



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-15-08-027

## UN38.3 Test Report

### Recommendations on the TRANSPORT OF DANGEROUS GOODS

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

**Customer: Lenovo**

**Model: L14M6P21**

**Rating: 11.1V, 90Wh,8100mAh**

**Test duration: 2015/7/27~2015/8/25**

Approved By	Checked By	Prepared By
Winel Zhao	Winel Zhao	Happy-Gin.

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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.

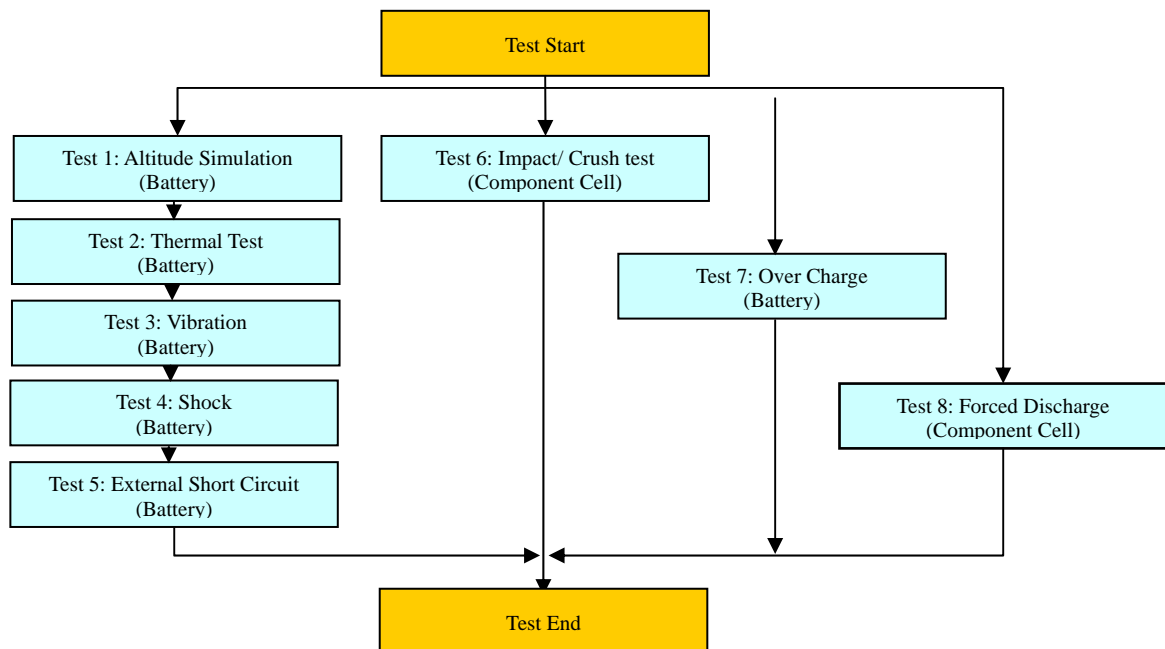
### 2. Test Quantity:

- 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.**



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Control NO: LE-CU-15-08-027

5. Test Equipment:

SMP 新普電子(常熟)有限公司

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Revised date: 2015/8/12

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Date: 2015/7/27~2015/8/25

Model name: L14M6P21

Test Instruments Reference List									
Used	Instrument ID(New)	Instrument ID(Old)	Instrument Name	Type	Range Used	Manufacturer	Calibration Date_Last	Calibration Date_Next	Remarks
<b>Pretest</b>									
V	EE01-CA-10.0002	C602M00.60096	715 learning機	新普科技	18V.6A	新普科技	2014/12/30	2015/12/29	
V	EE03-CA-10.0018	C602M00.60107	720 learning機	新普科技	Chang 18V/17A Discharge:1.6V/18A	新普科技	2015/03/09	2016.03/08	
	EE01-CA-10.0003	C602M00.60099	715 learning機	新普科技	18V.6A	新普科技	2015/03/09	2016.03/08	
	EE01-CA-10.0005	C602M00.60098	715 learning機	新普科技	18V.6A	新普科技	2015/04/08	2016.04/07	
	EE03-CA-10.0020	C602M00.60163	720 learning機	新普科技	Chang 18V/17A Discharge:1.6V/18A	新普科技	2014/10/21	2015/10/20	
<b>Low Pressure Test</b>									
V	EC15-CA-E.00003	C602M00.0462	Altitude	SVT-110	Kpa: 0~99Kpa	HSIN JIANG	2014/09/08	2015.09/07	
V	EA02-CA-10.0002	C602M00.0293	mQ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015.8/16	
V	EF03-CA-10.0001	C602M00.C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
V	ED01-CA-10.0007	C602M00.T0412	Thermo Meter	TA218	T : -10℃~70℃ RH : 25%~98%	KTJ	2014/8/27	2015.8/26	
<b>Thermal Test</b>									
V	EC29-CA-E.00002	C602M00.0671	Thermal Shock	TSK-A4C-150	T:-65℃ to 150℃	KSON	2014/06/09	2015.06/08	
V	EA02-CA-10.0002	C602M00.0293	mQ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015.8/16	
V	EF03-CA-10.0001	C602M00.C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
V	ED01-CA-10.0007	C602M00.T0412	Thermo Meter	TA218	T : -10℃~70℃ RH : 25%~98%	KTJ	2014/8/27	2015.8/26	
<b>Vibration Test</b>									
	EC08-CA-E.00001	C602M00.0197	Vibration	EM-200F2K-25N50	F:3~2000Hz G:0.2~55G	King Design	2015/3/11	2016.8/10	
V	EC08-CA-E.00002	C602M00.0052	Vibration	EM-200F2K-25N50	F:3~2000Hz G:0.2~55G	King Design	2014/9/24	2015.8/23	
V	EA02-CA-10.0002	C602M00.0293	mQ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015.8/16	
V	EF03-CA-10.0001	C602M00.C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
<b>Shock Test</b>									
V	EC17-CA-E.00001	C602M00.0570	Shock	HS 15/45	G:10~2000G	Lansmont	2014/09/08	2015.09/07	
V	EA02-CA-10.0002	C602M00.0293	mQ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015.8/16	
V	EF03-CA-10.0001	C602M00.C0604	Electronic Balance	XS1220M-SCS	1220g±0.001g	CHENGZHUN	2014/10/21	2015/10/20	
<b>External Short Circuit Test</b>									
V	EA02-CA-10.0002	C602M00.0293	mQ Hitester	3561	R:-10~310mΩ V:-20~20V	HIOKI	2014/9/17	2015.8/16	
V	EA09-CA-10.0004	C602M00.0207	Data logger	34970A	V:0~300V, T:-150℃~1200℃	Agilent	2014/09/17	2015.09/16	
V	EC26-CA-10.0023	C602M00.0518	chamber	WIT TH-2P-E	-40℃ to 150℃	WIT	2015/08/10	2016.08/09	
V	ED01-CA-10.0007	C602M00.T0412	Thermo Meter	TA218	T : -10℃~70℃ RH : 25%~98%	KTJ	2014/8/27	2015.8/26	
<b>Impact Test/Cursh Test</b>									
	EC17-CA-10.0001	C602M00.1204	Impact test	100-372	H:60~80cm	JYI SHENG	2014/9/17	2015.8/16	
V	EC23-CA-E.00001	C602M00.0743	Cursh Test	BE-6047	1.0KN~15.0KN	BELL	2014/09/08	2015.09/07	
V	EA09-CA-10.0005	C602M00.0588	Data logger	34970A	V:0~300V, T:-150℃~1200℃	Agilent	2014/09/17	2015.09/16	
V	ED01-CA-10.0010	C602M00.T0581	Thermo Meter	TA218	T : -10℃~70℃ RH : 25%~98%	KTJ	2015/6/21	2016.6/20	
<b>Overcharge Test</b>									
V	EA06-CA-E.00003	C602M00.P0779	Power Supply	DS6024	0~60V 0~24A	MOTECH	2015/03/11	2016.03/10	
V	EA06-CA-E.00002	C602M00.P0777	Power Supply	DS6024	0~60V 0~24A	MOTECH	2015/03/11	2016.03/10	
V	EA06-CA-E.00001	C602M00.P0775	Power Supply	DS6024	0~60V 0~24A	MOTECH	2015/03/11	2016.03/10	
V	EA06-CA-E.00004	C602M00.P0781	Power Supply	DS6024	0~60V 0~24A	MOTECH	2015/03/11	2016.03/10	
V	ED01-CA-10.0007	C602M00.T0412	Thermo Meter	TA218	T : -10℃~70℃ RH : 25%~98%	KTJ	2014/8/27	2015.8/26	
<b>Froced Discharge Test</b>									
V	EA06-CA-10.0004	/	Power Supply	E3633A	0~8V,20A,0~20V,10A	AGILENT	2014/9/17	2015.8/16	
V	EA06-CA-10.0016	/	Power Supply	E3633A	0~8V,20A,0~20V,10A	AGILENT	2015/5/9	2016.5/8	
V	EA06-CA-10.0015	C602M00.P0481	Power Supply	E3633A	0~8V,20A,0~20V,10A	AGILENT	2015/5/9	2016.5/8	
V	EA05-CA-10.0006	/	Electronic LOAD	3311D	60V,60A, 300W	PRODIGIT	2015/05/11	2016.05/10	
V	EA05-CA-10.0009	/	Electronic LOAD	3311F	60V,60A, 300W	PRODIGIT	2015/05/11	2016.05/10	
V	EA05-CA-10.0008	C602M00.L0402	Electronic LOAD	3311F	60V,60A, 300W	PRODIGIT	2015/08/12	2016.08/11	

Note 1: DC Voltage: 0.1~1000V; AC Voltage: 0.5~700V at 60Hz, 1kHz; Resistance: 10Ω~10MΩ; DC current: 0.1m A-3A; AC current: 0.01m A-3A at 60Hz, 0.01m A-1A, at 1kHz

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Control NO: LE-CU-15-08-027

6. T.1~T8 detail reports:

Control No.:LE-CU-15-08-027

UN 38.3 Test Datasheet

Customer: Lenovo

Model Name:L14M6P21

Test Duration: 2015/7/27~2015/8/25

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

T.1 Altitude Simulation					T.2 Thermal Test				
Start time:2015/08/10 08:20					Start time:2015/08/10 17:40				
Finish time:2015/08/10 17:30					Finish time:2015/08/17 08:20				
Ambient temp.: 22.4 ℃					Ambient temp.: 21.9 ℃				
Operator: Happy_Gu					Operator: Happy_Gu				
Sample No.: 01					Sample No.: 02				
	Before	After	Variation			Before	After	Variation	
Mass (g)	475.26	475.25	Mass loss %	0.00%	Mass (g)	474.79	474.78	Mass loss %	0.00%
OCV (V)	12.482	12.466	Residual OCV%	99.87%	OCV (V)	12.489	12.476	Residual OCV%	99.90%
				P					P
Sample No.: 03					Sample No.: 04				
	Before	After	Variation			Before	After	Variation	
Mass (g)	475.36	475.36	Mass loss %	0.00%	Mass (g)	475.12	475.12	Mass loss %	0.00%
OCV (V)	12.489	12.476	Residual OCV%	99.90%	OCV (V)	12.486	12.472	Residual OCV%	99.89%
				P					P
Sample No.: 05					Sample No.: 06				
	Before	After	Variation			Before	After	Variation	
Mass (g)	475.01	475.01	Mass loss %	0.00%	Mass (g)	474.37	474.37	Mass loss %	0.00%
OCV (V)	12.493	12.478	Residual OCV%	99.88%	OCV (V)	12.496	12.480	Residual OCV%	99.87%
				P					P
Sample No.: 07					Sample No.: 08				
	Before	After	Variation			Before	After	Variation	
Mass (g)	474.70	474.69	Mass loss %	0.00%	Mass (g)	476.03	476.02	Mass loss %	0.00%
OCV (V)	12.498	12.483	Residual OCV%	99.86%	OCV (V)	12.500	12.486	Residual OCV%	99.89%
				P					P

T.3 Vibration				
Start time:2015/08/17 08:30				
Finish time:2015/08/18 08:30				
Ambient temp.: 23.1 ℃				
Operator: Happy_Gu				
Sample No.: 01				
	Before	After	Variation	
Mass (g)	475.25	475.24	Mass loss %	0.00%
OCV (V)	12.294	12.273	Residual OCV%	99.83%
				P
Sample No.: 03				
	Before	After	Variation	
Mass (g)	475.36	475.35	Mass loss %	0.00%
OCV (V)	12.299	12.280	Residual OCV%	99.85%
				P
Sample No.: 05				
	Before	After	Variation	
Mass (g)	475.01	475.00	Mass loss %	0.00%
OCV (V)	12.307	12.286	Residual OCV%	99.83%
				P
Sample No.: 07				
	Before	After	Variation	
Mass (g)	474.69	474.68	Mass loss %	0.00%
OCV (V)	12.310	12.287	Residual OCV%	99.81%
				P

T.3 Vibration				
Start time:2015/08/17 08:30				
Finish time:2015/08/18 08:30				
Ambient temp.: 23.1 ℃				
Operator: Happy_Gu				
Sample No.: 02				
	Before	After	Variation	
Mass (g)	474.78	474.77	Mass loss %	0.00%
OCV (V)	12.297	12.278	Residual OCV%	99.86%
				P
Sample No.: 04				
	Before	After	Variation	
Mass (g)	475.11	475.11	Mass loss %	0.00%
OCV (V)	12.298	12.274	Residual OCV%	99.80%
				P
Sample No.: 06				
	Before	After	Variation	
Mass (g)	474.36	474.36	Mass loss %	0.00%
OCV (V)	12.302	12.282	Residual OCV%	99.84%
				P
Sample No.: 08				
	Before	After	Variation	
Mass (g)	476.01	476.01	Mass loss %	0.00%
OCV (V)	12.312	12.289	Residual OCV%	99.81%
				P

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Control NO: LE-CU-15-08-027

T.4 Shock					Start time:2015/08/18 08:40					Ambient temp.: 23.1 ℃					Operator: Happy_Gu					
Finish time:2015/08/18 14:40																				
Sample No.: 01					Sample No.: 02					Sample No.: 03					Sample No.: 04					
	Before	After	Variation		Results			Before	After	Variation		Results			Before	After	Variation		Results	
Mass (g)	475.24	475.24	Mass loss %	0.00%	P		Mass (g)	474.77	474.77	Mass loss %	0.00%	P		Mass (g)	475.35	475.35	Mass loss %	0.00%	P	
OCV (V)	12.273	12.258	Residual OCV %	99.89%			OCV (V)	12.278	12.264	Residual OCV %	99.89%			OCV (V)	12.280	12.263	Residual OCV %	99.89%		
Sample No.: 05					Sample No.: 06					Sample No.: 07					Sample No.: 08					
	Before	After	Variation		Results			Before	After	Variation		Results			Before	After	Variation		Results	
Mass (g)	475.00	475.00	Mass loss %	0.00%	P		Mass (g)	474.36	474.35	Mass loss %	0.00%	P		Mass (g)	474.68	474.68	Mass loss %	0.00%	P	
OCV (V)	12.286	12.272	Residual OCV %	99.89%			OCV (V)	12.282	12.268	Residual OCV %	99.89%			OCV (V)	12.287	12.274	Residual OCV %	99.89%		

T.5 External Short Circuit										Start time:2015/08/18 14:50										Ambient temp.: 21.8 ℃										Operator: Happy_Gu									
Finish time:2015/08/19 09:10																																							
Resistance (<100mΩ)		Sample No.: 01		Sample No.: 02		Sample No.: 03		Sample No.: 04		Sample No.: 05		Sample No.: 06		Sample No.: 07		Sample No.: 08		Sample No.: 09		Sample No.: 10		Sample No.: 11		Sample No.: 12		Sample No.: 13		Sample No.: 14		Sample No.: 15		Sample No.: 16							
		56.9		57.3		58.2		57.2		54.9		58.1		55.6		54.3																							
OCV before test/after short circuit(V)		12.258 0.000		12.264 0.000		12.263 0.000		12.259 0.000		12.272 0.000		12.268 0.000		12.274 0.000		12.273 0.000																							
Max Temp. (< 170℃)		55.1		54.8		55.6		55.2		54.8		55.0		55.1		54.8																							
Results		P		P		P		P		P		P		P		P																							

T.6 Impact / Crush (Component Cell)										Start time:2015/07/29 08:30										Ambient temp.: 21.6 ℃										Operator: Happy_Gu									
Finish time:2015/07/29 18:40																																							
<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																													
OCV before test(V)		Sample No.: 01C		Sample No.: 02C		Sample No.: 03C		Sample No.: 04C		Sample No.: 05C		Sample No.: 06C		Sample No.: 07C		Sample No.: 08C		Sample No.: 09C		Sample No.: 10C		Sample No.: 11C		Sample No.: 12C		Sample No.: 13C		Sample No.: 14C		Sample No.: 15C		Sample No.: 16C							
		3.699		3.701		3.698		3.699		3.700																													
Max Temp. (< 170℃)		32.6		30.8		31.6		32.0		31.5																													
Results		P		P		P		P		P																													

T.7 Overcharge										Start time:2015/08/12 10:20										Ambient temp.: 23.4 ℃										Operator: Happy_Gu									
Finish time:2015/08/22 13:10																																							
OCV before test(V)		Sample No.: 09		Sample No.: 10		Sample No.: 11		Sample No.: 12		Sample No.: 13		Sample No.: 14		Sample No.: 15		Sample No.: 16		Sample No.: 17		Sample No.: 18		Sample No.: 19		Sample No.: 20		Sample No.: 21		Sample No.: 22		Sample No.: 23		Sample No.: 24							
		12.495		12.490		12.501		12.498		12.503		12.499		12.501		12.500																							
Results		P		P		P		P		P		P		P		P																							

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Control NO: LE-CU-15-08-027

T 8 Forced Discharge (Component Cell) Start time:2015/08/13 08:30 Ambient temp.: 21.6 ℃ Operator: Happy\_Gu  
 Finish time:2015/08/24 13:30

	Sample No.: 06C	Sample No.: 07C	Sample No.: 08C	Sample No.: 09C	Sample No.: 10C
OCV before test(V)	3.391	3.389	3.397	3.401	3.396
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)	3.398	3.396	3.391	3.388	3.403
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)	3.379	3.382	3.385	3.380	3.384
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)	3.378	3.361	3.373	3.388	3.373
Results	P	P	P	P	P

## 7. Test sample:



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