

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 1 of 13

Date: Feb 16, 2016

E-ONE MOLI ENERGY CORP.

Tainan Science-Based Industry Park No.10 Dail 2nd Rd., Shan-Hwa, Tainan City, Taiwan R.O.C.

Tel: 886-6-505-0666, Fax: 886-6-505-0777

<http://www.molicel.com>.

The following merchandise was submitted and identified by the vendor as:

Item	Information	Comments
Product Description	Lithium-Ion Rechargeable Battery	
Battery Manufacturer	E-One Moli Energy Corp	
Model No.	IHR-18650B	
Rated Capacity	2250mAh	
Nominal Voltage	3.6V	
Charge Current	Less than 2.2A	
Charge Voltage	4.2V \pm 0.05V	
Discharge Current	5.0A (\leq 45 °C), 4.0A (\leq 60°C)	

We have tested the submitted sample(s) as requested and the following results were obtained:

Test Required : Section 38.3 Lithium metal and lithium ion batteries in UN ST/SG/AC.10/11/Rev.6

Recommendations on the TRANSPORT OF DANGEROUS GOODS Manual of

Tests and Criteria Fifth revised edition

Conclusion

Submitted samples comply with the requirement of Section 38.3 Lithium metal and lithium ion batteries in UN ST/SG/AC.10/11/Rev.6, Recommendations on the TRANSPORT OF DANGEROUS GOODS Manual of Tests and Criteria Fifth revised edition.

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 2 of 13

Test Program:

ID	Test item	Test Conditions
T1	Altitude Simulation	Stored at a pressure of 11.6 kPa for 6 hrs at 20 ± 5 °C.
T2	Thermal Test	75 ± 2 °C(6hrs) \Leftrightarrow 40 ± 2 °C(6hrs) in 30 mins, 10 times.
T3	Vibration	7Hz \Leftrightarrow 200Hz \Leftrightarrow 7Hz in 15mins, 12 cycles for a total of 3hrs per direction, 3 directions.
T4	Shock	A half-sine shock of peak acceleration of 150g, pulse duration of 6ms, 3 shocks(+) and 3 shocks(-) per direction, 3 directions for a total of 18 shocks.
T5	External Short Circuit	External resistance of less than 0.1 ohm, case temp: 57 ± 4 °C, test time: 1hr or case temperature return, then deposit 6 hrs at 20 ± 5 °C.
T6	Impact	ψ 15.8 mm bar across the centre of the sample, 9.1 kg mass is to be dropped from 61 ± 2.5 cm height.
T7	Overcharge (Pack only)	Charge Current: 2 times I(max), two times V(max) or 22V, when V(max)<18V, 1.2 times V(max), when V(max)>18V, test time: 24hrs at 20 ± 5 °C.
T8	Forced Discharge	Discharge Current: I(max), 12V DC power supply and resistive load in series with cell, test time: rated capacity divided by I(max), then deposit 7 days at 20 ± 5 °C.

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 3 of 14

Date of Tests:

Test Started	Test Completed
Jan 9, 2015	Jan 30, 2015

Lab Environmental Conditions:

Ambient temperature: $20\pm 5^{\circ}\text{C}$
Relative humidity: $55\pm 20\%\text{RH}$

Sample Condition:

Sample Status	Sample Size	Sample No.
1. First cycle in fully charged status	25pcs	No.1~No.25
2. After fifty cycles ending in fully charged status	10pcs	No.26~No.35

Test Equipment:

Name	Brand
Rechargeable Battery Testing System	MOLICEL
Vacuum-Temperature Cabinet	SINKU KIKO
Thermal Shock Tester	KSON
Vibration Test System	KING DESIGN
Controller Panel	KING DESIGN
Control Accelerometer	KING DESIGN
Shock Test System	KING DESIGN
Data Acquisition & Analysis System	KING DESIGN
ICP Accelerometer	KING DESIGN
Data Acquisition/ Switch Unit	HP
True RMS Multimeter	ADEX
Electronic Precision Balance	OHAUS
Impact Test System	AUTOLAND
DC Electronic Load	PRODIGT
DC Power Supply	Agilent

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 4 of 13

Images:



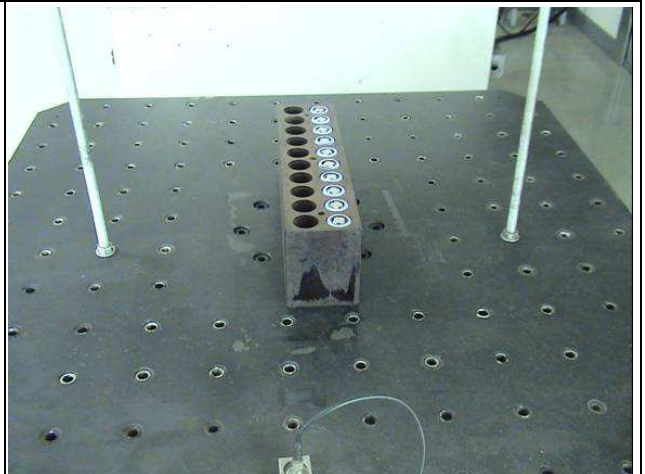
**Appearance of sample:
(2250mAh)**



T1: Altitude Simulation



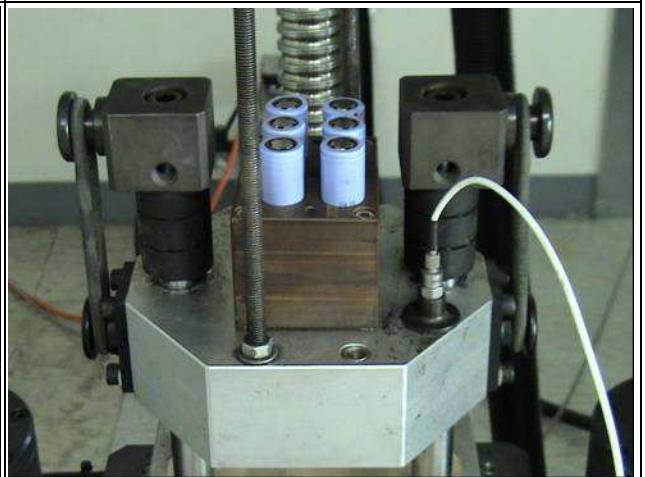
T2: Thermal Test



T3: Vibration Test



T3: Vibration Test



T4: Shock Test

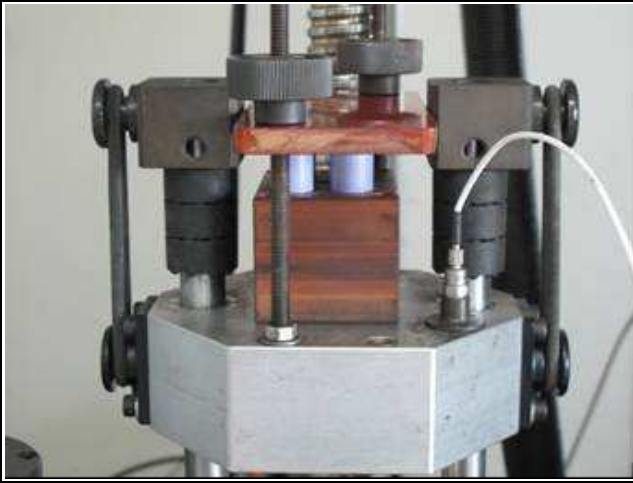
TEST REPORT

Reliability Laboratory

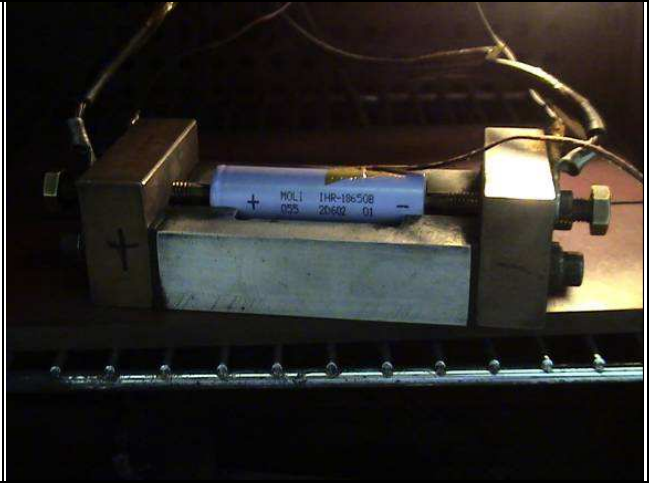
Report No.:160216-10-2

Page: 5 of 14

Images--Continued:



T4: Shock Test



T5: External Short Circuit Test



T6: Impact Test



T8: Forced discharge Test

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 6 of 13

Test Result:

T1 Altitude Simulation

Model: IHR-18650B									
Sample No.	Weight Measurement				Voltage Measurement				Appearance Check
	Unit:gram				Unit:Volt				
	Initial (W ₀)	Final (W ₁)	Mass loss (W ₀ -W ₁)/W ₀	Mass loss < 0.1%	Initial (V ₀)	Final (V ₁)	(V ₁ /V ₀)	(V ₁ /V ₀) >90%	No leakage, No venting, No disassembly, No rupture and No fire
1	44.7129	44.7119	0.0000	0.0%	4.177	4.173	0.999	100.1%	PASS
2	44.5871	44.5865	0.0000	0.0%	4.176	4.172	0.999	100.1%	PASS
3	44.6590	44.6585	0.0000	0.0%	4.177	4.173	0.999	100.1%	PASS
4	44.6290	44.6296	0.0000	0.0%	4.178	4.174	0.999	100.1%	PASS
5	44.5229	44.5223	0.0000	0.0%	4.176	4.172	0.999	100.1%	PASS
6	44.6169	44.6178	0.0000	0.0%	4.176	4.172	0.999	100.1%	PASS
7	44.6206	44.6195	0.0000	0.0%	4.176	4.172	0.999	100.1%	PASS
8	44.6059	44.6059	0.0000	0.0%	4.177	4.173	0.999	100.1%	PASS
9	44.4361	44.4376	0.0000	0.0%	4.176	4.172	0.999	100.1%	PASS
10	44.5006	44.5011	0.0000	0.0%	4.177	4.173	0.999	100.1%	PASS
Conclusion	Meet the requirement of section 38.3.4.1 Test T.1: Altitude Simulation.								

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 7 of 13

Test Result:

T2 Thermal Test

Model: IHR-18650B									
Sample No.	Weight Measurement				Voltage Measurement				Appearance Check
	Unit:gram				Unit:Volt				
	Initial (W ₀)	Final (W ₁)	Mass loss (W ₀ -W ₁)/W ₀	Mass loss < 0.1%	Initial (V ₀)	Final (V ₁)	(V ₁ /V ₀)	(V ₁ /V ₀) >90%	No leakage, No venting, No disassembly, No rupture and No fire
1	44.7119	44.7089	0.0001	0.0%	4.173	4.128	0.989	98.9%	PASS
2	44.5865	44.5833	0.0001	0.0%	4.172	4.126	0.989	98.9%	PASS
3	44.6585	44.6532	0.0001	0.0%	4.173	4.126	0.989	98.9%	PASS
4	44.6296	44.6180	0.0003	0.0%	4.174	4.126	0.989	98.9%	PASS
5	44.5223	44.5198	0.0001	0.0%	4.172	4.127	0.989	98.9%	PASS
6	44.6178	44.6138	0.0001	0.0%	4.172	4.124	0.988	98.8%	PASS
7	44.6195	44.6172	0.0001	0.0%	4.172	4.126	0.989	98.9%	PASS
8	44.6059	44.6040	0.0000	0.0%	4.173	4.126	0.989	98.9%	PASS
9	44.4376	44.4352	0.0001	0.0%	4.172	4.126	0.989	98.9%	PASS
10	44.5011	44.5000	0.0000	0.0%	4.173	4.128	0.989	98.9%	PASS
Conclusion	Meet the requirement of section 38.3.4.2 Test T.2: Thermal test.								

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 8 of 14

Test Result:

T3 Vibration

Model: IHR-18650B									
Sample No.	Weight Measurement				Voltage Measurement				Appearance Check
	Initial (W ₀)	Final (W ₁)	Mass loss (W ₀ -W ₁)/W ₀	Mass loss < 0.1%	Initial (V ₀)	Final (V ₁)	(V ₁ /V ₀)	(V ₁ /V ₀) >90%	
									No leakage, No venting, No disassembly, No rupture and No fire
1	44.7089	44.7081	0.0000	0.0%	4.128	4.128	1.000	100.0%	PASS
2	44.5833	44.5851	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
3	44.6532	44.6545	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
4	44.6180	44.6167	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
5	44.5198	44.5191	0.0000	0.0%	4.127	4.127	1.000	100.0%	PASS
6	44.6138	44.6136	0.0000	0.0%	4.124	4.125	1.000	100.0%	PASS
7	44.6172	44.6159	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
8	44.6040	44.6039	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
9	44.4352	44.4361	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
10	44.5000	44.4979	0.0000	0.0%	4.128	4.128	1.000	100.0%	PASS
Conclusion	Meet the requirement of section 38.3.4.3 Test T.3: Vibration Test.								

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 9 of 13

Test Result:

T4 Shock

Model: IHR-18650B									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				Appearance Check No leakage, No venting, No disassembly, No rupture and No fire
	Initial (W ₀)	Final (W ₁)	Mass loss (W ₀ -W ₁)/W ₀	Mass loss < 0.1%	Initial (V ₀)	Final (V ₁)	(V ₁ /V ₀)	(V ₁ /V ₀) >90%	
1	44.7081	44.7078	0.0000	0.0%	4.128	4.128	1.000	100.0%	PASS
2	44.5851	44.5844	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
3	44.6545	44.6546	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
4	44.6167	44.6163	0.0000	0.0%	4.126	4.125	1.000	100.0%	PASS
5	44.5191	44.5184	0.0000	0.0%	4.127	4.127	1.000	100.0%	PASS
6	44.6136	44.6136	0.0000	0.0%	4.125	4.125	1.000	100.0%	PASS
7	44.6159	44.6143	0.0000	0.0%	4.126	4.125	1.000	100.0%	PASS
8	44.6039	44.6042	0.0000	0.0%	4.126	4.126	1.000	100.0%	PASS
9	44.4361	44.4355	0.0000	0.0%	4.126	4.124	1.000	100.0%	PASS
10	44.4979	44.4969	0.0000	0.0%	4.128	4.126	1.000	100.0%	PASS
Conclusion	Meet the requirement of section 38.3.4.4 Test T.4: Shock Test.								

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 10 of 13

Test Result:

T5 **External Short Circuit**

Model: IHR-18650B			
Sample No.	External Temperature Unit:°C		Appearance Check
	Temperature (T1)	T1 < 170°C	No disassembly, No rupture and No fire with in six hours
1	62	62	PASS
2	61	61	PASS
3	61	61	PASS
4	60	60	PASS
5	61	61	PASS
6	62	62	PASS
7	62	62	PASS
8	60	60	PASS
9	61	61	PASS
10	63	63	PASS
Conclusion	Meet the requirement of section 38.3.4.5 Test T5: External short circuit.		

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 11 of 13

Test Result:

T6 Impact

Model: IHR-18650B			
Sample No.	Impact Temperature Unit:°C		Appearance Check
	Temperature (T1)	T1 < 170°C	No disassembly, No rupture and No fire
11	86	86	PASS
12	85	85	PASS
13	79	79	PASS
14	68	68	PASS
15	86	86	PASS
Conclusion	Meet the requirement of section 38.3.4.6Test T6: Impact		

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 12 of 13

Test Result:

T8 **Forced Discharge**

Model: IHR-18650B		
Fresh cell (SOC:0%)		
Sample No.	Forced Discharge Temperature Unit:°C	Appearance Check
	Temperature (T1)	No disassembly and No fire within seven days of the test
16	54	PASS
17	60	PASS
18	63	PASS
19	65	PASS
20	57	PASS
21	60	PASS
22	65	PASS
23	60	PASS
24	57	PASS
25	69	PASS
50 Cycled cell (SOC:0%)		
Sample No.	Forced Discharge Temperature Unit:°C	Appearance Check
	Temperature (T1)	No disassembly and No fire within seven days of the test
26	63	PASS
27	54	PASS
28	53	PASS
29	68	PASS
30	57	PASS
31	43	PASS
32	54	PASS
33	59	PASS
34	53	PASS
35	57	PASS
Conclusion	Meet the requirement of section 38.3.4.8 Test T.8: Forced Discharge	

TEST REPORT

Reliability Laboratory

Report No.:160216-10-2

Page: 13 of 13

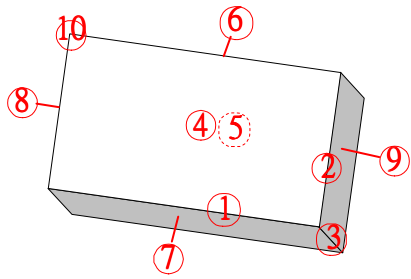
Test Summary:

Test Item	Test Result	Note
Test T.1: Altitude simulation	Pass	
Test T.2: Thermal test	Pass	
Test T.3: Vibration	Pass	
Test T.4: Shock	Pass	
Test T.5: External short circuit	Pass	
Test T.6: Impact Test	Pass	
Test T.8: Forced discharge Test	Pass	

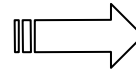
— — — The End of Test Report — — —

IHR-18650B 1.2m Drop test

(Pass, without damage and shifting of contents)



After drop



Certificate of Compliance

E-ONE MOLI ENERGY CORP.

Tainan Science-Based Industry Park
No. 10 Dail 2nd Rd., Shan-Hwa, Tainan City,
Taiwan R.O.C.
Tel: 886-6-505-0666, Fax: 886-6-505-0777
<http://www.molicel.com>.

Issue Date: Feb 16, 2016

The following products have been tested in accordance with the UN document titled 'AMENDMENTS TO THE FIFTH REVISED EDITION OF THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MANUAL OF TESTS AND CRITERIA (Refer to UN ST/SG/AC.10/11/Rev.6)' and found to comply with the stated criteria:

<u>Item</u>	<u>Product Part No</u>	<u>Rated Capacity</u>
1	IHR-18650B	2.25Ah

All test records are maintained on file at E-One Moli Energy Corp.

Sincerely,



2016/2/16

Product Evaluation Engineer, QA