



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-1905005

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: L19M3PF2

Rating/ Mass: 11.52V, Typical Capacity 4950mAh/ 57Wh

Rated Capacity 4820mAh/ 55Wh/ 221 (g)

Issue date: 2019/05/22

Approved By	Checked By	Prepared By
Assistant Manager	Authorized Signatory	Test Engineer
<i>Sung Jin</i>	<i>Samh</i>	<i>Gibson Lin</i>

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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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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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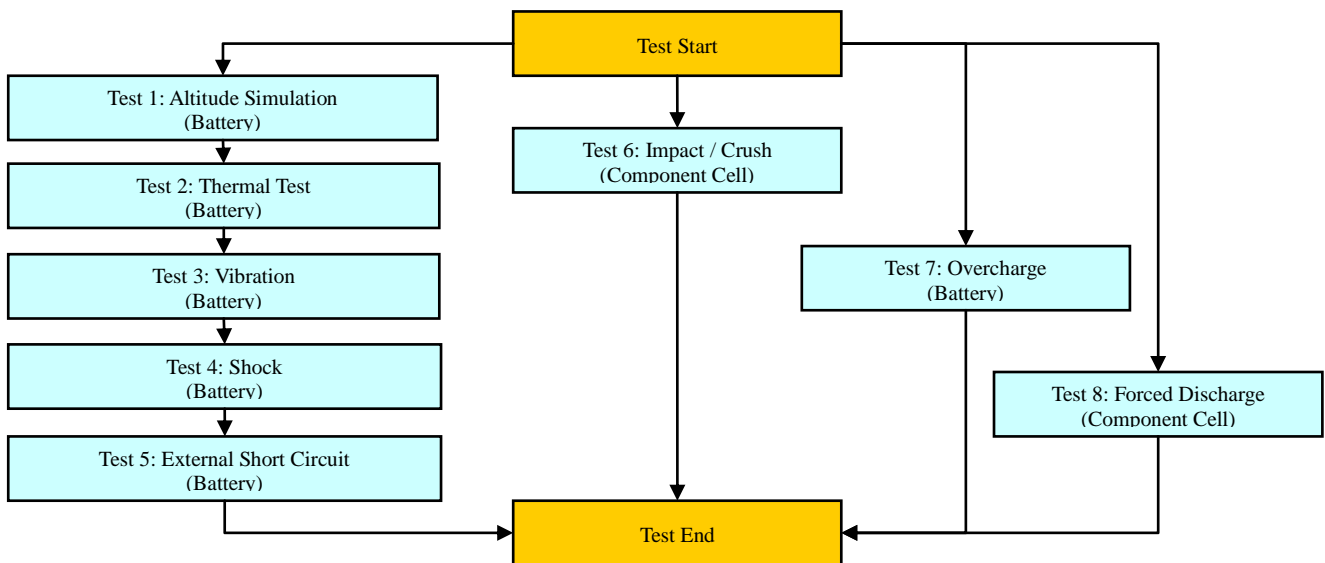
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6. Test Procedure :

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 :

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Revised Date: 2019-05-22

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	2018/7/18	2019/7/18	
V	ML-257	Multimeter	34401A	Note 1	Agilent	2019/2/26	2020/2/26	
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 ℃; 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 100℃	GF	2019/1/3	2020/1/3	
V	ML-257	Multimeter	34401A	note 1	Agilent	2019/2/26	2020/2/26	
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-551	Data Logger	313	15-35 ℃; 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	2019/2/26	2020/2/26	
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-552	Data Logger	313	15-35 ℃; 30-80 %RH	CENTER	2018/9/18	2019/9/18	
T.4 Shock								
V	ML-056	Shock	DP-1200-25	G:10-800G	King Design	2018/8/24	2019/8/24	
V	ML-257	Multimeter	34401A	note 1	Agilent	2019/2/26	2020/2/26	
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-551	Data Logger	313	15-35 ℃; 30-80 %RH	CENTER	2018/9/18	2019/9/18	
T.5 External Short Circuit								
V	ML-894	Battery Hister	BT356Z	1mΩ - 30kΩ	HIOKI	2018/6/11	2019/6/11	
V	ML-459	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2018/9/12	2019/9/12	
V	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200℃	Yokogawa	2018/9/12	2019/9/12	
V	ML-521	Oven	9031	30-80 ℃	YEOW LONG	2018/9/12	2019/9/12	
V	ML-549	Data Logger	313	15-35 ℃; 30-80 %RH	CENTER	2018/9/18	2019/9/18	
T.6 Impact / Crush								
V	ML-339	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 150℃	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 200℃	Yokogawa	2018/9/12	2019/9/12	

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Control Number: SLEU-1905005

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Revised Date: 2019-05-22

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	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200 ℃	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	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	2018/7/18	2019/7/18	
	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	2018/9/12	2019/9/12	
	ML-460	Data Acquisition	MX100-E-1D	1-100 Vdc, -50 to 200 ℃	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	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-1905005

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-1905005	Customer: Lenovo	Model Name: L19M3PF2	SMP Project Name: Kylin
Pack P/N: 928QA290H (A)(B)	Configuration: 3S1P	Test Duration: 2019/04/30-2019/05/21	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: 2019/05/07 09:00	Ambient temp.: 24.2 °C								Operator: Gibson
Finish time: 2019/05/07 16:10	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	12.698	12.702	12.705	12.699	12.696	12.701	12.709	
	After	12.683	12.686	12.688	12.685	12.681	12.686	12.691	
	Residual OCV %	99.88%	99.87%	99.87%	99.89%	99.88%	99.88%	99.87%	
Mass (g)	Before	220.743	221.953	220.928	221.508	221.928	220.891	220.782	
	After	220.740	221.953	220.924	221.507	221.926	220.891	220.779	
	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: 2019/05/07 16:30	Ambient temp.: 24.0 °C								Operator: Gibson
Finish time: 2019/05/14 08:50	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	12.683	12.686	12.688	12.685	12.681	12.686	12.691	
	After	12.541	12.551	12.549	12.540	12.538	12.548	12.551	
	Residual OCV %	98.88%	98.94%	98.90%	98.86%	98.87%	98.92%	98.90%	
Mass (g)	Before	220.740	221.953	220.924	221.507	221.926	220.891	220.779	
	After	220.726	221.936	220.906	221.487	221.910	220.878	220.762	
	Mass loss %	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: 2019/05/14 09:10	Ambient temp.: 23.5 °C								Operator: Gibson
Finish time: 2019/05/14 09:10	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	12.541	12.551	12.549	12.540	12.538	12.549	12.551	
	After	12.526	12.535	12.532	12.526	12.522	12.536	12.536	
	Residual OCV %	99.88%	99.87%	99.86%	99.89%	99.87%	99.90%	99.88%	
Mass (g)	Before	220.726	221.936	220.906	221.487	221.910	220.878	220.762	
	After	220.724	221.935	220.903	221.487	221.909	220.877	220.760	
	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: 2019/05/15 09:30	Ambient temp.: 23.9 °C								Operator: Gibson
Finish time: 2019/05/15 13:10	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08	
OCV (V)	Before	12.526	12.535	12.532	12.526	12.522	12.536	12.536	
	After	12.517	12.527	12.525	12.515	12.516	12.523	12.526	
	Residual OCV %	99.93%	99.94%	99.94%	99.91%	99.95%	99.90%	99.92%	
Mass (g)	Before	220.724	221.935	220.903	221.487	221.909	220.877	220.760	
	After	220.722	221.934	220.903	221.487	221.906	220.877	220.758	
	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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T.5 External Short Circuit

Start time: 2019/05/15 13:30		Ambient temp.: 24.1 °C						Operator: Gibson	
Finish time: 2019/05/16 08:40		Sample 01	Sample 02	Sample 03	Sample 04	Sample 05	Sample 06	Sample 07	Sample 08
OCV (V)	Before	12.517	12.527	12.525	12.515	12.516	12.523	12.526	12.530
	After	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Resistance (<100mΩ)		58.4	59.6	60.5	57.1	58.8	56.3	61.1	59.2
Max Temp. (< 170°C)		57.4	57.1	57.6	57.3	57.5	57.4	57.7	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: 2019/05/10 08:50		Ambient temp.: 23.7 °C				Operator: Gibson	
Finish time: 2019/05/10 17:00		Sample 01C	Sample 02C	Sample 03C	Sample 04C	Sample 05C	Sample 06C
Initial OCV (V)		3.794	3.796	3.787	3.781	3.792	3.792
Max Temp. (< 170°C)		24.4	24.0	23.5	23.9	23.6	23.6
Results		P	P	P	P	P	P
Sample No.		Sample 06C	Sample 07C	Sample 08C	Sample 09C	Sample 10C	Sample 11C
Initial OCV (V)		3.783	3.780	3.789	3.795	3.798	3.798
Max Temp. (< 170°C)		23.9	24.1	24.3	24.0	23.8	23.8
Results		P	P	P	P	P	P

T.7 Overcharge

Start time: 2019/05/09 09:00		Ambient temp.: 24.0 °C						Operator: Gibson	
Finish time: 2019/05/17 10:50		Sample 09	Sample 10	Sample 11	Sample 12	Sample 13	Sample 14	Sample 15	Sample 16
Initial OCV (V)		12.697	12.703	12.707	12.702	12.692	12.699	12.708	12.710
Results		P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time: 2019/05/13 08:50		Ambient temp.: 23.9 °C						Operator: Gibson	
Finish time: 2019/05/21 10:30		Sample 11C	Sample 12C	Sample 13C	Sample 14C	Sample 15C	Sample 16C	Sample 17C	Sample 18C
Initial OCV (V)		3.483	3.466	3.492	3.470	3.461	3.485	3.478	3.463
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)		3.480	3.482	3.494	3.467	3.488	3.479	3.473	3.464
Results		P	P	P	P	P	P	P	P
Sample No.		Sample 27C	Sample 28C	Sample 29C	Sample 30C	Sample 31C	Sample 32C	Sample 33C	Sample 34C
Initial OCV (V)		3.469	3.495	3.474	3.471	3.488	3.479	3.473	3.464
Results		P	P	P	P	P	P	P	P

9. Test Sample:



Form No. : W11-002-B05

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