PRODUCT SPECIFICATION

Rechargeable Lithium Ion Battery
Model : ICP423443 A1 810mAh

Prepared	Reviewed	Approved
Jung Koo Kang  Date : '10.07.09	JooHwan Sung  Date : '10.07.09	Soonho Ahn  Date : '10.07.09

LG Chem

20 YOIDO-DONG YOUNGDUNGPO-GU,

SEOUL 150-721, KOREA

TEL : (82) 2-3773-1114 FAX : (82) 2-3773-7005

http://www.lgchem.com

Revision History

Revision	Date	Originator	Description
0	2006-04-25	Jeong, Kyung Hee	Original Release
1	2006-05-23	Jeong, Kyung Hee	Capacity changed.
2	2008-02-22	Chu, Seung Woo	1. Changed 2.3 Standard charge current 2. Confirmed the Ref. capacity at section 4.3 3. Changed 2.4 Max. charge current 4. Added Precaution on protection circuit
3	2010-03-30	Kang, June Koo	Updated 3.2 Dimension Revised 4.2.3 Cycle life
4	2010-07-09	Kang, Jung Koo	Updated 3.2 Dimension (Thickness)

Contents

1. General Information

1.1 Scope

This product specification defines the requirements of the rechargeable lithium ion battery to be supplied to the Customer by LG Chem.

1.2 Application: Mobile Phone, PDA, MP3, etc

1.3 Product classification: Prismatic rechargeable lithium ion battery

1.4 Model name: ICP423443 A1

2. Nominal Specification

Item	Condition / Note	Specification
2.1 Capacity	Std. charge / discharge	Nominal 830 mAh (C_{nom}) Minimum 810 mAh (C_{min})
2.2 Nominal Voltage	Average	3.7V
2.3 Standard Charge (Refer to 4.1.1)	Constant current Constant voltage End condition (Cut off)	0.5C (405 mA) 4.2V 3hours
2.4 Max. Charge Current	-	1.0C (810 mA)
2.5 Standard Discharge (Refer to 4.1.2)	Constant current End voltage (Cut off)	0.2C (162 mA) 2.75 V
2.6 Max. Discharge Current	For continuous discharge	2C (1620 mA)
2.7 Weight	Approx.	15.5g
2.8 Operating Temperature	Charge Discharge	0 ~ 45℃ -20 ~ 60℃
2.9 Storage Temperature (For shipping state[i])	1 month 3 month 1 year	-20 ~ 60℃ -20 ~ 45℃ -20 ~ 20℃

* Shipping state: About 50% capacity of fully charged state

3. Appearances and Dimension

3.1 Appearance

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

3.2 Dimension

Thickness	:	Shipping thickness max. 4.53 mm (Max. 4.94 mm after 500 cycles)
Width/Diameter	:	33.75 ± 0.15 mm
Height	:	42.40 ± 0.20 mm (w/ Ni strip : 42.60 ± 0.20 mm)

4. Performance Specification

4.1 Standard test condition

4.1.1 Standard Charge

Unless otherwise specified, “Standard Charge” shall consist of charging at constant current of 0.5C. The cell shall then be charged at constant voltage of 4.2V while tapering the charge current. Charging time is 3.0 hours in all. For test purposes, charging shall be performed at 23ºC ± 2ºC.

4.1.2 Standard Discharge

“Standard Discharge” shall consist of discharging at a constant current of 0.2C to 2.75V. Discharging is to be performed at 23 ºC ± 2 ºC unless otherwise noted (such as capacity versus temperature).

4.1.3 Fast Charge / discharge condition

Cells shall be charged at constant current of 1C(810mAh) to 4.2V with end current of 50mA. Cells shall be discharged at constant current of 1C(810mAh) to 3.0V. Cells are to rest 10 minutes after charge and 20 minutes after discharge.

4.2 Electrical Specification

Item	Condition	Specification
4.2.1 Initial AC Impedance	Cell shall be measured at 1kHz after charge per 4.1.1.	≤ 60 mΩ, without PTC ≤ 110 mΩ, with PTC
4.2.2 Initial Capacity	Cells shall be charged per 4.1.1 and discharged per 4.1.2 within 1h after full charge.	≥ 810 mAh ($C_{min.}$)
4.2.3 Cycle Life	Cells shall be charged and discharged per 4.1.3 500 cycles. A cycle is defined as one charge and one discharge. 501st discharge capacity shall be measured per 4.1.1 and 4.1.2	500^{th} 1C ≥ 50%of 1^{st} 1C 501^{th} 0.2C ≥ 75% (of C_{min} In 2.1)

4.3 Environmental specification.

Item	Condition		Specification
4.3.1 Storage Characteristics	Cells shall be charged per 4.1.1 and stored in a temperature-controlled environment at 23ºC ± 2ºC for 30 days. After storage, cells shall be discharged per 4.1.2 to obtain the remaining capacity.		Capacity remaining rate ≥ 90 % (of $C_{min.}$ in 2.1)
4.3.2 High Temperature Storage Test	Cells shall be charged per 4.1.1 and stored in a temperature-controlled environment at 60ºC for 30 days. After storage, cells shall be discharged per 4.1.3 and cycled per 4.1.1/4.1.2 for 3 cycles to obtain recovered capacity*.		No leakage, Capacity recovery rate ≥ 70 % (of $C_{min.}$ in 2.1)
4.3.3 High Temperature and High Humidity Test	Cells are charged per 4.1.1 and stored at 60ºC (95% RH) for 168 hours. After test, cells are discharged per 4.1.3 and cycled per 4.1.1/4.1.2 for 3 cycles to obtain recovered capacity.		No leakage, No rust Capacity recovery rate ≥ 80 % (of $C_{min.}$ in 2.1)
4.3.4 Thermal Shock Test	65ºC (8h) ← 3hrs → -20ºC (8h) for 8 cycles with cells charged per 4.1.1 After test, cells are discharged per 4.1.3 and cycled per 4.1.1/4.1.2 for 3 cycles to obtain recovered capacity.		No leakage Capacity recovery rate ≥ 80 % (of $C_{min.}$ in 2.1)
4.3.5 Temperature Dependency of Capacity	Cells shall be charged per 4.1.1 at 23ºC ± 2ºC and discharged per 4.1.2 at the following temperatures.		
	Charge	Discharge	Capacity
	23℃	-10℃ 0℃ 23℃ 60℃	60% of $C_{min.}$ 85% of $C_{min.}$ 100% of $C_{min.}$ 95% of $C_{min.}$

* Remaining Capacity : After storage, cells shall be discharged with Std. condition(4.1.2) to measure the remaining capacity.
** Recovery Capacity : After storage, cells shall be discharged with fast discharge condition(4.1.3), and then cells shall be charged with std. charge condition(4.1.1), and then discharged with Std. condition(4.1.2). This charge / discharge cycle shall be repeated three times to measure the recovery capacity.

4.4 Mechanical Specification

Item	Condition	Specification
4.4.1 Drop Test	Cells charged per 4.1.1 are dropped onto an oak board from 1.5-meter height for 3cycles, where each cycle consists of 3drops from each of the three mutually perpendicular axis (x, y, z) for total of 9drops.	No leakage No temperature rising
4.4.2 Vibration Test	Cells charged per 4.1.1 are vibrated for 90 minutes per each of the three mutually perpendicular axis (x, y, z) with total excursion of 0.8mm, frequency of 10Hz to 55Hz and sweep of 1Hz change per minute.	No leakage

4.5 Safety Specification

Item	Condition	Specification
4.5.1 Overcurrent charge Test	Cells are discharged per 4.1.2, then charged at constant current of 3 times the max. Charge condition and constant voltage of 4.2V while tapering the charge current. Charging is continued for 7 hours (Per UL1642).	No explosion, No fire
4.5.2 External Short - Circuiting Test	Cells are charged per 4.1.1, and the positive and negative terminal is connected by a 100mΩ-wire for 1 hour (Per UL1642).	No explosion, No fire
4,5.3 Overdischarge Test	Cells are discharged at constant current of 0.2C to 250% of the minimum capacity.	No explosion, No fire
4.5.4 Heating Test	Cells are charged per 4.1.1 and heated in a circulating air oven at a rate of 5ºC per minute to 130ºC. At 130ºC, oven is to remain for 10 minutes before test is discontinued (Per UL1642).	No explosion, No fire
4.5.5 Impact Test	Cells charged per 4.1.1 are impacted with their longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm diameter bar (Per UL1642).	No explosion, No fire

4.5.6 Crush Test	Cells charged per 4.1.1 are crushed with their longitudinal axis parallel to the flat surface of the crushing apparatus. And cells are also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow sides will be subjected to the crushing force. (Per UL1642).	No explosion, No fire

5. Cautions and Prohibition in Handling

Warning for using the lithium ion rechargeable battery. Mishandling of the battery may cause heat, fire and deterioration in performance. Be sure to observe the following.

Caution

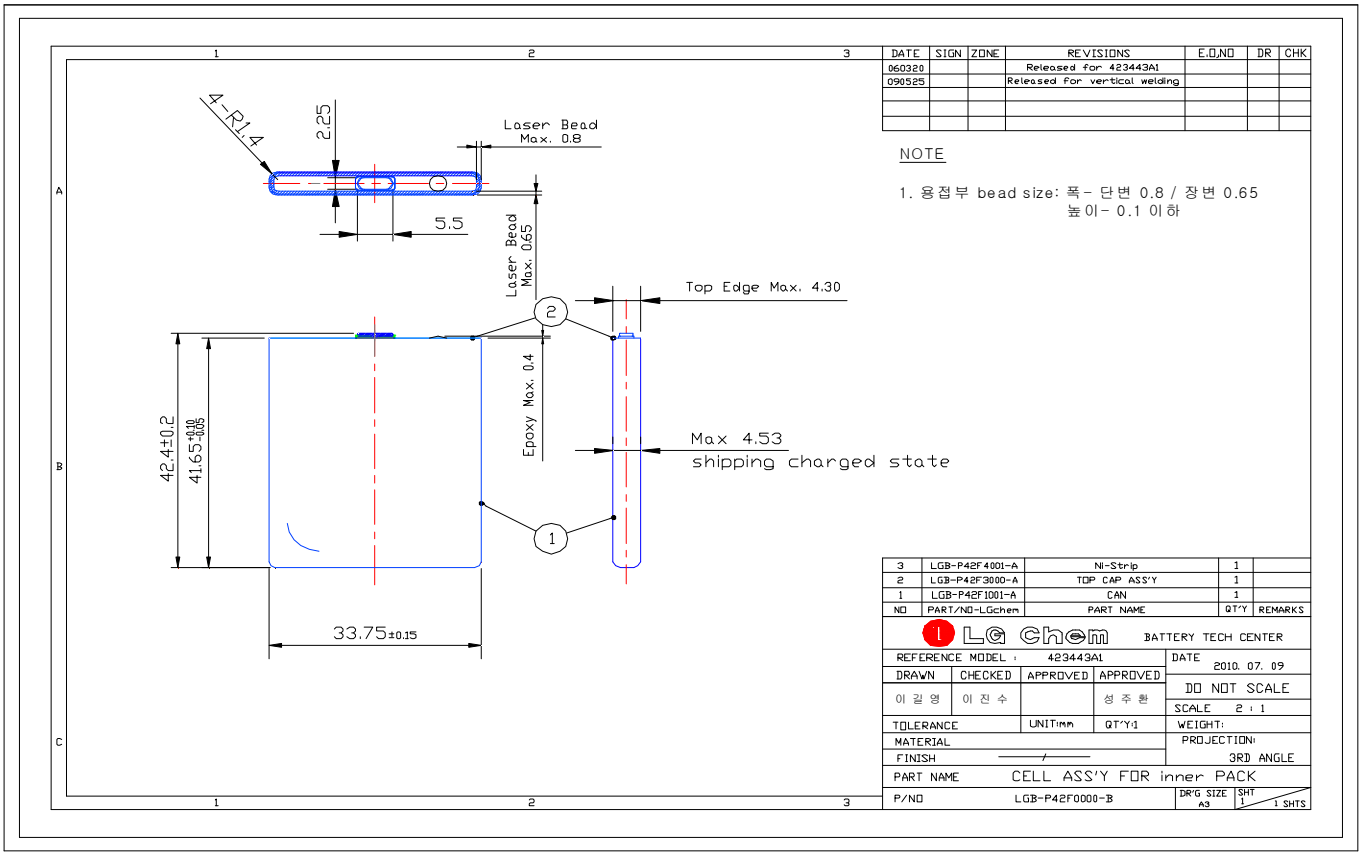
- When using the application equipped with the battery, refer to the user's manual before usage.
- Please read the specific charger manual before charging.
- Charge time should not be longer than specified in the manual.
- When the cell is not charged after long exposure to the charger, discontinue charging.
- Battery must be charged at operating temperature range 0 ~ 45℃.
- Battery must be discharged at operating temperature range -20 ~ 60℃.
- Please check the positive (+) and negative (-) direction before packing.
- When a lead plate or wire is connected to the cell for packing, check out insulation not to short-circuit.
- Battery must be stored separately.
- Battery must be stored in a dry area with low temperature for long-term storage.
- Do not place the battery in direct sunlight or heat.
- Do not use the battery in high static energy environment where the protection device can be damaged.
- When rust or smell is detected on first use, please return the product to the seller immediately.
- The battery must be away from children or pets
- When cell life span shortens after long usage, please exchange to new cells.
- Protection circuit should have function which is described below inside battery pack, to insure safety of battery in case of misuse.
  - A. Overcharge protection
    - i. At the voltage maximum 4.3V (Maximum recommended voltage)/cell by charge, overcharge protection should work. Then charge current shall be shut down.
  - B. Over discharge protection
    - i. At the voltage range 2.00~2.4V/cell over discharge protection should work. Then discharge current shall be shut down.
  - C. Over discharge current protection
    - i. When discharge current exceed about 2.0C, over discharge current protection should work. Then over discharge current shall be shut down.

Prohibitions

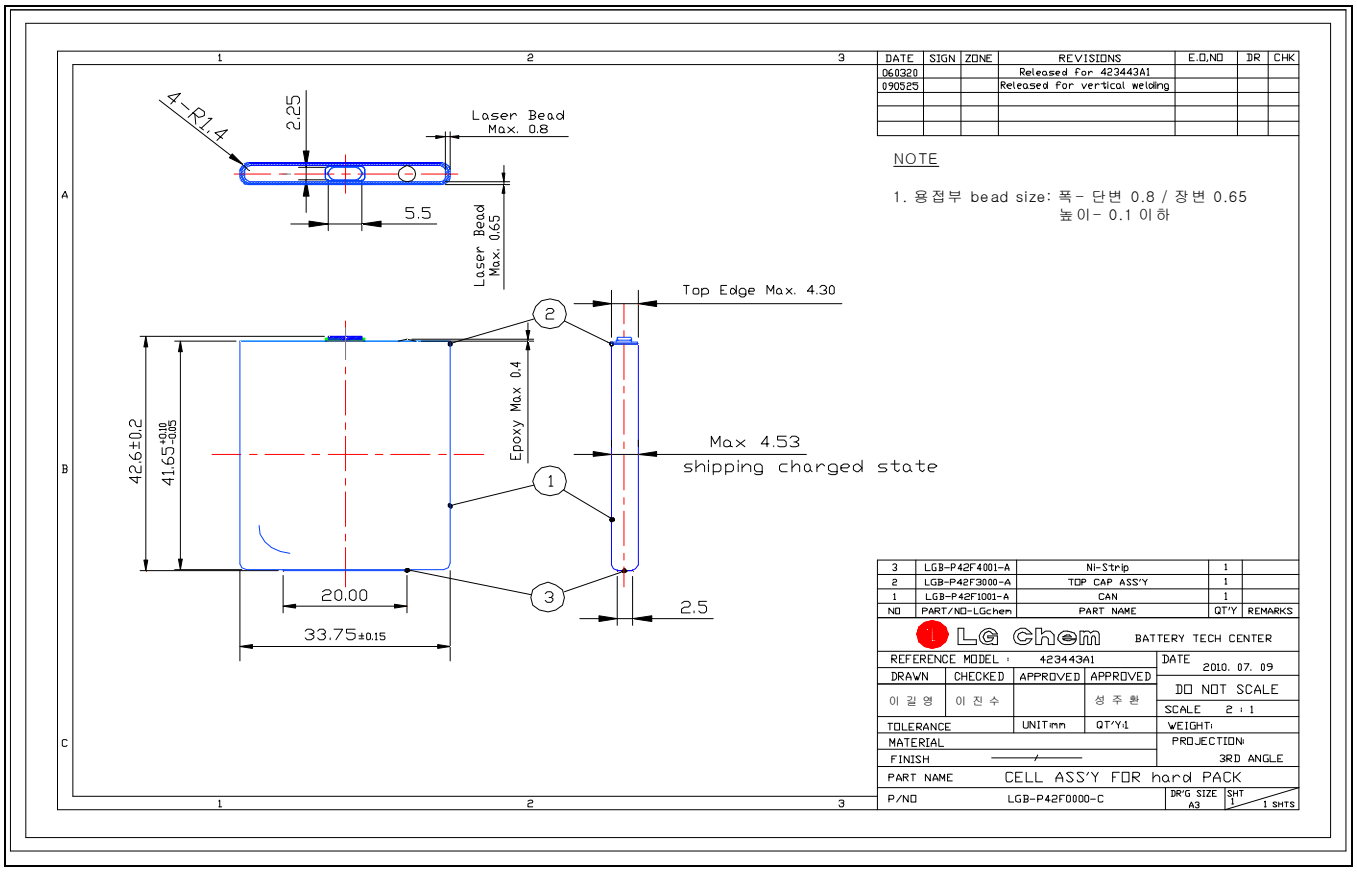
- Do not use different charger. Do not use cigarette jacks (in cars) for charging.
- Do not charge with constant current more than maximum charge current.
- Do not disassemble or reconstruct the battery.
- Do not throw or cause impact.
- Do not pierce a hole in the battery with sharp things. (such as nail, knife, pencil, drill)
- Do not use with other batteries or cells.
- Do not solder on battery directly.
- Do not press the battery with overload in manufacturing process, especially ultrasonic welding.
- Do not use old and new cells together for packing.
- Do not expose the battery to high heat. (such as fire)
- Do not put the battery into a microwave or high pressure container.
- Do not use the battery reversed.
- Do not connect positive (+) and negative (-) with conductive materials (such as metal, wire)
- Do not allow the battery to be immerged in or wetted with water or sea-water.

6. Dimensional Drawing

6.1 Cell without Ni-strip



6.2 Cell with Ni-strip



For reference only, drawings may subject to change without prior notice.

Please contact our technical engineers for specification change requests or updated drawings