AA Portable Power Corp.
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Tel: 510-525-4710 Fax: 510-525-4728 Toll Free: 1-800-448-4428
Email: sales@aaportablepower.com Web: www.aaportablepower.com

Product model	**18650 battery**	VER A	
Product Specification	**3.6V 2400 mah**	Date 2005/1/3	

Specification
Cylinderical Li-ion
18650 2400mAh
Rechargeable cell

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1. Scope

This product specification defines the requirements of the rechargeable lithium ion battery to be supplied to the customer by AA Portable Power Co. Should there be any additional information required by the customer, customers are advised to contact AA portable Power Co . before selecting a solution.

2. Description and Model

2.1 Description : Rechargeable Lithium Ion Battery

2.2 Model : LC-18650-2400

3. Technical Information

3.1	Capacity	Nominal	:	2400 mAh (by standard charge and discharge)
		Minimum	:	2300 mAh
3.2	Nominal Voltage		:	Average 3.7 V
3.3	Standard Charge		:	Constant Current and Constant Voltage (CC/CV) Current = 1150 mA Voltage = 4.2 V End Current = 50 mA
3.4	Max. Charge Current		:	2300 mA
3.5	Standard Discharge		:	Constant Current (CC) Current = 460 mA End Voltage = 3.0 V
3.6	Max. Discharge Current		:	4600 mA (for continuous discharge)
3.7	Weight		:	Approx. 46.5 g
3.8	Operating Temperature	Charge	:	0 to 45 °C
		Discharge	:	-20 to 60 °C
3.9	Storage Temperature	1 month	:	-20 to 60 ℃
		3 months	:	-20 to 45 ℃
		1 year	:	-20 to 45 C

4. Cell Dimensions

80 % (of minimum capacity in 3.1)

Diameter	:	18.3 ± 0.1 mm	(Max. 18.4 mm)
Height	:	64.9 ± 0.2 mm	(Max. 65.1 mm)

5. Appearances

There shall be no such defects as deep scratch, crack, rust, discoloration or leakage, which may adversely affect the commercial value of the cell.

6. Characteristics

6.1 Standard Charge

Unless otherwise specified, "Standard Charge" shall consist of charging at constant current of 1150mA. The cell shall then be charged at constant voltage of 4.2V while tapering the charge current. Charging shall be terminated when the charging current has tapered to 50mA. For test purposes, charging shall be performed at 23ºC ± 2ºC.

6.2 Standard Discharge

"Standard Discharge" shall consist of discharging at a constant current of 460mA to 3.0V. Discharging is to be performed at 23 ºC ± 2 ºC unless otherwise noted (such as capacity versus temperature).

6.3 Initial Capacity

Cells shall be charged per 6.1 and discharged per 6.2 within 1 hour after full charge. Initial capacity shall meet the following requirement.

Initial Capacity >= 2300 mAh

6.4 Cycle Life

Cells shall be charged at constant current of 1150mA to 4.2V with end current of 50mA. Cells shall be discharged at constant current of 1150mA to 3.0V. Cells are to rest 10 minutes after charge and 20 minutes after discharge. A cycle is defined as one charge and one discharge. Discharge capacity shall be measured per 6.1 and 6.2 after 300 cycles.

Discharge capacity (301th Cycle)

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6.5 Initial AC Impedance

Initial AC impedance is measured at 1kHz after standard charge.

Initial AC Impedance 90 m (with PTC)

6.6 Temperature Dependency of Capacity

Cells shall be charged per 6.1 at 23ºC ± 2ºC and discharged per 6.2 at the following temperatures. Relative capacity at each temperature shall meet the following.

Charge Temp.	Discharge Temperature			
23ºC	-10ºC	0ºC	23ºC	60ºC
	70 %	90 %	100 %	95%

6.7 Storage Characteristics

Cells shall be charged per 6.1 and stored in a temperature-controlled environment at 23ºC ± 2ºC for 30 days. After storage, cells shall be discharged per 6.2 to obtain the remaining capacity.

Remaining capacity 90 % (of minimum capacity in 3.1)

6.8 Cell Voltage (as of shipment)

Voltage range : 3.7 ~ 3.9 V

7. Mechanical Characteristics

7.1 Drop Test

Test method : Cells charged per 6.1 are dropped onto an wooden floor from 4 feet height for 3 cycles, where each cycle consists of 3 drops, 2 drops from each cell terminal and 1drop from the side of cell can (Total number of drops = 9). After test, cells are discharged per 6.2 and cycled per 6.1 and 6.2 for 3 cycles to obtain recovered capacity.

Criteria : No leakage, Capacity recovery rate 80 %

7.2 Vibration Test

Test method : Cells charged per 6.1 are vibrated for 90 minutes per each of the three mutually perpendicular axis (x, y, z) with an amplitude of 0.8mm, frequency of 10Hz to 55Hz and sweep of 1Hz change per minute. After test, cells are discharged per 6.2 and cycled per 6.1 and 6.2 for 3 cycles to obtain recovered capacity.

Criteria : No leakage, Capacity recovery rate 80 %

4. Cell Dimensions

80 % (of minimum capacity in 3.1)

Diameter	:	18.3 ± 0.1 mm	(Max. 18.4 mm)
Height	:	64.9 ± 0.2 mm	(Max. 65.1 mm)

5. Appearances

There shall be no such defects as deep scratch, crack, rust, discoloration or leakage, which may adversely affect the commercial value of the cell.

6. Characteristics

6.1 Standard Charge

Unless otherwise specified, "Standard Charge" shall consist of charging at constant current of 1150mA. The cell shall then be charged at constant voltage of 4.2V while tapering the charge current. Charging shall be terminated when the charging current has tapered to 50mA. For test purposes, charging shall be performed at 23ºC ± 2ºC.

6.2 Standard Discharge

"Standard Discharge" shall consist of discharging at a constant current of 460mA to 3.0V. Discharging is to be performed at 23 ºC ± 2 ºC unless otherwise noted (such as capacity versus temperature).

6.3 Initial Capacity

Cells shall be charged per 6.1 and discharged per 6.2 within 1 hour after full charge. Initial capacity shall meet the following requirement.

Initial Capacity > 2300 mAh

6.4 Cycle Life

Cells shall be charged at constant current of 1150mA to 4.2V with end current of 50mA. Cells shall be discharged at constant current of 1150mA to 3.0V. Cells are to rest 10 minutes after charge and 20 minutes after discharge. A cycle is defined as one charge and one discharge. Discharge capacity shall be measured per 6.1 and 6.2 after 300 cycles.

Discharge capacity (301th Cycle)

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9.4 Nail Test

Test method : A nail (diameter : 2.5~5mm) is penetrated vertically through the center of cells charged per 6.1 and left for 6 hours.

Criteria : No rupture, No fire

9.5 Heating Test

Test method : Cells are charged per 6.1 and heated in a circulating air oven at a rate of 5ºC per minute to 150ºC. At 150ºC, oven is to remain for 10 minutes before test is discontinued .

Criteria : No rupture, No fire

9.6 Impact Test

Test method : Cells charged per 6.1 are impacted with their longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm diameter bar .

Criteria : No rupture, No fire

9.7 Crush Test

Test method : Cells charged per 6.1 are crushed with their longitudinal axis parallel to the flat surface of the crushing apparatus .

Criteria : No rupture, No fire

10. Standard Test Conditions

Unless otherwise specified, all tests stated in this Product Specification are conducted at temperature 23 ºC and humidity 65 20 %RH.

~~11. Warranty~~

As long as the cell is treated in accordance with this Product Specification and/or Proper Use and Handling, AA Portable power corp. warrants that the cell should be free from any defect for a period of 3 months from date of purchasing.

The warranty set forth above or described in Proper Use and Handling excludes a defect which is not related to manufacturing on the cell.

~~12. Others~~

Any matter not included in this specification shall be conferred between the both parties.

This document shall replace the document bearing a former revision index, and customers are kindly requested to destroy the former document in possession.