

Battery Pack Test Report UN38.3

Customer: Lenovo Pack Model: L17C2PB4 Nominal voltage: 7.7V Nominal capacity: 5070mAh/39Wh Configuration: 2S1P Customer P/N: 5B10P53999 Celxpert P/N: 921300154 Cell Type: Coslight CA595490G 5070mAh Jan. 19 . 2018

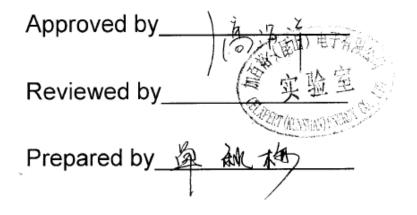
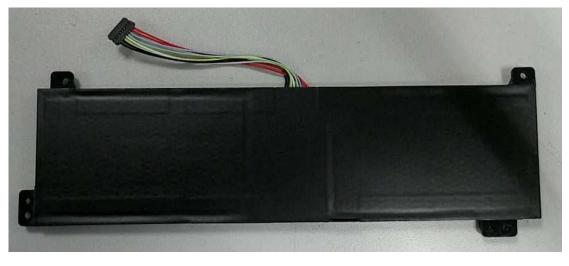




Figure photo of the pack





Lenovo

Lenovo, is the trademark of Lenovo, used under license. Lenovo,是联想集团所属企业的商标,根据许可使用。 Model name 型号/型號:L17C2PB4 Rating:7.7V == TYP 5070mAh / 39Wh MIN 4940mAh / 38Wh 额定容量:4940mAh,充电限制电压:8.8V Rechargeable Li-lon Battery (锂离子电池组) For use with Lenovo laptops, tablets and convertibles. Manufactured By Celxpert(Kunshan)Energy Co., Ltd. 制造地/製造地:中国/中國 Made in China

PS:此報告僅針對送檢樣品有效

The test report is valid for the tested samples only.



1. UN38	3.3 Test Re	port				
Test Period	2017/05/24~2	2017/06/16	Test Spec.	ST/SG/AC.10/11/Rev.5 Amend.1&2		
Parts Name	Battery Pack	Application	NB	Quantity	Pack 16PCS/Cell 25pcs	

1.1 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
Т3	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
Т6	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.

Cel>(pert Energy Corporation

1.2 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 5070mAh	38.3.6
2	Sample No:2/16	38.3.1~5	2	Coslight CA595490G 5070mAh	38.3.6
3	Sample No:3/16	38.3.1~5	3	Coslight CA595490G 5070mAh	38.3.6
4	Sample No:4/16	38.3.1~5	4	Coslight CA595490G 5070mAh	38.3.6
5	Sample No:5/16	38.3.1~5	5	Coslight CA595490G 5070mAh	38.3.6
6	Sample No:6/16	38.3.1~5	6	Coslight CA595490G 5070mAh	38.3.8
7	Sample No:7/16	38.3.1~5	7	Coslight CA595490G 5070mAh	38.3.8
8	Sample No:8/16	38.3.1~5	8	Coslight CA595490G 5070mAh	38.3.8
9	Sample No:9/16	38.3.7	9	Coslight CA595490G 5070mAh	38.3.8
10	Sample No:10/16	38.3.7	10	Coslight CA595490G 5070mAh	38.3.8
11	Sample No:11/16	38.3.7	11	Coslight CA595490G 5070mAh	38.3.8
12	Sample No:12/16	38.3.7	12	Coslight CA595490G 5070mAh	38.3.8
13	Sample No:13/16	38.3.7	13	Coslight CA595490G 5070mAh	38.3.8
14	Sample No:14/16	38.3.7	14	Coslight CA595490G 5070mAh	38.3.8
15	Sample No:15/16	38.3.7	15	Coslight CA595490G 5070mAh	38.3.8
16	Sample No:16/16	38.3.7	16	Coslight CA595490G 5070mAh	38.3.8
			17	Coslight CA595490G 5070mAh	38.3.8
			18	Coslight CA595490G 5070mAh	38.3.8
			19	Coslight CA595490G 5070mAh	38.3.8
			20	Coslight CA595490G 5070mAh	38.3.8
			21	Coslight CA595490G 5070mAh	38.3.8
			22	Coslight CA595490G 5070mAh	38.3.8
			23	Coslight CA595490G 5070mAh	38.3.8
			24	Coslight CA595490G 5070mAh	38.3.8
			25	Coslight CA595490G 5070mAh	38.3.8



1.3 Test result

T1 Altitude batta T1 Simulation (UN38.3-1) 1-2.Batta T2.Batta of 12 hour C. 1-3.Vaca mea are 1 Test Period Start: 20 Test Equipment 數位電 Major Problem - Warning Point - Recommendation The batta 1 2 3 3 4 4	/acuum is release neasured. The ch ire measured and : 2017/05/24 電表 Q153, 電· battery packs Before OCV Wei	andard charged sycled 50 times, arged state. All s measured. Th voltage are corded. stored at a pre s for at least six temperature 20 ed. All cells wei harged cell volta d recorded. End:2 子天平 Q090, pass the tes	. 4 No mass no leakag no disass rupture a Battery ve 10%. +/-5 ght is age 017/05/24 真空烘箱 Q14	ge, no venting, c sembly, no nd no fire. oltage drop <	Samp 4 packs are s charged (Pac 4 packs 50 c ending in full states (Packs	standard ck#1~4) ycled y charged						
T1 Altitude batta endi batta char mea T1 Simulation (UN38.3-1) 1-2.Batta of 12 hour °C. T2.Batta of 12 hour °C. 1-3.Vacta mea are batta C. Test Period Start: 20 Test Equipment Major Problem - Warning Point - Recommendation The batta start: 20 The batta are batta are batta are batta batta char nea Major Problem - Warning Point - Recommendation The batta are batta are batta bat	atteries are 1C of ending in fully cha batteries weight is charged batteries neasured and rea Batteries shall be of 11.6Kpa or less nours at ambient C. //acuum is release neasured. The char re measured and : 2017/05/24 電表 Q153, 電· battery packs	eycled 50 times, arged state. All s measured. Th voltage are corded. stored at a pre s for at least six temperature 20 ed. All cells wei harged cell volta d recorded. End:2 子天平 Q090, pass the tes	no leakag no disass rupture a Battery v 10%. +/-5 ght is age 017/05/24 真空烘箱 Q14	ge, no venting, c sembly, no nd no fire. oltage drop <	charged (Pao 4 packs 50 c ending in full	ck#1~4) ycled y charged						
T1 Altitude batta Simulation (UN38.3-1) 1-2.Batta of 1 ⁺ hour of 1 ⁺ hour Test Period Start: 20 Test Equipment 數位電: Major Problem - Warning Point - Recommendation The batta 1 3 1 3 2 3 3 3	atteries weight is harged batteries neasured and red atteries shall be of 11.6Kpa or less nours at ambient 2. /acuum is release neasured. The ch re measured and : 2017/05/24 電表 Q153, 電: battery packs	s measured. Th voltage are corded. stored at a pre s for at least six temperature 20 ed. All cells wei harged cell volta d recorded. End:2 子天平 Q090, pass the tes	e no disass rupture a Battery vi 10%. +/-5 ght is age 017/05/24 真空烘箱 Q14	sembly, no nd no fire. oltage drop < s	4 packs 50 c ending in full	ycled y charged						
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(UN38.3-1) of 11 hour °C. 1-3. Vacumea are Test Period Start: 20 Test Equipment 數位電 Major Problem - Warning Point - Recommendation The base 1 2 3 3 4 3	of 11.6Kpa or less nours at ambient 2. /acuum is release neasured. The ch ire measured and : 2017/05/24 電表 Q153, 電· battery packs	s for at least six temperature 20 ed. All cells wei harged cell volta <u>d recorded.</u> 子天平 Q090, pass the tes	+/-5 ght is age 017/05/24 真空烘箱 Q14	46								
Test Period Start: 20 Test Equipment 數位電: Major Problem - Warning Point - Recommendation The ba	ours at ambient //acuum is release neasured. The ch ire measured and : 2017/05/24 電表 Q153, 電· battery packs Before OCV Wei	temperature 20 ed. All cells wei harged cell volta <u>d recorded.</u> End:2 子天平 Q090, pass the tes	+/-5 ght is age 017/05/24 真空烘箱 Q14	46								
C. 1-3. Vacumea are 1 Test Period Start: 20 Test Equipment 數位電: Major Problem - Warning Point - Recommendation The bar No. 1 2 3 3 4 3	C. /acuum is release neasured. The ch ire measured and : 2017/05/24 電表 Q153, 電・ battery packs Before OCV Wei	ed. All cells wei harged cell volta d recorded. End:2 子天平 Q090, pass the tes	ght is age 017/05/24 真空烘箱 Q14	46								
1-3. Vacimea are in Test Period Start: 20 Test Equipment 數位電 Major Problem - Warning Point - Recommendation The base No. 1 1 2 3 3	/acuum is release neasured. The ch ire measured and : 2017/05/24 電表 Q153, 電· battery packs Before OCV Wei	harged cell volta <u>d recorded.</u> End:2 子天平 Q090, pass the tes	āge 017/05/24 真空烘箱 Q14	46								
meaarent Test Period Start: 20 Test Equipment 數位電: Major Problem - Warning Point - Recommendation The base No. 1 1 2 3 3 4 3	neasured. The ch ire measured and : 2017/05/24 電表 Q153, 電· battery packs Before OCV Wei	harged cell volta <u>d recorded.</u> End:2 子天平 Q090, pass the tes	āge 017/05/24 真空烘箱 Q14	46								
are Test Period Start: 20 Test Equipment 數位電: Major Problem - Warning Point - Recommendation The base No. 1 1 2 3 2 3 2	<u>ire measured and</u> : 2017/05/24 電表 Q153, 電· battery packs Before OCV Wei	d recorded. End:2 子天平 Q090, pass the tes	017/05/24 真空烘箱 Q14	46								
Test Period Start: 20 Test Equipment 數位電: Major Problem - Warning Point - Recommendation The ba	: 2017/05/24 電表 Q153, 電· battery packs Before OCV Wei	End:2 子天平 Q090, pass the tes	真空烘箱 Q14	46								
Major Problem - Warning Point - Recommendation The ba	battery packs Before OCV Wei	pass the tes		16								
Warning Point - Recommendation The ba	Before OCV Wei		t.									
Recommendation The ba	Before OCV Wei		t.									
No.	Before OCV Wei		t.									
1 3 2 3 3 4	OCV Wei	Altitude Sin			Recommendation The battery packs pass the test.							
1 3 2 3 3 4	OCV Wei	Altitude Sin										
1 3 2 3 3 4	OCV Wei	Altitude Simulation Test on Charged Packs Before After voltage residue mass loss										
1 3 2 3 3 4			After	voltage residue	mass loss							
2 3 3 4 4 5	0.0	ght OCV	Weight	Volt	Weight	other event						
2 3 3 4 4 5	(V) (g		(g)	(%)	(%)							
3 4	8.724 150.		150.11	99.91%	0.01%	0						
4 8	8.722 150.		150.21	99.91%	0.01%	0						
	8.727 150.		150.18	99.92%	0.01%	0						
	8.725 150		150.16	99.92%	0.01%	0						
	8.634 148		148.28	99.91%	0.01%	0						
	8.616 148		148.62	99.97%	0.01%	0						
	8.624 148		148.26	99.98%	0.01%	0						
	8.621 148	.51 8.614	148.50	99.92%	0.01%	0						
Bow Data	-Leakage ; V-Venting ;		· · · · · · · · · · · · · · · · · · ·									
	O-No Leakage , No Ven	ting , No Disassembly	/, No Rupture , No Fir	e								



Item	Test Item		Te	est specificatio	n		J	udge criteria	Samp	ole(s)
T2	Thermal test (UN38.3-2)	followed by storage for 6 hours at -40±2°C . no leakage, no venting, The maximum time interval between test temperature extremes is 30 minutes. 2-2 Repeat 2-1 for 10 times. Then store the 2-2 Repeat 2-1 for 10 times. Then store the						4 packs are standard charged (Pack#1~4) 4 packs 50 cycled ending in fully charged states (Pack#5~8)		
Test Per	iod	Star	t: 2017/05	/25	End:20)17/0)5/30			
Test Equ	iipment	數位	電表 Q15	3, 電子天平	- Q090,	冷熱	衝擊機	& Q336		
Major Pr	oblem	-								
, Warning		-								
	nendation	The	nacks n	ass the tes	t					
Recomm	lenualion									
					Therma	al Tes	t on Cha	arged Packs		
			Be	efore	A	fter		voltage residue	mass loss	
		No.	OCV	Weight	OCV		eight	Volt	Weight	other event
		1	(V) 8.716	(g) 150.11	(V) 8.677		(<mark>g)</mark> 0.11	(%) 99.55%	(%) 0.00%	0
		2	8.716	150.11	8.678		0.11	99.55%	0.00%	0
		3	8.720	150.18	8.685		0.18	99.60%	0.00%	0
		4	8.718	150.16	8.684	15	0.14	99.61%	0.01%	0
		5	8.626	148.28	8.595	14	8.27	99.64%	0.00%	0
		6	8.613	148.62	8.578		8.61	99.59%	0.01%	0
		7	8.622	148.26	8.584		8.25	99.56%	0.01%	0
			8 8.614 148.50 8.579 148.48 99.59% 0.01% O							
Rav	w Data		-	/enting ; D-Disass				Fire		



l t e ree	Tast liam			Testere	-ifi e eti e e			ludere erit	a ri a	6	
Item	Test Item	2.1	Packs are fi	Test spee mly secured		orm of the		Judge crit No mass loss			ample(s)
тз	Vibration test (UN38.3-3)	3-3. /	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 \rightarrow 1gn 18-50 Hz \rightarrow 0.8mm amplitude 50-200 Hz \rightarrow 8gn 3-3. All packs weight are measured. The charged packs voltage are measured and recorded.								50 cycled n fully states
Test Per	iod	Sta	art: 2017/0	6/05	End:2	017/06/07	7				
Test Equ	lipment	數位	電表 Q15	3, 電子天	平 Q090,	振動測試	機 Q	300			
Major Pr	oblem	-									
Warning		-									
	nendation	The	packs pa	ass the te	st.						
						ion Test on					
		No.		fore	Af		volt	age residue		ss loss	other event
		140.	0CV (V)	Weight (g)		Weight (g)		Volt (%)		eight (%)	oundr overne
		1	8.677	150.11	8.670	150.10		99.92%		.01%	0
		2	8.678	150.20	8.671	150.19		99.92%	0.	.01%	0
		3	8.685	150.18	8.677	150.17		99.91% 0.01%			0
		4	8.684 8.595	150.14 148.27	8.676 8.587	150.14 148.26		99.91%		.00%	0
		6	8.578	148.61	8.587	148.60		99.91% 0.01% 99.93% 0.00%			0
		7	8.584	148.25	8.575	148.24		99.90%		.01%	0
		8	8.579	148.48	8.572	148.47		99.92%	0.	.01%	0
				/enting ; D-Disas							
Rav	w Data		U-NU Leakage	, No Venting , No	JUSASSETTIDIY	, NO RUPLUTE ,					



Item	Test Item			Test specific	ation		Judge criteria	Sample(s)		
T4	Shock test (UN38.3-4)	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.						4 packs 50 ending in fu	charged (Pack#1~4) 4 packs 50 cycled ending in fully charged states (Pack#5~8)	
Test Per	iod	Star	t: 2017/06	6/08	End:201	7/06/0	8	•		
Test Equ	lipment	數位	電表 Q15	3, 電子天-	平 Q090, 徸	擊測註	式機 Q154			
Major Pr	-	-								
Warning		-								
	nendation	The	packs p	ass the te	st.					
	icitiation		paone p							
					Shock	Fest on C	harged Packs			
			Be	fore	A	fter	voltage residue	mass loss		
		No.	OCV	Weight	OCV	Wei	ight Volt	Weight	other event	
			(V)	(g)	(V)	(g	J) (%)	(%)		
		1	8.670	150.10	8.664	150.		0.01%	0	
		2	8.671	150.19	8.666	150.		0.01%	0	
		3	8.677	150.17	8.672	150.		0.01%	0	
		4 5	8.676 8.587	150.14 148.26	8.670 8.583	150. 148.		0.01%	0	
		6	8.587	148.60	8.565	148		0.01%	0	
		7	8.575	148.24	8.569	148.		0.01%	0	
		8	8.572	148.47	8.567	148		0.01%	0	
		Note:	L-Leakage : V-V	/enting : D-Disas:	sembly ; R-Ruptur	e : F-Fire				
_	w Data				Disassembly , No		No Fire			



	corporation								
Item	Test Item		Test specif				Judge criteria	l	Sample(s)
Т5	Short Circuit Test	ext 5-2.Wh shc wir 5-4. The or t	ks are placed in to a erior packs temperat en packs exterior rea orted by connecting t e of resistance less t e short was continue the cell temperature cks are observed for	ture are moni ach $55\pm2^{\circ}C$, t erminals with han 100m O d for more th return to $55^{\circ}C$	tored hey are a copper hm. an 1hour C. The	disa expl smc exte	rupture, no issembly, no losion, no fire, oke. Packs erior peak perature <170	no 4 pa in fu	acks are standard Irged (Pack#1~4) acks 50 cycled ending ully charged states ck#5~8)
Test Per	iod	Start:	2017/06/15	End:2	017/06/1	6			
Test Equ	ipment		E表 Q153, 資料的				1		
Recomm	nendation	The p	acks pass the t	est.					
		S	hort Circuit Test on	Charged Pac	ks				
		No.	Max. Temp.(°C)	Other ev	/ent				
		1	55.26	0					
		2	54.31	0					
		3	54.37	0					
Ray	w Data	4	55.64 55.26	0					
		6	54.37	0					
		7	54.76	0					
		8	55.13	0					
			Disassembly ; R-Ruptu)- No Disassembly , No		ire				
Item	Test Item	Test specification					Judge o	riteria	Sample(s)
Т6	Crush test/ Impact test (UN38.3-6)	(A 9.1 k 61±2.50 6-2.Cel (The ce							charged
Test Per	iod	Start:	2017/05/25	End: 2	017/05/26	6			
Test Equ	ipment		E表 Q153, 資料收				機 Q437/撞	擊測試	幾 Q231
Recomm	nendation	The C	Cells pass the te	st.					
			Crush Test	on 50% C	harged C	ells			
		No.	Max. Temp	(°°).	Oth	er e	event		
		1	21.34			0			
		2	20.46			0			
Rav	w Data	3	21.36			0			
		4	21.59			0			
		5	20.48			0			
		Note: [D-Disassembly ; F·	Fire / O-N	o Disasse	mbly	/ , No Fire		



Item	Test Item			st specification		Judge criteria	Sample(s)		
Τ7	Overcharge test (UN38.3-7)	rec 7-2.The (a) W mc the ba (b) W (b) W tha tim 7-3. Tes	commended maxin e minimum voltage /hen the Spec's re ore than 18V, the n e lesser of two time ttery or 22V. /hen the Spec's re in 18V, the minimu es the maximum of	commended charg um voltage of the t charge voltage. ucted at ambient to	harge current. e as follows: ge voltage is not f the test shall be harge voltage of the ge voltage is more est shall be 1.2	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 Per	iod		2017/06/04	End: 201	7/06/08				
Test Equ	ipment	數位電	【表 Q153, 資	料收集器 Q078	,電源供應器Q	148/Q149/Q15	0		
Major Pi	oblem	-							
Warning	Point	-							
Recomn	nendation	The p	acks pass the	e test.					
			Ove Charge	ercharge Tes Charge	t on Charged				
		No.	Voltage(V)	Current(A)	Max. Temp.(°(C) Other	revent		
		9			21.34		0		
		10	1		21.65		0		
					20.16 21.49		0		
		12	- 176V	5.0	20.15		0		
		14			20.43		0		
		15			20.49		0		
		16			21.85	(0		
Rav	w Data	Note: D-Disassembly ; F-Fire / O-No Disassembly ,No Fire							



Item	Test Item			Test specification			Judge criteria	Sample(s)
Т8	Forced discharge test (UN38.3-8)	conne initial	ecting it in series	scharged at ambient tem with a 12 V D.C. power the maximum discharge ufacturer.	supply	re by at an	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 Per	iod	Start	: 2017/06/12	End:2017/06/1	5	L		· · · · ·
Test Equ	ipment	數位	電表 Q153,	資料收集器 Q160,	電源	供應器Q	147/Q236/Q23	37
Major Pr		-						
Warning		-						
	nendation	The	packs pass	the test				
		For	ed discharge are fi	rst cycle in fully discharged	Forcer	l discharge a	re after 50 cycles end	ling in fully discharged
		No.	Max. Temp.(°C)	Other event	No.	Max. Ten		Other event
		6	31.26	0	16	30.2		0
		7	32.49	0	17	32.2	6	0
		8 9	29.83	0	18	31.5		0
			27.64	0	19	32.4		0
			25.36 29.64	0	20 21	31.2 34.5		0
		11 12	25.67	0	21	32.69		0
		13	27.45	0	23	29.8		0
		14	29.56	0	24	30.1	6	0
		15	28.59	0	25	28.5	9	0
Ra	w Data			re / O-No Disassembly , No Fi				