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 NO: LE-CU-15-01-041

UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

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

Customer: Lenovo
Model: L14M2P23
Rating: 7.4V, 30Wh, 4050mAh
Test duration: 2014/12/29~2015/01/23

Approved By	Checked By	Prepared By
Wine Zhao	Wine Zhao	Happy Gu.

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1. Purpose of the Test:

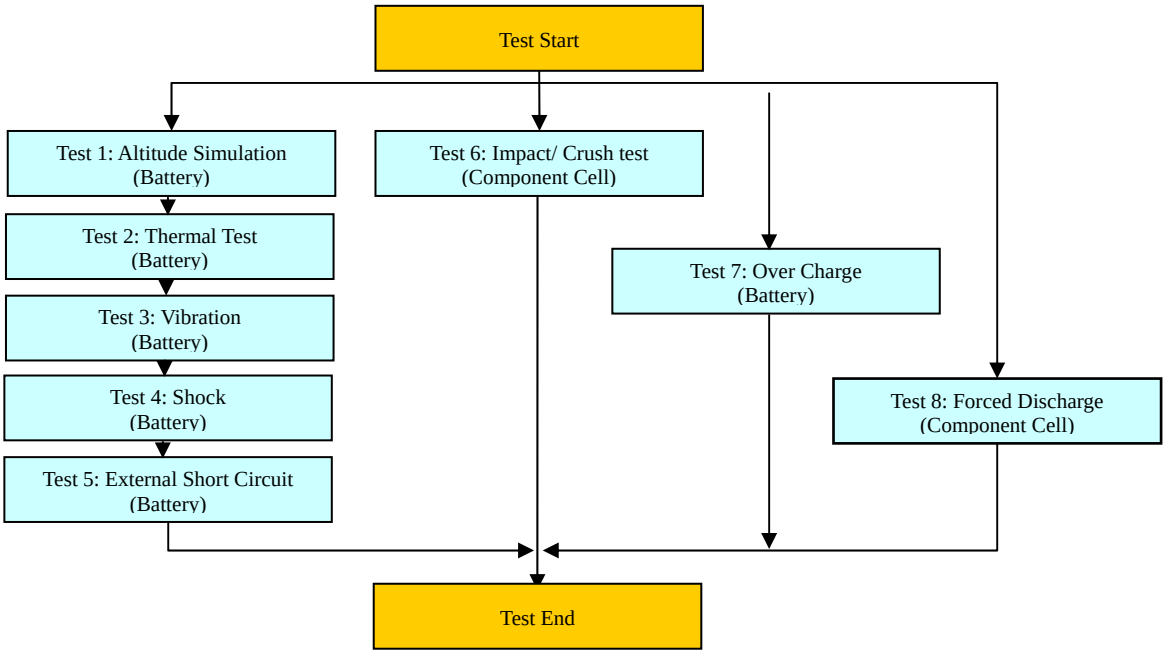
To test each cell/battery is of the type proved to meet the requirements in the Recommendations on the TRANSPORT OF DANGEROUS GOODS, Manual of Tests and Criteria, Fifth revised edition, Amend 1.

2. Test Quantity:

2.1 Four batteries, at first cycle, in fully charged states. (T.1~T.5 test only)
2.2 Four batteries, after fifty cycles ending in fully charged states. (T.1~T.5 test only)
2.3 Five component cells, at first cycle at 50% of the design rated capacity. (T.6 test only)
2.4 Four batteries, at first cycle, in fully charged states. (T.7 test only)
2.5 Four batteries, after fifty cycles ending in fully charged states. (T.7 test only)
2.6 Ten component cells, at first cycle in fully discharge states. (T.8 test only)
2.7 Ten component cells, after fifty cycles ending in fully discharged states. (T.8 test only)

3. Test procedure:

3.1 All detail related test procedure shall be follow Standard Operation Procedure of SMP subjected CW01-5916 Rev.4 issue documentation.
3.2 Test flow shall be follow below statement.



4. Test Result:

4.1 T.1 ~T.4 Test result: **Passed**

4.1.1 All batteries could meet the requirement, mass loss was less than 0.1% and residual OCV not less than 90% after the test.

4.1.2 No leakage, no venting, no disassembly, no rupture and no fire.

4.2 T.5 Test result: **Passed**

4.2.1 All batteries could meet the requirement, external temperature did not exceed 170℃.

4.2.2 All batteries were no disassembly, no rupture and no fire during the test and within six hours after the test.

4.3 T.6 Test result: **Passed**

4.3.1 All component cells could meet the requirement, external temperature did not exceed 170℃.

4.3.2 All component cells were no disassembly and no fire during the test and within six hours after the test.

4.4 T.7 Test result: **Passed**

4.4.1 All batteries could meet no disassembly and no fire during the test and within seven days after the test.

4.5 T.8 Test result: **Passed**

4.5.1 All component cells could meet the requirement, no disassembly and no fire during the test and within seven days after the test.

Conclusion: The samples had passed the test items of UN38.3.

5. Test Equipment:

SMP 新世电子(常熟)有限公司 SIMPLO TECHNOLOGY(CHANGSHU) INC.

Revised date: 2014/12/30 Page:1

Address : No.2 Dong Nan Avenue,Changshu, Jingsu Province.China Date:2014/12/29~2015/01/23

TEL: 0512-52302255 FAX: 0512-52302277 Model name: L14M2P23

Test Instruments Reference List

Used	Instrument ID(New)	Instrument ID(Old)	Instrument Name	Type	Range Used	Manufacturer	CalibrationDate_Last	Calibration Date_Next	Remarks
	Pretest								
V	EE01-CA-I00002	C602M00/S0096	715 learning機	新普科技	18V/8A	新普科技	2014/12/30	2015/12/29	
V	EE03-CA-I00018	C602M00/S0107	720 learning機	新普科技	Chang:18V/17A Dischange:16V/18A	新普科技	2014/3/10	2015/3/9	
	EE01-CA-I00003	C602M00/S0099	715 learning機	新普科技	18V/8A	新普科技	2014/03/10	2015/03/09	
	EE01-CA-I00005	C602M00/S0098	715 learning機	新普科技	18V/8A	新普科技	2014/04/09	2015/04/08	
	EE03-CA-I00020	C602M00/S0163	720 learning機	新普科技	Chang:18V/17A Dischange:16V/18A	新普科技	2014/10/21	2015/10/20	
	Low Pressure Test								
V	EC15-CA-E00003	C602M00/0462	Altitude	SVT-110	Kpa: 0～99Kpa	HSIN JIANG	2014/09/08	2015/09/07	
V	EA02-CA-I00002	C602M00/A0293	mΩ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EF03-CA-I00001	C602M00/C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
V	ED01-CA-I00007	C602M00/T0412	Thermo Meter	TA218	T：-10℃~70℃ RH：25%～98%	KTJ	2014/8/27	2015/8/26	
	Thermal Test								
V	EC29-CA-E00002	C602M00/0671	Thermal Shock	TSK-A4C-150	T:-65℃ to 150℃	KSON	2014/06/09	2015/06/08	
V	EA02-CA-I00002	C602M00/A0293	mΩ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EF03-CA-I00001	C602M00/C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
V	ED01-CA-I00007	C602M00/T0412	Thermo Meter	TA218	T：-10℃~70℃ RH：25%～98%	KTJ	2014/8/27	2015/8/26	
	Vibration Test								
V	EC08-CA-E00001	C602M00/0197	Vibration	EM-200F2K-25N	F:3~2000Hz G:0.2~55G	King Design	2014/3/12	2015/3/11	
	EC08-CA-E00002	C602M00/0052	Vibration	EM-200F2K-25N	F:3~2000Hz G:0.2~55G	King Design	2014/9/24	2015/9/23	
V	EA02-CA-I00002	C602M00/A0293	mΩ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EF03-CA-I00001	C602M00/C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
	Shock Test								
V	EC17-CA-E00001	C602M00/0570	Shock	HS-15/45	G:10~2000G	Lansmont	2014/09/08	2015/09/07	
V	EA02-CA-I00002	C602M00/A0293	mΩ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EF03-CA-I00001	C602M00/C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
	External Short Circuit Test								
V	EA02-CA-I00002	C602M00/A0293	mΩ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EA09-CA-I00004	C602M00/0207	Data logger	34970A	V: 0~ 300V, T: -150℃~1200℃	Agilent	2014/09/17	2015/09/16	
V	EC26-CA-I00023	C602M00/0518	chamber	WIT TH-2P-E	-40℃ to 150℃	WIT	2014/08/11	2015/08/10	
V	ED01-CA-I00007	C602M00/T0412	Thermo Meter	TA218	T：-10℃~70℃ RH：25%～98%	KTJ	2014/8/27	2015/8/26	
	Impact Test/Cursh Test								
	EC17-CA-I00001	C602M00/1204	Impact test	100-372	H:60~80cm	JYI SHENG	2014/9/17	2015/9/16	
V	EC23-CA-E00001	C602M00/0743	Qursh Test	BE-6047	1.0KN~15.0KN	BELL	2014/09/08	2015/09/07	
V	EA09-CA-I00005	C602M00/0588	Data logger	34970A	V: 0~ 300V, T: -150℃~1200℃	Agilent	2014/09/17	2015/09/16	
V	ED01-CA-I00010	C602M00/T0581	Thermo Meter	TA218	T：-10℃~70℃ RH：25%～98%	KTJ	2014/6/22	2015/6/21	
	Overcharge Test								
V	EA06-CA-E00003	C602M00/P0779	Power Supply	DS6024	0~60V 0~24A	MOTECH	2014/03/12	2015/03/11	
V	EA06-CA-E00002	C602M00/P0777	Power Supply	DS6024	0~60V 0~24A	MOTECH	2014/03/12	2015/03/11	
V	EA06-CA-E00001	C602M00/P0775	Power Supply	DS6024	0~60V 0~24A	MOTECH	2014/03/12	2015/03/11	
V	EA06-CA-E00004	C602M00/P0781	Power Supply	DS6024	0~60V 0~24A	MOTECH	2014/03/12	2015/03/11	
V	ED01-CA-I00007	C602M00/T0412	Thermo Meter	TA218	T：-10℃~70℃ RH：25%～98%	KTJ	2014/8/27	2015/8/26	
	Froced Discharge Test								
V	EA06-CA-I00004	/	Power Supply	E3633A	0~8V,20A/0~20V,10A	AGILENT	2014/9/17	2015/9/16	
V	EA06-CA-I00016	/	Power Supply	E3633A	0~8V,20A/0~20V,10A	AGILENT	2014/5/10	2015/5/9	
V	EA06-CA-I00015	C602M00/P0481	Power Supply	E3633A	0~8V,20A/0~20V,10A	AGILENT	2014/5/10	2015/5/9	
V	EA05-CA-I00006	/	Electronic LOAD	3311D	60V/60A, 300W	PRODIGIT	2014/05/12	2015/05/11	
V	EA05-CA-I00009	/	Electronic LOAD	3311F	60V/60A, 300W	PRODIGIT	2014/05/12	2015/05/11	
V	EA05-CA-I00008	C602M00/L0402	Electronic LOAD	3311F	60V/60A, 300W	PRODIGIT	2014/08/13	2015/08/12	

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: 0.01mA~3A at 60Hz, 0.01mA~1A, at 1kHz

6. T.1~T8 detail reports:

Control No.:LE-CU-15-01-041 **UN 38.3 Test Datasheet**

Customer:Lenovo **Model Name:L14M2P23** **Test Duration:2014/12/29~2015/01/23** **Reviewer:Wind_Zhao**

Test Sample Identification:

Battery						Component Cell		
Used	Sample No.	Sample State	Used	Sample No.	Sample State	Used	Sample No.	Sample State
V	1~4	1 Cycle, Fully charged	V	5~8	50 Cycle, Fully charged	V	1C~5C	1 Cycle, 50% charged
V	9~12	1 Cycle, Fully charged	V	13~16	50 Cycle, Fully charged	V	6C~15C	1 Cycle, 0% charged
		25Cycle, Fully charged			25 Cycle, Fully charged	V	16C~25C	50 Cycle, 0% charged

T.1 Altitude Simulation — Start time:2015/01/12 08:20 — Finish time:2015/01/12 17:30 — Ambient temp.: 22.7 °C — Operator: Happy_Gu

Sample No.: 01						Sample No.: 02					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	143.5	143.5	Mass loss %	0.01%	P	Mass (g)	143.1	143.0	Mass loss %	0.01%	P
OCV (V)	8.30	8.28	Residual OCV %	99.75%		OCV (V)	8.31	8.28	Residual OCV %	99.71%	
Sample No.: 03						Sample No.: 04					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	143.6	143.6	Mass loss %	0.01%	P	Mass (g)	142.5	142.5	Mass loss %	0.01%	P
OCV (V)	8.31	8.29	Residual OCV %	99.71%		OCV (V)	8.29	8.27	Residual OCV %	99.71%	
Sample No.: 05						Sample No.: 06					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	143.0	143.0	Mass loss %	0.01%	P	Mass (g)	143.0	143.0	Mass loss %	0.01%	P
OCV (V)	8.31	8.28	Residual OCV %	99.69%		OCV (V)	8.29	8.27	Residual OCV %	99.71%	
Sample No.: 07						Sample No.: 08					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	142.6	142.6	Mass loss %	0.01%	P	Mass (g)	142.9	142.9	Mass loss %	0.01%	P
OCV (V)	8.30	8.28	Residual OCV %	99.74%		OCV (V)	8.30	8.28	Residual OCV %	99.70%	

T.2 Thermal Test — Start time:2015/01/12 17:40 — Finish time:2015/01/19 08:20 — Ambient temp.: 19.5 °C — Operator: Happy_Gu

Sample No.: 01						Sample No.: 02					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	143.5	143.5	Mass loss %	0.01%	P	Mass (g)	143.0	143.0	Mass loss %	0.01%	P
OCV (V)	8.28	8.16	Residual OCV %	98.53%		OCV (V)	8.28	8.16	Residual OCV %	98.56%	
Sample No.: 03						Sample No.: 04					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	143.6	143.6	Mass loss %	0.01%	P	Mass (g)	142.5	142.5	Mass loss %	0.01%	P
OCV (V)	8.29	8.17	Residual OCV %	98.59%		OCV (V)	8.27	8.14	Residual OCV %	98.50%	
Sample No.: 05						Sample No.: 06					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	143.0	142.9	Mass loss %	0.01%	P	Mass (g)	143.0	143.0	Mass loss %	0.01%	P
OCV (V)	8.28	8.16	Residual OCV %	98.54%		OCV (V)	8.27	8.15	Residual OCV %	98.57%	
Sample No.: 07						Sample No.: 08					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	142.6	142.6	Mass loss %	0.01%	P	Mass (g)	142.9	142.9	Mass loss %	0.01%	P
OCV (V)	8.28	8.16	Residual OCV %	98.51%		OCV (V)	8.28	8.15	Residual OCV %	98.50%	

T.3 Vibration — Start time:2015/01/19 08:40 — Finish time:2015/01/20 08:20 — Ambient temp.: 20.7 °C — Operator: Happy_Gu

Sample No.: 01						Sample No.: 02					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	143.5	143.5	Mass loss %	0.01%	P	Mass (g)	143.0	143.0	Mass loss %	0.01%	P
OCV (V)	8.16	8.04	Residual OCV %	98.47%		OCV (V)	8.16	8.04	Residual OCV %	98.51%	
Sample No.: 03						Sample No.: 04					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	143.6	143.6	Mass loss %	0.01%	P	Mass (g)	142.5	142.5	Mass loss %	0.01%	P
OCV (V)	8.17	8.05	Residual OCV %	98.53%		OCV (V)	8.14	8.02	Residual OCV %	98.48%	
Sample No.: 05						Sample No.: 06					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	142.9	142.9	Mass loss %	0.01%	P	Mass (g)	143.0	143.0	Mass loss %	0.01%	P
OCV (V)	8.16	8.04	Residual OCV %	98.48%		OCV (V)	8.15	8.03	Residual OCV %	98.52%	
Sample No.: 07						Sample No.: 08					
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	142.6	142.6	Mass loss %	0.01%	P	Mass (g)	142.9	142.9	Mass loss %	0.01%	P
OCV (V)	8.16	8.04	Residual OCV %	98.53%		OCV (V)	8.15	8.03	Residual OCV %	98.48%	

T.4 Shock

Start time:2015/01/20 08:40
Finsh time:2015/01/21 09:50

Ambient temp.: 21.4 ℃

Operator: Happy_Gu

Sample No.: 01					
	Before	After	Variation		Results
Mass (g)	143.5	143.5	Mass loss %	0.01%	P
OCV (V)	8.04	8.01	Residual OCV %	99.74%	

Sample No.: 02					
	Before	After	Variation		Results
Mass (g)	143.0	143.0	Mass loss %	0.01%	P
OCV (V)	8.04	8.02	Residual OCV %	99.75%	

Sample No.: 03					
	Before	After	Variation		Results
Mass (g)	143.6	143.5	Mass loss %	0.01%	P
OCV (V)	8.05	8.03	Residual OCV %	99.70%	

Sample No.: 04					
	Before	After	Variation		Results
Mass (g)	142.5	142.4	Mass loss %	0.01%	P
OCV (V)	8.02	8.00	Residual OCV %	99.71%	

Sample No.: 05					
	Before	After	Variation		Results
Mass (g)	142.9	142.9	Mass loss %	0.01%	P
OCV (V)	8.04	8.01	Residual OCV %	99.70%	

Sample No.: 06					
	Before	After	Variation		Results
Mass (g)	143.0	143.0	Mass loss %	0.01%	P
OCV (V)	8.03	8.01	Residual OCV %	99.74%	

Sample No.: 07					
	Before	After	Variation		Results
Mass (g)	142.6	142.6	Mass loss %	0.01%	P
OCV (V)	8.04	8.02	Residual OCV %	99.71%	

Sample No.: 08					
	Before	After	Variation		Results
Mass (g)	142.9	142.9	Mass loss %	0.01%	P
OCV (V)	8.03	8.01	Residual OCV %	99.73%	

T.5 External Short Circuit

Start time:2015/01/21 10:10
Finsh time:2015/01/22 08:30

Ambient temp.: 20.6 ℃

Operator: Happy_Gu

	Sample No.: 01		Sample No.: 02		Sample No.: 03		Sample No.: 04		Sample No.: 05		Sample No.: 06		Sample No.: 07		Sample No.: 08	
Resistance (<100mΩ)	59.7		56.4		55.8		57.2		56.8		56.2		56.9		58.4	
OCV before test/ after short circuit(V)	8.01	0.00	8.02	0.00	8.03	0.00	8.00	0.00	8.01	0.00	8.01	0.00	8.02	0.00	8.01	0.00
Max Temp. (< 170℃)	54.8		55.1		55.2		54.8		54.9		55.5		55.6		55.2	
Results	P		P		P		P		P		P		P		P	

T.6 Impact / Crush (Component Cell)

Start time:2015/01/06 08:30
Finsh time:2015/01/06 18:40

Ambient temp.: 19.4 ℃

Operator: Happy_Gu

☐ Impact-Cylindrical cells greater than 20mm in diameter
■ Crush- Prismatic, pouch, coin/button cells and cylindrical cells not more than 20mm in diameter

	Sample No.: 01C	Sample No.: 02C	Sample No.: 03C	Sample No.: 04C	Sample No.: 05C
OCV before test(V)	3.71	3.70	3.72	3.71	3.71
Max Temp. (< 170℃)	26.4	24.4	25.1	24.7	24.5
Results	P	P	P	P	P

T.7 Overcharge

Start time:2015/01/14 10:20
Finsh time:2015/01/23 14:10

Ambient temp.: 18.9 ℃

Operator: Happy_Gu

	Sample No.: 09	Sample No.: 10	Sample No.: 11	Sample No.: 12	Sample No.: 13	Sample No.: 14	Sample No.: 15	Sample No.: 16
OCV before test(V)	8.31	8.30	8.31	8.30	8.29	8.30	8.29	8.30
Results	P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)

Start time:2015/01/13 08:30
Finsh time:2015/01/22 13:30

Ambient temp.: 20.4 ℃

Operator: Happy_Gu

	Sample No.: 06C	Sample No.: 07C	Sample No.: 08C	Sample No.: 09C	Sample No.: 10C
OCV before test(V)	3.18	3.19	3.18	3.18	3.18
Results	P	P	P	P	P
	Sample No.: 11C	Sample No.: 12C	Sample No.: 13C	Sample No.: 14C	Sample No.: 15C
OCV before test(V)	3.18	3.20	3.18	3.19	3.19
Results	P	P	P	P	P
	Sample No.: 16C	Sample No.: 17C	Sample No.: 18C	Sample No.: 19C	Sample No.: 20C
OCV before test(V)	3.20	3.19	3.18	3.20	3.19
Results	P	P	P	P	P
	Sample No.: 21C	Sample No.: 22C	Sample No.: 23C	Sample No.: 24C	Sample No.: 25C
OCV before test(V)	3.19	3.20	3.18	3.18	3.20
Results	P	P	P	P	P

7. Test sample: