



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-1909001

Lithium-ion Battery UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

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

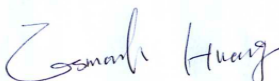
Customer: Lenovo

Model: L19M3PF3

Rating/ Mass: 11.1V, Typical Capacity 4060mAh/ 44.5Wh

Rated Capacity 3950mAh/ 43.5Wh/ 222 (g)

Issue date: 2019/09/09

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-1909001

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-1909001

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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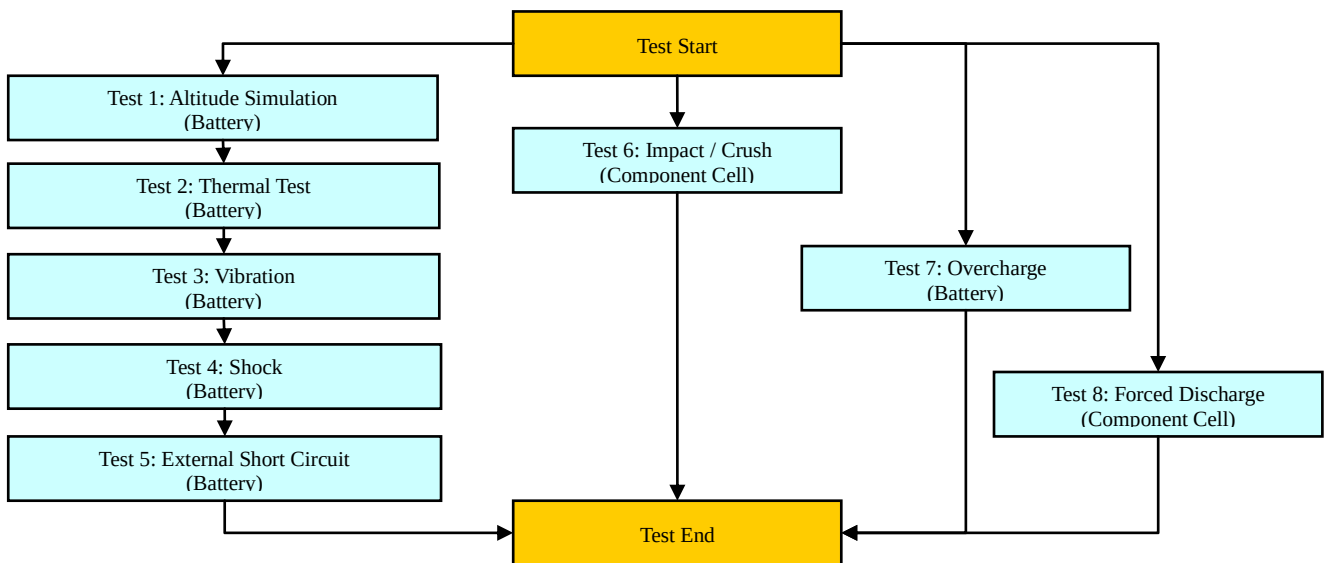
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6. Test Procedure :

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: 2019-09-09

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 Hitester	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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Revised Date: 2019-09-09

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-1909001

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-1909001	Customer: Lenovo	Model Name: L19M3PF3	SMP Project Name: S550-14 ,44.5Wh
Pack P/N: 928QA311H (A)(B)	Configuration: 3S1P	Test Duration: 2019/08/21~2019/09/06	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: 2019/08/28 08:55		Ambient temp.: 25.1 °C					Operator: Betty		
Finish time: 2019/08/28 16:05		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.172	12.173	12.170	12.178	12.171	12.176	12.181	12.175
	After	12.161	12.160	12.161	12.166	12.157	12.163	12.172	12.165
	Residual OCV %	99.91%	99.89%	99.93%	99.90%	99.88%	99.89%	99.93%	99.92%
Mass (g)	Before	222.263	222.521	222.308	222.497	222.296	222.337	222.505	222.452
	After	222.260	222.517	222.306	222.493	222.296	222.334	222.505	222.450
	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: 2019/08/28 16:28		Ambient temp.: 25.3 °C					Operator: Betty		
Finish time: 2019/09/04 09:00		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.161	12.160	12.161	12.166	12.157	12.163	12.172	12.165
	After	12.023	12.029	12.027	12.031	12.025	12.027	12.034	12.030
	Residual OCV %	98.87%	98.92%	98.90%	98.89%	98.91%	98.88%	98.87%	98.89%
Mass (g)	Before	222.260	222.517	222.306	222.493	222.296	222.334	222.505	222.450
	After	222.245	222.498	222.289	222.477	222.276	222.313	222.488	222.431
	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: 2019/09/04 09:22		Ambient temp.: 25.5 °C					Operator: Betty		
Finish time: 2019/09/05 08:50		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.023	12.029	12.027	12.031	12.025	12.027	12.034	12.030
	After	12.005	12.012	12.011	12.015	12.010	12.009	12.014	12.013
	Residual OCV %	99.85%	99.86%	99.87%	99.87%	99.88%	99.85%	99.83%	99.86%
Mass (g)	Before	222.245	222.498	222.289	222.477	222.276	222.313	222.488	222.431
	After	222.245	222.495	222.287	222.474	222.276	222.311	222.487	222.428
	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: 2019/09/05 09:10		Ambient temp.: 25.3 °C					Operator: Betty		
Finish time: 2019/09/05 13:00		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	11.994	12.003	11.999	12.007	12.001	11.999	12.002	12.002
	After	11.983	11.992	11.991	11.997	11.993	11.989	11.991	11.990
	Residual OCV %	99.91%	99.91%	99.93%	99.92%	99.93%	99.92%	99.91%	99.90%
Mass (g)	Before	222.245	222.495	222.287	222.474	222.276	222.311	222.487	222.428
	After	222.242	222.490	222.280	222.469	222.271	222.308	222.481	222.425
	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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Control Number: SLEU-1909001

T.5 External Short Circuit

Start time: 2019/09/05 13:23	Ambient temp.: 25.6 °C				Operator: Betty			
Finish time: 2019/09/06 09:00	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	11.983	11.992	11.991	11.997	11.993	11.989	11.991
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		56.4	58.5	55.9	57.6	60.3	56.7	59.1
Max Temp. (< 170°C)		57.3	57.7	57.4	57.1	57.5	57.4	57.9
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: 2019/08/29 08:53	Ambient temp.: 25.3 °C				Operator: Betty			
Finish time: 2019/08/29 12:00	Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C			
Initial OCV (V)	3.663	3.667	3.654	3.651	3.659			
Max Temp. (< 170°C)	24.3	23.5	23.7	24.0	23.9			
Results	P	P	P	P	P			
Sample No.	Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C			
Initial OCV (V)	3.658	3.660	3.665	3.662	3.666			
Max Temp. (< 170°C)	24.7	24.4	23.5	24.1	23.4			
Results	P	P	P	P	P			

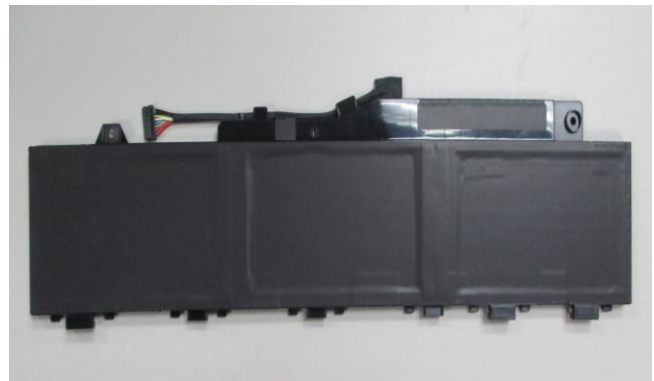
T.7 Overcharge

Start time: 2019/08/29 13:00	Ambient temp.: 25.5 °C				Operator: Betty			
Finish time: 2019/09/06 15:30	Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)	12.169	12.177	12.172	12.174	12.168	12.171	12.176	12.174
Results	P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time: 2019/08/28 10:16	Ambient temp.: 25.2 °C				Operator: Betty			
Finish time: 2019/09/05 11:30	Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C
Initial OCV (V)	3.450	3.491	3.485	3.455	3.462	3.497	3.464	3.471
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)	3.477	3.482	3.493	3.470	3.459	3.466	3.460	3.458
Results	P	P	P	P	P	P	P	P
Sample No.	Sample 27C	Sample 28C	Sample 29C	Sample 30C				
Initial OCV (V)	3.461	3.486	3.472	3.490				
Results	P	P	P	P				

9. Test Sample:



Form No. : W11-002-B05

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