Panasonic

Date:January 26,2015

UN Test Report

Name of Sample	Lithium Ion Battery 3UR18650-1-T1219
Consignor	SANYO Energy(Suzhou) CO.,LTD
Manufacturer	SANYO Energy(Suzhou) CO.,LTD
Test Method	United Nations "Recomenndations on the TRANSPORT OF DANGEROUS GOODS"
Criterion	United Nations "Recomenndations on the TRANSPORT OF DANGEROUS GOODS"
Appearance	Black rectangular parallelepiped
Test Date	T1-T5 2009/06/25-2009/07/09 T6 2013/03/06 T7 2009/07/01-2009/07/09 T8 2011/03/07-2011/03/14
Test Items	Altitude simulation, Thermal test, Vibration test, Shock test, External short circuit, Overcharged
Conclusion	The sample has passed the items of UN38.3.
Remark	Certification by Original Cell Model Certification by Similar Battery Model:3UR18650-1-T0512 Ratio of (3UR18650-1-T1219)/(3UR18650-1-T0512) [Wh rating ratio]: 96%, [Voltage ratio]: 100%
Consignor Address	No.86 Sunwu Road, Xukou, Wuzhong District, Suzhou City, Jiangsu Province 215164, China

Sanyo Energy(Suzou) Co.,Ltd.

Approval	Check	Writing
T. Kura	A. Kawamori	Candy Tang

CONFIDENTIAL

Date:January 26,2015

B：Checklist for Judging New Type Battery or not

Confirmation of presence of change in "The element which is given influence"
（Change ⇒ ○、 No change ⇒ ー）
When there is no change in all items, it is NOT considered to be a New Type Battery.

Model which UN regulation test has completed	3UR18650-1-T0512
Target model which is not a new type	3UR18650-1-T1219

Test Item (Function)	The element which is given influence	Presence of change
T1：Altitude Simulation (Decompression load)	・Crimped part, Gasket (Cell) ・Gas Release Vent, Cell Case (Cell) ・Pack (Plastic) Case ・Holding Member(Insulator, Insulation Tape, Both Sides Tape) ・Coating materials	ー
T2：Thermal Shock (Repetition of high temp. and low temp.)	・Crimped part, Gasket (Cell) ・Gas Release Vent, Cell Case (Cell) ・Finished state of Wound Electrodes (Cell) ・Pack (Plastic) Case ・Holding Member(Insulator, Insulation Tape, Both Sides Tape) ・Coating materials	ー
T3：Vibration (Vibration load)	・Finished state of Wound Electrodes (Cell) ・Electric wiring member ・Electronic Parts on a circuit board ・Cell Holding Member (Adhesive, Both Sides Tape, Lib of Plastic Case)	ー
T4：Shock(Shock load)	・Wiring Member ・Electronic Parts on a circuit board ・Cell Holding Member(Adhesive, Both Sides Tape, Lib of Plastic Case) ・Finished state of Wound Electrodes (Cell)	ー
T5：External Short Circuit(Short current)	・Over-voltage Protection ・Current Control Device ・Safety Device of cell (Cell) ・Lead Tab	ー
T6(Cell)：Impact/Crush	・Separator (Cell) ・Insulation State in a cell (Cell)	ー
T7(Pack)：Overcharge (Charge load)	・Overcharge Protection ・Thermal Device ・Safety Device of cell (Cell)	ー
T8(Cell)：Forced Discharge	・Finished state of Wound Electrodes	ー/NA *1
Wh of cell	Is Wh difference of cell less than 20%?	ー
Voltage of cell	Is increase of cell voltage less than 20%?	ー
Judgment result	New Type or not	New・Not new

*1 Judgement has not applied if first checking was run under the UN test manual ver. 5 or former.

Sanyo Energy(Suzou) Co.,Ltd.

approval	Check	Writing
T. Kura	A. Kawauchi	Candy Tang

Panasonic

E1517484 Jan. 26. 2015

Certificate of UN test for Lithium ion battery

Sanyo Energy (Suzhou) Co., Ltd.

UN評価合格
三洋電機株式会社
小型二次電池事業部

T.Kura Manager

Customer Model : L14S3A01
Global Code : BJ-A130352AA
Product Name : 3UR18650-1-T1219

We declare that this battery passed UN test.

Manual of Tests and Criteria (38.3 Lithium batteries)		Test results	Note	Number of test batteries/cells	
No.	Test item				
T 1	Altitude simulation	Pass		First cycle fully charged 4 batteries	After 50 cycles fully charged 4 batteries
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	Pass		First cycle, Fully charged 4 batteries	After 50 cycles, Fully charged 4 batteries
T 8	Forced discharge	Pass		First cycle, fully discharged 10 cells	After 50 cycles, fully discharged 10 cells

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

Lithium ion battery Specification

Item	Nominal value	Note
Watt-hour rating	24 Wh	
Nominal voltage	10.8 V	
Lithium equivalent content	1.98 g	

Above test procedures are compliant to the following manual.
(Manual of Tests and Criteria ST/AC.10/11, PartIII, sub-section 38.3, Rev.5A1 for cell, Rev.5A1 for battery)

UN Test Data (Model:3UR18650-1-T1219)

UN評価合格
三洋電機株式会社
小型二次電池事業部

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 11.6kPa or less for at least six hours at ambient temperature(20±5℃).

SANYO Internal Procedure:

As above.

4.Test Requirements:

No mass loss,no leakage,no venting,no disassembly,no rupture and no fire,and the voltage retention is not less than 90%.

5.Test Date: **2009/6/25**

6.Test Data

Battery No.		Mass(g)		Mass loss (%) (=<0.1%)	Voltage(V)		Voltage Retention (%)(=>90	Other event	Result	Judgement
		Before test	After test		Before test	After test				
At first cycle,in fully charged states	1	140. 14	140. 14	0.00	12. 47	12. 47	100.0	0	PASS	PASS
	2	140. 12	140. 13	0.01	12. 48	12. 47	99.9	0	PASS	
	3	140. 08	140. 09	0.01	12. 47	12. 47	100.0	0	PASS	
	4	139. 99	139. 99	0.00	12. 47	12. 46	99.9	0	PASS	
After 50 cycles ending in fully charged	5	140. 49	140. 50	0.01	12. 47	12. 46	99.9	0	PASS	
	6	140. 41	140. 40	0.01	12. 47	12. 47	100.0	0	PASS	
	7	140. 12	140. 12	0.00	12. 48	12. 47	99.9	0	PASS	
	8	139. 96	139. 97	0.01	12. 47	12. 47	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:3UR18650-1-T1219)

UN評価合格
三洋電機株式会社
小型二次電池事業部

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 to 72±2℃, followed by storage for at least six hours at a test temperature equal to -40±2℃.The maximum time internal between test temperature extremes is 30 minutes.This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ±5℃). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

SANYO Internal Procedure:

As above.

4.Test Requirements:

No mass loss,no leakage,no venting,no disassembly,no rupture and no fire,and the voltage retention is not less than 90%.

5.Test Date: **2009/6/29-2009/7/5**

6.Test Data

Battery No.		Mass(g)		Mass loss (%) (=<0.1%	Voltage(V)		Voltage Retention(%)(=>90%)	Other event	Result	Judgement
		Before test	After test		Before test	After test				
At first cycle,in fully charged states	1	140. 14	140. 10	0.03	12. 47	12. 34	99.0	0	PASS	PASS
	2	140. 13	140. 08	0.04	12. 47	12. 34	99.0	0	PASS	
	3	140. 09	140. 05	0.03	12. 47	12. 34	99.0	0	PASS	
	4	139. 99	139. 95	0.03	12. 46	12. 33	99.0	0	PASS	
After 50 cycles ending in fully charged	5	140. 50	140. 46	0.03	12. 46	12. 34	99.0	0	PASS	
	6	140. 40	140. 37	0.02	12. 47	12. 34	99.0	0	PASS	
	7	140. 12	140. 10	0.01	12. 47	12. 35	99.0	0	PASS	
	8	139. 97	139. 95	0.01	12. 47	12. 34	99.0	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:3UR18650-1-T1219)

UN評価合格
三洋電機株式会社
小型二次電池事業部

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 manner 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 hours 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 is as follows: from 7 Hz a peak acceleration of 1gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm(1.6 mm total excursion) and thefrequency increased until a peak acceleration of 8gn occurs (approximately 50Hz).A peak acceleration of 8 gn is then maintained until the frequency is increased to 200Hz. For large batteries, the peak acceleration of 2 gn is maintained.

SANYO Internal Procedure:

As above.

4.Test Requirements:

No mass loss,no leakage,no venting,no disassembly,no rupture and no fire,and the voltage retention is not less than 90%.

5.Test Date: **2009/7/7-2009/7/8**

6.Test Data

Battery No.		Mass(g)		Mass loss (%) (=<0.1%	Voltage(V)		Voltage Retention(%)(=>90%)	Other event	Result	Judgement
		Before test	After test		Before test	After test				
At first cycle,in fully charged states	1	140. 10	140. 07	0.02	12. 34	12. 33	99.9	0	PASS	PASS
	2	140. 08	140. 07	0.01	12. 34	12. 32	99.8	0	PASS	
	3	140. 05	140. 06	0.01	12. 34	12. 33	99.9	0	PASS	
	4	139. 95	139. 96	0.01	12. 33	12. 31	99.8	0	PASS	
After 50 cycles ending in fully charged	5	140. 46	140. 45	0.01	12. 34	12. 32	99.8	0	PASS	
	6	140. 37	140. 38	0.01	12. 34	12. 33	99.9	0	PASS	
	7	140. 10	140. 07	0.02	12. 35	12. 33	99.8	0	PASS	
	8	139. 95	139. 94	0.01	12. 34	12. 32	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:3UR18650-1-T1219)

UN評価合格
三洋電機株式会社
小型二次電池事業部

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 mounting surfaces of each test battery. Each cell or battery shall be subjected to a half-sine shock of pack acceleration of 150 g_n and pulse duration of 6 milliseconds. Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 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 shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.

SANYO Internal Procedure:

As above.

4.Test Requirements:

No mass loss,no leakage,no venting,no disassembly,no rupture and no fire,and the voltage retention is not less than 90%.

5.Test Date: **2009/7/8**

6.Test Data

Battery No.		Mass(g)		Mass loss (%) (=<0.1%	Voltage(V)		Voltage Retention(%)(=>90%)	Other event	Result	Judgement
		Before test	After test		Before test	After test				
At first cycle,in fully charged states	1	140. 07	140. 08	0.01	12. 33	12. 33	100.0	0	PASS	PASS
	2	140. 07	140. 07	0.00	12. 32	12. 32	100.0	0	PASS	
	3	140. 06	140. 05	0.01	12. 33	12. 33	100.0	0	PASS	
	4	139. 96	139. 95	0.01	12. 31	12. 31	100.0	0	PASS	
After 50 cycles ending in fully charged	5	140. 45	140. 42	0.02	12. 32	12. 32	100.0	0	PASS	
	6	140. 38	140. 37	0.01	12. 33	12. 33	100.0	0	PASS	
	7	140. 07	140. 06	0.01	12. 33	12. 32	99.9	0	PASS	
	8	139. 94	139. 95	0.01	12. 32	12. 32	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:3UR18650-1-T1219)

UN評価合格
三洋電機株式会社
[illegible]電池事業部

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℃ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1ohm at 55±2℃.This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 55±2℃. The cell or battery must be observed for a further six hours for the test to be concluded.

SANYO Internal Procedure:

As above.

4.Test Requirements:

External temperature of test batteries does not exceed 170℃ and there is no disassembly,no rupture and no fire within six hours after this test.

5.Test Date: **2009/7/9**

6.Test Data

Battery No.		Maximum temperature (°C)	Other event	Result	Judgement
At first cycle,in fully charged states	1	55.0	0	PASS	PASS
	2	55.2	0	PASS	
	3	55.2	0	PASS	
	4	55.1	0	PASS	
After 50 cycles ending in fully charged	5	54.9	0	PASS	
	6	55.1	0	PASS	
	7	55.0	0	PASS	
	8	54.9	0	PASS	

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

UN Test Data (Model:3UR18650-1-T1219)

UN評価合格
三洋電機株式会社
[illegible]

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℃ and there is no disassembly,no rupture and no fire during the test and within six hours after the test.

5.Test Date: 2013/03/06

6.Test Data:

Cell No.		Maximum Temperature(°C)	Other event	Result	Judgement
At first cycle, 50% charged states	1	21.1	0	PASS	PASS
	2	21.3	0	PASS	
	3	20.3	0	PASS	
	4	22.6	0	PASS	
	5	22.9	0	PASS	

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

UN Test Data (Model:3UR18650-1-T1219)

UN評価合格
三洋電機株式会社

1.Test Item: Overcharged (T7)

2.Test Purpose: This test evaluates the ability of a rechargeable battery to withstand an overcharge condition.

3.Test Procedure:

The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:

(a) when the manufacturer's recommended charge voltage is not more than 18V,the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V.

(b) when the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.

Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.

SANYO Internal Procedure:

Min.Charge Voltage:	22V
Charge Current:	3.6A

4.Test Requirements:

There is no disassembly and no fire within seven days after the test.

5.Test Date: **2009/7/1-2009/7/9**

6.Test Data

Battery No.		Event	Result	Judgement
At first cycle in fully charged states	1	0	PASS	PASS
	2	0	PASS	
	3	0	PASS	
	4	0	PASS	
After 50 cycles ending in fully charged states	5	0	PASS	
	6	0	PASS	
	7	0	PASS	
	8	0	PASS	

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

UN Test Data (Model:3UR18650-1-T1219)

UN評価合格
三洋電機株式会社

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 a 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 in 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: 2011/03/07 - 2011/03/14

6.Test Data

Cell No.		Maximum Temperature(°C)	Other event	Result	Judgement
At first cycle, in fully discharged states	1	83.6	0	PASS	PASS
	2	87.0	0	PASS	
	3	82.0	0	PASS	
	4	90.0	0	PASS	
	5	88.0	0	PASS	
	6	91.0	0	PASS	
	7	83.0	0	PASS	
	8	75.0	0	PASS	
	9	80.0	0	PASS	
	10	81.0	0	PASS	
After 50 cycles ending, in fully discharged states	11	98.3	0	PASS	
	12	101.9	0	PASS	
	13	102.1	0	PASS	
	14	101.3	0	PASS	
	15	97.1	0	PASS	
	16	97.8	0	PASS	
	17	102.2	0	PASS	
	18	101.5	0	PASS	
	19	98.9	0	PASS	
	20	99.4	0	PASS	

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