



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-2003006

Lithium-ion Battery UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

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

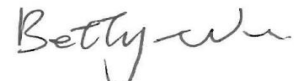
Customer: Lenovo

Model: L19M4PG4

Rating/ Mass: 7.72V, Typical Capacity 5470mAh/ 42Wh

Rated Capacity 5340mAh/ 41Wh /160 (g)

Issue date: 2020/03/16

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

●	SIMPLO TECHNOLOGY CO., LTD. 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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Email : Test_Lab@simplo.com.tw

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-2003006

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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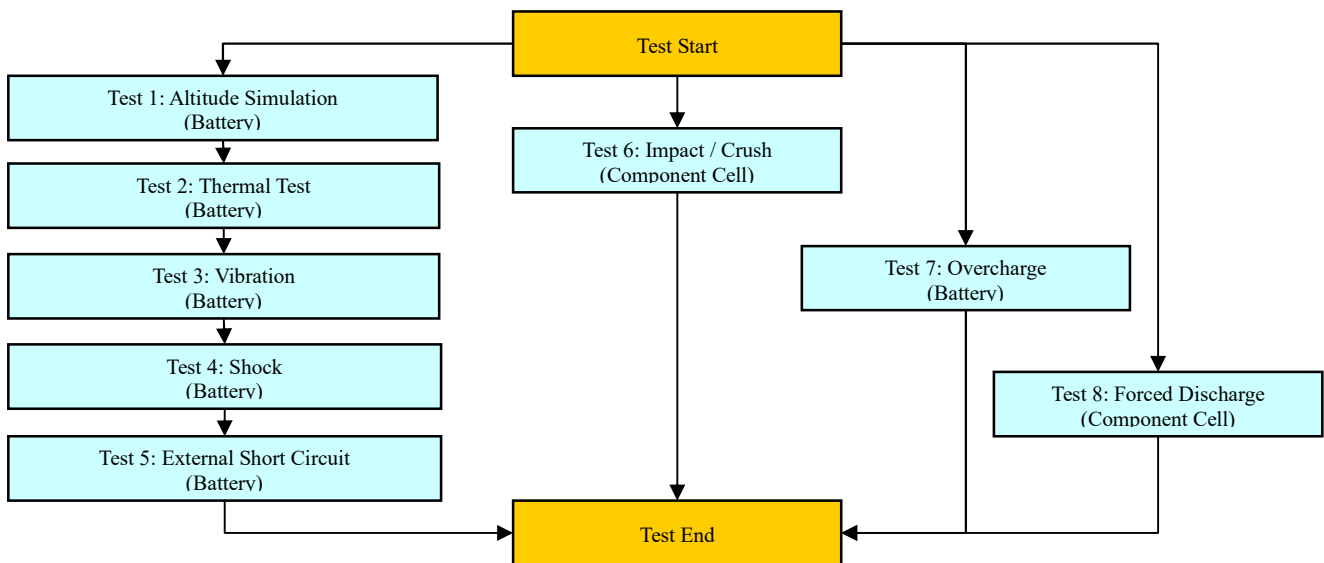
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6. Test Procedure :

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 : NA



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8. Test Equipment :

SMP SIMPLO TECHNOLOGY CO., LTD.

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Revised Date: 2020-03-16

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	2020/2/19	2021/3/19	
V	ML-762	Learning	715C	0~18V 0~8A	SMP	2020/1/2	2021/2/2	
V	ML-763	Learning	715C	0~18V 0~8A	SMP	2020/2/19	2021/3/19	
V	ML-764	Learning	715C	0~18V 0~8A	SMP	2020/1/2	2021/2/2	
	ML-925	Learning	750C8	0~60V 0~30A	SMP	2020/1/2	2021/2/2	
	T.1 Altitude Simulation							
V	ML-522	Altitude	SVT-120	kPa:30~90	HSIN JIANG	2019/7/17	2020/8/17	
V	ML-257	Multimeter	34401A	Note 1	Agilent	2019/9/2	2020/10/2	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2019/7/17	2020/8/17	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2019/8/16	2020/9/16	
V	ML-550	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/8/15	2020/9/15	
V	ML-964	Barometric Air Pressure	MP55	750 to 1100 mbar	KIMO	2019/6/8	2020/7/8	
	T.2 Thermal Test							
V	ML-789	Thermal Shock	GTST-080-65-AW	T:-40 to 100°C	GF	2019/7/2	2020/8/2	
V	ML-257	Multimeter	34401A	note 1	Agilent	2019/9/2	2020/10/2	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2019/7/17	2020/8/17	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2019/8/16	2020/9/16	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/8/15	2020/9/15	
	T.3 Vibration							
V	ML-233	Vibration	KD-9636-EM-300F2K-30N80	F:5~2000Hz G:0.2~20G	King Design	2019/8/7	2020/9/7	
V	ML-257	Multimeter	34401A	note 1	Agilent	2019/9/2	2020/10/2	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2019/7/17	2020/8/17	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2019/8/16	2020/9/16	
V	ML-552	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/8/15	2020/9/15	
	T.4 Shock							
V	ML-056	Shock	DP-1200-25	G:10~600G	King Design	2019/8/7	2020/9/7	
V	ML-257	Multimeter	34401A	note 1	Agilent	2019/9/2	2020/10/2	
V	ML-494	Electronic Balance	XS1220M-SCS	1-1220 gf	PRECISA	2019/7/17	2020/8/17	
	ML-523	Electronic Balance	MTW-30K	30*0.005kg		2019/8/16	2020/9/16	
V	ML-551	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/8/15	2020/9/15	
	T.5 External Short Circuit							
V	ML-894	Battery Hitester	BT3562	1mΩ ~ 30kΩ	HIOKI	2019/6/11	2020/7/11	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2019/8/16	2020/9/16	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2019/8/16	2020/9/16	
V	ML-521	Oven	9031	30~80 °C	YEOW LONG	2019/8/16	2020/9/16	
V	ML-952	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/7/24	2020/8/24	
	T.6 Impact / Crush							
V	ML-458	Data Acquisition	XL122-D	1-100 Vdc, -50 to 150°C	Yokogawa	2019/6/12	2020/7/12	
	ML-076	Impact Tester			JYI SHENG	2020/1/6	2021/2/6	
	ML-553	Crush Tester	BCT-01		Simple	2019/5/10	2020/6/10	
V	ML-866	Crush Tester	M0654		JYI SHENG	2019/4/8	2020/5/8	
	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200°C	Yokogawa	2019/8/16	2020/9/16	

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Revised Date: 2020-03-16

Test Instruments Reference List								
Used	Instrument ID	Instrument Name	Type	Range of use	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
	T.7 Overcharge							
V	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/6/9	
V	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/6/9	
V	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/6/9	
V	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/6/9	
V	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2019/5/9	2020/6/9	
V	ML-952	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2019/7/24	2020/8/24	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2019/8/16	2020/9/16	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2019/8/16	2020/9/16	
	ML-918	Overcharge & Forced discharge tester	T901	3~30 Vdc, Charge: 0.05~20A Discharge: 0.02~10A	SMP	2019/5/10	2020/6/10	
	T.8 Forced Discharge							
V	ML-132	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
V	ML-133	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
V	ML-136	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
V	ML-192	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
V	ML-269	Electronic Load	3311C	60V,60A, 300W	Prodigit	2020/2/20	2021/3/20	
V	ML-532	DC Electronic Load	33511-01	120V, 240A, 3600W	Prodigit	2019/7/17	2020/8/17	
V	ML-482	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/6/9	
V	ML-483	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/6/9	
V	ML-484	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/6/9	
V	ML-486	Programmable DC Source	DS10014	1-100Vdc, 0.3-14.4A	MOTECH	2019/5/9	2020/6/9	
V	ML-487	Programmable DC Source	DS6024	1-60 Vdc, 0.3-24A	MOTECH	2019/5/9	2020/6/9	
V	ML-952	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2019/7/24	2020/8/24	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2019/8/16	2020/9/16	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2019/8/16	2020/9/16	
	ML-918	Overcharge & Forced discharge tester	T901	3~30 Vdc, Charge: 0.05~20A Discharge: 0.02~10A	SMP	2019/5/10	2020/6/10	
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-2003006

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-2003006	Customer: Lenovo	Model Name: L19M4PG4	SMP Project Name: Hera_Nec
Pack P/N: 931QA174H (A)(B)	Configuration: 2S2P	Test Duration: 2020/02/26~2020/03/16	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: 2020/03/04 08:48		Ambient temp.: 22.6 °C						Operator: Betty	
Finish time: 2020/03/04 15:30		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	8.504	8.510	8.508	8.505	8.514	8.512	8.501	8.515
	After	8.493	8.497	8.496	8.497	8.504	8.503	8.489	8.504
	Residual OCV %	99.87%	99.85%	99.86%	99.91%	99.88%	99.89%	99.86%	99.87%
Mass (g)	Before	159.685	159.907	160.034	160.018	159.884	159.736	160.005	159.791
	After	159.678	159.899	160.022	160.006	159.877	159.728	159.997	159.780
	Mass loss %	0.00%	0.01%	0.01%	0.01%	0.00%	0.01%	0.00%	0.01%
Results		P	P	P	P	P	P	P	P

T.2 Thermal Test

Start time: 2020/03/04 15:50		Ambient temp.: 22.5 °C						Operator: Betty	
Finish time: 2020/03/11 08:52		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	8.493	8.497	8.496	8.497	8.504	8.503	8.489	8.504
	After	8.400	8.406	8.401	8.403	8.412	8.410	8.398	8.410
	Residual OCV %	98.90%	98.93%	98.88%	98.89%	98.92%	98.91%	98.93%	98.89%
Mass (g)	Before	159.678	159.899	160.022	160.006	159.877	159.728	159.997	159.780
	After	159.658	159.882	160.003	159.986	159.860	159.710	159.977	159.761
	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: 2020/03/11 09:15		Ambient temp.: 23.5 °C						Operator: Betty	
Finish time: 2020/03/12 09:01		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	8.400	8.406	8.401	8.403	8.412	8.410	8.398	8.410
	After	8.390	8.398	8.395	8.396	8.403	8.402	8.388	8.403
	Residual OCV %	99.88%	99.90%	99.93%	99.92%	99.89%	99.90%	99.88%	99.92%
Mass (g)	Before	159.658	159.882	160.003	159.986	159.860	159.710	159.977	159.761
	After	159.653	159.875	159.997	159.979	159.853	159.704	159.971	159.754
	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: 2020/03/12 09:24		Ambient temp.: 23.2 °C						Operator: Betty	
Finish time: 2020/03/12 13:20		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	8.390	8.398	8.395	8.396	8.403	8.402	8.388	8.403
	After	8.384	8.390	8.387	8.389	8.396	8.393	8.382	8.396
	Residual OCV %	99.93%	99.90%	99.90%	99.92%	99.91%	99.89%	99.93%	99.91%
Mass (g)	Before	159.653	159.875	159.997	159.979	159.853	159.704	159.971	159.754
	After	159.646	159.870	159.991	159.971	159.848	159.698	159.966	159.749
	Mass loss %	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%
Results		P	P	P	P	P	P	P	P

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華普電子(常熟)有限公司

Control Number: SLEU-2003006

T.5 External Short Circuit

Start time: 2020/03/13 09:15	Ambient temp.: 23.4 °C				Operator: Betty			
Finish time: 2020/03/13 16:20	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	8.371	8.378	8.372	8.376	8.382	8.379	8.370
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		58.4	61.7	57.5	59.0	58.8	60.1	56.9
Max Temp. (< 170°C)		57.8	57.4	57.3	57.9	57.2	57.6	57.5
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: 2020/03/05 09:03	Ambient temp.: 22.8 °C				Operator: Betty			
Finish time: 2020/03/05 12:50	Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C			
Initial OCV (V)	3.810	3.817	3.824	3.826	3.821			
Max Temp. (< 170°C)	24.0	23.6	23.7	24.3	23.4			
Results	P	P	P	P	P			
Sample No.	Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C			
Initial OCV (V)	3.828	3.814	3.819	3.820	3.817			
Max Temp. (< 170°C)	24.7	23.5	23.9	24.2	23.7			
Results	P	P	P	P	P			

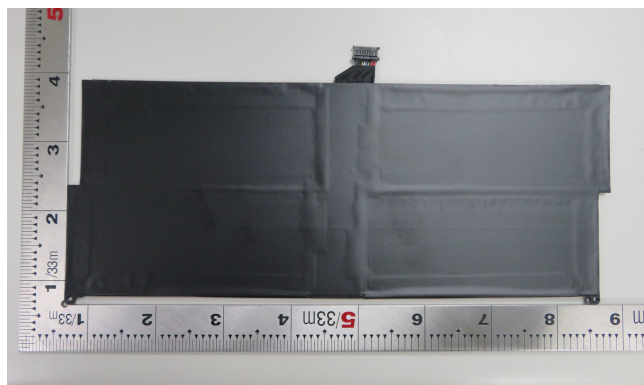
T.7 Overcharge

Start time: 2020/03/04 10:27	Ambient temp.: 22.7 °C				Operator: Betty			
Finish time: 2020/03/12 13:10	Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)	8.502	8.516	8.513	8.501	8.521	8.508	8.503	8.519
Results	P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time: 2020/03/06 09:00	Ambient temp.: 22.7 °C				Operator: Betty			
Finish time: 2020/03/16 08:40	Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C
Initial OCV (V)	3.465	3.450	3.461	3.448	3.454	3.449	3.435	3.457
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)	3.440	3.432	3.469	3.455	3.441	3.433	3.456	3.463
Results	P	P	P	P	P	P	P	P
Sample No.	Sample 27C	Sample 28C	Sample 29C	Sample 30C				
Initial OCV (V)	3.437	3.446	3.452	3.444				
Results	P	P	P	P				

9. Test Sample:



Form No. : W11-002-B05

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This test report is valid only to the items, Invalid for separation using.