

TO : International Components Corporation

Delivery Specification

The Name of An Article: Lithium Ion Cell

Applied Article: NCR14400 (NCR14400)

Accepted

Customer Signature

Panasonic Corporation

Energy Company

Lithium-ion Battery Business Unit

Approved

Checked

Prepared

Reference

Lithium Ion Cell
NCR14400
Specification

1. Application Range

This specification is applied to Lithium ion cell NCR14400 which will be used for lithium ion battery packs to be manufactured by International Components Corporation .

Applied standard(regulation): UL1642, Electrical Appliance and Material Safety Law(Japan), UN38.3

Confirmation should be done ,except for mentioned above standard(regulation).

2. Rated specification

2.1. Rated voltage:	3.6 V
2.2. Capacity:	
2.2.1. Rated capacity:	700mAh (Min.cap. in quick charging, standard discharging(1) at 20°C)
2.2.2. Nominal capacity:	Min.720mAh Typ.750mAh(in quick charging, standard discharging(2) at 25°C)
2.3. Standard charging:	4.2V, 504mA, 14mA end (Constant voltage, constant current) (Approval maximum charging voltage by tolerance : 4.25V)
2.4. Quick charging:	4.2V, 504mA, 14mA end (Constant voltage, constant current) (Maximum charging voltage : 4.25V) Charging method and charger are only those designated.
2.5. Standard discharging:	
2.5.1. Standard discharging (1):	140mA (Constant current, 2.5V end)
2.5.2. Standard discharging (2):	144mA (Constant current, 2.5V end)
2.6. Continuous allowable discharging current:	1440mA (45°C or under)
2.7. Temperature and humidity range:	0 to 45°C, 45 to 85%RH (in standard charging) 10 to 45°C, 45 to 85%RH (in quick charging) -20 to 60°C, 45 to 85%RH (in standard discharging)
2.8. Storage Temperature and humidity range:	-20 to 35°C, 45 to 85%RH (within 1 year) -20 to 40°C, 45 to 85%RH (within 6 months) -20 to 45°C, 45 to 85%RH (within 1 month) -20 to 50°C, 45 to 85%RH (within 1 week)

(Notes) The capacity recovery rate in the delivery state (30-35% capacity of fully charged) after storage is assumed to be 80% or more.

2.9. Volume Energy density:	409 Wh/l
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(Notes) This value is calculated by rated capacity, rated voltage and cell volume without shrink tube.

3. Remarks

- 3.1. Maximum voltage at standard and quick charging: The cell voltage must not exceed 4.25V.
Even if factoring charge voltage control accuracy, the maximum voltage must never exceed 4.25V with any charge method(including pulse charge).
- 3.2. Protection circuit overdischarge prohibition voltage: The cell voltage must not be below 2.0V.
- 3.3. Pack construction(restriction of cell quantity for the battery pack)
Maximum quantity number: in series = cells, in parallel = cells (*For normal application use)
Maximum total quantity : cells / one battery pack(UN transportation regulation)

4. Structure

The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte, case and assembled sealing cap. The positive and negative electrode plates are housed in the case in the state being separated by the separator, and the assembled sealing cap is fit to the case. The assembled sealing cap houses the positive electrode terminal, current shut off mechanism and explosion-proof safety valve element, making the case the negative electrode terminal.

5. Test method and judgment criteria

5.1. Test condition

5.1.1. Cells to be used for testing are those delivered within 1 month and are not used.

Charging / Discharging states are the states Charging / Discharging at $20\pm 5^{\circ}\text{C}$ in quick charging / standard discharging(2), and being left not more than 24 hours.

5.1.2. Test state is Class 5 ($20\pm 5^{\circ}\text{C}$) standard temperature state and class 20 ($65\pm 20\%\text{RH}$) standard humidity state specified in JIS Z8703 (standard condition of the test state).

5.1.3. Test conditions are 5.1.1. and 5.1.2., unless otherwise specified.

5.2. Test instruments

The following instruments are used for the test.

5.2.1. Voltmeter: With precision 0.5mV or more.(Class 0.5 specified in JIS C1102)

5.2.2. Ammeter: With precision 0.5mA or more.(Class 0.5 specified in JIS C1102)

5.2.3. Height and thickness gauge: With precision 0.05mm or more.

5.2.4. Internal resistance meter: Those with 1kHz sinewave AC 4 terminal method.

5.2.5. Balance: Those with reciprocal sensibility 10mg or more.

5.3. Test method and judgment criteria:

Item	Test method	Judgment criteria
1. Indication Appearance	Visual check.	There are not excessive dirt, deformation and flaws.
2. Dimensions	Measured by calipers.	The data is in allowance of dimensions in appended drawing 1.
3. Weight	Measured by balance.	16g or less.
4. Open Circuit Voltage	Measure open circuit voltage within 1 hour after quick charging.	4.1V or more.
5. Internal Resistance	Measure internal resistance within 1 hour after quick charging.	85mΩ or less.
6. Nominal Capacity(Minimum)	Measure capacity by discharging in the standard discharging within 1 hour after quick charging at 25°C .	720mAh or more.
7. High Rate Discharging	Measure capacity by discharging (in the below condition) within 1 hour after quick charging at 25°C . ●Discharging : 720mA to 2.5V	660mAh or more.
8. High Temperature Discharging	Measure capacity by holding at $45\pm 2^{\circ}\text{C}$ for 4 hours after quick charging and discharging in the below condition. ●Discharging : 720mA to 2.5V	660mAh or more.

9. Low Temperature Discharging	Measure capacity by holding at $0\pm2^{\circ}\text{C}$ for 4 hours after quick charging and discharging in the below condition. ●Discharging : 720mA to 2.5V	528mAh or more.
10. Cycle Life	300 cycle charging/discharging is repeated in the below condition. ●Charging : 4.2V, 504mA, 14mA end Constant voltage constant current ●Rest time : 20 min. between charging and discharging ●Discharging : 720mA to 2.5V ●Temperature : $25\pm2^{\circ}\text{C}$ Measure capacity on the 301 cycle after repeating of 1 cycle standard charging/standard discharging.	495mAh or more.
11. Storage	The capacity is measured by standard discharging at 25°C after the below condition. Charged battery should be stored for 14 days at 60°C then perform standard discharging and quick charging cycles for 2 cycles.	576mAh or more.
	The capacity is measured by standard discharging at 25°C after the below condition. Discharged battery should be stored for 14 days at 60°C then perform quick charging cycles for 1 cycles.	648mAh or more.
12. Leakage	After quick charging at 25°C , the cell shall be left in a thermostatic oven. The inner temperature of the thermostatic oven, the time it is to be left as is, and the test procedure shall be as follows. Step.1: Leave the cell at $75\pm2^{\circ}\text{C}$ for four hours. Step.2: Change the temperature to $20\pm5^{\circ}\text{C}$ within 30 minutes and left the equipment for two hours. Step.3: Change the temperature to $-20\pm2^{\circ}\text{C}$ within 30 minutes and the equipment shall be left for four hours. Step.4: Change the temperature to $20\pm5^{\circ}\text{C}$ within 30 minutes and left the equipment for at least two hours. Step.5: Steps 1 to 4 repeat another four times. Store the charged cells at $20\pm5^{\circ}\text{C}$ for seven days, and then conduct a visual inspection.	No leakage.
13. Vibration	Vibrate the cell in triaxial direction for 90 min. per axis in condition of frequency 10-55Hz (1Hz per 1 min.) and amplitude 1.5mm p-p.	No fire. No explosion.
14. Shock Drop	Drop the cell onto concrete board from 1m height 3 times.	No fire. No explosion.
15. Short Circuit	Short circuit the lead wire (resistance $80\pm20\text{m}\Omega$) across + and - terminals of the cell after quick charging.	No fire. No explosion.

6. Product drawing

Refer to appended drawing.

7. Packing drawing

Refer to appended drawing.

8. Packing state

Charging capacity of delivered cells is about 216mAh.

9. Prohibition and caution items in handling

Refer to the related pages.

10. Warranty of cell

10.1. The Cells are warranted to the descriptions contained in this Specification for a period of twelve(12) months from the date of receipt by International Components Corporation.

In the event that a Cell fails to comply with the Specifications and the cause of which was attributable to Panasonic Corporation Energy Company's (hereinafter called Energy Company) fault during the said warranty period, Energy Company will repair such non-conforming cells, or supply a replacement cell, either way agreed by both parties.

10.2. Energy Company's warranty shall not be applicable in the case where customer fails to carry out proper handling, operating, installation, testing, service and checkout of the cell and/or to follow the instructions, cautions, warnings, notes provided in this Specification, or other direction from Energy Company.

10.3. Energy Company can not be held responsible for problems resulting from circuit, battery pack and/or equipment matching issues.

10.4. Energy Company will bear responsibility for PL issues resulting from defects which are directly attributable to the cell. However, PL issues resulting from battery pack or equipment problems are the responsibility of the International Components Corporation and compensation should come from International Components Corporation.