

Battery Pack Test Report ***(UN38.3)***

Customer: Lenovo

Pack Model: L17C6P51

Nominal voltage: 11.4V

Typical capacity: 8684mAh/99Wh

Rated: 8440mAh/96Wh

Configuration: 3S2P

Customer P/N: SB10T83147

Celxpert P/N: 921300306

Cell Type: Coslight CA595490G-C 4342mAh

Apr.16.2018

Approved by _____

Reviewed by _____

Prepared by _____



1. Figure photo of the pack.



PS:此報告僅針對送檢樣品有效

The test report is valid for the tested samples only.

2. UN38.3 Test Report

Test Period	2018/03/28~2018/04/15		Test Spec.	ST/SG/AC.10/11/Rev.6/Amend.1	
Parts Name	Battery Pack	Application	NB	Quantity	Pack 16PCS/Cell 30pcs

2.1 Test Summary

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

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 CA595490G-C 4342mAh	38.3.6
2	Sample No:2/16	38.3.1~5	2	Coslight CA595490G-C 4342mAh	38.3.6
3	Sample No:3/16	38.3.1~5	3	Coslight CA595490G-C 4342mAh	38.3.6
4	Sample No:4/16	38.3.1~5	4	Coslight CA595490G-C 4342mAh	38.3.6
5	Sample No:5/16	38.3.1~5	5	Coslight CA595490G-C 4342mAh	38.3.6
6	Sample No:6/16	38.3.1~5	6	Coslight CA595490G-C 4342mAh	38.3.6
7	Sample No:7/16	38.3.1~5	7	Coslight CA595490G-C 4342mAh	38.3.6
8	Sample No:8/16	38.3.1~5	8	Coslight CA595490G-C 4342mAh	38.3.6
9	Sample No:9/16	38.3.7	9	Coslight CA595490G-C 4342mAh	38.3.6
10	Sample No:10/16	38.3.7	10	Coslight CA595490G-C 4342mAh	38.3.6
11	Sample No:11/16	38.3.7	11	Coslight CA595490G-C 4342mAh	38.3.8
12	Sample No:12/16	38.3.7	12	Coslight CA595490G-C 4342mAh	38.3.8
13	Sample No:13/16	38.3.7	13	Coslight CA595490G-C 4342mAh	38.3.8
14	Sample No:14/16	38.3.7	14	Coslight CA595490G-C 4342mAh	38.3.8
15	Sample No:15/16	38.3.7	15	Coslight CA595490G-C 4342mAh	38.3.8
16	Sample No:16/16	38.3.7	16	Coslight CA595490G-C 4342mAh	38.3.8
			17	Coslight CA595490G-C 4342mAh	38.3.8
			18	Coslight CA595490G-C 4342mAh	38.3.8
			19	Coslight CA595490G-C 4342mAh	38.3.8
			20	Coslight CA595490G-C 4342mAh	38.3.8
			21	Coslight CA595490G-C 4342mAh	38.3.8
			22	Coslight CA595490G-C 4342mAh	38.3.8
			23	Coslight CA595490G-C 4342mAh	38.3.8
			24	Coslight CA595490G-C 4342mAh	38.3.8
			25	Coslight CA595490G-C 4342mAh	38.3.8
			26	Coslight CA595490G-C 4342mAh	38.3.8
			27	Coslight CA595490G-C 4342mAh	38.3.8
			28	Coslight CA595490G-C 4342mAh	38.3.8
			29	Coslight CA595490G-C 4342mAh	38.3.8
			30	Coslight CA595490G-C 4342mAh	38.3.8

2.3 Test result

Item	Test Item	Test specification	Judge criteria	Sample(s)				
T1	Altitude Simulation (UN38.3-1)	<p>1-1. batteries are standard charged. ending in fully charged state. All batteries weight is measured. The charged batteries voltage are measured and recorded.</p> <p>1-2. Batteries shall be stored at a pressure of 11.6Kpa or less for at least six hours at ambient temperature $(20 \pm 5)^{\circ}\text{C}$.</p> <p>1-3. Vacuum is released. All cells weight is measured. The charged cell voltage are measured and recorded.</p>	<p>No mass loss (<0.1%), no leakage, no venting, no disassembly, no rupture and no fire.</p> <p>Battery voltage drop < 10%.</p>	<p>4 packs are first cycle in fully charged (Pack#1~4)</p> <p>4 packs are 25 times cycled ending in fully charged state (Pack #5~8)</p>				
Test Period		Start: 2018/03/28 End: 2018/03/28						
Test Equipment		數位電表 Q153, 電子天平 Q090, 真空烘箱 Q0443						
Major Problem		-						
Warning Point		-						
Recommendation		The 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)			
	1	12.513	435.15	12.511	435.14	99.98%	0.00%	O
	2	12.534	435.68	12.533	435.67	99.99%	0.00%	O
	3	12.504	435.19	12.503	435.18	99.99%	0.00%	O
	4	12.519	435.19	12.516	435.18	99.98%	0.00%	O
	5	12.399	435.23	12.397	435.22	99.98%	0.00%	O
	6	12.391	435.27	12.388	435.26	99.98%	0.00%	O
	7	12.384	435.18	12.383	435.17	99.99%	0.00%	O
8	12.383	435.21	12.379	435.20	99.97%	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 (57±4) °C oven, and exterior packs temperature are monitored 5-2.When packs exterior reach (57±4)°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 57°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 first cycle in fully charged (Pack#1~4) 4 packs are 25 times cycled ending in fully charged state (Pack #5~8)			
Test Period		Start: 2018/04/12 End: 2018/04/15					
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	55.26	O			
		2	54.18	O			
		3	54.79	O			
		4	55.68	O			
		5	53.49	O			
		6	56.78	O			
		7	55.18	O			
8	54.91	O					
		Note: D-Disassembly ; R-Rupture ; F-Fire					
Item	Test Item	Test specification	Judge criteria	Sample(s)			
T6	Crush test (UN38.3-6)	6-1.Cell's diameter > 18mm, Execution impact test. (A 9.1 Kg mass is to be dropped from a height of (61±2.5)cm onto the sample.) 6-2.Cell's diameter < 18mm, 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 first cycle in charged states to 50%. (Pack#1~5) 5 cells are after 25 cycles ending in charged states to 50%. (Pack #6~10)			
Test Period		Start: 2018/04/04 End: 2018/04/04					
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	No.	Max. Temp.(°C)	Other event
		1	21.36	O	6	20.46	O
		2	20.46	O	7	21.59	O
		3	21.89	O	8	20.81	O
		4	21.47	O	9	20.75	O
		5	20.39	O	10	20.38	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 of the test.	4 packs are first cycle in fully charged (Pack#9~12) 4 packs are 25 times cycled ending in fully charged state (Pack #13~16)
Test Period		Start: 2018/03/23 End: 2018/03/28		
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	17.2	20.16
	10			21.49
	11			20.79
	12			21.46
	13			20.38
	14			21.47
	15			21.38
	16			20.58
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#11~20) 10 cells are after 25 cycles ending in fully discharged states (Pack #21~30)																																																																									
Test Period		Start: 2018/03/29 End: 2018/03/30																																																																											
Test Equipment		數位電表 Q153, 資料收集器 Q160, 電源供應器 Q147/Q236/Q237																																																																											
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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>11</td><td>49.83</td><td>O</td><td>21</td><td>51.26</td><td>O</td></tr> <tr><td>12</td><td>48.72</td><td>O</td><td>22</td><td>53.48</td><td>O</td></tr> <tr><td>13</td><td>45.16</td><td>O</td><td>23</td><td>49.41</td><td>O</td></tr> <tr><td>14</td><td>47.59</td><td>O</td><td>24</td><td>48.36</td><td>O</td></tr> <tr><td>15</td><td>48.29</td><td>O</td><td>25</td><td>47.26</td><td>O</td></tr> <tr><td>16</td><td>47.26</td><td>O</td><td>26</td><td>46.58</td><td>O</td></tr> <tr><td>17</td><td>45.79</td><td>O</td><td>27</td><td>52.48</td><td>O</td></tr> <tr><td>18</td><td>52.46</td><td>O</td><td>28</td><td>51.37</td><td>O</td></tr> <tr><td>19</td><td>55.27</td><td>O</td><td>29</td><td>52.68</td><td>O</td></tr> <tr><td>20</td><td>53.69</td><td>O</td><td>30</td><td>51.73</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	11	49.83	O	21	51.26	O	12	48.72	O	22	53.48	O	13	45.16	O	23	49.41	O	14	47.59	O	24	48.36	O	15	48.29	O	25	47.26	O	16	47.26	O	26	46.58	O	17	45.79	O	27	52.48	O	18	52.46	O	28	51.37	O	19	55.27	O	29	52.68	O	20	53.69	O	30	51.73	O
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