



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-14-12-001

UN38.3 Test Report

Recommendations on the TRANSPORT OF DANGEROUS GOODS

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

Customer: Lenovo

Model: L14M2P24

Rating: 7.6V, 35Wh, 4610mAh

Test duration: 2014/11/05~2014/12/01

Approved By	Checked By	Prepared By
<i>Mike Chen</i>	<i>Mike Chen</i>	<i>Happy-Gu.</i>

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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.

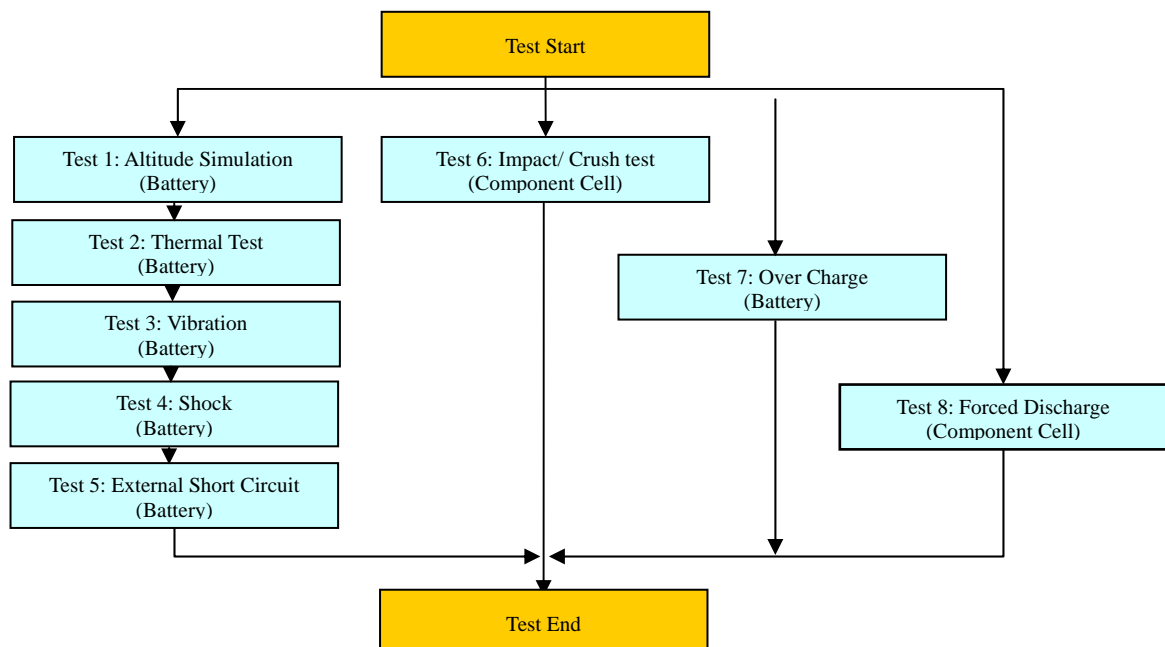
2. Test Quantity:

- 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.





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Control NO: LE-CU-14-12-001

4. Test Result:

4.1 T.1 ~T4 Test results: **Pass**

- 4.1.1 Batteries meet requirement regard mass loss was less then 0.1% and voltage loss less 10% relating original situation.
- 4.1.2 No leakage, No venting, No disassembly, No rupture and no fire.

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

- 4.2.1 All Batteries can meet requirement subjected external temperature does not exceed 170 .
- 4.2.2 All Batteries no disassembly, no rupture and no fire within six hours.

4.3 T.6 Test results: **Pass**

- 4.3.1 All cells can meet requirement subjected external temperature does not exceed 170 .
- 4.3.2 All cells no disassembly and no fire within six hours of this test.

4.4 T.7 Test results: **Pass**

- 4.4.1 All batteries can meet no disassembly and no fire within seven days of the test.

4.5 T.8 Test results: **Pass**

- 4.5.1 All cells can meet requirement subjected external temperature does not exceed 170 .
- 4.5.2 All cells after this test seven days, no disassembly, no fire.



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Control NO: LE-CU-14-12-001

5. Test Equipment:

SMP 新世電子(常熟)有限公司		Address : No.2 Dong Nan Avenue,Changshu, Jngsu Province,China		Revised date: 2014/10/21		Page:1			
TEL: 0512-52302255		FAX: 0512-52302277		Date: 2014/11/05~2014/12/01		Model name: L14M2P24			
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-100002	C602M00/S0096	715 learning 機	新普科技	18V/8A	新普科技	2014/01/02	2015/01/01	
V	EE03-CA-100018	C602M00/S0107	720 learning 機	新普科技	Chang:18V/17A Discharge:16V/18A	新普科技	2014/3/10	2015/3/9	
V	EE01-CA-100003	C602M00/S0099	715 learning 機	新普科技	18V/8A	新普科技	2014/03/10	2015/03/09	
V	EE01-CA-100005	C602M00/S0098	715 learning 機	新普科技	18V/8A	新普科技	2014/04/09	2015/04/08	
V	EE03-CA-100020	C602M00/S0163	720 learning 機	新普科技	Chang:18V/17A Discharge: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-100002	C602M00/0293	mQ Hitester	3561	R:10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EF03-CA-100001	C602M00/C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
V	ED01-CA-100007	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℃	KSONI	2014/06/09	2015/06/08	
V	EA02-CA-100002	C602M00/0293	mQ Hitester	3561	R:10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EF03-CA-100001	C602M00/C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
V	ED01-CA-100007	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-25N50	F3~2000Hz G:0.2~55G	King Design	2014/3/12	2015/3/11	
V	EC08-CA-E00002	C602M00/0052	Vibration	EM-200F2K-25N50	F3~2000Hz G:0.2~55G	King Design	2014/3/24	2015/3/23	
V	EA02-CA-100002	C602M00/0293	mQ Hitester	3561	R:10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EF03-CA-100001	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#5	G:10~2000G	Lansmont	2014/09/08	2015/09/07	
V	EA02-CA-100002	C602M00/0293	mQ Hitester	3561	R:10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EF03-CA-100001	C602M00/C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
External Short Circuit Test									
V	EA02-CA-100002	C602M00/0293	mQ Hitester	3561	R:10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015/9/16	
V	EA09-CA-100004	C602M00/0207	Data logger	34970A	V:0~300V, T:-150℃~1200℃	Agilent	2014/09/17	2015/09/16	
V	EC26-CA-100023	C602M00/0518	chamber	NIIT TH-2P-E	-40℃ to 150℃	NIIT	2014/08/11	2015/08/10	
V	ED01-CA-100007	C602M00/T0412	Thermo Meter	TA218	T: -10℃~70℃ RH: 25%~98%	KTJ	2014/8/27	2015/8/26	
Impact Test/Cush Test									
V	EC17-CA-100001	C602M00/1204	Impact test	100-372	H 50~80cm	JYI SHENG	2014/9/17	2015/9/16	
V	EC23-CA-E00001	C602M00/0743	Cush Test	BE-6047	1.0KN~15.0KN	BELL	2014/09/08	2015/09/07	
V	EA09-CA-100005	C602M00/0588	Data logger	34970A	V:0~300V, T:-150℃~1200℃	Agilent	2014/09/17	2015/09/16	
V	ED01-CA-100010	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	D56024	0~60V 0~24A	MO TECH	2014/03/12	2015/03/11	
V	EA06-CA-E00002	C602M00/P0777	Power Supply	D56024	0~60V 0~24A	MO TECH	2014/03/12	2015/03/11	
V	EA06-CA-E00001	C602M00/P0775	Power Supply	D56024	0~60V 0~24A	MO TECH	2014/03/12	2015/03/11	
V	EA06-CA-E00004	C602M00/P0781	Power Supply	D56024	0~60V 0~24A	MO TECH	2014/03/12	2015/03/11	
V	ED01-CA-100007	C602M00/T0412	Thermo Meter	TA218	T: -10℃~70℃ RH: 25%~98%	KTJ	2014/8/27	2015/8/26	
Forced Discharge Test									
V	EA06-CA-100004	/	Power Supply	E3633A	0~8V,20A,0~20V,10A	AGILENT	2014/9/17	2015/9/16	
V	EA06-CA-100016	/	Power Supply	E3633A	0~8V,20A,0~20V,10A	AGILENT	2014/5/10	2015/5/9	
V	EA06-CA-100015	C602M00/P0481	Power Supply	E3633A	0~8V,20A,0~20V,10A	AGILENT	2014/5/10	2015/5/9	
V	EA05-CA-100006	/	Electronic LOAD	3311D	60V,60A, 3000W	PRODIGIT	2014/05/12	2015/05/11	
V	EA05-CA-100009	/	Electronic LOAD	3311F	60V,60A, 3000W	PRODIGIT	2014/05/12	2015/05/11	
V	EA05-CA-100008	C602M00/L0402	Electronic LOAD	3311F	60V,60A, 3000W	PRODIGIT	2014/06/13	2015/06/12	

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

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6. T.1~T8 detail reports:



Control No: LE-CU-14-12-001

UN 38.3 Test Datasheet

Customer: Lenovo

Model Name: L14M2P24

Test Duration: 2014/11/05~2014/12/01

Reviewer: Mingya_Wang

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
		25 Cycle, Fully charged			25 Cycle, Fully charged	V	16C~25C	50 Cycle, 0% charged

T.1 Altitude Simulation Start time:2014/11/20 08:20 Ambient temp.: 22.7 °C Operator: Happy_Gu
 Finsh time:2014/11/20 17:30

Sample No.: 01					Sample No.: 02				
	Before	After	Variation	Results		Before	After	Variation	Results
Mass (g)	147.6	147.6	Mass loss % 0.01%	P	Mass (g)	148.1	148.0	Mass loss % 0.01%	P
OCV (V)	8.62	8.60	Residual OCV % 99.81%		OCV (V)	8.60	8.59	Residual OCV % 99.80%	
Sample No.: 03					Sample No.: 04				
Mass (g)	148.9	148.9	Mass loss % 0.01%	P	Mass (g)	147.4	147.3	Mass loss % 0.01%	P
OCV (V)	8.61	8.60	Residual OCV % 99.87%		OCV (V)	8.61	8.60	Residual OCV % 99.83%	
Sample No.: 05					Sample No.: 06				
Mass (g)	147.0	147.0	Mass loss % 0.01%	P	Mass (g)	146.5	146.5	Mass loss % 0.01%	P
OCV (V)	8.61	8.59	Residual OCV % 99.81%		OCV (V)	8.62	8.60	Residual OCV % 99.85%	
Sample No.: 07					Sample No.: 08				
Mass (g)	146.9	146.8	Mass loss % 0.01%	P	Mass (g)	146.5	146.5	Mass loss % 0.01%	P
OCV (V)	8.62	8.60	Residual OCV % 99.79%		OCV (V)	8.62	8.60	Residual OCV % 99.79%	

T.2 Thermal Test Start time:2014/11/20 17:40 Ambient temp.: 19.5 °C Operator: Happy_Gu
 Finsh time:2014/11/27 08:20

Sample No.: 01					Sample No.: 02				
	Before	After	Variation	Results		Before	After	Variation	Results
Mass (g)	147.6	147.5	Mass loss % 0.01%	P	Mass (g)	148.0	148.0	Mass loss % 0.01%	P
OCV (V)	8.60	8.48	Residual OCV % 98.58%		OCV (V)	8.59	8.47	Residual OCV % 98.61%	
Sample No.: 03					Sample No.: 04				
Mass (g)	148.9	148.9	Mass loss % 0.01%	P	Mass (g)	147.3	147.3	Mass loss % 0.01%	P
OCV (V)	8.60	8.48	Residual OCV % 98.64%		OCV (V)	8.60	8.47	Residual OCV % 98.56%	
Sample No.: 05					Sample No.: 06				
Mass (g)	147.0	147.0	Mass loss % 0.01%	P	Mass (g)	146.5	146.5	Mass loss % 0.01%	P
OCV (V)	8.59	8.47	Residual OCV % 98.59%		OCV (V)	8.60	8.49	Residual OCV % 98.63%	
Sample No.: 07					Sample No.: 08				
Mass (g)	146.8	146.8	Mass loss % 0.01%	P	Mass (g)	146.5	146.5	Mass loss % 0.01%	P
OCV (V)	8.60	8.48	Residual OCV % 98.57%		OCV (V)	8.60	8.48	Residual OCV % 98.56%	

T.3 Vibration Start time:2014/11/27 08:40 Ambient temp.: 20.7 °C Operator: Happy_Gu
 Finsh time:2014/11/28 08:20

Sample No.: 01					Sample No.: 02				
	Before	After	Variation	Results		Before	After	Variation	Results
Mass (g)	147.5	147.5	Mass loss % 0.01%	P	Mass (g)	148.0	148.0	Mass loss % 0.01%	P
OCV (V)	8.48	8.46	Residual OCV % 99.74%		OCV (V)	8.47	8.45	Residual OCV % 99.78%	
Sample No.: 03					Sample No.: 04				
Mass (g)	148.9	148.9	Mass loss % 0.01%	P	Mass (g)	147.3	147.3	Mass loss % 0.01%	P
OCV (V)	8.48	8.46	Residual OCV % 99.80%		OCV (V)	8.47	8.45	Residual OCV % 99.72%	
Sample No.: 05					Sample No.: 06				
Mass (g)	147.0	147.0	Mass loss % 0.01%	P	Mass (g)	146.5	146.5	Mass loss % 0.01%	P
OCV (V)	8.47	8.45	Residual OCV % 99.75%		OCV (V)	8.49	8.47	Residual OCV % 99.79%	
Sample No.: 07					Sample No.: 08				
Mass (g)	146.8	146.8	Mass loss % 0.01%	P	Mass (g)	146.5	146.5	Mass loss % 0.01%	P
OCV (V)	8.48	8.45	Residual OCV % 99.73%		OCV (V)	8.48	8.45	Residual OCV % 99.72%	

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Control NO: LE-CU-14-12-001

T.4 Shock											
Start time:2014/11/28 08:40					Ambient temp.: 21.4 ℃						
Finsh time:2014/11/28 13:30					Operator: Happy_Gu						
Sample No.: 01					Sample No.: 02						
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	147.5	147.5	Mass loss %	0.01%	P	Mass (g)	148.0	148.0	Mass loss %	0.01%	P
OCV (V)	8.46	8.44	Residual OCV %	99.79%		OCV (V)	8.45	8.43	Residual OCV %	99.78%	
Sample No.: 03					Sample No.: 04						
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	148.9	148.9	Mass loss %	0.01%	P	Mass (g)	147.3	147.3	Mass loss %	0.01%	P
OCV (V)	8.46	8.45	Residual OCV %	99.86%		OCV (V)	8.45	8.44	Residual OCV %	99.83%	
Sample No.: 05					Sample No.: 06						
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	147.0	147.0	Mass loss %	0.01%	P	Mass (g)	146.5	146.5	Mass loss %	0.01%	P
OCV (V)	8.45	8.43	Residual OCV %	99.80%		OCV (V)	8.47	8.45	Residual OCV %	99.78%	
Sample No.: 07					Sample No.: 08						
	Before	After	Variation		Results		Before	After	Variation		Results
Mass (g)	146.8	146.8	Mass loss %	0.01%	P	Mass (g)	146.5	146.5	Mass loss %	0.01%	P
OCV (V)	8.45	8.44	Residual OCV %	99.81%		OCV (V)	8.45	8.43	Residual OCV %	99.80%	

T.5 External Short Circuit																
Start time:2014/11/28 13:50								Ambient temp.: 20.6 ℃								
Finsh time:2014/11/29 09:10								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)	8.44	8.44	8.43	8.43	8.45	8.45	8.44	8.44	8.43	8.43	8.45	8.45	8.44	8.44	8.43	8.43
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:2014/11/10 08:30						Ambient temp.: 19.4 ℃				
Finsh time:2014/11/10 18:40						Operator: Happy_Gu				
<input type="checkbox"/> Impact-Cylindrical cells greater than 20mm in diameter <input checked="" type="checkbox"/> 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)	3.80		3.80		3.81		3.81		3.81	
Max Temp. (< 170℃)	27.8		25.4		26.6		25.3		26.1	
Results	P		P		P		P		P	

T.7 Overcharge								
Start time:2014/11/28 10:20					Ambient temp.: 18.9 ℃			
Finsh time:2014/11/28 13:10					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)	8.61	8.62	8.60	8.62	8.61	8.60	8.62	8.60
Results	P	P	P	P	P	P	P	P

T.8 Forced Discharge (Component Cell)										
Start time:2014/11/20 08:30						Ambient temp.: 20.4 ℃				
Finsh time:2014/11/28 13:30						Operator: Happy_Gu				
	Sample No.: 06C		Sample No.: 07C		Sample No.: 08C		Sample No.: 09C		Sample No.: 10C	
OCV before test(V)	3.11		3.17		3.16		3.14		3.13	
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)	3.13		3.15		3.17		3.12		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)	3.16		3.16		3.14		3.17		3.15	
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)	3.17		3.16		3.14		3.11		3.17	
Results	P		P		P		P		P	

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Control NO: LE-CU-14-12-001

7. Test sample:



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