



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-1909002

Lithium-ion Battery UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

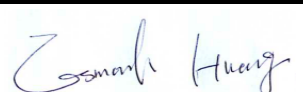
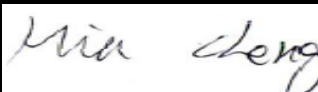
(Manual of Tests and Criteria, Sixth revised edition, Amend 1)

Customer: Lenovo

Model: L19M3PF4

**Rating/ Mass: 11.52V, Typical Capacity 4955mAh/ 56.5Wh
Rated Capacity 4840mAh/ 55Wh/ 228 (g)**

Issue date: 2019/09/10

Approved By	Checked By	Prepared By
Assistant Manager	Authorized Signatory	Test Engineer
		

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Form No. : W11-002-B05

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Control Number: SLEU-1909002

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/>

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Control Number: SLEU-1909002

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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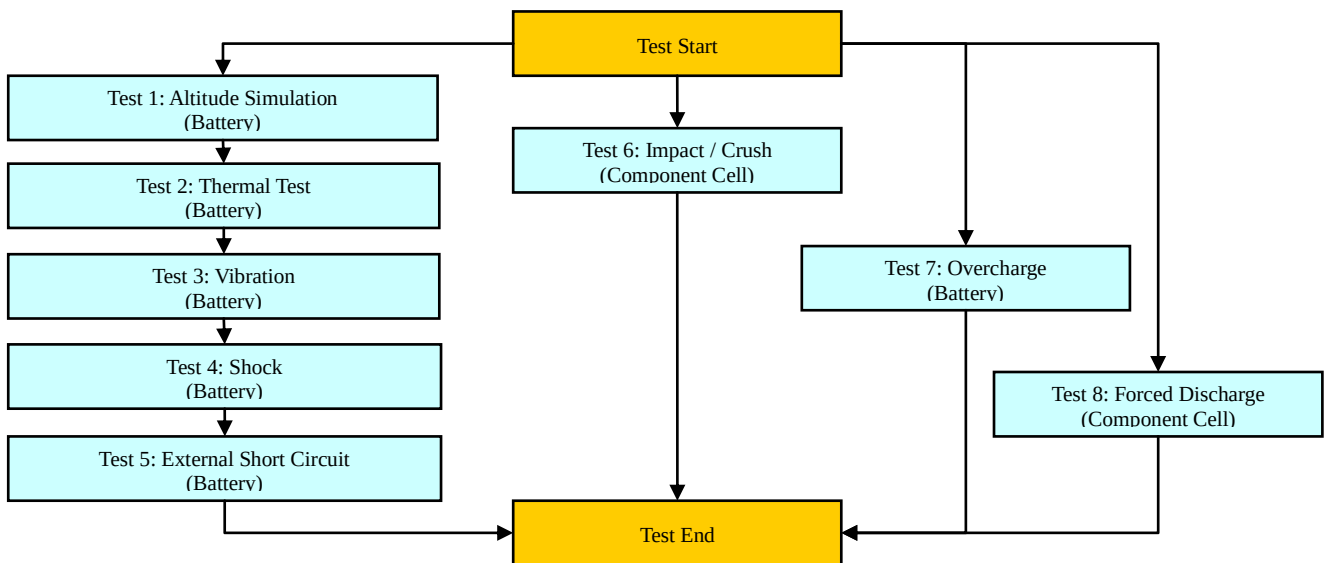
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6. Test Procedure :

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 : N/A



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8. Test Equipment :



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Revised Date: 2019-09-10

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	Learning	715C	0~18V 0~8A	SMP	2019/2/25	2020/2/25	
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.1 Altitude Simulation							
V	ML-522	Altitude	SVT-120	kPa:30~90	HSIN JIANG	2019/7/17	2020/7/17	
V	ML-257	Multimeter	34401A	Note 1	Agilent	2019/9/2	2020/9/2	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2019/7/17	2020/7/17	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2019/8/16	2020/8/16	
V	ML-550	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/8/15	2020/8/15	
	T.2 Thermal Test							
V	ML-789	Thermal Shock	GTST-080-65-AW	T:-40 to 100°C	GF	2019/7/2	2020/7/2	
V	ML-257	Multimeter	34401A	note 1	Agilent	2019/9/2	2020/9/2	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2019/7/17	2020/7/17	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2019/8/16	2020/8/16	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/8/15	2020/8/15	
	T.3 Vibration							
V	ML-233	Vibration	KD-9636-EM-300F2K-30N80	F:5~2000Hz G:0.2~20G	King Design	2019/8/7	2020/8/7	
V	ML-257	Multimeter	34401A	note 1	Agilent	2019/9/2	2020/9/2	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2019/7/17	2020/7/17	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2019/8/16	2020/8/16	
V	ML-552	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/8/15	2020/8/15	
	T.4 Shock							
V	ML-056	Shock	DP-1200-25	G:10~600G	King Design	2019/8/7	2020/8/7	
V	ML-257	Multimeter	34401A	note 1	Agilent	2019/9/2	2020/9/2	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2019/7/17	2020/7/17	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2019/8/16	2020/8/16	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/8/15	2020/8/15	
	T.5 External Short Circuit							
V	ML-894	Battery Hister	BT3562	1mΩ ~ 30kΩ	HIOKI	2019/6/11	2020/6/11	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2019/8/16	2020/8/16	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2019/8/16	2020/8/16	
V	ML-521	Oven	9031	30~80 °C	YEOW LONG	2019/8/16	2020/8/16	
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-458	Data Acquisition	XL122-D	1-100 Vdc, -50 to 150°C	Yokogawa	2019/6/12	2020/6/12	
	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 200°C	Yokogawa	2019/8/16	2020/8/16	

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Control Number: SLEU-1909002

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Revised Date: 2019-09-10

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	2019/5/9	2020/5/9	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/5/9	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/5/9	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/5/9	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2019/5/9	2020/5/9	
V	ML-549	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2019/8/16	2020/8/16	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2019/8/16	2020/8/16	
V	ML-918	Overcharge & Forced discharge tester	T901	3~30 Vdc, Charge: 0.05~20A Discharge: 0.02~10A	SMP	2019/5/10	2020/5/10	
	T.8 Forced Discharge							
	ML-132	Electronic Load	3311C	60V,60A, 300W	Prodigit	2019/2/26	2020/2/26	
	ML-133	Electronic Load	3311C	60V,60A, 300W	Prodigit	2019/2/26	2020/2/26	
	ML-136	Electronic Load	3311C	60V,60A, 300W	Prodigit	2019/2/26	2020/2/26	
	ML-192	Electronic Load	3311C	60V,60A, 300W	Prodigit	2019/2/26	2020/2/26	
	ML-269	Electronic Load	3311C	60V,60A, 300W	Prodigit	2019/2/26	2020/2/26	
	ML-532	DC Electronic Load	33511-01	120V, 240A, 3600W	Prodigit	2019/7/17	2020/7/17	
	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/5/9	
	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/5/9	
	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/5/9	
	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/5/9	
	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2019/5/9	2020/5/9	
V	ML-549	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2018/9/18	2019/9/18	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2019/8/16	2020/8/16	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2019/8/16	2020/8/16	
V	ML-918	Overcharge & Forced discharge tester	T901	3~30 Vdc, Charge: 0.05~20A Discharge: 0.02~10A	SMP	2019/5/10	2020/5/10	
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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Control Number: SLEU-1909002

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-1909002	Customer: Lenovo	Model Name: L19M3PF4	SMP Project Name: S550-14 ,56.5Wh
Pack P/N: 928QA310H (A)(B)	Configuration: 3S1P	Test Duration: 2019/08/22~2019/09/09	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: 2019/08/29 09:00		Ambient temp.: 25.2 °C						Operator: Mia	
Finish time: 2019/08/29 16:13		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.760	12.761	12.757	12.763	12.768	12.762	12.759	12.761
	After	12.742	12.742	12.742	12.747	12.750	12.747	12.740	12.741
	Residual OCV %	99.86%	99.85%	99.88%	99.87%	99.86%	99.88%	99.85%	99.84%
Mass (g)	Before	228.795	228.762	228.754	228.766	228.770	228.781	228.796	228.735
	After	228.791	228.759	228.752	228.764	228.769	228.778	228.796	228.735
	Mass loss %	0.00%	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: 2019/08/29 16:38		Ambient temp.: 25.4 °C						Operator: Mia	
Finish time: 2019/09/05 08:46		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.742	12.742	12.742	12.747	12.750	12.747	12.740	12.741
	After	12.600	12.605	12.607	12.608	12.610	12.609	12.599	12.599
	Residual OCV %	98.89%	98.92%	98.94%	98.91%	98.90%	98.92%	98.89%	98.89%
Mass (g)	Before	228.791	228.759	228.752	228.764	228.769	228.778	228.796	228.735
	After	228.772	228.739	228.736	228.747	228.751	228.762	228.776	228.718
	Mass loss %	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Results		P	P	P	P	P	P	P	P

T.3 Vibration

Start time: 2019/09/05 09:15		Ambient temp.: 25.3 °C						Operator: Mia	
Finish time: 2019/09/05 09:10		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.600	12.605	12.607	12.608	12.610	12.609	12.599	12.599
	After	12.579	12.587	12.587	12.590	12.591	12.591	12.579	12.582
	Residual OCV %	99.83%	99.86%	99.84%	99.86%	99.85%	99.86%	99.84%	99.87%
Mass (g)	Before	228.772	228.739	228.736	228.747	228.751	228.762	228.776	228.718
	After	228.766	228.736	228.729	228.742	228.744	228.756	228.772	228.712
	Mass loss %	0.00%	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: 2019/09/06 09:32		Ambient temp.: 25.2 °C						Operator: Mia	
Finish time: 2019/09/06 13:20		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.579	12.587	12.587	12.590	12.591	12.591	12.579	12.582
	After	12.572	12.582	12.581	12.584	12.584	12.586	12.573	12.576
	Residual OCV %	99.94%	99.96%	99.95%	99.95%	99.94%	99.96%	99.95%	99.95%
Mass (g)	Before	228.766	228.736	228.729	228.742	228.744	228.756	228.772	228.712
	After	228.761	228.731	228.723	228.738	228.738	228.753	228.767	228.706
	Mass loss %	0.00%	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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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-1909002

T.5 External Short Circuit

Start time: 2019/09/09 08:48	Ambient temp.: 25.5 °C				Operator: Mia			
Finish time: 2019/09/09 16:45	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.452	12.482	12.441	12.464	12.484	12.463	12.446
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		58.4	56.3	60.7	57.9	60.1	58.8	59.5
Max Temp. (< 170°C)		57.4	57.5	57.9	57.3	57.5	57.7	57.3
Results		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: 2019/08/30 08:50	Ambient temp.: 25.4 °C				Operator: Mia			
Finish time: 2019/08/30 11:50	Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C			
Initial OCV (V)	3.799	3.805	3.803	3.794	3.793			
Max Temp. (< 170°C)	23.7	23.2	24.2	24.6	24.1			
Results	P	P	P	P	P			
Sample No.	Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C			
Initial OCV (V)	3.808	3.801	3.796	3.806	3.794			
Max Temp. (< 170°C)	24.0	23.9	23.6	24.5	23.4			
Results	P	P	P	P	P			

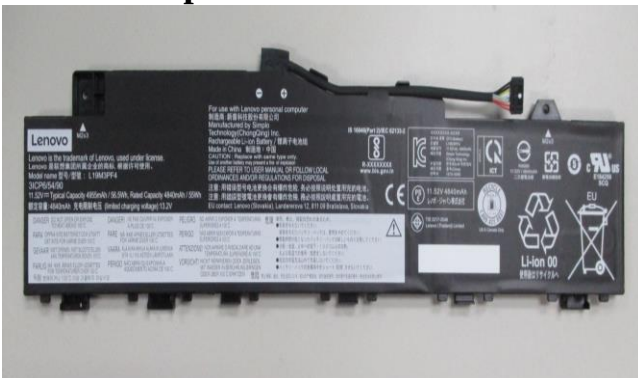
T.7 Overcharge

Start time: 2019/08/30 13:05	Ambient temp.: 25.6 °C				Operator: Mia			
Finish time: 2019/09/09 10:40	Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)	12.757	12.763	12.760	12.759	12.770	12.767	12.758	12.759
Results	P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time: 2019/08/29 10:30	Ambient temp.: 25.3 °C				Operator: Mia			
Finish time: 2019/09/06 11:50	Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C
Initial OCV (V)	3.683	3.704	3.711	3.675	3.724	3.719	3.708	3.680
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)	3.679	3.695	3.702	3.694	3.690	3.716	3.728	3.686
Results	P	P	P	P	P	P	P	P
Sample No.	Sample 27C	Sample 28C	Sample 29C	Sample 30C				
Initial OCV (V)	3.715	3.673	3.687	3.722				
Results	P	P	P	P				

9. Test Sample:



Form No. : W11-002-B05

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