Panasonic

Test report No. E2029596 Jan. 07. 2020

Test summary of UN test for Lithium ion cell

Customer Model : UR14500AC
Global Code : BJ-AF00074AA
Product Name : UR14500A-H02QA
Manufacturer : SANYO Electric Co., Ltd. 222-1 Kaminaizen, Sumoto City, Hyogo 656-8555, Japan
Tel +81-799-23-3931, email prb-bp-ta@ml.jp.panasonic.com
https://industrial.panasonic.com/ww/products/batteries/
Test Laboratory : Same as the manufacturer

M. Takahashi

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We declare that this cell passed UN test.

Manual of Tests and Criteria (38.3 Lithium batteries)		Test results	Note	Number of test cells	
No.	Test item				
T 1	Altitude simulation	Pass		First cycle fully charged 10 cells	
T 2	Thermal test	Pass			
T 3	Vibration	Pass			
T 4	Shock	Pass			
T 5	External short circuit	Pass			
T 6	Crush	Pass		First cycle 50% charged 5 cells	
T 7	Overcharge	-	For battery only	For battery only	
T 8	Forced discharge	Pass		First cycle, fully discharged 10 cells	After 50 cycles, fully discharged 10 cells

*1 The test data may contain additional test result other than above table.

Lithium ion cell Specification

Item	Value/Description	Note
Watt-hour rating / Rated capacity	2.7 Wh / 0.74 Ah	
Nominal voltage	3.6 V	
Weight	max. 19.6 g	
Physical description	Cylindrical cell	
Lithium equivalent content	0.22 g	

Above test procedures are compliant to the following manual.
(Manual of Tests and Criteria ST/SG/AC.10/11/Rev.5A1, PartIII, sub-section 38.3)
Judgment for necessity of test items is carried out based on the latest rules, and it is not linked with the version actually tested.

UN Test Data (Model:UR14500A-H02QA)

1.Test Item: Altitude simulation (T1)

2.Test Purpose: This test simulates air transport under low-pressure conditions.

3.Test Procedure:

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20 ± 5 °C).

4.Test Requirements:

No mass(M) loss(1g≤M≤75g : less than 0.2% , M>75g : less than 0.1%),no leakage,no venting,no disassembly,no rupt and no fire,and the voltage retention is not less than 90%.

5.Test Date: 2012/09/25

6.Test Data

Cell No.		Mass(g)		Mass loss (%)	Voltage(V)		Voltage retention (%)	Other event	Result	Judgement
		Before test	After test		Before test	After test				
At first cycle,in fully charged states	1	17.444	17.444	0.00	4.163	4.157	99.9	0	PASS	PASS
	2	17.508	17.508	0.00	4.163	4.158	99.9	0	PASS	
	3	17.496	17.496	0.00	4.165	4.159	99.9	0	PASS	
	4	17.490	17.490	0.00	4.166	4.162	99.9	0	PASS	
	5	17.472	17.472	0.00	4.167	4.160	99.8	0	PASS	
	6	17.495	17.494	0.00	4.163	4.159	99.9	0	PASS	
	7	17.502	17.502	0.00	4.166	4.159	99.8	0	PASS	
	8	17.527	17.527	0.00	4.164	4.158	99.9	0	PASS	
	9	17.559	17.559	0.00	4.166	4.160	99.9	0	PASS	
	10	17.502	17.501	0.00	4.164	4.157	99.8	0	PASS	

Notes: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire,
0-No leakage, no venting, no disassembly, no rupture & no fire

UN Test Data (Model:UR14500A-H02QA)

1.Test Item: Thermal Test (T2)

2.Test Purpose: This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.

3.Test Procedure:

Test cells and batteries are to be stored for at least six hours at a test temperature equal to72± 2 °C, followed by stora for at least six hours at a test temperature equal to - 40 ± 2 °C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C).

For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

4.Test Requirements:

No mass(M) loss(1g≤M≤75g : less than 0.2% , M>75g : less than 0.1%),no leakage,no venting,no disassembly,no rup and no fire,and the voltage retention is not less than 90%.

5.Test Date: 2012/10/01 - 2012/10/07

6.Test Data

Cell No.		Mass(g)		Mass loss (%)	Voltage(V)		Voltage retention (%)	Other event	Result	Judgement
		Before test	After test		Before test	After test				
At first cycle,in fully charged states	1	17.444	17.442	0.01	4.157	4.111	98.9	0	PASS	PASS
	2	17.508	17.506	0.01	4.158	4.115	99.0	0	PASS	
	3	17.496	17.494	0.01	4.159	4.110	98.8	0	PASS	
	4	17.490	17.488	0.01	4.162	4.114	98.8	0	PASS	
	5	17.472	17.470	0.01	4.160	4.114	98.9	0	PASS	
	6	17.494	17.492	0.01	4.159	4.110	98.8	0	PASS	
	7	17.502	17.500	0.01	4.159	4.112	98.9	0	PASS	
	8	17.527	17.525	0.01	4.158	4.110	98.8	0	PASS	
	9	17.559	17.557	0.01	4.160	4.113	98.9	0	PASS	
	10	17.501	17.500	0.01	4.157	4.110	98.9	0	PASS	

Notes: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire,
0-No leakage, no venting, no disassembly, no rupture & no fire

UN Test Data (Model:UR14500A-H02QA)

1.Test Item: Vibration (T3)

2.Test Purpose: This test simulates vibration during transport.

3.Test Procedure:

Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a mai as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hour for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face.

The logarithmic frequency sweep shall differ for cells and batteries with a gross mass of not more than 12 kg (cells and small batteries), and for batteries with a gross mass of more than 12 kg (large batteries).

For cells and small batteries: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitud then maintained at 0.8 mm (1 6 mm total excursion) and the frequency increased until a peak acceleration of 8 g_n occ (approximately 50 Hz). A peak acceleration of 8 g_n is then maintained until the frequency is increased to 200 Hz.

For large batteries: from 7 Hz to a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is the maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 g_n occurs (approximately 25 Hz). A peak acceleration of 2 g_n is then maintained until the frequency is increased to 200 Hz.

4.Test Requirements:

No mass(M) loss(1g≤M≤75g : less than 0.2% , M>75g : less than 0.1%),no leakage,no venting,no disassembly,no rup and no fire,and the voltage retention is not less than 90%.

5.Test Date: 2012/10/07 - 2012/10/08

6.Test Data

Cell No.		Mass(g)		Mass loss (%)	Voltage(V)		Voltage retention (%)	Other event	Result	Judgement
		Before test	After test		Before test	After test				
At first cycle,in fully charged states	1	17.441	17.441	0.00	4.108	4.106	100.0	0	PASS	PASS
	2	17.506	17.505	0.00	4.112	4.110	100.0	0	PASS	
	3	17.494	17.494	0.00	4.110	4.108	100.0	0	PASS	
	4	17.487	17.487	0.00	4.111	4.108	99.9	0	PASS	
	5	17.470	17.470	0.00	4.112	4.110	100.0	0	PASS	
	6	17.492	17.491	0.01	4.108	4.105	99.9	0	PASS	
	7	17.499	17.499	0.00	4.110	4.108	100.0	0	PASS	
	8	17.525	17.524	0.01	4.108	4.105	99.9	0	PASS	
	9	17.557	17.556	0.00	4.110	4.108	100.0	0	PASS	
	10	17.500	17.499	0.00	4.108	4.106	100.0	0	PASS	

Notes: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire,
0-No leakage, no venting, no disassembly, no rupture & no fire

UN Test Data (Model:UR14500A-H02QA)

1.Test Item: Shock (T4)

2.Test Purpose: This test simulates possible impacts during transport.

3.Test Procedure:

Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mountir surfaces of each test battery. Each cell or battery shall be subjected to a half-sine shock of peak acceleration of 150 g_n pulse duration of 6 milliseconds. Each cell or battery shall be subjected to three shocks in the positive direction followed three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total 18 shocks.

However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds. Each cell or battery is subjected to three shocks in the positive direction followed by three s in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.

4.Test Requirements:

No mass(M) loss(1g≤M≤75g : less than 0.2% , M>75g : less than 0.1%),no leakage,no venting,no disassembly,no ruptu and no fire,and the voltage retention is not less than 90%.

5.Test Date: 2012/10/08

6.Test Data

Cell No.		Mass(g)		Mass loss (%)	Voltage(V)		Voltage retention (%)	Other event	Result	Judgement
		Before test	After test		Before test	After test				
At first cycle,in fully charged states	1	17.441	17.441	0.00	4.106	4.109	100.1	0	PASS	PASS
	2	17.505	17.506	0.00	4.110	4.112	100.0	0	PASS	
	3	17.494	17.494	0.00	4.108	4.110	100.0	0	PASS	
	4	17.487	17.487	0.00	4.108	4.111	100.1	0	PASS	
	5	17.470	17.470	0.00	4.110	4.112	100.0	0	PASS	
	6	17.491	17.491	0.00	4.105	4.108	100.1	0	PASS	
	7	17.499	17.498	0.00	4.108	4.110	100.0	0	PASS	
	8	17.524	17.523	0.00	4.105	4.108	100.1	0	PASS	
	9	17.556	17.555	0.01	4.108	4.111	100.1	0	PASS	
	10	17.499	17.498	0.00	4.106	4.108	100.0	0	PASS	

Notes: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire,
0-No leakage, no venting, no disassembly, no rupture & no fire

UN Test Data (Model:UR14500A-H02QA)

1.Test Item: External short circuit (T5)

2.Test Purpose: This test simulates an external short circuit.

3.Test Procedure:

The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 55 ± 2 °C and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 55 ± 2 °C. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 55 ± 2 °C.

4.Test Requirements:

External temperature of test cells and batteries does not exceed 170°C and there is no disassembly,no rupture and no fire during the test and within six hours after the test.

5.Test Date: 2012/10/09

6.Test Data

Cell No.		Maximum temperature (°C)	Other event	Result	Judgement
At first cycle,in fully charged states	1	75.1	0	PASS	PASS
	2	81.4	0	PASS	
	3	80.9	0	PASS	
	4	70.3	0	PASS	
	5	80.6	0	PASS	
	6	75.6	0	PASS	
	7	80.6	0	PASS	
	8	79.8	0	PASS	
	9	78.8	0	PASS	
	10	80.1	0	PASS	

Notes: D-Disassembly, R-Rupture, F-Fire, 0-No disassembly, no rupture & no fire

UN Test Data (Model:UR14500A-H02QA)

1.Test Item: Crush (T6)

Applicable to prismatic, pouch, coin/button cells and cylindrical cells not more than 20 mm in diameter

2.Test Purpose: These tests simulate mechanical abuse from a crush that may result in an internal short circuit.

3.Test Procedure:

A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.

(a) The applied force reaches 13 kN ± 0.78 kN;

(b) The voltage of the cell drops by at least 100 mV; or

(c) The cell is deformed by 50% or more of its original thickness.

Once the maximum pressure has been obtained, the voltage drops by 100 mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released.

A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis.

Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for a further 6 h.

The test shall be conducted using test cells or component cells that have not previously been subjected to other tests.

4.Test Requirements:

External temperature of test cells and component cell does not exceed 170°C and there is no disassembly,no rupture and no fire during the test and within six hours after the test.

5.Test Date: 2013/06/06

6.Test Data:

Cell No.		Maximum Temperature(°C)	Other event	Result	Judgement
At first cycle, 50% charged states	1	21.5	0	PASS	PASS
	2	22.6	0	PASS	
	3	23.0	0	PASS	
	4	22.1	0	PASS	
	5	22.3	0	PASS	

Notes: D-Disassembly, F-Fire, 0-No disassembly & no fire

UN Test Data (Model:UR14500A-H02QA)

1.Test Item: Forced discharge (T8)

2.Test Purpose:

This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition.

3.Test Procedure:

Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at ar current equal to the maximum discharge current specified by the manufacturer.

The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in serie the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the ini test current (in ampere).

4.Test Requirements:

No disassembly and no fire during the test and within seven days after the test.

5.Test Date: 2012/10/02 - 2012/10/09

6.Test Data

Cell No.		Maximum Temperature(°C)	Other event	Result	Judgement
At first cycle, in fully discharged states	1	78.3	0	PASS	PASS
	2	78.4	0	PASS	
	3	79.9	0	PASS	
	4	77.9	0	PASS	
	5	78.8	0	PASS	
	6	78.1	0	PASS	
	7	80.4	0	PASS	
	8	77.7	0	PASS	
	9	79.3	0	PASS	
	10	78.8	0	PASS	
After 50 cycles ending, in fully discharged states	11	76.1	0	PASS	
	12	79.0	0	PASS	
	13	78.8	0	PASS	
	14	78.6	0	PASS	
	15	74.3	0	PASS	
	16	74.1	0	PASS	
	17	79.6	0	PASS	
	18	77.1	0	PASS	
	19	77.4	0	PASS	
	20	74.1	0	PASS	

Notes: D-Disassembly, R-Rupture, F-Fire, 0-No disassembly, no rupture & no fire