.59	52.61	51.71	53.44	56.69	53.38	52.69
Result (Average)	55.08	51.02	46.67	52.26	51.55	53.01	56.16	52.86	52.83

Unit in hour

Condition 5: Portable Lighting (LED)

Sample Number	Power xp	Energizer	Fujitsu	Duracell Coppertop	Rayovac	Varta	Duracell Quantum	Rayovac Fusion	Panasonic
1	463.20	456.00	382.80	456.00	463.20	466.80	484.20	468.00	475.20
2	479.40	455.40	379.20	455.40	467.40	462.60	486.00	475.20	478.80
3	486.60	448.20	399.00	454.80	463.80	468.00	490.80	475.20	479.40
4	471.60	447.00	399.00	454.80	468.00	467.40	487.80	467.40	479.40
Result (Average)	475.20	451.80	390.00	455.40	465.60	466.20	487.20	471.60	478.20

Unit in minute

The average was greater than the minimum average duration and no more than one battery has a service output of less than 80 % of the minimum average duration.