



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-1909005

Lithium-ion Battery UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

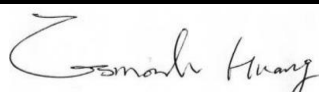
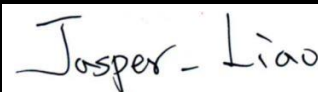
(Manual of Tests and Criteria, Sixth revised edition, Amend 1)

Customer: Lenovo

Model: L19M4PC2

**Rating/ Mass: 15.36V, Typical Capacity 5350mAh/ 80Wh
Rated Capacity 5135mAh/ 78Wh/ 332 (g)**

Issue date: 2019/09/26

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-1909005

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-1909005

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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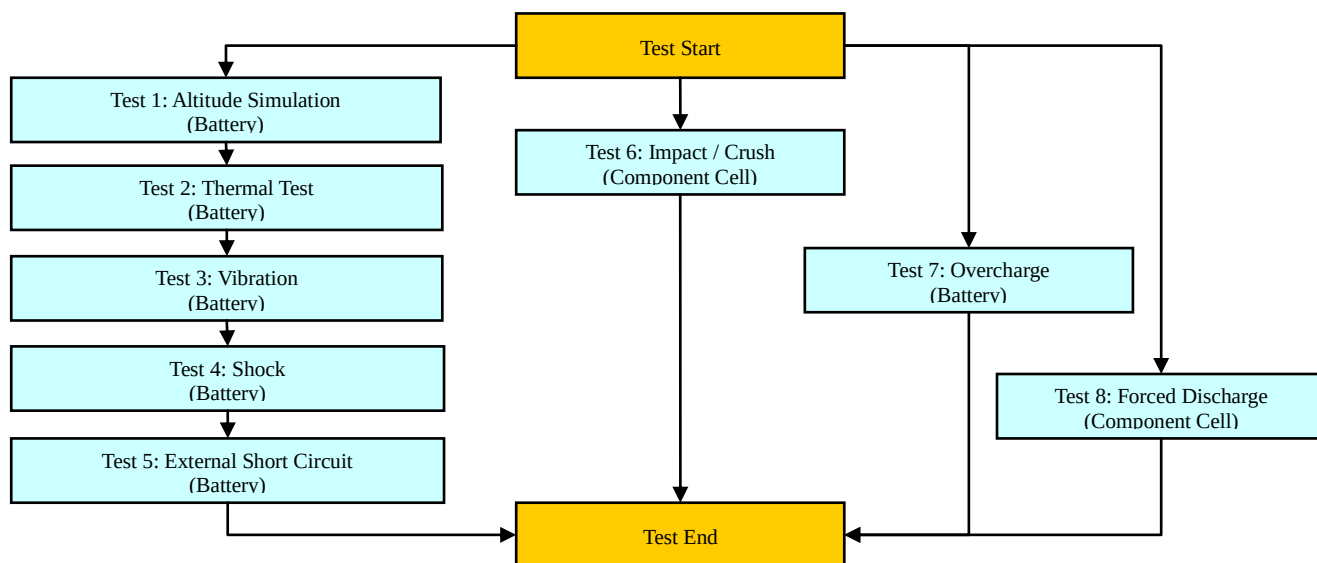
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6. Test Procedure :

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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Control Number: SLEU-1909005

8. Test Equipment :

SMP SIMPLO TECHNOLOGY CO., LTD.

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Revised Date: 2019-09-26

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	
V	ML-964	Barometric Air Pressure	MP55	750 to 1100 mbar	KIMO	2019/6/8	2020/6/8	
	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-952	Data Logger	313	15~35 °C; 30~80 %RH	CENTER	2019/7/24	2020/7/24	
	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-1909005

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Revised Date: 2019-09-26

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-952	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2019/7/24	2020/7/24	
	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-952	Data Logger	313	15~35 ℃; 30~80 %RH	CENTER	2019/7/24	2020/7/24	
	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-1909005

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-1909005	Customer: Lenovo	Model Name: L19M4PC2	SMP Project Name: Y750
Pack P/N: 928QA301H (A)(B)	Configuration: 4S1P	Test Duration: 2019/09/09~2019/09/26	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: 2019/09/17 09:00		Ambient temp.: 24.5 °C				Operator: Jasper			
Finish time: 2019/09/17 16:15		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	17.168	17.170	17.177	17.173	17.165	17.171	17.173	17.169
	After	17.151	17.150	17.154	17.156	17.146	17.149	17.153	17.150
	Residual OCV %	99.90%	99.88%	99.87%	99.90%	99.89%	99.87%	99.88%	99.89%
Mass (g)	Before	332.356	331.393	331.650	331.928	332.119	331.514	332.307	332.051
	After	332.348	331.390	331.646	331.922	332.110	331.507	332.302	332.047
	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: 2019/09/17 16:40		Ambient temp.: 24.7 °C				Operator: Jasper			
Finish time: 2019/09/24 08:49		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	17.151	17.150	17.154	17.156	17.146	17.149	17.153	17.150
	After	16.958	16.965	16.966	16.966	16.960	16.954	16.961	16.955
	Residual OCV %	98.87%	98.92%	98.90%	98.89%	98.92%	98.86%	98.88%	98.86%
Mass (g)	Before	332.348	331.390	331.646	331.922	332.110	331.507	332.302	332.047
	After	332.330	331.371	331.629	331.900	332.091	331.484	332.281	332.023
	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: 2019/09/24 09:13		Ambient temp.: 24.5 °C				Operator: Jasper			
Finish time: 2019/09/25 09:02		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	16.958	16.965	16.966	16.966	16.960	16.954	16.961	16.955
	After	16.939	16.945	16.949	16.944	16.943	16.938	16.942	16.934
	Residual OCV %	99.89%	99.88%	99.90%	99.87%	99.90%	99.91%	99.89%	99.88%
Mass (g)	Before	332.330	331.371	331.629	331.900	332.091	331.484	332.281	332.023
	After	332.317	331.361	331.613	331.882	332.079	331.469	332.265	332.009
	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

T.4 Shock

Start time: 2019/09/25 09:25		Ambient temp.: 24.3 °C				Operator: Jasper			
Finish time: 2019/09/25 13:07		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	16.939	16.945	16.949	16.944	16.943	16.938	16.942	16.934
	After	16.930	16.933	16.939	16.931	16.933	16.930	16.930	16.921
	Residual OCV %	99.95%	99.93%	99.94%	99.92%	99.94%	99.95%	99.93%	99.92%
Mass (g)	Before	332.317	331.361	331.613	331.882	332.079	331.469	332.265	332.009
	After	332.305	331.354	331.604	331.871	332.070	331.457	332.255	331.996
	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
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Control Number: SLEU-1909005

T.5 External Short Circuit

Start time: 2019/09/25 13:30		Ambient temp.: 24.6 °C						Operator: Jasper	
Finish time: 2019/09/26 09:05		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	16.930	16.933	16.939	16.931	16.933	16.930	16.930	16.921
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		61.6	57.8	59.2	60.7	58.3	60.1	59.9	56.4
Max Temp. (< 170°C)		57.7	57.3	57.5	57.5	57.9	57.6	57.4	57.8
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: 2019/09/18 13:00		Ambient temp.: 24.8 °C				Operator: Jasper	
Finish time: 2019/09/18 16:43		Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C	
Initial OCV (V)		3.794	3.803	3.799	3.801	3.792	
Max Temp. (< 170°C)		23.4	24.1	23.9	23.6	24.7	
Results		P	P	P	P	P	
Sample No.		Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C	
Initial OCV (V)		3.808	3.805	3.798	3.794	3.795	
Max Temp. (< 170°C)		24.5	24.0	23.7	24.3	23.9	
Results		P	P	P	P	P	

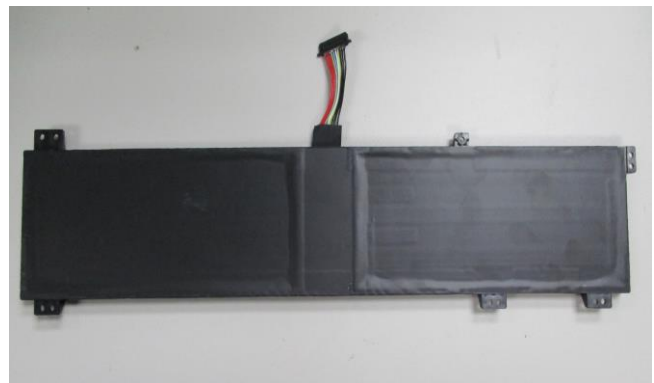
T.7 Overcharge

Start time: 2019/09/17 13:00		Ambient temp.: 24.8 °C						Operator: Jasper	
Finish time: 2019/09/25 15:00		Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)		17.170	17.167	17.175	17.173	17.169	17.168	17.176	17.171
Results		P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time: 2019/09/18 08:48		Ambient temp.: 24.4 °C						Operator: Jasper	
Finish time: 2019/09/26 10:25		Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C
Initial OCV (V)		3.450	3.439	3.442	3.467	3.453	3.470	3.462	3.449
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)		3.434	3.471	3.458	3.469	3.477	3.446	3.453	3.445
Results		P	P	P	P	P	P	P	P
Sample No.		Sample 27C	Sample 28C	Sample 29C	Sample 30C				
Initial OCV (V)		3.475	3.464	3.460	3.444				
Results		P	P	P	P				

9. Test Sample:



Form No. : W11-002-B05

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