

Celxpert(kunshan)Energy Co.,Ltd

Battery Pack UN38.3 Test Report

Customer:Lenovo Model: L18C3PF2 Rating: 11.25V IssueDate:Nov .01.2018



1.Standard

UN38.3S-T/SG/AC.10/11/Rev.6/Amend.1

2.Sample Description

			•
Model Name	L18C3PF2	Pack Configuration	3S1P
Sample type	Pack 16pcs/Cell 30pcs	Use	NB
Cell Factory/Model	ATL 594285 3320mAh	Battery weight	160.85g
Factory Address	Hi-Tech Industrial Park, 1111 Hanpu Rd, Kun Shan, Jiangsu 215316, China	Laboratory Address:	Hi-Tech Industrial Park, 1111 Hanpu Rd, Kun Shan, Jiangsu 215316, China
Factory Name:	Celxpert (kunshan) Enengy.,Ltd	Laboratory Name:	品保部實驗室
Factory TEL	+86-512-57775999	Laboratory Tel:	+86-512-57775999
Factory E-mail:	Frank_Gao@cn.celxpert.com	Laboratory E-mail:	Frank_Gao@cn.celxpert.com
Factory Web:	www. celxpert.com.tw	Laboratory Web:	www. celxpert.com.tw
Client Date	2018/08/01	Completing Data	2018/08/22

3. Test items and quantity

- T.1. Altitude simulation
- T.2. **⊠** Thermal test
- T.3. **⊠** Vibration
- T.4. Shock

- T.5. 🗵 External short circuit
- T.6. ☑ Impact /⊠ Crush
- ☑ Overcharge T.7.

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summary table of required test for rechargeable cells and batteries

T.8.

			<u> </u>									
			T.1	T.2	T.3	T.4	T.5	T.6	T.7	T.8	SUM	
	First cycle,50% charged state							5				
		25th cycle,50% charged state					5			20		
Cell		First cycle, fully discharged state								10 30		
		25th cycle, fully discharged state								10		
<12kg	Small	First cycle, fully charged state	4					4		40		
	batteries	25th cycle, fully charged state	4				4		16			
>12kg	Large	First cycle, fully charged state	2					2				
	batteries	25th cycle, fully charged state			2				2		8	



4.Photo of The Sample



表單編號 QS-3Q-043-02F



6.Test method and verdict

Clause	Require	ements			Result	Verdict
	Mass loss means a loss	of mass that ex	ceeds the values in	table 38.3.1 l	below	
Table 38.3.1	Mass	Table 38.3.1:MaM of cell or battery $M < 1g$ $1g \leq M \leq 75g$ $M > 75g$	Ass loss limit Mass loss limit 0.5% 0.2% 0.1%			
		T1 :Altitude	simulation			
38.3.4.1	This test simulates air transport under low- Test cells and batteries shall be stored at a p hour at ambient temperature (20±5°C)	pressure of 11.	6kPa or less for at k		No leakage no venting no disassemble no rupture	
	Cells and batteries meet this requirement if disassemble, no rupture and no fire and if the c after testing is not less than 90% of its voltage i requirement relating to voltage is not applicabl states	pen circuit vol mmediately pr	tage of each test cel ior to this procedur	l or battery e. The	no fire. voltage not less than 90% Mass loss limit (see table 38.3.1)	Р
		T2:Ther	mal test			
	This test assesses cell and battery seal integ test is conducted using rapid and extreme to Test cells and batteries are to be stored for					
38.3.4.2	to 72 ± 2 °C, followed by storage for at least six h °C. The maximum time interval between test to procedure is to be repeated until 10 total cycles batteries are to be stored for 24 hours at ambie and batteries the duration of exposure to the test.	o – 40±2 s. This cells and arge cells	No leakage no venting no disassemble no rupture no fire voltage not less than 90%	Р		
	hours. Cells and batteries meet this requirement if disassemble, no rupture and no fire and if the c after testing is not less than 90% of its voltage i requirement relating to voltage is not applicabl states.	l or battery e. The	Mass loss limit (see table 38.3.1).			
		T3:Vib	ration			
38.3.4.3	This test simulates vibration during transport Cells and batteries are firmly secured to the distorting the cells in such a manner as to faith shall be a sinusoidal waveform with a logarithm to 7 Hz traversed in 15 minutes. This cycle shal for each of three mutually perpendicular moun of vibration must be perpendicular to the term For cells and small batteries: from 7 Hz a per Hz is reached. The amplitude is then maintained frequency increased until a peak acceleration of acceleration of 8gn is then maintained until the For large batteries: from 7 Hz to a peak acceleration of frequency increased until a peak acceleration of acceleration of 2gn is then maintained at 0 frequency increased until a peak acceleration of acceleration of 2gn is then maintained until the Cells and batteries meet this requirement if disassemble, no rupture and no fire during the voltage of each test cell or battery directly after position is not less than 90% of its voltage imm requirement relating to voltage is not applicable states.	e platform of th fully transmit to nic sweep betw l be repeated 1 ting positions inal face. eak acceleration d at 0.8 mm (1. f 8gn occurs (a frequency is i eleration of 1gn 8 mm (1.6 mm f 2gn occurs (a frequency is i there is no leat test and after to testing in its to eliately prior	he vibration. The vi veen 7 Hz and 200 H 2 times for a total c of the cell. One of th n of 1gn is maintain 6 mm total excursion approximately 50 H ncreased to 200 Hz. h is maintained unti total excursion) an approximately 25 H ncreased to 200 Hz. kage, no venting, no he test and if the op hird perpendicular	bration Hz and back of 3 hours e directions ed until 18 on) and the z). A peak l 18 Hz is od the z). A peak concircuit mounting he	No leakage no venting no disassemble no rupture no fire. voltage not less than 90% Mass loss limit (see table 38.3.1)	Р

Clause	Requirements	Result	Verdict
	T4:Shock	-	
	This test assesses the robustness of cells and batteries against cumulative shocks		
	Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery		
38.3.4.4	Each cell shall be subjected to a half-sine shock of peak acceleration of 150gn and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50gn and pulse duration of 11 milliseconds. Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for large batteries. The formulas below are provided to calculate the appropriate minimum peak accelerations. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks. Cells and batteries meet this requirement if there is no leakage, no venting, no	No leakage no venting no disassemble no rupture no fire. voltage not less than 90% Mass loss limit (see table 38.3.1)	Р
	disassemble, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states. T5:External short circuit		
	This test simulates an external short circuit		
38.3.4.5	The cell or battery to be tested shall be shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of $57\pm4^{\circ}$ C, measured on the external case. This period of time depends on the size and design of the cell or battery and should be assessed and documented. If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries. Then the cell or battery at $57\pm4^{\circ}$ C shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $57\pm4^{\circ}$ C, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value. The short circuit and cooling down phases shall be conducted at least at ambient temperature.	no disassemble no rupture no fire. Packs exterior peak temperature <170°C Mass loss limit (see table 38.3.1)	Ρ
	o i		

Clause	Requirements	Result	Verdict
	T6:Impact/Crush		
	These tests simulate mechanical abuse from an impact or crush that may result in an internal short circuit.		
	Impact applicable to cylindrical cells not less than 18.00 in diameter.		
	The test sample cell or component cell is to be placed on a flat smooth surface. A $15.8 \text{mm} \pm 0.1 \text{mm}$ diameter, at least 6cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the sample. A 9.1 kg \pm 0.1kg mass is to be dropped from a height of 61 \pm 2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface.		
	The test samples is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm±0.1mm diameter curved surface lying across the centre of the test samples. Each sample is to be subjected to only a single impact.		
38346		no disassemble no rupture no fire. not exceed 170°C Mass loss limit (see table 38.3.1)	
38.3.4.6	A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached. (a) The applied force reaches 13kN±0.78kN; Example : The force shall be applied by a hydraulic ram with a 32 mm diameter piston until a pressure of 17 MPa is reached on the hydraulic ram (b) The voltage of the cell drops by at least 100mV; or (c) The cell is deformed by 50% or more of its original thickness.		Р
	Once the maximum pressure has been obtained, the voltage drops by 100mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released		
	A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis.		
	Each test cell or component cell is to be subjected to one crush only. The test Samples shall be observed for a further 6 h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests.		
	Cells and component cells meet this requirement if their external temperature does not exceed 170 $^\circ\rm C$ and there is no disassemble and no fire during the test and within six hours after this test.		

Clause	Requirements	Result	Verdict						
	T7:Ovecharge								
	This test evaluates the ability of a rechargeable battery or a single cell rechargeable battery to withstand an overcharge condition								
	The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:								
38.3.4.7	(a) When the manufacturer'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.	No disassemble no fire. Mass loss limit	Р						
	(b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.	Mass loss limit (see table 38.3.1)							
	Tests are to be conducted at ambient temperature; the duration of the test shall be 24 hours								
	Rechargeable batteries meet this requirement if there is no disassemble and no fire during the test and within seven days after the test.								
	T8:Forced discharge								
	This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition								
38.3.4.8	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.	no disassembly no fire							
	The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere).	Mass loss limit (see table 38.3.1)	Р						
	Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.								

3	38.3.4.1 T1.Altitude simulation										
Test	Equipment	Digital Meter :	Q153 ,	Vacuum Ovei	n : Q0443	, Scales : Q	090				
Test Period Start: 2018/08/02 End:2018/08/02											
		Altitude Simulation Test on Charged Packs									
		Before After voltage residue				mass loss					
No.		Weight	OCV	Weight	Volt	Weight	other event				
	(V)	(g)	(V)	(g)	(%)	(%)					
1	12.476	160.85	12.474	160.85	99.98%	0.00%	0				
2	12.463	160.77	12.462	160.77	99.99%	0.00%	0				
3	12.485	160.90	12.483	160.90	99.98%	0.00%	0				
4	12.429	160.81	12.426	160.81	99.98%	0.00%	0				
5	12.439	160.56	12.435	160.56	99.97%	0.00%	0				
6	12.482	160.84	12.480	160.84	99.98%	0.00%	0				
7	12.419	160.59	12.417	160.58	99.98%	0.00%	0				
8	12.471	160.53	12.470	160.53	99.99%	0.00%	0				
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire											
	O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire										
3	38.3.4.2 T2.Thermal test										
Test	Equipment	Digital Meter :	Q153 , Pro	grammable T	hermal Tester : Q	0446 , Scal	es : Q090				
Te	st Period	Start:2018/08/	09	End:2018/08	/15						
			Thermal	Test on Char	ged Packs						
	В	efore	Afte	er	voltage residue	mass loss					
No.	OCV	Weight	OCV	Weight	Volt	Weight	other event				
	(V)	(g)	(V)	(g)	(%)	(%)					
1	12.474	160.85	12.410	160.83	99.49%	0.01%	0				
2	12.462	160.77	12.411	160.75	99.59%	0.01%	0				
3	12.483	2.483 160.90 12.414 160		160.89	99.45%	0.01%	0				
4	12.426	160.81	12.365	160.80	99.51%	0.01%	0				
5	12.435	160.56	12.368	160.55	99.46%	0.01%	0				
6	12.480	160.84	12.409	160.83	99.43%	0.01%	0				
7	12.417	160.58	12.348 160.57 99.449		99.44%	0.01%	0				
8	12.470	160.53	12.419	160.51	99.59%	0.01%	0				
Note:	L-Leakage ; V	Venting ; D-Disas	sembly ; R-Rupture	e; F-Fire							
	O-No Leakage	e , No Venting , No	Disassembly , No	Rupture , No Fire	e						

7.Test Data

$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	38.	38.3.4.3 T3.Vibrationt									
Vibration Test on Charged Packs No. Defore After voltage residue mass loss other eve (V) (g) (V) (g) (V) (g) (%) 000% 000% 000% 000% 000% 000% 000% 0 <td>Test Eq</td> <td colspan="7">Equipment Digital Meter: Q153, Vibration Tester: Q300, Scales: Q153</td>	Test Eq	Equipment Digital Meter: Q153, Vibration Tester: Q300, Scales: Q153									
Before After voltage residue mass loss other eve No. OCV Weight (V) OCV Weight (V) Volt Weight (%) other eve 1 12.410 160.83 12.406 160.83 99.97% 0.01% O 2 12.411 160.75 12.407 160.75 99.97% 0.00% O 3 12.414 160.89 12.411 160.88 99.98% 0.00% O 4 12.365 160.80 12.361 160.79 99.97% 0.00% O 5 12.368 160.55 12.364 160.54 99.97% 0.00% O 6 12.409 160.83 12.416 160.51 99.98% 0.01% O 7 12.348 160.57 12.347 160.57 99.99% 0.00% O 8 12.419 160.51 12.417 160.51 99.98% 0.00% O Note: L-Leakage ; No Venting ; D-Disassembly ; No Rupt	Test	Period	Start: 2018/08,	/16	End:2018/08	/17					
No. OCV Weight (y) OCV Weight (y) Voit (g) Weight (%) other event (%) 1 12.410 160.83 12.406 160.83 99.97% 0.01% O 2 12.411 160.75 12.407 160.75 99.97% 0.00% O 3 12.414 160.89 12.411 160.88 99.98% 0.00% O 4 12.365 160.80 12.361 160.79 99.97% 0.00% O 5 12.368 160.55 12.364 160.54 99.97% 0.00% O 6 12.409 160.83 12.406 160.82 99.98% 0.01% O 7 12.348 160.57 12.347 160.57 99.99% 0.00% O 8 12.419 160.51 12.417 160.51 99.98% 0.00% O Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire											
(V) (g) (V) (g) (%) (%) 1 12.410 160.83 12.406 160.83 99.97% 0.01% O 2 12.411 160.75 12.407 160.75 99.97% 0.00% O 3 12.414 160.89 12.411 160.75 99.97% 0.00% O 4 12.365 160.80 12.361 160.79 99.97% 0.00% O 5 12.368 160.55 12.364 160.54 99.97% 0.00% O 6 12.409 160.83 12.406 160.82 99.98% 0.01% O 7 12.348 160.57 12.347 160.57 99.99% 0.00% O 8 12.419 160.51 12.417 160.51 99.98% 0.00% O Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire			Before	Afte	er	voltage residue	mass loss				
$\begin{tabular}{ c c c c c c } \hline 1 & 12.410 & 160.83 & 12.406 & 160.83 & 99.97\% & 0.01\% & 0 \\ \hline 2 & 12.411 & 160.75 & 12.407 & 160.75 & 99.97\% & 0.00\% & 0 \\ \hline 3 & 12.414 & 160.89 & 12.411 & 160.88 & 99.98\% & 0.00\% & 0 \\ \hline 4 & 12.365 & 160.80 & 12.361 & 160.79 & 99.97\% & 0.00\% & 0 \\ \hline 5 & 12.368 & 160.55 & 12.364 & 160.54 & 99.97\% & 0.00\% & 0 \\ \hline 6 & 12.409 & 160.83 & 12.406 & 160.82 & 99.98\% & 0.01\% & 0 \\ \hline 7 & 12.348 & 160.57 & 12.347 & 160.57 & 99.99\% & 0.00\% & 0 \\ \hline 8 & 12.419 & 160.51 & 12.417 & 160.51 & 99.98\% & 0.00\% & 0 \\ \hline 8 & 12.419 & 160.51 & 12.417 & 160.51 & 99.98\% & 0.00\% & 0 \\ \hline Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire & $$V$ or No biassembly ; No Rupture , No Fire $$V$ or No Disassembly ; No Rupture , No Fire $$V$ or No Disassembly , OCV $$V$ or $	No.		-		-		-	other event			
$\begin{tabular}{ c c c c c c c } \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $											
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	2	12.411	160.75	12.407	160.75	99.97%	0.00%	0			
5 12.368 160.55 12.364 160.54 99.97% 0.00% O 6 12.409 160.83 12.406 160.82 99.98% 0.01% O 7 12.348 160.57 12.347 160.57 99.98% 0.00% O 8 12.419 160.51 12.417 160.51 99.98% 0.00% O 8 12.419 160.51 12.417 160.51 99.98% 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 V V V 38.3.4.4 T4 Shock Test Equipment Digital Meter : Q153< , Shock Tester : Q154< , Scales : Q090 Test 2018/08/20 Shock Test on Charged Packs No. OCV Weight OCV Weight Volt Weight other event No. OCV Weight OCV Weight Volt Weight other event 1 12.40	3	12.414	160.89	12.411	160.88	99.98%	0.00%	0			
6 12.409 160.83 12.406 160.82 99.98% 0.01% O 7 12.348 160.57 12.347 160.57 99.99% 0.00% O 8 12.419 160.51 12.347 160.51 99.98% 0.00% O 8 12.419 160.51 12.417 160.51 99.98% 0.00% O 8 12.419 160.51 12.417 160.51 99.98% 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 Image: Constant and the set of t	4	12.365	160.80	12.361	160.79	99.97%	0.00%	0			
7 12.348 160.57 12.347 160.57 99.99% 0.00% O 8 12.419 160.51 12.417 160.51 99.98% 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 Image: Constant of the second	5	12.368	160.55	12.364	160.54	99.97%	0.00%	0			
8 12.419 160.51 12.417 160.51 99.98% 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	6	12.409	160.83	12.406	160.82	99.98%	0.01%	0			
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire 38.3.4.4 T.4 Shock Test Equipment Digital Meter : Q153 , Shock Tester : Q154 , Scales : Q090 Test Period Start: 2018/08/20 Shock Test on Charged Packs No. OCV Weight OCV Weight Volt Weight other event No. OCV Weight OCV Weight OOI Other event No. OCV Weight OCV Weight Volt Weight other event No. OCV Weight OCV Weight Volt Weight other event No. OCV Weight OCV Weight OOI OOI 1 12.406 160.83 12.402 160.82 99.97% 0.00% O	7	12.348	160.57	12.347	160.57	99.99%	0.00%	0			
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire 38.3.4.4 Test Equipment Digital Meter : Q153 , Shock Tester : Q154 , Scales : Q090 Test Equipment Start: 2018/08/20 End:2018/08/20 Start: 2018/08/20 O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire Test Shock Test Equipment Digital Meter : Q153 , Shock Tester : Q154 , Scales : Q090 Test 2018/08/20 Start: 2018/08/20 Shock Test on Charge Packs No. OCV Weight OCV Voltage residue mass loss OCV Weight OCV Weight OCV Weight OCV Weight OCH (%) Other event No. OCV Weight OCV Weight OCH (%) Other event Other event No. OCV Weight OCH (%) OOB (%) Other event Other event 1 12.406 160.83 12.402 160.82 99.97% 0.00% O	8	12.419	160.51	12.417	160.51	99.98%	0.00%	0			
38.3.4.4T.4 ShockTest EquipmentDigital Meter : Q153 , Shock Tester : Q154 , Scales : Q090Test PeriodStart: 2018/08/20End:2018/08/20Shock Test on Charged PacksNo.OCVWeightOCVWeightNo.OCVWeightOCVWeightVoltWeightI12.406160.8312.402160.8299.97%0.00%O	Note: L-	Leakage ; V	-Venting ; D-Disas	sembly ; R-Rupt	ure ; F-Fire						
Test EquipmentDigital Meter : Q153 , Shock Tester : Q154 , Scales : Q090Test EvriodStart: 2018/08/20End:2018/08/20Shock Tester : Q154 , Scales : Q090Test VeriodStart: 2018/08/20End:2018/08/20End:2018/08/20Shock Tester : Q154 , Scales : Q090Test VeriodStart: 2018/08/20End:2018/08/20End:2018/08/20Shock Test on Charged PacksNo.OCVVeltage residuemass lossOCVWeightVoltWeightOther evelNo.OCVWeightVoltWeightOther evel(V)(g)(V)(g)(%)(%)Other evel112.406160.8312.402160.8299.97%0.00%Other		O-No Leak	age , No Venting ,	No Disassembly	, No Rupture , N	lo Fire					
Test Period Start: 2018/08/20 End:2018/08/20 Shock Test on Charged Packs Before After voltage residue mass loss No. OCV Weight OCV Weight Volt Weight other event 1 12.406 160.83 12.402 160.82 99.97% 0.00% O	38.	.3.4.4			Т	4 Shock					
Shock Test on Charged Packs Before After voltage residue mass loss other event No. OCV Weight OCV Weight Volt Weight other event 1 12.406 160.83 12.402 160.82 99.97% 0.00% O	Test Eq	quipment	Digital Meter :	Q153 , S	hock Tester :	Q154 , Scal	es : Q090				
Before After voltage residue mass loss No. OCV Weight OCV Weight Volt Weight other event (V) (g) (V) (g) (%) (%) other event 1 12.406 160.83 12.402 160.82 99.97% 0.00% O	Test	Period	Start: 2018/08,	/20	End:2018/08	/20					
No. OCV Weight (V) OCV Weight (V) Weight (V) Volt Weight (%) Other even (%) 1 12.406 160.83 12.402 160.82 99.97% 0.00% O				Shock	Test on Charg	jed Packs					
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				_							
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4 12.361 160.79 12.358 160.78 99.98% 0.00% O 5 12.364 160.54 12.362 160.53 99.98% 0.00% O											
6 12.406 160.82 12.402 160.81 99.97% 0.00% O 7 12.347 160.57 12.345 160.56 99.98% 0.00% O											
12.347 160.37 12.343 160.36 99.98% 0.00% O 8 12.417 160.51 12.414 160.50 99.98% 0.00% O											
Note: L-Leakage ; V-Venting ; D-Disassembly ; R-Rupture ; F-Fire 99.98% 0.00% 0						33.3870	0.0070	0			
O-No Leakage , No Venting , No Disassembly , No Rupture , No Fire		_	-			e					

38.3.4.5		T.5 Short circuit								
Test Equipment	t Digi	Digital Meter: Q153 , Data Logger : Q075 , Oven: Q171								
Test Period	Start	:2018/08/21	End:2	018/08	3/22					
	Short Circuit Test on Charged Packs									
		No.	Max. Temp.(°C)	Other ev	vent 🛛				
1			55.16		0					
2			55.48		0					
		3	55.36		0					
		4	55.79		0					
		5	55.48		0					
		6	55.29		0					
7			55.28		0					
8			55.81		0					
		Note: D-Dis	assembly ; R-Rupt							
		O- No	Disassembly , No	Ruptu	re, No Fire					
38.3.4.6				T.6 Imp	oact / Crush					
Test Equipmen	Test Equipment Digital Meter: Q153 Data Logger: Q152 Impact tester/Crush tester: Q437/ Q23									
Test Period Start: 2018/08/02 End:2018/08/02										
Crush Test on 50% Charged Cells										
	No.	Max. Temp.(°C)	Other event	No.	Max. Temp.(°C)	Other event				
	1	21.35	0	6	20.49	0				
	2	21.48	0	7	20.75	0				
-	3 20.56		0	8	21.62	0				
-	4 20.18		0	9	21.85	0				
	5	21.48	0	10	20.95	0				
-	Note:		y;F-Fire / O-No							
L										

38.3.	4.7					Г 7 Ovecharge			
Test Equi	ipment	Digital Meter: Q153 Data Logg			.ogger:	Q078 Powe	r Supply	unit : Q14	8/Q150/Q0236
Test Pe	eriod	Start:201	8/08/06	En	d:2018/	08/07			
			Over	charge T	est on	Charged Pa	cks		
		No.	Charge Voltage(V)	Charge Current(Max. Temp.(°C)	Other	revent	
		11				21.36		0	
		12				20.48		0	
		13				20.59		0	
		14 15	22.0 V	3.32		21.47		0	
		16				<u>21.35</u> 20.49		0 0	
		17				20.49		0	
		18				20.48		0	
			Note: D-Disassembly ; F-Fire / O-No Disassembly ,No Fire						
38.3.	4.8				Т8	Forced discharge	!		
Test Equi	ipment	Digital Meter: Q153 Data logger: Q160 Power Supply unit : Q0474/Q0475/Q0					/Q0475/Q0476		
Test Pe	eriod	Start:201	8/08/13	En	d:2018/	08/15			
Forced d	ischarge	are first	cycle in fully	discharged	Forced	discharge are afte	er 25 cycles	s ending in t	fully discharged
No.	Max. 1	[emp.(°C)	Other	event	No.	Max. Temp.(°C)	Other event	
11		5.36	(21	51.48		0	
12	51.23		(22	52.49		0	
13		0.48	(23 24	53.48			0
14 15		9.63 3.52		0 0		52.48 49.86			0
15		2.16)	25 26	49.80			0
17	50.78				27	45.26			0
18	49.37)	28	46.35			0
19	48	3.52	()	29	51.78			0
20	53	3.64	()	30	56.48			0
Note:D-Dis	sassemb	ly ; F-Fire	/ O-No Disas	sembly , No	Fire				