



新普科技股份有限公司
 新世電子(常熟)有限公司
 新普科技(重慶)有限公司
 華普電子(常熟)有限公司

Control Number: SLEU-1908001

Lithium-ion Battery UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

(Manual of Tests and Criteria, Sixth revised edition, Amend 1)

Customer: Lenovo

Model: L18M4PC0

**Rating/ Mass: 7.72V , Typical Capacity 6755mAh /52Wh
 Rated Capacity 6620mAh /51Wh/ 218 (g)**

Issue date: 2019/08/01

Approved By	Checked By	Prepared By
Assistant Manager	Authorized Signatory	Test Engineer
<i>Sung Sin</i>	<i>Zemari Huang</i>	<i>Mia Deng</i>

SIMPLO TECHNOLOGY CO., LTD.

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Website : <http://www.simplo.com.tw/>



Form No. : W11-002-B05

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1. Purpose of the Test :

To test each cell/battery is of the type proved to meet the requirements in United Nations Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3.

2. Test Result :

Test results of the UN Recommendations on the Transport of Dangerous Goods

No.	Test Item	Test results
T.1	Altitude simulation	PASS
T.2	Thermal test	PASS
T.3	Vibration test	PASS
T.4	Shock test	PASS
T.5	External short circuit	PASS
T.6	Impact, Crush test	PASS
T.7	Overcharge	PASS
T.8	Forced discharge	PASS

3. Test Lab: Email : Test_Lab@simplo.com.tw Website : <http://www.simplo.com.tw/>

●	SIMPLO (Taiwan) Laboratory ADD : No. 471 Pa Teh Rd, Sec 2 Hu Kou, Hsinchu Hsien, 303 Taiwan TEL: +886-3-5695920 FAX: +886-3-5695931
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Control Number: SLEU-1908001

4. Product manufacturer : Email : Test_Lab@simplo.com.tw Website : <http://www.simplo.com.tw/>

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5. Test Quantity :

- 5.1 Four batteries, at first cycle, in fully charged states. (For T.1~T.5)
- 5.2 Four batteries, after 25 cycles ending in fully charged states. (For T.1~T.5)
- 5.3 Five component cells, at first cycle at 50% of the design rated capacity. (For T.6)
- 5.4 Five component cells, after 25 cycles at 50% of the design rated capacity. (For T.6)
- 5.5 Four batteries, at first cycle, in fully charged states. (For T.7)
- 5.6 Four batteries, after 25 cycles ending in fully charged states. (For T.7)
- 5.7 Ten component cells, at first cycle in fully discharge states. (For T.8)
- 5.8 Ten component cells, after 25 cycles ending in fully discharged states. (For T.8)

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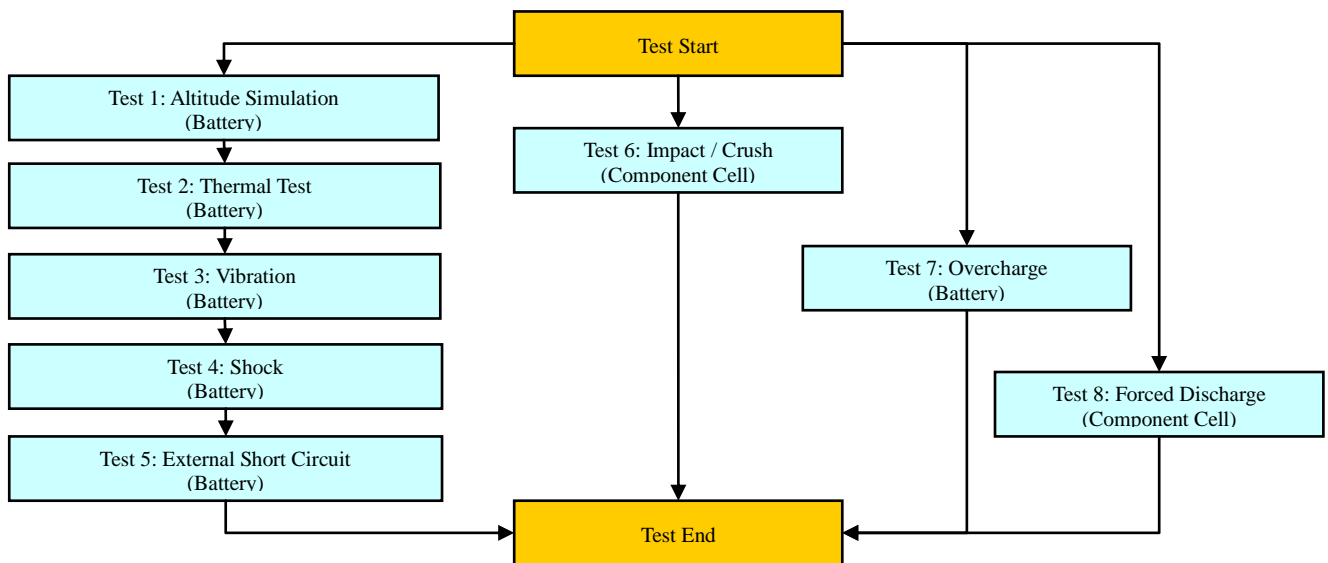
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6. Test Procedure :

6.1 All detailed test procedures must be based on United Nations Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3.

6.2 Test flow shall be followed as below.



Conclusion: The samples had passed the test items of UN38.3.

7. Comment :

Follow the requirement of “TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Sixth revised edition, Amend 1, Section 38.3”, this report was updated. (The control number of old report: SLEU-1810002)



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8. Test Equipment :

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Revised Date: 2018-10-18

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
Pretest								
V	ML-761	Leaming	715C	0~18V 0~8A	SMP	2018/2/26	2019/2/26	
V	ML-762	Leaming	715C	0~18V 0~8A	SMP	2018/1/3	2019/1/3	
V	ML-763	Leaming	715C	0~18V 0~8A	SMP	2018/2/26	2019/2/26	
V	ML-764	Leaming	715C	0~18V 0~8A	SMP	2018/1/3	2019/1/3	
	ML-925	Leaming	750C8	0~60V 0~30A	SMP	2018/1/3	2019/1/3	
T.1 Altitude Simulation								
V	ML-522	Altitude	SVT-120	Kpa:30~90	HSIN JIANG	2018/7/18	2019/7/18	
V	ML-257	Multimeter	34401A	Note 1	Agilent	2018/3/1	2019/3/1	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	Precisa	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-550	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
V	ML-555	Barometric Air Pressure	C300	750 to 1100 mbar	Lufft	2018/9/18	2019/9/18	
T.2 Thermal Test								
V	ML-789	Thermal Shock	GTST-080-65-AW	T:-40 to 120°C	GF	2018/1/3	2019/1/3	
V	ML-257	Multimeter	34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	Precisa	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.3 Vibration								
V	ML-233	Vibration	KD-9636-EM-300F2K-30N80	F:5~2000Hz G:0.2~20G	King Design	2018/8/24	2019/8/24	
V	ML-257	Multimeter	34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	Precisa	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-552	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.4 Shock								
V	ML-056	Shock	DP-1200-25	G:10~600G	King Design	2018/8/24	2019/8/24	
V	ML-257	Multimeter	34401A	note 1	Agilent	2018/3/1	2019/3/1	
	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	Precisa	2018/7/18	2019/7/18	
	ML-523	Electronic Balance	MTW-30K	30*0.005Kg		2018/9/12	2019/9/12	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.5 External Short Circuit								
V	ML-534	mΩ Hitester	3540	1mΩ ~ 30kΩ	HIOKI	2018/9/18	2019/9/18	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-521	Oven	9031	30~80 °C	YEOW LONG	2018/9/12	2019/9/12	
V	ML-549	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
T.6 Impact / Crush								
V	ML-457	Data Acquisition	XL122-D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/6/11	2019/6/11	
	ML-076	Impact Tester			JYI SHENG	2018/1/3	2019/1/3	
	ML-553	Crush Tester	BCT-01		Simplo	2018/5/16	2019/5/16	
V	ML-866	Crush Tester	M0654		JYI SHENG	2018/4/9	2019/4/9	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/9/12	2019/9/12	

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Revised Date: 2018-10-18

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
T.7 Overcharge								
	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2018/5/17	2019/5/17	
V	ML-549	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-918	Overcharge & Forced discharge tester	T901	3~30 Vdc, Charge: 0.05~20A Discharge: 0.02~10A	SMP	2018/5/17	2019/5/17	
T.8 Forced Discharge								
	ML-132	Electronic Load	3311C	60V,60A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-133	Electronic Load	3311C	60V,60A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-136	Electronic Load	3311C	60V,60A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-192	Electronic Load	3311C	60V,60A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-269	Electronic Load	3311C	60V,60A, 300W	Prodigit	2018/3/1	2019/3/1	
	ML-532	DC Electronic Load	33511-01	120V, 240A, 3600W	Prodigit	2018/7/18	2019/7/18	
	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2018/5/17	2019/5/17	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2018/5/17	2019/5/17	
V	ML-549	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2018/9/12	2019/9/12	
V	ML-918	Overcharge & Forced discharge tester	T901	3~30 Vdc, Charge: 0.05~20A Discharge: 0.02~10A	SMP	2018/5/17	2019/5/17	
Note 1: DC Voltage: 0.1-1000V; AC Voltage: 0.5-700V at 60Hz, 1kHz; Resistance: 10Ω-10MΩ; DC Current: 0.1mA-3A; AC Current: 0.01-3A at 60Hz, 0.01-1A, at 1kHz.								

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Revised Date: 2019-08-01

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Pretest								
V	ML-761	Learning	715C	0~18V 0~8A	SMP	2019/2/26	2020/2/26	
V	ML-762	Learning	715C	0~18V 0~8A	SMP	2019/1/3	2020/1/3	
V	ML-763	Learning	715C	0~18V 0~8A	SMP	2019/2/26	2020/2/26	
V	ML-764	Learning	715C	0~18V 0~8A	SMP	2019/1/3	2020/1/3	
	ML-925	Learning	750C8	0~60V 0~30A	SMP	2019/1/3	2020/1/3	
T.6 Impact / Crush								
V	ML-339	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2019/5/10	2020/5/10	
	ML-076	Impact Tester			JYI SHENG	2019/1/3	2020/1/3	
	ML-553	Crush Tester	BCT-01		Simplo	2019/5/10	2020/5/10	
V	ML-866	Crush Tester	M0654		JYI SHENG	2019/4/8	2020/4/8	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150°C	Yokogawa	2018/9/12	2019/9/12	

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Control Number: SLEU-1908001

9. T.1~T.8 Detail Reports:

UN 38.3 Test Datasheet

UN38.3/ST/SG/AC.10/11/Rev.6/Amend.1

Control Number: SLEU-1908001	Customer: Lenovo	Model Name: L18M4PC0	SMP Project Name: S940
Pack P/N: 928QA265H (A)(B)	Configuration: 2S2P	Test Duration: 2018/09/17-2018/10/17 2019/07/24-2019/08/01	Reviewer: Esmond

Test Sample Identification: Large Battery Small Battery Single-cell Battery

Battery Pack						Component Cell		
Used	Sample No.	Sample State	Used	Sample No.	Sample State	Used	Sample No.	Sample State
V	01-04	1 Cycle, Fully charged	V	05-08	25 Cycles, Fully charged	V	01C-05C	1 Cycle, 50% SOC
V	09-12	1 Cycle, Fully charged	V	13-16	25 Cycles, Fully charged	V	06C-10C	25 Cycles, 50% SOC
						V	11C-20C	1 Cycle, Fully discharged (0% SOC)
						V	21C-30C	25 Cycles, Fully discharged (0% SOC)

T.1 Altitude Simulation

Start time: 2018/10/03 08:30	Ambient temp.: 24.1 °C								Operator: Kenny
Finish time: 2018/10/04 16:50	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	8.808	8.808	8.807	8.806	8.806	8.807	8.807	
	After	8.798	8.799	8.797	8.795	8.795	8.796	8.798	
	Residual OCV %	99.89%	99.90%	99.89%	99.88%	99.88%	99.89%	99.90%	
Mass (g)	Before	218.339	218.330	218.323	218.301	218.311	218.309	218.325	
	After	218.335	218.327	218.320	218.296	218.307	218.305	218.321	
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Results	P	P	P	P	P	P	P	P	

T.2 Thermal Test

Start time: 2018/10/04 17:00	Ambient temp.: 24.2 °C								Operator: Kenny
Finish time: 2018/10/11 08:40	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	8.798	8.799	8.797	8.795	8.795	8.796	8.798	
	After	8.680	8.680	8.682	8.679	8.679	8.681	8.681	
	Residual OCV %	98.66%	98.65%	98.69%	98.68%	98.68%	98.69%	98.67%	
Mass (g)	Before	218.335	218.327	218.320	218.296	218.307	218.305	218.321	
	After	218.295	218.288	218.283	218.258	218.269	218.266	218.282	
	Mass loss %	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	
Results	P	P	P	P	P	P	P	P	

T.3 Vibration

Start time: 2018/10/11 08:50	Ambient temp.: 23.9 °C								Operator: Kenny
Finish time: 2018/10/12 08:40	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	8.680	8.680	8.682	8.679	8.679	8.681	8.681	
	After	8.665	8.663	8.666	8.662	8.662	8.665	8.666	
	Residual OCV %	99.83%	99.80%	99.82%	99.80%	99.80%	99.82%	99.83%	
Mass (g)	Before	218.295	218.288	218.283	218.258	218.269	218.266	218.282	
	After	218.290	218.283	218.277	218.252	218.262	218.259	218.277	
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Results	P	P	P	P	P	P	P	P	

T.4 Shock

Start time: 2018/10/12 08:50	Ambient temp.: 23.9 °C								Operator: Kenny
Finish time: 2018/10/12 11:00	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	8.665	8.663	8.666	8.662	8.662	8.665	8.666	
	After	8.663	8.661	8.664	8.659	8.659	8.663	8.664	
	Residual OCV %	99.98%	99.98%	99.98%	99.97%	99.97%	99.98%	99.98%	
Mass (g)	Before	218.290	218.283	218.277	218.252	218.262	218.259	218.277	
	After	218.288	218.281	218.274	218.249	218.259	218.257	218.275	
	Mass loss %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Results	P	P	P	P	P	P	P	P	

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Control Number: SLEU-1908001

T.5 External Short Circuit

Start time: 2018/10/12 11:10	Ambient temp.: 24.2 °C								Operator: Kenny	
Finish time: 2018/10/13 08:40	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08		
OCV (V)	Before	8.663	8.661	8.664	8.659	8.659	8.663	8.664	8.663	
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Resistance (<100mΩ)		59.7	59.6	59.9	59.8	60.1	60.1	59.7	59.8	
Max Temp. (< 170°C)		57.7	57.4	57.5	57.6	57.7	57.4	57.7	57.4	
Results		P	P	P	P	P	P	P	P	

T.6 Impact / Crush (Component Cell)

UN38.3/ST/SG/AC.10/11/Rev.6/Amend.1

Impact - Cylindrical cells not less than 18.0 mm in diameter

Crush - Prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter

Start time: 2019/08/01 09:20	Ambient temp.: 24.4 °C					Operator: Mia				
Finish time: 2019/08/01 15:30	Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C	Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C
Initial OCV (V)	3.823	3.827	3.818	3.810	3.825					
Max Temp. (< 170°C)	23.8	23.4	24.3	24.1	24.8					
Results	P	P	P	P	P					
Sample No.	Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C					
Initial OCV (V)	3.814	3.821	3.816	3.819	3.812					
Max Temp. (< 170°C)	23.3	24.0	23.9	24.5	23.6					
Results	P	P	P	P	P					

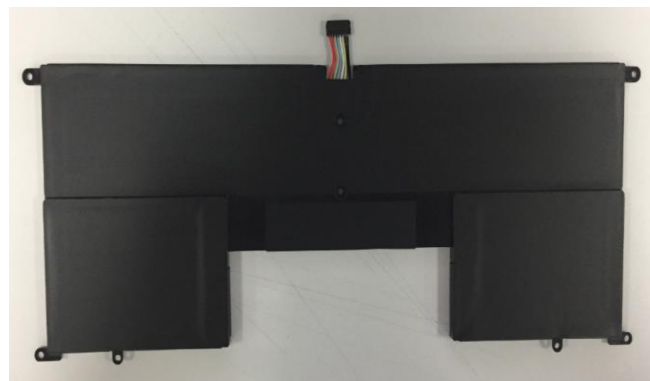
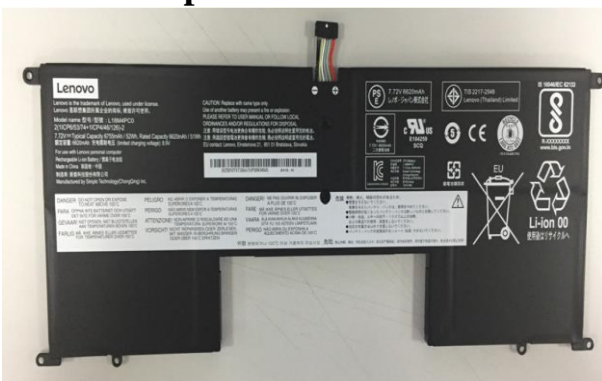
T.7 Overcharge

Start time: 2018/10/08 08:30	Ambient temp.: 24.2 °C								Operator: Kenny	
Finish time: 2018/10/16 08:40	Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16		
Initial OCV (V)	8.805	8.805	8.803	8.804	8.802	8.803	8.804	8.803		
Results	P	P	P	P	P	P	P	P		

T.8 Forced Discharge (Component Cell)

Start time: 2018/10/09 08:40	Ambient temp.: 24.2 °C								Operator: Kenny	
Finish time: 2018/10/17 09:00	Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C		
Initial OCV (V)	3.415	3.413	3.434	3.425	3.428	3.439	3.423	3.420		
Results	P	P	P	P	P	P	P	P		
Sample No.	Sample 19C	Sample 20C	Sample 21C	Sample 22C	Sample 23C	Sample 24C	Sample 25C	Sample 26C		
Initial OCV (V)	3.427	3.426	3.439	3.431	3.424	3.427	3.428	3.440		
Results	P	P	P	P	P	P	P	P		
Sample No.	Sample 27C	Sample 28C	Sample 29C	Sample 30C						
Initial OCV (V)	3.430	3.431	3.431	3.440						
Results	P	P	P	P						

9. Test Sample:



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