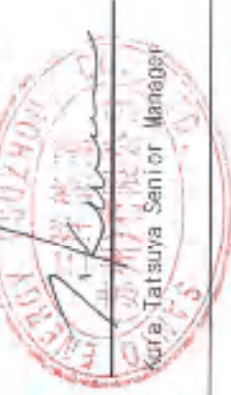


Certificate of UN test for Lithium ion battery

Sanyo Energy(Suzhou)Co., Ltd.



Customer Model : L09S8L09
 Sanyo Model : 2UF103450-2-T0521
 Sanyo Product Code : F12440142

Manual of Tests and Criteria (38.3 Lithium batteries)		Test results	Note
No.	Test item		
T1	Altitude simulation	Pass	
T2	Thermal Test	Pass	
T3	Vibration	Pass	
T4	Shock	Pass	
T5	External short circuit	Pass	
T6	Impact	Pass	do in Japan
T7	Overcharged	Pass	For battery only
T8	Forced discharge	-	For cell only

Lithium ion battery Specification

item	Nominal value	Note
Watt-hour rating/Rated capacity	69Wh	
Nominal voltage	7.4V	
Lithium equivalent content	5.52g	

We declare that the above mentioned test is the result of being checked according to UNtest (Manual of Tests and Criteria ST/SG/AC.10/11/Rev.4 PartIII, sub-section 38.3)

UN Test Data (Model:2UF103450-2-T0521)

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°C).

SANYO Internal Procedure:

As above.

4.Test Requirements:

No mass loss(less than 0.1%),no leakage,no venting,no disassembly,no rupture and no fire,and the voltage retention is not less than 90%.

The requirement relating to voltage is not applicable to test batteries at fully discharged states.

5.Test Date: 2009/8/24

6.Test Data

Battery No.	Mass(g)		Voltage(V)	Voltage Retention(%) (N>=90%)	Other event	Result	Judgement	
	Before test	After test						
At first cycle, fully charged states	1	451.05	451.05	0.000	8.33	8.32	99.9	PASS
	2	450.95	450.95	0.000	8.30	8.29	99.9	PASS
	3	451.74	451.73	0.002	8.28	8.28	100.0	PASS
	4	450.65	450.65	0.000	8.33	8.32	99.9	PASS
At first cycle, fully discharged states	5	452.28	452.27	0.002				PASS
	6	451.07	451.07	0.000				PASS
	7	450.92	450.90	0.004				PASS
	8	451.08	451.08	0.000				PASS
After 50 cycles ending in fully charged states	9	450.45	450.45	0.000	8.33	8.32	99.9	PASS
	10	451.02	451.03	0.002	8.28	8.27	99.9	PASS
	11	451.92	451.93	0.002	8.27	8.26	99.9	PASS
	12	452.50	452.49	0.002	8.29	8.28	99.9	PASS
After 50 cycles ending in fully discharged states	13	451.05	451.03	0.004				PASS
	14	451.75	451.76	0.002				PASS
	15	451.69	451.70	0.002				PASS
	16	452.89	452.87	0.004				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:2UF103450-2-T0521)

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 75±2°C, followed by storage 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 10 times, 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.

SANYO Internal Procedure:

As above.

4.Test Requirements:

No mass loss(less than 0.1%),no leakage,no venting,no disassembly,no rupture and no fire,and the voltage retention is not less than 90%.

The requirement relating to voltage is not applicable to test batteries at fully discharged states.

5.Test Date: 2009/8/25-2009/8/31

6.Test Data

Battery No.	Mass(g)		Mass loss (%) (<=0.1%)	Voltage(V)		Voltage Retention(%) X(→90%)	Other event	Result	Judgement
	Before test	After test		Before test	After test				
At first cycle in fully discharged states	1	451.05	450.90	0.033	8.32	8.24	99.0	PASS	PASS
	2	450.95	450.79	0.035	8.29	8.22	99.2	PASS	
	3	451.73	451.60	0.029	8.28	8.20	99.0	PASS	
	4	450.65	450.43	0.049	8.32	8.21	98.7	PASS	
At first cycle in fully discharged states	5	452.27	452.15	0.027				PASS	
	6	451.07	451.05	0.004				PASS	
	7	450.90	450.76	0.031				PASS	
	8	451.08	450.93	0.033				PASS	
After 50 cycles ending in fully charged states	9	450.45	450.35	0.022	8.32	8.24	99.0	PASS	
	10	451.03	450.89	0.031	8.27	8.23	99.5	PASS	
	11	451.93	451.72	0.046	8.26	8.20	99.3	PASS	
	12	452.49	452.34	0.033	8.28	8.24	99.5	PASS	
After 50 cycles ending in fully discharged states	13	451.03	450.86	0.038				PASS	
	14	451.76	451.56	0.044				PASS	
	15	451.70	451.55	0.033				PASS	
	16	452.87	452.72	0.033				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:2UF103450-2-T0521)

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 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 the frequency 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.

SANYO Internal Procedure:

As above.

4. Test Requirements:

No mass loss(less than 0.1%),no leakage,no venting,no disassembly,no rupture and no fire,and the voltage retention is not less than 90%.

The requirement relating to voltage is not applicable to test batteries at fully discharged states.

5. Test Date: 2009/9/1-2009/9/3

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	450.90	450.87	0.007	8.24	8.23	99.9	PASS	PASS
	2	450.79	450.76	0.007	8.22	8.22	100.0	PASS	
	3	451.60	451.59	0.002	8.20	8.19	99.9	PASS	
	4	450.43	450.41	0.004	8.21	8.20	99.9	PASS	
At first cycle in fully discharged states	5	452.15	452.13	0.004				PASS	
	6	451.05	450.94	0.024				PASS	
	7	450.76	450.74	0.004				PASS	
	8	450.93	450.92	0.002				PASS	
After 50 cycles ending in fully charged states	9	450.35	450.32	0.007	8.24	8.24	100.0	PASS	
	10	450.89	450.88	0.002	8.23	8.23	100.0	PASS	
	11	451.72	451.70	0.004	8.20	8.19	99.9	PASS	
	12	452.34	452.30	0.009	8.24	8.22	99.8	PASS	
After 50 cycles ending in fully discharged states	13	450.86	450.83	0.007				PASS	
	14	451.56	451.55	0.002				PASS	
	15	451.55	451.55	0.000				PASS	
	16	452.72	452.70	0.004				PASS	

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

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 peak acceleration of 150 g_a 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_a 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(less than 0.1%),no leakage,no venting,no disassembly,no rupture and no fire,and the voltage retention is not less than 90%.

The requirement relating to voltage is not applicable to test batteries at fully discharged states.

5.Test Date: 2009/9/3

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 discharged states	1	450.87	450.85	0.004	8.23	8.22	99.9	0	PASS
	2	450.76	450.74	0.004	8.22	8.21	99.9	0	PASS
	3	451.59	451.56	0.007	8.19	8.19	100.0	0	PASS
	4	450.41	450.40	0.002	8.20	8.20	100.0	0	PASS
At first cycle, in fully discharged states	5	452.13	452.10	0.007				0	PASS
	6	450.94	450.93	0.002				0	PASS
	7	450.74	450.71	0.007				0	PASS
	8	450.92	450.90	0.004				0	PASS
After 50 cycles ending in fully discharged states	9	450.32	450.30	0.004	8.24	8.23	99.9	0	PASS
	10	450.88	450.85	0.007	8.23	8.22	99.9	0	PASS
	11	451.70	451.69	0.002	8.19	8.19	100.0	0	PASS
	12	452.30	452.29	0.002	8.22	8.22	100.0	0	PASS
After 50 cycles ending in fully discharged states	13	450.83	450.82	0.002				0	PASS
	14	451.55	451.53	0.004				0	PASS
	15	451.55	451.53	0.004				0	PASS
	16	452.70	452.68	0.004				0	PASS

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

PASS

UN Test Data (Model:2UF103450-2-T0521)

P.7/10

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 $55\pm 2^{\circ}\text{C}$ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than $0.1\ \Omega$ at $55\pm 2^{\circ}\text{C}$. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $55\pm 2^{\circ}\text{C}$. 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°C and there is no disassembly, no rupture and no fire within six hours of this test.

5. Test Date: 2009/9/4-2009/9/7

6. Test Data

Battery No.	Maximum temperature ($^{\circ}\text{C}$)	Other event	Result	Judgement
1	54.9	0	PASS	PASS
2	54.9	0	PASS	
3	54.9	0	PASS	
4	55.0	0	PASS	
5	54.7	0	PASS	
6	54.8	0	PASS	
7	54.9	0	PASS	
8	54.8	0	PASS	
9	54.9	0	PASS	
10	54.9	0	PASS	
11	54.9	0	PASS	
12	54.9	0	PASS	
13	54.9	0	PASS	
14	55.6	0	PASS	
15	54.8	0	PASS	
16	54.9	0	PASS	

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

UN Test Data (Model: 2UF103450-2-T0521)

1. Test Item: Impact (T6)

2. Test Purpose: This test simulates an impact

3. Test Procedure:

The test sample cell or component cell is to be placed on a flat surface. A 15.8mm diameter bar is to be placed across the centre of the sample. A 9.7kg mass is to be dropped from a height of 61±2.5cm onto the sample.

A cylindrical or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm diameter curved surface. The impact is to be applied across the centre of the test sample. A prismatic cell is also to be rotated 60 degrees around its longitudinal axis so that both the wide and narrow sides will be subjected to the impact. Each sample is to be subjected to only a single impact. Separate samples are to be used for each impact.

A coin or button cell is to be impacted with the flat surface of the sample parallel to the flat surface and the 15.8mm diameter curved surface lying across its centre.

SANYO Internal Procedure:

As above.

4. Test Requirements:

External temperature of test batteries does not exceed 170°C and there is no disassembly and no fire within six hours of this test.

5. Test Date: 2008/1/29

6. Test Data

Cell No.	Maximum Temperature(°C)	Other event	Result	Judgement
1	130	0	PASS	PASS
2	121	0	PASS	
3	126	0	PASS	
4	122	0	PASS	
5	124	0	PASS	
6				
7				
8				
9				
10				
11	72	0	PASS	
12	88	0	PASS	
13	69	0	PASS	
14	66	0	PASS	
15	68	0	PASS	
16				
17				
18				
19				
20				

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

UN Test Data (Model:2UF103450-2-T0521)

P.9/10

1. Test Item: Overcharge (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 1.8V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 2.2V.

(b) when the manufacturer's recommended charge voltage is more than 1.8V, 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:	16.8V
Charge Current:	6.84A

4. Test Requirements:

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

5. Test Date: 2009/8/25-2009/9/3

6. Test Data

Battery No.	Event	Result	Judgement
1	0	PASS	PASS
2	0	PASS	
3	0	PASS	
4	0	PASS	
5	0	PASS	
6	0	PASS	
7	0	PASS	
8	0	PASS	

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