TEST REPORT

Reliability Laboratory

Report No.: 181024-10-1
Page: 1 of 13
Date: Oct 24, 2018

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, Name: KUO-YU-LUN, E-Mail:ylkuo@molicel.com, 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.	ICP-103450-M20A	
Rated Capacity	2000mAh	
Nominal Voltage	3.7V	
Charge Current	Less than 6.0A	
Charge Voltage	4.2V ± 0.05V	
Discharge Current	4.0A (>0 ^{o}C)	
Discharge Cutoff Voltage	3.0V	
Mass	42.0 g (Max)	

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-AC10-11-Rev6-Amend1e Recommendations on the TRANSPORT OF DANGEROUS GOODS Manual of Tests and Criteria Sixfth Amend1e revised edition

Conclusion
Submitted samples comply with the requirement of Section 38.3 Lithium metal and lithium ion batteries in UN UN ST-SG-AC10-11-Rev6-Amend1e, Recommendations on the TRANSPORT OF DANGEROUS GOODS Manual of Tests and Criteria Sixfth Amend1e revised edition.

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Test Program:

ID	Test item	Test Conditions
T1	**Altitude Simulation**	Stored at a pressure of 11.6 kPa for 6 hrs at 20 ± 5 ℃.
T2	**Thermal Test**	72 ± 2 ℃(6hrs)<=>- 40 ± 2 ℃(6hrs) in 30 mins, 10 times.
T3	**Vibration**	7Hz <=> 200Hz <=> 7Hz in 15mins, 12 cycles for a total of 3hrs per direction, 3 dietections.
T4	**Shock**	A half-sine shock of peak acceleration of 150g, pluse 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℃, test time: 1hr or case temperature return, then deposit 6 hrs at 20 ± 5 ℃.
T6	**Crush**	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; The applied force reaches 13 kN ± 0.78 kN;Example: The force shall be applied by a hydraulic ram with a 32 mm diameter piston until a pressure of 17 MPa is reached on the hydraulic ram; The voltage of the cell drops by at least 100 mV; or; The cell is deformed by 50% or more of its original thickness
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 ℃.
T8	**Forced Discharge**	Discharge Current: I(max), 12V DC power supply and resistive load in series with cell, test time: rated capacity devided by I(max), then deposit 7 days at 20 ± 5 ℃.

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Date of Tests:

Test Started	Test Completed
Sep 20, 2018	Oct 25, 2018

Lab Environmental Conditions:

Ambient temperature: 20±5 °C
Relative humidity: 55±20%RH

Sample Condition:

Sample Status	Sample Size	Sample No.
1. First cycle in fully charged status	20pcs	No.1~No.20
2. After 25th cycles ending in fully charged status	20pcs	No.21~No.40

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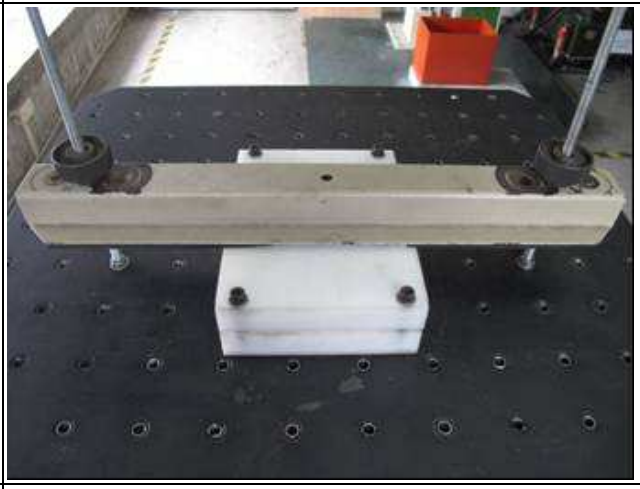
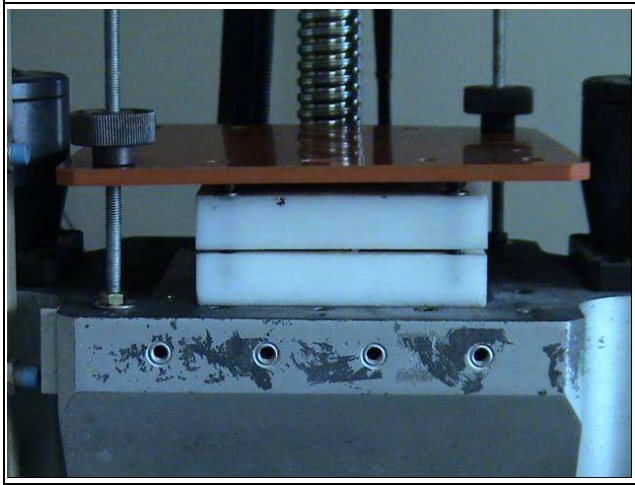
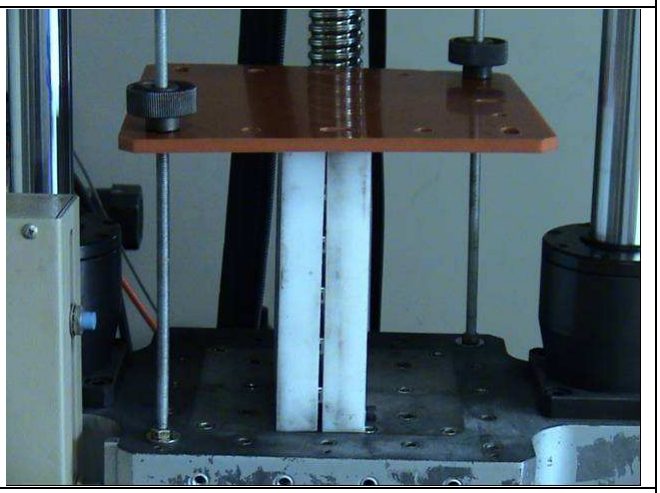
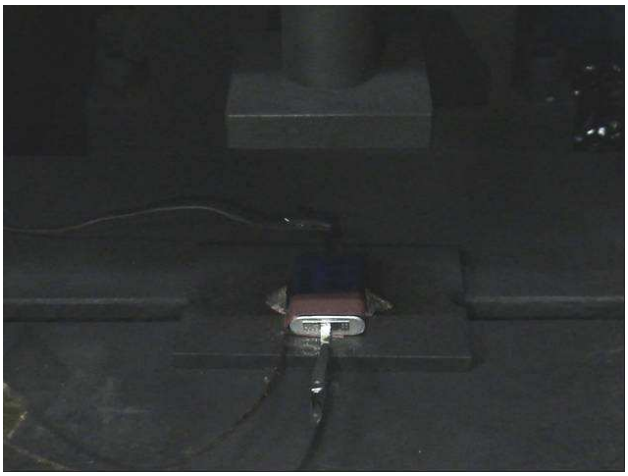
Images:

	
Appearance of sample: (2000mAh)	**T1: Altitude Simulation**
	
T2: Thermal Test	**T3: Vibration Test**
	
T3: Vibration Test	**T4: Shock Test**

Images--Continued:

	
T5: External Short Circuit Test	**T6: Crush Test**
	
T7: Over charge	**T8:Forced discharge Test**

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Test Result:

T1 **Altitude Simulation**

Model: ICP-103450-M20A									
Fresh cell (SOC:100%)									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				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	38.9406	38.9385	0.0001	0.0%	4.172	4.172	1.000	100.0%	PASS
2	38.9211	38.9187	0.0001	0.0%	4.171	4.170	1.000	100.0%	PASS
3	38.9743	38.9721	0.0001	0.0%	4.170	4.169	1.000	100.0%	PASS
4	38.9969	38.9947	0.0001	0.0%	4.170	4.170	1.000	100.0%	PASS
5	38.9243	38.9217	0.0001	0.0%	4.173	4.172	1.000	100.0%	PASS
25 Cycled cell (SOC:100%)									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				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
21	38.6135	38.6148	0.0000	0.0%	4.172	4.174	1.000	100.0%	PASS
22	38.5544	38.5557	0.0000	0.0%	4.169	4.172	1.001	100.1%	PASS
23	38.6360	38.6376	0.0000	0.0%	4.169	4.172	1.001	100.1%	PASS
24	38.6625	38.6645	-0.0001	0.0%	4.168	4.171	1.001	100.1%	PASS
25	38.5477	38.5494	0.0000	0.0%	4.169	4.172	1.001	100.1%	PASS
Conclusion	Meet the requirement of section 38.3.4.1 Test T.1: Altitude Simulation.								

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Test Result:

T2 **Thermal Test**

Model: ICP-103450-M20A									
Fresh cell (SOC:100%)									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				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	38.9385	38.939	0.0000	0.0%	4.172	4.117	0.987	98.7%	PASS
2	38.9187	38.921	0.0000	0.0%	4.170	4.116	0.987	98.7%	PASS
3	38.9721	38.973	0.0000	0.0%	4.169	4.115	0.987	98.7%	PASS
4	38.9947	38.997	-0.0001	0.0%	4.170	4.115	0.987	98.7%	PASS
5	38.9217	38.922	0.0000	0.0%	4.172	4.118	0.987	98.7%	PASS
25 Cycled cell (SOC:100%)									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				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
21	38.6148	38.6120	0.0001	0.0%	4.103	4.172	1.017	101.7%	PASS
22	38.5557	38.5538	0.0000	0.0%	4.099	4.169	1.017	101.7%	PASS
23	38.6376	38.6353	0.0001	0.0%	4.101	4.169	1.017	101.7%	PASS
24	38.6645	38.6619	0.0001	0.0%	4.095	4.168	1.018	101.8%	PASS
25	38.5494	38.5476	0.0000	0.0%	4.098	4.169	1.017	101.7%	PASS
Conclusion	Meet the requirement of section 38.3.4.2 Test T.2: Thermal test.								

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Test Result:

T3 **Vibration**

Model: ICP-103450-M20A									
Fresh cell (SOC:100%)									
Sample No.	**Weight Measurement Unit:gram**				**Voltage Measurement Unit:Volt**				**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	38.939	38.9386	0.0000	0.0%	4.117	4.117	1.000	100.0%	PASS
2	38.921	38.9199	0.0000	0.0%	4.116	4.116	1.000	100.0%	PASS
3	38.973	38.9733	0.0000	0.0%	4.115	4.115	1.000	100.0%	PASS
4	38.997	38.9963	0.0000	0.0%	4.115	4.115	1.000	100.0%	PASS
5	38.922	38.9231	0.0000	0.0%	4.118	4.117	1.000	100.0%	PASS
25 Cycled cell (SOC:100%)									
Sample No.	**Weight Measurement Unit:gram**				**Voltage Measurement Unit:Volt**				**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**
21	38.6120	38.6117	0.0000	0.0%	4.103	4.103	1.000	100.0%	PASS
22	38.5538	38.5522	0.0000	0.0%	4.098	4.099	1.000	100.0%	PASS
23	38.6353	38.6341	0.0000	0.0%	4.100	4.101	1.000	100.0%	PASS
24	38.6619	38.6604	0.0000	0.0%	4.094	4.095	1.000	100.0%	PASS
25	38.5476	38.5456	0.0001	0.0%	4.097	4.098	1.000	100.0%	PASS
Conclusion	**Meet the requirement of section 38.3.4.3 Test T.3: Vibration Test.**								

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Test Result:

T4 **Shock**

Model: ICP-103450-M20A									
Fresh cell (SOC:100%)									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				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	38.9386	38.9374	0.0000	0.0%	4.117	4.117	1.000	100.0%	PASS
2	38.9199	38.9190	0.0000	0.0%	4.116	4.116	1.000	100.0%	PASS
3	38.9733	38.9710	0.0001	0.0%	4.115	4.115	1.000	100.0%	PASS
4	38.9963	38.9943	0.0001	0.0%	4.115	4.115	1.000	100.0%	PASS
5	38.9231	38.9206	0.0001	0.0%	4.117	4.118	1.000	100.0%	PASS
25 Cycled cell (SOC:100%)									
Sample No.	Weight Measurement Unit:gram				Voltage Measurement Unit:Volt				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
21	38.6117	38.6117	0.0000	0.0%	4.102	4.103	1.000	100.0%	PASS
22	38.5522	38.5532	0.0000	0.0%	4.098	4.098	1.000	100.0%	PASS
23	38.6341	38.6347	0.0000	0.0%	4.100	4.100	1.000	100.0%	PASS
24	38.6604	38.6611	0.0000	0.0%	4.094	4.094	1.000	100.0%	PASS
25	38.5456	38.5466	0.0000	0.0%	4.097	4.097	1.000	100.0%	PASS
Conclusion	Meet the requirement of section 38.3.4.4 Test T.4: Shock Test.								

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Test Result:

T5 **External Short Circuit**

Model: ICP-103450-M20A			
Fresh cell (SOC:100%)			
Sample No.	**External Temperature Unit:℃**		**Appearance Check**
	Temperature (T1)	**T1 < 170℃**	**No disassembly, No rupture and No fire with in six hours**
1	94	94	PASS
2	89	89	PASS
3	87	87	PASS
4	95	95	PASS
5	88	88	PASS
25 Cycled cell (SOC:100%)			
Sample No.	**External Temperature Unit:℃**		**Appearance Check**
	Temperature (T1)	**T1 < 170℃**	**No disassembly, No rupture and No fire with in six hours**
21	104	104	PASS
22	105	105	PASS
23	106	106	PASS
24	107	107	PASS
25	106	106	PASS
Conclusion	**Meet the requirement of section 38.3.4.5 Test T5: External short circuit.**		

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Test Result:

T6 **Crush**

Model: ICP-103450-M20A			
Fresh cell (SOC:50%)			
Sample No.	External Temperature Unit:℃		Appearance Check
	Temperature (T1)	T1 < 170℃	No disassembly, No rupture and No fire with in six hours
6	23	23	PASS
7	23	23	PASS
8	23	23	PASS
9	23	23	PASS
10			PASS
25 Cycled cell (SOC:50%)			
Sample No.	External Temperature Unit:℃		Appearance Check
	Temperature (T1)	T1 < 170℃	No disassembly, No rupture and No fire with in six hours
26	27	27	PASS
27	26	26	PASS
28	26	26	PASS
29	26	26	PASS
30	26	26	PASS
Conclusion	Meet the requirement of section 38.3.4.6 Test T6: Crush		

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Test Result:

T8 **Forced Discharge**

Model: ICP-103450-M20A		
Fresh cell (SOC:0%)		
Sample No.	**Forced Discharge Temperature Unit:℃**	**Appearance Check**
	Temperature (T1)	**No disassembly and No fire within seven days of the test**
11	34	PASS
12	44	PASS
13	33	PASS
14	42	PASS
15	34	PASS
16	41	PASS
17	33	PASS
18	34	PASS
19	34	PASS
20	34	PASS
25 Cycled cell (SOC:0%)		
Sample No.	**Forced Discharge Temperature Unit:℃**	**Appearance Check**
	Temperature (T1)	**No disassembly and No fire within seven days of the test**
31	37	PASS
32	41	PASS
33	36	PASS
34	36	PASS
35	37	PASS
36	38	PASS
37	39	PASS
38	38	PASS
39	43	PASS
40	39	PASS
Conclusion	**Meet the requirement of section 38.3.4.8 Test T.8: Forced Discharge**	

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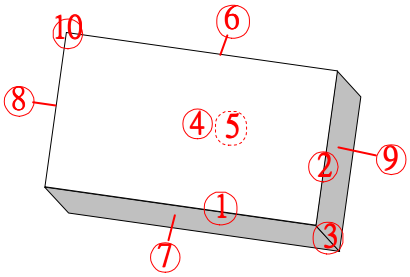
Test Summary:

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: Crush Test	Pass	
Test T.8: Forced discharge Test	Pass	

ー ー ー The End of Test Report ー ー ー

ICP-103450-M20A 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: Oct 25, 2018

The following products have been tested in accordance with the UN document titled 'AMENDMENTS TO THE SIXTH AMEND1E 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-Amend1e)' and found to comply with the stated criteria:

Item	Product Part No	Rated Capacity
1	ICP-103450-M20A	2.0Ah

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

Sincerely,

2018/10/25
Product Evaluation Engineer, QA