

Battery Pack Test Report ***(Package Drop & UN38.3)***

Customer: Lenovo

Pack Model: L17C3P61

Nominal voltage: 11.52V

Nominal capacity: 3166mAh/36Wh

Configuration: 3S1P

Customer P/N: 5B10Q39200

Celxpert P/N: 921300173

Cell Type: Coslight CA4043B0G 3166mAh

Mar. 09. 2018

Approved by _____



Reviewed by _____

Prepared by _____

A handwritten signature in black ink.

Figure photo of the pack



PS E 11.52V 3070mAh
レノボ・ジャパン株式会社

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Rechargeable Li-ion Battery (二次锂电池组)

Model Name (型號/型号): L17C3P61

Manufactured By Celxpert(Kunshan) Energy Co.,Ltd.

Cell made in China / Pack processed in China
制造地 / 製造地: 中国 / 中国

制造商: 加百裕工业股份有限公司

额定容量: 3070mAh, 充电限制电压: 13.2V

Rating 11.52V --- TYP 3166mAh/36Wh MIN 3070mAh/35Wh

EU contact: Lenovo, Einsteinova21, 85101 Bratislava, Slovakia

STORE BETWEEN 0°C~60°C 32°F~140°F

For use with Lenovo personal computer

為避免起火爆炸之危險，請勿自行拆卸、壓擠或短路電池
請勿丟置於火裡或水裡。請依說明書指示進行充電。
請參考使用說明或者遵循相關法律規定處理废弃電池
禁止拆解、撞擊、擠壓或投入火中。
若出現嚴重鼓脹，請勿繼續使用。請勿置於高溫環境中。

XXXXXXXX-XXXXX
전지의종류: 리튬이온이차전지
모 델 명: L17C3P61
제품장려: 11.52Vdc, 3070mAh
제조자명: Celxpert(Kunshan) Energy Co., L
수입자명: 한국레노버
제조국명: 중국(China)
연락처: 1670-0088

Li-ion00
 使用後はリサイクルへ

PS:此報告僅針對送檢樣品有效

The test report is valid for the tested samples only.

1. Package Drop Test Report

Test Period	2017/08/25		Test Spec.	IATA A58 & QS-3Q-043	
Sample Level	Mass Production	Sample Mode	Finished Product	Quantity	42 PCS

1.1 DECSRIPTION OF TEST EQUIPMENTS

Kingdom Technology KD-128AS drop tester. Description of performance:

Payload capacity: 160 lbs. (72.6 kg)

Payload dimensions: Length: 61 cm / Width: 76 cm / Height: 90cm

Drop height range: 30 - 180 cm

Base Plate Material: Solid Steel (Std.)

Base Plate Size: 76.2x114.3x1.3cm

1.2 TEST CONDITION

Drop height: 120cm

Drop weight: 9.38Kg

Drop position: One corner, three edges and three faces with 1 time. (Total: 7 drops).

Drop Position and sequence: Ref. attachment 1

1.3 SUMMARY OF TEST

Concluding the follow check items, the result of the test is **pass**.

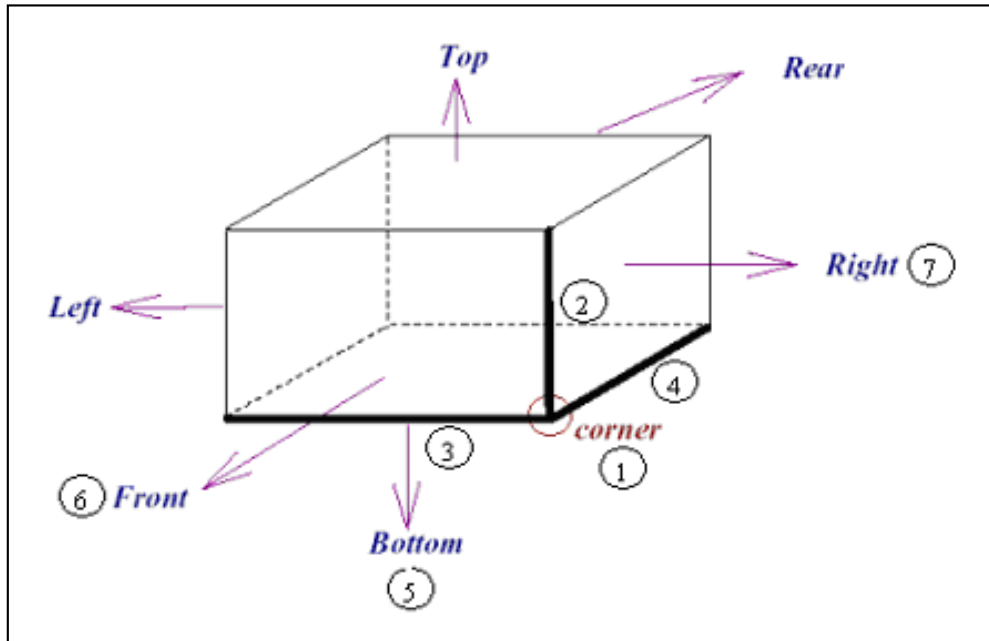
Check items	Before	After
Battery pack function	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Fail
Battery pack appearance	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Fail
Package internal status	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Fail
Package outside status	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Fail

Test photographs please refer to Attachment 2

Function Check details please refer to Attachment 3

Attachment 1:









DROP POSITION









DROP SEQUENCE

DROP	IMPACT SURFACE
1	Corner (2-3-4)
2	Edge 1 (2)
3	Edge 2 (3)
4	Edge 3 (4)
5	Bottom (Flat 5)
6	Front (Flat 6)
7	Right (Flat 7)

Attachment 2:

Drop Sequence	Test Setup	Test Result
1		
2		
3		
4		

Drop Sequence	Test Setup	Test Result
5		
6		
7		

Open Package check for internal after drop test



2. UN38.3 Test Report

Test Period	2017/02/10~2017/03/02		Test Spec.	ST/SG/AC.10/11/Rev.5 Amend.1&2	
Parts Name	Battery Pack	Application		Quantity	Pack 16PCS/Cell 25pcs

2.1 Test Summary

Item	Test Item	Test Result	Details
T1	Altitude simulation test (UN38.3-1)	Pass	Page 9
T2	Thermal test (UN38.3-2)	Pass	Page 10
T3	Vibration test (UN38.3-3)	Pass	Page 11
T4	Shock test (UN38.3-4)	Pass	Page 12
T5	Short Circuit test (UN38.3-5)	Pass	Page 13
T6	Crush Test (UN38.3-6)	Pass	Page 13
T7	Overcharge test (UN38.3-7)	Pass	Page 14
T8	Forced discharge test (UN38.3-8)	Pass	Page 15

The battery pack passes UN38.3 test.

2.2 Test sample list

No.	Pack S/N	Test item	No.	Cell Num.	Test item
1	Sample No:1/16	38.3.1~5	1	Coslight CA4043B0G 3166mAh	38.3.6
2	Sample No:2/16	38.3.1~5	2	Coslight CA4043B0G 3166mAh	38.3.6
3	Sample No:3/16	38.3.1~5	3	Coslight CA4043B0G 3166mAh	38.3.6
4	Sample No:4/16	38.3.1~5	4	Coslight CA4043B0G 3166mAh	38.3.6
5	Sample No:5/16	38.3.1~5	5	Coslight CA4043B0G 3166mAh	38.3.6
6	Sample No:6/16	38.3.1~5	6	Coslight CA4043B0G 3166mAh	38.3.8
7	Sample No:7/16	38.3.1~5	7	Coslight CA4043B0G 3166mAh	38.3.8
8	Sample No:8/16	38.3.1~5	8	Coslight CA4043B0G 3166mAh	38.3.8
9	Sample No:9/16	38.3.7	9	Coslight CA4043B0G 3166mAh	38.3.8
10	Sample No:10/16	38.3.7	10	Coslight CA4043B0G 3166mAh	38.3.8
11	Sample No:11/16	38.3.7	11	Coslight CA4043B0G 3166mAh	38.3.8
12	Sample No:12/16	38.3.7	12	Coslight CA4043B0G 3166mAh	38.3.8
13	Sample No:13/16	38.3.7	13	Coslight CA4043B0G 3166mAh	38.3.8
14	Sample No:14/16	38.3.7	14	Coslight CA4043B0G 3166mAh	38.3.8
15	Sample No:15/16	38.3.7	15	Coslight CA4043B0G 3166mAh	38.3.8
16	Sample No:16/16	38.3.7	16	Coslight CA4043B0G 3166mAh	38.3.8
			17	Coslight CA4043B0G 3166mAh	38.3.8
			18	Coslight CA4043B0G 3166mAh	38.3.8
			19	Coslight CA4043B0G 3166mAh	38.3.8
			20	Coslight CA4043B0G 3166mAh	38.3.8
			21	Coslight CA4043B0G 3166mAh	38.3.8
			22	Coslight CA4043B0G 3166mAh	38.3.8
			23	Coslight CA4043B0G 3166mAh	38.3.8
			24	Coslight CA4043B0G 3166mAh	38.3.8
			25	Coslight CA4043B0G 3166mAh	38.3.8

2.3 Test result

Item	Test Item	Test specification	Judge criteria	Sample(s)				
T1	Altitude Simulation (UN38.3-1)	1-1. 4 batteries are standard charged. 4 batteries are 1C cycled 50 times, ending in fully charged state. All batteries weight is measured. The charged batteries voltage are measured and recorded. 1-2. Batteries shall be stored at a pressure of 11.6Kpa or less for at least six hours at ambient temperature 20+/-5 °C. 1-3. Vacuum is released. All cells weight is measured. The charged cell voltage are measured and recorded.	No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire. Battery voltage drop < 10%.	4 packs are standard charged (Pack#1~4) 4 packs 50 cycled ending in fully charged states (Pack#5~8)				
Test Period	Start: 2017/02/10 End:2017/02/10							
Test Equipment	數位電表 Q153, 電子天平 Q090, 真空烘箱 Q146							
Major Problem	-							
Warning Point	-							
Recommendation	The battery packs pass the test.							
Raw Data	Altitude Simulation Test on Charged Packs							
	No.	Before		After		voltage residue	mass loss	other event
		OCV (V)	Weight (g)	OCV (V)	Weight (g)	Volt (%)	Weight (%)	
	1	12.733	146.73	12.731	146.72	99.98%	0.00%	O
	2	12.729	146.59	12.728	146.58	99.99%	0.00%	O
	3	12.734	146.81	12.733	146.80	99.99%	0.00%	O
	4	12.735	146.67	12.732	146.66	99.98%	0.00%	O
	5	12.516	146.58	12.514	146.57	99.98%	0.01%	O
	6	12.533	146.64	12.530	146.63	99.98%	0.01%	O
	7	12.503	146.73	12.502	146.72	99.99%	0.01%	O
8	12.531	146.73	12.527	146.72	99.97%	0.01%	O	
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire								
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire								

Item	Test Item	Test specification	Judge criteria	Sample(s)					
T2	Thermal test (UN38.3-2)	2-1. Packs are stored for 6 hours at $72\pm 2^{\circ}\text{C}$, followed by storage for 6 hours at $-40\pm 2^{\circ}\text{C}$. The maximum time interval between test temperature extremes is 30 minutes. 2-2.Repeat 2-1 for 10 times. Then store the packs at ambient for 24 hours. All packs weight are measured. The charged battery voltage are measured and recorded.	No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire. Battery voltage drop < 10%.	4 packs are standard charged (Pack#1~4) 4 packs 50 cycled ending in fully charged states (Pack#5~8)					
Test Period		Start: 2017/02/13 End:2017/02/20							
Test Equipment		數位電表 Q153, 電子天平 Q090, 冷熱衝擊機 Q336							
Major Problem		-							
Warning Point		-							
Recommendation		The packs pass the test.							
Raw Data		Thermal Test on Charged Packs							
		No.	Before		After		voltage residue	mass loss	other event
			OCV (V)	Weight (g)	OCV (V)	Weight (g)	Volt (%)	Weight (%)	
		1	12.731	146.72	12.662	146.72	99.46%	0.00%	O
		2	12.728	146.58	12.652	146.57	99.40%	0.01%	O
		3	12.733	146.80	12.658	146.80	99.41%	0.00%	O
		4	12.732	146.66	12.658	146.65	99.42%	0.01%	O
		5	12.514	146.57	12.443	146.57	99.43%	0.00%	O
		6	12.530	146.63	12.455	146.62	99.40%	0.01%	O
		7	12.502	146.72	12.434	146.71	99.46%	0.01%	O
8	12.527	146.72	12.452	146.70	99.40%	0.01%	O		
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire									
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire									

Item	Test Item	Test specification	Judge criteria	Sample(s)				
T3	Vibration test (UN38.3-3)	3-1. Packs are firmly secured to the platform of the vibration machine without distorting the packs in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of 3 mutually perpendicular to the terminal face. 3-2. The logarithmic frequency sweep is as follows: 7-18 Hz → 1gn 18-50 Hz → 0.8mm amplitude 50-200 Hz → 8gn 3-3. All packs weight are measured. The charged packs voltage are measured and recorded.	No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire. Battery voltage drop < 10%.	4 packs are standard charged (Pack#1~4) 4 packs 50 cycled ending in fully charged states (Pack#5~8)				
Test Period	Start: 2017/02/21 End:2017/02/22							
Test Equipment	數位電表 Q153, 電子天平 Q090, 振動測試機 Q300							
Major Problem	-							
Warning Point	-							
Recommendation	The packs pass the test.							
Raw Data	Vibration Test on Charged Packs							
	No.	Before		After		voltage residue	mass loss	other event
		OCV (V)	Weight (g)	OCV (V)	Weight (g)	Volt (%)	Weight (%)	
	1	12.662	146.72	12.655	146.71	99.94%	0.01%	O
	2	12.652	146.57	12.645	146.57	99.94%	0.01%	O
	3	12.658	146.80	12.650	146.79	99.94%	0.01%	O
	4	12.658	146.65	12.650	146.64	99.94%	0.00%	O
	5	12.443	146.57	12.435	146.56	99.94%	0.01%	O
	6	12.455	146.62	12.449	146.62	99.95%	0.00%	O
	7	12.434	146.71	12.425	146.70	99.93%	0.01%	O
8	12.452	146.70	12.445	146.69	99.94%	0.01%	O	
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire								
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire								

Item	Test Item	Test specification	Judge criteria	Sample(s)					
T4	Shock test (UN38.3-4)	4-1. Packs shall be secured to the testing machine by means of a rigid mount, which will support all mounting surfaces. 4-2. Packs shall be subjected to a half-sine shock of peak acceleration 150gn and pulse duration of 6 milliseconds. Each pack shall be subjected to 3 shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicularly mounting positions of the pack for a total of 18 shocks. 4-3. All batteries weight are measured. The charged cell voltage are measured and recorded.	No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire. Battery voltage drop < 10%.	4 packs are standard charged (Pack#1~4) 4 packs 50 cycled ending in fully charged states (Pack#5~8)					
Test Period		Start: 2017/02/24 End:2017/02/24							
Test Equipment		數位電表 Q153, 電子天平 Q090, 衝擊測試機 Q154							
Major Problem		-							
Warning Point		-							
Recommendation		The packs pass the test.							
Raw Data		Shock Test on Charged Packs							
		No.	Before		After		voltage residue	mass loss	other event
			OCV (V)	Weight (g)	OCV (V)	Weight (g)	Volt (%)	Weight (%)	
		1	12.655	146.71	12.649	146.71	99.95%	0.00%	O
		2	12.645	146.57	12.640	146.56	99.96%	0.00%	O
		3	12.650	146.79	12.645	146.79	99.96%	0.00%	O
		4	12.650	146.64	12.644	146.64	99.95%	0.00%	O
		5	12.435	146.56	12.431	146.55	99.97%	0.00%	O
		6	12.449	146.62	12.442	146.61	99.94%	0.00%	O
		7	12.425	146.70	12.419	146.70	99.95%	0.00%	O
8	12.445	146.69	12.440	146.69	99.96%	0.00%	O		
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire									
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire									

Item	Test Item	Test specification	Judge criteria	Sample(s)
T5	Short Circuit Test (UN38.3-5)	5-1.Packs are placed in to a 55±2°C oven, and exterior packs temperature are monitored 5-2.When packs exterior reach 55±2°C, they are shorted by connecting terminals with a copper wire of resistance less than 100m Ohm. 5-4. The short was continued for more than 1hour or the cell temperature return to 55°C. The packs are observed for a further 6 hours.	No rupture, no disassembly, no explosion, no fire, no smoke. Packs exterior peak temperature <170°C.	4 packs are standard charged (Pack#1~4) 4 packs 50 cycled ending in fully charged states (Pack#5~8)
Test Period		Start: 2017/02/27 End:2017/03/02		
Test Equipment		數位電表 Q153, 資料收集器 Q075, 烘箱 Q171		
Recommendation		The packs pass the test.		
Raw Data		Short Circuit Test on Charged Packs		
		No.	Max. Temp.(°C)	Other event
		1	55.32	O
		2	54.68	O
		3	55.19	O
		4	54.27	O
		5	55.25	O
		Note: D-Disassembly ; R-Rupture ; F-Fire O- No Disassembly , No Rupture , No Fire		
Item	Test Item	Test specification	Judge criteria	Sample(s)
T6	Crush test/ Impact test (UN38.3-6)	6-1.Cell's diameter > 20mm, Execution impact test. (A 9.1 Kg mass is to be dropped from a height of 61±2.5cm onto the sample.) 6-2.Cell's diameter < 20mm, Execution crush test (The cells are crushed with a 13 KN with the crush tester. Once the force is obtained it is to be released.)	External temperature of cell does not exceed 170°C and there is no disassembly and no fire within 6 hours of the test.	5 cells are 50% charged (Cell #1~5)
Test Period		Start: 2017/02/14 End: 2017/02/14		
Test Equipment		數位電表 Q153, 資料收集器 Q152, 擠壓試驗機 Q437/撞擊測試機 Q231		
Recommendation		The Cells pass the test.		
Raw Data		Crush Test on 50% Charged Cells		
		No.	Max. Temp.(°C)	Other event
		1	47.56	O
		2	48.23	O
		3	46.72	O
		4	50.23	O
		5	49.51	O
		Note: D-Disassembly ; F-Fire / O-No Disassembly , No Fire		

Item	Test Item	Test specification	Judge criteria	Sample(s)
T7	Overcharge test (UN38.3-7)	7-1. The charge current shall be twice the Spec's recommended maximum continuous charge current. 7-2. The minimum voltage of the test shall be as follows: (a) When the Spec's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. (b) When the Spec's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. 7-3. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.	No disassembly, no fire within seven days after the test.	4 packs are fully charged (Pack#9~12) 4 packs are 50 times cycled ending in fully charged state (Pack #13~16)
Test Period		Start: 2017/02/16 End:2017/02/21		
Test Equipment		數位電表 Q153, 資料收集器 Q078, 電源供應器 Q148/Q149/Q150		
Major Problem		-		
Warning Point		-		
Recommendation		The packs pass the test.		
Raw Data	Overcharge Test on Charged Packs			
	No.	Charge Voltage(V)	Charge Current(A)	Max. Temp.(°C)
	9	22.0 V	6.2	20.36
	10			21.14
	11			21.55
	12			20.26
	13			20.31
	14			21.25
	15			21.37
	16			20.43
Note: D-Disassembly ; F-Fire / O-No Disassembly ,No Fire				

Item	Test Item	Test specification	Judge criteria	Sample(s)																																																																									
T8	Forced discharge test (UN38.3-8)	Cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current Specified by the manufacturer.	No disassembly, no fire within seven days after the test.	10 cells are first cycle in fully discharged states (Pack#6~15) 10 cells are after 50 cycles ending in fully discharged states (Pack #16~25)																																																																									
Test Period	Start: 2017/02/22 End:2017/02/24																																																																												
Test Equipment	數位電表 Q153, 資料收集器 Q160, 電源供應器 Q147/Q236/Q237																																																																												
Major Problem	-																																																																												
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Raw Data	<table border="1"> <thead> <tr> <th colspan="3">Forced discharge are first cycle in fully discharged</th> <th colspan="3">Forced discharge are after 50 cycles ending in fully discharged</th> </tr> <tr> <th>No.</th> <th>Max. Temp.(°C)</th> <th>Other event</th> <th>No.</th> <th>Max. Temp.(°C)</th> <th>Other event</th> </tr> </thead> <tbody> <tr><td>6</td><td>56.32</td><td>O</td><td>16</td><td>65.54</td><td>O</td></tr> <tr><td>7</td><td>46.14</td><td>O</td><td>17</td><td>41.63</td><td>O</td></tr> <tr><td>8</td><td>57.32</td><td>O</td><td>18</td><td>56.84</td><td>O</td></tr> <tr><td>9</td><td>65.41</td><td>O</td><td>19</td><td>64.51</td><td>O</td></tr> <tr><td>10</td><td>47.23</td><td>O</td><td>20</td><td>43.57</td><td>O</td></tr> <tr><td>11</td><td>47.18</td><td>O</td><td>21</td><td>58.47</td><td>O</td></tr> <tr><td>12</td><td>48.69</td><td>O</td><td>22</td><td>62.17</td><td>O</td></tr> <tr><td>13</td><td>49.71</td><td>O</td><td>23</td><td>43.68</td><td>O</td></tr> <tr><td>14</td><td>58.74</td><td>O</td><td>24</td><td>55.78</td><td>O</td></tr> <tr><td>15</td><td>62.13</td><td>O</td><td>25</td><td>47.48</td><td>O</td></tr> </tbody> </table>					Forced discharge are first cycle in fully discharged			Forced discharge are after 50 cycles ending in fully discharged			No.	Max. Temp.(°C)	Other event	No.	Max. Temp.(°C)	Other event	6	56.32	O	16	65.54	O	7	46.14	O	17	41.63	O	8	57.32	O	18	56.84	O	9	65.41	O	19	64.51	O	10	47.23	O	20	43.57	O	11	47.18	O	21	58.47	O	12	48.69	O	22	62.17	O	13	49.71	O	23	43.68	O	14	58.74	O	24	55.78	O	15	62.13	O	25	47.48	O
	Forced discharge are first cycle in fully discharged			Forced discharge are after 50 cycles ending in fully discharged																																																																									
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